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PROJECT AGREEMENT

**TO DESIGN, BUILD AND FINANCE
CONFEDERATION LINE EXTENSION**

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| Schedule 34 | - Mobility Matters |
| Schedule 35 | - Permits, Licenses, Approvals and Agreements |
| Schedule 36 | - Interface Agreement |
| Schedule 37 | - Extension and Additional Phases |
| Schedule 38 | - Utility Baseline Report |

THIS PROJECT AGREEMENT is made as of the [•] day of [•], 20[•]

BETWEEN:

THE CITY OF OTTAWA

(the “City”)

AND:

EAST WEST CONNECTORS GP, [REDACTED]

(“DB Co”)

WHEREAS:

- A. A new light rail transit system is currently under construction in Ottawa, Ontario, being an approximately 12.5 kilometer line along the City’s Bus Rapid Transit corridor from Blair station in the east to Tunney’s Pasture station in the west (the “**Existing Confederation Line**”), which is scheduled to be completed in 2018.
- B. Pursuant to the City’s 2013 Transportation Master Plan, the City wishes to procure the design, construction, installation, testing, commissioning and completion of extensions to the Existing Confederation Line, including (i) extensions west from the Tunney’s Pasture station to the Baseline and Moodie stations (the “**Confederation Line West Extension**”), and (ii) an extension east from the Blair station to the Trim station (the “**Confederation Line East Extension**”), together with certain other Works in relation thereto as described herein (collectively, the “**Project**”).
- C. DB Co will carry out and perform all Works necessary to complete the Project.
- D. The City and DB Co wish to enter into this project agreement (the “**Project Agreement**”), which sets out the terms and conditions upon which DB Co shall perform the Works and complete the Project.
- E. The construction and completion of the Project will provide an overall improvement to the quality of life of the citizens of Ottawa and its outlying regions as well as to visitors to the City.
- F. Public ownership and control of the Existing Confederation Line and the Project will be preserved.
- G. With a view to ensuring that both Parties are able to properly and effectively discharge their respective duties, functions and responsibilities under Applicable Law, it is the intent that the City and DB Co work collaboratively, responsibly and cooperatively throughout the Project Term.

NOW THEREFORE in consideration of the mutual covenants and agreements of the Parties hereinafter contained and for other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the Parties covenant and agree as follows:

1. DEFINITIONS AND INTERPRETATION

1.1 Definitions and Interpretation

- (a) This Project Agreement shall be interpreted in accordance with Schedule 1 – Definitions and Interpretation.
- (b) This Project Agreement is comprised of this executed agreement and the following documents, all of which are hereby incorporated by reference into and form part of this Project Agreement:

| Schedule No. | Description |
|---------------------|---|
| Schedule 1 | - Definitions and Interpretation |
| Schedule 2 | - Completion Documents |
| Schedule 3 | - Subcontractor's Direct Agreement |
| Schedule 4 | - Lenders' Direct Agreement |
| Schedule 5 | - Construction Contractor's Direct Agreement |
| Schedule 6 | - Independent Certifier Agreement |
| Schedule 7 | - Letters of Credit |
| Schedule 8 | - DB Co Parties |
| Schedule 9 | - Key Individuals |
| Schedule 10 | - Review Procedure |
| Schedule 11 | - Integrated Management System Requirements |
| Schedule 12 | - Works Scheduling Requirements |
| Schedule 13 | - DB Co Proposal Extracts |
| Schedule 14 | - Testing & Commissioning |
| Schedule 15 | - Output Specifications |
| Schedule 16 | - Encumbrances |
| Schedule 17 | - Environmental Obligations |
| Schedule 18 | - Communication and Stakeholder Engagement Obligations |
| Schedule 19 | - Procurement Monitoring and Implementation Plan |
| Schedule 20 | - Lands |
| Schedule 21 | - Construction Period Payments |
| Schedule 22 | - Variation Procedure |
| Schedule 23 | - Compensation on Termination |
| Schedule 24 | - Intellectual Property |
| Schedule 25 | - Insurance and Performance Security Requirements |
| Schedule 26 | - Record Provisions |
| Schedule 27 | - Dispute Resolution Procedure |
| Schedule 28 | - Refinancing |
| Schedule 29 | - Form of Performance Guarantee of Construction Guarantor |
| Schedule 30 | - Insurance Trust Agreement |
| Schedule 31 | - DB Co Information |
| Schedule 32 | - [REDACTED] |
| Schedule 33 | - Works Report Requirements |
| Schedule 34 | - Mobility Matters |
| Schedule 35 | - Permits, Licenses, Approvals and Agreements |
| Schedule 36 | - Interface Agreement |
| Schedule 37 | - Extension and Additional Phases |
| Schedule 38 | - Utility Baseline Report |

- (c) The documents comprising this Project Agreement are complementary and what is called for by any one of them shall be interpreted as if called for by all, except in the event of ambiguities, conflicts or inconsistencies, in which case Section 1.2 shall apply.
- (d) Except for those parts of DB Co's proposal which are incorporated by explicit reference into this Project Agreement by the DB Co Proposal Extracts, on Financial Close the Request for Proposals and DB Co's proposal shall be superseded entirely by this Project Agreement and rendered null and void, and shall not be relied upon or used by DB Co, the City or anyone else (including anyone pursuant to Schedule 27 – Dispute Resolution Procedure or any arbitral body or any court) in any way to interpret or qualify the scope of the Works, any obligations or liabilities of DB Co, or anything else contained in this Project Agreement.
- (e) Unless it is specifically provided that a consent, approval or satisfaction is in the sole discretion of the City, no consent, approval or satisfaction of the City or the City Representative shall be unreasonably withheld or delayed.
- (f) Unless it is specifically provided that a consent, approval or satisfaction is in the sole discretion of DB Co, no consent, approval or satisfaction of DB Co or the DB Co Representative shall be unreasonably withheld or delayed.
- (g) The organization of the Output Specifications into divisions, sections and parts shall not control DB Co in dividing the Works among the DB Co Parties or in establishing the extent of the Works to be performed by a trade.

1.2 Conflict of Terms

- (a) In the event of ambiguities, conflicts or inconsistencies between or among any of the provisions of this Project Agreement, the provisions shall govern in the following order of precedence with each taking precedence over those listed subsequently:
 - (i) the provisions of amendments in writing to this Project Agreement signed by the Parties and Variation Confirmations shall govern and take precedence only over those specific provisions of this Project Agreement expressly amended thereby;
 - (ii) any provision establishing a higher standard of safety, reliability, durability, performance or service shall take precedence over a provision establishing a lower standard of safety, reliability, durability, performance or service;
 - (iii) the body of this Project Agreement;
 - (iv) Schedule 1 – Definitions and Interpretation;
 - (v) Schedule 35 – Permits, Licences, Approvals and Agreements;
 - (vi) Schedule 20 – Lands;
 - (vii) Schedule 27 – Dispute Resolution Procedure;
 - (viii) Schedule 21 – Construction Period Payments;

- (ix) Schedule 15 – Output Specifications;
 - (x) Schedule 17 – Environmental Obligations;
 - (xi) Schedule 25 – Insurance and Performance Security Requirements;
 - (xii) Schedule 22 – Variation Procedure;
 - (xiii) Schedule 10 – Review Procedure;
 - (xiv) Schedule 14 – Testing & Commissioning;
 - (xv) Schedule 11 – Integrated Management System Requirements;
 - (xvi) Schedule 28 – Refinancing;
 - (xvii) Schedule 23 – Compensation on Termination;
 - (xviii) Schedule 26 – Record Provisions;
 - (xix) the other Schedules in the order in which they are listed in Section 1.1(b);
 - (xx) Schedule 13 – DB Co Proposal Extracts.
- (b) Subject to Section 1.2(a), if the ambiguity, conflict or inconsistency is between a provision of general application and a provision that applies only to a specific part of the Works, the provision that applies to the specific part of the Works shall govern for that specific part of the Works.
- (c) If any ambiguity, conflict or inconsistency is not readily resolved by the foregoing provisions of this Section 1.2, then DB Co or the City, upon discovery of same, shall immediately give Notice to the City Representative. The City Representative shall, within 10 Business Days after such Notice, make a determination of which provision governs and give Notice of such determination, in writing, to DB Co.
- (d) The City and DB Co shall comply with the determination of the City Representative pursuant to this Section 1.2 unless DB Co disputes the decision of the City Representative in which event such Dispute may be referred for resolution in accordance with Schedule 27 – Dispute Resolution Procedure.

1.3 Conflict of Documents

- (a) In the event of any ambiguity, conflict or inconsistency between the provisions of this Project Agreement and the Lenders' Direct Agreement, the provisions of the Lenders' Direct Agreement shall prevail and govern to the extent of such ambiguity, conflict or inconsistency. Notwithstanding the foregoing, if there is any right or remedy in favour of the City set out in the Lenders' Direct Agreement or any part thereof which is not set out or provided for in the Project Agreement, such additional right or remedy shall not constitute an ambiguity, conflict or inconsistency.

1.4 Legal Requirements

- (a) Whenever standards of Applicable Law differ, the most stringent standards shall govern.

1.5 Interface Agreement and Interface with RTG

- (a) On the execution and delivery of this Project Agreement, the parties shall, and the City shall cause RTG to, execute and deliver the Interface Agreement, provided that the Interface Agreement shall be held in escrow until released by notice delivered by the City to DB Co.
- (b) DB Co hereby agrees as follows:
- (i) without prejudice to DB Co's right to claim Delay Events and Compensation Events hereunder from the City, including pursuant to Sections 18.5 and 18.7 relating to defects, errors or inaccuracies in the Stage 1 Connection Infrastructure and Stage 1 Systems Infrastructure, neither RTG nor any RTG Party shall be liable to DB Co or any DB Co Party for, and DB Co shall not and shall ensure that no DB Co Party shall seek to recover from RTG or any RTG Party, any damages, losses, costs, liabilities or expenses which may arise or be suffered, sustained or incurred by, or brought against, any of them (whether in contract, tort, for breach of statutory duty or otherwise) arising, directly or indirectly, out of, or in consequence of, or involving or relating to, the performance or any breach of the PS Services or the PS Services Variation by RTG, or the performance or any breach of the RTG Interface and Design Management Works or the variation to the Stage 1 Project Agreement governing the RTG Interface and Design Management Works by RTG, or any act or omission of RTG or any RTG Party in connection therewith;
 - (ii) RTG's obligations and liability to DB Co are limited to those obligations and liabilities of RTG arising under the Interface Agreement, and nothing herein shall be applied or construed so as to modify or limit such obligations and liabilities, or impose additional obligations or liabilities on RTG or any RTG Party;
 - (iii) the rights of DB Co against the City in relation to the agreements, terms, conditions, scope of Works, standards or other obligations to be performed by DB Co under this Project Agreement shall not be limited by anything in the Interface Agreement; and
 - (iv) in the event that any amount is agreed or determined to be due and payable by DB Co to RTG under the Interface Agreement and RTG has exhausted any rights against DB Co under the Interface Agreement, then the City shall be entitled to recover such amount in the same way as any other liability owing from DB Co to the City hereunder, including by way of set-off or through any performance security provided under this Project Agreement, but subject to the same restrictions or limitations set out hereunder, under the Interface Agreement, or in such performance security as if the underlying obligations had formed part of this Project Agreement. Notwithstanding the foregoing, in no event shall a failure to make payment under the Interface Agreement or any other breach by DB Co thereunder constitute a DB Co Event of Default under this Project Agreement or give rise to any right in favour of the City against DB Co under this Project Agreement, at law or in equity other than the set off right or right to draw on performance security as referred to above. The City shall, and shall procure that RTG shall, comply with the prohibition on duplication of claims under Section 1.4(b) of the Interface Agreement. For greater

certainty, any amounts settled by DB Co with RTG whether through cash payment or otherwise with respect to any obligation under the Interface Agreement shall reduce the City's right to recover such amount on behalf of RTG on a dollar-for-dollar basis. DB Co shall be entitled to settle any obligation under the Interface Agreement directly with RTG without any regard for any agreements, liabilities, obligations or any equities which may otherwise exist between RTG and the City. In the event of a dispute in respect of such amounts, such dispute shall be settled in accordance with the dispute resolution procedure under the Interface Agreement.

(c) DB Co acknowledges and agrees that:

- (i) the City has delegated certain responsibilities to RTG in respect of the construction and maintenance of the Existing Confederation Line and the maintenance of the Confederation Line East Extension and the Confederation Line West Extension under the Stage 1 Project Agreement. Accordingly, and notwithstanding any direct rights of recourse that RTG may have against DB Co under the Interface Agreement, the City shall be entitled, upon the release of the Interface Agreement from escrow as contemplated in Section 1.5(a), to enforce any term of this Project Agreement against DB Co on behalf of RTG or any RTG Party (or any other party to whom the City has delegated any such functions), provided that, for the avoidance of doubt, DB Co shall owe no greater obligations to the City in this regard than if the delegated responsibilities had been performed by the City in its own name;
- (ii) DB Co's liability to the City under this Project Agreement shall not be affected by the existence of any arrangements between the City and RTG whereby the City's liability to RTG is limited to the liability which the City can establish against DB Co.

1.6 Early Works Agreement

- (a) Upon achievement of Financial Close, this Project Agreement shall supersede and replace the early works agreement in respect of the Project executed by the Parties on or about March 15, 2019 (the "**Early Works Agreement**"). Without prejudice to the generality of the foregoing, any part of the Works performed by DB Co under and in accordance with the Early Works Agreement shall be treated as having been performed under and in accordance with this Project Agreement, and the City's payment obligations related to that part of the Early Works will be those under this Project Agreement and not under this Early Works Agreement, and shall be accounted for and paid for as part of the Mobilization Credit in accordance with Schedule 21 – Construction Period Payments of the Project Agreement.

2. COMMERCIAL CLOSE AND FINANCIAL CLOSE

2.1 Effective Date

- (a) The provisions of Sections 1.1, 1.2, 1.3, 1.4, 2.1, 2.2, 2.3, 2.4, 3.1, 4.11 to 4.17, 5 to 15, 16.5, 17 to 22, 26 to 31, and 41 to 53 and Schedules 1, 2, 7 – 13, 16 – 18, 20 – 22, 24 – 27, 32 and 35 of this Project Agreement will come into effect on the date of this Project Agreement ("**Commercial Close**"). All other provisions and schedules will come into effect only on Financial Close.

2.2 Standby Letter of Credit

- (a) If DB Co has provided the City with multiple standby letters of credit in accordance with Section 9.1(2) of the RFP, for purposes of this Section 2.2 each of the multiple irrevocable standby letters of credit is referred to as a Standby Letter of Credit for purposes of this Project Agreement.
- (b) Unless a Standby Letter of Credit is drawn by the City in accordance with the provisions of this Project Agreement, the City shall release and deliver the Standby Letter(s) of Credit to DB Co on Financial Close.
- (c) DB Co shall ensure that the Standby Letter(s) of Credit (and any replacement therefor) is renewed prior to its expiry date if, as at such date, Financial Close will not, or may reasonably be expected not to, have occurred.
- (d) If there are multiple Standby Letters of Credit, DB Co acknowledges and agrees that:
 - (i) the City may draw upon any Standby Letter of Credit provided by any Letter of Credit Provider in any specified ratable amount;
 - (ii) the City may draw on any Standby Letter of Credit provided by any Letter of Credit Provider in a disproportionate amount to such Letter of Credit Provider's contribution to security;
 - (iii) the City may draw upon any Standby Letter of Credit provided by any Letter of Credit Provider even in the event that such Letter of Credit Provider is no longer a DB Co Party; and
 - (iv) the provision of multiple Standby Letters of Credit shall not in any way prejudice or adversely affect the rights of the City to draw on the Standby Letter(s) of Credit in accordance with this Project Agreement, including in a circumstance where the default giving rise to the City's right to draw on the Standby Letter(s) of Credit is not the result of any act or omission of the Letter of Credit Provider(s) whose Standby Letter of Credit is drawn upon.

2.3 Financial Close

- (a) No later than 30 days prior to the Financial Close Target Date, DB Co will deliver to the City drafts of all documents referred to in Section 1 of Schedule 2 - Completion Documents.
- (b) On or before the Financial Close Target Date:
 - (i) DB Co shall deliver to the City the documents referred to in Section 1 of Schedule 2 - Completion Documents; and
 - (ii) the City shall deliver to DB Co the documents referred to in Section 2 of Schedule 2 - Completion Documents.
- (c) If DB Co fails to deliver to the City any of the documents referred to in Section 1 of Schedule 2 - Completion Documents by the Financial Close Target Date (other than as a direct result of a

breach by the City of its obligations under Section 2.3(b)(ii)) and the City does not waive such requirement, the City will be entitled to:

- (i) draw on the Standby Letter of Credit immediately and to retain the lesser of (A) the full amount of the Standby Letter of Credit, and (B) the difference between the Guaranteed Price and the price that Contracting Authority is able to obtain from another contractor for the Works, together with all costs reasonably incurred by Contracting Authority to enter into binding agreements with such other contractor, and such amount shall be retained as liquidated damages; and
- (ii) terminate this Project Agreement in its entirety by written Notice having immediate effect.

The Parties agree that such liquidated damages are not a penalty but represent a genuine and reasonable pre-estimate of the damages that the City will suffer as a result of the happening of the specified event. Such payment shall constitute full and final settlement of any and all damages that may be claimed by the City as a result of DB Co not achieving Financial Close. The Parties agree that such liquidated damages shall be payable whether or not the City incurs or mitigates its damages, and that the City shall not have any obligation to mitigate any such damages.

- (d) If the City fails to deliver to DB Co any of the documents referred to in Section 2 of Schedule 2 - Completion Documents by the Financial Close Target Date (other than as a direct result of a breach by DB Co of its obligations under Section 2.3(b)(i)) and DB Co does not waive such requirement, DB Co will be entitled to the return of the Standby Letter of Credit and to terminate this Project Agreement in its entirety by written Notice having immediate effect.
- (e) The following documents will be delivered by DB Co to the City no later than forty-five (45) days following the earliest date such documents are available from the Workplace Safety and Insurance Board: in respect of the Construction Contractor, a CAD-7 and a Workplace Injury Summary Report.

2.4 Disruption in Financial Markets

- (a) If Financial Close cannot be achieved by the Financial Close Target Date by reason solely of a Severe Market Disruption, subject to DB Co's obligation to renew the Standby Letter of Credit pursuant to Section 2.2, the Financial Close Target Date will be extended until the date falling 10 Business Days (or such other period as the Parties agree, acting reasonably) after the date on which such Severe Market Disruption ceases.
- (b) If a Severe Market Disruption exists, then, at any time before such Severe Market Disruption ceases and prior to Financial Close, the City may in its sole discretion either:
 - (i) terminate this Project Agreement in its entirety by written Notice having immediate effect; or
 - (ii) direct DB Co to assign to a designee of the City which has agreed to assume:
 - (A) the Project Agreement, and all of DB Co's right, title and interest in the Project Data, the Intellectual Property Rights and the DB Co Permits, Licences, Approvals and Agreements; and

- (B) those contracts between DB Co and any DB Co Party which the City elects to be assigned.
- (c) If the City exercises its rights pursuant to Section 2.4(b), and, provided DB Co has, if directed, delivered the assignments provided for in Section 2.4(b)(ii)(A) and (B) above, DB Co will be entitled to the return of its Standby Letter of Credit and to payment of an amount equal to the Design and Bid Fee pursuant to Section 10.3.2 of the Request for Proposals plus [REDACTED]% of such fee. The City's obligation to return the Standby Letter of Credit and to pay such fee shall be contingent on the receipt of a waiver, in form and substance satisfactory to the City, that such fee represents full and final satisfaction of any obligation or liability of the City and any other Government Entity to DB Co and any DB Co Parties in connection with the Project Agreement and the Request for Proposals process.

3. GUARANTEED PRICE

3.1 Guaranteed Price and Adjustments

- (a) The Guaranteed Price, exclusive of HST, is \$[REDACTED], and is equal to the sum of the Cost of the Works and the Cost of the Financing. The Cost of the Works and the expected Cost of the Financing as of the date hereof are as set out in the Financial Model.
- (b) DB Co represents and warrants that the Project Debt Interest Cost is based upon the Interest Reference Rate. The Project Debt Interest Cost will be adjusted once on, or within the 2 Business Days immediately prior to, Financial Close on the basis of the actual increase or decrease in the Project Debt Interest Cost resulting directly from any change upward or downward in the Interest Reference Rate as compared to the Interest Reference Rate as at the RFP Financial Submission Deadline.
- (c) The Parties:
 - (i) acknowledge that the Project Debt Interest Cost is a component of the Cost of the Financing and that the Project Debt Interest Cost is subject to adjustment under Section 3.1(b) as at the date set out in Section 3.1(b); and
 - (ii) acknowledge and agree that subject to adjustments made in accordance with the provisions of this Project Agreement, the final Guaranteed Price shall be determined on the basis of such final adjusted Cost of the Financing and the final adjusted Cost of the Works as of the date set out in Section 3.1(b).
- (d) Subject to the provisions of Section 3.1(c) and without prejudice to express provisions in this Project Agreement requiring, or entitling DB Co to, an adjustment to monetary compensation, the Parties agree that the Guaranteed Price will not be subject to adjustment despite changes in the Works, unless such changes in the Works arise pursuant to a Variation Confirmation. The Parties further agree that the Guaranteed Price will only be adjusted where the Project Agreement specifically and expressly refers to an adjustment to the Guaranteed Price, and no claim for an adjustment to the Guaranteed Price on any legal or equitable basis outside of the specific and express rights to an adjustment of the Guaranteed Price set out in the Project Agreement will be allowed. In order to be effective, any permitted adjustment to the Guaranteed Price must be provided for in a Variation Confirmation under Schedule 22 – Variation Procedure, but without

prejudice to express provisions in this Project Agreement requiring or entitling DB Co to an adjustment to monetary compensation.

- (e) DB Co acknowledges and agrees that, subject to the provisions of Section 3.1(c) and without prejudice to express provisions in this Project Agreement requiring, or entitling DB Co to, an adjustment to monetary compensation,
 - (i) DB Co has satisfied itself as to the correctness and sufficiency of the Guaranteed Price, and has based the Guaranteed Price on the data, interpretations, necessary information, examinations and satisfaction as to all relevant matters and any further data relevant to the design;
 - (ii) the Guaranteed Price covers all of DB Co's obligations under the Project Agreement; and
 - (iii) the Guaranteed Price includes all premium time and overtime that may be required to perform the Works in accordance with this Project Agreement and Good Industry Practice.

4. PAYMENT

4.1 General

- (a) Subject to the provisions of the Project Agreement (including, for clarity Section 3.1(d)) and in accordance with and subject to Applicable Law respecting holdbacks, the City shall make the payments set out in this Section 4.
- (b) For the purpose of this Project Agreement, payments made by electronic transfer shall be deemed to have been made on the day and at the time the electronic transfer is initiated, as confirmed by the initiating bank by a confirmation setting out the transfer number and the other details of the transfer.

4.2 Construction Period Payments

- (a) The City shall pay to DB Co the Construction Period Payments, plus, for clarity, applicable HST in accordance with Schedule 21 – Construction Period Payments and this Project Agreement.
- (b) The City shall pay to DB Co:
 - (i) the East Substantial Completion Payment, plus, for clarity, applicable HST, on the East Substantial Completion Payment Date; and
 - (ii) the West Substantial Completion Payment together with any Unpaid Construction Period Payments as of the West Substantial Completion Payment Date, plus, for clarity, applicable HST, on the West Substantial Completion Payment Date,

each in accordance with Schedule 21 – Construction Period Payments and this Project Agreement.

- (c) Notwithstanding Section 4.2(b),

- (i) if the East Warranty Letter of Credit has not been delivered to the City by the East Substantial Completion Payment Date, the City may withhold from the East Substantial Completion Payment a holdback amount of \$[REDACTED] (the “**East Warranty Cash Amount**”); and
 - (ii) if the West Warranty Letter of Credit has not been delivered to the City by the West Substantial Completion Payment Date, the City may withhold from the West Substantial Completion Payment a holdback amount of \$[REDACTED] (the “**West Warranty Cash Amount**”).
- (d) In the event of Section 4.2(c)(i) above, the East Warranty Cash Amount may be withheld by the City, subject to reduction in value in accordance with Section 11.18(a), until the earlier of (i) the date that is two Business Days following the date that the East Warranty Letter of Credit has been delivered to the City, or (ii) the date that is two Business Days following the expiry of the East Warranty Period, and, in either case, the East Warranty Cash Amount shall be paid by the City to DB Co upon such second Business Day, less any amounts as would otherwise have been drawn down against the East Warranty Letter of Credit in accordance with Sections 11.17 and 11.17A. Until receipt of the East Warranty Letter of Credit, the City may use the East Warranty Cash Amount in the place of, in the same manner as and for the same purpose as the East Warranty Letter of Credit. The withholding of the East Warranty Cash Amount in accordance with this Section 4.2(d) until DB Co’s delivery of the East Warranty Letter of Credit to the City shall be the City’s sole remedy for failure on the part of DB Co to deliver the East Warranty Letter of Credit by the East Substantial Completion Payment Date and, for greater certainty, the City shall not be entitled to withhold payment of the balance of the East Substantial Completion Payment as a result of any such failure on the part of DB Co.
- (e) In the event of Section 4.2(c)(ii) above, the West Warranty Cash Amount may be withheld by the City, subject to reduction in value in accordance with Section 11.18(a), until the earlier of (i) the date that is two Business Days following the date that the West Warranty Letter of Credit has been delivered to the City, or (ii) the date that is two Business Days following the expiry of the West Warranty Period, and, in either case, the West Warranty Cash Amount shall be paid by the City to DB Co upon such second Business Day, less any amounts as would otherwise have been drawn down against the West Warranty Letter of Credit in accordance with Sections 11.17 and 11.17A. Until receipt of the West Warranty Letter of Credit, the City may use the West Warranty Cash Amount in the place of, in the same manner as and for the same purpose as the West Warranty Letter of Credit. The withholding of the West Warranty Cash Amount in accordance with this Section 4.2(e) until DB Co’s delivery of the West Warranty Letter of Credit to the City shall be the City’s sole remedy for failure on the part of DB Co to deliver the West Warranty Letter of Credit by the West Substantial Completion Payment Date and, for greater certainty, the City shall not be entitled to withhold payment of the balance of the West Substantial Completion Payment as a result of any such failure on the part of DB Co.
- (f) [Not used]
- (g) Notwithstanding Section 4.2(b), if the Remaining Works Letter of Credit has not been delivered to the City by the West Substantial Completion Payment Date, the City may withhold from the West Substantial Completion Payment a holdback amount of \$[REDACTED] (the “**Remaining Works Cash Amount**”);

- (h) In the event of Section 4.2(g) above, the Remaining Works Cash Amount may be withheld by the City until the earlier of (i) the date that is two Business Days following the date that the Remaining Works Letter of Credit has been delivered to the City, or (ii) the date when the Remaining Works Letter of Credit would have been returned to DB Co if it had been provided in accordance with Section 11.18A, and, in either case, upon such date, the Remaining Works Cash Amount shall be paid by the City to DB Co, less any amounts as would otherwise have been drawn down against the Remaining Works Letter of Credit in accordance with Section 11.18A. Until receipt of the Remaining Works Letter of Credit, the City may use the Remaining Works Cash Amount in the place of, in the same manner as and for the same purpose as the Remaining Works Letter of Credit. The withholding of the Remaining Works Cash Amount in accordance with this Section 4.2(h) until DB Co's delivery of the Remaining Works Letter of Credit to the City shall be the City's sole remedy for failure on the part of DB Co to deliver the Remaining Works Letter of Credit by the West Substantial Completion Payment Date and, for greater certainty, the City shall not be entitled to withhold payment of the balance of the West Substantial Completion Payment as a result of any such failure on the part of DB Co.

4.3 [Not Used]

4.4 [Not Used]

4.5 Compensation on Termination

- (a) If this Project Agreement is terminated pursuant to Sections 36.3(a), 37.2(a)(ii), 38.1, 38.2 or 38.3, then:
- (i) Schedule 23 – Compensation on Termination shall apply and the City shall pay DB Co any applicable compensation on termination; and
 - (ii) the provisions of Section 4.2 shall no longer apply.
- (b) DB Co hereby irrevocably directs the City to make any Compensation Payment to the Lenders' Agent, or as the Lenders' Agent may direct. The City shall pay the Compensation Payment as directed by the Lenders' Agent and shall not accept any redirection without the consent of Lenders' Agent. The City will pay the Compensation Payment in accordance with the provisions of Schedule 23 – Compensation on Termination. DB Co acknowledges and agrees that payment by the City of the Compensation Payment to the Lenders' Agent in accordance with this Section 4.5(b) constitutes payment by the City to DB Co in satisfaction of the City's obligation to pay the Compensation Payment to DB Co under this Project Agreement and in satisfaction of any trust obligation of the City with respect to such payments under section 7 of the CA pursuant to section 10 of the CA.

4.6 Payment Due under Insurance Policies

- (a) In the event of loss or damage occurring where payment becomes due under the property and boiler insurance policies, payments shall be made in accordance with the provisions of the Insurance Trust Agreement.

4.7 HST

- (a) The City covenants and agrees to pay to DB Co the HST that may be exigible with respect to any payments made by the City to DB Co hereunder.

4.8 Set-Off

- (a) The Parties agree that their rights of set-off at law or in equity are limited to the right of:
 - (i) the City, to set off against any amounts otherwise due to DB Co pursuant to the terms of this Project Agreement, any amounts (including, without limitation, any amounts payable in accordance with Section 46, or any amounts payable as liquidated damages) that are due and owed to the City from or by DB Co pursuant to the terms of this Project Agreement; and
 - (ii) DB Co to set off against any amounts otherwise due to the City pursuant to the terms of this Project Agreement, any amounts (including, without limitation, any amounts payable in accordance with Section 46) that are due and owed to DB Co from or by the City pursuant to the terms of this Project Agreement.
- (b) For clarity, the City is entitled to exercise its rights in accordance with Section 4.8(a)(i) immediately upon an amount becoming due and owed to the City by DB Co pursuant to the terms of this Project Agreement.

4.9 Effect of Payment

- (a) Subject to Section 40.2, no payment hereunder shall be construed as an acceptance or approval of incomplete, defective or improper performance by DB Co of any of its obligations under this Project Agreement, nor shall it operate to relieve DB Co from the performance of any of its obligations under this Project Agreement which have not been performed.

4.10 No Other Entitlement

- (a) DB Co shall not be entitled to any payments, compensation, rights, remedies, benefits or entitlements under or in connection with this Project Agreement, except as specifically and expressly set out in this Project Agreement.

4.11 Taxes

- (a) All amounts specified in this Project Agreement, including, for clarity, any compensation payable on termination, are expressed exclusive of HST, but inclusive of all other Taxes payable pursuant to Applicable Law. For clarity, the City shall not be required to pay any interest and/or penalties that are imposed on or assessed against DB Co or any DB Co Party for non-compliance with Applicable Law. If DB Co is required by Applicable Law to collect any such HST from the City, the City shall pay such HST to DB Co simultaneously with the amount to which such applicable HST relates or applies.
- (b) The City shall pay when due and payable, all property taxes or payments in lieu of property taxes that are assessed in respect of ownership or use of the Lands, the New City Infrastructure, the Existing Infrastructure and the New MTO Infrastructure.

- (c) The City shall pay all applicable HST properly payable in accordance with the *Excise Tax Act* (Canada) by the City upon and in connection with payments by the City to DB Co under this Project Agreement.

4.12 Changes in Scope of Taxation

- (a) If, as a result of a Change in Law, the application of Taxes under Part IX of the *Excise Tax Act* (Canada) or any provincial sales tax legislation changes with respect to the provision of any goods or services by DB Co in connection with the performance of the Works, the City and DB Co agree to co-operate to determine how such change affects their respective obligations under this Project Agreement to the extent not already addressed in this Project Agreement.

4.13 Changes in Recoverability of Tax Credits

- (a) The City will pay to DB Co from time to time, as the same is incurred by DB Co, amounts equal to any Irrecoverable Tax to the extent such Irrecoverable Tax results from a Change in Law. DB Co will pay to the City from time to time, as the same is incurred by DB Co, amounts equal to any Recoverable Tax to the extent such Recoverable Tax results from a Change in Law.
- (b) For the purposes of this Section 4.13, the term “**Irrecoverable Tax**” means HST or an irrecoverable sales tax levied by the Province in lieu of all or a portion of HST incurred by DB Co in respect of the supply of any good or service to the City which is consumed, used or supplied, or to be consumed, used or supplied, exclusively by DB Co in the course of carrying out the Works to the extent that DB Co is unable to recover or be credited with input tax credits, refunds, rebates or exemptions for such HST.
- (c) For the purposes of this Section 4.13, the term “**Recoverable Tax**” means HST incurred by DB Co in respect of the supply of any good or service to the City which is consumed, used or supplied, or to be consumed, used or supplied, exclusively by DB Co in the course of carrying out the Works to the extent that DB Co is able to recover or be credited with input tax credits, refunds, rebates or exemptions for such HST.

4.14 Information and Assistance Provided by DB Co

- (a) DB Co shall, at the City’s request and cost, assist the City in applying for and obtaining all remissions and credits of Taxes to which the City is entitled.
- (b) The City may apply for a global or general exemption, waiver, remission, or refund of some or all Taxes which may otherwise be applicable in relation to this Project Agreement. DB Co shall, at the City’s cost, assist the City in making any applications for such global or general exemption, waiver, remission or refund and shall provide the City with such documentation as the City may reasonably require to support such application and, in any event, shall provide such consent as the City may require. Any exemption, waiver, remission, refund or other recovery of Taxes obtained by the City through such application shall accrue to the sole benefit of the City.
- (c) DB Co will provide the City with any information reasonably requested by the City from time to time in relation to any Taxes chargeable in accordance with this Project Agreement and payable by the City to DB Co from time to time.

4.15 Residency – Income Tax Act (Canada)

- (a) DB Co shall not undertake any action or transaction that, if undertaken, would cause or result in DB Co becoming a Non-Resident without the City's prior written consent, which consent may be withheld in the City's sole discretion.

4.16 Taxes – General

- (a) DB Co shall not, without the prior written consent of the City (which consent may be withheld in its sole discretion), undertake any action or transaction that, if undertaken, would cause the City to have (or result in the City having) any obligation to deduct, withhold or remit any Taxes that are required by Applicable Law to be deducted, withheld or remitted from any amounts paid or credited to DB Co or any DB Co Party under this Project Agreement or under any other Ancillary Document.

4.17 Taxes – Indemnity

- (a) If (i) DB Co becomes a Non-Resident, or (ii) the City is or becomes required by Applicable Law to deduct or withhold any amount in respect of Taxes on or in respect of any amounts paid or credited to DB Co or a DB Co Party by the City under the Project Agreement or under any of the Project Documents, then the City shall be entitled to make any applicable deductions or withholdings required by Applicable Law from any amount paid or credited or to be paid or credited to DB Co or a DB Co Party on or after the date on which (A) DB Co or the DB Co Party becomes a Non-Resident and at all times while it remains a Non-Resident; or (B) the City is required by Applicable Law to deduct or withhold amounts in respect of any such amounts, in each case, in respect of all Taxes that are required by Applicable Law to be deducted or withheld from amounts paid or credited to a Non-Resident or otherwise as required by Applicable Law; and all amounts paid or credited by the City under this Project Agreement or under any other Ancillary Document to DB Co or a DB Co Party shall be paid or credited net of such deductions or withholdings.
- (b) If (i) DB Co becomes a Non-Resident, or (ii) the City is or becomes required by Applicable Law to deduct and withhold any amount in respect of Taxes on or in respect of any amounts paid or credited to DB Co or a DB Co Party by the City under the Project Agreement or under any of the Project Documents, DB Co shall, in each case, indemnify and hold harmless the City for (A) the full amount of all Taxes ("**Indemnifiable Taxes**") that arise, are imposed on or are required to be paid by the City in respect of any amounts paid or credited by the City to DB Co or any DB Co Party under this Project Agreement or under any other Ancillary Document as a result of either of the foregoing items less any amount withheld or deducted by the City in respect of such Taxes, and (B) any liability payable or incurred in connection with Indemnifiable Taxes (including penalties, interest and reasonable expenses associated with Tax compliance, reporting and contesting such liability for Indemnifiable Taxes, including reasonable professional expenses payable or incurred in connection therewith) arising from or with respect to Indemnifiable Taxes, whether or not they were correctly or legally asserted ("**Associated Liabilities**"). Payment under this indemnification shall be made within 30 days after the date the City makes written demand for it. A certificate containing reasonable detail as to the amount of Indemnifiable Taxes and Associated Liabilities submitted to DB Co by the City shall be conclusive evidence, absent manifest error, of the amount due from DB Co to the City. The City shall be entitled to exercise its rights of set off under Section 4.8 against any amounts owing under this indemnification. In the event that it is finally determined that such Indemnifiable Taxes were not correctly or legally

asserted or remitted, then such Indemnifiable Taxes shall be reimbursed to DB Co following such final determination.

5. SCOPE OF AGREEMENT

5.1 Scope of Agreement

- (a) DB Co shall undertake the Project and perform the Works in accordance with and subject to the provisions of this Project Agreement.
- (b) DB Co shall exercise its rights and perform its obligations at its own cost and risk without recourse to the City, except as otherwise provided in this Project Agreement. Except as provided in the Interface Agreement, DB Co's sole recourse with respect to the subject matter of this Project Agreement shall be to the City.

6. REPRESENTATIONS AND WARRANTIES

6.1 DB Co Representations and Warranties

- (a) DB Co represents and warrants to the City that as of Commercial Close:
 - (i) DB Co is [REDACTED] and is formed and validly existing under the laws of the Province of Ontario, and has all the requisite corporate power and authority to own its properties and assets, to carry on its business as it is currently being conducted, and to enter into this Project Agreement and to perform its obligations hereunder;
 - (ii) [REDACTED] under the laws of the Province of British Columbia, is in good standing with the Registrar of Companies in the Province of British Columbia with respect to the filing of annual reports, and has all the requisite corporate power and authority to own its properties and assets, to carry on its business as it is currently being conducted, and to enter into this Project Agreement and to perform its obligations hereunder in its capacity as a partner of DB Co;
 - (iii) [REDACTED] under the laws of the Province of Ontario, is in good standing with the Ministry of Government Services of Ontario with respect to the filing of annual reports, and has all the requisite corporate power and authority to own its properties and assets, to carry on its business as it is currently being conducted, and to enter into this Project Agreement and to perform its obligations hereunder in its capacity as a partner of DB Co;
 - (iv) [REDACTED] under the laws of the Province of Ontario, is in good standing with the Ministry of Government Services of Ontario with respect to the filing of annual reports, and has all the requisite corporate power and authority to own its properties and assets, to carry on its business as it is currently being conducted, and to enter into this Project Agreement and to perform its obligations hereunder in its capacity as a partner of DB Co;
 - (v) [REDACTED] under the laws of the Province of Ontario, is in good standing with the Ministry of Government Services of Ontario with respect to the filing of annual reports, and has all the requisite corporate power and authority to own its properties and assets, to carry on its business as it is currently being conducted, and to enter into this Project Agreement and to perform its obligations hereunder in its capacity as a partner of DB Co;

- (vi) all partnership interests in DB Co as of Commercial Close have been disclosed to the City;
- (vii) DB Co and the DB Co Parties, collectively, have extensive experience and are knowledgeable in the design and construction of infrastructure and facilities similar to the those included in the scope of the Project in scale, scope, type and complexity, and have the required ability, experience, skill and capacity to perform the Works in a timely and professional manner as set out in this Project Agreement;
- (viii) DB Co, and [REDACTED] have the requisite power, authority and capacity to execute, deliver and perform this Project Agreement, and to do all acts and things, and execute, deliver and perform all other agreements, instruments, undertakings and documents as are required by this Project Agreement to be done, executed, delivered or performed by DB Co or by [REDACTED] in its capacity as a partner of DB Co;
- (ix) no steps or proceedings have been taken or are pending to supersede or amend:
 - (A) the constating or formation documents of DB Co, including the partnership agreement governing DB Co; or
 - (B) the constating or formation documents, articles or by-laws of [REDACTED]

in each case, in a manner that would impair or limit its ability to perform the obligations of DB Co under this Project Agreement;

- (x) this Project Agreement has been duly authorized, executed, and delivered by DB Co, and constitutes a legal, valid, and binding obligation of DB Co, [REDACTED] enforceable against each of them in accordance with its terms, subject only to:
 - (A) limitations with respect to the enforcement of remedies by bankruptcy, insolvency, moratorium, winding-up, arrangement, reorganization, fraudulent preference and conveyance and other laws of general application affecting the enforcement of creditors' rights generally; and
 - (B) general equitable principles and the fact that the availability of equitable remedies is in the discretion of a court and that a court may stay proceedings or the execution of judgments;
- (xi) the execution delivery, and performance by DB Co, and performance by [REDACTED] in its capacity as a partner of DB Co, of this Project Agreement does not and will not violate or conflict with, or constitute a default under:
 - (A) its constating, formation or organizational documents, including any by-laws;
 - (B) any Applicable Law; or
 - (C) any covenant, contract, agreement, or understanding to which it is a party or by which it or any of its properties or assets is bound or affected;

- (xii) no DB Co Event of Default has occurred and is continuing;
- (xiii) all of the information regarding DB Co, [REDACTED] set out in Schedule 31 – DB Co Information is true and correct in all material respects;
- (xiv) there are no actions, suits, proceedings, or investigations pending or threatened against DB Co, [REDACTED] or, to DB Co's knowledge, any DB Co Party at law or in equity before any Governmental Authority or arbitral body (whether or not covered by insurance) that individually or in the aggregate could result in any material adverse effect on the business, properties, or assets, or the condition, financial or otherwise, of DB Co or in any impairment of its ability to perform its obligations under this Project Agreement, and DB Co has no knowledge of any violation or default with respect to any order, writ, injunction, or decree of any Governmental Authority or arbitral body that could result in any such material adverse effect or impairment;
- (xv) DB Co has conducted its own documentary investigations and has carefully reviewed the whole of this Project Agreement, and all other documents made available to DB Co by or on behalf of the City, and, to DB Co's knowledge, nothing contained herein or therein inhibits or prevents DB Co from completing the Works or performing the Works in accordance with this Project Agreement in a good and safe manner so as to achieve and satisfy the requirements of this Project Agreement;
- (xvi) DB Co, and [REDACTED] in its capacity as a partner of DB Co, is able to meet its obligations as they generally become due;
- (xvii) DB Co is registered under Division V of Part IX of the *Excise Tax Act* (Canada) and its HST registration number is [REDACTED];
- (xviii) [Intentionally Deleted];
- (xix) each Scheduled Substantial Completion Date is a realistic date and is achievable by DB Co performing the Works in accordance with this Project Agreement;
- (xx) DB Co, and [REDACTED] is not a Non-Resident;
- (xxi) DB Co has obtained all necessary DB Co Permits, Licences, Approvals and Agreements required to commence the Works;
- (xxii) the manager or supervisory personnel DB Co has assigned to the Project are highly experienced;
- (xxiii) DB Co has a sufficient staff of qualified and competent personnel to replace its designated supervisors, subject to the City's approval, in the event of death, incapacity or resignation;
- (xxiv) DB Co and the Construction Contractor have conducted inspections of the Lands prior to Commercial Close and an investigation and examination of the Project Agreement, the Background Information and any other documents made available to DB Co by the City so as to ascertain the nature or location of the Works and the Lands, the physical conditions of the Lands and the Existing Infrastructure on which Works will be

performed, and protocols, rules and regulations if any, possible delays in commencing the Works, conditions relating to the transportation, handling and storage of materials and availability of labour and the character and availability of equipment, materials and facilities needed to perform the Works;

- (xxv) DB Co has secured the Financing and is in a position to complete the Financing on or before the Financial Close Target Date, subject to the satisfaction of reasonable conditions that are customary in closing financing for projects similar to the Project;
- (xxvi) no Restricted Person has Direct or Indirect Power or Control over any member of the DB Co Group in relation to the decisions, management, actions or policies of DB Co or in relation to the operation, management and ownership of the Project;
- (xxvii) to the knowledge of DB Co, no Restricted Person has directly or indirectly, an Economic Interest in DB Co or the Project;
- (xxviii) either:
 - (A) the COR-Certified Construction DB Co Party is in possession of its COR Certification in good standing as required under this Project Agreement and has the ability to maintain such COR Certification at all times during the performance of the Works in accordance with its terms, provisions and conditions; or
 - (B) the COR-Qualified Construction DB Co Party:
 - (I) is in possession of its OHSAS 18001 Accreditation which remains in good standing and has the ability to maintain such OHSAS 18001 Accreditation in good standing at all times during the performance of the Works until such COR-Qualified Construction DB Co Party receives its COR Certification as required under this Project Agreement, and
 - (II) has made an application to the IHSA for its COR Certification as required under this Project Agreement; and
- (xxix) Prior to or concurrently with execution of this Project Agreement, DB Co has executed the Nominated Signalling Subcontract with the Nominated Signalling Subcontractor or has caused the Construction Contractor to execute the Nominated Signalling Subcontract with the Nominated Signalling Subcontractor.

6.2 City Representations and Warranties

- (a) The City represents and warrants to DB Co that as of Commercial Close:
 - (i) the City is a municipal corporation duly and validly constituted and subsisting under the laws of the Province of Ontario and has the requisite power, authority and capacity to execute and deliver this Project Agreement and perform its obligations under this Project Agreement and to do all acts and things, and execute, deliver and perform all other agreements, instruments, undertakings and documents as are required by this Project Agreement to be done, executed, delivered or performed;

- (ii) this Project Agreement has been duly authorized, executed, and delivered by the City and constitutes a legal, valid, and binding obligation of the City, enforceable against the City in accordance with its terms, subject only to:
 - (A) limitations with respect to the enforcement of remedies by bankruptcy, insolvency, moratorium, winding-up, arrangement, reorganization, fraudulent preference and conveyance and other laws of general application affecting the enforcement of creditors' rights generally;
 - (B) general equitable principles and the fact that the availability of equitable remedies such as specific performance and injunction are in the discretion of a court;
 - (C) the special jurisdiction and power of the Ontario Municipal Board over defaulting municipalities under the *Municipal Affairs Act* (Ontario);
- (iii) the execution, delivery, and performance by the City of this Project Agreement does not and will not violate or conflict with, or constitute a default under:
 - (A) any Applicable Law (including, for greater certainty, the *City of Ottawa Act 1999* (Ontario) and any by-laws issued in accordance therewith); or
 - (B) any covenant, contract, agreement, or understanding relating to the Project or the Lands to which it is a party or by which it or any of its properties or assets is bound or affected;
- (iv) the City has obtained all necessary consents and approvals required for the execution by the City of, and performance of its obligations under, this Project Agreement;
- (v) other than any proceeding under the *Expropriations Act* (Ontario) which could delay the acquisition by the City of the Lands, there are, to the knowledge of the City, no actions, suits, proceedings, or investigations pending or threatened (in writing) against the City, MTO or, to the City's knowledge, any City Party at law or in equity before any Governmental Authority or arbitral body (whether or not covered by insurance) of which the City or MTO has received written notice, and that individually or in the aggregate could result in any material adverse effect on the Project, or in any impairment of the City's, MTO's or DB Co's ability to perform their respective obligations under this Project Agreement, and the City has no knowledge of any violation or default with respect to any order, writ, injunction, or decree of any Governmental Authority or arbitral body that could result in any such material adverse effect or impairment;
- (vi) the City is able to meet its obligations as they generally become due;
- (vii) the City has rights of use and access to, on and over the Lands, or has the requisite power to obtain such rights, that are sufficient to enable the City to grant or to cause to be granted to DB Co the licence rights contemplated in Section 16.1;
- (viii) the Project is permitted by the existing official plan, zoning and other land use restrictions applicable to the City and the Project.

- (b) The City represents and warrants to DB Co that as of Commercial Close, no City Event of Default has occurred and is continuing.

7. BACKGROUND INFORMATION

7.1 No Liability

- (a) Except as expressly provided in Sections 1.5(b)7.4, 18.1(b), 18.2, 18.3, 18.4, 18.5, 18.6, 18.7 and 18.8 none of the City, any City Party, RTG or any RTG Party, or any Government Entity shall be liable to DB Co or any DB Co Party for, and DB Co or any DB Co Party shall not seek to recover from the City, any City Party, RTG or any RTG Party, or any Government Entity, any damages, losses, costs, liabilities or expenses which may arise (whether in contract, tort or otherwise) from the adoption, use or application of the Background Information by, or on behalf of, DB Co or any DB Co Party.

7.2 No Warranty

- (a) Except as expressly provided in Sections 7.4, 18.1(b), 18.2, 18.3, 18.4, 18.5, 18.6, 18.7 and 18.8:
 - (i) neither the City nor any City Party, nor RTG nor any RTG Party, nor any Government Entity gives any warranty or undertaking of whatever nature in respect of the Background Information and, specifically (but without limitation), neither the City nor any City Party, nor RTG nor any RTG Party, or Government Entity warrants that the Background Information represents all of the information in its possession or power (either during the conduct of the procurement process for the Project or at the time of execution and delivery of this Project Agreement) relevant or material to or in connection with the Project or the obligations of DB Co under this Project Agreement or under any of the Project Documents; and
 - (ii) neither the City nor any City Party, nor RTG nor any RTG Party, nor any Government Entity shall be liable to DB Co or any DB Co Party in respect of any failure, whether before, on or after the execution and delivery of this Project Agreement:
 - (A) to disclose or make available to DB Co or any DB Co Party any information, documents or data;
 - (B) to review or update the Background Information; or
 - (C) to inform DB Co or any DB Co Party of any inaccuracy, error, omission, defect or inadequacy in the Background Information.

7.3 No Claims

- (a) DB Co acknowledges and confirms that:
 - (i) it has conducted its own analysis and review of the Background Information and has, before the execution and delivery of this Project Agreement, satisfied itself as to the accuracy, completeness and fitness for purpose of any such Background Information upon which it places reliance; and

- (ii) except as expressly provided in Sections 7.4, 18.1(b), 18.2, 18.3, 18.4, 18.5, 18.6, 18.7 and 18.8, it shall not be entitled to and shall not, and shall ensure that no DB Co Party shall, make any claim against the City, or any City Party, RTG or any RTG Party, or Government Entity (whether in contract, tort or otherwise), including, without limitation, any claim in damages, for extensions of time or for additional payments under this Project Agreement on the grounds:

- (A) of any misunderstanding or misapprehension in respect of the Background Information; or

- (B) that the Background Information was incorrect or insufficient,

nor shall DB Co be relieved from any of its obligations under this Project Agreement on any such ground.

7.4 Technical Reports

- (a) The City agrees that, if at the date of this Project Agreement, except as disclosed in any Background Information (other than Technical Reports) or as otherwise disclosed by the City or any City Party or known by DB Co or any DB Co Party, in each case prior to the date that is 30 days prior to the RFP Technical Submission Deadline, any of the information in:

- (i) the Technical Reports (other than the Geotechnical Reliant Reports) is, to the actual knowledge of the City, incorrect, or there is relevant information in the possession or control of the City that would make any of the information in such Technical Reports incorrect, or

- (ii) the Geotechnical Reliant Reports is incorrect,

then, to the extent that such incorrect information materially adversely interferes with DB Co's ability to perform the Works or materially adversely affects DB Co's cost of, or schedule for, performing the Works, such incorrect information shall, subject to and in accordance with Schedule 22 – Variation Procedure, result in a Variation.

8. PROJECT DOCUMENTS

8.1 Project Documents

- (a) DB Co shall perform its obligations under, and observe all of the provisions of, each of the Project Documents to which it is a party, and shall ensure that each DB Co Party shall perform its obligations under, and observe all of the provisions of, each of the Project Documents to which such DB Co Party is a party, so as to ensure that other parties to such Project Documents shall not be entitled to terminate same. In the event that DB Co receives a Notice of default under any of the Project Documents, it shall promptly, and, in any event, no later than 2 Business Days after receipt thereof, deliver a copy of such Notice of default to the City.

8.2 Ancillary Documents

- (a) DB Co shall not:

- (i) terminate or agree to the termination of all or part of any Ancillary Document, except pursuant to Sections 27.3, 49.3 and 50.2 or otherwise to prevent or cure a DB Co Event of Default (provided that commercially reasonable alternative measures would not prevent or cure such DB Co Event of Default);
- (ii) subject to Section 8.2(a)(i) above, make or agree to any amendment, restatement or other modification or exercise any of its rights under any Ancillary Document that materially adversely affects DB Co's ability to perform its obligations under this Project Agreement or that has the effect of increasing any liability of the City, whether actual or potential;
- (iii) breach its obligations (or waive or allow to lapse any rights it may have) or permit others to breach their obligations (or waive or allow to lapse any rights they may have) under any Ancillary Document, if any such breach (or waiver or lapse) would materially adversely affect DB Co's ability to perform its obligations under this Project Agreement or that have the effect of increasing any liability of the City, whether actual or potential; or
- (iv) enter into, or permit the entry into by any other person of, any agreement replacing all or part of any Ancillary Document, except in the circumstances referenced in Section 8.2(a)(i),

without the prior written consent of the City, provided that, where consent is requested pursuant to Section 8.2(a)(i) or 8.2(a)(iv), such consent shall not be withheld, and shall be provided within a reasonable time, where the relevant matter referred to in Section 8.2(a)(i) or 8.2(a)(iv) will not materially adversely affect DB Co's ability to perform its obligations under this Project Agreement or have the effect of increasing any liability of the City, whether actual or potential. In the event of termination or agreement to the termination of all or part of any Ancillary Document as described in Section 8.2(a)(i), or the entering into of any agreement replacing all or part of any Ancillary Document as described in Section 8.2(a)(iv), DB Co shall, to the extent applicable, comply with all provisions herein relating to changes in Subcontractors, including Section 49.3.

- (b) Upon the written request of the City or the City Representative, DB Co will deliver or cause to be delivered to the City or the City Representative a copy of any notices delivered or received by DB Co under any of the Ancillary Documents.

8.3 Changes to Lending Agreements and Refinancing

- (a) Subject to the terms of the Lenders' Direct Agreement, DB Co shall not terminate, amend or otherwise modify the Lending Agreements, or waive or exercise any of its rights under the Lending Agreements, if at the time such action is contemplated and effected, it would materially adversely affect DB Co's ability to perform its obligations under this Project Agreement or the Project Documents or have the effect of increasing the liability of the City whether actual or potential, unless such action is a Permitted Borrowing or a Refinancing effected in accordance with the provisions of Schedule 28 – Refinancing.

8.4 Compliance with Lending Agreements

- (a) DB Co shall keep the Lending Agreements in good standing to the extent necessary to perform its obligations under this Project Agreement and the Project Documents, and shall ensure that none

of the terms and conditions of the Lending Agreements shall prevent DB Co from performing its obligations under this Project Agreement or the Project Documents.

9. THE CITY RESPONSIBILITIES

9.1 General

- (a) The City shall, at its own cost and risk:
 - (i) perform all of its obligations under, and observe all provisions of, this Project Agreement in compliance with Applicable Law;
 - (ii) obtain, maintain, and, as applicable, renew the City Permits, Licences, Approvals and Agreements which may be required for the performance of the Works;
 - (iii) comply with all City Permits, Licences, Approvals and Agreements, in accordance with their terms, and other Permits, Licences, Approvals and Authorizations to the extent obligations thereunder attributable to the City are within the actual knowledge of the City, and are not otherwise required be undertaken or assumed by DB Co hereunder; and
 - (iv) cooperate with DB Co in the fulfillment of the purposes and intent of this Project Agreement, provided, however, that the City shall not be under any obligation to perform any of DB Co's obligations under this Project Agreement.
- (b) The City shall, and shall cause all City Parties and MTO to, take reasonable steps to minimize undue interference with the provision of the Works by DB Co or any DB Co Party.
- (c) Nothing in this Project Agreement shall in any way fetter the right, authority and discretion of the City or any City Party or Government Entity in fulfilling its statutory or other functions under Applicable Law, and DB Co understands and agrees that nothing in this Project Agreement shall preclude the City from performing, discharging or exercising its duties, responsibilities, and powers under Applicable Law. DB Co further agrees that it shall comply, and shall cause all relevant DB Co Parties to comply, with all written directions issued by or on behalf of the City (or any respective designate appointed) from time to time, subject to Section 31.1(b).
- (d) The City may, acting in its sole discretion, without legal obligation to do so and at the expense of DB Co, take such commercially reasonable steps as DB Co may request to facilitate access for DB Co to Highway Corridor Lands to the extent DB Co may reasonably require to perform the Construction Activities provided that DB Co has demonstrated to the reasonable satisfaction of the City, that it has not been able to gain such access through the use of its own commercially reasonable efforts.
- (e) Notwithstanding the provisions of Section 11.8(a)(i), the City shall be responsible for all designations, assumptions, road closures, transfers and any other applicable requirements relating to any DB Co Permits, Licences, Approvals and Agreements which can only be effected by the City pursuant to the *Municipal Act, 2001* (Ontario), subject to receipt by the City of any required consent(s) from the Crown in right of Canada and subject to DB Co having, at its own cost, provided or caused to be provided such information, documentation, and technical or administrative assistance, as the City may request and as DB Co may reasonably be able to provide to enable the City to effect such requirements.

10. DB CO RESPONSIBILITIES – GENERAL

10.1 Other Business

- (a) DB Co shall not engage in any activities which are not specifically related to, required by and conducted for the purpose of the Project without the prior written consent of the City, in its sole discretion.

10.2 Complete and Operational New City Infrastructure and New MTO Infrastructure

- (a) DB Co shall design, engineer, construct and commission the New City Infrastructure and the New MTO Infrastructure so as to provide the City with complete and operational New City Infrastructure and New MTO Infrastructure in accordance with the Output Specifications, and the DB Co Proposal Extracts, all in accordance with and subject to the terms of this Project Agreement.

10.3 General Responsibilities and Standards

- (a) DB Co shall, at its own cost and risk, perform and complete the Works:
 - (i) in accordance with the Works Schedules and, in this regard, shall commence the Works no later than the day following Financial Close and, subject to adjustment as provided for in the Project Agreement, achieve:
 - (A) East Substantial Completion by the East Scheduled Substantial Completion Date;
 - (B) East Final Completion by the East Scheduled Final Completion Date;
 - (C) West Substantial Completion by the West Scheduled Substantial Completion Date; and
 - (D) West Final Completion by the West Scheduled Final Completion Date;
 - (ii) in compliance with Applicable Law;
 - (iii) so as to satisfy the Output Specifications;
 - (iv) in compliance with all Permits, Licences, Approvals and Agreements and so as to preserve the existence and continued effectiveness of any such Permits, Licences, Approvals and Agreements;
 - (v) in accordance with Good Industry Practice and to meet the standards followed by professionals, manufacturers, contractors and trades who are experienced in work on infrastructure that is comparable to the New City Infrastructure and the New MTO Infrastructure;
 - (vi) in a manner consistent with the Integrated Management System and Integrated Management Plans, and the DB Co Proposal Extracts;

- (vii) in a timely and professional manner;
 - (viii) with due regard to the health and safety of persons and property;
 - (ix) subject to the other provisions of this Project Agreement, in a manner which will not impair the ability of the City, any City Party or any Government Entity to comply with Applicable Law; and
 - (x) subject to the other provisions of this Project Agreement, in a manner which will not impair the performance of the Governmental Activities; and
 - (xi) in accordance with all other terms of this Project Agreement.
- (b) DB Co shall cooperate with the City in the fulfillment of the purposes and intent of this Project Agreement, provided however that DB Co shall not be under any obligation to perform any of the City's obligations under this Project Agreement.
- (c) DB Co shall, at its own cost and risk:
 - (i) without prejudice to the City's obligations under Sections 9 and 16.1, coordinate with the City all Construction Activities relating to Existing Infrastructure and Stage 1 Connection Infrastructure owned by the City or MTO and the New MTO Infrastructure, including the provision of the Works Schedules, and any updates to the Works Schedules relating to such infrastructure, so as to minimize the impact of Construction Activities on City or MTO operations and services provided by the City or MTO to the public; and
 - (ii) subject to Section 11.29, enter into any Utility Agreements that may be required by Utility Companies to complete the Works;
- (d) [Not used]
- (e) DB Co shall, at its own cost and risk, as soon as possible, and in any event within twenty-four (24) hours of its receipt or notice, notify the City of receipt or notice of (and provide the City with copies of any correspondence received in relation to) any incident report, investigation report or similar correspondence (in each case, whether in draft or final form) issued by the MOL or any other Governmental Authority in respect of the Works.
- (f) If the City has executed an agreement with MTO in relation to this Project (a "**Stakeholder Agreement**"), then the following shall apply:
 - (i) the City shall provide a copy of the Stakeholder Agreement to DB Co, and DB Co shall not, and shall ensure that the DB Co Parties do not, in any way whatsoever, contravene or cause the City to contravene the Stakeholder Agreement; and
 - (ii) to the extent that DB Co's performance of its obligations set out in Section 10.3(f)(i) would result in a material change to the Works, or materially adversely affects DB Co's cost of, or schedule for, performing the Works, and would not otherwise be required of DB Co under the Project Agreement, then such change shall, subject and in accordance with Schedule 22 – Variation Procedure, result in a Variation.

11. DB CO RESPONSIBILITIES – DESIGN AND CONSTRUCTION

11.1 Development of Design

- (a) DB Co shall, at its own cost, develop and complete the design of the New City Infrastructure and the New MTO Infrastructure and all Design Data in accordance with the requirements of this Project Agreement, including Schedule 10 – Review Procedure and this Section 11.1.
- (b) In order to develop the detailed design of the New City Infrastructure and New MTO Infrastructure, DB Co shall consult with the Stakeholders (which consultation requirements pursuant to the Environmental Assessments are further described in Schedule 17 – Environmental Obligations), the City Representative and the City Design Team in an interactive process. If the result of any consultation with Stakeholders is a change to the scope, configuration or size of any New City Infrastructure or New MTO Infrastructure or a change in the Works, then such change shall, subject to and in accordance with Schedule 22 – Variation Procedure, result in a Variation.
- (c) The further development of the design of the New City Infrastructure and New MTO Infrastructure and the process by which it is progressed must fully comply with the requirements of this Project Agreement.
- (d) The Parties agree that Appendix A to Schedule 10 – Review Procedure is an initial list of Design Data and other items that will require design review, which Design Data and other items shall include design and construction documentation (to a scale required by the City Design Team) for each of the following:
 - (i) design development drawings, reports, schedules and specifications progressed from the date of this Project Agreement with extensive user group input, showing all architectural, engineering and landscape design information sufficient to allow for the development of working drawings, submitted at,
 - (A) Pre-Final Design Development (PFDD); and
 - (B) Final Design Development (FDD);(collectively, the “**Design Development Submittals**”);
 - (ii) working drawing documentation, being construction drawings, reports, schedules and specifications progressed from the Design Development Submittals, showing all architectural, engineering and landscape design information in accordance with the requirements of this Project Agreement, submitted upon completion thereof and as required in accordance with Schedule 10 – Review Procedure (the “**Construction Document Submittals**”);
 - (iii) Permit, Licence, Approval and Agreement drawings (phased, if applicable); and
 - (iv) all other reports, studies, plans and documentation required pursuant to Schedule 10 – Review Procedure or otherwise identified in the Project Agreement.
- (e) DB Co shall submit to the City Representative for review in accordance with Schedule 10 – Review Procedure all Design Data and other items listed in Section 11.1(d).

- (f) The Design Data and other items listed in Section 11.1(d) must contain, at a minimum, the information required pursuant to Article 3 of Schedule 10 – Review Procedure.
- (g) The Design Data and other items listed in Section 11.1(d) must contain, at a minimum, the following additional information:
 - (i) identification of the stage of design or construction to which the documentation relates;
 - (ii) all design or construction drawings and specifications necessary to enable the City Representative to make an informed decision as to whether DB Co is permitted to proceed pursuant to Schedule 10 – Review Procedure;
 - (iii) for each stage of the design or construction documentation, a schedule identifying all changes to the relevant documentation that has occurred from the previous stage of design or construction documentation; and
 - (iv) where changes have been submitted, an indication of how the changes meet the requirements of this Project Agreement.
- (h) All design review meetings held by DB Co pursuant to the Review Procedure which the City wishes to attend shall be held in Ottawa, Ontario unless the City otherwise agrees in writing.
- (i) If DB Co commences or permits the commencement of the next level of design or construction of any part or parts of the New City Infrastructure prior to being entitled to proceed in accordance with Schedule 10 – Review Procedure and it is subsequently determined in accordance with Schedule 10 – Review Procedure or Schedule 27 – Dispute Resolution Procedure that the design or construction does not comply with this Project Agreement, then DB Co shall forthwith, at its own cost and risk, undo, remove from the New City Infrastructure and/or Lands, replace and restore, as applicable, any parts of the design or construction that do not comply with this Project Agreement.
- (j) Subject to Sections 18.5 and 18.7, neither the City nor any City Party will have any liability:
 - (i) if a document submitted by DB Co and reviewed by the City, the City Representative or the City Design Team results in non-compliance with this Project Agreement by DB Co or a breach by DB Co of Applicable Law; or
 - (ii) for any loss or claim arising due to some defect in any documents, drawings, specifications or certificates submitted by DB Co.
- (k) DB Co and the City will cooperate with each other in the design review process. Notwithstanding such cooperation by the City, such review shall not constitute acceptance of the Works, and DB Co shall remain solely responsible for compliance in full with all requirements of this Project Agreement.
- (l) DB Co shall allow the City Design Team, at any time, a reasonable opportunity to view any items of Design Data, which shall be made available to the City Representative as soon as practicable following receipt of a written request from the City Representative.

- (m) DB Co shall cause the Construction Contractor to establish and maintain a computerized design database and a web based Review Procedure Activities Register, which DB Co and the City may access remotely by computer to:
 - (i) view drawings comprised within the Design Data;
 - (ii) electronically store and print copies of such Design Data; and
 - (iii) track the status of each Works Submittal, pursuant to Article 3 of Schedule 10 – Review Procedure.

11.2 Start-Up Meeting

- (a) Within 10 Business Days after the date of this Project Agreement, DB Co and the Design Team shall attend a start-up meeting (the “**Start-Up Meeting**”) with the City to set out the design development process in greater detail.
- (b) The agenda for the Start-Up Meeting shall include the following:
 - (i) DB Co’s plan to develop a successful partnership with the City for the purpose of supporting the City in achieving its vision, mission and core values;
 - (ii) DB Co’s plan to ensure that the Works are completed in accordance with the requirements set forth in this Project Agreement;
 - (iii) DB Co’s process to ensure optimum design quality;
 - (iv) DB Co’s approach to ensure that all DB Co Parties perform the Works, as applicable, as a fully integrated team;
 - (v) DB Co’s approach to a fully integrated interior design process that includes every element of interior finishes, furniture, fixtures, equipment, occupant signage and wayfinding;
 - (vi) a proposed schedule of Works Submittals which is consistent with the Proposed Works Schedule and which provides for a progressive and orderly flow of Works Submittals from DB Co to the City Representative to allow sufficient time for review of each Works Submittal by the City Design Team, taking into account both the resources available to the City Design Team to conduct such review and whether delay in the review of the subject matter of the Works Submittal will have a material impact on DB Co’s ability to progress future anticipated Works Submittals and the Works in accordance with the Works Schedule;
 - (vii) DB Co’s plan to successfully integrate feedback from consultations with Stakeholders and the City Design Team, in accordance with, and subject to, the Review Procedure;
 - (viii) any issues related to Schedule 34 – Mobility Matters;
 - (ix) DB Co’s approach to timing, construction, adjustment and user feedback on required mock-ups; and

- (x) a communication process that includes an electronic data room and the use of a computerized document tracking system that has the capacity to report, on request, the status of all design and construction documentation.

11.3 [Not Used]

11.4 Performance of Design Obligations

- (a) In the design and engineering of the Project, DB Co, its consultants and the DB Co Parties shall, at a minimum, exercise the standard of care normally exercised by licensed or registered professional architectural and engineering personnel having specialized knowledge and experience in performing design activities of a similar nature, scope and complexity.
- (b) DB Co shall ensure that all parts of the Works shall, as required by Applicable Law, be performed or reviewed by licensed or registered professional engineers and architects registered to practice in the Province of Ontario. Such architects and engineers shall certify and, if required by Applicable Law, sign and seal, all designs, drawings and technical reports confirming that they comply with all prevailing design standards and design practices for such work in the Province of Ontario, all other applicable standards, Output Specifications and codes, and as otherwise required by Applicable Law.

11.5 Works Submittals

- (a) Any and all items, documents and anything else required or specified by this Project Agreement in respect of the,
 - (i) East Works to be submitted to, reviewed or otherwise processed by the City prior to East Substantial Completion; and
 - (ii) West Works to be submitted to, reviewed or otherwise processed by the City prior to West Substantial Completion,

including any and all subsequent revisions, amendments and changes thereto, shall be subject to review by the City pursuant to Schedule 10 – Review Procedure. The first document to be submitted by DB Co for review by the City pursuant to Schedule 10 – Review Procedure shall be the draft document control and security protocol described in Section 42.5(f).

11.6 Documents

- (a) DB Co shall keep one copy of the current digital files of the Project Agreement, Project Documents, Works Schedule, submittals, reports, Variation Confirmations, DB Co Variation Notices, Variation Directives, partnering documents, records of meetings and all other documents necessary for the administration of the Project, all in good order and readily accessible and available to the City, Lenders' Consultant and the City Representative.
- (b) DB Co shall, where practical, keep one copy of current standards and manufacturers' literature specified in the Project Documents in good order and readily accessible and available to the City Representative and Lenders' Consultant and their representatives for the duration of the Works.

11.7 General Construction Obligations

- (a) Without limiting Section 10.3:
- (i) DB Co is solely responsible for all construction means, methods and techniques used to undertake the Works and must provide everything (including labour, plant, equipment and materials) necessary for the construction and commissioning of the New City Infrastructure and the New MTO Infrastructure, and all other performance of the Works, save to the extent such equipment and materials are to be provided by the City or RTG as specified in Schedule 15-2 Part 3, Appendix A.
 - (ii) DB Co shall in a timely and professional manner and in accordance with the requirements of this Project Agreement:
 - (A) construct the Works diligently, expeditiously and in a thorough and workman-like manner consistent with Schedule 11 – Integrated Management System Requirements;
 - (B) ensure that
 - (I) no works other than the Works under this Project Agreement are constructed on the Lands, the New City Infrastructure, the New MTO Infrastructure, the Existing Infrastructure or the Stage 1 Connection Infrastructure by DB Co, any DB Co Party or any person for whom DB Co is responsible at law; and
 - (II) the New City Infrastructure is constructed only on the Lands in accordance with Schedule 15 – Output Specifications;
 - (C) protect the Works from all of the elements, casualty and damage;
 - (D) in respect of plant, equipment, Products and materials incorporated in the Works, use plant, equipment, Products and materials that:
 - (I) are of a kind that are consistent with the Output Specifications;
 - (II) are new, of good quality and are used, handled, stored and installed in accordance with Applicable Law and Good Industry Practice, including, with respect to health and safety, so as not to be hazardous or dangerous; and
 - (III) where they differ from the Output Specifications, have been substituted with the City's prior written consent in accordance with Section 11.20.
 - (iii) Without limiting DB Co's obligations pursuant to Section 11.11 or DB Co's indemnity pursuant to Section 46.1, DB Co shall, from commencement of the Works until East Substantial Completion in respect of the System Infrastructure comprising the East Works, West Substantial Completion in respect of the System Infrastructure comprising the West Works, the applicable Handover in respect of the New MTO Infrastructure, and the applicable New Municipal Infrastructure Component Acceptance Date in respect of

the New Municipal Infrastructure, be responsible for maintaining and securing the Site to prevent access onto the Site, the New City Infrastructure, the New MTO Infrastructure and the elements of the Existing Infrastructure on which Works will be performed (during such times as it has care and custody of such Existing Infrastructure) of any persons not entitled to be there, and the licence granted to DB Co pursuant to Section 16.1 shall include rights for DB Co to do so.

- (iv) DB Co shall not, and DB Co shall ensure that the DB Co Parties do not, in any way whatsoever, contravene or cause a contravention of any labour-related contractual obligation or agreement, to the extent that DB Co has been notified of the same, or any provision of any disclosed collective agreement to which the City or MTO is a party that is applicable to the New MTO Infrastructure or New City Infrastructure and constructed pursuant to the Project Agreement, as such disclosed collective agreements or labour-related agreements may be amended from time to time. To the extent that compliance with any amendments made to any such disclosed collective agreements or labour-related agreements, or to the extent any such disclosed collective agreements or labour-related agreements entered into or disclosed to DB Co after Financial Close, adversely interferes with DB Co's ability to perform the Works or materially adversely affects DB Co's cost of, or schedule for, performing the Works, the same shall, subject to and in accordance with Section 32, be treated as a Delay Event and, subject to and in accordance with Section 33, be treated as a Compensation Event.
- (b) DB Co shall provide a new construction site office for use by the City at each location specified in Schedule 15 – Output Specifications, upon DB Co's mobilization to the Site at such location, and in accordance with the requirements set out in Schedule 15 – Output Specifications.

11.8 Permits, Licences, Approvals and Agreements

- (a) DB Co shall, at its own cost and risk:
 - (i) obtain, maintain, and, as applicable, renew all DB Co Permits, Licences, Approvals and Agreements which may be required for the performance of the Works;
 - (ii) except for those obligations which are identified as the City obligations in Schedule 35 – Permits, Licences, Approvals and Agreements, assume all of the obligations of the City under the City Permits, Licences, Approvals and Agreements (and for greater certainty, the Development Approvals);
 - (iii) comply with all Permits, Licences, Approvals and Agreements in accordance with their terms; and
 - (iv) provide all security, including all letters of credit, that may be required in connection with any DB Co Permits, Licences, Approvals and Agreements, provided that, if the City is able to obtain an exemption from such security on behalf of DB Co and with respect to the Project,
 - (A) DB Co shall provide to the City an accurate accounting of the costs and expenses avoided by DB Co as a result of any such exemption; and

- (B) the City shall be permitted to deduct an amount equal to all costs and expenses that were avoided by DB Co as a result of any such exemption from a Substantial Completion Payment.
- (b) Where any DB Co Permits, Licences, Approvals and Agreements have requirements that may impose any conditions, liabilities or obligations on the City or any City Party or RTG or any RTG Party, DB Co shall not obtain, amend or renew (other than upon the same terms and conditions) such DB Co Permits, Licences, Approvals and Agreements without the prior written consent of the City, such consent not to be unreasonably withheld or delayed, provided that none of the City, any City Party, RTG or any RTG Party shall be responsible for obtaining or for the failure of DB Co to obtain any DB Co Permit, Licence, Approval and Agreement. The City shall comply, or shall require compliance, with any conditions, liabilities or obligations as are imposed on the City or any City Party or RTG or any RTG Party by the requirements of any DB Co Permit, Licence, Approval and Agreement obtained with the City's consent under this Section 11.8(b).
- (c) The City shall provide DB Co with such information and administrative assistance as DB Co may reasonably require in relation to the Permits, Licences, Approvals and Agreements. In respect of Section 11.8(a)(ii), the City shall,
- (i) provide DB Co with relevant information and copies of notices received under the applicable City Permits, Licences, Approvals and Agreements; and
- (ii) execute any documents under the applicable City Permits, Licences, Approvals and Agreements which Applicable Law dictates that only the City can execute.
- (d) DB Co shall, at its own cost, provide or cause to be provided such information, documentation, and administrative assistance as the City may request and as DB Co may reasonably be able to provide, and shall execute such applications as are required to be in its name, to enable the City to obtain, maintain or renew any of the City Permits, Licences, Approvals and Agreements or to demonstrate compliance with any Permits, Licences, Approvals and Agreements, provided that DB Co shall not be responsible for obtaining or for any delay in obtaining or for the failure of the City to obtain any of the City Permits, Licences, Approvals and Agreements, unless such delay or failure is caused by any act or omission of DB Co, any DB Co Party or any other person for whom DB Co is responsible at law.
- (e) If, prior to the applicable Scheduled Substantial Completion Date, the City fails to issue to DB Co a final determination (a granting, conditional granting, or refusal) in respect of a Listed DB Co PLAA prior to the expiration of [REDACTED] per cent of the number of Business Days (rounding up to Business Days if such calculation results in a certain number of Business Days plus a fraction of a Business Day) designated for a final determination by the City in Appendix A to Schedule 35 – Permits, Licences, Approvals and Agreements for the applicable Listed DB Co PLAA (the “**City PLAA Deadline**”), then any delay in the Works or additional costs in respect of the Works caused by the failure to make a final determination by the City PLAA Deadline shall, subject to and in accordance with Section 32, be treated as a Delay Event and, subject to and in accordance with Section 33, be treated as a Compensation Event, provided that:
- (i) the applicable DB Co Permit, Licence, Approval or Agreement is a Listed DB Co PLAA;
- (ii) DB Co has fulfilled all obligations pursuant to the Applicable Law, in accordance with any deadline applicable to the Listed DB Co PLAA imposed by this Project Agreement

- or the City, including providing timely and thorough responses to questions or concerns posed by the City in respect of the Listed DB Co PLAA;
- (iii) DB Co submitted the applicable Listed DB Co PLAA in accordance with the timing for such submission in the Works Schedule or Recovery Schedule, as applicable (in each case, as such submission date may be extended on account of any Delay Event); and
 - (iv) DB Co's application for the Listed DB Co PLAA and DB Co's responses to all questions or concerns posed by the City were in accordance with Good Industry Practice.
- (f) For clarity, Section 11.8(e) does not entitle DB Co to a Delay Event or a Compensation Event,
- (i) in the event that the City's final determination on a Listed DB Co PLAA is made in a timely way, pursuant to the applicable City PLAA Deadline, but is not favourable to DB Co or DB Co disagrees with the substance of the final determination;
 - (ii) in the event that the City fails to issue to DB Co a final determination in respect of a Permit, Licence, Approval or Agreement that is not explicitly listed as a Listed DB Co PLAA; or
 - (iii) with respect to,
 - (A) Permits, Licences, Approvals or Agreements that are related to, but not explicitly included on, the Listed DB Co PLAAs; or
 - (B) the Traffic and Transit Management Plan.
- (g) DB Co shall, at its own cost and risk, provide to the City a system to track the status of each Listed DB Co PLAA through every stage of preparation, submission and approval. More specifically, such system shall:
- (i) be kept updated on a daily basis and be available to the City in real time during normal business hours through a web-based interface which would include functionality to provide automated email alerts to a customizable frequency and set of email addresses;
 - (ii) be operational no later than the date upon which the first Listed DB Co PLAA application is submitted; and
 - (iii) include a feature that highlights to the City each outstanding applicable Listed DB Co PLAA when it reaches the following milestone triggers:
 - (A) [REDACTED]% of the number of Business Days designated for a final determination by the City in Appendix A to Schedule 35 – Permits, Licences, Approvals and Agreements for the applicable Listed DB Co PLAA;
 - (B) [REDACTED]% of the number of Business Days designated for a final determination by the City in Appendix A to Schedule 35 – Permits, Licences, Approvals and Agreements for the applicable Listed DB Co PLAA; and

- (C) 5 Business Days prior to the expiration of the City PLAA Deadline.
- (h) DB Co shall submit documentation on the proposed design, functionality, and usage of the system to the City Representative in accordance with Schedule 10 – Review Procedure no later than 60 days after Financial Close.
- (i) In addition, DB Co shall provide written notice to the City Representative with respect to any outstanding Listed DB Co PLAA when it reaches the milestone triggers outlined in Section 11.8(g)(iii) above.
- (j) With respect to any failure to issue to DB Co a final determination in respect of a Listed DB Co PLAA prior to the expiration of the relevant City PLAA Deadline, DB Co shall not be entitled to the Delay Event or Compensation Event pursuant to Section 32.1(a)(xv) unless the tracking system as described in Section 11.8(g) is functional and available to the City, provides notice to the City of the milestone described in Section 11.8(g)(iii), and contains accurate information as to the status of the applicable Listed DB Co PLAA at all material times.
- (k) With respect to the NCC FLUDTA:
 - (i) the City shall obtain the NCC FLUDTA, but can only do so with DB Co's performance of the obligations set out in Section 11.8(k)(ii);
 - (ii) DB Co shall use commercially reasonable efforts to assist the City in obtaining the NCC FLUDTA as required from time to time including, without limitation:
 - (A) the preparation and delivery of all Design Data in respect of the NCC FLUDTA pursuant to Schedule 10 – Review Procedure;
 - (B) the preparation and delivery of Design Development Submittals and/or Construction Document Submittals pursuant to Section 11.1 that are reasonably necessary to obtain the NCC FLUDTA;
 - (C) the preparation and delivery of such other plans, specifications, agreements, documents and instruments in respect of Works and amendments thereto that are reasonably necessary to obtain the NCC FLUDTA; and
 - (D) DB Co shall make changes to the Design Data as required by NCC to further assist the City in obtaining the NCC FLUDTA and DB Co shall take such other actions as may be reasonably directed by the City from time to time with respect thereto; and
 - (iii) if, following Commercial Close:
 - (A) NCC requires a change to the Design Data or any other additional obligation to be assumed in respect of the NCC FLUDTA pursuant to Section 11.8(a); and
 - (B) the City, in a timely manner, requires DB Co to make such change or to assume such additional obligation,

provided the change or other obligation is not otherwise a responsibility or obligation of DB Co under this Project Agreement, then such change or obligation shall result in a Variation subject to and in accordance with Schedule 22 – Variation Procedure.

11.9 Protection of Work and Property

- (a) DB Co shall protect (i) the Works and the property of the City on the Site, the New City Infrastructure, the New MTO Infrastructure, and (ii) the Existing Infrastructure and Stage 1 Connection Infrastructure (while the same is in DB Co's possession or at any time such Existing Infrastructure or Stage 1 Connection Infrastructure is the subject of ongoing Works), from damage or destruction caused by DB Co's operations under this Project Agreement, and DB Co shall, in accordance with Section 11.9(b), be responsible for such damage or destruction, except for any damage or destruction which occurs as a result of acts or omissions by the City or any City Party.
- (b) Unless this Project Agreement is terminated in accordance with its terms, and except to the extent a Relief Event or Force Majeure Event occurs in respect of which the policies required to be procured pursuant to Section 1 of Schedule 25 do not respond, if all or any part of the Works is damaged or destroyed prior to the applicable Substantial Completion Date in respect of the System Infrastructure, or prior to the applicable New Municipal Infrastructure Component Acceptance Date in respect of the New Municipal Infrastructure, or prior to the applicable Handover in respect of the New MTO Infrastructure, DB Co shall, at its own cost and expense, Make Good the Works, or any part thereof, as applicable, (the "**Reinstatement Work**") promptly and in any event as soon as practicable in the circumstances. Except as otherwise expressly provided in this Project Agreement, damage to or destruction of all or any part of the Works shall not terminate this Project Agreement or relieve DB Co of any of its obligations hereunder or entitle DB Co to any compensation from the City.
- (c) DB Co shall not undertake to repair and/or replace any damage or destruction whatsoever to adjacent property or any Existing Infrastructure owned by third parties other than MTO without first consulting the City, and in the case of Existing Infrastructure owned by MTO, without first consulting MTO and, in each case, receiving written instructions as to the course of action to be followed.
- (d) Without derogating from any obligations which DB Co may have under any Encroachment Permit, DB Co acknowledges and agrees that the timely performance of Reinstatement Work relating to damage or destruction to Existing Infrastructure owned by MTO or New MTO Infrastructure (but in all cases subject to the time period limitations provided in Sections 11.9(b)) is critical to the ability of MTO to maintain effective operations of such infrastructure. DB Co will respond to any requirement by MTO to perform Reinstatement Work within the time periods required by MTO, acting reasonably having regard to the nature of the Reinstatement Work. DB Co acknowledges and agrees that if MTO is unable to contact DB Co and/or obtain the Reinstatement Work within the time specified by MTO, MTO may take such emergency steps as are reasonable and appropriate to correct any damage or destruction or failures to comply with the Project Agreement, at DB Co's sole risk, cost and expense. Except in the case of damage caused by MTO's own forces, such emergency steps taken by MTO shall not invalidate any DB Co warranties in respect of the Works.

- (e) Notwithstanding Sections 11.9(b) and 11.9(f), Reinstatement Work carried out by DB Co in respect of New MTO Infrastructure that is not owned by MTO shall be planned and implemented by DB Co in consultation with the applicable third party.
- (f) If the Reinstatement Work is reasonably estimated to cost more than \$[REDACTED] (index linked) or in any other case where the City Representative, having regard to the nature of the damage or destruction, notifies DB Co that a Reinstatement Plan is required (excluding where the damage or destruction occurs before the applicable time periods provided in Section 11.9(b) and the City Representative acting reasonably considers that the continued application of the Design and Construction Certification Procedure would be able to adequately address the Reinstatement Work without the need for a separate Reinstatement Plan), DB Co shall, as soon as practicable and in any event within 20 Business Days after the occurrence of the damage or destruction or receipt of notification from the City Representative, as the case may be, or, if such Reinstatement Work is in respect of Highway Works, such period of time as may be required to comply with directions of MTO, (or if, with the exercise of all due diligence more than 20 Business Days is reasonably required for such purposes, then within such longer period of time after the occurrence of such damage or destruction or receipt of notification from the City Representative, as the case may be, as may be reasonably required with the exercise of all due diligence, provided DB Co exercises and continues to exercise all such due diligence) submit to the City Representative pursuant to Schedule 10 - Review Procedure a plan (a “**Reinstatement Plan**”) prepared by DB Co for carrying out the Reinstatement Work setting out, in reasonable detail, *inter alia*:
 - (i) a description of the Reinstatement Work required to restore, replace and reinstate the damage or destruction;
 - (ii) DB Co’s proposed schedule for the execution of the Reinstatement Work; and
 - (iii) the information required pursuant to Schedule 22 – Variation Procedure as if such plan were an Estimate,

and the Reinstatement Work must not be commenced until the City Representative consents thereto in accordance with Schedule 10 - Review Procedure except (A) where such Reinstatement Work relates to Existing Infrastructure owned by MTO or New MTO Infrastructure and MTO requires performance of such Reinstatement Work on an expedited basis, or (B) to the extent necessary to address any Emergency, public safety needs. Notwithstanding Sections 11.9(c), (e) and (f), where there is danger to life or property which arises out of or in connection with the performance of the Works, either Party may, but DB Co shall, immediately take such emergency action as is necessary to remove the danger.

- (g) DB Co shall cause the Reinstatement Work to be carried out in accordance with the Output Specifications and all other applicable requirements under this Project Agreement and, where applicable, in accordance with the Reinstatement Plan consented to by the City Representative in accordance with Schedule 10 - Review Procedure. All designs, plans and specifications in respect of the Reinstatement Work shall be subject to the Design and Construction Certification Procedure. If requested by the City Representative, the persons (and if applicable, a suitable parent entity thereof acceptable to the City) retained by DB Co to design and carry out any Reinstatement Work shall, as a condition to their retainer and prior to commencing any Reinstatement Work or design work in connection therewith, enter into a construction contract with DB Co and a direct agreement with the City in substantially the same forms as the Design and Construction Contract and the Construction Contractor’s Direct Agreement.

- (h) In the event any Insurance Proceeds under Insurance Policies as referred to in Schedule 30 - Insurance Trust Agreement are available to carry out the Reinstatement Work, such Insurance Proceeds shall be paid into the Insurance Trust Account and shall be dispensed in accordance with the provisions of the Insurance Trust Agreement to carry out the Reinstatement Work.

- (i) [Not used]

11.10 Liability Unaffected

- (a) DB Co shall not be relieved of any liability or obligation under this Project Agreement by the retainer or appointment of any DB Co Party, and DB Co shall cause each DB Co Party, to the extent such DB Co Party performs, or is specified hereunder to perform, the Works, to comply with the obligations of DB Co to the City in the same manner and to the same extent as DB Co.
- (b) No inspection, review, comment, approval, verification, confirmation, certification, acknowledgement or audit pursuant to the provisions of this Project Agreement by the City, the City Representative, Lenders' Consultant, MTO, RTG, or anyone on their behalf, nor any failure of any of them to do so, shall relieve DB Co from performing or fulfilling any of its obligations under this Project Agreement or be construed as an acceptance of the Works or any part thereof.

11.11 Safety

- (a) DB Co shall, from Financial Close until the East Substantial Completion in respect of the System Infrastructure comprising the East Works, West Substantial Completion in respect of the System Infrastructure comprising the West Works, the applicable New Municipal Infrastructure Component Acceptance Date in respect of the New Municipal Infrastructure, the applicable Handover in respect of the New MTO Infrastructure, and West Final Completion in respect of the Remaining Works:
 - (i) comply with the health and safety requirements in Schedule 11 – Integrated Management System Requirements of the Project Agreement, its Integrated Management System, and the Construction Safety Management Plan;
 - (ii) keep the Site (including Existing Infrastructure on the Site), the Works, the New City Infrastructure and the New MTO Infrastructure in a safe and orderly state, as appropriate in accordance with Good Industry Practice, to avoid danger to persons on the Site (including Existing Infrastructure on the Site), the New City Infrastructure and the New MTO Infrastructure and in the immediate vicinity of the Site (including Existing Infrastructure on the Site), the New City Infrastructure and the New MTO Infrastructure;
 - (iii) take such measures as are reasonable in accordance with Good Industry Practice to prevent access to the Site (including Existing Infrastructure on the Site), the New City Infrastructure and the New MTO Infrastructure of any persons or creatures not entitled to be there;
 - (iv) comply, and cause each DB Co Party to comply,
 - (A) with Applicable Law relating to health and safety, including without limitation the *Occupational Health and Safety Act* (Ontario) and all regulations thereto;

- (B) with the Construction Access Management Plan, the Traffic and Transit Management Plan and all rules, requirements and restrictions relating to access, rail safety and operations and track protection, and road safety and operations, as set out in Schedule 15 – Output Specifications; and
 - (C) with any direction or instruction from Transport Canada pursuant to any contractual arrangement or board order involving Transport Canada and MTO with respect to the System Infrastructure corridor and facilitate and provide cooperation with respect to any inspections by Transport Canada on the Lands.
 - (v) register the Project with the MOL by way of a Notice of Project, pursuant to the Applicable Law, with the purpose of designating DB Co as the “constructor” for all Works on the Site;
 - (vi) with respect to the Works, cause a COR-Certified Construction DB Co Party or, prior to receipt of COR Certification, a COR-Qualified Construction DB Co Party, to perform, all of the obligations of the “constructor”, and indemnify the City, each City Party and each Government Entity against any and all of the liabilities of the “constructor”, under the *Occupational Health and Safety Act* (Ontario) and all regulations thereto;
 - (vii) provide the City with a certificate of good standing from WSIB or any successor thereto once every 90 days; and
 - (viii) facilitate and provide cooperation with respect to any inquiry or investigation of the MOL with respect to the Project.
- (b) New MTO Infrastructure and New City Infrastructure shall, for the all purposes of this Project Agreement, become Existing Infrastructure upon the earlier of, in the case of,
- (A) New MTO Infrastructure, the applicable Handover; and
 - (B) System Infrastructure comprising the East Works, East Substantial Completion;
 - (C) System Infrastructure comprising the West Works, West Substantial Completion; and
 - (D) New Municipal Infrastructure, the applicable New Municipal Infrastructure Component Acceptance Date.
- (c) At any time that the Works are being carried out in or around the Existing Infrastructure or Stage 1 Connection Infrastructure, DB Co shall at all times:
- (i) ensure that it complies with all safety requirements set out in the Project Agreement, including those set out in Section 11.11(a) above; and
 - (ii) keep the Existing Infrastructure or Stage 1 Connection Infrastructure in a safe and orderly state, as appropriate and in accordance with Good Industry Practice, to avoid any danger

to the System Users, employees, visitors and other persons attending the Existing Infrastructure or Stage 1 Connection Infrastructure.

- (d) If the MOL determines pursuant to the *Occupational Health and Safety Act* (Ontario) that DB Co is not the “constructor” for the Site or any portion thereof, then the following shall apply:
 - (i) DB Co shall comply with the instructions of the “constructor” relating to matters of health and safety on the Site, or such portion thereof, methods and manner of construction, and coordination and scheduling of the “constructor’s” works with the Works.
 - (ii) If DB Co’s activity or presence on the Site causes the City to be named “constructor” by MOL, DB Co will immediately take any necessary remedial action, including vacating the Site, to ensure that the MOL determines that DB Co is the “constructor”.
 - (iii) If a third party is named “constructor” by MOL, DB Co shall not interfere with or delay the third party’s work, and shall not do anything whatsoever that causes the third party to be in contravention of its obligations under the *Occupational Health and Safety Act* (Ontario). DB Co shall immediately cease and desist any activity that results or has a likelihood of resulting in such interference with or delay of the work of the third party.
 - (iv) DB Co shall indemnify the City, each City Party and each Government Entity against any and all of the liabilities arising from a determination by the MOL that the City, or both the City and a third party contractor has been designated as the “constructor”, under the *Occupational Health and Safety Act* (Ontario).
- (e) In the event that an act or omission of DB Co causes or contributes to an MOL determination that DB Co is not the “constructor” for its work, or if DB Co is denied access to the Site pursuant to Section 11.11(d)(iii), DB Co will not be eligible for a Delay Event or a Compensation Event.

11.12 Additional Works, Third Party Works and RTG Works

- (a) DB Co shall, having regard to DB Co’s obligations set out in Section 17, arrange and carry out all coordination of the Works with the Third Party Works directly with the applicable Third Party Contractor.
- (b) The City may, in its sole discretion, carry out Additional Works.
- (c) From Financial Close until the Substantial Completion Date for the Works affected by such Additional Works, the City may assign the responsibility for directing methods and manner of construction (where applicable) of the Additional Works, the coordination and scheduling of the Additional Works and the safety training in respect of the Additional Works to DB Co. For clarity, the City may, in its sole discretion, assign such responsibilities to DB Co, subject to Section 11.12(h).
- (d) In connection with the Additional Works, the City shall,
 - (i) cause Additional Contractors to comply with the instructions of DB Co relating to matters of health and safety on the Site, methods and manner of construction (where applicable), and coordination and scheduling of the Additional Works with the Works;

- (ii) enter into separate contracts with Additional Contractors,
 - (A) under conditions of contract which are compatible with the conditions of this Project Agreement;
 - (B) that require Additional Contractors to comply with Section 11.12(e) and all directions of DB Co in respect of any matter regarding health and safety on the Site, and methods and manner of construction (where applicable); and
 - (C) that require Additional Contractors to comply with DB Co's coordination and scheduling of the Additional Works; and
- (iii) ensure that insurance coverage is provided by each Additional Contractor as would be required by a prudent owner similarly situated and coordinate such insurance with the insurance coverage of DB Co and in any event, such insurance shall provide for liability insurance of not less than \$[REDACTED].
- (e) In connection with the Additional Works, if the City has assigned responsibilities to DB Co pursuant to Section 11.12(c), DB Co shall,
 - (i) provide for the methods and manner of construction (where applicable) of the Additional Works and the coordination and scheduling of the Additional Works with the Works to be performed under this Project Agreement;
 - (ii) for each of the East Works, West Works and Highway Works, assume overall responsibility for compliance with all aspects of Applicable Law relating to health and safety at the Site, including all the responsibilities of the "constructor" under the Occupational Health and Safety Act (Ontario), prior to the applicable Substantial Completion Date and, exercised in a manner consistent with the *Occupational Health and Safety Act* (Ontario), at any time that DB Co is acting as a "constructor" on the Site, or the applicable portion thereof, following the applicable Substantial Completion Date;
 - (iii) provide Additional Contractors reasonable opportunity to introduce and store their products and use their construction machinery and equipment to execute the Additional Works, as applicable;
 - (iv) participate with the City and Additional Contractors in reviewing the construction schedules of Additional Contractors, when directed to do so by the City; and
 - (v) if part of the Works is affected by or depends upon, for its proper execution, the Additional Works, promptly report to the City in writing and prior to proceeding with that part of the Works any readily apparent deficiencies in the Additional Works. Failure by DB Co to so report shall invalidate any claims against the City by reason of such readily apparent deficiencies.
- (f) In the case of Additional Works carried out prior to the last Substantial Completion, if:
 - (i) any Additional Contractors cause any damage to the Works;

- (ii) DB Co incurs any additional costs or there is any delay in the Works Schedule as a result of any Additional Contractors not complying with the coordination, scheduling and safety instructions of DB Co; or
- (iii) subject to the performance by DB Co of its obligations under this Section 11.12, if DB Co incurs any additional costs or there is any delay in the Works Schedule as a result of any such Additional Works,

then any such delay in the Works Schedule or additional costs in respect of the Works shall, subject to and in accordance with Section 32 be treated as a Delay Event and, subject to and in accordance with Section 33, be treated as a Compensation Event.

- (g) Claims, disputes, and other matters in question between DB Co and Additional Contractors shall be dealt with in substantially the same manner as contemplated in Schedule 27 – Dispute Resolution Procedure provided the Additional Contractors are subject to reciprocal dispute resolution obligations in the contracts between the City and the Additional Contractors. DB Co shall be deemed to have consented to arbitration of any dispute with any Additional Contractor whose contract with the City contains a reciprocal agreement to arbitrate.
- (h) In connection with the Additional Works, DB Co may request a Variation as follows:
 - (i) DB Co shall have a period of 10 Business Days following Notice from the City of the City's intention to carry out such Additional Works, including a reasonable description of such Additional Works, to request a Variation if such Additional Works are
 - (A) reasonably expected to make void a warranty made in favour of DB Co from a DB Co Party or equipment supplier and given in accordance with Good Industry Practice; or
 - (B) reasonably expected to have a material negative consequence on DB Co's ability to perform any of the Works, including a material delay in performance of the Works, or material additional costs in respect of the Works;
 - (ii) If DB Co has made a request for a Variation in accordance with Section 11.12(h)(i), the City shall, within 10 Business Days after such request, either issue a Variation Enquiry or give Notice to DB Co that it does not agree that a Variation is required;
 - (iii) Either Party may refer the question of whether a Variation is required for resolution in accordance with Schedule 27 – Dispute Resolution Procedure; and
 - (iv) If the City has, under Section 11.12(h)(ii), given Notice to DB Co that it does not agree that a Variation is required, the City shall, within 10 Business Days after a subsequent agreement or of a determination that a Variation is required, issue a Variation Enquiry and the relevant provisions of Schedule 22 – Variation Procedure shall apply except that:
 - (A) the City shall not be entitled to withdraw any such Variation Enquiry unless the City determines not to proceed with the Additional Works or to proceed only in a manner that the Additional Works will not result in a warranty becoming void or will not result in any material negative consequence on

DB Co's ability to perform any of the Works and DB Co has agreed with such conclusion, or the Parties otherwise agree; and

- (B) the Parties shall, without prejudice to their respective general obligations to comply with the terms of this Project Agreement, use commercially reasonable efforts to mitigate the adverse effects with respect to any void or voidable warranty and take commercially reasonable steps to minimize any increase in costs arising from any void warranty.
- (i) Placing, installing, applying or connecting the Additional Works performed by Additional Contractors on and to the Works performed by DB Co shall not relieve DB Co from its obligations under the Project Agreement with respect to the Works, except to the extent expressly described in any Variation Confirmation.
- (j) In connection with the RTG Stage 1 PA Works and RTG City Party Works, the City shall enter into and/or maintain contractual terms with RTG, including the Stage 1 Project Agreement and variations thereto,
 - (i) which are compatible with the conditions of this Project Agreement;
 - (ii) that require RTG and RTG Parties to comply with directions of DB Co in respect of any matter regarding health and safety on the Site;
 - (iii) that require RTG and RTG Parties to take reasonable steps to minimize undue interference with the provision of the Works by DB Co or any DB Co Party; and
 - (iv) in respect of the RTG Systems Integration Works, that require RTG and RTG Parties to comply with the Systems Integration Management Plan.
- (k) In the case of RTG Stage 1 PA Works and RTG City Party Works, if:
 - (i) RTG or any RTG Party causes any damage to the Works; or
 - (ii) DB Co incurs any additional costs or there is any delay in the Works Schedule as a result of any act or omission of RTG or any RTG Party, including due to non-compliance with the Systems Integration Management Plan by RTG or any RTG Party in the performance of the RTG Systems Integration Works or RTG Stage 1 PA Works,then any such delay in the Works Schedule or additional costs in respect of the Works shall, subject to and in accordance with Section 32 be treated as a Delay Event and, subject to and in accordance with Section 33, be treated as a Compensation Event.
- (l) To the extent that any City Party or Additional Contractor (other than RTG or an RTG Party) undertakes Remaining System Integration Work or any of the activities outlined in Section 5.2(m) of Schedule 15-2 Part 1, then the City shall be subject to the same obligations in respect of such City Party or Additional Contractor as set out in Section 11.12(j) and (k) as if such City Party or Additional Contractor were RTG or an RTG Party, *mutatis mutandis*.
- (m) Claims, disputes, and other matters in question between DB Co and RTG shall be dealt with (i) in respect of matters governed by the Interface Agreement, in accordance with the dispute resolution

procedure in the Interface Agreement, and (ii) in respect of all other matters involving the City, in substantially the same manner as contemplated in Schedule 27 – Dispute Resolution Procedure and the City shall ensure RTG is subject to reciprocal dispute resolution obligations in the Stage 1 Project Agreement and variations thereto, including in respect of Systems Integration Disputes which shall be referred at first instance to the Systems Integration Verifier in accordance with Schedule 27 – Dispute Resolution Procedure. DB Co shall be deemed to have consented to arbitration of any dispute with RTG.

11.13 Protest and Trespass

- (a) Except as otherwise provided in this Project Agreement, the City shall not be responsible for the presence of any persons participating in civil disobedience, demonstration or protest action (“**Protesters**”) or any other persons otherwise not entitled to be on or around the Lands (“**Trespassers**”). For greater certainty, the presence of, or interference by, any Protesters or Trespassers on or around the Lands shall not be a breach of the obligation of the City to grant licence rights of use and access to DB Co on and over the Lands pursuant to Section 16 nor a breach of any other obligation, representation or warranty under this Project Agreement.
- (b) Prior to the applicable Substantial Completion Date, the management of any Protesters or Trespassers shall be the responsibility of DB Co in respect of the Site (including Existing Infrastructure on the Site), to the extent such management is not otherwise the responsibility of the Police Service.
- (c) If, prior to the applicable Substantial Completion Date, Protesters or Trespassers occupy the Site, facilities or infrastructure referred to in Section 11.13(b), or access to such Site, facilities, or infrastructure is prevented or interfered with by Protesters or Trespassers, DB Co shall use all appropriate measures reasonable in the circumstances to manage such Protesters or Trespassers and promptly notify the City Representative of such occurrence and of the action which DB Co proposes to take in respect thereof. DB Co may exercise any legal remedy available to it to remove Protesters or Trespassers from the Site, facilities or infrastructure referred to in Section 11.13(b), provided that if DB Co does elect to exercise any such legal remedy, DB Co shall give the City Representative at least 24 hours’ Notice prior to commencing any such legal proceeding (except in a case of Emergency, danger to persons or material destruction or material damage to property where, in such circumstances, such Notice may be given to the City less than 24 hours prior to the commencement of such legal proceeding) and shall continually update the City Representative as to the status of any such legal proceeding in reasonable detail and at reasonable intervals, and provided further that:
 - (i) DB Co shall not give directly or indirectly to any Protester or Trespasser any inducement, monetary or otherwise, with a view to avoiding, limiting or influencing the manner of protest activities by that Protester or Trespasser or by other Protesters or Trespassers; and
 - (ii) DB Co shall not by virtue of this Section 11.13(c) be prevented from entering into *bona fide* settlements of claims brought against it by Protesters or Trespassers which provide for reasonable payments in satisfaction of such claims or agreeing to any reasonable cost orders in any proceedings.
- (d) DB Co may request the assistance of the City (at the cost of DB Co) to remove Protesters or Trespassers from the Site, Lands, facilities or infrastructure set out in Section 11.13(b), if DB Co demonstrates to the City’s reasonable satisfaction that:

- (i) DB Co is pursuing legal remedies available to it to remove the Protesters or Trespassers (provided that for this purpose DB Co may, but shall not be obligated to, prosecute injunctive or other judicial remedies beyond the court of first instance); and
- (ii) the continued presence of the Protesters or Trespassers is having a material adverse effect on the conduct of the Works that DB Co is unable to mitigate.

Following such request, the City shall notify DB Co whether the City can lawfully provide any assistance in relation to the removal of the Protesters or Trespassers that is not independently available to DB Co and, to the extent that such assistance can be lawfully provided, the City shall provide such assistance (at the cost of DB Co) to the extent it is, in the discretion of the City, reasonable and appropriate in the circumstances to do so.

11.14 Adjacent Developments

- (a) DB Co shall,
 - (i) having regard to this Section 11.14, review all planning and development applications received from the City in connection with proposed Adjacent Developments;
 - (ii) as required by the City, provide all commercially reasonable assistance to,
 - (A) facilitate the discussion, agreement and any implementation of proposals with respect to Adjacent Developments; and
 - (B) avoid or mitigate any adverse impact of an Adjacent Development on the Works and the New City Infrastructure;
 - (iii) subject to DB Co's reasonable operational and health and safety requirements, permit the developer of the Adjacent Development to post or affix signage in respect of the Adjacent Development, which signage may identify the Adjacent Development project architect, engineer and lender, and other members of the developer's project team;
 - (iv) subject to DB Co's reasonable operational and health and safety requirements, permit the developer of the Adjacent Development to post or affix, at one location on the Lands, signage, as required in connection with a development application; and
 - (v) at the City's request, provide to the developer of an Adjacent Development, all Project documentation in respect of the design and construction of elements of the New City Infrastructure that are relevant to the Adjacent Development, subject to the developer of the Adjacent Development, executing a confidentiality agreement and a waiver of liability, each in a form and substance satisfactory to the City and DB Co, each acting reasonably.
- (b) The City shall ensure that any contract entered into by the City with the developer of an Adjacent Development, in respect of which Section 11.14(a) is reasonably expected to apply, will contain a reciprocal provision to Section 11.14(a) for the benefit of DB Co.
- (c) All work and activities undertaken by DB Co or any DB Co Party pursuant to this Section 11.14 shall be at DB Co's own cost, provided that in the event that more than [REDACTED] Adjacent

Development applications are referred to DB Co by the City in a calendar year, then DB Co shall be entitled to a Variation in respect of the review of such development applications in excess of [REDACTED] applications per calendar year referred to them.

11.15 Defective Works

- (a) Prior to East Substantial Completion and save with respect to possible East Minor Deficiencies identified in accordance with Section 25.10(a), DB Co shall promptly Make Good any Construction Defects in respect of the East Works (an “**East Construction Defect**”) whether or not such East Construction Defect has been incorporated into the New City Infrastructure and whether or not the East Construction Defect is the result of poor workmanship, use of defective Products or equipment or damage through carelessness or other act or omission of DB Co. The correction of East Construction Defects shall be at DB Co’s sole cost and expense. DB Co shall Make Good, in a manner acceptable to the Independent Certifier, or, in the case of New Municipal Infrastructure, the City Engineer, all East Construction Defects, whether or not they are specifically identified by the Independent Certifier or the City Engineer, as the case may be, and DB Co shall prioritize the correction of any East Construction Defects so as not to interfere with or derogate from the Works Schedule, provided that DB Co shall prioritize the correction of any East Construction Defects that in the sole discretion of the City is determined to adversely affect the day to day operation of the City.
- (b) Prior to West Substantial Completion and save with respect to possible West Minor Deficiencies identified in accordance with Section 25.10(b), DB Co shall promptly Make Good any Construction Defect (other than Highway Construction Defects which shall be addressed in accordance with Section 11.15(c)) in respect of the West Works (a “**West Construction Defect**”) whether or not such West Construction Defect has been incorporated into the New City Infrastructure and whether or not the West Construction Defect is the result of poor workmanship, use of defective Products or equipment or damage through carelessness or other act or omission of DB Co. The correction of West Construction Defects shall be at DB Co’s sole cost and expense. DB Co shall Make Good, in a manner acceptable to the Independent Certifier, or, in the case of New Municipal Infrastructure, the City Engineer, all West Construction Defects, whether or not they are specifically identified by the Independent Certifier or the City Engineer, as the case may be, and DB Co shall prioritize the correction of any West Construction Defects so as not to interfere with or derogate from the Works Schedule, provided that DB Co shall prioritize the correction of any West Construction Defects that in the sole discretion of the City is determined to adversely affect the day to day operation of the City.
- (c) Prior to the applicable Handover, DB Co shall promptly Make Good any Construction Defect in respect of the Highway Works (a “**Highway Construction Defect**”) whether or not such Highway Construction Defect has been incorporated into the New MTO Infrastructure and whether or not the Highway Construction Defect is the result of poor workmanship, use of defective Products or equipment or damage through carelessness or other act or omission of DB Co. The correction of Highway Construction Defects shall be at DB Co’s sole cost and expense. DB Co shall Make Good, in a manner acceptable to the Independent Certifier, all Highway Construction Defects, whether or not they are specifically identified by the Independent Certifier, and DB Co shall prioritize the correction of any Highway Construction Defects so as not to interfere with or derogate from the Works Schedule, provided that DB Co shall prioritize the correction of any Highway Construction Defects that in the sole discretion of the City is determined to adversely affect the day to day operation of the City.

- (d) Prior to West Final Completion and save with respect to possible Remaining Works Minor Deficiencies identified in accordance with Section 25.12A(a), DB Co shall promptly Make Good any Construction Defect in respect of the Remaining Works (a “**Remaining Works Construction Defect**”) whether or not such Remaining Works Construction Defect has been incorporated into the New City Infrastructure or the New MTO Infrastructure and whether or not the Remaining Works Construction Defect is the result of poor workmanship, use of defective Products or equipment or damage through carelessness or other act or omission of DB Co. The correction of Remaining Works Construction Defects shall be at DB Co’s sole cost and expense. DB Co shall Make Good, in a manner acceptable to the Independent Certifier, all Remaining Works Construction Defects, whether or not they are specifically identified by the Independent Certifier, and DB Co shall prioritize the correction of any Remaining Works Construction Defects so as not to interfere with or derogate from the Works Schedule, provided that DB Co shall prioritize the correction of any Remaining Works Construction Defects that in the sole discretion of the City is determined to adversely affect the day to day operation of the City.
- (e) In the event DB Co is required to correct a Construction Defect pursuant to this Section 11.15, DB Co shall promptly Make Good other contractors’ work destroyed or damaged by such rectifications at DB Co’s expense.

11.16 Warranty Obligations

- (a) DB Co represents, warrants and covenants that:
 - (i) the East Works, including the New City Infrastructure and all Products, parts and workmanship provided by DB Co and DB Co Parties, including those replaced during the East Warranty Period;
 - (ii) the West Works, including the New City Infrastructure, the New MTO Infrastructure, and all Products, parts and workmanship provided by DB Co and DB Co Parties, including those replaced during the West Warranty Period; and
 - (iii) the Remaining Works, including all Products, parts and workmanship provided by DB Co and DB Co Parties, including those replaced during the Remaining Works Warranty Period,

shall conform to the requirements and specifications set out in this Project Agreement, Good Industry Practice, Applicable Law and all professional engineering principles generally accepted as standards of the industry in the Province of Ontario; be free of defects, including design defects, errors and omissions; be new, of good quality material, of merchantable quality; and all materials and equipment supplied by DB Co and DB Co Parties shall be of good quality, and in compliance with this Project Agreement and fit for their intended purpose as described in the Project Agreement.

- (b) Subject to Section 11.16(l), DB Co shall promptly, at its sole cost and expense,
 - (i) during the
 - (A) East Warranty Period correct and Make Good all East Construction Defects arising in respect of the East Works;

- (B) West Warranty Period correct and Make Good all West Construction Defects and Highway Construction Defects arising in respect of the West Works; and
 - (C) Remaining Works Warranty Period correct and Make Good all Remaining Works Construction Defects arising in respect of the Remaining Works,
 - (ii) for greater certainty, DB Co is required to correct and Make Good any Construction Defects related to any Product provided by DB Co and DB Co Parties, and any equipment supplied by DB Co and DB Co Parties during the applicable Warranty Period despite DB Co having obtained on the City's behalf industry-standard or other equipment warranties in accordance with Section 11.16(e);
 - (iii) correct and Make Good any Construction Defects that could not reasonably have been ascertained by a competent person in accordance with Good Industry Practice during a visual inspection of the Works ("**Construction Latent Defect**"), provided the City gives DB Co written Notice of the Construction Latent Defect within the time frame applicable to such Construction Latent Defect pursuant to the *Limitations Act*, 2002 (Ontario) and provided further Construction Latent Defects shall exclude:
 - (A) all electrical and mechanical components of the Works still in service beyond the supplier's recommended useful life, with such recommended useful life being consistent with Good Industry Practice; and
 - (B) any Construction Defects resulting from the effects of corrosion, erosion (other than corrosion or erosion due to Construction Defects in design and /or construction) or normal wear and tear upon any portion of the System Infrastructure or failure of the any portion of the System Infrastructure due to faulty maintenance by RTG or RTG Parties;
 - (iv) comply with the Warranty Protocol.
- (c) The warranties set out in Section 11.16(b) shall each cover labour and material, including, the costs of removal and replacement of covering materials. None of the warranties shall limit extended warranties on any Product or any item of equipment called for elsewhere in Schedule 15 - Output Specifications or otherwise provided by any manufacturer of such Product or item of equipment. DB Co shall ensure that all extended warranties specified in the Project Agreement are provided and shall, in the case of the System Infrastructure, assign to the City or such entity as the City may direct, all such extended warranties as the City or its designate may direct, and in the case of the New MTO Infrastructure, assign to the MTO, all such extended warranties the MTO may direct.
- (d) [Intentionally Deleted]
- (e) DB Co shall obtain warranties from the manufacturers of each of the Products and items of equipment for the duration(s) and in accordance with the applicable requirements specified in Schedule 15 - Output Specifications in the name of and to the benefit of DB Co, the City in the case of New City Infrastructure, and the MTO in the case of New MTO Infrastructure. Where, in respect of a Product warranty or equipment warranty, the Output Specifications do not specify a specific duration and/or other requirements, DB Co shall obtain industry-standard warranties

from the applicable manufacturers in the name of and to the benefit of DB Co and the City and shall use commercially reasonable efforts to ensure that such Product warranties and equipment warranties extend for as long a period as possible.

- (f) In respect of the East Works, each Product warranty and equipment warranty shall be issued by the applicable manufacturer and delivered to DB Co no later than 30 days prior to the East Substantial Completion Date. DB Co shall ensure that each Product warranty and equipment warranty, including any Product warranty or equipment warranty extended under Section 11.16(e), is fully assigned to the City, at no cost or expense to the City, at the end of the East Warranty Period, as such East Warranty Period may be extended in accordance with Section 11.16(b).
- (g) In respect of the West Works other than Highway Works, each Product warranty and equipment warranty shall be issued by the applicable manufacturer and delivered to DB Co no later than 30 days prior to the West Substantial Completion Date. DB Co shall ensure that each Product warranty and equipment warranty, including any Product warranty or equipment warranty extended under Section 11.16(e), is fully assigned to the City, at no cost or expense to the City, at the end of the West Warranty Period, as such West Warranty Period may be extended in accordance with Section 11.16(b).
- (h) In respect of the Highway Works, each Product warranty and equipment warranty shall be issued by the applicable manufacturer and delivered to DB Co no later than 30 days prior to the applicable Handover. DB Co shall ensure that each Product warranty and equipment warranty, including any Product warranty or equipment warranty extended under Section 11.16(e), is fully assigned to the City or the MTO, as applicable, at no cost or expense to the City or the MTO, at the end of the West Warranty Period, as such West Warranty Period may be extended in accordance with Section 11.16(b).
- (i) In respect of the Remaining Works, each Product warranty and equipment warranty shall be issued by the applicable manufacturer and delivered to DB Co no later than 30 days prior to, the West Final Completion Date. DB Co shall ensure that each Product warranty and equipment warranty, including any Product warranty or equipment warranty extended under Section 11.16(e), is fully assigned to the City, at no cost or expense to the City, at the end of the Remaining Works Warranty Period, as such Remaining Works Warranty Period may be extended in accordance with Section 11.16(b).
- (j) The City may, in its sole discretion, assign the DB Co warranties set out in Section 11.16(b) that relate to the Highway Works to the MTO, and shall provide Notice to DB Co of any such assignment of DB Co warranties. On the commencement of the first Warranty Period for each of the New City Infrastructure and the New MTO Infrastructure or any component thereof, DB Co shall provide at least two copies of each of the compilations of warranty certificates, one compilation for the New City Infrastructure and one compilation for the New MTO Infrastructure. DB Co shall update all copies of each of the compilations from time to time as each Warranty Period commences. Each of the compilations shall indicate the start and completion date of each DB Co warranty.
- (k) Subject to Section 11.12, DB Co acknowledges that,
 - (i) with respect to the New City Infrastructure, the City may, in its sole discretion; and

- (ii) with respect to the New MTO Infrastructure, the MTO may, in its sole discretion,

maintain, repair and/or alter any part or parts of the Works during the applicable Warranty Period and DB Co agrees that such work shall not impact any of the warranties provided by DB Co hereunder, provided that such work is carried out in accordance with Good Industry Practice and, if applicable, the Maintenance Instructions and that such work does not materially alter the affected part or parts of the Works.

- (l) For greater certainty, DB Co shall have no obligation under this Section 11.16 to procure, assign or enforce any manufacturer's warranties in respect of any Product or equipment which is procured or obtained by the City, any City Party, RTG or any RTG Party or Make Good any defect of deficiency in respect of the same; provided that DB Co shall not knowingly or negligently undertake any course of action that has the effect of nullifying or materially diminishing the enforceability of any such manufacturer's warranty.

11.17 Warranty Work and Prompt Repair of Warranty Work

- (a) DB Co shall carry out all Warranty Work,
 - (i) in respect of the East Works (such work, the "**East Warranty Work**");
 - (ii) in respect of the West Works (such work, the "**West Warranty Work**"); and
 - (iii) in respect of the Remaining Works (such work, the "**Remaining Works Warranty Work**").

All Warranty Work shall be carried out and completed at DB Co's sole cost and expense and Warranty Work shall not be the basis of a claim for a Delay Event, a Compensation Event, a Variation, additional compensation or damages. The applicable Warranty Period shall be extended for a further one year in respect of Remaining Works Warranty Work, and two years in respect of all other Warranty Work, in each case from the date of such Warranty Work is completed and accepted by the City in respect of the New City Infrastructure or any component thereof, and by the MTO in respect of the New MTO Infrastructure or any component thereof. For clarity, any extension of a Warranty Period for the purposes of a correction shall only apply to the relevant Warranty Work and not the Works as a whole, and in no event shall a Warranty Period be extended for a period in excess of two years following the expiry of the initial Warranty Period.

- (b) DB Co acknowledges and agrees that, the timely performance of Warranty Work is critical to the ability of the City to maintain effective operations of the New City Infrastructure, and to the ability of the MTO to maintain effective operations of the New MTO Infrastructure. DB Co shall use commercially reasonable efforts to respond to any requirement by the City or the MTO to perform Warranty Work within the reasonable time periods required by the City or the MTO to perform the Warranty Work for the New City Infrastructure or the New MTO Infrastructure, or, where applicable, within such time periods as required in a Warranty Request under the Warranty Protocol. Except where the Warranty Protocol imposes a specific additional obligation, DB Co shall commence and complete Warranty Work as expeditiously as possible and at times convenient to the City or MTO, as applicable, which may require work outside normal working hours at DB Co's expense. Any extraordinary measures required to complete such Warranty Work, as reasonably directed by the City or the MTO to accommodate the operation of the New

City Infrastructure, the New MTO Infrastructure, the Existing Infrastructure, the Stage 1 Connection Infrastructure or other aspects of the Project as constructed, shall be at DB Co's sole cost and expense. In relation to critical areas required for effective operations, DB Co shall commence, carry out and complete all Warranty Work on an urgent basis, as is reasonable having regard to the nature of the Warranty Work, taking into account the circumstances and any timelines for commencement and completion as may be communicated by the City, with respect to the New City Infrastructure, or the MTO, with respect to the New MTO Infrastructure, to DB Co.

(c) DB Co acknowledges and agrees that if,

- (i) subject to the Warranty Protocol, the City with respect to the New City Infrastructure; or
- (ii) the MTO with respect to the New MTO Infrastructure,

is unable to contact DB Co and/or obtain Warranty Work promptly, or, in the case of urgent Warranty Work within the time period specified in accordance with Section 11.17(b), the City and the MTO, as applicable, may take such emergency steps as are reasonable and appropriate to correct any defects, deficiencies or failures to comply with the Project Agreement, at DB Co's sole cost and expense. Except in the case of damage caused by the City's or the MTO's own forces, or where such emergency steps are not performed in accordance with Good Industry Practice or applicable Maintenance Instructions, such emergency steps taken by the City's or the MTO's own forces, as applicable, shall not invalidate any DB Co warranties in respect of the Works.

(d) If DB Co fails to carry out Warranty Work in accordance with Section 11.16(b), and in the time specified in Section 11.17(b) or subsequently agreed upon, without prejudice to any other right or remedy the City may have, the City and the MTO, as applicable, may perform such Warranty Work at the sole risk, cost and expense of DB Co and may draw down on the relevant Warranty Letter of Credit to fund or as reimbursement for such costs and expenses.

(e) DB Co acknowledges and agrees that all rules, requirements and restrictions relating to access, rail safety and operations and track protection, as set out in Schedule 15 – Output Specifications, apply to DB Co's performance of its obligations in accordance with Sections 11.16(b) and 11.17.

(f) DB Co shall be solely responsible for obtaining access from MTO for the purpose of carrying out Warranty Work. DB Co acknowledges that such access to the New MTO Infrastructure may be subject to such limitations as may be imposed by MTO, and that DB Co may be required to obtain a Permit, Licence, Approval or Agreement to access the New MTO Infrastructure for the purpose of carrying out Warranty Work. If, after making commercially reasonable efforts and otherwise complying with its obligations pursuant to this Project Agreement, DB Co is unable to obtain access to the New MTO Infrastructure, DB Co shall refer the matter to the City, and if City is unable to facilitate access to the New MTO Infrastructure in a timely manner, DB Co shall be excused from its obligations to carry out such Warranty Work.

(g) The warranties set out in Sections 11.16(b) and 11.17 shall not deprive the City or the MTO of any action, right or remedy otherwise available to the City or the MTO at law or in equity, and the periods referred to in this Section 11.17 shall not be construed as a limitation on the time in which the City or the MTO may pursue such other action, right or remedy.

- (h) Neither test results, nor selection or approval by the City or the City Representative of testing entities, nor any other thing in the Project Agreement shall have the effect of limiting or shortening or otherwise affecting in any way whatsoever the duration, effectiveness or content of any guarantee or warranty set forth in any other document or material forming part of the Project Agreement.
- (i) DB Co's aggregate maximum liability in respect of or relating to Warranty Work (including Remaining Works Warranty Work) shall be limited to the amount of the limitation on liability under the Performance Guarantee of Construction Contractor. This limitation on liability shall include, and be applicable to, (i) all costs incurred by or on behalf of the City or MTO to perform the Warranty Work, (ii) all liquidated damages payable by DB Co to the City pursuant to Section 11.17A, (iii) all Defect Rectification Costs and Direct Losses payable by DB Co to RTG under the Interface Agreement.

11.17A Liquidated Damages for Failure to Perform Warranty Work

- (a) The City shall provide Notice to DB Co of whether a Construction Defect is anticipated to be a Minor Construction Defect, Medium Construction Defect, Major Construction Defect or Critical Construction Defect, as soon as reasonably practicable after becoming aware of such Construction Defect, and shall thereafter notify DB Co as soon as reasonably practicable after becoming aware of any change in categorization of such Construction Defect.
- (b) Without prejudice to the City's other rights and remedies under Section 11.17, but subject to Section 11.17A(f), if DB Co has been provided with access to the System Infrastructure reasonably required to undertake Warranty Work in accordance with Section 11.17, but fails or refuses to perform Warranty Work required to rectify any Construction Defect in respect of the System Infrastructure within the reasonable time period required by the City in accordance with Section 11.17(b), or such time period set out in a Warranty Request in respect of such Construction Defect, as applicable, then DB Co shall:
 - (i) if the applicable Construction Defect is a Minor Construction Defect, pay to the City the sum of \$[REDACTED] per calendar day after the expiry of such time period until such Warranty Work is completed, as liquidated damages in respect of damages suffered and costs incurred by the City related to DB Co's failure or refusal to perform such Warranty Work within such time period;
 - (ii) if the applicable Construction Defect is a Medium Construction Defect, pay to the City the sum of \$[REDACTED] per calendar day after the expiry of such time period until such Warranty Work is completed, as liquidated damages in respect of damages suffered and costs incurred by the City related to DB Co's failure or refusal to perform such Warranty Work within such time period; or
 - (iii) if the applicable Construction Defect is a Major Construction Defect, pay to the City the sum of \$[REDACTED] per calendar day after the expiry of such time period until such Warranty Work is completed, as liquidated damages in respect of damages suffered and costs incurred by the City related to DB Co's failure or refusal to perform such Warranty Work within such time period;

provided that, except as otherwise set forth in Step 1.8(d) of the Warranty Protocol, in no event shall such liquidated damages commence to accrue until the later of (A) seven (7) calendar days

after DB Co's receipt of either (i) Notice from the City of such Construction Defect or (ii) the applicable Warranty Request under the Warranty Protocol, whichever is earlier or (B) the lapse of the applicable DB Co Response Period.

- (c) Without prejudice to the City's other rights and remedies under Section 11.17, but subject to Section 11.17A(f), if the applicable Construction Defect is a Critical Construction Defect, provided DB Co has been provided with access to the System Infrastructure reasonably required to undertake Warranty Work in accordance with Section 11.17, DB Co shall pay to the City the sum of \$[REDACTED] per calendar day for each day after receipt of Notice of such Critical Construction Defect or receipt of the applicable Warranty Request, as the case may be, until Warranty Work is completed, as liquidated damages in respect of damages suffered and costs incurred by the City related to DB Co's failure or refusal to promptly perform such Warranty Work; provided that, except as otherwise specified in Step 1.8(d) of the Warranty Protocol, in no event shall such liquidated damages commence to accrue until the later of (A) three (3) calendar days after DB Co's receipt of either (i) Notice from the City of such Construction Defect or (ii) the applicable Warranty Request under the Warranty Protocol, whichever is earlier, or (B) the lapse of the applicable DB Co Response Period.
- (d) Notwithstanding Section 11.17A(a), in the event such Warranty Work is undertaken by the City in accordance with 11.17(d), liquidated damages under section 11.17A(b) and (c) shall only accrue for that period of time in excess of the time period required by the City in accordance with Section 11.17(b) or set out in the applicable Warranty Request, as the case may be, until such Warranty Work is completed by the City or RTG. Where such Warranty Work is undertaken by RTG in accordance with the Warranty Protocol, liquidated damages shall only accrue for that period specified in Step 1.8(d) of the Warranty Protocol.
- (e) The Parties agree that the liquidated damages set out in this Section 11.17A are not a penalty but represent a genuine and reasonable pre-estimate of the damages that will be suffered by the City or any City Party related to DB Co's failure to timely perform Warranty Work in accordance with this Project Agreement, including, as applicable, the Warranty Protocol. DB Co further agrees that it is, and shall be, estopped from alleging that any liquidated damages set out in this Section 11.17A are a penalty and not liquidated damages, or are otherwise unenforceable for any reason, including that such damages were not incurred.
- (f) Subject to Section 11.17A(g) and subject to an aggregate maximum liability of DB Co for liquidated damages under this Section 11.17A equal to \$[REDACTED], unless otherwise specified herein, liquidated damages that accrue under this Section 11.17A shall become due and payable from time to time upon the City giving Notice to DB Co. Any such Notice shall specify the amount of liquidated damages that have accrued and are payable by DB Co to the City as of the date of such Notice. If such liquidated damages are not paid by DB Co within 10 Business Days from the date of such Notice, the City may recover any such liquidated damages due by DB Co by setting off such amounts from any amounts due or owing by the City to DB Co hereunder, or by drawing down the corresponding amount from the applicable Warranty Letter of Credit, in each case as required by the City, acting in its discretion. Failure by the City to provide a Notice to DB Co under this Section 11.17A(f) shall not constitute a waiver of the City's right to claim, or otherwise release DB Co from liability for, all liquidated damages under this Section 11.17A at any time.
- (g) In the event that there is a Dispute concerning whether or not a defect constitutes a Construction Defect or the required time period for performance of the required Warranty Work, and such

Dispute is ongoing, the City shall not be entitled to payment of related liquidated damages pursuant to this Section 11.17A unless and until such Dispute is resolved in accordance with either the Dispute Resolution Procedure, or the procedure in Appendix 6 of the Interface Agreement, as applicable, and, if resolved in favour of the City, the provisions respecting liquidated damages contained in this Section 11.17A shall apply with retroactive effect, except that there shall be added to the amount payable by DB Co on account of liquidated damages, interest at the rate of [REDACTED] percent per annum from the date the liquidated damages were required to be paid in the absence of the Dispute to the date of payment.

- (h) Notwithstanding the forgoing provisions of this Section 11.17A, provided DB Co has complied with, and exercised all commercially reasonable efforts to enforce, the warranty provisions in the Nominated Signalling Subcontract, liquidated damages shall not accrue under this Section 11.17A for a period of delay in completion of Warranty Work to the extent such delay is attributable to a delay or failure of the Nominated Signalling Subcontractor in undertaking Warranty Work in respect of the Nominated Signalling Subcontractor Works pursuant to the Nominated Signalling Subcontract.

11.18 Warranty Letter of Credit

- (a) DB Co shall deliver, or cause to be delivered, to the City unconditional and irrevocable letters of credit from any one or more of the Schedule I Canadian chartered banks or any other financial institutions approved by the City in the City's sole and absolute discretion, in each case, whose current long-term issuer rating is at least "A" by Standard & Poor's and "A2" by Moody's Investor Services or an equivalent rating by another party acceptable to the City, in its sole and absolute discretion, in favour and for the direct and exclusive benefit of the City, in the form set out in Schedule 7B – Warranty Letter of Credit (each, a "**Warranty Letter of Credit**"), on or before the following dates:
 - (i) the East Substantial Completion Date, in respect of the East Warranty Work (the "**East Warranty Letter of Credit**"); and
 - (ii) the West Substantial Completion Date, in respect of the West Warranty Work (the "**West Warranty Letter of Credit**").

If no warranty claims are made pursuant to Sections 11.16 and 11.17 within the first year of the any Warranty Period, the value of the applicable Warranty Letter of Credit shall be reduced by [REDACTED]% for the remainder of the initial two year term of such Warranty Period. If a Warranty Period is extended in accordance with Section 11.17(a) in respect of Warranty Work, the value of the applicable Warranty Letter of Credit shall, for the duration of the extension beyond the initial two year term of such Warranty Period, be reduced to an amount equal to [REDACTED]% of the value of such Warranty Work.

- (b) Unless a Warranty Letter of Credit is drawn by the City in accordance with the provisions of this Project Agreement, the City shall release and deliver the,
 - (i) East Warranty Letter of Credit to DB Co on the day following the expiry of the East Warranty Period; and
 - (ii) West Warranty Letter of Credit to DB Co on the day following the expiry of the West Warranty Period,

each Warranty Period as may be extended pursuant to Section 11.17(a).

- (c) If an East Warranty Letter of Credit is drawn by the City, the City shall release and deliver the full amount of the East Warranty Letter of Credit, less,
 - (i) the amount of any warranty claims then outstanding, if any; and
 - (ii) the amount of claims previously satisfied by a draw by the City on the East Warranty Letter of Credit, if any,

on the day following the expiry of the East Warranty Period, and as it may be extended pursuant to Section 11.17(a).

- (d) If a West Warranty Letter of Credit is drawn by the City, the City shall release and deliver the full amount of the West Warranty Letter of Credit, less,
 - (i) the amount of any warranty claims then outstanding, if any; and
 - (ii) the amount of claims previously satisfied by a draw by the City on the West Warranty Letter of Credit, if any,

on the day following the expiry of the West Warranty Period, and as it may be extended pursuant to Section 11.17(a).

- (e) [Not used]
- (f) The City shall be entitled to draw on a Warranty Letter of Credit:
 - (i) in accordance with Sections 11.17(d) and 1.5(b)(iv); and/or
 - (ii) to satisfy any amounts that are due and have remained outstanding for 30 days by DB Co pursuant to the terms of this Project Agreement or the Interface Agreement.
- (g) The City may make multiple calls on the East Warranty Letter of Credit and West Warranty Letter of Credit.
- (h) DB Co shall continuously maintain, replace or renew a Warranty Letter of Credit (or shall cause the continuous maintenance, replacement or renewal of a Warranty Letter of Credit) until such Warranty Letter of Credit is released and delivered to DB Co pursuant to Section 11.18(b), (c), or (d), as the case may be, provided that for clarity, in the event of any draw on a Warranty Letter of Credit, DB Co shall not be required to replenish the Warranty Letter of Credit to the extent so drawn.
- (i) In the event that DB Co does not renew (or does not cause the renewal of) a Warranty Letter of Credit (a “**Non-Renewed Warranty Letter of Credit**”) and does not provide (or cause the provision of) proof of such renewal to the City before the date that is 20 calendar days before the Warranty Letter of Credit’s expiry date then, at any time during such 20 calendar day period and upon providing prior written Notice to DB Co, the City may draw upon the full amount of the Non-Renewed Warranty Letter of Credit and deposit the cash proceeds thereof in a segregated bank account selected by DB Co (provided that such bank account must be at a bank that meets

the thresholds described in Section 11.18(a)) and if DB Co does not promptly select such bank account then such bank account may be selected by the City in its absolute discretion, and such cash proceeds shall thereupon stand in place of the Non-Renewed Warranty Letter of Credit until DB Co delivers (or causes the delivery of) a replacement Warranty Letter of Credit to the City. All interest earned on such cash proceeds shall be for the benefit of DB Co. The City shall be entitled to withdraw such cash proceeds in the same manner that it is permitted to draw upon a Warranty Letter of Credit under Section 11.18(f). Upon the delivery of a replacement Warranty Letter of Credit by DB Co to the City, all remaining cash proceeds and all accrued interest thereon from such segregated bank account shall be returned to DB Co or as DB Co may direct within five Business Days after the delivery of such replacement Warranty Letter of Credit by DB Co to the City.

11.18A Remaining Works Letter of Credit

- (a) On or before the West Substantial Completion Date, DB Co shall deliver, or cause to be delivered, to the City an unconditional and irrevocable letter of credit from any one or more of the Schedule I Canadian chartered banks or any other financial institutions approved by the City in the City's sole and absolute discretion, in each case, whose current long-term issuer rating is at least "A" by Standard & Poor's and "A2" by Moody's Investor Services or an equivalent rating by another party acceptable to the City, in its sole and absolute discretion, in favour and for the direct and exclusive benefit of the City, in the form set out in Schedule 7C – Remaining Works Letter of Credit (the "**Remaining Works Letter of Credit**").
- (b) Unless the Remaining Works Letter of Credit is drawn by the City in accordance with the provisions of this Project Agreement, the City shall release and deliver the Remaining Works Letter of Credit to DB Co within five Business Days following the West Final Completion Date.
- (c) If the Remaining Works Letter of Credit is drawn by the City, the City shall release and deliver the full amount of the Remaining Works Letter of Credit, less, any amounts drawn by the City on the Remaining Works Letter of Credit, to DB Co within five Business Days following the West Final Completion Date.
- (d) In the event that the Remaining Works, other than in respect of any Remaining Works Minor Deficiencies, have not been completed by the West Scheduled Final Completion Date, the City may, upon the delivery of written notice to DB Co at any time following the West Scheduled Final Completion Date, engage others to perform the work necessary to complete the Remaining Works at the risk and cost of DB Co and the City may, at any time and from time to time, fund the cost of completing such work by drawing against the Remaining Works Letter of Credit.
- (e) If, by the time specified in 25.12B(a) DB Co has failed to complete and rectify any of the Remaining Works Minor Deficiencies specified in the Remaining Works Minor Deficiencies List, the City may, upon the delivery of written notice to DB Co at any time following such date, engage others to perform the work necessary to complete and rectify such Remaining Works Minor Deficiencies, at the risk and cost of DB Co and the City may, at any time and from time to time, fund the cost of completing such work by drawing against the Remaining Works Letter of Credit.
- (f) Following the West Substantial Completion Date, in the event that:

- (i) a claim for a lien is registered against the Lands, or against the City or the holdback under the CA relating to the performance of the Remaining Works, or
- (ii) the City receives any written notice of a lien under the CA arising in relation to the performance of the Remaining Works,

and, in each case, unless DB Co makes alternative arrangements to bond or otherwise secure the amount of such lien claim and the costs associated therewith satisfactory to the City, acting reasonably, the City shall be entitled to draw down from the Remaining Works Letter of Credit, an amount the City reasonably determines would be required to satisfy the applicable lien claimant and any costs and expenses incurred by the City in connection therewith, including such amount on account of costs of the lien claimant such that the City may, upon payment of the amount of the lien claim together with such costs into court, obtain an order vacating such lien pursuant to the CA, until such time as such claim has been dealt with in accordance with the applicable provisions of Section 17.3.

- (g) The City may make multiple calls on the Remaining Works Letter of Credit.
- (h) DB Co shall continuously maintain, replace or renew the Remaining Works Letter of Credit (or shall cause the continuous maintenance, replacement or renewal of the Remaining Works Letter of Credit) until the Remaining Works Letter of Credit is released and delivered to DB Co pursuant to Section 11.18A(b), provided that, for clarity, in the event of any draw on the Remaining Works Letter of Credit, DB Co shall not be required to replenish the Remaining Works Letter of Credit to the extent so drawn.
- (i) In the event that DB Co does not renew (or does not cause the renewal of) the Remaining Works Letter of Credit and does not provide (or cause the provision of) proof of such renewal to the City before the date that is 20 calendar days before the Remaining Works Letter of Credit's expiry date, then at any time during such 20 calendar day period and then at any time and upon providing prior written Notice to DB Co, the City may draw upon the full amount of the Remaining Works Letter of Credit and deposit the cash proceeds thereof in a segregated bank account selected by DB Co (provided that such bank account must be at a bank that meets the thresholds described in Section 11.18A(a) and if DB Co does not promptly select such bank account then such bank account may be selected by the City in its sole and absolute discretion) and such cash proceeds shall thereupon stand in place of the Remaining Works Letter of Credit until DB Co delivers (or causes the delivery of) a replacement Remaining Works Letter of Credit to the City. All interest earned on such cash proceeds shall be for the benefit of DB Co. The City shall be entitled to withdraw such cash proceeds in the same manner that it is permitted to draw upon the Remaining Works Letter of Credit under Section 11.18A(d). Upon the delivery of a replacement Remaining Works Letter of Credit by DB Co to the City, all remaining cash proceeds and all accrued interest thereon from such segregated bank account shall be returned to DB Co or as DB Co may direct within five Business Days after the delivery of such replacement Remaining Works Letter of Credit by DB Co to the City.

11.18B Intentionally Deleted

11.18C Intentionally Deleted

11.18D Return of Draw Amount

- (a) In the event that the City obtains funds (the "**Draw Amount**") as a result of the City's call on any Warranty Letter of Credit or Remaining Works Letter of Credit and it is subsequently determined pursuant to the Dispute Resolution Procedure that such call was in breach of this Project Agreement or the amount of such call was in excess of the amount that the City was entitled to draw under this Project Agreement, the City shall repay such Draw Amount or excess amount, as applicable, and the Direct Losses of DB Co resulting from such wrongful or excess draw, within five (5) Business Days of such final determination; provided that, such repayment shall be conditional upon (and take place concurrently with) the restoration of such Warranty Letter of Credit or Remaining Works Letter of Credit, as applicable (if and to the extent that the applicable Warranty Letter of Credit or Remaining Works Letter of Credit has not been released by such date in accordance with this Project Agreement) by a face amount equal to the Draw Amount or excess amount, as applicable.
- (b) Notwithstanding anything to the contrary contained in this Project Agreement, the City shall only be permitted to draw on any Letter of Credit to the extent that the City's or MTO's, as applicable, entitlement to perform any Warranty Work or the Construction Defect giving rise thereto is not the subject of ongoing Dispute.

11.19 Coordination and Minimization of Disruption and Interference

- (a) DB Co shall perform the Works so as to coordinate with,
 - (i) the operations of, and the performance of any services by, the City, any City Party, any Governmental Authority, any Other Contractor, any Railway Company, any Utility Company, MTO, any Transit System and any railway system, including the performance of the Governmental Activities and the Other Works;
 - (ii) the operations of, and the performance of any RTG Works, by RTG and any RTG Party, including in accordance with the Interface Agreement (and subject to any specific coordination arrangements agreed therein);
 - (iii) the construction of the interface, connection or inter-connection between the New City Infrastructure, the New MTO Infrastructure, and any existing transit systems, highway systems, railway systems, Transit Systems, railway networks and any other Ontario or City of Ottawa road or roadway.
- (b) DB Co acknowledges and agrees that,
 - (i) DB Co has familiarized itself with all operations and activities associated with the Lands, the Existing Infrastructure and the existing transit systems, highway systems and railway systems, including the Existing Confederation Line, to the extent pertinent to or affected by the Works, and will perform the Works in accordance with, and subject to,
 - (A) this Project Agreement, including all rules, requirements and restrictions relating to access, rail safety and operations and track protection, as set out in Schedule 15 – Output Specifications;

- (B) the Traffic and Transit Management Plan and the Construction Access Management Plan; and
 - (C) the requirements of the City and the MTO,

in order to maintain normal operations and activities associated with the Lands, the Existing Infrastructure and the existing transit systems, highway systems and railway systems, including the Existing Confederation Line;
 - (ii) the carrying on of the City Activities during construction is a priority for the City, and DB Co has reviewed the Project Documents with respect to this; and
 - (iii) DB Co shall use all methods required to comply with the instructions set out in this Project Agreement during the performance of the Works, DB Co shall fully cooperate with the City in complying with such instructions during the performance of the Works. Any costs incurred by DB Co in complying with said instructions shall be part of the Guaranteed Price, except in circumstances where DB Co is otherwise entitled to additional compensation in accordance with this Project Agreement.
- (c) Except as explicitly permitted by the City or this Project Agreement, and subject to DB Co's compliance with all applicable Permits, Licences, Approvals and Agreements,
- (i) DB Co shall minimize disturbance to and interference with,
 - (A) the existing transit systems, highway systems, railway systems, and the Existing Infrastructure and Stage 1 Connection Infrastructure in accordance with this Project Agreement, including with respect to noise, dust control, access to the Lands and the particular requirements in respect of those portions of the Works which are to be carried out within the Existing Infrastructure or Stage 1 Connection Infrastructure and in respect of those portions of the Works where connections are being made to the Existing Infrastructure or Stage 1 Connection Infrastructure;
 - (B) the construction, operations or maintenance activities of the City, any Governmental Authority, any Other Contractor, any Railway Company, any Utility Company, MTO, RTG and RTG Parties in accordance with the Interface Agreement (and subject to any specific coordination arrangements agreed therein), any Transit System and any railway system, and with respect to any road or roadway, including the performance of the Governmental Activities, RTG Works and the Other Works;
 - (C) the convenience of the public in respect of, and the access of the public to and use of, any public or private roads or highways or other transportation infrastructure including the Existing Infrastructure (other than the New City Infrastructure and the New MTO Infrastructure), whether under the control or in the possession of the City or any other person, and DB Co shall minimize any lane or ramp closures or diversions, track closures or diversions and traffic diversions or restrictions.

- (d) To the extent that the Project necessitates interference, in any way, with the operation of the existing transit systems, existing highway systems, existing railway systems or Existing Infrastructure, including the imposition of any closures or detours on the existing highway systems, railway systems or Existing Infrastructure, DB Co shall use commercially reasonable efforts to cooperate with the City, Governmental Authorities, Other Contractors, Railway Companies, Utility Companies, MTO, RTG and RTG Parties in accordance with the Interface Agreement (and subject to any specific requirements therein), Transit Systems, railway systems and other relevant third parties to ensure the continued operation of the existing transit systems, highway systems, rail systems and Existing Infrastructure.
- (e) DB Co shall develop and implement protocols in furtherance of its obligations as set out in this Section 11.19 in accordance with the Traffic and Transit Management Plan, the Construction Access Management Plan and the Output Specifications.

11.20 Substitutions

- (a) Whenever equipment, components, materials, supplies, tools, and other items are specified or otherwise described in this Project Agreement by using the name or catalogue or model number of a particular manufacturer, fabricator, vendor or distributor, or any other material name or description, the naming or identification of the item is intended to establish the type and the minimum function and quality required, and equipment, components, materials, supplies, tools, and other items of other manufacturers, fabricators, vendors or distributors shall not be substituted without the prior written consent of the City, in its sole discretion. Notwithstanding the foregoing, in the case of obsolescence of an item or in any other circumstances where the relevant prescribed item is unavailable through no fault of DB Co or any DB Co Party, to the extent the replacement item is more expensive to purchase or install than the prescribed item, or increases the costs of Works, or causes delay in the Works, such change shall, subject to and in accordance with Section 32 be treated as a Delay Event and, subject to and in accordance with Section 33, be treated as a Compensation Event. To the extent the replacement item is less expensive to purchase or install than the prescribed item, or reduces the costs of Works, such change shall be addressed as a Variation.

11.21 Change in Standards

- (a) Where this Project Agreement requires DB Co to comply with a technical standard in respect of the design and construction of the Utility Works, New City Infrastructure and the New MTO Infrastructure, and that standard has changed between the date of this Project Agreement and the date that such compliance is required, then DB Co shall give Notice to the City of such change. If, after such Notice, the City requires compliance with the changed standard (rather than the standard applicable as of the date of this Project Agreement), then, to the extent such change impacts the Works and would not have otherwise been taken into account by compliance with Good Industry Practice, such changed standard shall, subject to and in accordance with Schedule 22 – Variation Procedure, result in a Variation. If the City does not require compliance with the changed standard, then DB Co shall continue to comply with the standard applicable as of the date of this Project Agreement, without a Variation therefor. This Section 11.21 shall not apply where a change in a technical standard is also a Change in Law, in which case Article 30 shall govern.

11.22 Subcontractors and Suppliers

- (a) DB Co shall preserve and protect the rights of the Parties under this Project Agreement with respect to the works to be performed under Subcontract, and shall:
 - (i) enter into Subcontracts or written agreements with DB Co Parties to require them to perform their work as provided in the Project Agreement;
 - (ii) incorporate the relevant terms and conditions of the Project Agreement into all contracts or written agreements with DB Co Parties; and
 - (iii) be as fully responsible to the City for acts and omissions of the DB Co Parties as for acts and omissions of persons directly employed by DB Co.
- (b) Attached in Part 1 of Schedule 8 – DB Co Parties is a list of all DB Co Parties that DB Co has engaged or caused to be engaged for the performance of the Work as of the date of execution of this Project Agreement. DB Co agrees to update such list (and including, for greater clarity, Part 2 of Schedule 8) from time to time as additional DB Co Parties are engaged. Any of these named DB Co Parties listed by DB Co may be changed by DB Co upon prior Notice to (but without the approval of) the City Representative, provided however, that if the City Representative reasonably objects to any change to a Prequalified Subcontractor (other than the Nominated Signaling Subcontractor) that is a DB Co Party, then DB Co shall select an alternative replacement Prequalified Subcontractor to which the City Representative does not reasonably object.
- (c) DB Co hereby agrees to contractually obligate the Construction Contractor to enter into the Construction Contractor's Direct Agreement and, subject to Section 11.22(d), to cause the Construction Contractor to cause each of the other DB Co Parties, including Suppliers leasing any construction machinery and equipment, to enter into the Subcontractor's Direct Agreement, to evidence, among other things, that the City shall have the right to cure any default by the Construction Contractor under the Subcontract.
- (d) With the exception of the Subcontracts specifically listed in item 1 in Part 2 of Schedule 8 – DB Co Parties, none of DB Co, the Construction Contractor or the applicable DB Co Party are obliged to enter into a Subcontractor's Direct Agreement in respect of Subcontracts having a total estimated cost of \$[REDACTED] or less.
- (e) Subject to Section 11.22(d), DB Co agrees to deliver to the City the Subcontractor's Direct Agreements by the applicable due dates set out in Part 2 of Schedule 8 – DB Co Parties. If, following the date that [REDACTED]% (and issued for construction) Construction Document Submittals are submitted to the City in accordance with Schedule 10 – Review Procedure, DB Co is required to enter into any additional Subcontractor's Direct Agreement pursuant to this Section 11.22, DB Co shall deliver such Subcontractor's Direct Agreements to the City within 30 days after execution.

11.23 Apprenticeship Plan and Program

- (a) No later than six months after Financial Close, DB Co shall provide a plan setting out DB Co's Project-specific approach to maximizing apprenticeship opportunities on the Project (the

“**Apprenticeship Plan**”) for review and approval by the City. The Apprenticeship Plan shall include,

- (i) specific objectives for apprenticeship opportunities for the Project on a trade-by-trade basis;
 - (ii) apprenticeship opportunities for each trade required on the Project;
 - (iii) a confirmation that apprenticeships will be registered with the Ministry of Advanced Education and Skills Development and the Ontario College of Trades, as applicable;
 - (iv) a program to ensure the required supply of apprentices to meet DB Co’s Apprenticeship Plan targets and requirements; and
 - (v) a program to support apprentices on the Project, to complete their apprenticeships during the Project Term and, for those whose apprenticeships are not complete by the end of the Project Term a program to support apprentices to complete their apprenticeships after the end of the Project Term.
- (b) DB Co shall implement the approved Apprenticeship Plan.
- (c) DB Co shall provide an annual report to the City on the implementation of the Apprenticeship Plan which report shall include,
- (i) statistics on the number of apprentices involved in the Project relative to the number of journeypersons, for each month of the Project; and
 - (ii) detailed information setting out DB Co’s progress toward achieving the objectives set out in the Apprenticeship Plan, including an identification of barriers that prevented DB Co from achieving its objectives.
- (d) The City may require DB Co to amend its Apprenticeship Plan if, in its opinion, acting reasonably, DB Co is failing to maximize apprenticeship opportunities on the Project pursuant to the then current Apprenticeship Plan.
- (e) The City may, in its sole discretion, release DB Co’s Apprenticeship Plan to the public. DB Co’s Apprenticeship Plan shall not be Confidential Information.

11.24 Procurement Monitoring and Implementation Plan

- (a) DB Co shall implement the procurement monitoring and implementation plan (the “**Procurement Monitoring and Implementation Plan**”) attached as Schedule 19 – Procurement Monitoring and Implementation Plan to this Project Agreement.
- (b) A director of DB Co shall submit, annually, on each anniversary of Commercial Close, a completed and executed declaration in the form attached as Appendix 1 to Schedule 19 – Procurement Monitoring and Implementation Plan that DB Co has made the proper inquiries and has determined that the requirements of the Procurement Monitoring and Implementation Plan have been complied with by DB Co and its Subcontractors in the immediately previous year.

11.25 Health and Safety Certification

- (a) DB Co shall, at its own cost and risk, at all times during the performance of the Works cause a COR-Qualified Construction DB Co Party or COR-Certified Construction DB Co Party, as the case may be, to:
 - (i) to the extent a COR-Qualified Construction DB Co Party has not obtained its COR Certification prior to Financial Close,
 - (A) use best efforts to obtain its COR Certification no later than 18 months following Financial Close. In the event that the City is satisfied, in its sole discretion, that the COR-Qualified Construction DB Co Party has used best efforts to obtain its COR Certification in accordance with this Section 11.25 and the COR-Qualified Construction DB Co Party has not obtained COR Certification by the end of such 18 month period, then the City shall establish a time period during which the COR-Qualified Construction DB Co Party shall obtain its COR Certification, which time period shall not be less than 30 days; and
 - (B) maintain in good standing and, as applicable, renew its ISO 45001 Accreditation or OHSAS 18001 Accreditation until such time as the COR-Qualified Construction DB Co Party has obtained its COR Certification, and
 - (ii) once the COR-Qualified Construction DB Co Party is certified (thereafter referred to as a **“COR-Certified Construction DB Co Party”**), maintain in good standing, and, as applicable, renew its COR Certification; and
 - (iii) comply with all requirements of its ISO 45001 Accreditation or OHSAS 18001 Accreditation (if a COR-Qualified Construction DB Co Party) or COR Certification (if a COR-Certified Construction DB Co Party), in accordance with its terms.
- (b) Without limiting any other provision of this Project Agreement, if at any time during the performance of the Works:
 - (i) a COR-Qualified Construction DB Co Party fails to obtain its COR Certification in accordance with this Project Agreement and the City determines that the failure to obtain the COR Certification is as a result of such COR-Qualified Construction DB Co Party not using best efforts to obtain such certification and the City delivers a Notice to DB Co indicating that a COR-Qualified Construction DB Co Party has failed to obtain its COR Certification in accordance with this Project Agreement;
 - (ii) a COR-Qualified Construction DB Co Party fails to maintain its ISO 45001 Accreditation or OHSAS 18001 Accreditation in good standing in accordance with its terms or in accordance with this Project Agreement;
 - (iii) a COR-Certified Construction DB Co Party fails to maintain its COR Certification in good standing in accordance with its terms or in accordance with this Project Agreement,(each a **“H&S Certification Default Event”**);

- (iv) the City delivers a Notice to DB Co indicating that the City is of the opinion that a COR-Qualified Construction DB Co Party will fail to maintain its ISO 45001 Accreditation or OHSAS 18001 Accreditation in good standing in accordance with its terms or in accordance with this Project Agreement; or
- (v) the City delivers a Notice to DB Co indicating that the City is of the opinion that a COR-Certified Construction DB Co Party will fail to maintain its COR Certification in good standing in accordance with its terms or in accordance with this Project Agreement,

DB Co shall:

- (vi) immediately upon the occurrence of a H&S Certification Default Event, notify the City that a H&S Certification Default Event has occurred, and:
 - (A) produce and deliver to the City a report identifying the reasons for the failure to obtain or maintain in good standing the COR Certification, ISO 45001 Accreditation or OHSAS 18001 Accreditation, as the case may be;
 - (B) produce and deliver to the City a plan showing the steps that are to be taken to have the COR Certification, ISO 45001 Accreditation or OHSAS 18001 Accreditation, as the case may be, obtained or reinstated in good standing within a period of not more than 30 days (the “**H&S Certification Reinstatement Plan**”), which H&S Certification Reinstatement Plan shall be subject to review and approval by the City and, to the extent the City requires any amendments or revisions to be made to the H&S Certification Reinstatement Plan, DB Co shall take, and shall cause the COR-Qualified Construction DB Co Party or the COR-Certified Construction DB Co Party, as the case may be, to take, all reasonable steps as may be necessary to make all such required amendments and revisions and deliver to the City an amended H&S Certification Reinstatement Plan not more than five Business Days from the date on which such request is made by the City;
 - (C) no later than five Business Days after the H&S Certification Default Event occurs, arrange to have conducted a complete H&S Construction Inspection in accordance with Section 15.2; and
 - (D) arrange to have conducted an H&S Construction Re-Inspection in accordance with Section 15.2(c), if required; or
- (vii) within five Business Days after receipt of the Notice from the City under Section 11.25(b)(iv) or 11.25(b)(v):
 - (A) produce and deliver to the City Representative a report identifying the manner in which the COR Certification, ISO 45001 Accreditation or OHSAS 18001 Accreditation, as the case may be, shall be maintained in good standing or obtained, as applicable;
 - (B) produce and deliver to the City Representative a plan showing the steps that are to be taken to ensure that the COR Certification, ISO 45001 Accreditation or OHSAS 18001 Accreditation, as the case may be, will be

maintained in good standing without interruption (the “**H&S Certification Maintenance Plan**”), which H&S Certification Maintenance Plan shall be subject to review and approval by the City and, to the extent the City requires any amendments or revisions to be made to the H&S Certification Maintenance Plan, DB Co shall take all reasonable steps as may be necessary to make all such required amendments and revisions and deliver to the City an amended and H&S Certification Maintenance Plan not more than five Business Days from the date on which such request is made by the City;

- (C) arrange to have conducted a complete H&S Construction Inspection in accordance with Section 15.2, and
- (D) arrange to have conducted an H&S Construction Re-Inspection in accordance with Section 15.2(c), if required.

11.26 Demolition Requirements

- (a) Without limiting DB Co’s obligation to perform the Works at all times in accordance with Applicable Law, in respect of any Demolition, DB Co shall, and shall cause each applicable DB Co Party that is performing any part of the Demolition to, at such person’s own cost and risk and at all times during the performance of the Works:
 - (i) conduct all work in connection with any Demolition at all times in compliance with section 3 of the Performance Standards Regulation and the Building Code;
 - (ii) ensure that all DB Co Parties having responsibility for the supervision of any such Demolition are qualified as either a professional engineer, limited license holder or provisional license holder (as such terms are used in the Performance Standards Regulation) (such person is hereinafter referred to as a “**Demolition Supervisor**”);
 - (iii) observe and perform the Demolition in a manner that is consistent with the recommendations set forth in the Demolition Guidelines in all material respects; and
 - (iv) in respect of any Complex Structure Demolition to be conducted by DB Co or any DB Co Party:
 - (A) prepare detailed specifications relating to such Complex Structure Demolition which specifications will include, without limitation, a detailed risk assessment and risk mitigation plan assessing all apparent or inferable risks that might be associated with the Demolition, colour-coded Load-Path Diagrams (which will include a description of the Demolition Requirements set forth herein) to supplement the Site work plans and blueprints relating to the Demolition and all other technical requirements relating to the Complex Structure Demolition (the “**Demolition Specifications**”);
 - (B) at all times when a Complex Structure Demolition is being performed that the Demolition Specifications, Demolition work plans and Load-Path Diagram, be present and available at the Site at which such Complex Structure Demolition is being performed; and

- (C) ensure at all times when a Complex Structure Demolition is being performed that a Demolition Supervisor will be on the Site at which such Complex Structure Demolition is being performed and actively supervising all activities in respect of the Complex Structure Demolition,

(collectively the “**Demolition Requirements**”).

- (b) If at any time while any Demolition is being performed pursuant to this Project Agreement, DB Co or any DB Co Party that is performing any part of any Demolition receives Notice from the City or any City Party or Governmental Authority that the Demolition is being conducted in a manner that is either not in compliance with the Demolition Requirements or not otherwise in accordance with this Project Agreement (such event referred to as a “**Demolition Default Event**”), DB Co shall and shall cause any applicable DB Co Party to:
 - (i) be required immediately upon the occurrence of a Demolition Default Event, to notify the City that a Demolition Default Event has occurred, unless the City was the person that provided Notice of the Demolition Default Event;
 - (ii) cease all work in respect of such Demolition; and
 - (iii) within five Business Days after receipt of a Notice of a Demolition Default Event produce and deliver to the City Representative:
 - (A) a report identifying the reasons for the occurrence of the Demolition Default Event; and
 - (B) a Demolition Plan showing the steps that are to be taken to rectify the Demolition Default Event within a period of not more than 30 days from the occurrence of the Demolition Default Event, which Demolition Plan shall be subject to review and approval by the City and, to the extent the City requires any amendments or revisions to be made to such Demolition Plan, DB Co and the applicable DB Co Parties shall take all reasonable steps as may be necessary to make all such required amendments and revisions and deliver to the City an amended and revised Demolition Plan not more than five Business Days from the date on which such request is made by the City.
- (c) No Demolition shall be recommenced at the Site that was the subject of the Demolition Default Event until:
 - (i) the City is satisfied that DB Co or the applicable DB Co Party has taken all necessary steps to remediate such Demolition Default Event in accordance with Demolition Plan; and
 - (ii) the City has received a report, in form and substance satisfactory to the City, prepared by a professional engineer that the Demolition Default Event has been remediated and the Site has been properly prepared for the Demolition to proceed in accordance with the Demolition Plan.

- (d) For clarity, DB Co shall not be eligible for a Delay Event or a Compensation Event in connection with a Demolition Default Event or the recommencement of a Demolition pursuant to Section 11.26(c).

11.27 New Municipal Infrastructure Works

- (a) DB Co shall achieve all New Municipal Infrastructure Works Acceptance by the Scheduled West Substantial Completion Date.
- (b) The City Engineer shall (i) receive and monitor all drawings, specifications, plans and documents related to the design and development of the New Municipal Infrastructure Works; (ii) receive and monitor all progress reports as necessary for the City Engineer to be in a position to confirm progress and extent of completion of the New Municipal Infrastructure Works; (iii) review and monitor the tests described in Schedule 15 – Output Specifications in respect of the New Municipal Infrastructure Works; (iv) prior to any certification and/or acceptance of New Municipal Infrastructure Works, consider the views and comments of both DB Co and the City in relation to the satisfaction of the conditions for such certification and/or acceptance; (v) conduct inspections and reviews of the New Municipal Infrastructure Works as necessary for the City Engineer to be satisfied that the New Municipal Infrastructure Works are proceeding in accordance with the requirements of the Project Agreement; (vi) review relevant documentation, including the Design Development Submittals relating to New Municipal Infrastructure Works, certificates and approvals, Permits, Licences, Approvals, and Agreements, certifications, test results, quality assurance audits, letters of assurance from professionals, schedules of equipment and staff profile schedules, in each case, relating to New Municipal Infrastructure Works provided to the City Engineer pursuant to this Project Agreement and within the timeframes contemplated for such review within Schedule 10 – Review Procedure; and (vii) provide all other services set forth in Schedule 15 – Output Specifications as it relates to the New Municipal Infrastructure Works, in each case, for purposes of enabling the City Engineer to confirm satisfaction of the conditions for issuance of the New Municipal Infrastructure Component Acceptance Certificate for each New Municipal Infrastructure Component and the Final New Municipal Infrastructure Works Acceptance Certificate in relation to all of the New Municipal Infrastructure.
- (c) DB Co shall deliver a notice (a “**New Municipal Infrastructure Works Component Countdown Notice**”) to the City and the City Engineer specifying the date on which DB Co anticipates that New Municipal Infrastructure Component Acceptance will be achieved in respect of such New Municipal Infrastructure Component (the “**Anticipated New Municipal Infrastructure Component Acceptance Date**”). The New Municipal Infrastructure Works Component Countdown Notice shall be delivered not less than 90 days prior to the Anticipated New Municipal Infrastructure Component Acceptance Date. DB Co shall give the City Engineer and the City Representative at least 10 Business Days’ notice prior to the date upon which DB Co anticipates all requirements for New Municipal Infrastructure Component Acceptance shall be satisfied.
- (d) DB Co shall give the City Engineer and the City Representative notice (the “**New Municipal Infrastructure Component Acceptance Notice**”) upon the satisfaction of all requirements of the New Municipal Infrastructure Component Acceptance, together with DB Co’s opinion as to whether the conditions for issuance of the New Municipal Infrastructure Component Acceptance Certificate have been satisfied, and each of the following:

- (i) to the extent transferable and without prejudice to the City's rights pursuant to Section 41 and Schedule 24 – Intellectual Property, all copyright licences for computer programs, or licences to use the same, used in connection with the applicable New Municipal Infrastructure Components together with all technical drawings and data, supplier agreements and contracts, utilities consumption information, environmental and technical reports, leases, licence and subletting data and contracts, asset conditions data, standard operating procedures processes and manuals, and all other information related to the New Municipal Infrastructure Works in respect of the applicable New Municipal Infrastructure Component accumulated up until the New Municipal Infrastructure Component Acceptance Date, in each case, in electronic format acceptable to the City, acting reasonably, where it exists in electronic format, and in original format, when not in electronic format;
- (ii) the most recent Record Drawings relating to the New Municipal Infrastructure Works in the format that the City, acting reasonably, considers most appropriate at the time;
- (iii) copies of all test results performed and test reports prepared in accordance with Schedule 15, together with all DB Co Permits, Licences, Approvals and Agreements obtained and/or entered into in connection with the New Municipal Infrastructure Works;
- (iv) all Project Data and Intellectual Property relating to the design, construction and completion of the New Municipal Infrastructure Component; and
- (v) all information, reports, documents, records and the like referred to in the Project Agreement as it relates to New Municipal Infrastructure Works including as referred to in Schedule 26 – Record Provisions, in each case as it relates to New Municipal Infrastructure and New Municipal Infrastructure Works only,

(collectively, the “**New Municipal Infrastructure Component Works Requirements**”).

Within 10 Business Days after receipt of a New Municipal Infrastructure Component Acceptance Notice the City Engineer shall determine whether the conditions for issuance of the New Municipal Infrastructure Component Acceptance Certificate have been satisfied and to issue to the City and DB Co either:

- (A) the New Municipal Infrastructure Component Acceptance Certificate, setting out in such certificate the New Municipal Infrastructure Component Acceptance Date; or
 - (B) a report detailing the matters that the City Engineer considers are required to be performed by DB Co to satisfy the conditions for issuance of the New Municipal Infrastructure Component Acceptance Certificate.
- (c) Where the City Engineer has issued a report in accordance with Section 11.27(d)(v)(B) above, DB Co shall, within 5 Business Days after receipt of such report, provide the City Engineer and the City Representative with:
 - (i) a detailed list indicating the rectification actions proposed for all matters raised in such report;

- (ii) the schedule for completion of all such rectification actions; and
- (iii) any additional tests that need to be undertaken in respect of the New Municipal Infrastructure Works as a result of the rectification actions,

and DB Co shall perform all such additional rectification actions and testing in a timely manner. Upon completion thereof, DB Co may give a further New Municipal Infrastructure Component Acceptance Notice and Section 11.27(c) to (e) inclusive shall be repeated until the New Municipal Infrastructure Component Acceptance Certificate has been issued.

- (f) On each New Municipal Infrastructure Component Acceptance Date in respect of each New Municipal Infrastructure Component:
 - (i) DB Co shall cooperate fully with the City and any persons providing services on or at the New Municipal Infrastructure Components in order to avoid or mitigate, insofar as reasonably practicable, any inconvenience or any risk to the health and safety of any person at, on or under the Lands on which the New Municipal Infrastructure Works are or were performed, including those areas where any warranty work is or has been performed;
 - (ii) insofar as title to the New Municipal Infrastructure Components shall not have already passed to the City pursuant to Section 45.1, DB Co shall transfer to, and there shall vest in the City, free from all Encumbrances (other than the Encumbrances caused or consented to by the City), the New Municipal Infrastructure Components;
 - (iii) DB Co shall use commercially reasonable efforts to assign, or otherwise transfer, to the City, free from all Encumbrances (other than any Encumbrances caused or consented to by the City), the benefit of all manufacturers' warranties, including all documentation in respect thereof, in respect of mechanical and electrical plant and equipment used or made available by DB Co under this Project Agreement which is included in the New Municipal Infrastructure Components; and
 - (iv) subject to Section 41 and Schedule 24 - Intellectual Property, all information obtained by DB Co in connection with the New Municipal Infrastructure Works relating to the applicable New Municipal Infrastructure Components, including Record Drawings and other technical drawings and data, supplier agreements and contracts, utilities consumption information, environmental and technical reports, lease, licence and subletting data and contracts, asset conditions data, standard operating procedure, processes and manuals, and all other information directly related to the New Municipal Infrastructure Works relating to the applicable New Municipal Infrastructure Component accumulated over the course of the Project Term shall be the property of the City.
- (g) Subject to the warranty obligations described herein, the issuance by the City Engineer in accordance with Section 11.27(d) of the New Municipal Infrastructure Component Acceptance Certificate in respect of any New Municipal Infrastructure Component shall result in the responsibility for traffic management, maintenance, repair of the New Municipal Infrastructure Component described in such New Municipal Infrastructure Component Acceptance Certificate reverting back to the City.

- (h) After New Municipal Infrastructure Component Acceptance Certificates for all New Municipal Infrastructure Components have been delivered by the City Engineer to DB Co, DB Co shall deliver a notice to the City Engineer requesting delivery of the Final New Municipal Infrastructure Works Acceptance Certificate. Upon satisfaction of all conditions to complete the New Municipal Infrastructure Works and achievement of New Municipal Infrastructure Works Acceptance, the City Engineer shall deliver to DB Co the Final New Municipal Infrastructure Works Acceptance Certificate.
- (i) DB Co shall deliver to the City and the City Engineer the following, in each case, in form and substance satisfactory to the City and the City Engineer, acting reasonably, in order to be eligible to receive the Final New Municipal Infrastructure Works Acceptance Certificate one complete set of the New Municipal Infrastructure Component Works Requirements divided up in separate packages for each New Municipal Infrastructure Component (i) showing all alterations made to the New Municipal Infrastructure Works since the New Municipal Infrastructure Component Acceptance Date in respect of each New Municipal Infrastructure Component and (ii) including updates and additions to any of the New Municipal Infrastructure Works Requirements since the New Municipal Infrastructure Component Acceptance Date (the “**Final New Municipal Infrastructure Works Requirements**”).

11.28 Works, Goods, Equipment, Consumables and Materials

- (a) Without expanding its obligations under Section 11.16, DB Co shall cause the goods, equipment, consumables and materials used or supplied by it or any contractor or Subcontractor in connection with the Works to be:
 - (i) of good quality, fit for their intended purpose and maintained in a safe, serviceable and clean condition in accordance with the Output Specifications and Good Industry Practice;
 - (ii) of the type specified in the Output Specifications, if applicable; and
 - (iii) in compliance with all Applicable Law,and shall, as soon as practicable after receiving a request from the City Representative, supply to the City Representative evidence to demonstrate its compliance with this Section 11.28(a).
- (b) DB Co shall cause sufficient stocks of goods, equipment, consumables and materials to be held in compliance with its obligations under this Project Agreement.

11.29 Utility Works – Cash Allowance

- (a) DB Co shall perform and complete, the DB Co Utility Works, and shall procure and coordinate the performance and completion of the Utility Company Self-Performed Works by the applicable Utility Company pursuant to Utility Agreements:
 - (i) so as to satisfy the Output Specifications;
 - (ii) in accordance with the Works Schedule; and
 - (iii) in accordance with the other terms and conditions of this Project Agreement.

- (b) DB Co shall complete or cause the completion of the Utility Works, comprising part of, or required for:
 - (i) the East Works, as a precondition to achieving East Final Completion;
 - (ii) the West Works other than Highway Works, as a precondition to achieving West Final Completion;
 - (iii) the Highway Works, as a precondition to achieving the applicable Handover; and
 - (iv) the Remaining Works, as a precondition to achieving West Final Completion.
- (c) DB Co shall be solely responsible for coordinating the Utility Works with its activities in respect of the Project Operations and shall not be entitled to an extension of time or additional compensation in respect of the remainder of the Works as a result of the Utility Works or any matter relating thereto, except as provided for in this Section 11.29, Section 18.6, Section 32.1(a)(xxiv) and Section 33.6.
- (d) The DB Co Utility Works shall be reviewed, certified, financed and paid for as part of Earned Value in accordance with Schedule 21 – Construction Period Payments. The Utility Company Self-Performed Works shall be reviewed, certified, financed and paid for in accordance with this Section 11.29. DB Co shall not be required to obtain financing for the costs of the Utility Company Self-Performed Works.
- (e) Prior to entering into a Utility Agreement for the performance of Utility Company Self-Performed Work, DB Co shall submit to the City Representative a draft of such agreement setting out the scope and pricing proposed by the Utility Company for the performance of the Utility Company Self-Performed Work for review by the City. The City may, in conjunction with DB Co, for a period not to exceed 10 Business Days from receipt of the draft agreement, engage with the Utility Company to negotiate pricing for inclusion in the Utility Agreement based upon preferential pricing arrangements which the City may have with the applicable Utility Company and may also raise comments on proposed scope which DB Co shall consider acting reasonably and both Parties may seek to negotiate with the Utility Company. The City shall notify DB Co by the end of such 10 Business Day period of the results of such price discussions and the draft Utility Agreement will be updated for (i) any pricing amendments mutually agreed by the Utility Company and the City and (ii) any scope amendments mutually agreed by the Parties and the Utility Company. DB Co shall enter into the updated Utility Agreement. The City will only pay the Utility Company Works Cash Allowance and Utility Works Fee in respect of Utility Agreements which have been approved by the City in accordance with this Section 11.29(e).
- (f) The estimated cost of the Utility Company Self-Performed Works is \$[REDACTED] (the “**Utility Company Works Cash Allowance**”) plus applicable HST, and shall be paid for by the City on a monthly progress basis as the Utility Company Self-Performed Works are progressed and invoiced by the applicable Utility Company to DB Co. In the event that the actual costs of the Utility Company Self-Performed Works as evidenced by invoices rendered by the applicable Utility Company exceeds the estimated Utility Company Works Cash Allowance for any cause other than the negligence, default or willful misconduct of DB Co or any DB Co Party, the City shall pay such additional cost, plus applicable HST and the applicable Utility Works Fee applicable to such additional cost.

- (g) The City shall also pay DB Co a fee of [REDACTED]% of the Utility Works Cost (the “**Utility Works Fee**”), plus applicable HST, for the management, coordination and administration of the completion of the Utility Company Self-Performed Works.
- (h) DB Co may, on a monthly basis, provide to the City Representative and the Independent Certifier a request for payment (each, a “**Request for Utility Works Payment**”) that includes (i) an itemized breakdown of the applicable Utility Company Self-Performed Works invoiced in the previous month by a Utility Company, (ii) the Utility Works Fee applicable to the costs of the Utility Company Self-Performed Works included in such invoice, and (iii) applicable HST in respect of the amounts specified in (i) and (ii) above. Such Request for Utility Works Payment may be delivered concurrently with an application for progress payments on account of Earned Value achieved in respect of DB Co Utility Works in accordance with Schedule 21 – Construction Period Payments, but shall be presented separately for processing and payment by the City.
- (i) DB Co shall include with each Request for Utility Works Payment the certification of the Independent Certifier that the relevant Utility Company Self-Performed Works described in such Request for Utility Works Payment is eligible for payment by the City in accordance with this Section 11.29.
- (j) DB Co shall include with each Request for Utility Works Payment such additional supporting documentation as the City Representative may reasonably require in connection with the claimed base progress payments, the estimated cost to complete the Utility Company Self-Performed Works, any cumulative projected variance from the estimated Utility Company Works Cash Allowance and any discounts, rebates, refunds, chargebacks, credits, price adjustments and other allowances available to DB Co in connection with the Utility Company Self-Performed Works. Each Request for Utility Works Payment submitted to the City shall be in a form stipulated by the City, acting reasonably, and shall support an “open-book” pricing approach for the completion of the Utility Company Self-Performed Works.
- (k) Within 10 Business Days of receipt of a Request for Utility Works Payment, the City shall, in consultation with the Independent Certifier, advise DB Co, in writing, whether or not it agrees with the particulars set out in the Request for Utility Works Payment. The City shall only be permitted to withhold its approval if the Independent Certifier determines that the Request for Utility Works Payment does not contain the information that the Independent Certifier requires, acting reasonably, to discharge their obligations under this Section 11.29. If the Independent Certifier withholds its approval pursuant to this Section 11.29(k) and subsequently receives the information that the Independent Certifier requires, acting reasonably, to discharge its obligations under this Section 11.29, it shall, within 10 Business Days of its receipt of such information, make payment of the amount set out in the aforementioned Request for Utility Works Payment. Any Disputes with respect to determinations made under this Section 11.29 shall be resolved in accordance with Schedule 27 – Dispute Resolution Procedure.
- (l) If the City approves in writing the payment of the amount set out in a Request for Utility Works Payment, it shall make payment of the amount set out in the approved Request for Utility Works Payment within 10 Business Days of receipt of the Request for Utility Works Payment.
- (m) DB Co acknowledges and agrees that:

- (i) all costs and expenses related to the administration and scheduling of the Utility Company Self-Performed Works, including, without limitation, the preparation of Requests for Utility Works Payment and any required reporting, shall be compensated solely by the Utility Works Fee; and,
- (ii) all discounts, rebates, refunds, chargebacks, credits, price adjustments and other allowances available to DB Co or any Subcontractor in connection with the Utility Company Self-Performed Works shall be to the credit of the City.

11.30 Art Cash Allowance

- (a) DB Co shall procure and coordinate the performance and completion of the Art Cash Allowance Items:
 - (i) so as to satisfy the Output Specifications;
 - (ii) in accordance with the Works Schedule; and
 - (iii) in accordance with the other terms and conditions of this Project Agreement.
- (b) DB Co shall complete or cause the completion of the Art Cash Allowance Items, comprising part of, or required for:
 - (i) the East Works, as a precondition to achieving East Substantial Completion;
 - (ii) the West Works, as a precondition to achieving West Substantial Completion; and
 - (iii) the Remaining Works, as a precondition to achieving West Final Completion.
- (c) DB Co shall be solely responsible for coordinating the completion of the Art Cash Allowance Items with its activities in respect of the Project Operations and shall not be entitled to an extension of time or additional compensation in respect of the remainder of the Works as a result of the Art Cash Allowance Items or any matter relating thereto, except as provided for in this Section 11.30.
- (d) The Art Cash Allowance Items shall be reviewed, certified, financed and paid for in accordance with this Section 11.30. DB Co shall not be required to obtain financing for the costs of the Art Cash Allowance Items.
- (e) The City and DB Co shall comply with the processes and requirements set forth in Article 12 of Part 1 of Schedule 15-2 of the Output Specifications in respect of the procurement of Art Cash Allowance Items. The City will only pay the Art Cash Allowance in respect of Art Cash Allowance Items which have been procured in accordance with this Section 11.30 and the processes and requirements set forth in Article 12 of Part 1 of Schedule 15-2 of the Output Specifications.
- (f) The estimated cost of the Art Cash Allowance Items is \$[REDACTED] (the “**Art Cash Allowance**”) plus applicable HST, and shall be paid for by the City on a monthly progress basis as the Art Cash Allowance Items are progressed and invoiced to DB Co. In the event that the actual costs of the Art Cash Allowance Items exceed the estimated Art Cash Allowance for any

cause other than the negligence, default or willful misconduct of DB Co or any DB Co Party, the City shall pay such additional cost, plus applicable HST.

- (g) DB Co may, on a monthly basis, provide to the City Representative and the Independent Certifier a request for payment (each, a “**Request for Art Payment**”) that includes (i) an itemized breakdown of the applicable Art Cash Allowance Items invoiced to DB Co in the previous month, and (ii) applicable HST in respect of the amounts specified in (i) above. Such Request for Art Payment may be delivered concurrently with an application for progress payments on account of Earned Value achieved in accordance with Schedule 21 – Construction Period Payments, but shall be presented separately for processing and payment by the City.
- (h) DB Co shall include with each Request for Art Payment the certification of the Independent Certifier that the relevant Art Cash Allowance Items described in such Request for Art Payment is eligible for payment by the City in accordance with this Section 11.30.
- (i) DB Co shall include with each Request for Art Payment such additional supporting documentation as the City Representative may reasonably require in connection with the claimed base progress payments, the estimated cost to complete the Art Cash Allowance Items, any cumulative projected variance from the estimated Art Cash Allowance and any discounts, rebates, refunds, chargebacks, credits, price adjustments and other allowances available to DB Co in connection with the Art Cash Allowance Items. Each Request for Art Payment submitted to the City shall be in a form stipulated by the City, acting reasonably, and shall support an “open-book” pricing approach for the completion of the Art Cash Allowance Items.
- (j) Within 10 Business Days of receipt of a Request for Art Payment, the City shall, in consultation with the Independent Certifier, advise DB Co, in writing, whether or not it agrees with the particulars set out in the Request for Art Payment. The City shall only be permitted to withhold its approval if either the Independent Certifier determines that the Request for Art Payment does not contain the information that the Independent Certifier requires, acting reasonably, to discharge their obligations under this Section 11.30. If the Independent Certifier withholds its approval pursuant to this Section 11.30(j) and subsequently receives the information that the Independent Certifier requires, acting reasonably, to discharge its obligations under this Section 11.30, it shall, within 10 Business Days of its receipt of such information, make payment of the amount set out in the aforementioned Request for Art Payment. Any Disputes with respect to determinations made under this Section 11.30 shall be resolved in accordance with Schedule 27 – Dispute Resolution Procedure.
- (k) If the City approves in writing the payment of the amount set out in a Request for Art Payment, it shall make payment of the amount set out in the approved Request for Art Payment within 10 Business Days of receipt of the Request for Art Payment.
- (l) DB Co acknowledges and agrees that:
 - (i) all costs and expenses related to the procurement, administration and scheduling of the Art Cash Allowance Items, including, without limitation, the preparation of Requests for Art Payment and any required reporting, shall be financed and paid for as part of Earned Value in accordance with Schedule 21 – Construction Period Payments; and

- (ii) all discounts, rebates, refunds, chargebacks, credits, price adjustments and other allowances available to DB Co or any Subcontractor in connection with the Art Cash Allowance Items shall be to the credit of the City.

11.31 Nominated Signalling Subcontractor Cash Allowance

- (a) DB Co shall, in accordance with Nominated Signalling Subcontract, be responsible for the Nominated Signalling Subcontractor Works as part of the Works hereunder.
- (b) The Nominated Signalling Subcontractor Works shall be reviewed, certified, financed and paid for in accordance with this Section 11.31, and not as part of the Earned Value in accordance with Schedule 21 – Construction Period Payments. DB Co shall not be required to obtain financing for the costs of the Nominated Signalling Subcontractor Works.
- (c) The agreed cost of the Nominated Signalling Subcontractor Works to be reimbursed by the City is \$[REDACTED] as of Commercial Close (the “**Nominated Signalling Subcontractor Works Cash Allowance**”), plus applicable HST. The Nominated Signalling Subcontractor Works Cash Allowance shall only be amended pursuant to a Variation Confirmation or Variation Directive issued in accordance with Schedule 22 – Variation Procedure, or, subject to and in accordance with Section 33, upon the occurrence of a Compensation Event.
- (d) The City shall open the Nominated Signalling Subcontract Cash Allowance Account on or before Financial Close and shall manage the Nominated Signalling Subcontract Cash Allowance Account in accordance with this Section 11.31.
- (e) The cash flow process applicable to the Nominated Signalling Subcontract Cash Allowance Account will be as follows:
 - (i) the City will deposit the applicable portion of the Nominated Signalling Subcontractor Works Cash Allowance relating to each particular Nominated Signalling Subcontract Milestone into the Nominated Signalling Subcontract Cash Allowance Account five (5) Business Days prior to the date and in the amount set out in Schedule B of the Nominated Signalling Subcontract in respect of such applicable Nominated Signalling Subcontract Milestone (subject to adjustment in accordance with Section 11.31(c));
 - (ii) the City will hold and manage all monies in the Nominated Signalling Subcontract Cash Allowance Account; and
 - (iii) the Parties, together with the Construction Contractor and the Nominated Signalling Subcontractor shall review the operation of the Nominated Signalling Subcontract Cash Allowance Account on a regular basis and make any appropriate modifications to ensure its efficient operation.
- (f) Upon achievement of any Nominated Signalling Subcontract Milestone, DB Co shall provide to the City Representative and the Independent Certifier a request for payment (each, a “**Request for Nominated Signalling Subcontractor Works Payment**”) that includes (i) an itemized breakdown of the completed Nominated Signalling Subcontractor Works comprising the achieved Nominated Signalling Subcontract Milestone, and the invoice for services and materials rendered by the Nominated Signalling Subcontractor in respect thereof, and (ii) applicable HST. DB Co shall include with each Request for Nominated Signalling Subcontractor Works Payment such

additional supporting documentation as the Independent Certifier may reasonably require to confirm achievement of the applicable Nominated Signalling Subcontract Milestone. Such Request for Nominated Signalling Subcontractor Works Payment may be delivered concurrently with an application for progress payments on account of Earned Value in accordance with Schedule 21 – Construction Period Payments, but shall be presented separately for processing and payment by the City.

- (g) The Independent Certifier shall, within five (5) Business Days of receipt of a Request for Nominated Signalling Subcontractor Works Payment, advise DB Co, in writing, whether or not the applicable Nominated Signalling Subcontract Milestone as described in such Request for Nominated Signalling Subcontractor Works Payment is achieved and eligible for payment in accordance with this Section 11.31 and the payment terms of the Nominated Signalling Subcontract.
- (h) The Independent Certifier shall only be permitted to withhold its approval if the Independent Certifier determines that the Request for Nominated Signalling Subcontractor Works Payment does not contain the information that the Independent Certifier requires, acting reasonably, to discharge their obligations under this Section 11.31. If the Independent Certifier withholds its approval pursuant to this Section 11.31(h) and subsequently receives the information that the Independent Certifier requires, acting reasonably, to discharge its obligations under this Section 11.31, the Independent Certifier shall, within five (5) Business Days of its receipt of such information, provide to DB Co, in writing, the Independent Certifier's approval of the applicable Request for Nominated Signalling Subcontractor Works Payment. Any Disputes with respect to determinations made under this Section 11.31 shall be resolved in accordance with Schedule 27 – Dispute Resolution Procedure.
- (i) If the Independent Certifier approves the payment set out in a Request for Nominated Signalling Subcontractor Works Payment, the City shall release the applicable portion of the Nominated Signalling Subcontractor Works Cash Allowance from the Nominated Signalling Subcontract Cash Allowance Account for payment to the Nominated Signalling Subcontractor in accordance with the Nominated Signalling Subcontract.
- (j) In addition to payment of the Nominated Signalling Subcontractor Works Cash Allowance, the City shall also pay to DB Co:
 - (i) an amount equal to **[REDACTED]**% of the Nominated Signalling Subcontractor Works Gainshare, if any, plus applicable HST, on the East Substantial Completion Payment Date; and
 - (ii) an amount equal to **[REDACTED]**% of the Nominated Signalling Subcontractor Works Gainshare, if any, plus applicable HST, on the West Substantial Completion Payment Date.

11.32 Category 1 Utility Company Tracking System

- (a) DB Co shall, at its own cost and risk, provide to the City a system to track the progress made by the Category 1 Utility Companies in performing the activities described in the Utility Baseline Report. More specifically, such system shall:

- (i) be kept updated on a daily basis and be available to the City in real time during normal business hours through a web-based interface which would include functionality to provide automated email alerts to a customizable frequency and set of email addresses;
- (ii) be operational no later than the date upon which the first Category 1 Utility Company activity described in the Utility Baseline Report is commenced;
- (iii) include a feature that highlights to the City and the applicable Category 1 Utility Company each outstanding applicable activity described in the Utility Baseline Report when it reaches the following milestone triggers:
 - (A) [REDACTED]% of the number of Business Days designated for completion by the Category 1 Utility Company in the Utility Baseline Report for the applicable activity described in the Utility Baseline Report; and
 - (B) [REDACTED]% of the number of Business Days designated for completion by the Category 1 Utility Company in the Utility Baseline Report for the applicable activity described in the Utility Baseline Report.
- (b) DB Co shall provide written notice to the City Representative with respect to any outstanding Category 1 Utility Company activity described in the Utility Baseline Report when it reaches the milestone triggers outlined in Section 11.32(a)(iii)(A) and Section 11.32(a)(iii)(B).
- (c) With respect to any failure by a Category 1 Utility Company to perform the obligations set out in the Utility Baseline Report, DB Co shall not be entitled to the Delay Event or Compensation Amount pursuant to Section 32.1(a)(xxiv) unless the tracking system as described in this Section 11.32(a) is functional and available to the City, provides notice to the City of the milestones described in Section 11.32(a)(iii), and contains accurate information as to the progress made by the Category 1 Utility Companies in performing the activities described in the Utility Baseline Report at all material times.

12. REPRESENTATIVES

12.1 The City Representative

- (a) Subject to the limitations set out in Section 12.1(d), the City Representative shall exercise the functions and powers identified in this Project Agreement as functions or powers to be performed by the City Representative and such other functions and powers of the City under this Project Agreement as the City may notify DB Co from time to time.
- (b) The City may, from time to time by written Notice to DB Co, change the City Representative. Such change shall have effect on the later of the date of delivery of such Notice and the date specified in such Notice.
- (c) During any period when no City Representative has been appointed, or when the City Representative is unable, through illness, incapacity or any other reason whatsoever, to perform the City Representative's functions under this Project Agreement, the City shall perform or may, by written Notice to DB Co, promptly appoint an alternative City Representative to perform the functions which would otherwise be performed by the City Representative. Upon receipt of such written Notice, DB Co and the DB Co Representative shall be entitled to treat any act of such

alternative City Representative which is permitted by this Project Agreement as being authorized by the City, and DB Co and the DB Co Representative shall not be required to determine whether authority has in fact been given.

- (d) The City Representative shall not, except as otherwise provided in this Project Agreement, be entitled to modify or waive any provision of this Project Agreement or to authorize a Variation.
- (e) Subject to the limitations set out in Sections 12.1(d), unless otherwise notified in writing, DB Co and the DB Co Representative shall be entitled to treat any act of the City Representative which is explicitly authorized by this Project Agreement as being authorized by the City, and DB Co and the DB Co Representative shall not be required to determine whether authority has in fact been given.

12.2 The DB Co Representative

- (a) Subject to the limitations set out in Section 12.2(d), the DB Co Representative shall have full authority to act on behalf of DB Co for all purposes of this Project Agreement.
- (b) DB Co may change the DB Co Representative with the prior written consent of the City.
- (c) During any period when the DB Co Representative is unable, through illness, incapacity or any other reason whatsoever, to perform the DB Co Representative's functions under this Project Agreement, DB Co shall perform or may, by written Notice to the City, promptly appoint an alternative DB Co Representative to perform the functions which would otherwise be performed by the DB Co Representative, provided that, DB Co must seek the City's consent in accordance with Section 12.2(b) if such alternative DB Co Representative is in place for more than 180 days. Upon receipt of such written Notice, the City and the City Representative shall be entitled to treat any act of such alternative DB Co Representative which is permitted by this Project Agreement as being authorized by DB Co, and the City and the City Representative shall not be required to determine whether authority has in fact been given.
- (d) The DB Co Representative shall not, except as otherwise provided in this Project Agreement, be entitled to modify or waive any provision of this Project Agreement.
- (e) Subject to the limitations set out in Section 12.2(d), unless otherwise notified in writing, the City and the City Representative shall be entitled to treat any act of the DB Co Representative which is explicitly authorized by this Project Agreement as being authorized by DB Co, and the City and the City Representative shall not be required to determine whether authority has in fact been given.

12.3 Communications to Representatives

- (a) At the time that a Party appoints or changes the appointment of the City Representative or the DB Co Representative, as applicable, that Party shall also provide the other Party with contact information for delivery of communications to such representative. Communications to such representative shall not constitute Notices to the Party appointing such representative.

12.4 Key Individuals

- (a) The individuals who are critical to the performance of the Works are identified in Schedule 9 – Key Individuals. DB Co shall use commercially reasonable efforts to ensure that such persons remain involved in the Works in the capacity set out in Schedule 9 – Key Individuals (unless such Key Individuals are not available for reasons beyond the control of DB Co or a DB Co Party). DB Co or a DB Co Party shall not, for the duration of the Works, require or request any such person to be involved in any other project, if, in the reasonable opinion of the City such involvement would have a material adverse effect on the Works. If DB Co fails to comply with this Section 12.4(a), DB Co shall pay to the City the liquidated damages amount, if any, ascribed for such Key Individual in Schedule 9 – Key Individuals. For clarity, DB Co and the DB Co Parties' reasonable commercial efforts, in accordance with this Section 12.4(a), shall include the denial of promotions or relocations of a Key Individual, to the extent such denial is permitted by the Applicable Law. For the purposes of this Section 12.4(a), only the following reasons will be considered beyond the control of DB Co or a DB Co Party: death, short term disability, long term disability or any other reason in the opinion of the City, acting reasonably (DB Co shall provide to the City any further documentation as may be reasonably requested by the City to assess any reason beyond the control of DB Co).
- (b) Subject to DB Co's obligations to ensure that Key Individuals remain involved in the Works as set out in Section 12.4(a), if it becomes necessary for DB Co to replace any individual identified in Schedule 9 - Key Individuals, DB Co shall nominate a competent suitably qualified and experienced permanent replacement or replacements as soon as practicable and provide the City with relevant information on the proposed replacement and shall consult with the City before finalizing the appointment of such replacement. DB Co shall not replace any of the individuals identified in Schedule 9 - Key Individuals without the prior written consent of the City, which consent shall not be withheld or delayed where DB Co is compliant with Sections 12.4(a) and 12.4(c) and the proposed replacement is suitably qualified and experienced. For those Key Individual's in respect of whom liquidated damages amounts are ascribed in Schedule 9 – Key Individuals, in the event DB Co fails to nominate a competent suitably qualified and experienced permanent replacement or replacements for a period of greater than 60 days from the date it became necessary for DB Co to replace any such Key Individual, DB Co shall pay to the City the liquidated damages ascribed in Schedule 9 – Key Individuals. The Parties agree that the liquidated damages set out in this Section 12.4(b) are not a penalty but represent a genuine and reasonable pre-estimate of the damages that the City will suffer as a result of DB Co's failure to provide the applicable Key Individual.
- (c) If the City determines, acting reasonably, that it is in the best interests of the City that any individual identified in Schedule 9 - Key Individuals be replaced, the City shall notify DB Co (including a detailed explanation of the reasons for such determination), and, within 60 days after receipt by DB Co of such Notice, DB Co shall provide the City with relevant information on the proposed replacement and shall consult with the City before finalizing the appointment of such replacement.

13. WORKS SCHEDULE AND WORKS REPORT

13.1 Completion of the Works

- (a) DB Co shall complete the Works in accordance with this Project Agreement and achieve:

- (i) East Substantial Completion by the East Scheduled Substantial Completion Date;
- (ii) East Final Completion by the East Scheduled Final Completion Date;
- (iii) West Substantial Completion by the West Scheduled Substantial Completion Date; and
- (iv) West Final Completion, including all Remaining Works, by the West Scheduled Final Completion Date.

13.2 The Works Schedule

- (a) From Financial Close until PBS-2 becomes the Current PBS, PBS-1 shall be deemed to be the Current PBS and, until such time, the following provisions of the Project Agreement applicable to the Current PBS shall be applicable to PBS-1: Sections 10.3(a)(i), 11.12(f)(ii), 11.12(f)(iii), 14.2(b), 14.2(d), and 26.2(a)(i) of the Project Agreement; Section 1.8(c) of Schedule 10 – Review Procedure; and Section 1.6(b)(vii) of Schedule 22 – Variation Procedure;
- (b) DB Co shall, in accordance with Schedule 12 – Works Scheduling Requirements, prepare and submit to the City and the Independent Certifier:
 - (i) within 180 days after Financial Close, PBS-2 and a schedule narrative in accordance with Section 2.2 of Schedule 12 - Works Scheduling Requirements indicating the differences between PBS-1 and PBS-2;
 - (ii) every month, within 10 Business Days after the end of each calendar month from Financial Close, the Monthly Progress Report and PBS Update in accordance with Schedule 33 – Works Reports;
 - (iii) after receipt of written request from the City, acting reasonably, a Micro-Schedule for any specific area in accordance with Schedule 12 – Works Scheduling Requirements, to be provided no later than the end of subsequent reporting period; and
 - (iv) Recovery Schedules, PBS Re-baselines, Short Duration Schedules, As-built Schedules and Informal Implementation Schedules in accordance with Schedule 12 – Works Scheduling Requirements,each meeting the requirements of Schedule 12 – Works Scheduling Requirements to the reasonable satisfaction of the City that support the completion of the Works in accordance with Section 13.1.
- (c) The City shall review all submissions in accordance with Schedule 12 – Works Scheduling Requirements and, as applicable, Schedule 10 – Review Procedure.
- (d) At the request of the City Representative, the DB Co Representative shall review the Works Schedules with the City Representative to explain to the City Representative’s reasonable satisfaction:
 - (i) the activity logic and planning assumptions contained in the Works Schedule;
 - (ii) any proposed changes to the Critical Path of the Works; and

- (iii) any other matter raised by the City Representative concerning the Works Schedules.
- (e) DB Co and the City shall comply with the provisions of Schedule 12 – Works Scheduling Requirements.
- (f) Any comment or lack of comment by the City in regard to any Works Schedule indicating potential Delay Events pursuant to Section 32.2(a) of the Project Agreement shall not constitute any acknowledgement or acceptance of the potential delay.

14. WORKS COMMITTEE

14.1 Establishment

- (a) The Parties shall, within 30 days after Financial Close, establish a committee (the “**Works Committee**”) consisting of:
 - (i) six representatives appointed by the City from time to time, one of whom shall be the City Representative; and
 - (ii) five representatives appointed by DB Co, including the DB Co Representative, the Design Build Director, the Testing and Commissioning Coordinator, the Director of Communications and Stakeholder Engagement, and a representative of the Construction Contractor.
- (b) The Independent Certifier shall be entitled, but not required, to attend meetings as non-voting members of the Works Committee. Members of the Works Committee may invite, on prior Notice to all members, such advisors and consultants as they require from time to time to attend meetings and to provide briefings to the Works Committee members.
- (c) The City Representative shall be the chairperson of the Works Committee.

14.2 Function and Role

- (a) The Works Committee shall assist the Parties by promoting cooperative and effective communication with respect to matters related to the Works.
- (b) The Works Committee shall be responsible for receiving and reviewing all matters related to the Works, including:
 - (i) any design, construction and commissioning issues;
 - (ii) the Works Schedules;
 - (iii) any issues arising from reports or documents provided by DB Co or the Independent Certifier;
 - (iv) any quality assurance and safety and security issues, including any design, configuration control, interfacing, training, testing, operational impact and other matters creating or giving rise to a safety or security issue or otherwise requiring attention and oversight;

- (v) the Works Reports;
 - (vi) any special matters referred to the Works Committee by the City or DB Co;
 - (vii) any Proceeding At Risk Matters referred to the Works Committee in accordance with Section 14.6;
 - (viii) any community and media relations issues in accordance with Schedule 18 – Communication and Stakeholder Engagement Obligations;
 - (ix) any issues related to the Construction Access Management Plan and the Traffic and Transit Management Plan and any issues related to the rules, requirements and restrictions relating to access, rail safety and operations and track protection, as set out in Schedule 15 – Output Specifications;
 - (x) monitoring the Testing & Commissioning Program; and
 - (xi) any other issues pertaining to the Works.
- (c) Subject to Section 14.2(d), any unanimous decision of the Works Committee shall be final and binding on the Parties. If the Works Committee is unable to reach a unanimous decision, either Party may refer the matter for resolution in accordance with Schedule 27 – Dispute Resolution Procedure.
- (d) The Works Committee shall not have authority to make decisions with respect to or approve:
- (i) any amendment to or waiver of any provision of this Project Agreement;
 - (ii) any change to a Key Work Milestones set out in the Works Schedules, any Scheduled Substantial Completion Date or any Scheduled Final Completion Date;
 - (iii) any Variation;
 - (iv) any change that may materially adversely affect DB Co’s ability to achieve the East Substantial Completion by the East Scheduled Substantial Completion Date or East Final Completion by the East Scheduled Final Completion Date;
 - (v) any change that may materially adversely affect DB Co’s ability to achieve the West Substantial Completion by the West Scheduled Substantial Completion Date or West Final Completion by the West Scheduled Final Completion Date; or
 - (vi) any matter with respect to which the City has a right of consent or in respect of which the City may exercise discretion pursuant to this Project Agreement.

14.3 Term of Works Committee

- (a) Unless otherwise agreed by the Parties, the Works Committee shall operate only until the later of the East Final Completion Date and West Final Completion Date (the “**Works Committee End Date**”).

14.4 Replacement of Committee Members

- (a) The City shall be entitled to replace any of its respective representatives on the Works Committee by written Notice to DB Co. The City will use commercially reasonable efforts to deliver prior written Notice of any such replacement to DB Co. DB Co may replace any of its representatives on the Works Committee with the prior written consent of the City.

14.5 Procedures and Practices

- (a) The members of the Works Committee may:
 - (i) adopt such procedures and practices for the conduct of the activities of the Works Committee as they consider appropriate from time to time;
 - (ii) invite to any meeting of the Works Committee such other persons as the members of the Works Committee may agree;
 - (iii) exclude from any meeting of the Works Committee such persons as the members of the Works Committee may agree; and
 - (iv) receive and review reports from any person or organization agreed to by the members of the Works Committee.
- (b) Once established, the Works Committee shall meet at least once each month from Financial Close until the Works Committee End Date, unless otherwise agreed by the members of the Works Committee or the Parties.
- (c) Any one of the DB Co Representatives or the City Representatives on the Works Committee may convene a special meeting of the Works Committee at any time. Special meetings of the Works Committee may be convened on not less than 5 Business Days' Notice to all members of the Works Committee identifying the agenda items to be discussed at the special meeting, provided that, in an Emergency, a meeting may be called at any time on such Notice as may be reasonable in the circumstances.
- (d) Unless otherwise agreed by the members of the Works Committee, the Works Committee shall meet in the City of Ottawa, Ontario. Meetings of the Works Committee may be held by means of such telephonic, electronic or other communication facilities as permit all persons participating in the meeting to communicate with each other simultaneously and instantaneously. A person participating in a meeting by such means will be deemed to be present at such meeting, provided that each member of the Works Committee must attend in person at least once each calendar quarter.
- (e) Four representatives appointed by the City (one of whom shall be the City Representative) and three representatives appointed by DB Co (one of whom shall be the DB Co Representative) shall constitute a quorum at any meeting of the Works Committee. A quorum of members may exercise all the powers of the Works Committee. The members shall not transact business at a meeting of the Works Committee unless a quorum is present.
- (f) Minutes of all meetings, recommendations and decisions of the Works Committee, including those made by telephone or other form of communication, shall be recorded and maintained by

DB Co. DB Co shall circulate copies of such minutes within 5 Business Days after the holding of the meeting or the making of the recommendation or decision. Unless the City notifies DB Co within 5 Business Days after receipt of the minutes that the City disagrees with the contents of the minutes, DB Co and the City shall be deemed to have approved such minutes. DB Co shall maintain a complete set of all minutes of the meetings of the Works Committee and shall make such minutes available for inspection by the City during regular business hours.

14.6 Proceeding At Risk

- (a) If at any time the City Representative has noted a Works Submittal as “CRITICAL COMMENT” in accordance with Schedule 10 – Review Procedure (a “**Proceeding At Risk Matter**”), then the City may issue to DB Co (with a copy to the Independent Certifier) a Notice (the “**Proceeding At Risk Notice**”) identifying the City’s reasons for issuing the Proceeding At Risk Notice and requesting DB Co to deliver any relevant Design Data and any other information reasonably required by the City from DB Co to review the Proceeding At Risk Matter.
- (b) Following the issuance of a Proceeding At Risk Notice, the City Representative and the DB Co Representative, together with the other members of the Works Committee, shall each promptly and diligently make a reasonable *bona fide* effort to resolve the Proceeding At Risk Matter. The Independent Certifier shall be required to attend all meetings and deliberations of the Works Committee at which the Proceeding At Risk Matter is considered, but shall not be entitled to participate in any decisions of the Works Committee.
- (c) Within 10 Business Days after receipt by DB Co of a Proceeding At Risk Notice, DB Co shall deliver a response to the City, each member of the Works Committee and the Independent Certifier, which shall include:
 - (i) the Design Data and any other information requested by the City in the Proceeding At Risk Notice;
 - (ii) DB Co’s opinion confirming agreement with, or disputing the opinion of, the City regarding the Proceeding At Risk Matter;
 - (iii) any additional Design Data and other information in support of DB Co’s opinion regarding the Proceeding At Risk Matter; and
 - (iv) DB Co’s proposal to rectify the Proceeding at Risk Matter.
- (d) Within five Business Days after receipt by the City of the response from DB Co pursuant to Section 14.6(c), the City shall notify DB Co if the City requires any additional information from DB Co. DB Co shall provide such additional information to the City and each member of the Works Committee and the Independent Certifier within 5 Business Days after receipt of such Notice.
- (e) The Independent Certifier shall within 30 Business Days after the Proceeding At Risk Notice, deliver to each of the City and DB Co its written opinion as to whether the City acted reasonably in delivering the Proceeding At Risk Notice.
- (f) Within 15 Business Days after receipt by the City of all deliverables contemplated by Section 14.6(c) and, if applicable, Section 14.6(d), and in any event, no later than 35 Business Days after

receipt by DB Co of the Proceeding At Risk Notice, the Works Committee shall meet in person (the “**PAR Meeting**”) to attempt to resolve the Proceeding At Risk Matter.

- (g) Within five Business Days after the PAR Meeting and, in any event, no later than 40 Business Days after receipt by DB Co of the Proceeding At Risk Notice (“**PAR Meeting Expiry Date**”), the Works Committee shall attempt to reach a final decision with respect to the Proceeding At Risk Matter. If the Works Committee is unable to reach a final decision, and the Independent Certifier’s opinion delivered pursuant to Section 14.6(e) confirms that the City acted reasonably in delivering the Proceeding At Risk Notice, DB Co shall be deemed to be “**Proceeding At Risk**” and the City may, in its sole discretion, give notice to the Lenders’ Agent pursuant to Section 15 of the Lenders’ Direct Agreement, that DB Co is Proceeding At Risk, together with the relevant information supporting the City’s opinion that DB Co is Proceeding at Risk.
- (h) Regardless of the Independent Certifier’s opinion, if the Works Committee fails to reach a final decision with respect to the Proceeding At Risk Matter by the PAR Meeting Expiry Date, either Party may refer the Proceeding At Risk Matter for resolution in accordance with Schedule 27 – Dispute Resolution Procedure.
- (i) The Proceeding At Risk Notice, review, and comments made during the process set out in this Section 14.6 are for general conformity to the obligations and requirements of this Project Agreement, and any such Notice, review and comment shall not relieve DB Co of the risk and responsibility for the Works and for meeting all of its obligations under and satisfying all requirements of this Project Agreement, and shall not create any new or additional obligations or liabilities for the City.
- (j) If it is determined in accordance with Schedule 27 – Dispute Resolution Procedure that DB Co should not have been deemed to be Proceeding at Risk under Section 14.6(g), the City shall (i) promptly notify the Lender’s Agent that it is withdrawing its notice given pursuant to Section 14.6(g), if applicable, and (ii) reimburse DB Co for its reasonable costs incurred in connection with responding to a Proceeding at Risk Notice and for its participation in the Proceeding at Risk Matter.

15. INTEGRATED MANAGEMENT SYSTEM

15.1 Integrated Management System

- (a) DB Co shall comply with the provisions of Schedule 11 – Integrated Management System Requirements.

15.2 Safety Management

- (a) DB Co shall cause the Construction Contractor, at its sole cost and expense, to conduct an inspection of its facilities and of its health and safety management systems on an annual basis until Final Completion or as otherwise required in accordance with Sections 11.25(b)(vi)(C) or 11.25(b)(vii)(C) (each, an “**H&S Construction Inspection**”), which H&S Construction Inspections shall:
 - (i) be conducted by a Certified H&S Inspector, and
 - (ii) during the performance of the Works, include, at a minimum,

- (A) a review of general compliance with all applicable Occupational Health and Safety Act (Ontario) requirements, compliance with all safety manuals applicable to the Site at which the Works are being conducted; and
 - (B) a review of the Construction Contractor's job hazard analysis documentation on any portion of the Lands which could endanger or put at risk the safety of any person working on any portion of the Lands;
- (b) DB Co shall cause the results of each H&S Construction Inspection (such results referred to as the “**H&S Construction Inspection Report**”) to be delivered to the City and the Works Committee not more than five Business Days from the date on which a H&S Construction Inspection is completed. An H&S Construction Inspection Report arising from an H&S Construction Inspection shall be tabled and presented by DB Co for discussion by the Works Committee at the next meeting of the Works Committee that follows the date on which such H&S Construction Inspection Report was issued.
- (c) To the extent an H&S Construction Inspection Report discloses any non-compliance by the COR-Qualified Construction DB Co Party or the COR-Certified Construction DB Co Party, as the case may be, with the terms of the COR Certification or OHSAS 18001 Accreditation, as the case may be, the City shall have the right to require DB Co to cause the COR-Qualified Construction DB Co Party or the COR-Certified Construction DB Co Party, as the case may be, at its sole cost and expense:
 - (i) to take any corrective and remedial action required by the H&S Construction Inspection Report to correct any such non-compliance and DB Co shall cause the COR-Qualified Construction DB Co Party or the COR-Certified Construction DB Co Party, as the case may be, to comply with all instructions given by the Certified H&S Inspector in respect of actions required to be taken to correct any such non-compliance;
 - (ii) to arrange to have conducted by a Certified H&S Inspector such follow-up H&S Construction Inspections of those facilities and health management systems associated with the non-compliances identified in the relevant H&S Construction Inspection Report (each, an “**H&S Construction Re-Inspection**”) within three Business Days from the date on which any such request is made by the City, until any and all corrective and remedial actions required by the Certified H&S Inspector with respect to the correction of each identified non-compliance is completed to the satisfaction of the Certified H&S Inspector; and
 - (iii) to cause the results of each H&S Construction Re-Inspection (such results referred to as the “**H&S Construction Re-Inspection Report**”) to be delivered to the City and the Works Committee not more than three Business Days from the date on which a H&S Construction Re-Inspection is completed. An H&S Construction Re-Inspection Report arising from an H&S Construction Re-Inspection shall be tabled and presented by DB Co for discussion by the Works Committee at the next meeting of the Works Committee that follows the date on which such H&S Construction Re-Inspection Report was issued.

16. ACCESS TO THE LANDS

16.1 Access to Lands

- (a) Subject to this Section 16 and the provisions of Schedule 20 – Lands, including any restrictions on the use and access to the Lands set out Schedule 20 – Lands, the City shall grant or have caused to be granted, and shall continuously grant or cause to be granted, to DB Co and all DB Co Parties non-exclusive licence rights of use and access to, on and over the Lands, except such rights set out as a DB Co responsibility to obtain under the Permits, Licences, Approvals and Agreements tables attached as Schedule 35 – Permits, Licences, Approvals and Agreements, as are required by DB Co and such DB Co Parties and sufficient (subject to DB Co performing its obligations described in the Permits, Licences, Approvals and Agreements tables attached as Schedule 35 – Permits, Licences, Approvals and Agreements and subject to the timing and extent of the grant of use and access to the Lands set out in Schedule 20 – Lands) to allow DB Co and such DB Co Parties to perform that part of the Works to be performed on Lands. The rights granted to DB Co pursuant to this Section 16.1(a) shall be effective on the later of,
- (i) the date of Financial Close; and
 - (ii) the commencement date for access to individual parcels of lands that comprise the Lands as set out in Schedule 20 – Lands.
- (b) Subject to DB Co's obligation to comply with the other terms and conditions set forth in this Project Agreement and the other Project Documents, DB Co shall ensure that each DB Co Party shall at all times, when entering the Lands, act in a manner consistent with the obligations of DB Co under the Project Agreement.
- (c) In consideration for the use and access rights granted pursuant to Section 16.1(a), DB Co shall provide the Works subject to and in accordance with this Project Agreement.
- (d) Without derogating from any of the City's rights hereunder, in particular, and subject to any restrictions set out in Schedule 20 – Lands, the City acknowledges that, in respect of the Works, DB Co and the DB Co Parties require, and the City shall provide, access to the Lands in accordance with Section 16.1(a) without material interference by the City, any City Party, MTO, RTG or any RTG Party (except as provided in the Interface Agreement). DB Co further acknowledges that following Substantial Completion, DB Co's access to the applicable Lands shall be subject to the City Activities.
- (e) Subject to Section 16.1(a), none of the rights granted pursuant to this Section 16.1 shall grant access to,
- (i) any lands beyond the boundaries of the Lands, or to any lands other than the Lands, other than easements and similar interests of the City which benefit the Lands, obtained after the date of this Project Agreement, to the extent the same are necessary for the Works or exceed any restrictions set out in Schedule 20 – Lands; or
 - (ii) any facilities or infrastructure of the City, Utility Companies, Railway Companies, MTO or any other third parties, except as set out in Schedule 20 – Lands (which access, if any, is subject to Section 16.1(b)).

- (f) The use and access rights provided in this Section 16.1 shall automatically terminate as of the Termination Date, save and except for any earlier termination of the use and access rights specified in Schedule 20 – Lands.
- (g) For greater certainty, the use and access rights provided in this Section 16.1 shall not entitle DB Co or any DB Co Party to extract any mineral from the Lands for use in the Works.
- (h) The City shall acquire use of and access to the Lands described in Schedule 20 – Lands on or prior to the applicable commencement date for access set out in Schedule 20 – Lands. The City shall provide Notice to DB Co of the commencement of access rights to the Lands as such access is obtained by the City.

16.2 Non-Exclusive Rights to Lands and Development of Lands

- (a) Without prejudice to Section 11.12, DB Co acknowledges and agrees that the rights granted to DB Co and the DB Co Parties hereunder to the Lands shall be non-exclusive and that the City and any person authorized by the City may occupy and possess the Lands, the New City Infrastructure, the New MTO Infrastructure and the Existing Infrastructure (in each case, on the Lands) without the prior consent of DB Co, including for the purposes of carrying out the Governmental Activities, the Other Works or RTG Works. In exercising its rights DB Co shall not, and shall require that the DB Co Parties shall not, except as permitted under this Project Agreement, disrupt the performance of the Governmental Activities, the Other Works or RTG City Party Works.
- (b) Without limiting Section 16.2(a), DB Co acknowledges that the City may from time to time use or develop (including by way of subdivision or expansion), or permit the use or development of, or dispose of, portions of the Lands, other than those portions of the Lands (or interests in the Lands) necessary for the performance of the Works. To the extent that such use, development or disposition materially adversely interferes with DB Co's licence rights hereunder or materially adversely interferes with DB Co's ability to perform the Works, such use, development or disposition shall, subject to and in accordance with Schedule 22 – Variation Procedure, result in a Variation. For greater certainty, but without limiting the generality of the foregoing, DB Co acknowledges and agrees that certain of the Lands shall be subject to the restrictions set out in Schedule 20 – Lands and Schedule 15 – Output Specifications.
- (c) Access to Existing Infrastructure shall be provided for in accordance with Schedule 20 – Lands and any Permits, Licences, Approvals and Agreements.
- (d) Except as otherwise specified in the Output Specifications or elsewhere in this Project Agreement, DB Co acknowledges and agrees with the City that the City has no authority to grant use and access to the Third Party Lands, which use and access must be sought from MTO in accordance with the Applicable Law and any Permit, License, Approval or Agreement or other requirements imposed by MTO. DB Co shall be solely responsible to obtain permission from applicable third parties access to the Existing Infrastructure or any component thereof owned by third parties.

16.3 [Not Used]

16.4 Naming and Signage

- (a) DB Co acknowledges that the City and the applicable owners of the New MTO Infrastructure and the Existing Infrastructure reserve and retain,
 - (i) all rights to designate the name for the New City Infrastructure, the New MTO Infrastructure and the Existing Infrastructure, and any part thereof and to retain all revenues derived from the sponsorship of such names;
 - (ii) all rights to signage in relation to the Lands and any part of the New City Infrastructure, the New MTO Infrastructure and the Existing Infrastructure; and
 - (iii) all rights, Trade-Marks, naming or branding regarding any part of the New City Infrastructure, the New MTO Infrastructure and the Existing Infrastructure.
- (b) Without limiting the City's rights pursuant to Section 16.4(a), with the prior written consent of the City, which may take into consideration,
 - (i) any applicable governmental or other guidelines, including the guidelines set out in Schedule 15 – Output Specifications or Schedule 18 – Communication and Stakeholder Engagement Obligations; and
 - (ii) any provision or restriction set out in Schedule 20 – Lands,

DB Co, the DB Co Parties and the Lenders may, for the period prior to Substantial Completion, erect and maintain signage (which may include such parties' logos and trade names) at or on the Lands identifying their respective roles in connection with the development and construction of the Project, provided that such signage is erected and maintained in accordance with the requirements and restrictions set out in this Project Agreement, including Schedule 15 – Output Specifications and Schedule 18 – Communication and Stakeholder Engagement Obligations.

16.5 No Interest in Land, Facilities or Infrastructure

- (a) DB Co acknowledges and agrees that neither DB Co nor the Lenders shall acquire any estate, right, title or ownership interest in the Lands or any part of the New City Infrastructure, the New MTO Infrastructure or the Existing Infrastructure, or any other interest in land, facilities or infrastructure pursuant to this Project Agreement, the Project Documents or otherwise. Notwithstanding any provision herein or in any of the Project Documents to the contrary, all fee simple interest in and freehold title to the Lands, or any part thereof, and the Project, shall at all times remain unencumbered by any interest of DB Co or the Lenders. DB Co and the Lenders shall have access to the Lands and the New City Infrastructure under and subject to the licences and access rights granted under this Section 16 and the Lenders' Direct Agreement, respectively.

16.6 Non-Disturbance Agreement

- (a) If the City mortgages, charges or otherwise encumbers the Lands, the City shall notify DB Co and, at the request of DB Co, provide DB Co with an agreement, in form satisfactory to DB Co, acting reasonably, executed by the mortgagee of the Lands permitting DB Co and the Lenders'

Agent to access and use the Lands under the use and access granted pursuant to this Section 16 and the Lenders' Direct Agreement, respectively, free from interference from the mortgagee or any person claiming by or through the mortgagee. This Section 16.6 shall not apply in respect of any portion of the Lands used or developed pursuant to Section 16.2(b) if neither the licence granted pursuant to this Section 16 nor the Works pertain to such portion of the Lands.

16.7 Adjustments to Lands Available to DB Co

- (a) [REDACTED]
- (b) [REDACTED]
- (c) DB Co shall be entitled to obtain any properties (or obtain temporary access to any properties) at its own cost and expense, however, such properties shall not, for the purposes of this Project Agreement, be Lands and no New City Infrastructure shall be located on, or rely in any way upon, any properties which DB Co acquires pursuant to this Section 16.7(b).

17. ENCUMBRANCES

17.1 DB Co Shall Perform Obligations Under Encumbrances

- (a) DB Co's access to and use of the Lands or any part thereof granted in Section 16 shall be subject to the Encumbrances.
- (b) Subject to Section 17.2, DB Co shall perform all obligations of the City under all Encumbrances for or on behalf of the City, other than:
 - (i) obligations which DB Co is not legally capable of performing for or on behalf of the City; and
 - (ii) obligations which the applicable counterparty to such Encumbrance formally relieves or waives DB Co from performing, with the consent of the City, in its sole discretion (and if such relief or waiver is not consented to by the City, and subject to Section 17.1(b)(i), DB Co shall perform such obligations in accordance with this Section 17).
- (c) DB Co, whether before, during or after the completion of the Works, shall not in any manner breach the Encumbrances.

17.2 No Encumbrances

- (a) DB Co shall not create, incur, permit or suffer to exist any Encumbrance to be created, filed, issued or registered upon or against the Lands or any part of them or any interest therein (i) due to an act or omission of DB Co or any DB Co Party, or (ii) arising in relation to the Works.
- (b) DB Co does not have title to the Lands or any interest therein, and no act or omission by DB Co or any DB Co Party shall give rise to a right for any person to obtain title to or any interest in the Lands or any part thereof, except:
 - (i) as may be expressly agreed to in writing by the City or the applicable third party owner of the Lands;

- (ii) as may be expressly permitted by the terms of this Project Agreement; or
 - (iii) as may be permitted under Applicable Law, but without limiting DB Co's obligations under Sections 17.2(c)(i) and 17.3(a).
- (c) In the event that the Lands or any part thereof or any interest therein becomes subject to any Encumbrance following Financial Close,
 - (i) due to an act or omission of DB Co or any DB Co Party (which has not been consented to in writing by the City), or arising in relation to the Works, DB Co shall immediately take all steps necessary to terminate, remove, vacate or discharge such Encumbrance. If such Encumbrance is not terminated, removed, vacated or discharged within 10 Business Days after DB Co becoming aware of the creation, filing, issuance or registration of such Encumbrance, then, without prejudice to any other rights or remedies it may have, the City may take whatever steps it deems necessary and appropriate, in its sole discretion, to terminate, remove, vacate or discharge the Encumbrance, including payment of any amount owing or claimed thereunder, and seek immediate recovery from DB Co of the amount of any such payment and any associated costs, including legal costs (on a full indemnity basis), all of which shall be payable on demand, and DB Co hereby appoints the City as DB Co's attorney to execute any termination or discharge of an Encumbrance referred to in this Section 17.2(c)(i) which appointment is coupled with an interest and shall be irrevocable for the Project Term and thereafter so long as any of DB Co's obligations under this Section 17.2(c)(i) are outstanding;
 - (ii) due to an act or omission of DB Co or any DB Co Party (which has been consented to in writing by the City), or arising in relation to the Works, DB Co shall perform all obligations under such Encumbrance in accordance with Sections 17.1 and 17.3 (as is applicable) and at its sole cost and expense; or
 - (iii) which is not due to an act or omission of DB Co or any DB Co Party, or which has not arisen in relation to the Works, prior to performing obligations under any such Encumbrance, DB Co shall promptly notify the City of any such Encumbrance and the City may elect, in its sole discretion, to:
 - (A) have such Encumbrance be removed, vacated or discharged at the City's sole cost and expense;
 - (B) perform the required obligations thereunder; or
 - (C) instruct DB Co to perform the required obligations thereunder.
- (d) For the purposes of this Section 17, if,
 - (i) an encumbrance otherwise identified in Sections (b)(viii), (ix) or (x) of Schedule 16 – Encumbrances has not been complied with (excluding non-compliance by DB Co and DB Co Parties) and such non-compliance materially interferes with the use of the Lands for the purposes of the Works; or
 - (ii) an encumbrance otherwise identified in Sections (b)(vii), (viii), (ix) or (x) of Schedule 16 – Encumbrances was not disclosed to DB Co and was not ascertainable through

commercially standard off-title searches, and such encumbrance materially interferes with the use of the Lands for the purposes of the Works,

the City shall be entitled to the same election as set out in Section 17.2(c)(iii), subject to Section 17.2(e). DB Co shall promptly notify the City of any such encumbrance upon DB Co becoming aware of such encumbrance.

- (e) If DB Co is instructed to perform obligations under an Encumbrance pursuant to Section 17.2(c)(iii) or Section 17.2(d), which performance imposes costs or delays in the performance of Works, such performance shall, subject to and in accordance with Section 32, be treated as a Delay Event and, subject to and in accordance with Section 33, be treated as a Compensation Event.

17.3 Construction Act (Ontario)

- (a) The Parties acknowledge that Section 17.2 shall apply to claims for liens made against the Lands pursuant to the CA and shall also apply to claims made against the City or the holdback under the CA as though such a claim were an Encumbrance against the Lands as referred to therein. For clarity, Section 17.2 shall not apply to claims for lien that do not relate to the Work provided or performed by or on behalf of DB Co and DB Co Parties.
- (b) DB Co shall withhold from each Subcontractor the holdbacks required under the CA and shall deal with such holdbacks in accordance with the CA.
- (c) DB Co shall, as a condition of final payment under any Subcontract for which lien rights or rights in respect of the holdback may be claimed under the CA, require that a certificate of completion under section 33(1) of the CA for such Subcontract be issued and the relevant Subcontractor provide statutory declarations or other assurances confirming that all those engaged by the Subcontractor have been paid in accordance with Applicable Law.
- (d) DB Co shall follow the requirements of the CA and Good Industry Practice for posting and advertising certificates of completion when issued.
- (e) DB Co shall promptly provide the City with a copy of any materials which are provided to the Lenders to evidence compliance with the CA.
- (f) Upon request by the City, DB Co shall perform and deliver to the City a sub-search of title on the Lands or any part thereof. The City shall pay the reasonable costs of any such search except (i) a search that reveals Encumbrances that are not permitted by this Project Agreement, (ii) a search requested based on a reasonable suspicion that an Encumbrance that is not permitted by this Project Agreement has been registered on title to the Lands, and (iii) a search requested for the purpose of confirming that an Encumbrance that is not permitted by this Project Agreement has been discharged from title to the Lands.
- (g) DB Co shall cause a Payment Certifier to be appointed under the Design and Construction Contract and shall cause such Payment Certifier to certify the substantial performance of the Design and Construction Contract in accordance with the CA.

- (h) The City shall, and shall cause MTO to, provide DB Co with any notice of lien that is delivered to the City or MTO in connection with the Works promptly (and in any event within 5 Business Days) following receipt thereof.

18. SITE CONDITIONS AND RELIANT INFORMATION

18.1 Acceptance of Site Conditions

- (a) Subject to Sections 7.4, 18.1(b), 18.2, 18.3, 18.4, 18.5, 18.6, 18.7 and 18.8 DB Co acknowledges and agrees that it has inspected or investigated the Lands, the Existing Infrastructure (including the surroundings thereof) on which Works will be performed, and the Site Conditions in accordance with Good Industry Practice taking into account all matters relating to the Lands (including the buildings, structures and works, on, over and under the Lands existing on the date hereof and the Background Information), the Existing Infrastructure on which Works will be performed, and the Site Conditions prior to executing this Project Agreement and agrees to accept the Lands, the Existing Infrastructure on which Works will be performed, and the Site Conditions on an “as is, where is” basis. Without limiting the generality of the foregoing, but subject to Sections 7.4, 18.1(b), 18.2, 18.3, 18.4, 18.5, 18.6, 18.7 and 18.8, DB Co shall not be entitled to make any claim of any nature whatsoever against the City or any City Party, or RTG or any RTG Party, on any grounds relating to the Lands, the Existing Infrastructure on which Works will be performed, or the Site Conditions, including the fact that incorrect or insufficient information on any matter relating to the Lands, the Existing Infrastructure on which Works will be performed, or the Site Conditions was given to it by any person, whether or not the City or a City Party, RTG or any RTG Party.
- (b) Section 18.1(a) is not intended to prohibit DB Co from relying upon information that has been provided by a person who has given DB Co an express written entitlement to rely on that information, provided however, subject to Sections 7.4, 18.2, 18.3, 18.4, 18.5, 18.6, 18.7 and 18.8, DB Co shall not be entitled to make any claim of any nature whatsoever against the City or any City Party, RTG or any RTG Party, on any grounds relating to the information provided by that person. For clarity, subject to Sections 7.4, 18.2, 18.3, 18.4, 18.5, 18.6, 18.7 and 18.8, DB Co’s legal recourse shall be against the person who provided the express written entitlement to rely on the information and not the City or any City Party, or RTG or any RTG Party.
- (c) Subject to Sections 7.4, 18.1(b), 18.2, 18.3, 18.4, 18.5, 18.6, 18.7 and 18.8, DB Co acknowledges and agrees that it has and shall be deemed to have:
 - (i) performed all necessary due diligence and investigations or inspections on the Lands, and examined the Lands and its surroundings and any existing works on, over or under the Lands in accordance with Good Industry Practice, taking into account all matters relating to the Lands, including any Existing Infrastructure, and any other buildings, structures and works, on, over and under the Lands existing on the date hereof;
 - (ii) performed all necessary due diligence and investigation or inspection on the Existing Infrastructure in accordance with Good Industry Practice on which Works will be performed and satisfied itself prior to executing this Project Agreement as to the structural, environmental and general condition of such Existing Infrastructure;
 - (iii) in accordance with Good Industry Practice, taking into account all matters relating to the Lands, including any Existing Infrastructure, and any other buildings, structures and

works, on, over and under the Lands existing on the date hereof, satisfied itself as to the nature of the Site Conditions, the ground and the subsoil, the level and quantity of groundwater, the form and nature of the Lands, the loadbearing and other relevant properties of the Lands, the risk of injury or damage to property affecting the Lands, the nature of the materials (whether natural or otherwise) to be excavated and the nature of the design, work and materials necessary for the execution and delivery of the Works;

- (iv) satisfied itself as to the presence of any Contamination on, in or under the Lands, in accordance with Good Industry Practice, taking into account all matters relating to the Lands, including any Existing Infrastructure, and any other buildings, structures and works, on, over and under the Lands existing on the date hereof;
 - (v) satisfied itself as to the adequacy of the Lands, rights of access to, from and through the Lands and any accommodation it may require for the purposes of fulfilling its obligations under this Project Agreement;
 - (vi) satisfied itself as to the possibility of interference by persons of any description whatsoever with access to or use of, or rights in respect of, the Lands; and
 - (vii) satisfied itself as to the precautions, times and methods of working necessary to prevent any nuisance or interference, whether public or private, being caused to any third parties.
- (d) DB Co further acknowledges and agrees that, other than as referred to or contained in this Project Agreement, no representations or warranties have been made, nor documentation delivered to DB Co or any DB Co Party, which would indicate that DB Co would be unable to perform the Works in a lawful manner.

18.2 Contamination

- (a) At all times prior to the applicable Substantial Completion Date, DB Co shall be responsible for managing, remediating and/or removing, in accordance with Section 4.5 of Schedule 17 – Environmental Obligations, any Contamination located on, in or under the Site which was described in, or was properly inferable, readily apparent or readily discoverable from, the Environmental Reports or the Geotechnical Reports made available to DB Co at least 30 days prior to the RFP Technical Submission Deadline (“**Existing Contamination**”). Notwithstanding the forgoing or anything else to the contrary contained in this Agreement, DB Co shall have no responsibility for any Contamination that is migrating to or from the Lands, except (I) to the extent that DB Co or any DB Co Party Released such Contamination in a manner which does not comply with Applicable Law or (II) DB Co or any DB Co party is causing the migration of Existing Contamination.
- (b) DB Co shall be responsible for managing, removing or remediating, in accordance with Section 4.5 of Schedule 17 – Environmental Obligations:
 - (i) any Contamination on, in or under the Lands which DB Co or any DB Co Party has brought onto the Lands or lands adjacent to the Lands and caused to be Released in a manner which does not comply with Applicable Law; and

- (ii) any Existing Contamination which was harmless or stored, contained or otherwise dealt with in accordance with Applicable Law which DB Co or any DB Co Party causes to be Released in a manner which does not comply with Applicable Law.

In addition, and without limiting any other obligation of DB Co under the Project Agreement, DB Co shall be responsible for all Direct Losses associated with the Releases of Contamination or Existing Contamination described in Sections 18.2(b)(i) and 18.2(b)(ii) above and, to the extent of DB Co's responsibility for Contamination that is migrating to or from the Site, Section 18.2(a).

- (c) Contamination which is not the responsibility of DB Co pursuant to Sections 18.2(a) and 18.2(b) shall be the responsibility of the City.
- (d) Upon the discovery of any Contamination, DB Co shall immediately inform the City Representative and shall comply, and ensure compliance by all DB Co Parties, with all Applicable Law and Schedule 17 - Environmental Obligations in respect thereof:
 - (i) at the City's cost pursuant to Section 18.2(g), in respect of Contamination for which the City is responsible pursuant to Section 18.2(c); and
 - (ii) at its own cost in respect of Contamination for which it is responsible pursuant to Section 18.2(a) or 18.2(b).
- (e) Except to the extent required to prevent or mitigate an Emergency or to comply with Applicable Law, DB Co shall not undertake any significant work pursuant to Section 18.2(d) in respect of Contamination for which the City is responsible pursuant to Section 18.2(c) until the City Representative has been given a reasonable opportunity to review the nature and extent of the Contamination and has instructed DB Co to proceed with such work.
- (f) In the event that the City wishes DB Co to perform actions in respect of any Contamination which are in addition to any required pursuant to Section 18.2(d), then the City shall issue an instruction to DB Co specifying what action the City requires DB Co to take and DB Co shall promptly and diligently comply with all such instructions at the City's cost pursuant to Section 18.2(g).
- (g) If Sections 18.2(d)(i), 18.2(e) or 18.2(f) require DB Co to perform any alteration, addition, Demolition, extension or variation in the Works as a result of Contamination for which the City is responsible pursuant to Section 18.2(c) or as a result of any instructions given by the City pursuant to Section 18.2(f) and which would not otherwise be required under this Project Agreement, then any such alteration, addition, Demolition, extension or variation in the Works shall, subject to and in accordance with Section 32, be treated as a Delay Event and, subject to and in accordance with Section 33, be treated as a Compensation Event.
- (h) In the event that the City and DB Co do not agree as to the nature or extent of Contamination, or in the event of a disagreement as to whether DB Co is responsible for Contamination pursuant to either Sections 18.2(a) or 18.2(b), or the actions to be performed by DB Co pursuant to Section 18.2(d) or Schedule 17 – Environmental Obligations, such disagreement shall be referred for determination to a panel of 3 independent and suitably qualified and experienced persons, 1 appointed by the City, 1 appointed by DB Co, and a third appointed jointly by the appointees of the City and DB Co. If either Party fails to appoint such appointee within 10 Business Days of delivery Notice of such disagreement, or if the appointees of the City and DB Co fail to appoint

the third appointee within 10 Business Days of the later of their respective appointments, then the Superior Court of Justice of Ontario shall appoint such appointee. The costs and expenses of retaining such appointees shall be borne by the unsuccessful Party. Such panel shall endeavour to deliver a decision within 15 Business Days of any such disagreement being referred to such panel. Such panel's decision shall be determined by majority and shall be final and binding on the Parties only in respect of the nature of the Contamination and any action to be performed by DB Co pursuant to Section 18.2(d), except to the extent that either Party alleges that such decision would result in non-compliance with Applicable Law or this Project Agreement, in which event either Party may refer the disagreement for resolution in accordance with Schedule 27 - Dispute Resolution Procedure.

18.3 Items of Geological, Historical or Archaeological Interest or Value

- (a) As between the Parties, all fossils, artifacts and other objects having artistic, historic, archaeological or monetary value, including human remains and burial sites, which may be found on or at the Lands are or shall be the sole and absolute property of the City or the owner of the relevant property, as applicable.
- (b) The City shall be responsible for items referred to in Section 18.3(a) except for any such items that were described in, or were properly inferable, readily apparent or readily discoverable from any Archaeological Reports or any Cultural Heritage Reports.
- (c) Upon the discovery of any item referred to in Section 18.3(a), DB Co shall:
 - (i) immediately inform the City Representative of such discovery; and
 - (ii) take all steps not to disturb the item and, if necessary, cease any Works in so far as performing such Works would endanger the item or prevent or impede its excavation, take all necessary steps to preserve and ensure the preservation of the item in the same position and condition in which it was found, and comply, and ensure that all DB Co Parties comply, with Applicable Law and all requirements of Governmental Authorities with respect to such discovery, including the *Funeral, Burial and Cremations Services Act, 2002* (Ontario) and the *Standards & Guidelines for Conservation of Provincial Heritage Properties issued under the Ontario Heritage Act* (Ontario):
 - (A) subject to and in accordance with Section 18.3(e), at the City's cost, in respect of any such discovery for which the City is responsible pursuant to Section 18.3(b); and
 - (B) at its own cost in respect of any such discovery for which it is responsible pursuant to Section 18.3(b).
- (d) In the event that the City wishes DB Co to perform actions in respect of any discovery of any item referred to in Section 18.3(a) which are in addition to any required pursuant to Section 18.3(c), then the City shall issue an instruction to DB Co specifying what action the City requires DB Co to take and DB Co shall promptly and diligently comply with all such instructions at the City's cost subject to and in accordance with Section 18.3(e).
- (e) If Section 18.3(c) or Section 18.3(d) require DB Co to perform any alteration, addition, Demolition, extension or variation in the Works as a result of any such discovery for which the

City is responsible pursuant to Section 18.3(b) or as a result of any instructions given by the City pursuant to Section 18.3(d) and which would not otherwise be required under this Project Agreement, then any such alteration, addition, Demolition, extension or variation shall, subject to and in accordance with Section 32, be treated as a Delay Event and, subject to and in accordance with Section 33, be treated as a Compensation Event.

- (f) In the event that the City and DB Co do not agree as to the nature or extent of the actions required to be performed by DB Co pursuant to Section 18.3(c)(ii), such disagreement shall be referred for determination to an independent and suitably qualified and experienced person, acceptable to DB Co and the City, each acting reasonably (and the costs and expenses of retaining such person shall be borne by the unsuccessful Party). Such person's decision shall be final and binding on the Parties except to the extent that either Party alleges that such decision would result in non-compliance with Applicable Law or this Project Agreement, in which event either Party may refer the disagreement for resolution in accordance with Schedule 27 – Dispute Resolution Procedure.

18.4 Species-at-Risk

- (a) DB Co shall be responsible for any Species-at-Risk which may be found on, in or at the Site, the occurrence of which, in the location in which it is found, was described in the Environmental Assessments. The City shall be responsible for any Species-at-Risk which may be found on, in or at the Site, except for any Species-at-Risk the occurrence of which, in the location in which it is found, was described in the Environmental Assessments.
- (b) In respect of Species-at-Risk for which DB Co is responsible pursuant to Section 18.4(a), DB Co shall, at its own cost, comply, and ensure compliance by all DB Co Parties, with all Applicable Law and the provisions of Schedule 17 – Environmental Obligations. Upon the discovery of any Species-at-Risk for which the City are responsible pursuant to Section 18.4(a), DB Co shall:
 - (i) immediately inform the City Representative of such discovery; and
 - (ii) comply, and ensure compliance by all DB Co Parties, with all Applicable Law and the provisions of Schedule 17 - Environmental Obligations in respect thereof, including taking all necessary steps to preserve the respective habitat and relocate the Species-at-Risk at the City's cost pursuant to Section 18.4(d).
- (c) In the event that the City wishes DB Co to perform actions which are in addition to any required pursuant to Section 18.4(b), then the City shall issue an instruction to DB Co specifying what action the City requires DB Co to take and DB Co shall promptly and diligently comply with all such instructions at the City's cost pursuant to Section 18.4(d).
- (d) If Sections 18.4(b) or 18.4(c) require DB Co to perform any alteration, addition, demolition, extension or variation in the Works as a result of the discovery of any Species-at-Risk for which the City is responsible pursuant to Section 18.4(a) or as a result of any instructions given by the City pursuant to Section 18.4(c) and which would not otherwise be required under this Project Agreement, then any such alteration, addition, demolition, extension or variation:
 - (i) prior to Substantial Completion shall, subject to and in accordance with Section 32, be treated as a Delay Event and, subject to and in accordance with Section 33, be treated as a Compensation Event; and

- (ii) following Substantial Completion shall, subject to and in accordance with Schedule 22 - Variation Procedure, result in a Variation.

18.5 Stage 1 Connection Infrastructure

- (a) DB Co has reviewed the Stage 1 Connection Infrastructure Preliminary Report, and shall, subject to terms of this Section 18.5, undertake the design and Construction Activities related to the interface and interconnection of the Confederation Line East Extension and Confederation Line West Extension with the Existing Confederation Line in accordance with this Project Agreement. DB Co shall be entitled to assume and rely on the fact that the actual specifications and conditions of the Stage 1 Connection Infrastructure, upon completion of construction and commissioning such Stage 1 Connection Infrastructure, will be as described in the Stage 1 Connection Infrastructure Preliminary Report.
- (b) After Financial Close, and no later than June 25, 2019 the City will provide updated information, to the extent available, relating to the Stage 1 Connection Infrastructure Preliminary Report. No later than December 31, 2019, the City shall provide to DB Co a Stage 1 Connection Infrastructure Final Report.
- (c) If the Stage 1 Connection Infrastructure, or the Stage 1 Connection Infrastructure Final Report, demonstrates a deviation from the Stage 1 Connection Infrastructure Preliminary Report or the requirements in the Output Specifications, unless such deviation:
 - (i) was within the actual knowledge of DB Co or a DB Co Party, as of the date which is 30 days prior to the RFP Technical Submission Deadline;
 - (ii) was disclosed as such by the City to DB Co at least 30 days prior to the RFP Technical Submission Date (either in the Stage 1 Connection Infrastructure Preliminary Report or otherwise); or
 - (iii) has been, or is reasonably capable of being fully mitigated by DB Co without (A) incurring additional expenses which, when aggregated with all such other expenses incurred by DB Co and DB Co Parties in mitigating other such deviations from the Stage 1 Connection Infrastructure Preliminary Report or requirements in the Output Specifications, exceed \$[REDACTED], or (B) delaying the Critical Path,

to the extent that such deviation requires DB Co to perform any alteration, addition, demolition, extension, re-performance or variation in the Works, which would not otherwise be required under this Project Agreement, or otherwise delays DB Co's performance of the Works, any such alteration, addition, demolition, extension, variation or delay shall, subject to and in accordance with Section 32, be treated as a Delay Event and, subject to and in accordance with Section 33, be treated as a Compensation Event.

- (d) For the purposes of Section 18.5(c)(i), "actual knowledge of DB Co" shall mean knowledge that is actually held by the person who was identified as the project manager (or analogous position) for the Project in DB Co's proposal in response to the Request for Proposals.

18.6 Mislocated or Unknown Utilities

- (a) DB Co shall be responsible for Utility Infrastructure on the Site pursuant to Schedule 15 – Output Specifications, except for any Utility Infrastructure that is:
 - (i) Mislocated Utility Infrastructure; or
 - (ii) is Utility Infrastructure that:
 - (A) was not within the actual knowledge of DB Co or a DB Co Party, as of the date which is 30 days prior to the RFP Technical Submission Deadline; and
 - (B) was not referenced or described in, or was not inferable, readily apparent or readily discoverable, from the Background Information.
- (b) For the purposes of Section 18.6(a)(ii)(A), “actual knowledge of DB Co” shall mean knowledge that is actually held by the person who was identified as the project manager (or analogous position) for the Project in DB Co’s proposal in response to the Request for Proposals.
- (c) If Utility Infrastructure on the Site that is not the responsibility of DB Co pursuant to Section 18.6(a) delays DB Co’s performance of the Works then any such delay or additional costs in respect of the Works shall, subject to and in accordance with Section 32 be treated as a Delay Event and, subject to and in accordance with Section 33, be treated as a Compensation Event.
- (d) DB Co shall not be eligible for the Delay Event or Compensation Event set out in this Section 18.6 in respect of:
 - (i) any Utility Infrastructure that is a service connection;
 - (ii) any Utility Infrastructure that is above-ground, aerial, or at-grade;
 - (iii) any of the following Utility Infrastructure that is owned by the City or MTO:
 - (A) watermains of nominal diameter less than 150mm;
 - (B) combined sewers or storm sewers of nominal diameter less than 300mm;
 - (C) sanitary sewers of nominal diameter less than 225mm; and
 - (D) street lighting and traffic signal cables;
 - (iv) any Utility Infrastructure relocations carried out at the Site within the study area limits represented by the Subsurface Utility Engineering (SUE) Reports subsequent to Commercial Close, or within the study area limits represented by the Roll Plans subsequent to the City obtaining such subsurface utility engineering information, in either case including with respect to,
 - (A) the Works; and
 - (B) Third Party Works and Additional Works.

- (e) Any Dispute as to whether Utilities encountered by DB Co are or not Mislocated Utility Infrastructure or Utility Infrastructure described in clause (i) or (ii) of Section 18.6(a) shall initially be submitted to the Independent Certifier for independent determination in accordance with Section 4 of Schedule 27 – Dispute Resolution Procedure.

18.7 Stage 1 Systems Information

- (a) DB Co shall be entitled to rely upon the accuracy of the Stage 1 Systems Information for purposes of the Works and shall be entitled to rely on the fact that the Existing Confederation Line systems have been built in accordance with the Stage 1 Systems Information and Stage 1 Project Agreement.
- (b) In the event of any defect, omission, error or inaccuracy in the Stage 1 Systems Information (including if the Stage 1 System Information is not compliant with the Stage 1 Project Agreement or demonstrates a deviation from the requirements in the Output Specifications), unless such defect, omission, error or inaccuracy:
 - (i) was within the actual knowledge of DB Co or a DB Co Party, as of the as of the date which is 30 days prior to the RFP Technical Submission Deadline; or
 - (ii) was disclosed as such by the City to DB Co at least 30 days prior to the RFP Technical Submission Date (either in the Stage 1 Systems Information or otherwise),and provided compliance with the requirements of this Project Agreement reasonably requires DB Co to perform any alteration, addition, demolition, extension or variation in the Works which would not otherwise be required under this Project Agreement, or if such defect, error or inaccuracy otherwise delays DB Co's performance of the Works, any such alteration, addition, demolition, extension, variation or delay shall, subject to and in accordance with Section 32, be treated as a Delay Event and, subject to and in accordance with Section 33, be treated as a Compensation Event.
- (c) For the purposes of Section 18.7(b)(i), "actual knowledge of DB Co" shall mean knowledge that is actually held by the person who was identified as the project manager (or analogous position) for the Project in DB Co's proposal in response to the Request for Proposals.

18.8 Defects – Major Existing Third Party Infrastructure

- (a) The City shall be responsible for defects in Major Existing Third Party Infrastructure provided that the defect,
 - (i) was not within the actual knowledge of DB Co or a DB Co Party, as of the date which is 30 days prior to the RFP Technical Submission Deadline;
 - (ii) was not referenced or described in, or was not properly inferable, readily apparent or readily discoverable from, the Background Information;
 - (iii) was not properly attributable to the result of the aging of the Major Existing Third Party Infrastructure; or
 - (iv) was not caused or contributed to by DB Co or a DB Co Party.

- (b) For the purposes of Section 18.8(a)(i), “actual knowledge of DB Co” shall mean knowledge that is actually held by the person who was identified as the project manager (or analogous position) for the Project in DB Co’s proposal in response to the Request for Proposals.
- (c) If a defect in Major Existing Third Party Infrastructure that is the responsibility of the City pursuant to Section 18.8(a), delays DB Co’s performance of the Works, then any such delay in the Works Schedule or additional costs in respect of the Works shall, subject to and in accordance with Section 32, be treated as a Delay Event and, subject to and in accordance with Section 33, be treated as a Compensation Event.

19. GOVERNMENTAL AND THIRD PARTY FINANCIAL OBLIGATIONS

19.1 Governmental and Third Party Financial Obligations

- (a) DB Co shall be responsible for,
 - (i) all Financial Obligations under or in respect of all DB Co Permits, Licences, Approvals and Agreements, including,
 - (A) any engineering, administration and inspection fees required in respect of works or services to be performed;
 - (B) any security deposits required under any DB Co Permits, Licences, Approvals and Agreements; and
 - (C) any other amounts payable under any DB Co Permits, Licences, Approvals and Agreements; and
 - (ii) all Financial Obligations in respect of the City Permits, Licences, Approvals and Agreements that are set out as being DB Co’s responsibility in Schedule 15 – Output Specifications, Schedule 17 – Environmental Obligations or Schedule 35 – Permits, Licences, Approvals and Agreements, including any engineering, administration and inspection fees required in respect of works or services to be performed.
- (b) For clarity, and notwithstanding Section 19.1(a), DB Co shall not be responsible for payment of any development charges relating to the Works, the New City Infrastructure, the New MTO Infrastructure or the Lands.
- (c) Subject to Section 19.1(a)(ii), the City shall be responsible for all Financial Obligations under or in respect of all the City Permits, Licences, Approvals and Agreements including such Financial Obligations, as applicable in either case, to the City of Ottawa, any Utility Company, any Railway Company, any Governmental Authority or any other third party in respect of the Works, including:
 - (i) any engineering administration and inspection fees required in respect of works or services required to be performed;
 - (ii) any security deposits required under any City Permits, Licences, Approvals and Agreements; and

- (iii) any other amounts payable under any City Permits, Licences, Approvals and Agreements.
- (d) The Parties agree that any refund, partial rebate or credit granted by the City, any applicable Utility Company, any applicable Railway Company, or any applicable Governmental Authority or any other third party relating to the Financial Obligations referred to in Sections 19.1(a), 19.1(b) and 19.1(c) shall be for the benefit of the City to the extent such Financial Obligations were paid by the City (including pursuant to Section 11.29) and shall be for the benefit of DB Co to the extent such Financial Obligations were paid by DB Co. Without limiting the generality of the foregoing, to the extent that the City enters into any cost sharing arrangements with any Utility Company, any Railway Company, any Governmental Authority or any third party, DB Co acknowledges and agrees that the City shall be the sole beneficiary of any such cost sharing arrangements and DB Co shall have no entitlement whatsoever to any benefit arising from any such cost sharing arrangements.

20. CITY ACCESS AND MONITORING

20.1 City Access During the Works

- (a) Subject to Section 20.1(b) but without limiting any of the City's rights in respect of the Lands, the New City Infrastructure, the New MTO Infrastructure or the right of any third party in relation to that third party's portion of the Lands or New MTO Infrastructure, DB Co acknowledges and agrees that DB Co shall not restrict the access of the City, and the Government Entities and their respective representatives, to,
 - (i) the Lands, the New City Infrastructure, the New MTO Infrastructure or any workshop where materials, plant or equipment are being manufactured, prepared or stored at all reasonable times during normal working hours, including for the purposes of general inspection or audit, or of attending any test or study being carried out in respect of the Works, or to fulfill any statutory, public or other duties or functions; or
 - (ii) the Lands, the New City Infrastructure, the Existing Infrastructure for the purpose of operating the Existing Confederation Line.

For clarity, nothing in this Section 20.1 shall restrict or impede the City's or any other third party owner's right to use and access the Existing Infrastructure or any part of the Lands not required at that time for DB Co's performance of the Works in accordance with the terms hereof.

- (b) In exercising their access rights under Section 20.1(a) in respect of the Lands, the City shall, and shall cause the Government Entities, and their respective representatives, to:
 - (i) provide reasonable prior Notice appropriate to the circumstances (other than for any offices or other facilities provided for the use of the City and/or Government Entities);
 - (ii) comply with all relevant safety procedures and any reasonable directions with regard to site safety that may be issued by or on behalf of the DB Co Representative from time to time; and
 - (iii) if required by DB Co, be accompanied by a representative of DB Co or a DB Co Party.

20.2 Increased Monitoring

- (a) If, at any stage, the City is of the opinion, acting reasonably, that there are defects in the Works or that DB Co has failed to comply, in any material respect, with the requirements of this Project Agreement, the City may, without prejudice to any other right or remedy available to it, by Notice to DB Co, increase the level of monitoring of DB Co from that set out in this Project Agreement to such level as the City considers reasonable taking into account the nature of the relevant defect or failure until such time as DB Co shall have demonstrated, to the City's satisfaction, that it is capable of performing and will perform, in all material respects, its obligations related to the Works under this Project Agreement. DB Co will compensate the City for any reasonable costs incurred as a result of such increased monitoring.

20.3 Right to Uncover

- (a) DB Co shall ensure that the City is afforded advance Notice of, and that the City is afforded a full opportunity to witness, all inspection and test activity in accordance with the Inspection and Test Plan. If DB Co does not provide such Notice and opportunity, DB Co shall at the request of the City uncover any relevant part of the Works which have been covered up or otherwise put out of view or remove any relevant part of the Works that have been proceeded with in order to permit the City to witness the relevant inspection or test activity. DB Co shall bear all costs of any such uncovering or removal, regardless of whether or not any defect is discovered in the relevant Works.
- (b) The City shall have the right, at any time prior to the East Final Completion Date, to request DB Co to uncover or open up and inspect (or allow the City to inspect) any part or parts of the East Works, or to require testing of any part or parts of the East Works, where the City reasonably believes that such part or parts of the East Works is or are defective or that DB Co has failed to comply with the requirements of this Project Agreement (including the Design Data) relevant to such part or parts of the East Works, and DB Co shall comply with such request. When the City makes such a request, the City shall include reasonably detailed reasons with such request.
- (c) The City shall have the right, at any time prior to the West Final Completion Date, to request DB Co to uncover or open up and inspect (or allow the City to inspect) any part or parts of the West Works, or to require testing of any part or parts of the West Works (other than Highway Works in respect of which Section 20.3(d) shall apply), where the City reasonably believes that such part or parts of the West Works is or are defective or that DB Co has failed to comply with the requirements of this Project Agreement (including the Design Data) relevant to such part or parts of the West Works, and DB Co shall comply with such request. When the City makes such a request, the City shall include reasonably detailed reasons with such request.
- (d) The City shall have the right, at any time prior to the applicable Handover, to request DB Co to uncover or open up and inspect (or allow the City to inspect) any part or parts of the Highway Works, or to require testing of any part or parts of the Highway Works, where the City reasonably believes that such part or parts of the Highway Works is or are defective or that DB Co has failed to comply with the requirements of this Project Agreement (including the Design Data) relevant to such part or parts of the Highway Works, and DB Co shall comply with such request. When the City makes such a request, the City shall include reasonably detailed reasons with such request.

- (e) If an inspection shows that the relevant part or parts of the Works is or are defective or that DB Co has failed to comply with the requirements of this Project Agreement (including the Design Data) relevant to such part or parts of the Works, DB Co shall rectify all such defects and non-compliance diligently and at no cost to the City and DB Co shall not be entitled to any additional compensation or extension of time in relation thereto.
- (f) If an inspection shows that the relevant part or parts of the Works is not or are not defective and that DB Co has complied with the requirements of this Project Agreement (including the Design Data) relevant to such part or parts of the Works, the exercise by the City of its rights pursuant to this Section 20.3 shall, subject to and in accordance with Section 32, be treated as a Delay Event and, subject to and in accordance with Section 33, be treated as a Compensation Event.

20.4 No Relief from Obligations

- (a) The Parties acknowledge that the exercise by the City or the City Representative of the rights under this Section 20 shall in no way affect the obligations of DB Co under this Project Agreement except as set out in this Section 20.

20.5 Access by Others

- (a) Subject to Section 20.5(b) and subject to and in accordance with Section 11.12 (to the extent applicable), DB Co shall ensure that throughout the Project Term, without prejudice to any access rights of any such person as a member of the general public or pursuant to Applicable Law, that it does not restrict access to the Lands, New City Infrastructure, Existing Infrastructure, Stage 1 Connection Infrastructure or New MTO Infrastructure for:
 - (i) the Independent Certifier to the extent required to perform its obligations pursuant to Schedule 6 - Independent Certifier Agreement;
 - (ii) inspectors and other persons authorized to act on behalf of the City and owners of New MTO Infrastructure and Existing Infrastructure, for inspection and/or acceptance purposes;
 - (iii) all Other Contractors, including the owners or operators of any Third Party Facilities and their agents at all reasonable times to exercise any right or power or perform any duty or obligation under any Applicable Law or the Utility Agreements, Railway Orders or Encroachment Permits, provided that, wherever consistent with the requirements of Applicable Law and the requirements of this Project Agreement, DB Co may limit such access so as to not unnecessarily impede or restrict traffic flows, the operation of the Existing Infrastructure or any Works;
 - (iv) all Governmental Authorities and Emergency Service Providers in order to carry out any work (including surveys and inspections) in accordance with or to exercise any right or power or perform any duty or obligation under any Applicable Law and provided that, whenever consistent with the applicable requirements of such Governmental Authority, Emergency Service Providers or Applicable Law and the requirements of this Project Agreement (as the case may be), DB Co may limit such access so as to not unnecessarily impede or restrict traffic flows, the operation of the Existing Infrastructure or any Works;

- (v) any Other Contractors, owners or operators of Third Party Facilities, Governmental Authorities, MTO, Emergency Service Providers, Utility Companies, Railway Companies, Transit Systems and railway systems for the purposes of access to and from any other lands and/or facilities adjacent to or in proximity to the Lands, the New City Infrastructure, the New MTO Infrastructure and Existing Infrastructure owned or operated by such person or in which such person has any interest, provided that, whenever consistent with the requirements of Applicable Law and the requirements of this Project Agreement, DB Co may limit such access so as to not unnecessarily impede or restrict traffic flows, the operation of the Existing Infrastructure or any Works;
 - (vi) any City Party to undertake emergency training in relation to the New City Infrastructure;
 - (vii) any City Party to undertake and perform Systems Integration Works in accordance with the Systems Integration Management Plan, or RTG or RTG Parties in accordance with the provisions of the Interface Agreement.
- (b) Subject to Section 20.5(c), the City shall require persons accessing Site(s) on the Lands in accordance with access rights under Section 20.5(a) to:
 - (i) provide reasonable prior Notice to DB Co appropriate to the circumstances;
 - (ii) comply with all relevant health and safety procedures and any reasonable directions with regard to health and safety that may be issued by or on behalf of the DB Co Representative from time to time; and
 - (iii) if reasonably required by DB Co, be accompanied by a representative of DB Co or a DB Co Party.
- (c) Section 20.5(b) shall not apply,
 - (i) to Additional Contractors, who shall instead comply with any instructions or procedures made by DB Co pursuant to Section 11.12;
 - (ii) in the case of access rights described in Section 20.5(a) for the purpose of responding to an Emergency ;
 - (iii) for the purposes of responding to an emergency declared by the City or by a Governmental Authority; and
 - (iv) in circumstance where the requirements of Section 20.5(b) are inconsistent with the requirements of the applicable Governmental Authority or Emergency Service Provider.

20.6 Public Use

- (a) DB Co shall have no right to grant to the general public the right to use either the New City Infrastructure or the New MTO Infrastructure. It shall be the right of the City to grant the right of use to the general public to the New City Infrastructure. It shall be the right of the MTO to grant the right of use to the general public to the New MTO Infrastructure.

- (b) Except as otherwise expressly provided in this Project Agreement, DB Co shall not have any claim whatsoever against the City, any City Party, any Emergency Service Providers or any other Governmental Authority for, or in respect of any lane or ramp closure or diversion or any track closure or diversion, including any such closure or diversion as a result of the exercise of any other rights or powers or the discharge of any other duties or functions by any such authority, affecting all or any part of the Lands, the New City Infrastructure or the New MTO Infrastructure, at any time.

21. ENVIRONMENTAL REQUIREMENTS

21.1 [Intentionally Deleted]

21.2 Environmental Requirements

- (a) DB Co and the City shall comply with the provisions of Schedule 17 – Environmental Obligations.

21.3 [Intentionally Deleted]

22. INDEPENDENT CERTIFIER

22.1 Appointment

- (a) On or prior to Financial Close, the Parties shall appoint an independent and suitably qualified and experienced consultant to act as the Independent Certifier for the purposes of this Project Agreement and shall enter into an agreement with the Independent Certifier substantially in the form of Schedule 6 – Independent Certifier Agreement. If the Parties are unable to agree upon the Independent Certifier within such period of time, then the determination of the Independent Certifier shall be made in the same manner as the identification of a replacement Independent Certifier under Section 22.7(b).
- (b) Neither Party shall, without the prior written consent of the other Party, enter into any agreement with the Independent Certifier in connection with the Project other than the Independent Certifier Agreement, and DB Co shall ensure that no DB Co Party enters into any separate agreement with the Independent Certifier in connection with the Project.

22.2 Role of Independent Certifier

- (a) The general role, obligations and functions of the Independent Certifier are described in Schedule 6 – Independent Certifier Agreement.

22.3 Changes to Terms of Appointment

- (a) Neither the City nor DB Co shall without the other's prior written approval:
 - (i) waive, settle, compromise or otherwise prejudice any rights or claims which the other may from time to time have against the Independent Certifier; or
 - (ii) vary the terms of the Independent Certifier Agreement or the services performed or to be performed by the Independent Certifier.

- (b) The Parties shall perform their respective obligations arising under or in connection with the Independent Certifier Agreement.

22.4 Right to Change Appointment

- (a) The Parties agree that the Independent Certifier shall not provide any services or reports or other information to DB Co, the Lenders, the DB Co Parties or any other person other than pursuant to the performance of the functions of the Independent Certifier under this Project Agreement unless agreed to in writing by the Parties. The Parties may agree to terminate the Independent Certifier Agreement upon 30 days' Notice to the Independent Certifier. If such Notice is given, then, pursuant to Section 22.7, a new Independent Certifier will be appointed. The Parties agree that, notwithstanding the 30 days' Notice of termination, the Independent Certifier shall continue on a day-to-day basis thereafter until a new Independent Certifier is appointed.

22.5 Cooperation

- (a) The Parties agree to cooperate with each other generally in relation to all matters within the scope of or in connection with the Independent Certifier Agreement. All instructions and representations issued or made by either of the Parties to the Independent Certifier shall be simultaneously copied to the other and the Parties shall be entitled to attend all inspections performed by or meetings involving the Independent Certifier.

22.6 Payment of Independent Certifier and Systems Integration Verifier

- (a) DB Co and the City shall share equally the responsibility for the payment of all fees and costs of the Independent Certifier.
- (b) DB Co and the City shall share equally the responsibility for the payment of all fees and costs of the Systems Integration Verifier.

22.7 Replacement

- (a) In the event of the Independent Certifier's engagement being terminated otherwise than for full performance, the Parties shall liaise and cooperate with each other in order to appoint a replacement consultant to act as the Independent Certifier as soon as reasonably practicable. The identity of any such replacement shall be as agreed by the Parties and the terms of his/her appointment shall, unless otherwise agreed by the Parties, be as set out in the Independent Certifier Agreement.
- (b) In the event the Parties fail to agree upon the identity of a replacement Independent Certifier within five Business Days after the termination of the original Independent Certifier's appointment, then a replacement Independent Certifier shall be chosen as follows:
 - (i) each Party shall, within five Business Days thereafter, select three suitably qualified and experienced replacements that would be acceptable to that Party, and shall provide Notice thereof to the other Party, with a ranking of preference for replacements;
 - (ii) if the Parties have both selected a common replacement, then such common replacement shall be the Independent Certifier, and if there is more than one common replacement, then the common replacement with the highest overall ranking (calculated by adding

together the ordinal rank assigned by the Parties) shall be selected, and in the event of a tie, the lowest-cost of such tied replacements shall be selected; and

- (iii) if the Parties have not selected a common replacement, then the determination of the new replacement may be referred for resolution in accordance with Schedule 27 – Dispute Resolution Procedure.

23. INTENTIONALLY DELETED

24. INTENTIONALLY DELETED

25. COMMISSIONING AND COMPLETION

25.1 Commissioning Activities

- (a) DB Co shall perform all,
 - (i) East DB Co Commissioning pursuant to the East Testing & Commissioning Plan;
 - (ii) West DB Co Commissioning pursuant to the West Testing & Commissioning Plan;
 - (iii) Highway DB Co Commissioning pursuant to the Highway Testing & Commissioning Plan; and
 - (iv) Remaining Works DB Co Commissioning pursuant to the Remaining Works Testing & Commissioning Plan.

25.2 Testing & Commissioning Program

- (a) [Not used]
- (b) The Testing & Commissioning Program shall, at a minimum:
 - (i) describe the requirements, and the timing and sequence of such requirements, necessary for, as applicable:
 - (A) the East DB Co Commissioning to achieve East Substantial Completion on or before the East Scheduled Substantial Completion Date, and East Final Completion on or before the East Scheduled Final Completion Date;
 - (B) the West DB Co Commissioning to achieve West Substantial Completion on or before the West Scheduled Substantial Completion Date, and West Final Completion on or before the West Scheduled Final Completion Date;
 - (C) the Highway DB Co Commissioning to achieve each Handover on or before the West Scheduled Substantial Completion Date; and
 - (D) the Remaining Works DB Co Commissioning to achieve completion of the Remaining Works on or before the West Final Completion Date,

as the case may be;

- (ii) comply with all requirements of the Schedule 14 – Testing & Commissioning;
 - (iii) include the names of the individuals or companies proposed to perform the applicable DB Co Commissioning;
 - (iv) include a schedule of each of the applicable DB Co Commissioning Tests proposed to be performed and the timeframe for completion, with start and end dates;
 - (v) include a schedule of meetings to be held between the Parties to coordinate the performance of the applicable DB Co Commissioning; and
 - (vi) list the approvals required from any Governmental Authority, manufacturer or other person that are necessary to meet the requirements of the Testing & Commissioning Program or Applicable Law.
- (c) The City shall provide DB Co with comments on each draft Testing & Commissioning Program in accordance with the procedures contemplated by Schedule 10 – Review Procedure, and DB Co shall revise each draft Testing & Commissioning Program to the extent contemplated by Schedule 10 – Review Procedure within 30 days after receipt of any comments from the City.

25.3 DB Co Commissioning

- (a) DB Co shall, in accordance with Schedule 14 – Testing & Commissioning, invite the Independent Certifier and the City Representative to witness, and to comment on, each aspect of each DB Co Commissioning and DB Co shall provide all information that the Independent Certifier and the City Representative may reasonably require in relation thereto, including:
- (i) tests proposed;
 - (ii) test methodology; and
 - (iii) expected test results.

25.4 Substantial Completion Certificate

- (a) DB Co shall give the Independent Certifier and the City Representative at least 10 Business Days' Notice prior to the date upon which DB Co anticipates delivering each of the East Substantial Completion Notice and West Substantial Completion Notice.
- (b) DB Co shall give the Independent Certifier and the City Representative Notice upon the satisfaction of all requirements for,
- (i) East Substantial Completion (the “**East Substantial Completion Notice**”), describing, in reasonable detail, the satisfaction of the requirements for East Substantial Completion, together with DB Co’s opinion as to whether the conditions for issuance of the East Substantial Completion Certificate have been satisfied; and

- (ii) West Substantial Completion (the “**West Substantial Completion Notice**”), describing, in reasonable detail, the satisfaction of the requirements for West Substantial Completion, together with DB Co’s opinion as to whether the conditions for issuance of the West Substantial Completion Certificate have been satisfied,

(each a “**Substantial Completion Notice**”).

- (c) For the purposes of determining each applicable Substantial Completion, and for the purposes of determining substantial performance in accordance with Section 2(2) of the CA, the Parties have agreed not to expeditiously complete any Remaining Works until after West Substantial Completion.

The Parties have agreed that the price of the services or materials to be supplied, and required, to complete any Remaining Works shall be deducted from the total Cost of Works in determining substantial performance. For greater certainty, completion of the Remaining Works shall be a requirement for achieving West Final Completion.

- (d) The City shall, within five Business Days after receipt of a,
 - (i) East Substantial Completion Notice, provide the Independent Certifier and DB Co with the City’s opinion as to whether the conditions for issuance of an East Substantial Completion Certificate has been satisfied and, if applicable, any reasons as to why they consider that the East Substantial Completion Certificate should not be issued; and
 - (ii) West Substantial Completion Notice, provide the Independent Certifier and DB Co with the City’s opinion as to whether the conditions for issuance of an West Substantial Completion Certificate has been satisfied and, if applicable, any reasons as to why they consider that the West Substantial Completion Certificate should not be issued.
- (e) Within five Business Days after DB Co’s receipt of the City’s opinion pursuant to Section 25.4(d), the Parties shall cause the Independent Certifier to determine whether the conditions for issuance of each Substantial Completion Certificate have been satisfied, having regard for the opinions of both DB Co and the City, to determine whether any Minor Deficiencies exist, and to issue to the City and to DB Co either:
 - (i) the relevant Substantial Completion Certificate confirming the date of issue as the Substantial Completion Date and setting out the Minor Deficiencies List (if applicable) in accordance with Section 25.10; or
 - (ii) a report detailing the matters that the Independent Certifier considers are required to be performed by DB Co to satisfy the conditions for issuance of a Substantial Completion Certificate.
- (f) Where the Independent Certifier has issued a report in accordance with Section 25.4(e)(ii) and DB Co has not referred a Dispute in relation thereto for resolution in accordance with Schedule 27 – Dispute Resolution Procedure, DB Co shall, within 5 Business Days after receipt of such report, provide the Independent Certifier and the City Representative with:
 - (i) a detailed list indicating the rectification actions proposed for all matters raised in such report;

- (ii) the schedule for completion of all such rectification actions; and
- (iii) any additional DB Co Commissioning that needs to be undertaken as a result of the rectification actions,

and DB Co shall perform all such additional rectification actions and DB Co Commissioning in a timely manner. Upon completion thereof, DB Co may give a further Substantial Completion Notice and Sections 25.4(c) to (f), inclusive, shall be repeated until the relevant Substantial Completion Certificate has been issued.

- (g) The Independent Certifier's decision to issue or not to issue a Substantial Completion Certificate shall be final and binding on the Parties solely in respect of determining the applicable Substantial Completion Payment Date, and a Dispute in relation to such Substantial Completion Payment Date shall not be subject to resolution pursuant to the Dispute Resolution Procedure, provided, however, that any other Dispute in relation to the Independent Certifier's decision to issue or not to issue the Substantial Completion Certificate may be referred for resolution pursuant to the Schedule 27 – Dispute Resolution Procedure.
- (h) In respect of the East Works, DB Co shall provide As-Built Drawings, Record Drawings and specifications, Design Data and Shop Drawings as soon as possible and in any event no later than 60 days after the East Substantial Completion Date.
- (i) In respect of the West Works other than Highway Works, DB Co shall provide As-Built Drawings, Record Drawings and specifications, Design Data and Shop Drawings as soon as possible and in any event no later than 60 days after the West Substantial Completion Date.
- (j) In respect of the Highway Works, DB Co shall provide As-Built Drawings, Record Drawings and specifications, Design Data and Shop Drawings as soon as possible and in any event no later than 60 days after the applicable Handover.

25.5 Countdown Notices, Failure to Achieve Substantial Completion and Liquidated Damages

- (a) DB Co shall deliver a Notice (each, a “**Initial Countdown Notice**”) to the City and the Independent Certifier specifying the date on which DB Co anticipates that,
 - (i) East Substantial Completion will be achieved (the “**East Anticipated Substantial Completion Date**”, such Countdown Notice, an “**East Initial Countdown Notice**”); and
 - (ii) West Substantial Completion will be achieved (the “**West Anticipated Substantial Completion Date**”, such Countdown Notice, a “**West Initial Countdown Notice**”).

An Initial Countdown Notice shall be delivered not less than 180 days prior to the applicable Anticipated Substantial Completion Date.

- (b) In accordance with Section 7 of Schedule 12 – Works Schedule Requirements, the:
 - (i) East Anticipated Substantial Completion Date shall not be earlier than the East Scheduled Substantial Completion Date; and

- (ii) West Anticipated Substantial Completion Date shall not be earlier than the West Scheduled Substantial Completion Date,

without the prior written consent of the City, in its sole discretion.
- (c) [Not used]
- (d) In the event that DB Co has not delivered an East Initial Countdown Notice to the City in accordance with the requirements of Section 25.5(a), then DB Co shall,
 - (i) within 3 Business Days after the date that the East Initial Countdown Notice was to have been delivered to the City, pay to the City the sum of \$[REDACTED] as liquidated damages in respect of damages suffered and costs incurred by the City related to DB Co's failure to deliver the East Initial Countdown Notice in a timely manner; and
 - (ii) pay to the City the additional sum of \$[REDACTED] per calendar day as liquidated damages in respect of damages suffered and costs incurred by the City related to DB Co's failure to deliver such Notice for each day after the date that the East Initial Countdown Notice was to have been delivered to the City in accordance with the requirements of Section 25.5(a), until and including the date such Notice is delivered.
- (e) In the event that DB Co has not provided a West Initial Countdown Notice to the City in accordance with the requirements of Section 25.5(a), then DB Co shall,
 - (i) within 3 Business Days after the date that the West Initial Countdown Notice was to have been delivered to the City, pay to the City the sum of \$[REDACTED] as liquidated damages in respect of damages suffered and costs incurred by the City related to DB Co's failure to deliver the West Initial Countdown Notice in a timely manner; and
 - (ii) pay to the City the additional sum of \$[REDACTED] per calendar day as liquidated damages in respect of damages suffered and costs incurred by the City related to DB Co's failure to deliver such Notice for each day after the date that the West Initial Countdown Notice was to have been delivered to the City in accordance with the requirements of Section 25.5(a) until and including the date such Notice is delivered.
- (f) [Not used]
- (g) If an East Initial Countdown Notice has been delivered to the City and DB Co subsequently determines that East Substantial Completion will not be achieved on or before the East Anticipated Substantial Completion Date established by such East Initial Countdown Notice, DB Co shall:
 - (i) forthwith issue a subsequent Notice (an "**East Subsequent Notice**") to the City establishing a revised date by which DB Co expects to achieve East Substantial Completion (the "**East Revised Substantial Completion Date**"), which East Revised Substantial Completion Date shall be no earlier than,
 - (A) the East Anticipated Substantial Completion Date established by the East Initial Countdown Notice, and

- (B) 15 days after the delivery of such East Subsequent Notice;
- (ii) pay to the City, as liquidated damages in respect of damages suffered and costs incurred by the City related to DB Co's failure to achieve East Substantial Completion by the East Anticipated Substantial Completion Date established as aforesaid, the following amount:
 - (A) if the East Subsequent Notice is delivered between 1 and 29 days after the delivery of the East Initial Countdown Notice, the sum of \$[REDACTED];
 - (B) if the East Subsequent Notice is delivered between 30 and 59 days after the delivery of the East Initial Countdown Notice, the sum of \$[REDACTED];
 - (C) if the East Subsequent Notice is delivered between 60 and 89 days after the delivery of the East Initial Countdown Notice, the sum of \$[REDACTED];
 - (D) if the East Subsequent Notice is delivered between 90 and 119 days after the delivery of the East Initial Countdown Notice, the sum of \$[REDACTED];
 - (E) if the East Subsequent Notice is delivered between 120 and 149 days after the delivery of the East Initial Countdown Notice, the sum of \$[REDACTED]; or
 - (F) if the East Subsequent Notice is delivered later than 149 days after the delivery of the East Initial Countdown Notice, the sum of \$[REDACTED].
- (h) If a West Initial Countdown Notice has been delivered to the City and DB Co subsequently determines that West Substantial Completion will not be achieved on or before the West Anticipated Substantial Completion Date established by such West Initial Countdown Notice, DB Co shall:
 - (i) forthwith issue a subsequent Notice (a "**West Subsequent Notice**") to the City establishing a revised date by which DB Co expects to achieve West Substantial Completion (the "**West Revised Substantial Completion Date**"), which West Revised Substantial Completion Date shall be no earlier than,
 - (A) the West Anticipated Substantial Completion Date established by the West Initial Countdown Notice, and
 - (B) 15 days after the delivery of such West Subsequent Notice;
 - (ii) pay to the City, as liquidated damages in respect of damages suffered and costs incurred by the City related to DB Co's failure to achieve West Substantial Completion by the West Anticipated Substantial Completion Date established as aforesaid, the following amount:
 - (A) if the West Subsequent Notice is delivered between 1 and 29 days after the delivery of the West Initial Countdown Notice, the sum of \$[REDACTED];
 - (B) if the West Subsequent Notice is delivered between 30 and 59 days after the delivery of the West Initial Countdown Notice, the sum of \$[REDACTED];

- (C) if the West Subsequent Notice is delivered between 60 and 89 days after the delivery of the West Initial Countdown Notice, the sum of \$[REDACTED];
 - (D) if the West Subsequent Notice is delivered between 90 and 119 days after the delivery of the West Initial Countdown Notice, the sum of \$[REDACTED];
 - (E) if the West Subsequent Notice is delivered between 120 and 149 days after the delivery of the West Initial Countdown Notice, the sum of \$[REDACTED]; or
 - (F) if the West Subsequent Notice is delivered later than 149 days after the delivery of the West Initial Countdown Notice, the sum of \$[REDACTED].
- (i) [Not used]
- (j) In the event that DB Co fails to achieve East Substantial Completion by the East Anticipated Substantial Completion Date without having delivered to the City an East Subsequent Notice, or in the event that DB Co has delivered to the City an East Subsequent Notice establishing an East Revised Substantial Completion Date and DB Co fails to achieve East Substantial Completion by such East Revised Substantial Completion Date, without having delivered a further East Subsequent Notice, in either case, DB Co shall:
- (i) forthwith issue an East Subsequent Notice to the City establishing a further revised date by which DB Co expects to achieve East Substantial Completion (the “**East Further Revised Substantial Completion Date**”), which East Further Revised Substantial Completion Date shall be no earlier than 15 days after the delivery of such East Subsequent Notice;
 - (ii) within 3 Business Days after the East Anticipated Substantial Completion Date or the East Revised Substantial Completion Date, as the case may be, pay to the City the amount of \$[REDACTED] as liquidated damages in respect of damages suffered and costs incurred by the City related to DB Co’s failure to achieve East Substantial Completion and deliver notice thereof in a timely manner;
 - (iii) if the East Subsequent Notice in subparagraph 25.5(j)(i) has not been delivered by DB Co, pay to the City the additional sum of \$[REDACTED] per calendar day for each day after the East Anticipated Substantial Completion Date or the East Revised Substantial Completion Date, as the case may be, that such East Subsequent Notice in respect of the East Further Revised Substantial Completion Date has not been delivered to the City, as liquidated damages in respect of damages suffered and costs incurred by the City related to DB Co’s failure to deliver such notice.
- (k) In the event that DB Co fails to achieve West Substantial Completion by the West Anticipated Substantial Completion Date without having delivered to the City a West Subsequent Notice, or in the event that DB Co has delivered to the City a West Subsequent Notice establishing a West Revised Substantial Completion Date and DB Co fails to achieve West Substantial Completion by such West Revised Substantial Completion Date, without having delivered a further West Subsequent Notice, in either case, DB Co shall:

- (i) forthwith issue a West Subsequent Notice to the City establishing a further revised date by which DB Co expects to achieve West Substantial Completion (the “**West Further Revised Substantial Completion Date**”), which West Further Revised Substantial Completion Date shall be no earlier than 15 days after the delivery of such West Subsequent Notice;
 - (ii) within 3 Business Days after the West Anticipated Substantial Completion Date or the West Revised Substantial Completion Date, as the case may be, pay to the City the amount of \$[REDACTED] as liquidated damages in respect of damages suffered and costs incurred by the City related to DB Co’s failure to achieve West Substantial Completion and deliver notice thereof in a timely manner;
 - (iii) if the West Subsequent Notice in subparagraph 25.5(k)(j)(i) has not been delivered by DB Co, pay to the City the additional sum of \$[REDACTED] per calendar day for each day after the West Anticipated Substantial Completion Date or the West Revised Substantial Completion Date, as the case may be, that such West Subsequent Notice in respect of the West Further Revised Substantial Completion Date has not been delivered to the City, as liquidated damages in respect of damages suffered and costs incurred by the City related to DB Co’s failure to deliver such notice.
- (l) Notwithstanding the forgoing provisions of this Section 25.5, provided DB Co has complied with, and exercised all commercially reasonable efforts to enforce, the scheduling and completion provisions in the Nominated Signalling Subcontract, liquidated damages shall not accrue under this Section 25.5 with respect to any failure to achieve Substantial Completion by the Anticipated Substantial Completion Date or Revised Substantial Completion Date, as the case may be, that is caused solely by the failure of the Nominated Signalling Subcontractor to perform the Nominated Signalling Subcontractor Works in accordance with the Works Schedules to the extent such failure delays the Critical Path.
- (m) The Parties agree that the liquidated damages set out in this Section 25.5 are not a penalty but represent a genuine and reasonable pre-estimate of the damages that will be suffered by the City related to DB Co’s failure to comply with and observe the provisions of this Section 25.5.
- (n) DB Co acknowledges and agrees that all liquidated damages set out in this Section 25.5 shall be payable whether or not the City incurs or mitigates these damages, and that the City shall have no obligation to mitigate these damages. DB Co further agrees that it is, and shall be, estopped from alleging that any liquidated damages set out in this Section 25.5 are a penalty and not liquidated damages, or are otherwise unenforceable for any reason, including that such damages were not incurred.
- (o) Subject to Section 25.5(p), unless otherwise specified herein, liquidated damages that accrue under this Section 25.5 shall become due and payable from time to time upon the City giving Notice to DB Co. Any such Notice shall specify the amount of liquidated damages that have accrued and are payable by DB Co to the City as of the date of such Notice. If such liquidated damages are not paid by DB Co within 10 Business Days from the date of such Notice, the City may recover any such liquidated damages due by DB Co by setting off such amounts from any amounts due or owing by the City to DB Co hereunder, or by drawing down the corresponding amount from any outstanding letters of credit, as applicable, in each case as required by the City, acting in its discretion. Failure by the City to provide a Notice to DB Co under this Section

25.5(o) shall not constitute a waiver of the City's right to claim, or otherwise release DB Co from liability for, all liquidated damages under this Section 25.5 at any time.

- (p) In the event that there is a Dispute concerning Substantial Completion and such Dispute is ongoing, the City shall not be entitled to payment of related liquidated damages pursuant to this Section 25.5 unless and until such Dispute is resolved in accordance with the Dispute Resolution Procedure outlined in Schedule 27 – Dispute Resolution Procedure and, if resolved in favour of the City, the provisions respecting liquidated damages contained in this Section 25.5 shall apply with retroactive effect, except that there shall be added to the amount payable by DB Co on account of liquidated damages, interest at the rate of [REDACTED] percent per annum from the date the liquidated damages were required to be paid in the absence of the Dispute to the date of payment.

25.6 Operations & Maintenance Manuals

- (a) DB Co shall prepare and deliver to the City draft copies of all necessary operations & maintenance manuals for the New City Infrastructure and the New MTO Infrastructure in the format set out in the Output Specifications no later than 6 months prior to each of the East Substantial Completion Date and West Substantial Completion Date, as applicable.

25.7 Maintenance Instructions

- (a) No later than 30 days prior to each Substantial Completion Date, DB Co shall prepare and deliver to the City maintenance data in the format set out in the Output Specifications which is compatible with the City's computerized maintenance management system (CMMS). The maintenance data shall detail all required planned activities for the applicable portion of the Works prescribed by the applicable operation and maintenance manuals and Good Industry Practice, including:
 - (i) structural inspection procedures, identifying all components of the Works to be inspected on a regular basis and the recommended frequency of such inspections; and
 - (ii) preventative maintenance activities.
- (b) The provided maintenance data shall be subject to the review and approval of the City, acting reasonably. Following the City's approval of such maintenance data, the City shall upload it into the CMMS.

25.8 [Intentionally Deleted]

25.9 [Intentionally Deleted]

25.10 Minor Deficiencies

- (a) In the event that any Minor Deficiencies exist when DB Co gives an East Substantial Completion Notice, the Independent Certifier, in consultation with DB Co and the City, shall prepare a list of all Minor Deficiencies (the "**East Minor Deficiencies List**") in respect of the East Works (such Minor Deficiencies, the "**East Minor Deficiencies**") identified at that time and an estimate of the cost for the City and the time for DB Co, to complete and rectify such East Minor Deficiencies. The City may withhold from the East Substantial Completion Payment a holdback amount that is

[REDACTED]% of the amount estimated by the Independent Certifier for the City, to complete and rectify all such East Minor Deficiencies identified on the East Minor Deficiencies List (the “**East Completion Holdback**”), which holdback shall be held in an interest bearing account.

- (b) In the event that any Minor Deficiencies exist when DB Co gives a West Substantial Completion Notice, the Independent Certifier, in consultation with DB Co and the City, shall prepare a list of all Minor Deficiencies (the “**West Minor Deficiencies List**”) in respect of the West Works (such Minor Deficiencies, the “**West Minor Deficiencies**”) identified at that time and an estimate of the cost for the City and the time for DB Co, to complete and rectify such West Minor Deficiencies. The City may withhold from the West Substantial Completion Payment a holdback amount that is [REDACTED]% of the amount estimated by the Independent Certifier for the City, to complete and rectify all such West Minor Deficiencies identified on the West Minor Deficiencies List (the “**West Completion Holdback**”), which holdback shall be held in an interest bearing account.
- (c) [Not used]
- (d) Each Minor Deficiencies List will contain the schedule for the completion and rectification of the relevant Minor Deficiencies. In determining the relevant time for rectifying such Minor Deficiencies, DB Co shall schedule the completion and rectification of Minor Deficiencies so as to,
 - (i) comply with the Traffic and Transit Management Plan, the Construction Access Management Plan and all rules, requirements and restrictions relating to access, rail safety and operations and track protection, and road safety and operations, as set out in Schedule 15 – Output Specifications; and
 - (ii) minimize, to the greatest extent reasonably possible,
 - (A) any disruption of the Works or restrictions or other impairment of the public’s use and enjoyment of the New City Infrastructure, the New MTO Infrastructure, the Existing Infrastructure, the Stage 1 Connection Infrastructure, or any portion thereof; and
 - (B) any disruption of the operations of the City, any City Party, any Governmental Authority, any Other Contractor, RTG and RTG Parties, including the performance of the Governmental Activities, the Other Works, and RTG Works.
- (e) The Independent Certifier must prepare the East Minor Deficiencies List in relation to the East Substantial Completion Notice as soon as reasonably practicable, and, in any event, before the East Substantial Completion Certificate is issued, but shall not withhold the East Substantial Completion Certificate by reason solely that there are East Minor Deficiencies.
- (f) The Independent Certifier must prepare the West Minor Deficiencies List in relation to the West Substantial Completion Notice as soon as reasonably practicable, and, in any event, before the West Substantial Completion Certificate is issued, but shall not withhold the West Substantial Completion Certificate by reason solely that there are West Minor Deficiencies.
- (g) [Not used]

- (h) No later than 20 Business Days prior to the Anticipated Final Completion Date, the City may direct the Independent Certifier to amend, in consultation with DB Co and the City, a Minor Deficiencies List to include a list of any and all Minor Deficiencies that were identified after the preparation of, or not included in, a Minor Deficiencies List pursuant to Section 25.10(a) to 25.10(b). The Independent Certifier shall prepare the amended Minor Deficiencies List as soon as reasonably practicable and, in any event, within 10 Business Days after such direction given by the City. The amended Minor Deficiencies List shall, following its preparation, be deemed to be the Minor Deficiencies List for the purposes of this Project Agreement, including, without limitation, for the purposes of Sections 25.10 to 25.11 inclusive. For clarity, the amount of the East Completion Holdback or West Completion Holdback, as the case may be, shall not be affected by an amended Minor Deficiencies List.
- (i) Where the Independent Certifier has been directed by the City to amend a Minor Deficiencies List pursuant to Section 25.10(e) to 25.10(f), the Independent Certifier shall specify a commercially reasonable completion and rectification time for any newly added Minor Deficiencies.
- (j) The City may, in its sole discretion, waive any requirement for East Substantial Completion or West Substantial Completion, as the case may be, and the failure to meet any such requirement shall constitute a Minor Deficiency.
- (k) As an alternative to and in substitution for the withholding permitted by each of Sections 25.10(a) and 25.10(b), DB Co may, on or prior to the date on which each relevant Substantial Completion Payment is to be made to DB Co, provide a bond or letter of credit in favour of the City in an amount equal to the relevant Completion Holdback, in a form and from a surety or bank, as applicable, acceptable to the City, which letter of credit will be returned by the City to DB Co on the date that the relevant Completion Holdback would otherwise have been finally released to DB Co by the City. The City shall be entitled to draw against such letters of credit any such amounts as would otherwise be deducted from the applicable Completion Holdback in accordance with Section 25.12(a).
- (l) The Independent Certifier, in consultation with DB Co and the City, shall prepare a list of all Minor Deficiencies Nominated Signalling Subcontractor Works and an estimate of the cost for the City and the time for DB Co, to complete and rectify such Minor Deficiencies Nominated Signalling Subcontractor Works and such Minor Deficiencies Nominated Signalling Subcontractor Works shall be managed in accordance with the Nominated Signalling Subcontract.

25.11 Completion and Rectification of Minor Deficiencies

- (a) DB Co shall, in consultation with the City Representative and so as to,
 - (i) comply with the Traffic and Transit Management Plan, the Construction Access Management Plan and all rules, requirements and restrictions relating to access, rail safety and operations and track protection, and road safety and operations, as set out in Schedule 15 – Output Specifications; and
 - (ii) minimize, to the greatest extent reasonably possible,

- (A) any disruption of the Works or restrictions or other impairment of the public's use and enjoyment of the New City Infrastructure, the New MTO Infrastructure, or any portion thereof; and
- (B) any disruption of the operations of the City, any City Party, any Governmental Authority, any Other Contractor, RTG and RTG Parties, including the performance of the Governmental Activities, the Other Works, and RTG Works,

complete and rectify all Minor Deficiencies:

- (iii) within 120 days after the issuance of a Minor Deficiencies List pursuant to Section 25.10 for all Minor Deficiencies where no time for completion and rectification has been specified by the Independent Certifier; or
 - (iv) within the time for completion and rectification of a Minor Deficiency where such a time was specified by the Independent Certifier in the Minor Deficiencies List.
- (b) DB Co acknowledges and agrees that the completion and rectification of Minor Deficiencies may require work outside of normal working hours in order to accommodate the efficient operation of the New City Infrastructure, the New MTO Infrastructure, the Existing Infrastructure, the Stage 1 Connection Infrastructure, or any portion thereof and to ensure compliance with the Construction Access Management Plan, the Traffic and Transit Management Plan and all rules, requirements and restrictions relating to access, rail safety and operations and track protection, and road safety and operations, as set out in Schedule 15 – Output Specifications.
 - (c) Upon completion and rectification of East Minor Deficiencies, as confirmed by the Independent Certifier in consultation with the City and DB Co for each calendar month after East Substantial Completion (including the month in which East Substantial Completion is achieved) until completion of all East Minor Deficiencies, the City shall release the amount of the East Completion Holdback related to such completed and rectified East Minor Deficiencies during such calendar month, within 5 Business Days of the conclusion of such calendar month. Notwithstanding the forgoing, payment of the final remaining amount of the East Completion Holdback shall be governed by Section 25.11(d).
 - (d) After the completion and rectification of all East Minor Deficiencies, as confirmed by the Independent Certifier in consultation with the City and DB Co:
 - (i) DB Co shall submit to the City the following documentation,
 - (A) DB Co's written request for the release of the remaining amount of East Completion Holdback, including a declaration that no written notice of lien arising in relation to the performance of the East Works has been received by it that has not been withdrawn by the lien claimant, or otherwise duly released, discharged or vacated in accordance with the CA;
 - (B) DB Co's Statutory Declaration CCDC 9A(2001); and
 - (C) DB Co's WSIB Certificate of Clearance; and

- (ii) Within two Business Days of DB Co submitting such documentation, the City shall release to DB Co the remaining amount of the East Completion Holdback (less any amounts deducted in accordance with Section 25.12(a), together with all interest accrued thereon and applicable HST). Where the City exercises its rights pursuant to 25.12(a), if the cost of such completion and rectification exceeds the amount of the East Completion Holdback and interest, then DB Co shall reimburse the City for all such excess cost.
- (e) Upon completion and rectification of West Minor Deficiencies, as confirmed by the Independent Certifier in consultation with the City and DB Co for each calendar month after West Substantial Completion (including the month in which West Substantial Completion is achieved) until completion of all West Minor Deficiencies, the City shall release the amount of the West Completion Holdback related to such completed and rectified West Minor Deficiencies during such calendar month, within 5 Business Days of the conclusion of such calendar month. Notwithstanding the forgoing, payment of the final remaining amount of the West Completion Holdback shall be governed by Section 25.11(f).
- (f) After the completion and rectification of all West Minor Deficiencies, as confirmed by the Independent Certifier in consultation with the City and DB Co:
 - (i) DB Co shall submit to the City the following documentation,
 - (A) DB Co's written request for the release of the remaining amount of West Completion Holdback, including a declaration that no written notice of lien arising in relation to the performance of the West Works has been received by it that has not been withdrawn by the lien claimant or otherwise duly released, discharged or vacated in accordance with the CA;
 - (B) DB Co's Statutory Declaration CCDC 9A(2001); and
 - (C) DB Co's WSIB Certificate of Clearance; and
 - (ii) Within two Business Days of DB Co submitting such documentation, the City shall release to DB Co the remaining amount of the West Completion Holdback (less any amounts deducted in accordance with Section 25.12(a), together with all interest accrued thereon and applicable HST). Where the City exercises its rights pursuant to 25.12(a), if the cost of such completion and rectification exceeds the amount of the West Completion Holdback and interest, then DB Co shall reimburse the City for all such excess cost.
- (g) [Not used]
- (h) [Not used]

25.12 Failure to Rectify Minor Deficiencies

- (a) If DB Co fails to complete and rectify any Minor Deficiency within the time for its completion and rectification specified in Section 25.11, the City may engage others to perform the work necessary to complete and rectify such Minor Deficiency at the risk and cost of DB Co, and the City may deduct such cost,

- (i) in respect of an East Minor Deficiency, from the East Completion Holdback and interest accrued thereon; and
- (ii) in respect of a West Minor Deficiency, from the West Completion Holdback and interest accrued thereon.

25.12A Remaining Works Minor Deficiencies

- (a) DB Co shall request the Independent Certifier to prepare a list of all Remaining Works Minor Deficiencies (the “**Remaining Works Minor Deficiencies List**”) by delivery of a written request (the “**Remaining Works Minor Deficiency Inspection Request**”) to the Independent Certifier. The Remaining Works Minor Deficiency Inspection Request shall be delivered not less than 60 days prior to the West Anticipated Final Completion Date. The Independent Certifier, in consultation with DB Co and the City, shall, within 10 Business Days of DB Co’s delivery of the Remaining Works Minor Deficiency Inspection Request prepare the Remaining Works Minor Deficiencies List which shall include an estimate of the time for completing and rectifying all Remaining Works Minor Deficiencies.
- (b) The Remaining Works Minor Deficiencies List will contain the schedule for the completion and rectification of all relevant Remaining Works Minor Deficiencies. In determining the relevant time for rectifying Minor Deficiencies, DB Co shall schedule the completion and rectification of any Remaining Works Minor Deficiencies so as to:
 - (i) comply with the Traffic and Transit Management Plan, the Construction Access Management Plan and all rules, requirements and restrictions relating to access, rail safety and operations and track protection, and road safety and operations, as set out in Schedule 15 – Output Specifications; and
 - (ii) minimize, to the greatest extent reasonably possible,
 - (A) any disruption of the applicable Works or restrictions or other impairment of the public’s use and enjoyment of the New City Infrastructure, the New MTO Infrastructure, the Existing Infrastructure, or any portion thereof; and
 - (B) any disruption of the operations of the City, any City Party, any Governmental Authority, any Other Contractor, RTG and RTG Parties, including the performance of the Governmental Activities, the Other Works, and RTG Works.

25.12B Rectification of Remaining Works Minor Deficiencies

- (a) DB Co shall, in consultation with the City Representative and so as to,
 - (i) comply with the Traffic and Transit Management Plan, the Construction Access Management Plan and all rules, requirements and restrictions relating to access, rail safety and operations and track protection, and road safety and operations, as set out in Schedule 15 – Output Specifications; and
 - (ii) minimize, to the greatest extent reasonably possible,

- (A) any disruption of the Works or restrictions or other impairment of the public's use and enjoyment of the New City Infrastructure, the New MTO Infrastructure, or any portion thereof; and
- (B) any disruption of the operations of the City, any City Party, any Governmental Authority, any Other Contractor, RTG and RTG Parties, including the performance of the Governmental Activities, the Other Works, and RTG Works,

complete and rectify all Remaining Works Minor Deficiencies within 60 days after the issuance of a Remaining Works Minor Deficiencies List or such other period as the Independent Certifier may specify in such Remaining Works Minor Deficiencies List, and in any event by no later than the West Scheduled Final Completion Date.

- (b) DB Co acknowledges and agrees that the completion and rectification of any Remaining Works Minor Deficiencies may require work outside of normal working hours in order to accommodate the efficient operation of the New City Infrastructure, the New MTO Infrastructure, the Existing Infrastructure or any portion thereof and to ensure compliance with the Construction Access Management Plan, the Traffic and Transit Management Plan and all rules, requirements and restrictions relating to access, rail safety and operations and track protection, and road safety and operations, as set out in Schedule 15 – Output Specifications.

25.13 Final Completion Countdown Notice

- (a) DB Co shall deliver a Notice (each, a “**Final Completion Countdown Notice**”), to the City and the Independent Certifier specifying the:
 - (i) East Anticipated Final Completion Date (the “**East Final Completion Countdown Notice**”); and
 - (ii) West Anticipated Final Completion Date (the “**West Final Completion Countdown Notice**”).
- (b) Each Final Completion Countdown Notice shall be delivered not less than 60 days prior to the relevant Anticipated Final Completion Date pursuant to Section 25.13(a) above. For clarity, if DB Co fails to deliver the,
 - (i) East Final Completion Countdown Notice not less than 60 days prior to the East Scheduled Final Completion Date, the East Anticipated Final Completion Date shall be deemed to be the same date as the East Scheduled Final Completion Date; and
 - (ii) West Final Completion Countdown Notice not less than 60 days prior to the West Scheduled Final Completion Date, the West Anticipated Final Completion Date shall be deemed to be the same date as the West Scheduled Final Completion Date.

25.14 Final Completion Certificate

- (a) DB Co shall give the Independent Certifier and the City Representative at least 10 Business Days' Notice prior to the date upon which DB Co anticipates delivering a Final Completion Notice.

- (b) DB Co shall give the Independent Certifier and the City Representative Notice (the “**East Final Completion Notice**”) upon the satisfaction of all requirements for East Final Completion, which East Final Completion Notice shall describe, in reasonable detail, the satisfaction of the requirements for East Final Completion, including the completion and rectification of all Minor Deficiencies, together with DB Co’s opinion as to whether the conditions for issuance of the East Final Completion Certificate have been satisfied.
- (c) DB Co shall give the Independent Certifier and the City Representative Notice (the “**West Final Completion Notice**”) upon the satisfaction of all requirements for West Final Completion, which West Final Completion Notice shall describe, in reasonable detail, the satisfaction of the requirements for West Final Completion, including the completion and rectification of all Minor Deficiencies, together with DB Co’s opinion as to whether the conditions for issuance of the West Final Completion Certificate have been satisfied.
- (d) [Not used]
- (e) Each Final Completion Notice shall also include the following documentation:
 - (i) a declaration that no written notice of lien arising in relation to the performance of the applicable Works has been received by it that has not been withdrawn by the lien claimant or otherwise duly released, discharged or vacated in accordance with the CA;
 - (ii) DB Co’s Statutory Declaration CCDC 9A (2001);
 - (iii) DB Co’s WSIB Certificate of Clearance;
 - (iv) a written statement that the applicable Works have been performed to the requirements of the Ancillary Documents, itemizing approved changes in such Works, the Independent Certifier’s written instructions, and modifications required by Governmental Authorities; and
 - (v) a written description of the correction of Minor Deficiencies and, for the West Final Completion Notice, Remaining Works Minor Deficiencies, that are seasonal in nature and cannot be completed prior to the applicable Final Completion Date, if any, and the time for completion of such work as agreed between the City and DB Co, each acting reasonably.
- (f) The City shall, within five Business Days after receipt of a Final Completion Notice, provide the Independent Certifier and DB Co with the City’s opinion as to whether the conditions for issuance of a Final Completion Certificate have been satisfied and, if applicable, any reasons as to why they consider that the Final Completion Certificate should not be issued.
- (g) Within five Business Days after DB Co’s receipt of the City’s opinion pursuant to Section 25.14(f), the Parties shall cause the Independent Certifier to determine whether the conditions for issuance of a Final Completion Certificate have been satisfied, having regard for the opinions of both DB Co and the City, and to issue to the City and to DB Co either:
 - (i) such Final Completion Certificate confirming the date of issue as a Final Completion Date; or

- (ii) a report detailing the matters that the Independent Certifier considers are required to be performed by DB Co to satisfy the conditions for issuance of a Final Completion Certificate, including any items on the Minor Deficiencies List and, in respect of West Final Completion, items on the Remaining Works Minor Deficiencies List, which remain outstanding.
- (h) Where the Independent Certifier has issued a report in accordance with Section 25.14(g)(ii) and DB Co has not referred a Dispute in relation thereto for resolution in accordance with Schedule 27 – Dispute Resolution Procedure, DB Co shall, within five Business Days after receipt of such report, provide the Independent Certifier and the City Representative with:
 - (i) a detailed list indicating the rectification actions proposed for all matters raised in such report;
 - (ii) the schedule for completion of all such rectification actions; and
 - (iii) any additional DB Co Commissioning that needs to be undertaken as a result of the rectification actions,and DB Co shall perform all such additional rectification actions and DB Co Commissioning in a timely manner. Upon completion thereof, DB Co may give a further Final Completion Notice and Sections 25.14(f) to 25.14(h), inclusive, shall be repeated until a Final Completion Certificate has been issued.
- (i) Any Dispute in relation to the Independent Certifier's decision to issue or not to issue a Final Completion Certificate may be referred for resolution in accordance with Schedule 27 – Dispute Resolution Procedure.

25.15 Effect of Certificates/Use

- (a) The issue of a Substantial Completion Certificate or Final Completion Certificate, the commencement of use by the City or the public of any part of the New City Infrastructure or New MTO Infrastructure under the terms of this Project Agreement or the commencement of any Governmental Activities, shall, in no way:
 - (i) limit the obligations of DB Co under this Project Agreement including in respect of any defects, deficiencies or items of outstanding work existing or discovered prior to or after the date of any of such certificates or the date of the Minor Deficiencies List or of the amended Minor Deficiencies List described in Section 25.10(e) to 25.10(h); or
 - (ii) be construed as an approval by the City of the Works or the way in which they have been carried out.

25.16 Inspection, Commissioning and Handover of New MTO Infrastructure

- (a) DB Co acknowledges and agrees that New MTO Infrastructure will be inspected, commissioned and handed over to the MTO on a component by component basis and from time to time during the Construction Period.

- (b) For the purposes of this Section 25.16, the City may delegate the responsibility for carrying out interim inspections, final inspections, warranty inspections, and commissioning and Handover activities, on behalf of the City, to MTO, in respect of the New MTO Infrastructure by providing Notice to DB Co of any such delegation (any such notice referred to as a “**Notice of Delegation**”), and the City may, in its sole discretion, and at any time revise such delegation by Notice to DB Co. For clarity, the City may delegate the foregoing responsibility in respect of all or any component of any New MTO Infrastructure. DB Co acknowledges and agrees that, for the purposes of this Section 25.16, DB Co shall Handover all New MTO Infrastructure directly to the City unless the City has delivered to DB Co a Notice of Delegation in respect of New MTO Infrastructure, in which case, DB Co shall Handover such New MTO Infrastructure directly to MTO.
- (c) No later than 5 days prior to the anticipated completion of New MTO Infrastructure, DB Co shall provide Notice to the City or, where a Notice of Delegation has been provided to DB Co, DB Co shall provide Notice to MTO, of the date on which the New MTO Infrastructure will be completed and ready for inspection and testing. DB Co and the City, or DB Co and MTO (where a Notice of Delegation has been provided) shall carry out a joint inspection of such New MTO Infrastructure. Such joint inspection shall occur no later than 90 days after the date of completion of the New MTO Infrastructure. The inspection and testing of New MTO Infrastructure pursuant to this Section 25.16(c) shall follow the inspection and testing requirements set out in the Inspection and Test Plan. Such inspection, shall be for the purposes of:
 - (i) assessing whether the New MTO Infrastructure has been constructed in accordance with the Output Specifications and is otherwise in compliance with the requirements in the Project Agreement; and
 - (ii) identifying any defects or deficiencies to the New MTO Infrastructure that DB Co must correct, repair or restore before DB Co completes the commissioning of the New MTO Infrastructure before the Handover of the New MTO Infrastructure.
- (d) Prior to final inspection of New MTO Infrastructure, DB Co shall:
 - (i) prepare a record of the following, and submit it to the City for review in accordance with Schedule 10 – Review Procedure at least 30 Business Days before the final inspection:
 - (A) a list of the New MTO Infrastructure to be inspected;
 - (B) the tests, inspection methods and procedures to be used and performed and the standards that apply in respect of tests, inspection methods and procedures, which test and inspection shall follow the inspection and testing requirements set out in the Inspection and Test Plan;
 - (C) the scheduled date for testing and inspection of the applicable New MTO Infrastructure;
 - (D) a list of the names and employers of persons to represent DB Co and the City or, if a Notice of Delegation has been issued in respect of the relevant New MTO Infrastructure, a list of the names and employers of persons to represent DB Co and MTO, as the case may be, at the inspection; and

- (E) a list of existing systems that may be impacted by the tests and inspection.
- (ii) Ensure that:
 - (A) all defects and deficiencies that have been identified by the City or MTO, as applicable, during any interim inspections, have been rectified; and
 - (B) any damage to New MTO Infrastructure is repaired by DB Co in accordance with this Project Agreement.
- (e) DB Co shall prepare a record of each inspection carried out pursuant to Section 25.16(c) in inspection report format including: (i) a list of defects or deficiencies to New MTO Infrastructure identified during the inspection; and (ii) actions to be taken by DB Co to correct each defect or deficiency and to rectify the damage. DB Co shall submit the inspection reports to the City within three Business Days of each inspection for review in accordance with Schedule 10 – Review Procedure.
- (f) After the inspection of the New MTO Infrastructure pursuant to Section 25.16(c), DB Co shall make all arrangements in respect of the applicable New MTO Infrastructure to:
 - (i) correct all defects and deficiencies to the applicable New MTO Infrastructure and repair any damage to the applicable New MTO Infrastructure;
 - (ii) complete commissioning of the applicable New MTO Infrastructure in accordance with Schedule 14 – Testing & Commissioning;
 - (iii) comply with all requirements in respect of New MTO Infrastructure (set out in Schedule 14 – Testing & Commissioning) prior to, and as a pre-condition of Handover of New MTO Infrastructure;
 - (iv) complete Handover of the New MTO Infrastructure to the City or, where the City has delivered to DB Co a Notice of Delegation in respect of New MTO Infrastructure, complete Handover to MTO; and
 - (v) seek, receive, and document confirmation from the City or, where the City has delivered to DB Co a Notice of Delegation in respect of the applicable New MTO Infrastructure, seek, receive, and document confirmation from MTO, that such commissioning and Handover has been completed.
- (g) DB Co shall provide Notice to the City when any New MTO Infrastructure has been commissioned and has achieved Handover to the MTO. Such Notice to the City shall include the following:
 - (i) a clear identification of that portion or component of the New MTO Infrastructure that is the subject of the Notice;
 - (ii) the date of Handover of the applicable New MTO Infrastructure (as set out in the written confirmation required by Section 25.16(g)(iii)); and

- (iii) a written confirmation, signed by an authorized representative of the MTO that commissioning and Handover of the New MTO Infrastructure has been completed, including the confirmed date of Handover.
- (h) MTO and the City may, at any time and from time to time prior to West Final Completion, on providing 30 Business Days' Notice to DB Co, require a joint interim inspection of the New MTO Infrastructure to be carried out for the purposes of:
 - (i) assessing whether the New MTO Infrastructure has been constructed in accordance with the Output Specifications and is otherwise in compliance with the requirements of the Project Agreement; and
 - (ii) identifying any defects or deficiencies to the applicable New MTO Infrastructure.
- (i) Prior to any interim inspection of New MTO Infrastructure, DB Co shall prepare and submit to the City, a record of the following at least 20 Business Days before the applicable interim inspection, as the case may be:
 - (i) a list of the New MTO Infrastructure to be inspected;
 - (ii) the tests, inspection methods and procedures to be used and performed and the standards that apply in respect of tests, inspection methods and procedures, which tests and inspections shall follow the inspection and testing requirements set out in the Inspection and Test Plan;
 - (iii) the date for testing and inspection of the applicable New MTO Infrastructure which shall be no later than 45 Business Days after the Notice has been provided to DB Co pursuant to Section 25.16(h).
 - (iv) a list of the names and employers of persons to represent DB Co and the City or, if a Notice of Delegation has been issued in respect of the relevant New MTO Infrastructure, a list of the names and employers of persons to represent DB Co and MTO, at the inspection; and
 - (v) a list of existing systems that may be impacted by the tests and inspection.
- (j) DB Co shall prepare a record of each interim inspection carried out pursuant to Section 25.16(h) in inspection report format including: (i) a list of defects or deficiencies to the New MTO Infrastructure identified during the inspection, and (ii) actions to be taken by DB Co to correct each defect or deficiency and to rectify the damage. DB Co shall submit the inspection reports to the City for review within 3 Business Days of the inspection for review in accordance with Schedule 10 – Review Procedure.
- (k) DB Co shall arrange, schedule, and facilitate all inspections, and commissioning and Handover activities, in respect of the New MTO Infrastructure directly with the City, except where the City has provided Notice of Delegation to DB Co in respect of any of the New MTO Infrastructure, in which case the City and DB Co shall arrange, schedule, and facilitate all inspections, and commissioning and Handover activities with MTO. DB Co acknowledges and agrees that no joint inspection shall proceed unless, where a Notice of Delegation has been provided, the MTO is in attendance at such inspection, and DB Co shall, with such reasonable assistance from the

City as may be requested by DB Co, coordinate with and ensure MTO is in attendance at all joint inspections contemplated under this Section 25.16. DB Co shall report to the City on the status of all inspections, commissioning and Handover carried out in accordance with this Section 25.16 as part of the Works Report.

26. HUMAN RESOURCES

26.1 Admittance of Personnel

- (a) The City shall have the right to order the removal from the Lands, the New City Infrastructure or the New MTO Infrastructure of any person employed by (or acting on behalf of) DB Co, or any DB Co Party, whose presence, in the reasonable opinion of the City is likely to have an adverse effect on the Other Works or the Governmental Activities or who, in the reasonable opinion of the City is not a fit and proper person to be on the Lands, the New City Infrastructure or the New MTO Infrastructure for any reason, including a failure to comply with any the City policy or any immediate obligation of the City to ensure the safety and well-being of persons on the Lands, the New City Infrastructure and the New MTO Infrastructure.
- (b) Any action taken under this Section 26.1 shall promptly be confirmed by the City to DB Co and, for greater certainty, shall not relieve DB Co of any of its obligations under this Project Agreement.
- (c) Any decision of the City made pursuant to this Section 26.1 shall be final and conclusive.

26.2 Staff Competency

- (a) DB Co shall ensure that:
 - (i) there shall at all times be a sufficient number of persons employed or engaged by DB Co or any DB Co Party (including all relevant grades of supervisory staff) engaged in the performance of the Works with the requisite level of skill and experience to perform the Works in accordance with this Project Agreement. For greater certainty, this obligation shall include ensuring that there are a sufficient number of such skilled and experienced persons employed or engaged by DB Co or any DB Co Party to complete the Works in accordance with the Works Schedule;
 - (ii) all persons employed or engaged by DB Co or any DB Co Party (including all relevant grades of supervisory staff) engaged in the performance of the Works receive such training and supervision as is necessary to ensure the proper performance of this Project Agreement and compliance with all health and safety rules, procedures and requirements, Authority Requirements and the City HR Policy; and
 - (iii) it creates and maintains, and causes all DB Co Parties to create and maintain, a process which allows it to assess, monitor and correct, on an ongoing basis, the competency of persons employed or engaged by DB Co or any DB Co Party (including all relevant grades of supervisory staff) engaged in the performance of the Works to ensure the proper performance of this Project Agreement.

26.3 Notification of Convictions

- (a) DB Co (to the extent permitted by Applicable Law) shall, and shall cause such DB Co Party to, ensure that all potential employees (including, for greater certainty, permanent, temporary, full time and part time employees) and persons who may otherwise perform the Works:
 - (i) are questioned concerning Relevant Convictions; and
 - (ii) are required to complete and deliver to DB Co a criminal records search form.
- (b) To the extent permitted by Applicable Law, DB Co shall, and shall cause each DB Co Party to, ensure that no person who discloses any Relevant Conviction, or who is found to have any Relevant Conviction following the completion of a criminal records search, in either case of which DB Co or a DB Co Party is aware or ought to be aware, is allowed access to the Lands, the New City Infrastructure or the New MTO Infrastructure to perform any Works, without the prior written consent of the City, in its sole discretion.
- (c) To the extent permitted by Applicable Law, DB Co shall ensure that the City is notified as soon as possible, and kept advised at all times of, any person employed or engaged by DB Co or any DB Co Party in the provision of any of the Works who, subsequent to the commencement of such employment or engagement, (i) has been arrested or detained; (ii) receives a Relevant Conviction; or (iii) is charged with an offence that could lead to a Relevant Conviction (of which DB Co or a DB Co Party becomes aware or whose previous Relevant Convictions become known to DB Co or a DB Co Party). DB Co shall use commercially reasonable efforts to obtain, or to cause all DB Co Parties to obtain, all consents as may be required by Applicable Law or otherwise authorizing the disclosure of such information to the City as contemplated in this Section 26.3.

26.4 Disciplinary Action

- (a) The City, acting reasonably, may notify DB Co of any DB Co or DB Co Party employee who engages in misconduct or is incompetent or negligent in the performance of duties or whose presence or conduct on the Lands or at work is otherwise considered by the City to be undesirable, to constitute a threat to the health and/or safety of any of the users of the Lands and/or System Users or which the City considers may potentially compromise (i) the City's reputation or integrity, or (ii) the nature of the public transit system in the City of Ottawa or the Province of Ontario so as to affect public confidence in the public transit system in one or more of the City of Ottawa, the Province of Ontario or the Project. Upon investigation, DB Co may institute, or cause the relevant DB Co Party to institute, disciplinary proceedings, which shall be in accordance with the requirements of Applicable Law, and shall advise the City in writing of the outcome of any disciplinary action taken in respect of such person.

26.5 Human Resources Policies

- (a) DB Co shall ensure that there are set up and maintained by it and by all DB Co Parties, human resources policies and procedures covering all relevant matters relating to the Works (including, for example, health and safety). DB Co shall ensure that the terms and the implementation of such policies and procedures comply with Applicable Law, Authority Requirements, and Good Industry Practice and that they are published in written form and that copies of them (and any revisions and amendments to them) are directly issued to the City and all DB Co Parties.

26.6 Management Organizations

- (a) DB Co shall provide, and shall ensure that all DB Co Parties provide, to the City, as required to keep such information current, the names of the management teams responsible for the provision of the Works.

26.7 Governmental Authority

- (a) DB Co shall ensure that it and all DB Co Parties comply at all times with any regulations, policies or directions set by any Governmental Authority related to labour, employment and/or human resources.

27. THE CITY'S REMEDIAL RIGHTS

27.1 Exercise of Remedial Rights

- (a) The City may exercise all rights set out in this Section 27 at any time and from time to time if:
 - (i) the City, acting reasonably, considers that a breach by DB Co of any obligation under this Project Agreement, or any act or omission on the part of DB Co or any DB Co Party:
 - (A) does or can reasonably be expected to create a serious threat to the health, safety or security of any person, including any System Users or City Party;
or
 - (B) does or can reasonably be expected to materially prejudice the performance of any Governmental Activities;
 - (C) may potentially compromise the City's reputation or integrity, or the nature of the public transit system in the City of Ottawa or the Province of Ontario, so as to affect public confidence in that system or the Project,

provided that:

- (D) in respect of a breach by DB Co of any obligation under this Project Agreement or any act or omission on the part of DB Co or any DB Co Party which can reasonably be expected to cause any of the consequences set out in Sections 27.1(a)(i)(A) and 27.1(a)(i)(B), the City shall not exercise its rights under this Section 27 unless DB Co has failed to cure the relevant breach, act or omission within 5 Business Days after Notice from the City or, if such breach, act or omission cannot reasonably be cured within such 5 Business Day period, DB Co thereafter fails to diligently and continuously pursue such cure and to cure such breach, act or omission within a reasonable period thereafter, provided that DB Co shall not be entitled to a cure period if any of the consequences set out in Sections 27.1(a)(i)(A) and 27.1(a)(i)(B) actually occur; and
- (E) in respect of Section 27.1(a)(i)(C), the City shall not exercise its rights under this Section 27 unless DB Co has failed to cure the relevant breach, act or omission within 5 Business Days after Notice from the City or, if such

breach, act or omission cannot reasonably be cured within such 5 Business Day period, DB Co thereafter fails to diligently and continuously pursue such cure and to cure such breach, act or omission within a reasonable period thereafter;

- (ii) DB Co has not caused the COR-Qualified Construction DB Co Party or the COR-Certified Construction DB Co Party, as the case may be, to perform its obligations with respect to its COR Certification or OHSAS 18001 Accreditation, as the case may be, in accordance with Section 11.25, or DB Co has not caused the COR-Qualified Construction DB Co Party or the COR-Certified Construction DB Co Party, as the case may be, to perform its obligations with respect to H&S Construction Inspections in accordance with Section 15.2, or to perform its obligations to rectify any non-compliance noted in any H&S Construction Inspection Report in accordance with Section 15.2(c);
- (iii) DB Co has not performed or is not performing its obligations in respect of the Demolition Requirements in accordance with Section 11.26 or DB Co has not performed or is not performing its obligations to rectify any Demolition Default Event in accordance with Section 11.26;
- (iv) DB Co has failed to comply with any written direction issued by or on behalf of the City in accordance with this Project Agreement.

27.2 Emergency

- (a) Notwithstanding that DB Co is not in breach of its obligations under this Project Agreement, the City may exercise all of the rights set out in this Section 27 at any time and from time to time if the City, acting reasonably, considers the circumstances to constitute an Emergency.

27.3 Rectification

- (a) Without prejudice to the City's rights under Section 36 and any other rights under this Project Agreement, in any of the circumstances set out in Sections 27.1 or 27.2, the City may, by written Notice, require DB Co to take such steps as the City, acting reasonably, considers necessary or expedient to mitigate, rectify or protect against such circumstance, including, if applicable, the termination and replacement of Subcontractors or a limited suspension of the performance of the Works, and DB Co shall use commercially reasonable efforts to comply with the City's requirements as soon as reasonably practicable.
- (b) If the City gives Notice to DB Co pursuant to Section 27.3(a) and either:
 - (i) DB Co does not either confirm, within 5 Business Days after such Notice or such shorter period as is appropriate in the case of an Emergency that it is willing to take the steps required in such Notice or present an alternative plan to the City to mitigate, rectify and protect against such circumstances that the City may accept or reject acting reasonably; or
 - (ii) DB Co fails to take the steps required in such Notice or accepted alternative plan within such time as set out in such Notice or accepted alternative plan or within such longer time as the City, acting reasonably, shall think fit,

then the City may take such steps as it considers to be appropriate, acting reasonably, requiring the termination and replacement of Subcontractors, either themselves or by engaging others (including a third party) to take any such steps.

- (c) Notwithstanding the foregoing provisions of this Section 27.3, in the event of an Emergency, the Notice under Section 27.3(a) shall be given as promptly as possible having regard to the nature of the Emergency and the City may, prior to DB Co's confirmation under Section 27.3(b)(i), take such steps as are appropriate having regard to the nature of the Emergency.

27.4 Costs and Expenses

- (a) Subject to the City's obligations pursuant to Sections 27.5 and 27.6:
 - (i) DB Co shall bear all costs and expenses incurred by DB Co in relation to the exercise of the City's rights pursuant to this Section 27; and
 - (ii) DB Co shall reimburse the City for all reasonable costs and expenses incurred by the City in relation to the exercise of the City's rights pursuant to this Section 27, including in relation to the City taking such steps, either itself or by engaging others (including a third party) to take any such steps as the City considers appropriate and as are in accordance with this Section 27.

27.5 Reimbursement Events

- (a) In this Section 27.5, a "**Reimbursement Event**" means:
 - (i) an act or omission of DB Co or any DB Co Party or a breach by DB Co or any DB Co Party of any obligation under this Project Agreement, but only to the extent such act, omission or breach is caused by the City or a the City Party; or
 - (ii) an Emergency that is not caused or contributed to by an act or omission of DB Co or any DB Co Party or a breach by DB Co or any DB Co Party of any obligation under this Project Agreement.
- (b) If the City either takes steps itself or requires DB Co to take steps in accordance with this Section 27 as a result of a Reimbursement Event:
 - (i) the City shall reimburse DB Co for the reasonable costs and expenses incurred by DB Co in relation to the exercise of the City's rights pursuant to this Section 27 that would not otherwise have been incurred by DB Co in the proper performance of its obligations under this Project Agreement; and
 - (ii) the City shall bear all costs and expenses incurred by the City in relation to the exercise of the City's rights pursuant to this Section 27.

27.6 Reimbursement if Improper Exercise of Rights

- (a) If the City exercises its rights pursuant to this Section 27, but the City was not entitled to do so, the City shall reimburse DB Co for the reasonable costs and expenses directly incurred by DB Co over and above those that would otherwise have been incurred by DB Co in the proper

performance of its obligations under this Project Agreement and that are directly and reasonably incurred by DB Co in complying with those written requirements of the City issued as a result of the City having exercised such rights.

- (b) DB Co acknowledges and agrees that DB Co has no right to require a determination of whether or not the City is entitled to exercise its rights pursuant to this Section 27 before taking any such action that the City may require and DB Co shall comply with all of the City's requirements. Only concurrently with or after complying with the City's requirements shall DB Co be entitled to refer any Dispute for resolution in accordance with Schedule 27 – Dispute Resolution Procedure. No action taken by DB Co pursuant to any direction issued by the City under this Section 27 shall be considered an acceptance or affirmation of the City's entitlement to exercise its rights under this Section 27, and such action shall be without prejudice to DB Co's rights under this Project Agreement or under the Dispute Resolution Procedure.

28. RECORDS, INFORMATION AND AUDIT

28.1 Records Provisions

- (a) DB Co shall comply with Schedule 26 – Record Provisions.

28.2 Information and General Audit Rights

- (a) DB Co shall provide, and shall cause each Subcontractor to provide, to the City all information, reports, documents, records and the like, including as referred to in Schedule 26 – Record Provisions, in the possession of, or available to, DB Co as the City may reasonably require from time to time for any purpose in connection with this Project Agreement, other than Sensitive Information. DB Co shall use commercially reasonable efforts to ensure that, for such purpose, all such information, reports, documents, records and the like in the possession of, or available to, the Construction Contractor shall be available to DB Co and DB Co shall include relevant terms in all Subcontracts to this effect.
- (b) DB Co shall also provide to the City, and shall require each Subcontractor, including the Construction Contractor, to provide to the City (at the City's reasonable cost), all information, reports, documents, records and the like required to be provided pursuant to Section 28.2(a) which subsequently come into the possession of, or become available to, DB Co or each Subcontractor, as the City may reasonably require from time to time to enable the City to provide reports, notices, returns and the like pursuant to Applicable Law, including information and documentation pertaining to the physical condition of the Lands, the New City Infrastructure and the New MTO Infrastructure, security, health and safety, fire safety, emergency preparedness, environmental matters, employees and human resources related matters, other than Sensitive Information.
- (c) DB Co shall promptly after receipt provide the City with a copy of any material notice, order, direction, requirement or other similar communication received by it or by any Subcontractor from any Governmental Authority in relation to any of the Works, the Lands, the New City Infrastructure and the New MTO Infrastructure, and DB Co shall include relevant terms in all Subcontracts to this effect.
- (d) DB Co shall promptly notify the City of any actions, suits, proceedings, or investigations commenced, pending or threatened against DB Co or, to DB Co's knowledge, any Subcontractor

at law or in equity before any Governmental Authority or arbitral body (whether or not covered by insurance) that individually or in the aggregate could result in any material adverse effect on the business, properties, or assets or the condition, financial or otherwise, of DB Co or in any impairment of its ability to perform its obligations under this Project Agreement.

- (e) All information, reports, documents and records in the possession of, or available to, DB Co, including as referred to in Schedule 26 – Record Provisions, which are required to be provided to or available to the City hereunder, shall be subject and open to inspection and audit by the City at any time and from time to time, which inspection and audit shall take place during normal business hours and at DB Co's normal places of business unless the City and DB Co otherwise agree. The City shall also have the right to monitor and audit the performance of any and all parts of the Works wherever located, and DB Co shall cooperate with, and shall require each Subcontractor to cooperate with, and provide access to the representatives of the City monitoring and auditing such parts of the Works, including providing them with access and copies (at the City's reasonable cost) of all relevant information, reports, documents and records pertaining to the performance of such parts of the Works. Except as otherwise provided herein, all of the City's costs for the inspections, audits and monitoring shall be borne by the City.
- (f) In conducting an audit of DB Co under Section 28.2(e) or as otherwise provided under this Project Agreement, the City shall have all rights necessary or incidental to conducting an audit, including the right to have access to and inspect and take copies (at the City's reasonable cost) of all books and records of DB Co required to be provided to or available to the City hereunder, upon reasonable Notice and at reasonable times. DB Co shall fully cooperate with the City and its auditors in the conduct of any audits, including by making available all such records and accounts (other than Sensitive Information) in existence at that time as they may require to perform a full and detailed audit, and DB Co further agrees to promptly review and settle with the City all matters arising from such audits, including the refunding of monies to the City where applicable. At the reasonable request of the City's auditors, DB Co shall provide such information, reports, documents and records as the City's auditors may reasonably require, other than Sensitive Information.
- (g) The City's rights pursuant to this Section 28.2 shall be in addition to, and shall not limit, any other audit, information, inspection or similar rights under this Project Agreement.
- (h) The City's rights pursuant to this Section 28.2 shall not limit or restrict any Governmental Authority's right of review, audit, information or inspection under Applicable Law. The City's right pursuant to this Section 28.2 may also be exercised by the Auditor General of Ontario, Her Majesty the Queen in right of Canada and the Auditor General of Canada without the requirement for further action on the part of the City.
- (i) Without limiting the generality of Section 28.2(a) and subject to Sections 42.1(a) and 42.3, in the event that the City is required to provide information, including financial information, in relation to the Project, to the Province for corporate or financial reporting purposes, DB Co shall provide such information to the City as the City may reasonably require in order to comply with its corporate or financial reporting obligations. DB Co acknowledges and agrees that such information may include Sensitive Information.

28.3 Lenders' Consultant Reports

- (a) DB Co shall cause the Lenders' Agent to cause, in accordance with Section 5(j) of Schedule 4 – Lenders' Direct Agreement, the Lenders' Consultant to provide the City a copy of any written assessment or report of the Works under the Design and Construction Contract, including but not limited to, any certificate of payment, concurrently with its delivery to the Lenders' Agent.

29. COMMUNICATIONS

29.1 Communications

- (a) Each of the Parties shall comply with Schedule 18 – Communication and Stakeholder Engagement Obligations.

30. CHANGES IN LAW

30.1 Performance after Change in Law

- (a) Following any and all Changes in Law, DB Co shall perform the Works in accordance with the terms of this Project Agreement, including in compliance with Applicable Law.

30.2 Works Change in Law

- (a) On the occurrence of a Works Change in Law:
 - (i) either Party may give Notice to the other of the need for a Variation as a result of such Works Change in Law;
 - (ii) the Parties shall meet within 10 Business Days after such Notice to consult with respect to the effect of the Works Change in Law and to reach an agreement on whether a Variation is required as a result of such Works Change in Law, and, if the Parties have not, within 10 Business Days after this meeting, reached an agreement, either Party may refer the question of whether a Works Change in Law has occurred or the effect of any Works Change in Law for resolution in accordance with Schedule 27 – Dispute Resolution Procedure; and
 - (iii) the City shall, within 10 Business Days after agreement or determination that a Variation is required, issue a Variation Enquiry and the relevant provisions of Schedule 22 – Variation Procedure shall apply except that:
 - (A) DB Co may only object to any such Variation Enquiry on the grounds that the implementation of the Variation would not enable it to comply with the Works Change in Law;
 - (B) DB Co shall be responsible for obtaining all Development Approvals and DB Co Permits, Licences, Approvals and Agreements required in respect of the Variation;
 - (C) the City shall not be entitled to withdraw any such Variation Enquiry unless the Parties otherwise agree;

- (D) DB Co shall proceed to implement the Variation within such period as will enable it to comply with the Works Change in Law as soon as reasonably practicable; and
- (E) DB Co shall not be entitled to any payment or other compensation or relief from performance of its obligations under this Project Agreement in respect of any Works Change in Law or associated Variation other than as established pursuant to Schedule 22 – Variation Procedure.

30.3 Relevant Change in Law

- (a) On the occurrence of a Relevant Change in Law, either Party shall be entitled to seek compensation for any increase or decrease (as the case may be) in the net cost to DB Co of performing the Works so as to put such Party in no better and no worse position than it would have been in had the Relevant Change in Law not occurred. Any such compensation shall be calculated in accordance with this Section 30.3.
- (b) On the occurrence of a Relevant Change in Law:
 - (i) either Party may give Notice to the other of the need for a Variation as a result of such Relevant Change in Law;
 - (ii) the Parties shall meet within 10 Business Days after such Notice to consult with respect to the effect of the Relevant Change in Law and to reach an agreement on whether a Variation is required as a result of such Relevant Change in Law, and, if the Parties have not, within 10 Business Days after this meeting, reached an agreement, either Party may refer the question of whether a Relevant Change in Law has occurred or the effect of any Relevant Change in Law for resolution in accordance with Schedule 27 – Dispute Resolution Procedure; and
 - (iii) the City shall, within 10 Business Days after agreement or determination that a Variation is required, issue a Variation Enquiry and the relevant provisions of Schedule 22 – Variation Procedure shall apply except that:
 - (A) DB Co may only object to any such Variation Enquiry on the grounds that the implementation of the Variation would not enable it to comply with the Relevant Change in Law;
 - (B) DB Co shall be responsible for obtaining all Development Approvals and DB Co Permits, Licences, Approvals and Agreements required in respect of the Variation;
 - (C) the City shall not be entitled to withdraw any such Variation Enquiry unless the Parties otherwise agree;
 - (D) DB Co shall proceed to implement the Variation within such period as will enable it to comply with the Relevant Change in Law as soon as reasonably practicable;

- (E) the Parties shall, without prejudice to their respective general obligations to comply with the terms of this Project Agreement:
 - (I) use commercially reasonable efforts to mitigate the adverse effects of any Relevant Change in Law and take commercially reasonable steps to minimize any increase in costs arising from such Relevant Change in Law; and
 - (II) use commercially reasonable efforts to take advantage of any positive or beneficial effects of any Relevant Change in Law and take commercially reasonable steps to maximize any reduction in costs arising from such Relevant Change in Law; and
- (F) any entitlement to compensation payable shall be in accordance with this Section 30.3, and any calculation of compensation shall take into consideration, inter alia:
 - (I) any failure by a Party to comply with Section 30.3(b)(iii)(E);
 - (II) any increase or decrease in its costs resulting from such Relevant Change in Law; and
 - (III) any amount which DB Co recovers under any insurance policy (or would recover if it complied with its obligations to insure under this Project Agreement or the terms of any policy of insurance required under this Project Agreement) which amount, for greater certainty, shall not include the amount of any excess or deductibles or any amount above the maximum insured amount applicable to any such insurance policy.
- (c) DB Co shall not be entitled to any payment or compensation or, except as provided in Section 32 or otherwise in this Project Agreement, relief in respect of any Relevant Change in Law, or the consequences thereof, other than in accordance with this Section 30.3, and Section 33 shall be construed accordingly.

31. VARIATIONS

31.1 Variation Procedure

- (a) Except as otherwise expressly provided in this Project Agreement, Schedule 22 – Variation Procedure shall apply in respect of Variations and any Small Works.
- (b) For greater certainty, DB Co shall, subject to and in accordance with Schedule 22 – Variation Procedure, be entitled to a Variation if a written direction issued by or on behalf of the City to DB Co or any DB Co Party results in a variation, addition, reduction, substitution, omission, modification, deletion, removal or other change to the whole or any part of the Works.
- (c) Without limiting DB Co's obligations pursuant to Section 11.10(a) and Schedule 22 – Variation Procedure, DB Co shall include in each Subcontract, and shall cause each DB Co Party to comply with, the Variation Procedure, to the extent that the Variation Procedure requires DB Co to minimize the cost and impact of Variations.

31.2 Innovation and Value Engineering

- (a) DB Co acknowledges that the City at all times desires to reduce the overall cost to the City of the Project, and DB Co agrees to cooperate, explore and work with the City in investigating and considering innovation and value engineering and other cost saving measures.
- (b) If an innovation and value engineering proposal is at any time and from time to time originated and initiated solely by DB Co, DB Co may make a proposal (the “**Innovation Proposal**”) by Notice to the City.
- (c) The Parties agree that the subject of an Innovation Proposal shall not include:
 - (i) any Variation Enquiry initiated by the City;
 - (ii) any Variation resulting from a Change in Law; or
 - (iii) any change to the City Activities.
- (d) The Innovation Proposal must:
 - (i) set out sufficient detail to enable the City to evaluate the Innovation Proposal in full;
 - (ii) specify DB Co’s reasons and justification for proposing the Innovation Proposal;
 - (iii) request the City to consult with DB Co with a view to deciding whether to agree to the Innovation Proposal and, if so, what consequential changes the City requires as a result;
 - (iv) indicate any implications of the Innovation Proposal, including a difference between the existing and the proposed requirements of this Project Agreement, and the comparative advantages of each to DB Co and the City;
 - (v) indicate if there are any dates by which a decision by the City must be made;
 - (vi) indicate the capital cost of the Innovation Proposal, including the cost of financing; and
 - (vii) include such other information and documentation as may be reasonably requested by the City to fully evaluate and consider the Innovation Proposal.
- (e) The City shall, acting in good faith, evaluate the Innovation Proposal, taking into account all relevant issues, including whether:
 - (i) the Innovation Proposal affects the quality of the Works, the New City Infrastructure, the New MTO Infrastructure, or the likelihood of successful completion of the Works;
 - (ii) the Innovation Proposal will benefit or interfere with the efficient operation of the New City Infrastructure, the New MTO Infrastructure or the performance of the City Activities;
 - (iii) the Innovation Proposal will interfere with the relationship between the City and third parties;

- (iv) the financial strength of DB Co is sufficient to deliver the changed Works;
 - (v) the residual value of the New City Infrastructure, or the New MTO Infrastructure is affected;
 - (vi) the Innovation Proposal materially affects the risks or costs to which the City is exposed; or
 - (vii) any other matter the City considers relevant.
- (f) The City may request clarification or additional information regarding the Innovation Proposal, and may request modifications to the Innovation Proposal.
- (g) The City may, in its sole discretion, accept or reject any Innovation Proposal.
- (h) If the City accepts the Innovation Proposal, with or without modification, the relevant Innovation Proposal shall be documented and evidenced by a written Variation Confirmation, together with any other documents necessary to amend this Project Agreement or any relevant Project Documents to give effect to the Innovation Proposal.
- (i) If, after taking into account the agreed implementation and reasonably allocated development costs incurred by DB Co in connection with the Innovation Proposal and any other uses of the Innovation Proposal by DB Co, the Innovation Proposal causes or will cause the costs of DB Co and/or of a Subcontractor to decrease, the net savings in the costs of DB Co and/or the Subcontractor will be shared equally by DB Co and the City, and the City's share of the net savings shall, if the Parties agree, be reflected in a lump sum payment.
- (j) If an Innovation Proposal causes or will cause the costs of the City to decrease, the net savings in the costs of the City will be shared:
- (i) equally by DB Co and the City following the implementation of the Innovation Proposal until the Termination Date; and
 - (ii) thereafter, the City shall be entitled to the full benefit of the net savings in costs (if applicable),
- and DB Co's share of the net savings shall be reflected in a lump sum payment.

32. DELAY EVENTS

32.1 Definition

- (a) For the purposes of this Project Agreement, "**Delay Event**" means any of the following events or circumstances only to the extent, in each case, that it affects the Works so as to cause a delay in achieving any Substantial Completion by the applicable Scheduled Substantial Completion Date, or a delay in achieving any Final Completion by the applicable Scheduled Final Completion Date:
- (i) the implementation of a Variation to the extent DB Co has identified such delay in its Estimate and such delay has been documented in the Variation Confirmation;

- (ii) subject to compliance by DB Co with the provisions of Section 11.12, damage, costs or delays from the execution of Additional Works on the Lands by Additional Contractors, as applicable, in the circumstances described in Section 11.12(f);
- (iii) a requirement that DB Co perform obligations under an Encumbrance pursuant to Section 17.2(c)(iii) or Section 17.2(d), which performance imposes costs or delays in the performance of the Works;
- (iv) any breach by the City of any of the City's obligations under this Project Agreement (including, subject to Section 32.2(o), any delay by the City in giving access to the Lands pursuant to Section 16.1, any obstruction of the rights afforded to DB Co under Section 16.1 or any delay by the City in carrying out its obligations set forth in Schedule 10 – Review Procedure), except to the extent that any such breach is caused, or contributed to, by DB Co or any DB Co Party;
- (v) a requirement pursuant to Section 18.2(g) for DB Co to perform any alteration, addition, Demolition, extension or variation in the Works, or to suspend or delay performance of the Works, upon the discovery of Contamination, which alteration, addition, Demolition, extension or variation in the Works, or suspension or delay in the performance of the Works, would not otherwise be required under this Project Agreement;
- (vi) a requirement pursuant to Section 18.3(c)(ii)(A) or Section 18.3(d) for DB Co to perform any alteration, addition, Demolition, extension or variation in the Works, or to suspend or delay performance of the Works, upon the discovery of any fossils, artifacts or other objects having artistic, historic, archaeological or monetary value, including human remains and burial sites, which alteration, addition, Demolition, extension or variation in the Works, would not otherwise be required under this Project Agreement;
- (vii) a requirement pursuant to Sections 18.4(b) or 18.4(c) for DB Co to perform any alteration, addition, demolition, extension or variation in the Works, or to suspend or delay performance of the Works, upon the discovery of Species-at-Risk for which the City is responsible, which alteration, addition, demolition, extension or variation in the Works, or suspension or delay in the performance of the Works, would not otherwise be required under this Project Agreement;
- (viii) subject to and in accordance with Section 18.5(b), a requirement for DB Co to perform any alteration, addition, demolition, extension or variation in the Works, or other delay in performance of the Works, due to a deviation from the Stage 1 Connection Infrastructure Preliminary Report;
- (ix) an uncovering of the Works pursuant to Section 20.3 where such Works are not subsequently found to be defective or not in compliance with the requirements of this Project Agreement (including the Output Specifications, the DB Co Proposal Extracts and the Design Data), unless such opening up of the Works was reasonable in the light of other defects or non-compliance previously discovered by the City in respect of the same or a similar component of the Works or subset of the Works;
- (x) a requirement pursuant to Section 13.1 of Schedule 27 – Dispute Resolution Procedure for DB Co to proceed in accordance with the direction of the City during the pendency of a Dispute, which Dispute is subsequently determined in DB Co's favour;

- (xi) a Relief Event;
- (xii) an event of Force Majeure;
- (xiii) a Relevant Change in Law;
- (xiv) a requirement for DB Co to perform any alteration, addition, demolition, extension or variation in the Works, or to suspend or delay performance of the Works, upon the discovery of unknown Utility Infrastructure or Mislocated Utility Infrastructure pursuant to Section 18.6, which alteration, addition, demolition, extension or variation in the Works, or suspension or delay in the performance of the Works, would not otherwise be required under this Project Agreement; or
- (xv) subject to compliance with Section 11.8(g), the City's failure to issue to DB Co a final determination in respect of a Listed DB Co PLAA as set out in and subject to Section 11.8(e),
- (xvi) damage, costs or delays caused by an act or omission of RTG or any RTG Party in the execution of the RTG Stage 1 PA Works or RTG City Party Works, in the circumstances described in Section 11.12(k);
- (xvii) changes to the terms, conditions or requirements of the Environmental Assessments (except to the extent resulting from any change by DB Co to the design of the Project or any act, omission or fault of DB Co or a DB Co Party);
- (xviii) a stop work order issued by a Governmental Authority in respect of the Works, provided that such order was not issued as a result of a Relief Event, an act of Force Majeure, or as a result of an act, omission or fault of DB Co or a DB Co Party;
- (xix) a Delay Event determined by the Adjudicator pursuant to Section 6.4(b) of Schedule 27 – Dispute Resolution Procedure;
- (xx) pursuant to an explicit provision in a permit, licence or approval granted by the City to a third party developer in respect of an Adjacent Property, that third party developer,
 - (A) constructs a physical barrier that prevents DB Co from carrying out the Works; or
 - (B) creates a significant physical impediment that prevents DB Co from carrying out the Works for a period greater than or equal to 30 consecutive days;
- (xxi) replacement or substitution of a prescribed item in accordance with Section 11.20 causes delay in the Works or increases the costs of the Works; or
- (xxii) in accordance with Section 11.7(a)(iv), compliance with any amendments made to any disclosed collective agreements or labour-related agreements, or any disclosed collective agreements or labour-related agreements entered into or disclosed to DB Co after Financial Close, adversely interferes with DB Co's ability to perform the Works or materially adversely affects DB Co's schedule for performing the Works,

- (xxiii) subject to and in accordance with Section 18.7, a requirement for DB Co to perform any alteration, addition, demolition, extension or variation in the Works, or other delay in performance of the Works, due to a defect, error or inaccuracy in the Stage 1 Systems Information;
- (xxiv) failure by a Category 1 Utility Company to perform its obligations, as set out in the Utility Baseline Report within the applicable time periods set out in the Utility Baseline Report, to the extent that such event does not arise (directly or indirectly) as a result of any act or omission of the DB Co or any DB Co Party. For clarity, for the purposes of determining whether a failure of a Category 1 Utility Company described in this Section 32.1(a)(xxiv) has caused a delay in achieving any Substantial Completion by the applicable Scheduled Substantial Completion Date, or a delay in achieving any Final Completion by the applicable Scheduled Final Completion Date, the Parties shall have regard to the cumulative effect of all failures by the Category 1 Utility Companies in accordance with this Section 32.1(a)(xxiv);
- (xxv) a defect in Major Existing Third Party Infrastructure that is the responsibility of the City pursuant to Section 18.8(a);
- (xxvi) subject to Section 3.1(a) of Part A of Schedule 34 – Mobility Matters and Section 3.1(a) of Part B of Schedule 34 – Mobility Matters, the City’s issuance of a DB Co Permit, Licence, Approval and Agreement that requires DB Co to meet more onerous lane opening or lane width requirements than those explicitly set out in Schedule 15-2 Part 7 Table 7-1.3; and
- (xxvii) any of the following event occurs in respect of the Nominated Signalling Subcontractor:
 - (A) any arrangement or composition with or for the benefit of creditors being entered into by or in relation to the Nominated Signalling Subcontractor pursuant to any insolvency law;
 - (B) a trustee, receiver, receiver and manager, interim receiver, liquidator, administrator or other custodian or other encumbrance holder taking possession of or being appointed over, or any distress, attachment, execution or other process being levied or enforced upon, the whole or any material part of the assets of the Nominated Signalling Subcontractor;
 - (C) the Nominated Signalling Subcontractor ceases to carry on business in the normal course or fails to maintain or breaches any franchise, licence, authorisation or right necessary to conduct its business;
 - (D) the Nominated Signalling Subcontractor making an assignment for the benefit of its creditors, being declared bankrupt or committing an act of bankruptcy, becoming insolvent, making a proposal or otherwise taking advantage of provisions for relief under the *Bankruptcy and Insolvency Act* (Canada), the *Companies’ Creditors Arrangement Act* (Canada), the *Winding Up and Restructuring Act* (Canada) or any other applicable insolvency legislation or similar legislation in any jurisdiction (“Insolvency Legislation”), or any other type of insolvency proceedings being commenced by or against the Nominated Signalling Subcontractor under any insolvency

- legislation and, if commenced against the Nominated Signalling Subcontractor, not stayed, dismissed or otherwise remedied within thirty (30) days of its commencement;
- (E) a petition being filed (and not being contested in good faith using all reasonable efforts), or a resolution being passed or an order being made for the winding-up, liquidation, administration, dissolution or other similar proceeding of the Nominated Signalling Subcontractor;
 - (F) any legal proceedings are taken by any person (and not stayed within thirty (30) days of commencement) with a view to proposing (under any enactment or otherwise) any kind of composition, scheme of arrangement, compromise or arrangement involving the Nominated Signalling Subcontractor and its creditors generally (or any class of them); or
 - (G) any Governmental Authority or any person or entity acting or purporting to act under any Governmental Authority takes any action in order to condemn, seize or appropriate, or to assume custody or control of, the Nominated Signalling Subcontractor or of all or any substantial part of the assets of the Nominated Signalling Subcontractor or takes action to curtail the Nominated Signalling Subcontractor's authority in the overall conduct of its business or operations.
- (b) For clarity, in respect of Section 32.1(a)(xxiv), a failure by a Category 1 Utility Company to perform its obligations as set out in the Utility Baseline Report within the applicable time periods set out in the Utility Baseline Report shall not, in any event, be cause for a Delay Event unless DB Co has,
- (i) fully complied with its obligations pursuant to the applicable Utility Agreement and the Baseline Utility Report;
 - (ii) properly coordinated the work being performed by the applicable Category 1 Utility Company with the Works; and
 - (iii) provided sufficient access to Site to the applicable Category 1 Utility Company for the purposes of carrying out the Category 1 Utility Company's work.
- (c) For further clarity, Section 32.1(a)(xxiv) does not apply in respect of,
- (i) Category 1 Utility Companies in circumstances other than those specifically set out in the Utility Baseline Report;
 - (ii) failures of any Utility Companies that are not Category 1 Utility Companies including failures of such Utility Companies to perform in accordance with the applicable Utility Agreement; or
 - (iii) Works carried out by DB Co or DB Co Parties or goods or services provided by DB Co or DB Co Parties to the Utility Companies.

32.2 Consequences of a Delay Event

- (a) DB Co shall provide written Notice to the City Representative and the Independent Certifier within five Business Days after becoming aware of the occurrence of any event or circumstances described in Section 32.1(a)(ii), Section 32.1(a)(iii), Section 32.1(a)(iv), Section 32.1(a)(v), Section 32.1(a)(vi), Section 32.1(a)(vii), Section 32.1(a)(viii), Section 32.1(a)(ix), Section 32.1(a)(xiv), Section 32.1(a)(xv), Section 32.1(a)(xvi), Section 32.1(a)(xvii), Section 32.1(a)(xviii), Section 32.1(a)(xix), Section 32.1(a)(xx), Section 32.1(a)(xxi), Section 32.1(a)(xxii), Section 32.1(a)(xxiii), Section 32.1(a)(xxiv), Section 32.1(a)(xxv), Section 32.1(a)(xxvi) or Section 32.1(a)(xxvii) which, at the time of its occurrence, has caused, or is reasonably likely to cause, an entitlement under this Section 32, which Notice shall identify such event or circumstances and, to the extent of DB Co's knowledge at the time of such Notice, summarize the consequences and the nature of DB Co's claim.
- (b) DB Co shall, within 10 Business Days (or such longer period of time as the Parties may agree) after delivering such Notice under Section 32.2(a), provide further written details to the City Representative and the Independent Certifier which shall include, to the extent of DB Co's knowledge at such time:
 - (i) identification of the category of Delay Event on which DB Co's claim for relief is based;
 - (ii) details of the event or circumstances forming the basis of DB Co's notification under Section 32.2(a);
 - (iii) details of the contemporary records which DB Co shall thereafter maintain to substantiate any claim for extra time;
 - (iv) details of the consequences (whether direct or indirect, financial or non-financial) that such event or circumstances may have upon Scheduled Substantial Completion Dates or Scheduled Final Completion Dates, including a Critical Path analysis of the event or circumstances indicating the impact upon Scheduled Substantial Completion Dates or Scheduled Final Completion Dates; and
 - (v) details of any measures that DB Co has adopted or proposes to adopt to mitigate the consequences of such claimed Delay Event.
- (c) As soon as possible but in any event within three Business Days after DB Co receiving, or becoming aware of, any supplemental information pertaining to the event or circumstances disclosed in Section 32.2(a), DB Co shall submit further particulars based on such information to the City Representative and the Independent Certifier.
- (d) The City Representative shall, after receipt of written details under Section 32.2(b), or of further particulars under Section 32.2(c), be entitled by written Notice to require DB Co to provide such further supporting particulars as the City Representative may reasonably consider necessary. DB Co shall afford the City Representative and the Independent Certifier reasonable facilities for their investigations, including, without limitation, on-site inspection.
- (e) [Not used]
- (f) [Not used]

- (g) [Not used]
- (h) Subject to the provisions of this Section 32, the City Representative shall allow DB Co an extension of time equal to the delay caused by the Delay Event and shall fix (A) revised Scheduled Substantial Completion Date(s), or (B) revised Scheduled Final Completion Date(s), as applicable, as soon as reasonably practicable and in any event within 10 Business Days following the later of:
 - (i) the date of receipt by the City Representative of DB Co's Notice given in accordance with Section 32.2(b) and the date of receipt of any further particulars (if such are required under Section 32.2(c), whichever is later; and
 - (ii) the date of receipt by the City Representative of any supplemental information supplied by DB Co in accordance with Section 32.2(c) and the date of receipt of any further particulars (if such are required under Section 32.2(d)), whichever is later.
- (i) For the sake of clarity, where the City issues a revised Scheduled Substantial Completion Date in accordance with Section 32.2(h), if the applicable Initial Countdown Notice has been delivered, DB Co shall be deemed to have delivered a Subsequent Notice referred to in Section 25.5 effecting such a new date.
- (j) If:
 - (i) the City Representative declines to fix (A) revised Scheduled Substantial Completion Date(s); or (B) a revised Scheduled Final Completion Date(s), as applicable;
 - (ii) DB Co considers that different (A) Scheduled Substantial Completion Date(s), or (B) Scheduled Final Completion Date(s) should be fixed; or
 - (iii) there is a dispute as to whether a Delay Event has occurred,then DB Co shall be entitled to refer the matter for determination by the Independent Certifier. The decision of the Independent Certifier may be disputed by either Party and referred for resolution in accordance with Schedule 27 – Dispute Resolution Procedure.
- (k) DB Co shall be relieved from liability for liquidated damages that would otherwise accrue under Section 25.5 for the period of extension resulting from a Delay Event determined in accordance with Sections 32.2(h) or (j).
- (l) If DB Co does not provide the Notice, details or further particulars required by Sections 32.2(a), (b), (c) or (d) to the City Representative and the Independent Certifier in respect of any Delay Event in accordance with the time periods specified herein, DB Co will not be entitled to any additional compensation, extension of time or other relief from its obligations under this Project Agreement to the extent the amount thereof was increased or the ability to mitigate was adversely affected as a result of such delay in providing such Notice, details or further particulars. If the period of delay in providing such Notice, details or further particulars is 6 months or more, the rights of DB Co with respect to such Delay Event will be of no further force or effect.
- (m) If the Works are behind schedule for a reason other than a Delay Event, or if a DB Co Party delays the progress of any portion of the Works necessary to complete the Works on schedule,

DB Co shall use all reasonable measures to bring the Works back on schedule. DB Co shall exercise all means within its discretion, such as directing any DB Co Party that is creating delays to increase their labour forces and equipment, to improve the organization and expediting of the Works, or to work overtime as may be necessary. DB Co shall provide any additional supervision, coordination and expediting, including overtime by its own personnel as may be required to achieve this end. The costs and expenses incurred by the use of such measures and overtime shall be borne by DB Co and/or the DB Co Parties and there shall be no adjustment to the Guaranteed Price as a result of such costs and expenses and for clarity, no extension to any Scheduled Substantial Completion Date.

- (n) Where there are Concurrent Delays, some of which are Delay Events for which DB Co would otherwise be entitled to schedule relief hereunder, and some of which are not Delay Events for which DB Co would otherwise be entitled to schedule relief hereunder, then DB Co shall not be entitled to:
 - (i) an extension in any Scheduled Substantial Completion Date, or Scheduled Final Completion Date, to the extent of such Concurrent Delays; or
 - (ii) any compensation for Concurrent Delay Direct Costs attributable to such Concurrent Delays,

except to the extent that one of the events that occurs as part of the Concurrent Delay is a Delay Event referred to in Section 32.1(a)(i), 32.1(a)(ii), 32.1(a)(iv), 32.1(a)(ix), 32.1(a)(xv) or 32.1(a)(xvi) in which case DB Co shall be entitled to schedule relief and compensation in accordance with Sections 32 (without regard to this Section 32.2(n)) and 33 of this Project Agreement. For greater certainty, the compensation payable by the City to DB Co pursuant to Section 33 of this Project Agreement with respect to all other Compensation Events by reason of such event being a Compensation Event (as opposed to being both a Compensation Event and a Delay Event) shall be payable in full without regard to the terms of this Section 32.2(n).

- (o) Subject to Sections 11.19, the City shall provide DB Co with access to and use of the Lands as required pursuant to Section 16 of this Project Agreement in a manner consistent with the Works Schedule and in accordance with the notification requirements and restrictions set out in the Project Agreement, provided that DB Co agrees that the inability of the City to provide DB Co with access to an area for construction activities not on the Critical Path for reasons set out in Section 11.19 will not result in the occurrence of a Delay Event (and, for greater certainty, there shall not be a resulting change to a Scheduled Substantial Completion Date) or a Compensation Event (and, for certainty, there shall not be any resulting change to the Guaranteed Price).
- (p) In no event shall the extension of time for a Delay Event be more than the necessary extension of the Critical Path as a result of the delay caused by the Delay Event.
- (q) Subject to DB Co meeting the obligations set out in Section 32.2 and Section 32.3, if, (i) a Lane Closure or Bus Rapid Transit Lane Closure is directly caused or extended by one or more of the events set out in Section 32.1(a), whether or not such event constitutes a Delay Event, such Lane Closure or Bus Rapid Transit Lane Closure or extension thereof shall not be included in the Aggregate Actual Lane Closures, or Aggregate Actual Bus Rapid Transit Lane Closures, or the Aggregate Actual Lane Closures Cost, or the Aggregate Actual Bus Rapid Transit Lane Closures Cost for the relevant Road Section for the purposes of calculating the Lane Closure Adjustment in accordance with the process set out in Schedule 34 – Mobility Matters.

- (r) Subject to DB Co meeting the obligations set out in Section 32.2 and Section 32.3, if (i) a date or duration in the Systems Integration Management Plan, or a Commencement Date or duration for use of the Lands identified in Schedule 20 – Lands, is delayed by one or more events set out in Section 32.1(a), whether or not such event constitutes a Delay Event, such date or extension of the applicable duration shall be amended in the Systems Integration Management Plan, and/or the City shall use commercially reasonable efforts to amend such Commencement Date or duration in Schedule 20 – Lands, as applicable.

32.3 Mitigation

- (a) If DB Co is (or claims to be) affected by a Delay Event, DB Co shall, and shall require all DB Co Parties to, take and continue to take commercially reasonable steps:
 - (i) to eliminate or mitigate the consequences of such event upon the performance of its obligations under this Project Agreement;
 - (ii) to continue to perform its obligations under this Project Agreement to the extent possible notwithstanding the Delay Event; and
 - (iii) to resume performance of its obligations under this Project Agreement affected by the Delay Event as soon as practicable.
- (b) To the extent that DB Co does not comply with its obligations under this Section 32.3, such failure shall be taken into account in determining DB Co's entitlement to an extension of time pursuant to this Section 32.

32.4 Change in Sequence of Scheduled Substantial Completion Dates

- (a) If, as a result of one or more Delay Events, the East Scheduled Substantial Completion Date is scheduled to occur after the West Scheduled Substantial Completion Date, the Parties hereby undertake to promptly negotiate in good faith any necessary amendments to this Project Agreement to effect such change in the sequence of Scheduled Substantial Completion Dates, with a view to ensuring that, subject to the obligations and rights to relief arising hereunder from such Delay Event(s), neither Party is in any worse position than it would have been had the East Scheduled Substantial Completion Date remained scheduled to occur prior to the West Scheduled Substantial Completion Date.

33. COMPENSATION EVENTS

33.1 Definition

- (a) For the purposes of this Project Agreement, “**Compensation Event**” means any event referred to in Sections 32.1(a)(ii), 32.1(a)(iii), 32.1(a)(iv) (subject to Section 32.2(o)), 32.1(a)(v), 32.1(a)(vi), 32.1(a)(vii), 32.1(a)(viii), 32.1(a)(ix), 32.1(a)(x), 32.1(a)(xiv), 32.1(a)(xv), 32.1(a)(xvi), 32.1(a)(xvii), 32.1(a)(xviii), 32.1(a)(xix), 32.1(a)(xx), 32.1(a)(xxi), 32.1(a)(xxii) and 32.1(a)(xxiii), 32.1(a)(xxv), 32.1(a)(xxvi) and 32.1(a)(xxvii) as a direct result of which DB Co has incurred loss or expense, whether or not any of these events has also caused a delay, and the procedure described in Section 32.2 shall apply, *mutatis mutandis*, to such events as Compensation Events (including, for certainty, Section 32.2(l)).

33.2 Consequences of a Compensation Event

- (a) If a Compensation Event occurs, DB Co's sole right to compensation shall be as set out in this Section 33. For greater certainty, except as aforesaid, no other Delay Event shall entitle DB Co to receive any compensation, except as otherwise provided in:
 - (i) Schedule 22 – Variation Procedure, in the case of a Delay Event referred to in Section 32.1(a)(i);
 - (ii) Section 35, in the case of a Delay Event referred to in Section 32.1(a)(xii);
 - (iii) Section 33.6, in the case of a Delay Event referred to in Section 32.1(a)(xi);
 - (iv) Section 30, in the case of a Delay Event referred to in Section 32.1(a)(xiii); and
 - (v) Section 33.6, in the case of a Delay Event referred to in Section 32.1(a)(xxiv).
- (b) Subject to Sections 33.2(c), 33.3, 33.4 and 33.5, if it is agreed, or determined in accordance with Schedule 27 – Dispute Resolution Procedure, that there has been a Compensation Event, DB Co shall be entitled to such compensation as would place DB Co in no better and no worse position than it would have been in had the relevant Compensation Event not occurred. For greater certainty, in respect of a Compensation Event that is also a Delay Event, such compensation will include amounts which, but for the Delay Event, would have been paid by the City to DB Co. DB Co shall promptly provide the City Representative with any information the City Representative may require in order to determine the amount of such compensation.
- (c) If the City is required to compensate DB Co pursuant to this Section 33.2, then the City may either pay such compensation as a lump sum payment or payments at times and in a manner to be agreed with DB Co, acting reasonably.
- (d) To the extent DB Co does not comply with its obligations under Sections 32.2(a), (b), (c), (d), (e) or (l), and subject to Section 32.2(l), such failure shall be taken into account in determining DB Co's entitlement to relief pursuant to this Section 33.

33.3 Mitigation

- (a) If DB Co is (or claims to be) affected by a Compensation Event, DB Co shall, and shall require all DB Co Parties to, take and continue to take commercially reasonable steps to minimize the amount of compensation due in accordance with this Section 33 in relation to any Compensation Event.
- (b) To the extent that DB Co does not comply with its obligations under this Section 33.3, such failure shall be taken into account in determining DB Co's entitlement to relief pursuant to this Section 33.

33.4 Insured Exposure

- (a) The compensation payable to DB Co pursuant to this Section 33 shall be reduced by any amount which DB Co or a DB Co Party recovers, or is entitled to recover, under any insurance policy, or would have recovered if it had complied with the requirements of this Project Agreement in

respect of insurance or the terms of any policy of insurance required under this Project Agreement, which amount, for greater certainty, shall not include any excess or deductibles or any amount over the maximum amount insured under any such insurance policy.

33.5 Delivery of PBS-2

- (a) If an event referred to in Section 32.1(a)(ii), Section 32.1(a)(iii), Section 32.1(a)(v), Section 32.1(a)(vi), Section 32.1(a)(vii), Section 32.1(a)(ix), Section 32.1(a)(x), 32.1(a)(xiv), Section 32.1(a)(xx), Section 32.1(a)(xxi), Section 32.1(a)(xxii), Section 32.1(a)(xxiii) or Section 32.1(a)(xxiv) occurs after the 240th day following Financial Close (provided that in the event that the City failed to comply with the time periods stipulated in Schedule 10 – Review Procedure in respect of PBS-2 such 240 day time period shall be automatically extended on a day-for-day basis) and prior to the City assigning the comment “NO COMMENT” or “MINOR COMMENT” to PBS-2 in accordance with Schedule 12 – Works Scheduling Requirements, DB Co shall not be entitled to receive any compensation under this Section 33 in respect of such Compensation Event, unless such Compensation Event is also a Delay Event, in which case DB Co shall be entitled to compensation in an amount equal to the lesser of:
- (i) the Debt Service Amount accrued and paid or that became payable in accordance with the Lending Agreements during the period of delay; and
 - (ii) the compensation which, but for the application of this Section 33.5, DB Co would have been entitled to receive pursuant to Section 33.2(b).

33.6 Special Compensation Regarding Category 1 Utility Company

- (a) For the purposes of the special compensation regarding Category 1 Utility Companies, the following shall apply:
- (i) Sections 33.3 and 33.4 shall apply to the compensation set out in this Section 33.6 notwithstanding that the Delay Event referred to in Section 32.1(a)(xxiv) is not a Compensation Event.
- (b) If it is agreed, or determined in accordance with Schedule 27 - Dispute Resolution Procedure, that there has been a Delay Event referred to in Section 32.1(a)(xxiv), DB Co shall be entitled to the following:
- (i) an amount calculated in accordance with the following:
 - (A) For the purpose of this Section 33.6(b)(i) “**Non-Debt Compensation Amount**” means an amount that would place DB Co in no better and no worse position than it would have been in had the applicable Delay Event referred to in Section 32.1(a)(xxiv) not occurred but excluding, any interest or financing costs accrued and paid or which became payable in accordance with the Lending Agreements during the period of the applicable Delay Event (such excluded amount, the “**Special Utility Debt Compensation Amount**”).
 - (B) If the applicable Delay Event delays any Substantial Completion for 30 or fewer days, the City shall pay to DB Co an amount equal to [REDACTED]

per cent of the Non-Debt Compensation Amount and [REDACTED] per cent of the Special Utility Debt Compensation Amount for the period of the delay.

- (C) If the applicable Delay Event delays any Substantial Completion for 60 or fewer days, the City shall pay to DB Co an amount equal to,
 - (I) [REDACTED] per cent of the Non-Debt Compensation Amount in respect of the first 30 days of the delay, plus,
 - (II) [REDACTED] per cent of the Non-Debt Compensation Amount for the number of days of delay exceeding 30 days of delay; plus
 - (III) [REDACTED] per cent of the Special Utility Debt Compensation Amount for the period of the delay.
- (D) If the applicable Delay Event delays any Substantial Completion for 180 or fewer days, the City shall pay to DB Co an amount equal to,
 - (I) [REDACTED] per cent of the Non-Debt Compensation Amount in respect of the first 30 days of delay, plus,
 - (II) [REDACTED] per cent of the Non-Debt Compensation Amount in respect of the next 30 days of delay, plus,
 - (III) [REDACTED] per cent of the Non-Debt Compensation Amount in respect of the number of days exceeding 60 days of delay; plus
 - (IV) [REDACTED] per cent of the Special Utility Debt Compensation Amount for the period of the delay.
- (E) If the applicable Delay Event delays any Substantial Completion for more than 180 days, the City shall pay to DB Co an amount equal to,
 - (I) [REDACTED] per cent of the Non-Debt Compensation Amount in respect of the first 30 days of delay, plus,
 - (II) [REDACTED] per cent of the Non-Debt Compensation Amount in respect of the next 30 days of delay, plus,
 - (III) [REDACTED] per cent of the Non-Debt Compensation Amount in respect of the next 120 days of delay, plus,
 - (IV) [REDACTED] per cent of the Non-Debt Compensation Amount in respect of the number of days exceeding 180 days of delay, plus
 - (V) [REDACTED] per cent of the Special Utility Debt Compensation Amount for the period of the delay.

34. RELIEF EVENTS

34.1 Definition

(a) For the purposes of this Project Agreement, “**Relief Event**” means any of the following events or circumstances to the extent, in each case, that it causes any failure by a Party to perform any of its obligations under this Project Agreement:

- (i) fire, explosion, lightning, storm, tempest, hurricane, tornado, flood, bursting or overflowing of water tanks, apparatus or pipes, ionizing radiation (to the extent it does not constitute Force Majeure), earthquake, riot or civil commotion;
- (ii) failure by any Utility Company, local authority or other like body to perform works or provide services (solely in its role as utility service provider or similar service provider to the Project), provided, however, that such a failure shall not, in any event, be cause for a Relief Event, unless DB Co:
 - (A) has performed its obligations under any applicable agreement with the Utility Company with respect to the provision of such services and the relevant Utility Company has failed to meet its obligations thereunder; and
 - (B) has made all, and is continuing to make all, commercially reasonable efforts to diligently enforce its legal rights under any applicable agreement in respect of such services and otherwise cause the Utility Company to perform those works or services.

For clarity, Section 34.1(a)(ii) shall apply only in circumstances where the Utility Company is providing services to DB Co of the type provided by the Utility Company in the normal course of its business. For further clarity, Section 34.1(a)(ii) shall not apply in circumstances where DB Co has entered into an agreement for the design and construction of Utility Infrastructure and the applicable Utility Company has failed to comply with its obligations under such an agreement;

- (iii) accidental loss or damage to the Works and/or the New City Infrastructure or any roads servicing the Lands;
- (iv) without prejudice to any obligation of DB Co to provide stand-by power facilities in accordance with this Project Agreement, failure or shortage of power, fuel or transport;
- (v) blockade or embargo falling short of Force Majeure;
- (vi) any official or unofficial strike, lockout, work to rule or other labour-related action generally affecting the New City Infrastructure, the New MTO Infrastructure or construction industry (or a significant sector of that industry) in the Province of Ontario; or
- (vii) any civil disobedience or protest action, including any action taken by any person or persons protesting or demonstrating against the carrying out of any part of the Works or the construction and/or operation of transit systems in general, provided, however, that a

civil disobedience or protest action shall not, in any event, be cause for a Relief Event unless DB Co has fully complied with Section 11.13,

provided, in each case, that such event does not arise (directly or indirectly) as a result of any act or omission of the Party claiming relief and/or (i) in the case of DB Co claiming relief, as a result of any act or omission of any DB Co Party and (ii) in the case of the City claiming relief, as a result of any act or omission of any City Party.

34.2 Consequences of a Relief Event

- (a) Subject to Section 34.3, no right of termination, other than either Party's right to terminate this Project Agreement pursuant to Section 38.1, shall arise under this Project Agreement by reason of any failure by a Party to perform any of its obligations under this Project Agreement, but only to the extent that such failure to perform is caused by the occurrence of a Relief Event (it being acknowledged and agreed by the Parties that all other rights and obligations of the Parties under this Project Agreement remain unaffected by the occurrence of a Relief Event).
- (b) In respect of a Relief Event that is also a Delay Event pursuant to Section 32.1(a)(xi):
 - (i) DB Co shall only be relieved of its obligations under this Project Agreement to the extent, if any, provided for in Section 32, and, to the extent such Relief Event causes any Lane Closure or Bus Rapid Transit Lane Closure, DB Co shall be relieved from any Lane Closure Adjustment, Bus Rapid Transit Lane Closure Adjustment or Peak Hour Lane Interruption that would otherwise result therefrom; and
 - (ii) in respect of a Relief Event referred to in Sections 34.1(a)(ii) (but only in respect of failure by a Utility Company to perform works or provide services), 34.1(a)(v), 34.1(a)(vi) or 34.1(a)(vii), on the earlier of (A) the affected Substantial Completion Date and (B) the date of payment of the City Default Termination Sum or Non-Default Termination Sum (and as a part thereof) in accordance with Schedule 23 – Compensation on Termination, the City shall pay to DB Co an amount equal to the Debt Service Amount accrued and paid or that became payable in accordance with the Lending Agreements during the period of delay by DB Co or any DB Co Party to the Lenders up to and including the applicable Scheduled Substantial Completion Date or the date of payment of the City Default Termination Sum or Non-Default Termination Sum, as applicable, together with interest thereon at the rate payable on the principal amount funded under the Lending Agreements, which, but for the Delay Event, would not have been paid by DB Co to the Lenders.
- (c) If a Relief Event occurs, DB Co shall not be entitled to receive any compensation other than as expressly provided in Sections 34.2(b)(ii) and 40.
- (d) Subject to Section 40, DB Co's sole right to payment or otherwise in relation to the occurrence of a Relief Event shall be as provided in this Section 34.

34.3 Mitigation and Process

- (a) Where a Party is (or claims to be) affected by a Relief Event, such Party shall take commercially reasonable steps to mitigate the consequences of the Relief Event upon the performance of its obligations under this Project Agreement, shall resume performance of its obligations affected by

the Relief Event as soon as practicable and shall use commercially reasonable efforts to remedy its failure to perform.

- (b) To the extent that the Party claiming relief does not comply with its obligations under this Section 34.3, such failure shall be taken into account in determining such Party's entitlement to relief pursuant to this Section 34.
- (c) The Party claiming relief shall give written Notice to the other Party within 5 Business Days after such Party becoming aware of the relevant Relief Event. Such initial Notice shall give sufficient details to identify the particular event claimed to be a Relief Event.
- (d) A subsequent written Notice shall be given by the Party claiming relief to the other Party within a further 5 Business Days of the initial Notice, which Notice shall contain such relevant information relating to the failure to perform (or delay in performing) as is available, including, without limitation, the effect of the Relief Event on the ability of the Party to perform, the action being taken in accordance with Section 34.3(a), the date of the occurrence of the Relief Event, and an estimate of the period of time required to overcome the Relief Event and/or its effects.
- (e) The Party claiming relief shall notify the other as soon as the consequences of the Relief Event have ceased and of when performance of its affected obligations can be resumed.
- (f) If, following the issue of any Notice referred to in Section 34.3(d), the Party claiming relief receives or becomes aware of any further information relating to the Relief Event and/or any failure to perform, such Party shall submit such further information to the other Party as soon as reasonably possible.

34.4 Insured Exposure

- (a) The compensation payable to DB Co pursuant to this Section 34 shall be reduced by any amount which DB Co or a DB Co Party recovers, or is entitled to recover, under any insurance policy, or would have recovered if it had complied with the requirements of this Project Agreement in respect of insurance or the terms of any policy of insurance required under this Project Agreement, which amount, for greater certainty, shall not include any excess or deductibles or any amount over the maximum amount insured under any such insurance policy.

35. FORCE MAJEURE

35.1 Definition

- (a) For the purposes of this Project Agreement, "**Force Majeure**" means any of the following events or circumstances which directly causes either Party to be unable to perform all or a material part of its obligations under this Project Agreement:
 - (i) war, civil war, armed conflict, terrorism, acts of foreign enemies or hostilities;
 - (ii) nuclear or radioactive contamination of the Works, the New City Infrastructure and/or the Lands, unless DB Co or any DB Co Party is the source or cause of the contamination;
 - (iii) chemical or biological contamination of the Works, the New City Infrastructure and/or the Lands from any event referred to in Section 35.1(a)(i);

- (iv) pressure waves caused by devices traveling at supersonic speeds; or
- (v) the discovery of any Species-at-Risk, fossils, artefacts and other objects having artistic, historic, archaeological or monetary value, including human remains and burial sites, which, as a result of Applicable Law, require the Works to be abandoned.

35.2 Consequences of Force Majeure

- (a) Subject to Section 35.3, the Party claiming relief shall be relieved from liability under this Project Agreement to the extent that, by reason of the Force Majeure, it is not able to perform its obligations under this Project Agreement.
- (b) In respect of an event of Force Majeure that is also a Delay Event pursuant to Section 32.1(a)(xii):
 - (i) DB Co shall only be relieved of its obligations under this Project Agreement to the extent, if any, provided for in Section 32; and
 - (ii) on the earlier of (A) the affected Substantial Completion Date(s) and (B) the date of payment of the City Default Termination Sum or Non-Default Termination Sum (and as a part thereof) in accordance with Schedule 23 – Compensation on Termination, the City shall pay to DB Co an amount equal to the Debt Service Amount accrued and paid or that accrued in accordance with the Lending Agreements during the period of delay by DB Co or any DB Co Party to the Lenders up to and including the applicable Scheduled Substantial Completion Date(s) or the date of payment of the City Default Termination Sum or Non-Default Termination Sum, as applicable, together with interest thereon at the rate payable on the principal amount of debt funded under the Lending Agreements, which, but for the Delay Event, would not have been paid by DB Co to the Lenders.
- (c) If an event of Force Majeure occurs prior to the affected Substantial Completion Date(s), DB Co shall not be entitled to receive any compensation other than as expressly provided in Sections 35.2(b)(ii) and 40.
- (d) Subject to Section 40, DB Co's sole right to payment or otherwise in relation to the occurrence of an event of Force Majeure shall be as provided in this Section 35.
- (e) Subject to the provisions of this Section 35, and with respect to an event of Force Majeure that is not a Delay Event and that arises prior to the affected Substantial Completion Date(s), (i) a Lane Closure that is directly caused or extended by the occurrence of an event of Force Majeure shall not be included in the Aggregate Actual Lane Closures or the Aggregate Actual Lane Closure Cost for the relevant Road Section for the purposes of calculating the Lane Closure Adjustment in accordance with the process set out in Schedule 34 – Mobility Matters.

35.3 Mitigation and Process

- (a) Where a Party is (or claims to be) affected by an event of Force Majeure, such Party shall take commercially reasonable steps to mitigate the consequences of such event of Force Majeure upon the performance of its obligations under this Project Agreement, shall resume performance of its obligations affected by the event of Force Majeure as soon as practicable and shall use

commercially reasonable efforts to remedy its failure to perform, including efforts to minimize any negative impact of the event of Force Majeure on the Works Schedule.

- (b) To the extent that the Party claiming relief does not comply with its obligations under this Section 35.3, such failure shall be taken into account in determining such Party's entitlement to relief pursuant to this Section 35.
- (c) The Party claiming relief shall give written Notice to the other Party within 5 Business Days after such Party becoming aware of the relevant event of Force Majeure. Such initial Notice shall give sufficient details to identify the particular event claimed to be an event of Force Majeure.
- (d) A subsequent written Notice shall be given by the Party claiming relief to the other Party within a further 5 Business Days of the initial Notice, which Notice shall contain such relevant information relating to the failure to perform (or delay in performing) as is available, including, without limitation, the effect of the event of Force Majeure on the ability of the Party to perform, the action being taken in accordance with Section 35.3(a), the date of the occurrence of the event of Force Majeure, and an estimate of the period of time required to overcome the event of Force Majeure and its effects.
- (e) The Party claiming relief shall notify the other as soon as the consequences of the event of Force Majeure have ceased and of when performance of its affected obligations can be resumed.
- (f) If, following the issue of any Notice referred to in Section 35.3(d), the Party claiming relief receives or becomes aware of any further information relating to the event of Force Majeure and/or any failure to perform, such Party shall submit such further information to the other Party as soon as reasonably possible.

35.4 Insured Exposure

- (a) The compensation payable to DB Co pursuant to this Section 35 shall be reduced by any amount which DB Co or a DB Co Party recovers, or is entitled to recover, under any insurance policy, or would have recovered if it had complied with the requirements of this Project Agreement in respect of insurance or the terms of any policy of insurance required under this Project Agreement, which amount, for greater certainty, shall not include any excess or deductibles or any amount over the maximum amount insured under any such insurance policy.

35.5 Modifications

- (a) The Parties shall use commercially reasonable efforts to agree to any modifications to this Project Agreement which may be equitable having regard to the nature of an event or events of Force Majeure. Schedule 27 – Dispute Resolution Procedure shall not apply to a failure of the City and DB Co to reach agreement pursuant to this Section 35.5.

36. DB CO DEFAULT

36.1 DB Co Events of Default

- (a) For the purposes of this Project Agreement, “**DB Co Event of Default**” means any one or more of the following events or circumstances:

- (i) the occurrence of any of the following events other than as a consequence of a breach by the City of its payment obligations hereunder:
 - (A) DB Co admits in writing its inability to pay its debts generally as they become due, or makes a general assignment for the benefit of creditors, or a receiver, manager, administrator, administrative receiver, receiver and manager, trustee, custodian or other similar official or any other like person is appointed by or on behalf of or at the instance of a creditor of DB Co with respect to DB Co or any of the property, assets or undertaking of DB Co, or any creditor of DB Co takes control, or takes steps to take control, of DB Co or any of DB Co's assets, or any proceedings are instituted against DB Co that result in DB Co being declared or ordered bankrupt or in administration, liquidation, winding-up, reorganization, compromise, arrangement, adjustment, protection, relief or composition of it or with respect to it or its debts or obligations, or any such proceedings are instituted by DB Co seeking any such result, or any such proceedings are instituted by a person other than DB Co, the City, a City Party or a person related to any of them seeking such result and such proceedings have or will have a material adverse effect on the performance of the Works or of the City Activities (where such proceedings have not been withdrawn, stayed, discharged, or are otherwise of no further effect, within 90 days after being instituted), under any Applicable Law (including the *Bankruptcy and Insolvency Act* (Canada) and the *Companies' Creditors Arrangement Act* (Canada)) relating to bankruptcy, insolvency or reorganization of or relief with respect to debtors or debtors' obligations or assets or other similar matters, or seeking the appointment of a receiver, manager, administrator, administrative receiver, receiver and manager, trustee, custodian or other similar official or like person for it or with respect to any of its assets, or any resolutions are passed or other corporate actions of DB Co are taken to authorize any of the actions set forth in this Section 36.1(a)(i);
 - (B) DB Co ceases performing a substantial portion of its business, or a substantial portion of such business is suspended or is not being performed, whether voluntarily or involuntarily, that has or will have a material adverse effect on DB Co's ability to perform its obligations under this Project Agreement;
 - (C) if any execution, sequestration, extent, garnishment or other process of or order by any court becomes enforceable against DB Co or if a distress or analogous process is levied against any property of DB Co that materially adversely affects DB Co's ability to perform its obligations hereunder; or
 - (D) DB Co suffers any event, or any event or set of circumstances occurs or comes about, analogous to the foregoing events or sets of circumstances set out in this Section 36.1(a)(i) in any jurisdiction in which it is incorporated or resident and such event or set of circumstances would, if set out in Section 36.1(a)(i)(A), (B) or (C), constitute a DB Co Event of Default;

- (ii) DB Co failing to achieve East Substantial Completion or West Substantial Completion within 365 days after the West Scheduled Substantial Completion Date (the “**Longstop Date**”);
- (iii) [Not used];
- (iv) [Not used];
- (v) DB Co either:
 - (A) failing to deliver a Recovery Schedule under Section 2.4 of Schedule 12 – Works Scheduling Requirements;
 - (B) delivering a Recovery Schedule under Section 2.4 of Schedule 12 – Works Scheduling Requirements which indicates that DB Co will not achieve East Substantial Completion or West Substantial Completion by the Longstop Date;
 - (C) delivering a Recovery Schedule under Section 2.4 of Schedule 12 – Works Scheduling Requirements that is not acceptable to the Independent Certifier, acting reasonably, as to the matters set out in Section 2.4 of Schedule 12 – Works Scheduling Requirements.
- (vi) DB Co making any representation or warranty herein that is false or misleading when made, and that has or will have at any time a material adverse effect on the performance of Works, or the Governmental Activities, or that may compromise (A) the City’s reputation or integrity, or (B) the nature of the public transit system in the City of Ottawa or the Province of Ontario so as to affect public confidence in the public transit system in the City of Ottawa or the Province of Ontario or the Project, and, in the case of a false or misleading representation or warranty that is capable of being remedied, such breach is not remedied within 10 Business Days after receipt of Notice of the same from the City;
- (vii) DB Co committing a breach of Sections 42 or 43;
- (viii) DB Co committing a breach of its obligations under this Project Agreement which has or will have a material adverse effect on the performance of the City Activities (other than a breach that is otherwise referred to in Sections 36.1(a)(i) to (vii) inclusive or (ix) to (xviii) inclusive) other than where such breach is a consequence of a breach by the City of its obligations under this Project Agreement or the result of any circumstance described in Section 11.12(k), and upon becoming aware of such breach DB Co failing to remedy such breach in accordance with all of the following:
 - (A) DB Co shall:
 - (I) immediately commence and thereafter diligently continue to remedy the breach and to mitigate any adverse effects on the City and the performance of the City’s operations and the City Activities;
 - (II) put forward, within 5 Business Days after receipt of Notice of such breach from the City, a reasonable plan and schedule for diligently

remedying the breach and mitigating its effect, which plan and schedule shall specify in reasonable detail the manner in which, and the latest date by which, such breach is proposed to be remedied, which latest date shall in any event be within 60 days after Notice of such breach, or if such breach is not capable of being rectified in such period then such longer period as is reasonable in the circumstances; and

- (III) thereafter perform its obligations to achieve all elements of such plan and schedule in accordance with its terms within the time for the performance of its obligations thereunder;
- (ix) DB Co wholly abandoning the Works for a period which exceeds three Business Days from receipt by DB Co of a written request to return to the Site, other than as a consequence of a breach by the City of its obligations under this Project Agreement;
- (x) DB Co failing to comply with Sections 49.1 or 49.3;
- (xi) the occurrence of any Change in Ownership or Change in Control which is prohibited by Section 49.4;
- (xii) DB Co failing to remove an Encumbrance that arose due to an act or omission of DB Co or any DB Co Party (other than any Encumbrance derived through the City) within 45 days following the earlier of:
 - (A) the registration of such Encumbrance against title to the Lands or any part thereof; and
 - (B) the date on which DB Co or any DB Co Party knew, or ought to have known, about the existence of the Encumbrance;
- (xiii) DB Co failing to pay any sum or sums due to the City under this Project Agreement, which sum or sums are not being disputed by DB Co in accordance with Schedule 27 – Dispute Resolution Procedure or have not been set off by DB Co pursuant to Section 4.8(a)(ii), and which sum or sums, either singly or in aggregate, exceed(s) \$[REDACTED] (index linked), and such failure continues for 30 days from receipt by DB Co of a Notice of non-payment from the City;
- (xiv) DB Co failing to comply with Section 50;
- (xv) DB Co failing to comply with Section 8.3 or Schedule 28 – Refinancing;
- (xvi) DB Co failing to obtain any bond, security or insurance required to be obtained by or on behalf of DB Co pursuant to this Project Agreement or any such bond, security or insurance being vitiated or otherwise ceasing to be in full force and effect or in material compliance with the requirements set out in this Project Agreement, other than
 - (A) as a consequence of a breach by the City of its obligations under this Project Agreement; or

- (B) the failure to deliver the East Warranty Letter of Credit, West Warranty Letter of Credit, and/or the Remaining Works Letter of Credit (in respect of which failure the City will have the rights set out in Section 4.2(d), (e) and (h), respectively); or
 - (C) the failure to replace a Non-Renewed Warranty Letter of Credit, or renew the Remaining Works Letter of Credit (in respect of which failure the City will have the rights set out in Section 11.18(i) and 11.18A(i) respectively),
- and,
- (D) in respect of insurance, such breach by DB Co is not remedied within 10 Business Days after the occurrence of the breach; and
 - (E) in respect of a bond or security, such breach by DB Co is not remedied within 5 Business Days after DB Co becoming aware of such breach;
- (xvii) DB Co failing to comply with any determination, order or award made against DB Co in accordance with Schedule 27 – Dispute Resolution Procedure;
- (xviii) A default by DB Co or any DB Co Party under any of the Ancillary Documents following the expiry of any applicable notice and cure periods thereunder.

36.2 Notification of Occurrence

- (a) DB Co shall, promptly upon DB Co becoming aware of the occurrence, notify the City of the occurrence, and details, of any DB Co Event of Default and of any event or circumstance which is likely, with the passage of time, giving of Notice, determination of any condition, or otherwise, to constitute or give rise to a DB Co Event of Default.

36.3 Right to Termination

- (a) On the occurrence of a DB Co Event of Default, or at any time after the City becomes aware of a DB Co Event of Default, and, if the occurrence of a DB Co Event of Default is disputed by DB Co in good faith, then following confirmation in accordance with Schedule 27 – Dispute Resolution Procedure that a DB Co Event of Default has occurred, the City may, subject to Section 36.4 and 36.3(b), terminate this Project Agreement in its entirety by written Notice having immediate effect, such Notice to be given to DB Co, and to any person specified in the Lenders' Direct Agreement to receive such Notice.
- (b) In the event a DB Co Event of Default was caused solely by the Nominated Signalling Subcontractor, the City's rights to terminate this Project Agreement for such DB Co Event of Default shall be stayed for a period of 180 days after a Notice of default to DB Co for such DB Co Event of Default. In the event that during such 180 day period the City and DB Co mutually agree that the Nominated Signalling Contractor will not be able to perform the Nominated Signalling Subcontractor Works in accordance with the Current PBS, then subject to and in accordance with Schedule 22 – Variation Procedure, any consequential alteration, extension or variation in the Works shall result in a Variation.

36.4 Remedy Provisions

- (a) In the case of a DB Co Event of Default referred to in Sections 36.1(a)(i)(B), 36.1(a)(i)(C), 36.1(a)(i)(D) (where the DB Co Event of Default referred to in Section 36.1(a)(i)(D) is analogous to a DB Co Event of Default referred to in Section 36.1(a)(i)(B) or 36.1(a)(i)(C)), 36.1(a)(v), 36.1(a)(vi), 36.1(a)(vii), 36.1(a)(ix), 36.1(a)(x), 36.1(a)(xi), (where the DB Co Event of Default referred to in Section 36.1(a)(xi) is capable of being remedied), 36.1(a)(xiii), 36.1(a)(xv), 36.1(a)(xvi) (where the DB Co Event of Default referred to in Section 36.1(a)(xvi)) is not in respect of insurance), 36.1(a)(xvii), or 36.1(a)(xviii), the City shall, prior to being entitled to terminate this Project Agreement, give Notice of default to DB Co, and to any person specified in the Lenders' Direct Agreement to receive such Notice, and DB Co shall:
 - (i) within five Business Days after such Notice of default, put forward a reasonable plan and schedule for diligently remedying the DB Co Event of Default, which schedule shall specify in reasonable detail the manner in, and the latest date by which, such DB Co Event of Default is proposed to be remedied, which latest date shall, in any event, be within 30 days after the Notice of default, or if such breach is not capable of being remedied in such period then such longer period as is acceptable to the City, acting reasonably; and
 - (ii) thereafter, perform its obligations to achieve all elements of such plan and schedule in accordance with its terms within the time for the performance of its obligations thereunder.
- (b) Where DB Co puts forward a plan and schedule in accordance with Section 36.4(a)(i) that has a date for the DB Co Event of Default to be remedied that is beyond 30 days from the Notice of default, the City shall have 5 Business Days from receipt of the same within which to notify DB Co that the City does not accept such longer period in the plan and schedule and that the 30 day limit will apply, failing which the City shall be deemed to have accepted the longer period in the plan and schedule.
- (c) If a DB Co Event of Default, of which a Notice of default was given under Section 36.4(a), occurs and:
 - (i) DB Co fails to immediately commence and thereafter diligently continue to remedy the DB Co Event of Default and to mitigate any adverse effects on the City and the Governmental Activities; or
 - (ii) DB Co fails to put forward a plan and schedule pursuant to Section 36.4(a)(i); or
 - (iii) such DB Co Event of Default is not remedied within 30 days after such Notice of default or such longer period as is established pursuant to the plan and schedule established pursuant to Sections 36.4(a) and (b); or
 - (iv) where DB Co puts forward a plan and schedule pursuant to Section 36.4(a)(i) and DB Co fails to perform its obligations thereunder necessary to achieve all elements of such plan and schedule in accordance with its terms within the time for the performance of its obligations,

then the City may terminate this Project Agreement in its entirety by written Notice with immediate effect, such Notice to be given to DB Co, and to any person specified in the Lenders' Direct Agreement to receive such Notice.

- (d) Notwithstanding that the City may give the Notice referred to in Section 36.4(a), and without prejudice to the other rights of the City in this Section 36.4, at any time during which a DB Co Event of Default is continuing, the City may, at DB Co's risk and expense, take such steps as the City considers appropriate, either themselves or by engaging others (including a third party) to take such steps, to perform or obtain the performance of DB Co's obligations under this Project Agreement or to remedy such DB Co Event of Default.
- (e) Upon the occurrence of a DB Co Event of Default that DB Co has remedied pursuant to this Section 36.4, such occurrence of a DB Co Event of Default shall thereafter cease to be a DB Co Event of Default and the City shall not be entitled to terminate this Project Agreement for that occurrence of a DB Co Event of Default.

36.5 City Costs

- (a) DB Co shall reimburse the City for all reasonable costs (including all applicable Taxes and all legal or professional services, legal costs being on a full indemnity basis) properly incurred by the City in exercising its rights under this Section 36, including any relevant increased administrative expenses. The City shall take commercially reasonable steps to mitigate such costs.

36.6 No Other Rights to Terminate

- (a) The City shall have no right or entitlement to terminate this Project Agreement, or to accept any repudiation of this Project Agreement, and shall not purport to exercise any such right or entitlement except as set forth in Sections 36 and 38.

37. CITY DEFAULT

37.1 City Events of Default

- (a) For the purposes of this Project Agreement, "**City Event of Default**" means any one or more of the following events or circumstances:
 - (i) the City failing to pay any sum or sums due to DB Co under this Project Agreement, which sum or sums are not being disputed by the City in accordance with Schedule 27 – Dispute Resolution Procedure or have not been set off by the City pursuant to Section 4.8(a)(i), and which sum or sums, either singly or in aggregate, exceed(s) **[\$[REDACTED]]** (index linked), and:
 - (A) in respect of a Substantial Completion Payment or Construction Period Payment, such failure continues for a period of 10 Business Days; or
 - (B) in respect of any other payment due and payable by the City to DB Co under this Project Agreement, such failure continues for a period of 90 days,
- in any such case, from receipt by the City of a Notice of non-payment from or on behalf of DB Co;

- (ii) the City committing a material breach of its obligations under Section 16 (other than as a consequence of a breach by DB Co of its obligations under this Project Agreement), which breach materially adversely affects the ability of DB Co to perform its obligations under this Project Agreement for a continuous period of not less than 60 days; or
- (iii) an act of any Governmental Authority which renders it impossible for DB Co to perform all or substantially all of its obligations under this Project Agreement (other than as a consequence of a breach by DB Co of its obligations under this Project Agreement) for a continuous period of not less than 60 days, provided that, for greater certainty, the non-issuance of, or the imposition of any conditions or limitations in, any of the DB Co Permits, Licences, Approvals and Agreements shall not constitute an “act of any Governmental Authority”.

37.2 DB Co’s Options

- (a) On the occurrence of a City Event of Default and while the same is continuing, DB Co may give Notice to the City of the occurrence of such City Event of Default, which Notice will specify the details thereof, and, at DB Co’s option and without prejudice to its other rights and remedies under this Project Agreement, DB Co may:
 - (i) suspend performance of the Works until such time as the City has remedied such City Event of Default; or
 - (ii) if such City Event of Default has not been remedied within 30 days after receipt by the City of Notice of the occurrence of such City Event of Default, terminate this Project Agreement in its entirety by Notice in writing having immediate effect.

37.3 DB Co’s Costs

- (a) The City shall reimburse DB Co for all reasonable costs (including all applicable Taxes and all legal or professional services, legal costs being on a full indemnity basis) properly incurred by DB Co in exercising its rights under this Section 37, including any relevant increased administrative expenses. DB Co shall take commercially reasonable steps to mitigate such costs.

37.4 No Other Rights to Terminate

- (a) DB Co shall have no right or entitlement to terminate this Project Agreement, nor to accept any repudiation of this Project Agreement, and shall not exercise, nor purport to exercise, any such right or entitlement except as expressly set forth in this Project Agreement.

38. RELIEF EVENT AND NON DEFAULT TERMINATION

38.1 Termination for Relief Event

- (a) If a Relief Event occurs and the effects of the Relief Event continue for 180 days from the date on which the Party affected gives Notice to the other Party pursuant to Section 34.3(c), either Party may, at any time thereafter, terminate this Project Agreement by written Notice to the other Party having immediate effect, provided that the effects of the Relief Event continue during such period to prevent either Party from performing a material part of its obligations under this Project Agreement.

38.2 Termination for Force Majeure

- (a) If an event of Force Majeure occurs and the Parties, having used commercially reasonable efforts, have failed to reach agreement on any modification to this Project Agreement pursuant to Section 35.5 within 180 days after the date on which the Party affected gives Notice to the other Party as set out therein, either Party may, at any time thereafter, terminate this Project Agreement by written Notice to the other Party having immediate effect, provided that the effects of the event of Force Majeure continue during such period to prevent either Party from performing a material part of its obligations under this Project Agreement.

38.3 Termination for Convenience

- (a) The City shall, in its sole discretion and for any reason whatsoever, be entitled to terminate this Project Agreement at any time on 180 days written Notice to DB Co.
- (b) In the event of Notice being given by the City in accordance with this Section 38.3, the City shall, at any time before the expiration of such Notice, be entitled to direct DB Co to refrain from commencing, or allowing any third party to commence, the Works, or any part or parts of the Works where such Works have not yet been commenced.

38.4 Automatic Expiry on Expiry Date

- (a) This Project Agreement shall terminate automatically on the Expiry Date.
- (b) DB Co shall not be entitled to any compensation due to termination of this Project Agreement on expiry of the Project Term on the Expiry Date.

39. EFFECT OF TERMINATION

39.1 Termination

- (a) Notwithstanding any provision of this Project Agreement, upon the service of a Notice of termination or termination on the Expiry Date pursuant to Section 38.4, this Section 39 shall apply in respect of such termination.

39.2 Continued Effect – No Waiver

- (a) Notwithstanding any breach of this Project Agreement by a Party, the other Party may elect to continue to treat this Project Agreement as being in full force and effect and to enforce its rights under this Project Agreement without prejudice to any other rights which such other Party may have in relation to such breach. The failure of either Party to exercise any right under this Project Agreement, including any right to terminate this Project Agreement and any right to claim damages, shall not be deemed to be a waiver of such right for any continuing or subsequent breach.

39.3 Continuing Performance

- (a) Subject to any exercise by the City of its rights to perform, or to seek, pursuant to this Project Agreement, a third party to perform, the obligations of DB Co, and subject to the rights of DB Co pursuant to Section 37.2, the Parties shall continue to perform their obligations under this Project

Agreement (including, if applicable, pursuant to Schedule 23 – Compensation on Termination) notwithstanding the giving of any Notice of default or Notice of termination, until the termination of this Project Agreement becomes effective in accordance with this Section 39.

39.4 Effect of Notice of Termination

- (a) On the service of a Notice of termination, or termination on the Expiry Date pursuant to Section 38.4:
- (i) if termination is prior to any Substantial Completion Date(s), in so far as any transfer shall be necessary to fully and effectively transfer such property to the City as shall not already have been transferred to the City pursuant to Section 45.1, DB Co shall transfer to, and there shall vest in, the City, free from all Encumbrances (other than the Encumbrances caused or consented to by the City), such part of the Works, the New City Infrastructure, and the New MTO Infrastructure as shall have been constructed and such items of the plant, infrastructure and equipment as shall have been procured by DB Co, and, if the City so elects:
 - (A) all plant, equipment and materials (other than those referred to in Section 39.4(a)(i)(B)) on or near to the Lands shall remain available to the City for the purposes of completing the Works; and
 - (B) all construction plant and equipment shall remain available to the City for the purposes of completing the Works, subject to payment by the City of the Construction Contractor's reasonable charges;
 - (ii) if termination is prior to any Substantial Completion Date(s), DB Co shall deliver to the City (to the extent such items have not already been delivered to the City) one complete set of all Project Data and Intellectual Property relating to the design, construction and completion of the Works, the New City Infrastructure, and the New MTO Infrastructure, as applicable, comprising the Works that are the subject of such Substantial Completion Date(s);
 - (iii) in so far as title shall not have already passed to the City pursuant to Section 45.1 or Section 39.4(a)(i), DB Co shall hand over to, and there shall vest in, the City, free from all Encumbrances (other than any Encumbrances caused or consented to by the City), the New City Infrastructure and the New MTO Infrastructure together with all other assets and rights capable of being transferred that are necessary for the performance of the Project and the Works and all facilities and equipment, and to the extent that any such assets or rights are not capable of being transferred by DB Co to the City, DB Co shall enter into agreements or make other arrangements in order to permit the use of the assets or rights by the City in order to enable them, or their designated agents or subcontractors, to continue to perform the activities which would have otherwise been performed by DB Co if this Project Agreement had not been terminated;
 - (iv) if the City so elects, DB Co shall ensure that any of the Subcontracts between DB Co and a Subcontractor (including the Design and Construction Contract), any other instrument entered into between any such Subcontractor and DB Co for securing the performance by such Subcontractor of its obligations in respect of the Works or to protect the interests of DB Co, shall be novated or assigned to the City or its nominee, provided that where

termination occurs other than as a result of a DB Co Event of Default, the consent of the relevant Subcontractor shall be required, and further provided that any such novation or assignment of the Design and Construction Contract with the Construction Contractor shall be made by the City pursuant to, and subject to, the terms of the Construction Contractor's Direct Agreement;

- (v) DB Co shall, or shall ensure that any DB Co Party shall, offer to sell (and if the City so elects, execute such sale) to the City at a fair value (determined as between a willing vendor and willing purchaser, with any Disputes as to such fair value being resolved in accordance with Schedule 27 – Dispute Resolution Procedure), free from all Encumbrances (other than any Encumbrances caused or consented to by the City), all or any part of the stocks of material and other assets, road vehicles, construction equipment, spare parts and other moveable property owned by DB Co or any DB Co Parties and dedicated to or predominantly used in respect of the New City Infrastructure, and reasonably required by the City in connection with the operation of the New City Infrastructure;
- (vi) DB Co shall use commercially reasonable efforts to assign, or otherwise transfer, to the City, free from all Encumbrances (other than any Encumbrances caused or consented to by the City), the benefit of all manufacturers' warranties, including all documentation in respect thereof, in respect of mechanical and electrical plant and equipment used or made available by DB Co under this Project Agreement and included in the New City Infrastructure and the New MTO Infrastructure; and
- (vii) DB Co shall deliver to the City all information, reports, documents, records and the like referred to in Section 28, including as referred to in Schedule 26 – Record Provisions, except where such are required by Applicable Law to be retained by DB Co or the DB Co Parties (in which case complete copies shall be delivered to the City).

39.5 Ownership of Information

- (a) Subject to Section 41, all information obtained by DB Co, including the As-Built Drawings, Record Drawings, and other technical drawings and data, supplier agreements and contracts, utilities consumption information, environmental and technical reports, static building information, lease, licence and subletting data and contracts, asset condition data, standard operating procedures, processes and manuals and all other information directly related to the Works accumulated over the course of the Project Term shall be the property of the City and upon termination of this Project Agreement shall be provided or returned to the City, as applicable, in electronic format acceptable to the City, acting reasonably, where it exists in electronic format, and in its original format, when not in electronic format.

39.6 Provision in Subcontracts

- (a) DB Co shall make provision in all Subcontracts to which it is a party (including requiring the relevant DB Co Parties to make such provision and to require other DB Co Parties to make such provision) to ensure that the City shall be in a position to exercise its rights, and DB Co shall be in a position to perform its obligations, under this Section 39.

39.7 Transitional Arrangements

- (a) On the termination of this Project Agreement for any reason, for a reasonable period both before and after any such termination, DB Co shall:
 - (i) as soon as practicable remove from the Lands all property belonging to DB Co or any DB Co Party that is not acquired by the City pursuant to Section 39.4 or otherwise, and, if DB Co has not done so within 60 days after any Notice from the City requiring it to do so, the City may, without being responsible for any loss, damage, costs or expenses, remove and sell any such property and shall hold any proceeds, less all costs incurred to the credit of DB Co;
 - (ii) forthwith deliver to the City Representative:
 - (A) all keys to, and any pass cards and other devices used to gain access to any part of the New City Infrastructure; and
 - (B) to the extent transferable and without prejudice to the City's rights pursuant to Section 41, any copyright licences for any computer programs, or licences to use the same, used in connection with the operation of the New City Infrastructure; and
 - (iii) as soon as practicable vacate the Lands and shall leave the Lands and the New City Infrastructure in a safe, clean and orderly condition.

39.8 Termination upon Aforesaid Transfer

- (a) On completion of DB Co's obligations pursuant to this Section 39, this Project Agreement shall terminate and, except as provided in Section 39.9, all rights and obligations of the City and DB Co under this Project Agreement shall cease and be of no further force and effect.

39.9 Survival

- (a) Except as otherwise provided in this Project Agreement, termination of this Project Agreement shall be without prejudice to, and shall not affect:
 - (i) all representations, warranties and indemnities under this Project Agreement; and
 - (ii) Sections 1.2, 1.3, 1.5, 4.8, 4.9, 4.11, 6, 7, 8, 11.15(b), 11.16(a), 11.17, 11.17A, 11.18, 11.18A, 17.2, 17.3, 18.1, 18.2, 18.3(a), 18.4(a), 22.6, 25.15, 27, 28, 36.5, 37.3, 38.4, 39, 40, 41 (with the exception of 41.4(b)), 42, 43, 44.3, 45, 46, 47, 48, 50.3, 51.1, 53.2, 53.3, 53.4, 53.8, 53.9, 53.10, 53.11, 53.12 of this Project Agreement, Schedule 7B – Warranty Letters of Credit, Schedule 7C – Remaining Works Letter of Credit, Schedule 14 – Testing & Commissioning, Schedule 23 – Compensation on Termination, Schedule 32 – Financial Model, Sections 1.2 – 1.8 of Schedule 26 – Record Provisions, Schedule 27 – Dispute Resolution Procedure, Sections 2.1 – 2.6 and 3.2-3.9 of Schedule 24 – Intellectual Property, Schedule 34 – Mobility Matters, and any other provisions of this Project Agreement which are expressed to survive termination or which are required to give effect to such provisions which survive termination or to such termination or the consequences of such termination,

all of which shall survive the termination of this Project Agreement, including for termination on the Expiry Date pursuant to Section 38.4. For clarity, any termination of this Project Agreement shall be without prejudice to, and shall not affect, the Performance Guarantee of Construction Guarantor, which shall survive the termination of this Project Agreement, including termination on the Expiry Date pursuant to Section 38.4, in respect of any and all of such surviving provisions of the Project Agreement.

40. COMPENSATION ON TERMINATION

40.1 Compensation on Termination

- (a) If this Project Agreement is terminated in accordance with the terms hereof, then Schedule 23 – Compensation on Termination shall apply and the City shall pay DB Co any applicable compensation on termination.

40.2 Full and Final Settlement

- (a) Except as otherwise provided in Section 40.2(b), any compensation paid pursuant to this Section 40, including pursuant to Schedule 23 – Compensation on Termination in the total amount owing thereunder, shall be in full and final settlement of any claims, demands and proceedings of DB Co and the City, and each shall be released from all liability to the other in relation to any breaches or other events leading to such termination of this Project Agreement, and the circumstances leading to such breach or termination, and DB Co and the City shall be precluded from exercising all other rights and remedies in respect of any such breach or termination whether in contract, tort, restitution, statute, at common law or otherwise.
- (b) Section 40.2(a) shall be without prejudice to:
 - (i) any liability of either Party to the other, including under the indemnities contained in this Project Agreement, that arose prior to the Termination Date (but not from the termination itself or the events leading to such termination) to the extent such liability has not already been set off pursuant to Section 4.8 or taken into account pursuant to Schedule 23 – Compensation on Termination in determining or agreeing upon the City Default Termination Sum, Non-Default Termination Sum, DB Co Default Termination Sum or any other termination sum, as the case may be; and
 - (ii) any liabilities arising under or in respect of any breach by either Party of their obligations surviving termination of this Project Agreement pursuant to Section 39.9, or the Sections referred to therein, which did not lead to such termination and which arises or continues after the Termination Date.

41. INTELLECTUAL PROPERTY

41.1 Ownership of Intellectual Property

- (a) Subject to Section 41.3(a), the Ownership of Intellectual Property shall be as set out in Schedule 24 – Intellectual Property. DB Co and the City shall each comply with the requirements of Schedule 24 – Intellectual Property.

41.2 Licenses to Intellectual Property

- (a) Schedule 24 – Intellectual Property sets out the terms on which Intellectual Property used or supplied in connection with the Project will be licenced.

41.3 Representation and Warranty

- (a) DB Co represents, warrants and covenants to the City that:
 - (i) DB Co has and shall have the full and unencumbered right to provide all rights and licenses granted to the City in this Project Agreement and to make all assignments of Intellectual Property as contemplated in this Project Agreement and to otherwise fully comply with the terms and requirements of Schedule 24 – Intellectual Property and its obligations therein;
 - (ii) any Intellectual Property licenses to the City pursuant to this Project Agreement does not and shall not infringe, and is not and shall not be misappropriation of, any third party Intellectual Property rights;
 - (iii) as of Commercial Close:
 - (A) DB Co has not received any alleged infringement or misappropriation notices from third parties regarding any such Intellectual Property; and
 - (B) no fact is known to DB Co (including in respect of any actual, pending or threatened disputes, claims, suits, actions or proceedings or any other circumstance or event) that will, or could reasonably, effect, limit or prevent DB Co from fully complying with this Section 41.3(a).

41.4 Jointly Developed Materials

- (a) To the extent any data, documents, drawings, reports, plans, software, formulae, calculations or designs or any other materials or Intellectual Property are developed jointly by,
 - (i) DB Co or any Subcontractor and the City to the exclusion of any other party pursuant to this Project Agreement or in relation to the New City Infrastructure, the Lands or Works (the “**City Jointly Developed Materials**”); and
 - (ii) DB Co or any Subcontractor and MTO to the exclusion of any other party in relation to the New MTO Infrastructure that will be owned by MTO (the “**MTO Jointly Developed Materials**”),(together, the “**Jointly Developed Materials**”), then the Parties hereby acknowledge and agree that,
 - (iii) the City shall be the sole and exclusive owner of all right, title and interest in and to the City Jointly Developed Materials, any Intellectual Property associated therewith and any and all Modifications thereto and DB Co shall, at the request of the City, execute such further agreements and cause the Subcontractors to execute any and all assignments,

waivers of moral rights and other documents as may be reasonably required to fulfill the intent of this provision; and

- (iv) MTO shall be the sole and exclusive owner of all right, title and interest in and to the MTO Jointly Developed Materials, any Intellectual Property associated therewith and any and all Modifications thereto and that DB Co shall, at the request of MTO, execute such further agreements and cause the Subcontractors to execute any and all assignments, waivers of moral rights and other documents as may be reasonably required to fulfill the intent of this provision.
- (b) The City hereby grants DB Co, and shall procure that MTO grants DB Co, a royalty free, non-exclusive and non-transferable licence, with a right to grant sub-licences to each Subcontractor, to use the Jointly Developed Materials during the Project Term for the sole purposes of DB Co or any Subcontractor performing its obligations under this Project Agreement or its Subcontract, as applicable.
- (c) Upon termination of this Project Agreement, all rights and licences whatsoever granted to DB Co in the Jointly Developed Materials shall automatically terminate, and DB Co shall return any and all Jointly Developed Materials in the custody or possession of DB Co to,
 - (i) the City, in the case of the City Jointly Developed Materials; and
 - (ii) MTO, in the case of the MTO Jointly Developed Materials.
- (d) In the event of any inconsistency between this Section 41 and any provision of Schedule 24 – Intellectual Property, the wording of this Section 41 shall prevail.

41.5 Maintenance of Data

- (a) To the extent that any of the data, materials and documents referred to in this Section 41 or Schedule 24 – Intellectual Property are generated by, or maintained on, a computer or similar system, DB Co shall procure for the benefit of the City, either at no charge or at the lowest reasonable fee, the grant of a licence or sub-licence for any relevant software to enable the City or its nominee to access and otherwise use (subject to the payment by the City of any relevant fee) such data, materials and documents in accordance with rights granted pursuant to Schedule 24 – Intellectual Property.
- (b) For the purposes of Section 41.5(a), “use” has the meaning set out in Schedule 24 – Intellectual Property, and includes the Limited Modification Rights.
- (c) Without limiting the obligations of DB Co under Section 41.5(a), DB Co shall ensure the back-up and storage in safe custody of the data, materials and documents referred to in this Section 41 in accordance with Good Industry Practice. DB Co shall submit to the City Representative DB Co’s proposals for the back-up and storage in safe custody of such data, materials and documents and the City shall be entitled to object if the same is not in accordance with Good Industry Practice. DB Co shall comply, and shall cause all DB Co Parties to comply, with all procedures to which the City Representative has not objected. DB Co may vary its procedures for such back-up and storage subject to submitting its proposals for change to the City Representative, who shall be entitled to object on the basis set out above. Any Disputes in connection with the provisions of

this Section 41.5(c) may be referred for resolution in accordance with Schedule 27 – Dispute Resolution Procedure with reference to Good Industry Practice.

41.6 City Trade-Marks

- (a) DB Co shall not:
 - (i) use any City Trade-Marks without obtaining a trade-mark licence on terms and conditions mutually satisfactory to the City and DB Co, each acting reasonably;
 - (ii) use the names or any identifying logos or otherwise of the City or the City Representative in any advertising or permit them so to be used except with the prior written consent of the City; or
 - (iii) use any Trade-Marks of RTG or any RTG Party without obtaining a trade-mark licence on terms and conditions satisfactory to the RTG or such RTG Party.

41.7 Confidential Information

- (a) It is expressly acknowledged and agreed that nothing in this Section 41 shall be deemed to create or convey to a Party any right, title, or interest in and/or to the Confidential Information of the other Party.

41.8 Government Use of Documents

- (a) DB Co hereby disclaims any right, title or interest of any nature whatsoever it may have in or to this Project Agreement that might prohibit or otherwise interfere with the City's ability to use this Project Agreement in any manner desired by the City.
- (b) DB Co hereby consents to the use by the City of this Project Agreement, and any portion thereof, subject to compliance with FIPPA and to the removal by the City (in consultation with DB Co) of any information supplied in confidence to the City by DB Co in circumstances where disclosure may be refused under section 17(1) of FIPPA.

41.9 Restrictions

- (a) The Parties hereby agree that either Party may use the Project Know-How for any purpose, provided, however, that neither DB Co nor any Subcontractor shall use the Project Know-How to the extent that such Project Know-How incorporates, references or is otherwise based on the Project Data, the Intellectual Property Rights, the Jointly Developed Material, the Intellectual Property of the City, the Intellectual Property of any City Party or any third party provided by the City, the Confidential Information of the City, or the Confidential Information of any City Party or any third party provided by the City, including the Output Specifications unless such use is otherwise permitted pursuant to this Project Agreement in order to enable DB Co and the DB Co Parties to meet DB Co's obligations under this Project Agreement.
- (b) DB Co hereby covenants and agrees that it will not make any commercial use, including use in any other request for proposal or similar procurement process, of the Project Data, the Intellectual Property Rights, the Jointly Developed Material, the Intellectual Property of the City, the Intellectual Property of any City Party or any third party provided by the City, the Confidential

Information of the City, or the Confidential Information of any City Party or any third party provided by the City, including the Output Specifications, or any other drawings, reports, documents, plans, formulae, calculations, manuals, or other data that was created specifically for the Project or was based upon the Project Data, the Intellectual Property Rights, the Jointly Developed Material, the Intellectual Property of the City, the Intellectual Property of any City Party provided by the City, the Confidential Information of the City, or the Confidential Information of any City Party provided by the City, including the Output Specifications.

- (c) Nothing in this Section 41.9 shall be deemed to grant to any party (including any Subcontractor or any personnel thereof) any right or license in respect of any other party's or other persons' Intellectual Property.

42. CONFIDENTIALITY

42.1 Disclosure

- (a) Subject to Sections 42.1(b), 42.1(c) and 42.2, but notwithstanding anything else in this Project Agreement to the contrary, DB Co acknowledges and agrees that the City has a right to disclose or publish (including on websites) this Project Agreement, any or all terms hereof, including any or all contractual submissions and other records kept in accordance with this Project Agreement, any information related to the performance of DB Co (or any DB Co Party) or any information derived from this Project Agreement or the information related to the performance of DB Co (or any DB Co Party) as the City, in its sole discretion, may consider appropriate. In exercising its discretion, the City will be guided by the principles set out in Sections 42.1(b) and 42.1(c).
- (b) The City will not disclose portions of this Project Agreement, any terms hereof, including any contractual submissions or other records kept in accordance with this Project Agreement, any information related to the performance of DB Co (or any DB Co Party) or any information derived from this Project Agreement or the information related to the performance of DB Co (or any DB Co Party) which would be exempt from disclosure under section 17(1) of FIPPA.
- (c) Notwithstanding Section 42.1(b), but subject to Section 42.2, where a compelling public interest in the disclosure of the information clearly outweighs the public interest in limiting the disclosure of the information supplied by DB Co (or any DB Co Party), the City may disclose such information.
- (d) Except as otherwise specified herein or in the Interface Agreement, or as otherwise reasonably required to be disclosed to RTG in respect of any bona fide dispute between RTG and DB Co or RTG and the City arising from or related to this Project Agreement or the Interface Agreement to substantiate any claim or defence thereto, the City shall not, DB Co shall not be required to, and the City shall have no right to compel DB Co to, disclose any commercially sensitive information of DB Co to RTG or any RTG Party. Without limiting the generality of the foregoing, commercially sensitive information shall include any information identified to the City as such by DB Co and shall include, the Lending Agreements, the Financial Model, any cost or draw schedules prepared in connection with this Project Agreement (including any fully-loaded cost schedule), any draw request or information submitted to the City in accordance with Schedule 21 – Construction Period Payments, any financial statements of DB Co, the Construction Contractor, the Construction Guarantors or any Affiliates thereof, and any pricing information obtained by the City, including any such information submitted in connection with any Variation or claim pursuant to Section 33, Section 33.6 or Section 35.

42.2 Redaction

- (a) Prior to disclosing or publishing this Project Agreement, any terms hereof, including any contractual submissions or other records kept in accordance with this Project Agreement, any information related to the performance of DB Co (or any DB Co Party) or any information derived from this Project Agreement or the information related to the performance of DB Co (or any DB Co Party), the City shall provide to DB Co a redacted version of this Project Agreement or other documents or information to be disclosed or published, on the basis that the information so redacted constitutes information which should not be disclosed pursuant to Section 42.1(b). The Parties acknowledge and agree that the Guaranteed Price, but not any breakdown thereof, may be disclosed.
- (b) If DB Co, acting in good faith, contends that any of the information not redacted constitutes information that falls within the scope of Section 42.1(b) and, accordingly, would be exempt from disclosure under FIPPA, the dispute may be referred for resolution in accordance with Schedule 27 – Dispute Resolution Procedure, and the City shall not disclose any information in dispute until a determination is made. Any such determination shall be made with reference to the text and principles of FIPPA.

42.3 Disclosure to Government

- (a) DB Co acknowledges and agrees that subject to compliance with FIPPA, the City will be free to use, disclose or publish (including on websites) any information, including Confidential Information, on such terms and in such manner as the City see fit.
- (b) For greater certainty, DB Co acknowledges and agrees that, subject only to the removal of any information which DB Co is (or would be) entitled to refuse to disclose pursuant to section 17(1) of FIPPA, this Project Agreement, any contractual submissions or other records kept in accordance with this Project Agreement, any information related to the performance of DB Co (or any DB Co Party) or any information derived from this Project Agreement or the information related to the performance of DB Co (or any DB Co Party) are public documents and information and, as such, may be disclosed by the City.

42.4 *Freedom of Information and Protection of Privacy Acts*

- (a) The Parties acknowledge and agree that,
 - (i) MFIPPA applies to the City, and that the City is required to fully comply with MFIPPA; and
 - (ii) FIPPA applies to the MTO, and that the MTO is required to fully comply with FIPPA.
- (b) The City shall, within the time periods provided in MFIPPA for a party to exercise rights to prevent disclosure of information, advise DB Co of any request for Confidential Information that relates to DB Co (or any DB Co Party) or of the City's intention to voluntarily release any information or documents which contain Confidential Information that relates to DB Co (or any DB Co Party).

42.5 Use and Disclosure of Confidential Information

- (a) Except as authorized hereunder, each Party shall hold in confidence, not disclose and not permit any person any manner of access to, whether directly or indirectly, any Confidential Information of the other Party, provided that this Section 42 shall not restrict either Party from disclosing such Confidential Information to its professional advisors, to the extent necessary, to enable that Party to perform, to cause to be performed, or to enforce, its rights or obligations under this Project Agreement.
- (b) DB Co may:
 - (i) disclose in confidence to the Lenders and prospective Lenders, including any trustee or agent of the Lenders and the Lenders' Agent, and their respective professional advisors such Confidential Information as is reasonably required by the Lenders in connection with the raising or syndication of the financing or any sub-participation in the financing of the Works or which DB Co is obliged to supply by the terms of the Lending Agreements; and
 - (ii) disclose in confidence to any DB Co Party and their professional advisors, such Confidential Information as is necessary for the performance by that DB Co Party of that DB Co Party's obligations under this Project Agreement.
- (c) DB Co acknowledges that the City may use the Confidential Information of DB Co for purposes not specific to the Project, but for other general governmental purposes, such as development of the City's alternate procurement and financing policies and framework. The City will advise DB Co prior to using any Confidential Information of DB Co for non-Project purposes.
- (d) Subject to the foregoing, neither Party shall use, or directly or indirectly cause, authorize or permit any other person to use, any Confidential Information of the other Party except for the purposes of this Project Agreement, as permitted by this Project Agreement or as authorized by the disclosing Party in writing.
- (e) Each Party shall,
 - (i) protect all Confidential Information of the disclosing Party with the same degree of care as it uses to prevent the unauthorized use, disclosure, publication, or dissemination of its own confidential information of a similar nature or character, but in no event with less than a reasonable degree of care;
 - (ii) if legally compelled to disclose any Confidential Information,
 - (A) provide the disclosing Party with prompt Notice to that effect to allow the disclosing Party to seek any appropriate remedies and cooperate with the disclosing Party and its legal counsel; and
 - (B) disclose only that portion of the Confidential Information that it is legally required to disclose; and
 - (iii) provide Confidential Information to the disclosing Party upon demand by the disclosing Party.

Section 42.5(e)(iii) shall not apply to Confidential Information in relation to which a Party has been provided a licence pursuant to Schedule 24 – Intellectual Property provided that the use of such Confidential Information is in accordance with Schedule 24 – Intellectual Property.

- (f) Without limiting the generality of this Section 42.5, DB Co shall comply with the document control and security protocol submitted by DB Co pursuant to Section 11.5 and approved by the City, which protocol shall prescribe limitations on the use, disclosure and storage of this Project Agreement and any other Confidential Information specified by the City.

42.6 Exceptions

- (a) Information of a Party (the “**Proprietor**”), other than Government Sensitive Information and other than Personal Information, will not be considered to be Confidential Information in the following circumstances:
- (i) the Proprietor advises the other Party to whom the information has been disclosed (the “**Confidant**”) that the information is not required to be treated as Confidential Information;
 - (ii) the information is as of the date of this Project Agreement, or becomes at any time thereafter, generally available to or accessible by the public through no fault or wrongdoing of the Confidant;
 - (iii) the information is a matter of public record or in the public domain;
 - (iv) the information was in the possession of the Confidant prior to its disclosure and the Confidant came into possession of such information without being in breach of this Project Agreement;
 - (v) the information is received by the Confidant on a non-confidential basis from a source other than the Proprietor, provided that to the best of the Confidant’s knowledge such source is not bound by a confidentiality agreement with the Proprietor or otherwise prohibited from disclosing the information to the Confidant by a contractual, legal or fiduciary obligation;
 - (vi) the information was independently developed by the Confidant without access to the Confidential Information, as evidenced by written records;
 - (vii) the information is required to be disclosed pursuant to Applicable Law, provided that the Confidant provides the Proprietor with reasonable notification and an opportunity to contest such requirement prior to disclosure;
 - (viii) the information is disclosed to the City upon a termination of this Project Agreement, pursuant to Section 38 or is otherwise required by the City for the purposes of performing (or having performed) the Works, including the design or construction of the New City Infrastructure, or any other operations or services the same as, or similar to, the Works; or
 - (ix) the information would not be exempt from disclosure under FIPPA.

42.7 Survival of Confidentiality

- (a) The obligations in Section 42.1 to Section 42.6 will cease on the date that is three years after the Termination Date and accordingly shall survive the termination of the Project Agreement.

42.8 Confidentiality of Intellectual Property

- (a) Nothing in this Section 42 shall prevent the City from exercising any right granted to the City pursuant to Schedule 24 – Intellectual Property. The City shall have the right to disclose Confidential Information of DB Co Parties when exercising the rights granted pursuant to Schedule 24 – Intellectual Property in accordance therewith.

43. PERSONAL INFORMATION

43.1 General

- (a) DB Co acknowledges the importance of maintaining the confidentiality and privacy of Personal Information.
- (b) DB Co shall, and shall require each DB Co Party to, only collect, hold, process, use, store and disclose Personal Information with the prior consent of the City and: (i) shall not collect, hold, process, use or store Personal Information except to the extent necessary to perform DB Co's obligations under this Project Agreement; and (ii) shall not disclose Personal Information or otherwise permit access to or make Personal Information available to any person except as expressly permitted or instructed by the City.
- (c) DB Co shall, and shall require each DB Co Party to, at all times treat Personal Information as strictly confidential and shall comply with all applicable requirements of the Output Specifications and the requirements of Applicable Law, including *FIPPA*, the *Personal Information Protection and Electronic Documents Act* (Canada), and any other Canadian federal or provincial legislation now in force or that may in the future come into force governing the collection, use, disclosure and protection of personal information applicable to DB Co, each DB Co Party or to the Works.
- (d) DB Co shall take all necessary and appropriate action, and shall require each DB Co Party to take all necessary and appropriate action, against any person who fails to comply with this Section 43.1.
- (e) DB Co shall allow the City on reasonable Notice to inspect any Personal Information in the custody or possession of DB Co or a DB Co Party and to audit DB Co and each DB Co Party's compliance with this Section 43 including the measures used by DB Co and each DB Co Party to protect Personal Information, and otherwise promptly and properly respond to all reasonable inquiries of the City with respect to DB Co or each DB Co Party's handling of Personal Information.
- (f) DB Co shall not subcontract or delegate to any third party any of the Works that involve or may involve the collection, use, storage, processing or any other handling of Personal Information without the express consent of the City and without obtaining written contractual commitments of such third party substantially the same as those of this Section 43.

43.2 Protection of Personal Information

- (a) DB Co shall implement and use, and shall require each DB Co Party to implement and use, appropriate technical, organizational and physical security measures to protect Personal Information against loss, theft and unauthorized access, disclosure, copying, use, modification or disposal, and shall otherwise ensure that DB Co, the DB Co Parties, and its and their staff shall protect, secure and keep confidential any Personal Information.
- (b) DB Co shall and shall cause each DB Co Party to restrict access to Personal Information to only those authorized employees and permitted DB Co Parties that require access to such Personal Information to fulfil their job requirements in connection with the Works and that are subject to obligations of confidentiality and Personal Information protection no less stringent than those of this Section 43.
- (c) Upon termination of this Project Agreement or upon request of the City, whichever comes first, DB Co shall immediately cease all use of and return to the City or, at the direction of the City, dispose of, destroy or render permanently anonymous all Personal Information, in each case using appropriate technical, organizational and physical security measures to protect Personal Information against loss, theft and unauthorized access, disclosure, copying, use or modification.
- (d) To the extent that any of the Works involve or may involve destruction or disposal of Personal Information, including any disposal or destruction pursuant to Section 43.2(c), such activities shall include, at a minimum, irreversible destruction, shredding or pulverizing of all documents, records or media containing Personal Information to a size or state that ensures that the document, record or other medium is permanently destroyed and that no information contained therein can be read, reconstructed or deciphered.
- (e) DB Co shall immediately inform the City of any actual or suspected loss, theft or accidental or unauthorized access, disclosure, copying, use, modification or destruction of Personal Information by DB Co or any DB Co Party or any other breach of this Section 43.
- (f) The City may from time to time require that DB Co and any DB Co Party or member of its or their staff execute and deliver within two Business Days after such request an agreement satisfactory to the City, acting reasonably, requiring such person to keep Personal Information confidential.

43.3 Personal Information

- (a) DB Co shall provide, and shall cause each DB Co Party to provide, in a timely manner, all necessary and reasonable information and co-operation to the City and to any regulatory or other governmental bodies or authorities with jurisdiction or oversight over Applicable Law governing the collection, use, disclosure and protection of personal information in connection with any investigations, audits or inquiries made by any such bodies or authorities under such legislation.
- (b) To the extent of any conflict or inconsistency between this Section 43 and any other provision of the Project Agreement, this Section 43 shall prevail.
- (c) The obligations in this Section 43.3 shall survive the termination of this Project Agreement.

44. INSURANCE AND PERFORMANCE SECURITY

44.1 General Requirements

- (a) DB Co and the City shall comply with the provisions of Schedule 25 – Insurance and Performance Security Requirements.

44.2 No Relief from Liabilities and Obligations

- (a) Neither compliance nor failure to comply with the insurance provisions of this Project Agreement shall relieve DB Co or the City of their respective liabilities and obligations under this Project Agreement.

44.3 Performance Guarantee of Construction Guarantor

- (a) At all times during the Project Term and, in respect of the provisions described in Section 39.9, following the Project Term, DB Co shall ensure that a valid and binding Performance Guarantee of the Construction Guarantor in favour of DB Co and the City from the Construction Guarantor (or a party of comparable financial strength, capacity and stability, as determined by the City acting in its sole discretion) of the obligations of the Construction Contractor under the Design and Construction Contract and in the form of guarantee attached as Schedule 29 – Form of Performance Guarantee of Construction Guarantor, is in place and enforceable by the City. The Performance Guarantee of the Construction Guarantor will be delivered to, and held by, the Account Trustee.

45. TITLE

45.1 Title

- (a) Title to each item and part of the New City Infrastructure or the New MTO Infrastructure, including any materials, supplies, equipment, facilities, parts and any other deliverable or component items, but not the risk of loss or damage or destruction thereto or thereof, shall pass to the City (or as the City may direct) upon the receipt of such item on the Lands, provided however that title to items of tangible personal property (personal property that can be seen, weighed, measured, felt or touched or that is in any way perceptible to the senses and includes computer programs, natural gas and manufactured gas) that comprise the New City Infrastructure and the New MTO Infrastructure or are to be affixed or attached to the New City Infrastructure and the New MTO Infrastructure prior to Substantial Completion shall pass to the City (or as the City may direct) at the time that such items are included in the New City Infrastructure and the New MTO Infrastructure or are to be affixed or attached to the New City Infrastructure and the New MTO Infrastructure.

46. INDEMNITIES

46.1 DB Co Indemnities to the City

- (a) DB Co shall indemnify and save harmless the City and its directors, officers, employees, agents and representatives and, in respect of (iii) and (iv) below, City Parties and each of their respective directors, officers, employees, agents and representatives, from and against any and all Direct

Losses which may be suffered, sustained, incurred or brought against them as a result of, in respect of, or arising out of any one or more of the following:

- (i) [Intentionally Deleted]
- (ii) a failure by DB Co to achieve,
 - (A) East Substantial Completion by the East Scheduled Substantial Completion Date; or
 - (B) West Substantial Completion by the West Scheduled Substantial Completion Date;
- (iii) any physical loss of or damage to all or any part of the Lands, lands that are adjacent to the Lands (but that are not Lands), the New City Infrastructure, the New MTO Infrastructure, the Existing Infrastructure, the Stage 1 Connection Infrastructure, the RTG Works, or to any equipment, assets or other property related thereto;
- (iv) the death or personal injury of any person;
- (v) any physical loss of or damage to property or assets of any third party, including, for clarity, any physical loss of or damage to Existing Infrastructure, or New MTO Infrastructure;
- (vi) any other loss or damage of any third party;
- (vii) Injurious Affection claims made by third parties,

in the case of Sections 46.1(a)(ii) to 46.1(a)(vi), arising, directly or indirectly, out of, or in consequence of, or involving or relating to, the performance or any breach of this Project Agreement by DB Co or any act or omission of DB Co or any DB Co Party, and in the case of Section 46.1(a)(vii), arising, directly or indirectly, out of, or in consequence of, or involving or relating to, any breach of this Project Agreement by DB Co or any DB Co Party, except to the extent caused, or contributed to, by:
 - (viii) the breach of this Project Agreement by the City; or
 - (ix) in respect of Section 46.1(a)(ii), any deliberate or negligent act or omission of the City, any City Party or, to the extent related to Highway Works, MTO; or
 - (x) in respect of Sections 46.1(a)(iii), 46.1(a)(iv), 46.1(a)(v), 46.1(a)(vi) or 46.1(a)(vii), any act or omission of the City, any City Party or, to the extent related to Highway Works, MTO.
- (b) DB Co shall indemnify and save harmless the City and its directors, officers, employees, agents and representatives from and against any and all Direct Losses which may be suffered, sustained, incurred or brought against them as a result of, in respect of, or arising out of any breach of a representation or warranty by DB Co set out in Section 6.1.

- (c) DB Co shall indemnify and save harmless the City and its directors, officers, employees, agents and representatives from and against any and all Direct Losses which may be suffered, sustained, incurred or brought against them as a result of, in respect of, arising out of, or involving or relating to any one or more of the following:
- (i) the performance by DB Co of this Project Agreement not in accordance with or in breach of the requirements of any Permits, Licences, Approvals and Agreements, Applicable Law or requirements of Governmental Authorities, or the failure of DB Co to obtain all necessary DB Co Permits, Licences, Approvals and Agreements in accordance with this Project Agreement;
 - (ii) any Contamination for which DB Co is responsible pursuant to Sections 18.2(a) or 18.2(b); or
 - (iii) the provision of assistance by the City to DB Co pursuant to Section 11.13(d),
- except to the extent that such Direct Losses are caused, or contributed to, by the breach of this Project Agreement by the City or by any act or omission of the City, any City Party or, to the extent related to Highway Works, MTO.
- (d) Without prejudice to the City's rights under Section 36 and any other rights under this Project Agreement, if the City exercises its step-in rights under the Construction Contractor's Direct Agreement, DB Co shall indemnify the City for all obligations of DB Co assumed by the City under the Design and Construction Contract, as the case may be, and for all reasonable costs and expenses incurred by the City in relation to the exercise of the City's rights.
- (e) DB Co shall indemnify the City for damages suffered or incurred on account of (i) any payment not duly made by DB Co pursuant to the terms of this Project Agreement on the due date; (ii) any overpayment to or underpayment by DB Co; or (iii) an amount determined as payable by DB Co to the City under Schedule 27 – Dispute Resolution Procedure, by payment of an amount equal to the Payment Compensation Amount calculated from day to day at a rate per annum from the day after the date on which payment was due, the day on which overpayment was made by the City, or from the date identified (if any) applicable to an amount determined as payable by DB Co to the City under Schedule 27 – Dispute Resolution Procedure, up to and including the date of payment.
- (f) DB Co shall defend, in accordance with the procedures of Section 46.3, and indemnify and save harmless the City, the City Parties, and any Governmental Authorities and each of their respective directors, officers, employees, agents and representatives from and against any and all Direct Losses which may be suffered, sustained, incurred or brought against them as a result of, in respect of, or arising out of any one or more of the following:
- (i) any breach of Section 41.3;
 - (ii) any claim, suit, action or proceeding by a person alleging that (x) any Intellectual Property licensed or assigned to and used by the City, any City Party, RTG, any RTG Party, or any Governmental Authority pursuant to this Project Agreement; or (y) any Intellectual Property or other materials used by DB Co or any DB Co Party or any Subcontractor in the performance of the Works and the Project, infringes or

misappropriates any Intellectual Property rights of that person, other than where such claim, suit, action or proceeding is directly caused by,

- (A) the use of such Intellectual Property by the City not in accordance with this Project Agreement or the applicable Technical Information; or
 - (B) the use of such Intellectual Property by the City in combination with other products, software or equipment not supplied by or on behalf of DB Co or the Subcontractors and not authorized by any of them;
- (iii) any claim, suit, action or proceeding arising out of the alleged infringement or misappropriation of any rights in or to any Project Data or Intellectual Property Rights or the use thereof by any City Party, RTG, any RTG Party, or any Governmental Authority or due to the use of any materials, machinery or equipment in connection with the Works infringes any rights in or to any Intellectual Property of a third party unless such infringement has arisen out of the use of any Project Data or Intellectual Property Rights by the relevant City Party, RTG, any RTG Party, otherwise than in accordance with the terms of this Project Agreement or the applicable Technical Information; and
- (iv) any claim, suit, action or proceeding by any Licensor alleging that DB Co or any DB Co Party or any Subcontractor has used any City Supplied Third Party Intellectual Property in breach of Sections 3.1(a)(ii), 3.1(b), 3.1(c) or 3.1(d) of Schedule 24 – Intellectual Property.
- (g) Without limiting and in addition to the obligations in Section 46.1(f), if, as a result of a claim under Section 46.1(f)(i) or Section 46.1(f)(ii), all or any part of any Intellectual Property licensed or assigned to and used by the City pursuant to this Project Agreement; or any Intellectual Property or other materials used by DB Co or any Subcontractor in the performance of the Works and the Project (any or all of the foregoing the “**Infringing Material**”) becomes, or in DB Co’s opinion is likely to be, enjoined from use, DB Co will:
 - (i) give Notice to the City of the same; and
 - (ii) at its sole option and expense, either:
 - (A) procure for itself and the City, to the extent required, the right to continue to use the infringing element or component of the Infringing Material as contemplated in this Project Agreement; or
 - (B) modify the infringing element or component of the Infringing Material so that it is non-infringing without materially affecting the quality, performance and functionality of such infringing element or component, or replace the infringing element or component with a substitute of materially equivalent quality, performance and functionality.

46.2 City Indemnities to DB Co

- (a) The City shall indemnify and save harmless DB Co and the DB Co Parties and each of their respective directors, officers, employees, agents and representatives from and against any and all

Direct Losses which may be suffered, sustained, incurred or brought against them as a result of, in respect of, or arising out of any one or more of the following:

- (i) the death or personal injury of any person arising, directly or indirectly, out of, or in consequence of, or involving or relating to, the performance or breach of this Project Agreement by the City or any act or omission of any City Party, except to the extent caused, or contributed to, by the breach of this Project Agreement by DB Co or by any act or omission of DB Co or any DB Co Party;
- (ii) any physical loss of or damage to all or any part of any property or assets of DB Co or any DB Co Party, arising, directly or indirectly, out of, or in consequence of, or involving or relating to, breach of this Project Agreement by the City or any deliberate or negligent act or omission of any City Party, except to the extent caused, or contributed to, by the breach of this Project Agreement by DB Co or by any act or omission of DB Co or any DB Co Party;
- (iii) any physical loss of or damage to property or assets of any third party, or any other loss or damage of any third party, arising, directly or indirectly, out of, or in consequence of, or involving or relating to, breach of this Project Agreement by the City or any deliberate or negligent act or omission of any City Party, except to the extent caused, or contributed to, by the breach of this Project Agreement by DB Co or by any act or omission of DB Co or any DB Co Party; and
- (iv) Contamination for which the City is responsible pursuant to Section 18.2(c),

provided that there shall be excluded from the indemnity given by the City any liability for the occurrence of risks against which DB Co is required to insure under this Project Agreement to the extent of the proceeds available or that should have been available but for a failure by DB Co to comply with its obligations to properly insure under this Project Agreement.

- (b) The City shall indemnify and save harmless DB Co and its directors, officers, employees, agents and representatives from and against any and all Direct Losses which may be suffered, sustained, incurred or brought against them as a result of, in respect of, or arising out of any breach of a representation or warranty by the City set out in Section 6.2(a).
- (c) The City shall indemnify DB Co for damages suffered or incurred on account of (i) any payment not duly made by the City pursuant to the terms of this Project Agreement on the due date; (ii) any overpayment to or underpayment by the City; or (iii) an amount determined as payable by the City to DB Co under Schedule 27 – Dispute Resolution Procedure, by payment of an amount equal to the Payment Compensation Amount calculated from day to day at a rate per annum from the day after the date on which payment was due, the day on which overpayment was made by DB Co, or from the date identified (if any) applicable to an amount determined as payable by the City to DB Co under Schedule 27 – Dispute Resolution Procedure, up to and including the date of payment.

46.3 Conduct of Claims

- (a) This Section 46.3 shall apply to the conduct of claims, made by a third person against a Party having, or claiming to have, the benefit of an indemnity pursuant to this Project Agreement. The

Party having, or claiming to have, the benefit of the indemnity is referred to as the “**Beneficiary**” and the Party giving the indemnity is referred to as the “**Indemnifier**”.

- (b) If the Beneficiary receives any Notice, demand, letter or other document concerning any claim for which it appears that the Beneficiary is, or may become entitled to, indemnification under this Section 46, the Beneficiary shall give written Notice to the Indemnifier as soon as reasonably practicable and in any event within 10 Business Days after receipt of the same. Such Notice shall specify with reasonable particularity, to the extent that information is available, the factual basis for the claim and the amount of the claim.
- (c) Subject to Sections 46.3(d), 46.3(e) and 46.3(f), on the giving of such Notice by the Beneficiary, where it appears that the Beneficiary is or may be entitled to indemnification from the Indemnifier in respect of all, but not part only, of the liability arising out of the claim, the Indemnifier shall (subject to providing the Beneficiary with a secured indemnity to the Beneficiary’s reasonable satisfaction against all costs and expenses that the Beneficiary may incur by reason of such action) be entitled to dispute the claim in the name of the Beneficiary at the Indemnifier’s own expense and take conduct of any defence, dispute, compromise, or appeal of the claim and of any incidental negotiations. The Beneficiary shall give the Indemnifier all reasonable cooperation, access and assistance for the purposes of considering and resisting such claim. The Beneficiary shall have the right to employ separate counsel in respect of such claim and the reasonable fees and expenses of such counsel shall be to the account of the Indemnifier only where representation of both the Indemnifier and Beneficiary by common counsel would be inappropriate due to any actual or potential conflicting interests between the Indemnifier and Beneficiary.
- (d) With respect to any claim conducted by the Indemnifier:
 - (i) the Indemnifier shall keep the Beneficiary fully informed and consult with it about material elements of the conduct of the claim;
 - (ii) the Indemnifier shall not bring the name or reputation of the Beneficiary into disrepute;
 - (iii) the Indemnifier shall not pay, compromise or settle such claims without the prior consent of the Beneficiary, such consent not to be unreasonably withheld or delayed;
 - (iv) the Indemnifier shall not admit liability or fault to any third party without the prior consent of the Beneficiary, such consent not to be unreasonably withheld or delayed; and
 - (v) the Indemnifier shall use commercially reasonable efforts to have the Beneficiary named as a beneficiary under any release given by the persons bringing the claim to which this Section 46.3 relates.
- (e) The Beneficiary shall be free to pay or settle any such claim on such terms as it thinks fit and without prejudice to its rights and remedies under this Project Agreement if:
 - (i) the Indemnifier is not entitled to take conduct of the claim in accordance with Section 46.3(c);
 - (ii) the Indemnifier fails to notify the Beneficiary of its intention to take conduct of the relevant claim as soon as reasonably practicable and in any event within 10 Business

Days following the Indemnifier's receipt of the Notice from the Beneficiary under Section 46.3(b) or notifies the Beneficiary that the Indemnifier does not intend to take conduct of the claim; or

- (iii) the Indemnifier fails to comply in any material respect with Section 46.3(d).
- (f) The Beneficiary shall be free at any time to give Notice to the Indemnifier that the Beneficiary is retaining or taking over, as the case may be, the conduct of any defence, dispute, compromise or appeal of any claim, or of any incidental negotiations, to which Section 46.3(c) applies. For greater certainty, DB Co acknowledges and agrees that where the City is the Beneficiary, the City may retain or take over such conduct in any matter involving Personal Information or any matter involving public policy. On receipt of such Notice the Indemnifier shall promptly take all steps necessary to transfer the conduct of such claim to the Beneficiary, and shall provide to the Beneficiary all relevant documentation and all reasonable cooperation, access and assistance for the purposes of considering and resisting such claim. If the Beneficiary gives any Notice pursuant to this Section 46.3(f), then the Indemnifier shall be released from any liabilities arising under the applicable indemnity hereunder in respect of the applicable claim.
- (g) If the Indemnifier pays to the Beneficiary an amount in respect of an indemnity and the Beneficiary subsequently recovers, whether by payment, discount, credit, saving, relief or other benefit or otherwise, a sum or anything else of value (the "**Recovery Amount**") which is directly referable to the fact, matter, event or circumstances giving rise to the claim under the indemnity, the Beneficiary shall forthwith repay to the Indemnifier whichever is the lesser of:
 - (i) an amount equal to the Recovery Amount less any out-of-pocket costs and expenses properly incurred by the Beneficiary in recovering the same; and
 - (ii) the amount paid to the Beneficiary by the Indemnifier in respect of the claim under the relevant indemnity,

provided that there shall be no obligation on the Beneficiary to pursue any Recovery Amount and that the Indemnifier is repaid only to the extent that the Recovery Amount, aggregated with any sum recovered from the Indemnifier, exceeds the loss sustained by the Beneficiary except, however, that if the Beneficiary elects not to pursue a Recovery Amount, the Indemnifier shall be entitled to require an assignment to it of the right to do so.

- (h) Any person taking any of the steps contemplated by this Section 46.3 shall comply with the requirements of any insurer who may have an obligation to provide an indemnity in respect of any liability arising under this Project Agreement.

46.4 Mitigation – Indemnity Claims

- (a) For greater certainty, Section 53.4 applies to any indemnity given under this Project Agreement and any such indemnity shall not extend to Direct Losses which could have been reduced or avoided by the Beneficiary complying with such Section.

47. LIMITS ON LIABILITY

47.1 Indirect Losses

- (a) Subject to Section 47.1(b) and without prejudice to the Parties' rights in respect of payments provided for herein, the indemnities under this Project Agreement shall not apply and there shall be no right to claim damages for breach of this Project Agreement, in tort or on any other basis whatsoever, to the extent that any loss claimed by either Party is:
- (i) for punitive, exemplary or aggravated damages;
 - (ii) for loss of profits, loss of use, loss of production, loss of business or loss of business opportunity; or
 - (iii) a claim for consequential loss or for indirect loss of any nature suffered or allegedly suffered by either Party,
- (collectively, "**Indirect Losses**").
- (b) With respect to the indemnity in Section 46.1(a)(ii) only, the exceptions for loss of use and loss of production in Section 47.1(a)(ii) and the exceptions in Section 47.1(a)(iii) shall not apply as a result of, or in relation to, the City's loss of use of the New City Infrastructure or a portion thereof, which for the purposes of Section 47.1(a)(ii), shall be Direct Losses.

47.2 No Liability in Tort

- (a) Subject to the indemnities provided herein, the City shall not be liable in tort to DB Co or any DB Co Party, and neither DB Co nor any DB Co Party shall be liable in tort to the City, any City Party or MTO in respect of any negligent act or omission of any such person relating to or in connection with this Project Agreement and no such person shall bring such a claim.

47.3 Sole Remedy

- (a) Nothing in this Project Agreement shall prevent or restrict the right of the City to seek injunctive relief or a decree of specific performance or other discretionary remedies of a court of competent jurisdiction.
- (b) Notwithstanding any other provision of this Project Agreement, and except to the extent recovered under any of the insurances required pursuant to Schedule 25 – Insurance and Performance Security Requirements, neither Party shall be entitled to recover compensation or make a claim under this Project Agreement, or any other agreement in relation to the Project, in respect of any loss that it has incurred (or any failure of the other Party) to the extent that the Party has already been compensated in respect of that loss or failure pursuant to this Project Agreement, or otherwise.
- (c) For clarity, the following shall apply with respect to the remedies and damages set out in the Project Agreement:
- (i) the amounts deducted from the Substantial Completion Payment pursuant to Schedule 34 – Mobility Matters shall be the City's sole remedy with respect to exceedances in Lane

Closures, or Bus Rapid Transit Lane Closures, which exceedances are contemplated in Schedule 34 – Mobility Matters;

- (ii) the liquidated damages paid by DB Co pursuant to Section 25.5 and the indemnity provided in Section 46.1(a)(ii) shall be the sole remedy in respect of the City's mobilization costs and other costs incurred by the City in accordance with of DB Co's failure to achieve East Substantial Completion by the East Scheduled Substantial Completion Date, and West Substantial Completion by the West Scheduled Substantial Completion Date, but, for clarity, shall not limit the City's rights otherwise provided for in Schedule 12 – Works Scheduling Requirements, or herein in connection with a termination pursuant to Section 36.1(a)(ii);
- (iii) the liquidated damages paid by DB Co pursuant to Section 12.4 shall be the sole remedy in respect of failure by DB Co to provide the Key Individuals named in Schedule 9 – Key Individuals immediately after Commercial Close;
- (iv) the right to withhold the East Warranty Cash Amount, the West Warranty Cash Amount and the Remaining Works Cash Amount, in each case, in accordance with Section 4.2, shall be the sole remedy of the City in respect of the failure by DB Co to deliver the East Warranty Letter of Credit, West Warranty Letter of Credit and/or the Remaining Works Letter of Credit, as applicable; and
- (v) the liquidated damages paid by DB Co pursuant to Section 11.17A shall be the City's sole remedy for the costs related to Minor Construction Defect, Medium Construction Defect, Major Construction Defect or Critical Construction Defect, but shall not otherwise diminish DB Co's obligation to perform the Warranty Work nor DB Co's obligations under the Interface Agreement.

47.4 Maximum Liability

- (a) Subject to Section 47.4(b), the maximum aggregate liability of each Party in respect of all claims under Section 46 shall not exceed \$[REDACTED]. This limit shall be index linked and shall be exclusive of any insurance or performance security proceeds received or which will be received pursuant to policies or performance security maintained in accordance with Schedule 25 – Insurance and Performance Security Requirements. This limit shall not apply in cases of wilful misconduct or deliberate acts of wrongdoing. This maximum aggregate liability of DB Co shall be reduced by the amount of any liability of DB Co to RTG that is subject to the aggregate limit of liability under Section 2.4(b) of the Interface Agreement. Notwithstanding the foregoing, the City acknowledges that all liability of DB Co to RTG or the City under the Interface Agreement, whether incurred directly to RTG or indirectly through the City pursuant to Section 1.5(b)(iv), shall be treated as obligations of DB Co to the City for the purpose of the limitation of liability set out in the Performance Guarantee of Construction Contractor. Under no circumstance shall the City be entitled, whether under an indemnity listed in Section 46.1 or Section 1.5(b)(iv), to recover from DB Co any amounts or liability that is in duplication of amounts due and owing by DB Co under the Interface Agreement pursuant to a claim that has been made under the Interface Agreement.
- (b) DB Co's maximum aggregate liability in respect of all claims under Sections 46.1(a)(ii) and 25.5 shall not exceed \$[REDACTED]. This limit shall be index linked and shall be exclusive of any insurance or performance security proceeds received or which will be received pursuant to

policies or performance security maintained in accordance with Schedule 25 – Insurance and Performance Security Requirements. This limit shall not apply in cases of wilful misconduct or deliberate acts of wrongdoing. For certainty, this limit shall be included in the limit of liability under Section 47.4(a).

- (c) Nothing in this Section 47.4 shall restrict, limit, prejudice or in any other way impair the rights and/or remedies of the Parties under any other provision of this Project Agreement.

48. DISPUTE RESOLUTION PROCEDURE

- (a) All Disputes shall be resolved in accordance with, and the Parties shall comply with, Schedule 27 – Dispute Resolution Procedure.

49. ASSIGNMENT, SUBCONTRACTING AND CHANGES IN CONTROL

49.1 DB Co Assignment

- (a) DB Co shall not sell, assign, transfer, charge, mortgage, encumber, dispose of or otherwise alienate all or any part of any interest, whether legal or beneficial, in this Project Agreement or any Ancillary Document without the prior written consent of the City, provided however that no assignment, transfer, charge, disposition or other alienation shall be permitted to a person where that person or its Affiliate is a Restricted Person or a person whose standing or activities may compromise (i) the City's reputation or integrity, or (ii) the nature of the public transit system in the City of Ottawa or the Province of Ontario, so as to affect public confidence in the public transit system in one or more of the City of Ottawa, the Province of Ontario or the Project.
- (b) Section 49.1(a) shall not apply to the grant of any security for any loan made to DB Co under the Lending Agreements provided that any grantee of such security shall enter into the Lenders' Direct Agreement in relation to the exercise of its rights, if the City so requires.

49.2 City Assignment

- (a) The City may assign, transfer, dispose of or otherwise alienate any interest in this Project Agreement or any agreement in connection with this Project Agreement to which DB Co and the City are parties:
 - (i) as may be required to comply with Applicable Law;
 - (ii) in circumstances other than those described in Section 49.2(a)(i) with the prior written consent of DB Co; provided that the person to whom any such assignment, transfer, disposition or other alienation is made has the capacity to perform, and confirms in writing to DB Co that it will perform all the obligations of the City hereunder and under any agreement in connection with this Project Agreement to which DB Co and the City are parties in respect of the period from and after the assignment.
- (b) The City shall not be released of any of its obligations under this Project Agreement except upon an assignment, transfer, disposition or other alienation of their interest in this Project Agreement in accordance with this Section 49.2.

49.3 Subcontracting

- (a) DB Co shall not subcontract any interest in this Project Agreement or the Design and Construction Contract, and shall not permit the Construction Contractor to subcontract any interest in the Design and Construction Contract, to a Restricted Person, or any Affiliate thereof, or a person whose standing or activities may compromise (i) the City's reputation or integrity, or (ii) the nature of the public transit system in the City of Ottawa or the Province of Ontario so as to affect public confidence in the public transit system in one or more of the City of Ottawa, the Province of Ontario or the Project.
- (b) DB Co shall not terminate, agree to the termination of or replace the Construction Contractor unless DB Co has complied with Sections 8.2(a), 49.3(c) and 49.3(d) or received the prior written consent of the City.
- (c) Subject to Section 49.3(d), if the Design and Construction Contract shall at any time lapse, terminate or otherwise cease to be in full force and effect, whether by reason of expiry, default or otherwise, with the effect that the Construction Contractor shall cease to act in relation to the Project, DB Co shall forthwith appoint a replacement, subject to the City's prior written consent, acting reasonably, as to the suitability of the replacement.
- (d) It is a condition of replacement of the Construction Contractor, and DB Co shall require, that any replacement enter into a contract upon the same or substantially similar terms as the person so replaced and into a direct agreement on the same terms as the Construction Contractor's Direct Agreement entered into by the person so replaced, unless any material variations are approved by the City, acting reasonably.

49.4 Changes in Ownership and Control

- (a) No Restricted Person or a person whose standing or activities are inconsistent with the City's reputation or integrity shall be permitted to have at any time or acquire, Direct or Indirect Power or Control over any member of the DB Co Group in relation to the decisions, management, actions or policies of DB Co or in relation to the operation, management and ownership of the Project.
- (b) No Change in Ownership of DB Co, or of any Control Party, shall be permitted:
 - (i) where the person acquiring the ownership interest is a Restricted Person or a person whose standing or activities may compromise (A) the City's reputation or integrity, or (B) the nature of the public transit system in the City of Ottawa or the Province of Ontario so as to affect public confidence in the public transit system in one or more of the City of Ottawa, the Province of Ontario or the Project; or
 - (ii) if such Change in Ownership would have a material adverse effect on the performance of the Works or the Governmental Activities.
- (c) In the event that a person having Direct or Indirect Power or Control over any member of the DB Co Group in relation to the decisions, management, actions or policies of DB Co or in relation to the operation, management and ownership of the Project becomes a Restricted Person, the City may:

- (i) in the case of an individual who becomes a Restricted Person, require that such Restricted Person be divested of his or her Direct or Indirect Power or Control; or
- (ii) in any other circumstance, require a Change in Ownership so that the Restricted Person shall be divested of its Direct or Indirect Power or Control,

in each case, on such terms as are satisfactory to the City, in its discretion.

- (d) DB Co shall provide Notice to the City of any Change in Ownership of DB Co or of any Control Party, as the case may be, that is not a Change in Control within 5 Business Days after such Change in Ownership, and such Notice shall include a statement identifying all persons with an ownership interest in DB Co or the relevant Control Party, as the case may be, and their respective holdings of such ownership interests, in each case prior to and following such Change in Ownership.
- (e) Subject to Sections 49.4(b), 49.4(c) and 49.4(d), no Change in Control of DB Co, or of any Control Party, shall be permitted without the prior written consent of the City.
- (f) DB Co shall provide Notice to the City of any proposed Change in Control of DB Co or of any Control Party, as the case may be, not less than 20 Business Days prior to such proposed Change in Control, and such Notice shall include:
 - (i) a statement identifying all persons with an ownership interest in DB Co or the relevant Control Party, as the case may be, and their respective holdings of such ownership interests in each case prior to and following any such proposed Change in Control; and
 - (ii) as applicable, the legal name, registered address, directors and officers of, and nature of the business and activities carried on by, the person who would acquire control over DB Co or the relevant Control Party pursuant to such Change in Control.

Following the delivery to the City of the Notice referred to in this Section 49.4(f), DB Co shall provide the City with such other information pertaining to the proposed Change in Control as the City may reasonably request.

- (g) Upon request by DB Co and delivery of the information required by the City, the City shall advise DB Co whether the person described in such particulars is a Restricted Person or a person whose standing or activities may compromise (i) the City's reputation or integrity, or (ii) the nature of the public transit system in the City of Ottawa or the Province of Ontario so as to affect public confidence in the public transit system in one or more of the City of Ottawa, the Province of Ontario or the Project.
- (h) Notwithstanding the definition of "Control Parties" set out Schedule 1 – Definitions and Interpretation, this Section 49.4 shall not apply to a Change in Ownership or Change in Control of persons whose equity securities or units evidencing ownership or any other ownership interests are listed on a recognized stock exchange.

49.5 The City's Due Diligence

- (a) DB Co shall promptly reimburse the City for the City's reasonable due diligence costs (including fees of professional advisors) in connection with any consent required of the City pursuant to, or

the City's determination of DB Co's compliance with, Sections 49.1, 49.3 or 49.4, whether or not such consent is granted.

50. PROHIBITED ACTS

50.1 Definition

(a) The term "**Prohibited Act**" means:

- (i) offering, giving or agreeing to give to the City or any public body (or anyone employed by or acting on their behalf), or to any family member of such person, any gift or consideration of any kind as an inducement or reward:
 - (A) for doing or not doing, or for having done or not having done, any act in relation to the obtaining or performance of this Project Agreement or any other agreement with the City or any public body in connection with the Project; or
 - (B) for showing or not showing favour or disfavour to any person in relation to this Project Agreement or any other agreement with the City or any public body in connection with the Project,

provided that this Section 50.1(a)(i) shall not apply to DB Co or any DB Co Party (or anyone employed by or acting on their behalf) providing consideration to the City or any public body in the ordinary course, or as reasonably necessary, to fulfill or comply with the obligations and liabilities of DB Co under this Project Agreement or any other agreement with the City or any public body in connection with the Project;

- (ii) entering into this Project Agreement or any other agreement with the City or any public body in connection with the Project if a commission or a fee has been paid or has been agreed to be paid by DB Co, or on its behalf or to its knowledge, the City or any public body (or anyone employed by or acting on their behalf), or to any family member of such person, unless, before the relevant agreement is entered into, particulars of any such commission or fee have been disclosed in writing to the City, provided that this Section 50.1(a)(ii) shall not apply to a fee or commission paid by DB Co or any DB Co Party (or anyone employed by or acting on their behalf) to the City or any public body pursuant to an agreement where such fee or commission is paid in the ordinary course, or as reasonably necessary, to fulfill or comply with the obligations and liabilities of DB Co under this Project Agreement or any other agreement with the City or any public body in connection with the Project without contravening the intent of this Section 50;
- (iii) breaching or committing any offence under Applicable Law in respect of corrupt or fraudulent acts in relation to this Project Agreement or any other agreement with the City or any public body in connection with the Project; or
- (iv) defrauding or attempting to defraud or conspiring to defraud the City or any other public body.

50.2 Remedies

- (a) If DB Co or any DB Co Party (or anyone employed by or acting on their behalf) commits any Prohibited Act, then the City shall be entitled to act in accordance with the following:
 - (i) if the Prohibited Act is committed by DB Co or by an employee acting under the direction of a director or officer of DB Co, then the City may give written Notice to DB Co and Section 36 shall apply;
 - (ii) if the Prohibited Act is committed by an employee of DB Co acting independently of a direction of a director or officer of DB Co, then the City may give written Notice to DB Co and Section 36 shall apply, unless, within 30 days after receipt of such Notice, DB Co terminates the employee's employment and ensures that the relevant part of the Works shall be performed by another person;
 - (iii) if a Prohibited Act is committed by a DB Co Party or by an employee of that DB Co Party not acting independently of a direction of a director or officer of that DB Co Party, then the City may give written Notice to DB Co and Section 36 shall apply, unless, within 30 days after receipt of such Notice, DB Co terminates the relevant Subcontract and ensures that the relevant part of the Works shall be performed by another person, where relevant, in accordance with Section 49.3;
 - (iv) if the Prohibited Act is committed by an employee of a DB Co Party acting independently of a direction of a director or officer of that DB Co Party, then the City may give Notice to DB Co and Section 36 shall apply, unless, within 30 days after receipt of such Notice, DB Co causes the termination of the employee's employment and ensures that the relevant part of the Works shall be performed by another person; and
 - (v) if the Prohibited Act is committed on behalf of DB Co or a DB Co Party by a person not specified in Sections 50.2(a)(i) to 50.2(a)(iv), then the City may give Notice to DB Co and Section 36 shall apply, unless, within 30 days after receipt of such Notice, DB Co causes the termination of such person's employment or the appointment of their employer and, if necessary, ensures that the relevant part of the Works shall be performed by another person.
- (b) Any Notice of termination under this Section 50.2 shall specify:
 - (i) the nature of the Prohibited Act;
 - (ii) the identity of the person whom the City believes has committed the Prohibited Act; and
 - (iii) the date of termination in accordance with the applicable provisions of this Project Agreement.
- (c) Without prejudice to its other rights or remedies under this Section 50.2, the City shall be entitled to recover from DB Co any Direct Loss sustained in consequence of any breach of this Section 50.

50.3 Permitted Payments

- (a) Nothing contained in this Section 50 shall prevent DB Co or any other person from paying any proper commission, fee or bonus whether to its employees within the agreed terms of their employment or otherwise, and such commission fee or bonus shall not constitute a Prohibited Act.

50.4 Notification

- (a) DB Co shall notify the City of the occurrence and details of any Prohibited Act promptly on DB Co becoming aware of its occurrence.

50.5 Replacement of DB Co Party

- (a) Where DB Co is required to replace any DB Co Party pursuant to this Section 50, the party replacing such DB Co Party shall from the time of the replacement be deemed to be a DB Co Party and the provisions of this Project Agreement shall be construed accordingly.

51. NOTICES

51.1 Notices to Parties

- (a) All notices, requests, demands, instructions, certificates, consents and other communications (each being a “**Notice**”) required or permitted under this Project Agreement shall be in writing (whether or not “written notice” or “notice in writing” is specifically required by the applicable provision of this Project Agreement) and served by sending the same by registered mail, email, facsimile or by hand, as follows:

If to DB Co:

East West Connectors GP
[REDACTED]

Attn.: [REDACTED]
Email: [REDACTED]

with a copy to:

[REDACTED]

Attn.: [REDACTED]
Email: [REDACTED]

If to the City:

City of Ottawa
110 Laurier Ave West
Ottawa, Ontario K1P 1J1
Mail code: [REDACTED]

Attn.: [REDACTED]

With an electronic copy, for information purposes only, to: [REDACTED]

51.2 Notices to Representatives

- (a) In addition to the notice requirements set out in Section 51.1, where any Notice is to be provided or submitted to the City Representative or the DB Co Representative it shall be provided or submitted by sending the same by registered mail, email, facsimile or by hand, as follows:

If to the DB Co Representative:

[REDACTED]

Attn.: **[REDACTED]**

Email: **[REDACTED]**

If to the City Representative:

City of Ottawa

110 Laurier Ave West

Ottawa, Ontario K1P 1J1

Mail code: **[REDACTED]**

Attn.: **[REDACTED]**

With an electronic copy, for information purposes only, to: **[REDACTED]**

51.3 Facsimile and Email

- (a) Where any Notice is provided or submitted to a Party via facsimile or email, an original of the Notice sent via facsimile or email shall promptly be sent by regular mail, registered mail or hand delivered. For greater certainty, a Notice given via facsimile or email shall not be invalid by reason only of a Party's failure to comply with this Section 51.3.

51.4 Change of Address

- (a) Either Party to this Project Agreement may, from time to time, change any of its contact information set forth in Sections 51.1 or 51.2 by prior Notice to the other Party, and such change shall be effective on the Business Day that next follows the recipient Party's receipt of such Notice unless a later effective date is given in such Notice.

51.5 Deemed Receipt of Notices

- (a) Subject to Sections 51.5(b), 51.5(c) and 51.5(d):
- (i) a Notice given by registered mail shall be deemed to have been received on the third Business Day after mailing;
 - (ii) a Notice given by hand delivery shall be deemed to have been received on the day it is delivered;
 - (iii) a Notice given by facsimile shall be deemed to have been received on the day it is transmitted by facsimile; and

- (iv) a Notice given by email shall be deemed to have been received on the day it is transmitted by email.
- (b) If the Party giving the Notice knows or ought reasonably to know of difficulties with the postal system which might affect negatively the delivery of mail, any such Notice shall not be mailed but shall be made or given by personal delivery or by facsimile transmission in accordance with this Section 51.
- (c) If any Notice delivered by hand, email, or transmitted by facsimile is so delivered or transmitted, as the case may be, either on a day that is not a Business Day or on a Business Day after 4:00 p.m. (recipient's local time), then such Notice shall be deemed to have been received by such recipient on the next Business Day.
- (d) A Notice given by facsimile shall be deemed to have been received by the recipient on the day it is transmitted only if a facsimile transmission report (maintained by the sender) indicates that the transmission of such Notice was successful.
- (e) A Notice given by email shall be deemed to have been received by the recipient on the day it is transmitted only if the sender's email "Sent" folder indicated that the transmission of such Notice was delivered.
- (f) In addition to the above methods of delivery for a Notice, each Notice shall be delivered via the secure document-sharing site approved by the City.

51.6 Service on the City

- (a) Where any Notice is required to be served on the City, the obligation to serve such Notice shall be fulfilled by serving it on the City in accordance with the provisions of this Section 51.

52. EMERGENCY MATTERS

52.1 Emergency

- (a) From Financial Close until the last Substantial Completion Date, upon the occurrence of an Emergency, DB Co shall comply with the Construction Safety Management Plan.
- (b) From and after each Substantial Completion Date, upon the occurrence of an Emergency, DB Co shall comply with its Construction Safety Management Plan in accordance with the Output Specifications.
- (c) If, in respect of any Emergency, the City notifies DB Co that it requires compliance with any additional or overriding procedures as may be determined by the City or any other statutory body, then DB Co shall, subject to Schedule 22 – Variation Procedure (if compliance with such procedures constitutes a Variation), comply with such procedures (whether such procedures are specific to the particular Emergency or of general application and on the basis that such procedures shall take precedence to the extent that they overlap with the procedures mentioned in Sections 52.1(a) or 52.1(b)).

53. GENERAL

53.1 Amendments

- (a) This Project Agreement may not be varied, amended or supplemented except by an agreement in writing signed by duly authorized representatives of the Parties and stating on its face that it is intended to be an amendment, restatement or other modification, as the case may be, to this Project Agreement.

53.2 Waiver

- (a) No waiver made or given by a Party under or in connection with this Project Agreement shall be binding or effective unless the waiver is in writing, signed by an authorized representative of the Party giving such waiver, and delivered by such Party to the other Parties. No waiver made with respect to any right, power or remedy in one instance will be deemed to be a waiver with respect to any other instance involving the exercise of such right, power, or remedy or with respect to any other right, power, or remedy.
- (b) Failure by either Party to exercise any of its rights, powers or remedies hereunder or its delay to do so shall not constitute a waiver of those rights, powers or remedies. The single or partial exercise of a right, power or remedy shall not prevent its subsequent exercise or the exercise of any other right, power or remedy.

53.3 Relationship Between the Parties

- (a) The Parties are independent contractors. This Project Agreement is not intended to and does not create or establish between the Parties, or between the City and any DB Co Party, any relationship as partners, joint venturers, employer and employee, master and servant, or (except as provided in this Project Agreement), of principal and agent, and does not create or establish any relationship whatsoever between the City and any representative or employee of DB Co or the DB Co Parties.
- (b) The Parties further agree that:
 - (i) except as expressly provided in this Project Agreement, neither Party shall be, or be deemed to be, an agent of the other Party, and neither Party shall have authority hereunder to represent that it is an agent of the other Party, or to accept any order, or enter into any contract or agreement, or make any representations or warranties of any kind to any person, or to assume or create any obligation, express or deemed, on behalf of or binding, or purportedly binding upon, the other Party;
 - (ii) neither Party shall be required to make or pay employment benefits, contributions for Employment Insurance, Canada Pension Plan, Workers' Compensation Board or other similar levies with respect to any persons employed or engaged by the other Party;
 - (iii) except as otherwise expressly provided in this Project Agreement, each Party shall be free from the control of the other Party as to the manner in which it shall perform its obligations, or cause same to be performed, under this Project Agreement; and

- (iv) any person which a Party may engage as an agent, employee, subcontractor or otherwise, to perform such Party's obligations under this Project Agreement, as permitted hereby, shall, unless the Parties otherwise agree in writing, be engaged by such Party to act solely on behalf of such Party, and such person shall not act, or be deemed to act, on behalf of the Party that did not engage its services.

53.4 General Duty to Mitigate

- (a) The City and DB Co shall at all times take commercially reasonable steps to minimize and mitigate any loss for which the relevant Party is entitled to bring a claim against the other Party pursuant to this Project Agreement.

53.5 Actual Knowledge

- (a) Except where limited to actual knowledge and/or such knowledge which they, at law, may from time to time, be deemed to have, DB Co and the City shall, for all purposes of this Project Agreement, be deemed to have such knowledge in respect of the Project as is actually held (or ought reasonably to be held) by the directors, officers and senior management of DB Co and in the case of the City, its directors, officers and senior management, and the City Representative or the DB Co Representative, as applicable. For clarity, except as expressly set out to the contrary, a reference in this Project Agreement to the "knowledge" of DB Co or of the City shall be construed in a manner consistent with the foregoing sentence.

53.6 Entire Agreement

- (a) Except where provided otherwise in this Project Agreement, this Project Agreement constitutes the entire agreement between the Parties in connection with its subject matter and supersedes all prior representations, communications, negotiations and understandings, whether oral, written, express or implied, concerning the subject matter of this Project Agreement.

53.7 No Reliance

- (a) Each of the Parties acknowledge that:
 - (i) it has not entered into this Project Agreement on the basis of and does not rely, and has not relied, upon any statement or representation, whether negligent or innocent, or warranty or other provision, whether oral, written, express or implied, made or agreed to by any person, whether a Party to this Project Agreement or not, except those expressly made, given or repeated in this Project Agreement and the only remedy or remedies available in respect of any misrepresentation or untrue statement made to it shall be those expressly provided for in this Project Agreement; and
 - (ii) this Section 53.7 shall not apply to any statement, representation or warranty made fraudulently, or to any provision of this Project Agreement which was induced by fraud, for which the remedies available shall be all those available under the law governing this Project Agreement.

53.8 Severability

- (a) Each provision of this Project Agreement shall be valid and enforceable to the fullest extent permitted by law. If any provision of this Project Agreement is declared invalid, unenforceable or illegal by the courts of a competent jurisdiction, such provision may be severed and such invalidity, unenforceability or illegality shall not prejudice or affect the validity, enforceability and legality of the remaining provisions of this Project Agreement. If any such provision of this Project Agreement is invalid, unenforceable or illegal, the Parties shall, acting in good faith, promptly negotiate new provisions to eliminate such invalidity, unenforceability or illegality and to restore this Project Agreement as near as possible to its original intent and effect.

53.9 Enurement

- (a) This Project Agreement and any other agreement entered into in connection with the Project to which both the City and DB Co are parties shall enure to the benefit of, and be binding on, the City and DB Co and their respective successors and permitted transferees and assigns.

53.10 Governing Law and Jurisdiction

- (a) This Project Agreement, and each of the documents contemplated by or delivered under or in connection with this Project Agreement, shall be governed by and construed in accordance with the laws of Ontario and the laws of Canada applicable therein and shall be treated in all respects as an Ontario contract, without regard to conflict of laws principles.
- (b) Subject to Schedule 27 – Dispute Resolution Procedure, both Parties hereby irrevocably attorn to the exclusive jurisdiction of the courts of the Province of Ontario and all courts competent to hear appeals therefrom.
- (c) Nothing in this Project Agreement affects the rights, protections and immunities of the Crown under the *Proceedings Against the Crown Act* (Ontario).

53.11 Cumulative Remedies

- (a) Except as otherwise set forth in this Project Agreement, the rights, powers and remedies of each Party set forth in this Project Agreement are cumulative and are in addition to and without prejudice to any other right, power or remedy that may be available to such Party under this Project Agreement.

53.12 Further Assurance

- (a) Each Party shall do all things, from time to time, and execute all further documents necessary to give full effect to this Project Agreement.

53.13 Costs

- (a) Each Party shall be responsible for paying its own costs and expenses incurred in connection with the negotiation, preparation and execution and delivery of this Project Agreement.

53.14 Language of Agreement

- (a) Each of the parties acknowledges having requested and being satisfied that this Project Agreement and related documents be drawn in English. Chacune des parties reconnaît avoir demandé que ce document et ses annexes soient rédigés en anglais et s'en déclare satisfaite.
- (b) For greater certainty, all correspondence, Notices, drawings, test reports, certificates, specifications, information, operation and maintenance instructions, name plates, identification labels, instructions and notices to the public and staff and all other written, printed or electronically readable matter required in accordance with, or for purposes envisaged by, this Project Agreement shall be in English

53.15 Proof of Authority

- (a) The City and DB Co each reserve the right to require any person executing this Project Agreement on behalf of the other Party to provide proof, in a form acceptable to the City or DB Co, as applicable, that they have the requisite authority to execute this Project Agreement on behalf of and to bind the City or DB Co, as applicable.

53.16 Counterparts

- (a) This Project Agreement may be executed in one or more counterparts. Any single counterpart or a set of counterparts executed, in either case, by all the Parties shall constitute a full, original and binding agreement for all purposes. Counterparts may be executed either in original or faxed form provided that any Party providing its signature in faxed form shall promptly forward to the other Party an original signed copy of this Project Agreement which was so faxed.

53.17 Time is of the Essence

- (a) Time is of the essence in this Project Agreement.

[SIGNATURE PAGES IMMEDIATELY FOLLOW]

IN WITNESS WHEREOF the Parties have executed this Project Agreement as of the date first above written.

THE CITY OF OTTAWA

Per:

Name: [REDACTED]

Title: [REDACTED]

I have authority to bind the corporation.

EAST WEST CONNECTORS GP

Per: _____

Name: [REDACTED]

Title: [REDACTED]

Per: _____

Name: [REDACTED]

Title: [REDACTED]

I/We have authority to bind the corporation.

SCHEDULE 1

DEFINITIONS AND INTERPRETATION

1. **Definitions.** In the Project Agreement, unless the context otherwise requires:
 - 1.1 “**Account Trustee**” has the meaning given in Schedule 30 - Insurance Trust Agreement.
 - 1.2 “**Activity**” or “**Activity Id**” shall mean an element of the Works performed during the course of the Project. An Activity has an expected duration and cost requirements, and shall be the lowest level of any Works Schedule.
 - 1.3 “**Additional Contractor**” means any independent contractor (not being, for the avoidance of doubt, any of the Third Party Contractors, DB Co or any DB Co Party, or RTG or any RTG Party) or the City’s own forces, engaged by the City to carry out the Additional Works.
 - 1.4 “**Additional Works**” means those works or services, in relation to any of the New City Infrastructure, New MTO Infrastructure, or any Existing Infrastructure owned by the City or MTO, which are not Works and which are to be carried out by an Additional Contractor, including works or services to be performed either before or after Substantial Completion.
 - 1.5 “**Adjacent Developments**” means any development works or like activity carried out during the Project Term by or on behalf of any third party adjacent to the Lands, New City Infrastructure or New MTO Infrastructure and which otherwise affects or may potentially affect any part of the Works, the Lands or the New City Infrastructure or New MTO Infrastructure.
 - 1.6 “**Adjudicator**” has the meaning given in Section 6.1 of Schedule 27 – Dispute Resolution Procedure.
 - 1.7 “**Affiliate**” means an “**affiliate**” as that term is used in the *Business Corporations Act* (Ontario) and any successor legislation thereto, and, in the case of DB Co, shall include each of the unitholders, shareholders, partners or owners of DB Co, as applicable, and any person or entity controlling, controlled by or under common control with DB Co where “control” of any person or entity shall mean the ownership, directly or indirectly, of securities of such person or entity having the power to elect a majority of directors or similar authority or to otherwise control the decisions made on behalf of such person or entity.
 - 1.8 “**Aggregate Actual Bus Rapid Transit Lane Closures**” has the meaning given in Schedule 34 – Mobility Matters.
 - 1.9 “**Aggregate Actual Bus Rapid Transit Lane Closures Cost**” has the meaning given in Schedule 34 – Mobility Matters.
 - 1.10 “**Aggregate Actual Lane Closures**” has the meaning given in Schedule 34 – Mobility Matters.
 - 1.11 “**Aggregate Actual Lane Closures Cost**” has the meaning given in Schedule 34 – Mobility Matters.
 - 1.1 “**Aggregate Vehicle Kilometres Availability Ratio**” for any period *n* means the total Revenue Service Vehicle Kilometres in period *n* plus the number of Scheduled Revenue Service Vehicle Kilometres which were “missed” or not achieved during period *n* due to causes or factors other

than a Construction Defect, divided by the total Scheduled Revenue Service Vehicle Kilometres for period n . For clarity, the formula is provided below:

$$AVKR_n = \frac{Rkm_n + NPCCKm_n}{Sk m_n}$$

Where:

- $AVKR_n$ Means the Aggregate Vehicle Kilometres Availability Ratio for the relevant period n ;
- Rkm_n Means the total amount of Revenue Service Vehicle Kilometres for period n ;
- $NPCCKm_n$ Means the number of Scheduled Revenue Service Vehicle Kilometres which were “missed” or not achieved during period n due to causes or factors other than a Construction Defect; and
- $Sk m_n$ Means the total Scheduled Revenue Service Vehicle Kilometres for period n .

- 1.12 “**Ancillary Documents**” means the Design and Construction Contract.
- 1.13 “**Anticipated Final Completion Date**” means either the East Anticipated Final Completion Date or West Anticipated Final Completion Date.
- 1.14 “**Anticipated Substantial Completion Date**” means either the East Anticipated Substantial Completion Date or West Anticipated Substantial Completion Date.
- 1.15 “**Applicable Law**” means:
- (a) any statute or proclamation or any delegated or subordinate legislation including regulations and by-laws;
 - (b) any Authority Requirement; and
 - (c) any judgment of a relevant court of law, board, arbitrator or administrative agency which is a binding precedent in the Province of Ontario,
- in each case, in force in the Province of Ontario, or otherwise binding on DB Co, any DB Co Party, the City, or any City Party.
- 1.16 “**Appointed Representative**” has the meaning given in Schedule 4 – Lenders’ Direct Agreement.
- 1.17 “**Appointed Representative Notice**” has the meaning given in Schedule 4 – Lenders’ Direct Agreement.
- 1.18 “**Apprenticeship Plan**” has the meaning given in Section 11.23(a) of the Project Agreement.
- 1.19 “**Archaeological Reports**” means, collectively, the following reports:
- (a) [REDACTED];
 - (b) [REDACTED];

- (c) [REDACTED];
 - (d) [REDACTED];
 - (e) [REDACTED];
 - (f) [REDACTED];
 - (g) [REDACTED];
 - (h) [REDACTED];
 - (i) [REDACTED]; and
 - (j) [REDACTED].
- 1.20 “**Architect**” means an architect licensed by the Ontario Association of Architects to practice in the Province of Ontario.
- 1.21 “**Art Cash Allowance**” has the meaning given in Section 11.30(f) of the Project Agreement.
- 1.22 “**Art Cash Allowance Items**” means the work and activities identified as being subject to the Art Cash Allowance, to be performed by DB Co pursuant to Article 12 of Part 1 of Schedule 15-2 of the Output Specifications.
- 1.23 “**As-built Drawings**” means drawings prepared by DB Co to reflect the installed, constructed or commissioned conditions of the Works, in a format and with content and details that the City (with respect to As-built Drawings related to the East Works and West Works) or MTO (with respect to As-built Drawings related to the Highway Works), acting reasonably, consider appropriate.
- 1.24 “**As-built Works Schedule**” has the meaning given in Schedule 12 – Works Scheduling Requirements.
- 1.25 “**Associated Liabilities**” has the meaning given in Section 4.17(b) of the Project Agreement.
- 1.26 “**Authority Requirements**” means any order, direction, directive, request for information, policy, administrative interpretation, guideline or rule of or by any Governmental Authority and includes, for clarity, any direction or instruction from Transport Canada arising from any contractual arrangement or board orders involving Transport Canada with respect to the System Infrastructure corridor.
- 1.27 “**Background Information**” means any and all drawings, reports (including the Environmental Reports, the Archaeological Reports, the Geotechnical Reports, the Cultural Heritage Reports, and the Environmental Assessments and any other report given or otherwise referred to in the Output Specifications), studies, plans, data, documents, or other information, given or made available to DB Co or any DB Co Party by the City or any City Party, or which was obtained from or through any other sources prior to the date of the Project Agreement.
- 1.28 “**Bank**” has the meaning given in Schedule 30 – Insurance Trust Agreement.

- 1.29 “**Bankruptcy and Insolvency Act (Canada)**” means the *Bankruptcy and Insolvency Act*, R.S.C. 1985, c. B-3, as amended from time to time.
- 1.30 “**Beneficiary**” has the meaning given in Section 46.3(a) of the Project Agreement.
- 1.31 “**Building Code**” means the regulations made under Section 34 of the *Building Code Act*, S.O. 1992, c.23 (Ontario), as amended from time to time.
- 1.32 “**Bus Rapid Transit**” or “**BRT**” means the existing network of transit traffic lanes including those segments identified in Section 1.6 of Schedule 34 – Mobility Matters.
- 1.33 “**Bus Rapid Transit Lane Closure**” has the meaning given in Schedule 34 – Mobility Matters.
- 1.34 “**Bus Rapid Transit Lane Closure Adjustment**” has the meaning given in Schedule 34 – Mobility Matters.
- 1.35 “**Business Corporations Act (Ontario)**” means the *Business Corporations Act*, R.S.O. 1990, c. B.16, as amended from time to time.
- 1.36 “**Business Day**” means any day other than a Saturday, a Sunday, a statutory holiday in the Province of Ontario or any day on which banks are not open for business in the City of Ottawa, Ontario.
- 1.37 “**Canadian and Industry Standards**” means, at the applicable time, those standards, practices, methods and procedures applicable to Good Industry Practice.
- 1.38 “**Canadian GAAP**” shall be deemed to be the generally accepted accounting principles from time to time approved by the Canadian Institute of Chartered Accountants, or any successor institute, applicable as at the date on which such calculation is made or required to be made in accordance with generally accepted accounting principles, as such principles may be amended or varied by International Financial Reporting Standards then in effect in Canada, in any case consistently applied from one period to the next.
- 1.39 “**Capital Expenditure**” means capital expenditure as interpreted in accordance with Canadian GAAP.
- 1.40 “**Cash Allowance**” means either the Utility Company Works Cash Allowance or the Art Cash Allowance, as the case may be.
- 1.41 “**Category 1 Utility Company**” means any one of:
- (a) [REDACTED];
 - (b) [REDACTED];
 - (c) [REDACTED];
 - (d) [REDACTED]; and
 - (e) [REDACTED].

- 1.42 “**Certificate of Recognition**” means the certification issued by IHSA to a person confirming that the health and safety management systems of such person comply with the terms, provisions and conditions of the COR Program.
- 1.43 “**Certification Services**” has the meaning given in Schedule 6 – Independent Certifier Agreement.
- 1.44 “**Certification Services Variation**” has the meaning given in Schedule 6 – Independent Certifier Agreement.
- 1.45 “**Certified H&S Inspector**” means an individual who is an employee or contractor of the IHSA and has the necessary credentials recognized by the COR Program for the purpose of such individual performing any inspections as may be required to be performed in accordance with Section 15.2 of the Project Agreement.
- 1.46 “**Change in Control**” means, with respect to a person:
- (a) any Change in Ownership, where the effect of such change is to result in control of the decisions made by or on behalf of such person subsequently being with a different entity or entities than prior to such change;
 - (b) any other change in respect of the power to elect a majority of the directors of the person or otherwise control the decisions made on behalf of such person; or
 - (c) any other change of direct or indirect power or authority through any contractual right or other power or interest with or over a person to influence, direct, cause to change or prevent from changing the approval of a decision, direction of the management, actions or policies of such person, to direct or cause the direction of the management, actions or policies of such person.
- 1.47 “**Change in Law**” means the coming into effect or repeal (without re-enactment or consolidation) in Ontario of any Applicable Law, or any amendment or variation of any Applicable Law, including any judgment of a relevant court of law which changes binding precedent in Ontario in each case after the date of the Project Agreement.
- 1.48 “**Change in Ownership**” means, with respect to a person, any change in ownership, whether beneficial or otherwise, of any of the shares or units of ownership of such person, or in the direct or indirect power to vote or transfer any of the shares or units of ownership of such person.
- 1.49 “**City**” has the meaning given in the introductory paragraph of the Project Agreement.
- 1.50 “**City Activities**” means the provision of all governmental services and the conduct of all activities provided in connection or otherwise associated with rail transit and other similar services, including the operation and maintenance of a live rail transit system on the System Infrastructure corridor and Existing Confederation Line.
- 1.51 “**City Default Termination Sum**” has the meaning given in Schedule 23 – Compensation on Termination.
- 1.52 “**City Design Team**” means any of the City, its agents, contractors and subcontractors of any tier and its or their directors, officers and employees, and other persons engaged in respect of design

- reviews, design evaluation, or design consultation processes with respect to the New City Infrastructure or the New MTO Infrastructure or the City Activities, but excluding DB Co and any DB Co Party.
- 1.53 “**City Engineer**” means the engineer appointed by the City in connection with, among other things, acceptance of the New Municipal Infrastructure Works.
- 1.54 “**City Event of Default**” has the meaning given in Section 37.1(a) of the Project Agreement.
- 1.55 “**City HR Policy**” means the City’s human resources policies and guidelines, as they may be amended from time to time and provided to DB Co in writing.
- 1.56 “**City Jointly Developed Materials**” has the meaning given in Section 41.4(a)(i) of the Project Agreement.
- 1.57 “**City Party**” means any of the City and its respective agents, contractors and subcontractors of any tier and its or their directors, officers and employees, and other persons engaged by any of the foregoing in respect of the City Activities, including RTG and RTG Parties in performance of the RTG City Party Works, but excluding RTG and RTG Parties in performance of the RTG Stage 1 PA Works notwithstanding the definition of City Activities, and excluding DB Co and any DB Co Party, and the “the City Parties” shall be construed accordingly.
- 1.58 “**City Permits, Licences, Approvals and Agreements**” means only those the City permits, licences, approvals and agreements which are the responsibility of the City to obtain as set out in Schedule 35 - Permits, Licences, Approvals and Agreements, but for greater certainty shall not include any permission, consent, approval, certificate, permit, licence, agreement or authorization not set out in Schedule 35 - Permits, Licences, Approvals and Agreements but required by the terms of any such item set out in such Appendix.
- 1.59 “**City PLAA Deadline**” has the meaning given in Section 11.8(e) of the Project Agreement
- 1.60 “**City Representative**” means the person designated as such by the City on or prior to the date of the Project Agreement and any permitted replacement.
- 1.61 “**City Supplied Third Party Intellectual Property**” has the meaning given in Schedule 24 – Intellectual Property.
- 1.62 “**City Taxes**” means taxes, or payments in lieu of taxes, imposed on the City and HST and property taxes for which the City is responsible pursuant to Section 4.11 of the Project Agreement.
- 1.63 “**City Trade-Marks**” means any and all Trade-Marks used by the City in any manner whatsoever.
- 1.64 “**CA**” means the *Construction Act*, R.S.O. 1990, c. C.30, as amended from time to time.
- 1.65 “**CMMS**” has the meaning given in Section 25.7(a) of the Project Agreement.
- 1.66 “**Commercial Close**” means the date of the Project Agreement.

- 1.67 “**Commissioning Submittals**” means the commissioning submittals described in Section 1.6 of Schedule 14 – Testing & Commissioning.
- 1.68 “**Commissioning Tests**” means all commissioning tests:
- (a) described in Schedule 14 – Testing & Commissioning;
 - (b) required by Applicable Law, Canadian and Industry Standards or CSA Standards;
 - (c) recommended by the manufacturer of any part of the New City Infrastructure or the New MTO Infrastructure; and
 - (d) required to be included in a Testing & Commissioning Program by the Independent Certifier or the City Representative during its development pursuant to Section 25.2 of the Project Agreement.
- 1.69 “**Companies’ Creditors Arrangement Act (Canada)**” means the *Companies’ Creditors Arrangement Act*, R.S.C. 1985, c. C-36, as amended from time to time.
- 1.70 “**Compensation Event**” has the meaning given in Section 33.1(a) of the Project Agreement.
- 1.71 “**Compensation Payment**” means the City Default Termination Sum, the DB Co Default Termination Sum or the Non-Default Termination Sum.
- 1.72 “**Completion Holdback**” means either the East Completion Holdback or West Completion Holdback, as the case may be.
- 1.73 “**Complex Structure**” means any post-tensioned or pre-tensioned structure that has undergone significant structural alteration making it difficult for personnel at the Site to predict the direction of forces or likely collapse mechanism to be experienced by such structure in connection with any Demolition of all or any part of such structure.
- 1.74 “**Complex Structure Demolition**” means any Demolition where any one or more of the following is applicable:
- (a) significant structural elements, such as girders, columns, shearwalls or slabs, or Complex Structures are being removed, de-stressed, altered or removed;
 - (b) large penetrations are being created through slabs;
 - (c) any Demolition may cause the collapse of any building or structure (or any portion thereof) and such collapse may directly impact adjacent occupied areas of a building or structure and potentially jeopardize the safety of workers, staff or the general public using such building or structure;
 - (d) the Demolition of any building or structure (or any portion thereof) has the potential to result in any materials collapsing onto or interfering with any pedestrian right-of-way or into an occupied part of any building or structure; and
 - (e) any apparent or inferable risk associated with the Demolition poses a significant risk to workers, the public or adjacent property.

- 1.75 “**Concurrent Delays**” means delays to the critical path caused by two or more independent which (a) occur at the same time and continue for the same period of time, and (b) which affect a Scheduled Substantial Completion Date, or Scheduled Final Completion Date.
- 1.76 “**Concurrent Delay Direct Costs**” mean the Direct Costs associated with so Concurrent Delays and referred to in clauses 1.1(i) through (x), inclusive, of Appendix A to Schedule 22 of this Project Agreement.
- 1.77 “**Condition Assessment**” means a close-up visual inspection of all structure elements to confirm and record severity and extent of material defects and suspected performance deficiencies of the various components in accordance with Ontario Structure Inspection Manual (OSIM).
- 1.78 “**Condition Assessment and Recommendations Report**” means a report documenting the findings of the Condition Assessment and providing the details of the recommended rehabilitation, repair or replacement method.
- 1.79 “**Confederation Line East Extension**” has the meaning given in the recitals to the Project Agreement.
- 1.80 “**Confederation Line West Extension**” has the meaning given in the recitals to the Project Agreement.
- 1.81 “**Confidant**” has the meaning given in Section 42.6(a)(i) of the Project Agreement.
- 1.82 “**Confidential Information**” means all confidential and proprietary information which is supplied by or on behalf of a Party, whether before or after the date of the Project Agreement.
- 1.83 “**Construction Access Management Plan**” means DB Co’s plan to manage construction and Site access in accordance with the requirements in Part 7 of Schedule 15-2.
- 1.84 “**Construction Activities**” means construction, rehabilitation, Reinstatement Work, rectification work, and any other aspect of the Works that:
- (a) comprises the alteration, augmenting, upgrading, construction, completion, inspection, calibration, testing or commissioning of any part of the New City Infrastructure and the New MTO Infrastructure;
 - (b) comprises the assessment of any New City Infrastructure or New MTO Infrastructure;
 - (c) may affect the structural integrity of any New City Infrastructure or New MTO Infrastructure, and including any such aspect of the Works carried out as part of any Force Majeure event, Relief Event, Variation, or Innovation Proposal accepted by the City; or
 - (d) comprises Construction Clearing and Grubbing.
- 1.85 “**Construction Certificate**” means a certificate with contents described in Attachment 2 to Appendix A of Schedule 10 – Review Procedure.

- 1.86 “**Construction Clearing and Grubbing**” means the stage of the Works in which vegetation and debris is cleared from the Lands (clearing) and a root rake or similar device is employed to remove roots remaining in the soil (grubbing).
- 1.87 “**Construction Contractor**” means [REDACTED] engaged by DB Co to perform the Works and any substitute construction contractor engaged by DB Co as may be permitted by the Project Agreement.
- 1.88 “**Construction Contractor’s Direct Agreement**” means the direct agreement between the City, DB Co, the Construction Contractor and the Construction Guarantor in the form set out in Schedule 5 – Construction Contractor’s Direct Agreement.
- 1.89 “**Construction Defect**” means any deficiency, defect or error in the Works or failure of the Works to conform to the Project Agreement (including for clarity any defect in the Existing Infrastructure which has been fully incorporated into the Works to the extent such defect was patent at the time of incorporation into the Works, but without prejudice to the risk allocation set out in Section 18.8 of the Project Agreement), or any deficiency, defect or error in relation to any Product procured by DB Co or any DB Co Party, in each case, arising from a non-compliance by DB Co or any DB Co Party with the requirements of the Project Agreement.
- 1.90 “**Construction Document Submittals**” has the meaning given in Section 11.1(d)(ii) of the Project Agreement.
- 1.91 “**Construction Guarantor**” means [REDACTED].
- 1.92 “**Construction Latent Defect**” has the meaning given in Section 11.16(b)(iii) of the Project Agreement.
- 1.93 “**Construction Period**” means that period of time commencing on Financial Close and ending on the earlier of (i) the Termination Date, or (ii) the latest Final Completion Date.
- 1.94 “**Construction Period Payments**” has the meaning given in Schedule 21 – Construction Period Payments.
- 1.95 “**Construction Period Payment Application**” has the meaning given in Schedule 21 – Construction Period Payments
- 1.96 “**Construction Period Quality Failures**” has the meaning given in Schedule 21 – Construction Period Payments.
- 1.97 “**Construction Period Performance Criteria**” has the meaning given in Schedule 21 – Construction Period Payments.
- 1.98 “**Construction Management Plan**” has the meaning given in Schedule 11 – Integrated Management System Requirements.
- 1.99 “**Construction Safety Management Plan**” means the plans to be prepared by DB Co to manage the safety of the Works, as described in Schedule 11 – Integrated Management System Requirements.

- 1.100 “**Contamination**” means the presence of any Hazardous Substance in the environment, except Hazardous Substances present in the environment in concentrations below applicable standards as set by Applicable Laws. If Contamination is present in soil, surface water or groundwater, then the soil, surface water or groundwater, as applicable, containing the Contamination shall also be deemed to be Contamination for the purposes of the Project Agreement.
- 1.101 “**Control Party**” means:
- (a) any person with any form of direct ownership interest in DB Co; and
 - (b) [REDACTED].
- 1.102 “**Copyrights**” means all copyrights (registered or otherwise) and registrations and applications for registration thereof, and all rights therein provided by multinational treaties or conventions.
- 1.103 “**COR Certification**” means, in respect of a person, receipt by such person of its (i) Certificate of Recognition; and (ii) Letter of Good Standing.
- 1.104 “**COR Program**” means the national safety program known as “The Certificate of Recognition (COR™)”, being a safety program that enables persons to assess their health and safety management systems to manage risks, establish controls, and minimize the incidence of injury and illness to their workers, and being nationally trademarked and endorsed by participating members of the Canadian Federation of Construction Safety Associations, or such other national safety program approved by the City.
- 1.105 “**COR-Certified Construction DB Co Party**” has the meaning given in Section 11.25(a)(ii) of the Project Agreement.
- 1.106 “**COR-Qualified Construction DB Co Party**” means:
- (a) where the Construction Contractor is a single legal entity, the Construction Contractor;
 - (b) where the Construction Contractor is a joint venture, all members of the joint venture;
 - (c) where the Construction Contractor is a partnership, all partners of the partnership; or
 - (d) the parent(s) of the entity or entities in (a), (b) or (c) above, as applicable,
- provided that each such person has current OHSAS 18001 Accreditation in good standing.
- 1.107 “**Cost of the Financing**” means all costs and expenses incurred in connection with the Financing pursuant to the Lending Agreements, including all interest, fees, expense reimbursements, pre-payment and breakage costs and all other costs and expenses, as set out in Schedule 32 – Financial Model.
- 1.108 “**Cost of the Works**” means the cost to DB Co of performing the Works as set out in Schedule 32 – Financial Model and shall include all amounts to be included in the Cost of the Works set out in the Project Agreement.
- 1.109 “**CN**” means the Canadian National Railway Company, and its successors.

- 1.110 “**CPI**” means, as at the date of the Project Agreement, CPI XFET and, thereafter, the latest available Consumer Price Index Canada (all items) as published by Statistics Canada from time to time (whether preliminary or final), or failing such publication, such other index as the Parties may agree, or as may be determined in accordance with Schedule 27 - Dispute Resolution Procedure, most closely resembles such index.
- 1.111 “**CPI XFET**” means the Consumer Price Index excluding food, energy and the effect of changes in indirect taxes.
- 1.112 “**CPI_{in}**” is the value of CPI on January 1 of the relevant year, to be determined by reference to the relevant index in the month immediately preceding the indexation date.
- 1.113 “**CPI_o**” is the value of CPI at Financial Close, to be determined by reference to the relevant index in the month immediately preceding Financial Close.
- 1.114 “**Critical Construction Defect**” means a Construction Defect in respect of the System Infrastructure which (a) results in a material disruption to operation of Confederation Line East or Confederation Line West which has caused the Aggregate Vehicle Kilometer Availability Ratio in relevant period prior to rectification to be lower than the Aggregate Vehicle Kilometer Availability Ratio constituting a Major Construction Defect or (b) results in a material disruption to access to any Station (including by System Users, understanding, however, that failure of any escalator or elevator shall not be deemed to be a material disruption provided there is a least one elevator is operational).
- 1.115 “**Critical Construction Period Quality Failure**” has the meaning given in Schedule 21 – Construction Period Payments.
- 1.116 “**Critical Items**” has the meaning given in Section 12.1 of Schedule 27 – Dispute Resolution Procedure.
- 1.117 “**Critical Non-Conformance**” means any Non-Conformance, or combination of Medium Non-Conformances, that:
- (a) is persistent, ongoing and repeated; or
 - (b) in the reasonable opinion of the City, by its continued existence or through the process of rectification, would:
 - (i) result or is reasonably expected to result in material disruption to the public or a materially adverse disruption to vehicular or rail traffic flow;
 - (ii) prejudice or is reasonably expected to materially prejudice the performance of any City Activities;
 - (iii) create or is reasonably expected to create a serious threat to the health, safety or security of any person, including any user of any part of or the whole of the New City Infrastructure, New MTO Infrastructure, Existing Infrastructure, and / or Stage 1 Connection Infrastructure, including System Users, volunteers and visitors to the New City Infrastructure, New MTO Infrastructure, Existing Infrastructure and/or Stage 1 Connection Infrastructure, and members of the public;

- (iv) materially increase the City’s risk or transfer risk to the City or any City Party;
 - (v) materially adversely affect the ability of any the City Party to perform their activities as permitted or contemplated by the Project Agreement;
 - (vi) materially adversely affect or change the critical path of the Project as defined in the Works Schedule, adversely affect DB Co’s ability to achieve Substantial Completion by a Scheduled Substantial Completion Date, require a material resequencing of the Works or cause any delay in achieving any Substantial Completion; or
 - (vii) potentially compromise the reputation or integrity of the City and/or any City Party or the nature of the public transit system in one or more of the City of Ottawa or the Province of Ontario so as to affect public confidence in the public transit system in the City of Ottawa, the Province of Ontario or the Project.
- 1.118 “**Critical Path(s)**” means the sequence of Activities determining the minimum time needed to complete the Works
- 1.119 “**Crown**” means Her Majesty the Queen in right of Ontario.
- 1.120 “**Crown Agency Act (Ontario)**” means the *Crown Agency Act*, R.S.O. 1990, c. 48, as amended from time to time.
- 1.121 “**CSA Standards**” means, at the applicable time, the Canadian Standards Association standards.
- 1.122 “**Cultural Heritage Reports**” means, collectively, the following reports:
- (a) [REDACTED];
 - (b) [REDACTED]; and
 - (c) [REDACTED].
- 1.123 “**Current PBS**” has the meaning given in Schedule 12 – Works Scheduling Requirements.
- 1.124 “**Cut and Cover**” has the meaning given in Schedule 15-1 - Technical Terms and Reference Documents.
- 1.125 “**DB Co**” has the meaning given in the introductory paragraph of the Project Agreement.
- 1.126 “**DB Co Amount**” has the meaning given in Schedule 23 – Compensation on Termination.
- 1.127 “**DB Co Commissioning**” means the commissioning activities to be carried out by DB Co prior to the issuance of the relevant Substantial Completion Certificate (in the case of New City Infrastructure and New MTO Infrastructure, other than the Remaining Works), and prior to the issuance of the West Final Completion Certificate (in the case of the Remaining Works) in accordance with the Testing & Commissioning Program.
- 1.128 “**DB Co Commissioning Tests**” means all Commissioning Tests required to be performed by DB Co pursuant to a Testing & Commissioning Program.

- 1.129 **“DB Co Construction Event of Default”** means a DB Co Event of Default relating to a failure or breach by DB Co to perform, observe or comply with any covenants, agreements, obligations or liabilities with respect to the Works, excluding a default by the Construction Guarantor under the Performance Guarantee of Construction Guarantor.
- 1.130 **“DB Co Construction Period Payment Documentation”** has the meaning given in Schedule 21 – Construction Period Payments.
- 1.131 **“DB Co Default Termination Sum”** has the meaning given in Schedule 23 – Compensation on Termination.
- 1.132 **“DB Co Event of Default”** has the meaning given in Section 36.1(a) of the Project Agreement.
- 1.133 **“DB Co Group”** means DB Co together with any person or group of persons, who, either individually or collectively, have Direct or Indirect Power or Control of DB Co.
- 1.134 **“DB Co Party”** means:
- (a) the Construction Contractor;
 - (b) any person engaged by DB Co and/or the Construction Contractor from time to time as may be permitted by the Project Agreement to procure or manage the provision of the Works (or any of them); and
 - (c) in respect of each of the above, their subcontractors of any tier, agents, employees, officers and directors,
- and **“DB Co Parties”** shall be construed accordingly.
- 1.135 **“DB Co Permits, Licences, Approvals and Agreements”** means all permissions, consents, approvals, certificates, permits, licences, agreements and authorizations required to perform the Works in accordance with the Project Agreement and as required by Applicable Law, and including those permissions, consents, approvals, certificates, permits, licences, agreements and authorizations which are the responsibility of DB Co to obtain as set out in Schedule 35 – Permits, Licences, Approvals and Agreements or which is the responsibility of DB Co to perform or fulfill as set out in Schedule 35 – Permits, Licences, Approvals and Agreements and the Output Specifications and all necessary consents, approvals, certificates, permits, licences, agreements and authorizations from and with any third parties (including, to the extent applicable, all Development Approvals, Railway Approvals and Utility Agreements, the Encroachment Permits, and the approval of the Fire Marshal of Ontario), needed to perform the Works in accordance with the Project Agreement and as required by Applicable Law, but other than the City Permits, Licences, Approvals and Agreements.
- 1.136 **“DB Co Proposal Extracts”** means the documents attached as Schedule 13 – DB Co Proposal Extracts.
- 1.137 **“DB Co Representative”** means the person designated as such by DB Co on or prior to Commercial Close and any permitted replacement.
- 1.138 **“DB Co Response Period”** has the meaning given in Schedule 36 – Interface Agreement.

- 1.139 “**DB Co Utility Works**” means the works relating to Utility Infrastructure carried out by DB Co in connection with or as part of the Project Operations, including design, construction, installation, commissioning, protection, removal and relocation of duct banks, poles, pole lines, conduits, gas pipes, oil pipes, sewers and telephone and telecommunication lines, and related and ancillary works.
- 1.140 “**DB Co Variation Notice**” has the meaning given in Schedule 22 - Variation Procedure.
- 1.141 “**Debt Amount**” has the meaning given in Schedule 23 – Compensation on Termination.
- 1.142 “**Debt Service Amount**” means, for any period, the principal and interest payable by DB Co or any DB Co Party to the Lenders in the normal course under the Lending Agreements, provided that at any time where any portion of the interest payable to the Lenders is subject to a Hedging Agreement between DB Co and a Hedge Provider, interest payable on account of such portion of interest payable to the Lenders shall be calculated based on the fixed rate payable by DB Co under such Hedging Agreement without regard to whether such fixed rate is payable directly to a Lender or to the Hedge Provider under the relevant Hedging Agreement and all references to interest payable to the Lenders under this Project Agreement shall be construed accordingly.
- 1.143 “**Delay Event**” has the meaning given in Section 32.1(a) of the Project Agreement.
- 1.144 “**Demolition**” means the removal of a building or structure, as the case may be, or of any material part of a building or structure.
- 1.145 “**Demolition Default Event**” has the meaning given in Section 11.26(b) of the Project Agreement.
- 1.146 “**Demolition Guidelines**” means those guidelines set forth in the document entitled “Professional Engineers Providing Services for Demolition of Buildings and other Structures” published by the Professional Standards Committee established by the Professional Engineers of Ontario and having a publication date of April, 2011.
- 1.147 “**Demolition Plan**” means a plan or other document prepared by a professional engineer, limited licence holder or provisional licence holder in accordance with subsection (3) of the Performance Standards Regulation with respect to the Demolition of a building or structure, and includes any changes to the plan or other document that are made by a professional engineer, limited licence holder or provisional licence holder.
- 1.148 “**Demolition Requirements**” has the meaning given in Section 11.26(a) of the Project Agreement.
- 1.149 “**Demolition Specifications**” means those specifications relating to any Demolition prepared by DB Co in accordance with Section 11.26(a)(iv)(A) of the Project Agreement.
- 1.150 “**Demolition Supervisor**” has the meaning given in Section 11.26(a)(ii) of the Project Agreement.
- 1.151 “**Design and Bid Fee**” has the meaning given in the Request for Proposals.
- 1.152 “**Design and Construction Contract**” means the design and construction contract between DB Co and the Construction Contractor dated on or about the date of Financial Close.

- 1.153 “**Design and Construction Certification Procedure**” means the process for review and issuance of Design Certificates and Construction Certificates in accordance with Schedule 10 – Review Procedure.
- 1.154 “**Design and Construction Report**” has the meaning given in Schedule 17 – Environmental Obligations.
- 1.155 “**Design Certificate**” means a certificate with contents described in Attachment 1 to Appendix A of Schedule 10 – Review Procedure.
- 1.156 “**Design Data**” means all drawings, reports, documents, plans, software, formulae, calculations, and other data prepared or obtained by DB Co relating to the design, construction, testing or monitoring of the New City Infrastructure and the New MTO Infrastructure, but excluding Intellectual Property Rights of third parties, such as CAD software, that is used only in the process of design and construction.
- 1.157 “**Design Development**” means that process for DB Co’s development of design for the Project described in Section 11.1 of the Project Agreement.
- 1.158 “**Design Development Submittal**” has the meaning given in Section 11.1(d)(i) of the Project Agreement.
- 1.159 “**Design Life**” has the meaning given in Schedule 15-1 - Technical Terms and Reference Documents.
- 1.160 “**Design Management Plan**” has the meaning given in Schedule 11 – Integrated Management System Requirements.
- 1.161 “**Design Manager**” means the DB Co Key Individual with the functions described in Schedule 9 – Key Individuals.
- 1.162 “**Design Report(s)**” means reports written to document engineering designs by providing parameters, conditions, needs and requirements to be taken into account in the design of the element in discussion and document the design process and describe the completed design.
- 1.163 “**Design Team**” means [REDACTED] engaged by DB Co to design the New City Infrastructure and the New MTO Infrastructure and any substitute design team engaged by DB Co as may be permitted by the Project Agreement.
- 1.164 “**Design Workshops**” means those workshops undertaken in accordance with Section 1.8 of Schedule 10 – Review Procedure.
- 1.165 “**Development Approvals**” means development permits, building permits, zoning approvals and any other planning or development permit, consent or applicable Permits, Licences, Approvals and Agreements, required from time to time for construction of the New City Infrastructure and the New MTO Infrastructure.
- 1.166 “**Direct Cost**” has the meaning given in Schedule 22 – Variation Procedure.
- 1.167 “**Direct Losses**” means all damage, losses, liabilities, penalties, fines, assessments, claims, actions, costs, expenses (including the cost of legal or professional services, legal costs being on a

substantial indemnity basis), proceedings, demands and charges whether arising under statute, contract or at common law, except Indirect Losses. For clarity, Direct Losses shall not include any "Deductions" (as such term is defined in the Stage 1 Project Agreement) made from any payment to RTG under the Stage 1 Project Agreement.

1.168 **“Direct or Indirect Power or Control”** means the direct or indirect power or control over the decisions, management, actions or policies of a person, including through the direct or indirect power or control over the decisions, management, actions or policies of any persons having direct or indirect power or control over the decisions, management, actions or policies of any other person, whether through:

- (a) ownership, beneficial or otherwise, of greater than [REDACTED] percent of any of the shares, units or equity interests of a person;
- (b) the direct or indirect power to vote any of the shares, units or equity interests of a person where an individual’s ownership, beneficial or otherwise, is equal to or exceeds [REDACTED] percent of the voting securities, units or equity interests of such person; or
- (c) the direct or indirect power or authority to influence or direct the approval of a decision, the management, actions or policies of a person or to prevent the approval of a decision, the management, actions or policies of a person through any contractual right or other power or interest with or over a person.

1.169 **“Discriminatory Change in Law”** means any Change in Law the effect of which is to discriminate directly against or impose additional Taxes which apply specifically to:

- (a) transit systems, roads or highways, including rail transit systems, roads or highways, whose design, construction, and financing are procured by a contract similar to the Project Agreement in relation to other similar transit systems;
- (b) the New City Infrastructure or New MTO Infrastructure in relation to other transit systems, including rail transit systems, roads or highways;
- (c) DB Co in relation to other persons; or
- (d) persons undertaking projects for design, construction, and financing that are procured by a contract similar to the Project Agreement in relation to other persons undertaking similar projects procured on a different basis,

except that such Change in Law shall not be a Discriminatory Change in Law:

- (e) where it is in response to any act or omission on the part of DB Co which contravenes Applicable Law (other than an act or omission rendered illegal by virtue of the Discriminatory Change in Law itself);
- (f) solely on the basis that its effect on DB Co is greater than its effect on other companies; or
- (g) where such Change in Law is a change in Taxes that affects companies generally.

- 1.170 “**Dispute**” has the meaning given in Schedule 27 - Dispute Resolution Procedure.
- 1.171 “**Dispute Resolution Procedure**” means the procedure set out in Schedule 27 – Dispute Resolution Procedure.
- 1.172 “**Division**” means one of the following: East Works, West Works, Highway Works, or Remaining Works.
- 1.173 “**Drainage**” has the meaning given in Schedule 15-1 - Technical Terms and Reference Documents.
- 1.174 “**Draw Amount**” has the meaning given in Section 11.18D of the Project Agreement.
- 1.175 “**Earlier Scheduled Substantial Completion Date**” has the meaning given in Schedule 12 – Works Scheduling Requirements.
- 1.176 “**Earned Value**” has the meaning given in Schedule 21 – Construction Period Payments.
- 1.177 “**East Anticipated Final Completion Date**” means the date (which, for greater certainty, will be on or before the East Scheduled Final Completion Date) on which DB Co anticipates that East Final Completion will be achieved.
- 1.178 “**East Anticipated Substantial Completion Date**” has the meaning given in Section 25.5(a)(i) of the Project Agreement.
- 1.179 “**East Completion Holdback**” has the meaning given in Section 25.10(a) of the Project Agreement.
- 1.180 “**East Construction Defect**” has the meaning given in Section 11.15(a) of the Project Agreement.
- 1.181 “**East DB Co Commissioning**” means the DB Co Commissioning in respect of the East Works other than the Highway Works.
- 1.182 “**East Final Completion**” means the completion of the East Works in accordance with the Project Agreement, including completion of all East Minor Deficiencies.
- 1.183 “**East Final Completion Countdown Notice**” has the meaning given in Section 25.13(a)(i) of the Project Agreement.
- 1.184 “**East Final Completion Certificate**” means the certificate to be issued by the Independent Certifier in accordance with Section 25.14(g) of the Project Agreement in respect of East Final Completion.
- 1.185 “**East Final Completion Date**” means the date on which East Final Completion is achieved as evidenced by the East Final Completion Certificate, as such date shall be stated therein.
- 1.186 “**East Final Completion Notice**” has the meaning given in Section 25.14(b) of the Project Agreement.
- 1.187 “**East Further Revised Substantial Completion Date**” has the meaning given in Section 25.5(j) of the Project Agreement.

- 1.188 “**East Initial Countdown Notice**” has the meaning given in Section 25.5(a)(i) of the Project Agreement.
- 1.189 “**East Look-ahead Schedule**” has the meaning given in Schedule 12 – Works Scheduling Requirements.
- 1.190 “**East Minor Deficiencies**” has the meaning given in Section 25.10(a) of the Project Agreement.
- 1.191 “**East Minor Deficiencies List**” has the meaning given in Section 25.10(a) of the Project Agreement.
- 1.192 “**East Revised Substantial Completion Date**” has the meaning given in Section 25.5(g)(i) of the Project Agreement.
- 1.193 “**East Scheduled Final Completion Date**” means the date that is March 14, 2025 following the East Substantial Completion Date.
- 1.194 “**East Scheduled Substantial Completion Date**” means November 26, 2024, as such date may be amended pursuant to Section 32 of the Project Agreement.
- 1.195 “**East Subsequent Notice**” has the meaning given in Section 25.5(g)(i) of the Project Agreement.
- 1.196 “**East Substantial Completion**” means the point at which, in respect of the East Works, (i) the New City Infrastructure, other than the Remaining Works, have been completed in accordance with the Project Agreement; and (ii) all requirements for East Substantial Completion described in the East Testing & Commissioning Plan, other than in respect of East Minor Deficiencies, the Remaining Works, the Remaining Works Minor Deficiencies, and Trial Running have been satisfied.
- 1.197 “**East Substantial Completion Certificate**” means the certificate to be issued by the Independent Certifier in accordance with Section 25.4(d) of the Project Agreement.
- 1.198 “**East Substantial Completion Date**” means the date on which East Substantial Completion is achieved as evidenced by the East Substantial Completion Certificate, as such date shall be stated therein.
- 1.199 “**East Substantial Completion Notice**” has the meaning given in Section 25.4(b)(i) of the Project Agreement.
- 1.200 “**East Substantial Completion Payment**” means the amount of \$[REDACTED], less the East Completion Holdback as at the East Substantial Completion Payment Date.
- 1.201 “**East Substantial Completion Payment Date**” means the date that is 2 Business Days after the East Substantial Completion Date.
- 1.202 “**East Testing & Commissioning Plan**” means the Testing & Commissioning Plan for the East Works included in the Testing & Commissioning Program.
- 1.203 “**East Warranty Letter of Credit**” has the meaning given in Section 11.18(a)(i) of the Project Agreement.

- 1.204 **“East Warranty Cash Amount”** has the meaning given in Section 4.2(c)(i) of the Project Agreement.
- 1.205 **“East Warranty Period”** means:
- (a) in respect of the East Works other than New Municipal Infrastructure, a period beginning on the East Substantial Completion Date and expiring on the date 2 years after such East Substantial Completion Date; and
 - (b) in respect of each New Municipal Construction Component comprising part of the East Works, a period beginning on the New Municipal Infrastructure Component Acceptance Date for such New Municipal Construction Component, and expiring on the date 2 years after such New Municipal Infrastructure Component Acceptance Date.
- 1.206 **“East Warranty Work”** has the meaning given in Section 11.17(a)(i) of the Project Agreement.
- 1.207 **“East Works”** means the Works as it relates to the Confederation Line East Extension, as generally described in Article 19 of Part 1 of Schedule 15-2.
- 1.208 **“Electronic Data Management System”** or **“EDMS”** means a management system as described in Article 3 of Schedule 10 – Review Procedure.
- 1.209 **“Economic Interest”** means any right to receive, directly or indirectly and whether in cash or in kind, a payment, repayment, fee, interest, dividend, distribution, redemption or any other consideration of benefit or value to the recipient of any nature whatsoever, but excluding wages, salaries or other employment-related benefits.
- 1.210 **“Encroachment Permits”** means the encroachment permits which DB Co is required to obtain from MTO to enable and authorize, among other things, DB Co to perform the Works.
- 1.211 **“Emergency”** means any situation, event, occurrence, multiple occurrences or circumstances:
- (a) that:
 - (i) constitutes or may constitute a hazard to or jeopardizes or may jeopardize or pose a threat to health and safety of any persons (including System Users and City Parties) or any part of or the whole of the New City Infrastructure, the New MTO Infrastructure, the Existing Infrastructure or the Stage 1 Connection Infrastructure;
 - (ii) causes or may cause damage or harm to property, buildings and/or equipment;
 - (iii) constitutes a hostage situation or state of emergency declared as such by the City Representative or the City (acting reasonably);
 - (iv) materially interferes with or prejudices or may materially interfere with or prejudice the safe operation of the New City Infrastructure or New MTO Infrastructure, any part of the Lands, the conduct of Works, or the conduct of Governmental Activities; or
 - (v) constitutes a period of transition to or from war,

and which, in the opinion of the City, requires immediate action to prevent and/or mitigate the occurrence (or risk of the occurrence) of the foregoing; or

- (b) which gives rise to an emergency, as determined by any statutory body including (notwithstanding the generality of the foregoing) an Emergency Service Provider.

1.212 **“Emergency Response Plan”** means the existing City of Ottawa Emergency Response Plan for the existing LRT system as amended and modified by the Emergency Management provisions in Schedule 15-2 Part 1.

1.213 **“Emergency Service Providers”** means any Police Service, firefighting service, ambulance service, armed forces or other authority with emergency service authority pursuant to Applicable Law which may require access to the New City Infrastructure or New MTO Infrastructure from time to time.

1.214 **“Encumbrances”** means the Encumbrances listed in Schedule 16 - Encumbrances and any other encumbrances deemed to be Encumbrances as described in and for the purposes set out in Section 17.2(d) of the Project Agreement.

1.215 **“Environmental Assessments”** has the meaning given in Schedule 17 – Environmental Obligations.

1.216 **“Environmental Protection Act (Ontario)”** means the *Environmental Protection Act*, R.S.O. 1990, c. E. 19, as amended from time to time.

1.217 **“Environmental Management Plan”** means has the meaning given in Schedule 17 – Environmental Obligations.

1.218 **[Not used]**

1.219 **“Environmental Reports”** means, collectively, the following reports:

- (a) [REDACTED];
- (b) [REDACTED];
- (c) [REDACTED];
- (d) [REDACTED];
- (e) [REDACTED];
- (f) [REDACTED];
- (g) [REDACTED];
- (h) [REDACTED];
- (i) [REDACTED];
- (j) [REDACTED];

- (k) [REDACTED];
- (l) [REDACTED];
- (m) [REDACTED];
- (n) [REDACTED];
- (o) [REDACTED];
- (p) [REDACTED];
- (q) [REDACTED];
- (r) [REDACTED];
- (s) [REDACTED];
- (t) [REDACTED];
- (u) [REDACTED];
- (v) [REDACTED];
- (w) [REDACTED];
- (x) [REDACTED];
- (y) [REDACTED];
- (z) [REDACTED];
- (aa) [REDACTED];
- (bb) [REDACTED];
- (cc) [REDACTED];
- (dd) [REDACTED];
- (ee) [REDACTED];
- (ff) [REDACTED];
- (gg) [REDACTED];
- (hh) [REDACTED];
- (ii) [REDACTED];
- (jj) [REDACTED];

- (kk) [REDACTED];
- (ll) [REDACTED];
- (mm) [REDACTED];
- (nn) [REDACTED];
- (oo) [REDACTED];
- (pp) [REDACTED];
- (qq) [REDACTED];
- (rr) [REDACTED];
- (ss) [REDACTED];
- (tt) [REDACTED];
- (uu) [REDACTED];
- (vv) [REDACTED];
- (ww) [REDACTED];
- (xx) [REDACTED];
- (yy) [REDACTED];
- (zz) [REDACTED];
- (aaa) [REDACTED];
- (bbb) [REDACTED];
- (ccc) [REDACTED];
- (ddd) [REDACTED];
- (eee) [REDACTED];
- (fff) [REDACTED];
- (ggg) [REDACTED];
- (hhh) [REDACTED]; and
- (iii) [REDACTED].

1.220 “**Erosion and Sediment Control Plan**” has the meaning given in Schedule 15-1 - Technical Terms and Reference Documents.

- 1.221 “ESA” means the *Endangered Species Act*, 2007 (Ontario).
- 1.222 “Estimate” has the meaning given in Schedule 22 - Variation Procedure.
- 1.223 “Excise Tax Act (Canada)” means the *Excise Tax Act*, R.S.C. 1985, c. E-15, as amended from time to time.
- 1.224 “Executive Council Act (Ontario)” means the *Executive Council Act*, R.S.O. 1990, c. E. 25, as amended from time to time.
- 1.225 “Existing Adjacent Structures” has the meaning given in Schedule 15-1 - Technical Terms and Reference Documents.
- 1.226 “Existing Confederation Line” has the meaning given in the recitals to the Project Agreement.
- 1.227 “Existing Contamination” has the meaning given in Section 18.2(a) of the Project Agreement.
- 1.228 “Existing Infrastructure” means existing public realm, road, highway, Utility Infrastructure, railway infrastructure, drainage works, landscaping, infrastructure situated on the Lands, owned by the MTO, the City, Utility Companies, Railway Companies, or any other third party, but excluding the Stage 1 Connection Infrastructure.
- 1.229 “Expiry Date” means the first anniversary of the latest Final Completion Date.
- 1.230 “External IMS Audit” has the meaning given in Schedule 11 – Integrated Management System Requirements.
- 1.231 “Facilities” has the meaning given in Schedule 15-1 - Technical Terms and Reference Documents.
- 1.232 “Factory Acceptance Test” or “FAT” has the meaning given in Schedule 14 – Testing & Commissioning.
- 1.233 “Federal Lands” means:
- (a) lands that belong to Her Majesty in right of Canada, or that Her Majesty in right of Canada has the power to dispose of, and all waters on and airspace above those lands, other than lands under the administration and control of the Commissioner of Yukon, the Northwest Territories or Nunavut;
 - (b) the following lands and areas:
 - (i) the internal waters of Canada, in any area of the sea not within a province,
 - (ii) the territorial sea of Canada, in any area of the sea not within a province,
 - (iii) the exclusive economic zone of Canada, and
 - (iv) the continental shelf of Canada;

- (c) reserves, surrendered lands and any other lands that are set apart for the use and benefit of a band and that are subject to the Indian Act, and all waters on and airspace above those reserves or lands.
- 1.234 “**Final Completion**” means either East Final Completion or West Final Completion, as applicable.
- 1.235 “**Final Completion Certificate**” means a certificate to be issued by the Independent Certifier in accordance with Section 25.14 of the Project Agreement.
- 1.236 “**Final Completion Countdown Notice**” means either the East Final Completion Countdown Notice or West Final Completion Countdown Notice, as applicable.
- 1.237 “**Final Completion Date**” means either the East Final Completion Date or West Final Completion Date, as applicable.
- 1.238 “**Final Completion Notice**” means either the East Final Completion Notice or West Final Completion Notice, as applicable.
- 1.239 “**Final Design Development**” or “**FDD**” has the meaning given in Schedule 10 – Review Procedure.
- 1.240 “**Final New Municipal Infrastructure Works Acceptance Certificate**” means the certificate issued by the City Engineer to DB Co confirming New Municipal Infrastructure Works Acceptance.
- 1.241 “**Final New Municipal Infrastructure Works Requirements**” has the meaning given in Section 11.27(h) of the Project Agreement.
- 1.242 “**Financial Administration Act (Ontario)**” means the *Financial Administration Act*, R.S.O. 1990, c. F.12, as amended from time to time.
- 1.243 “**Financial Close**” means the first date that funding is available under the Lending Agreements.
- 1.244 “**Financial Close Target Date**” means April 25, 2019, as such date may be extended in accordance with the provisions of the Project Agreement.
- 1.245 “**Financial Model**” means the computer spreadsheet [REDACTED] for the Project incorporating statements of DB Co’s cashflows including all expenditure, revenues, financing and taxation of the Works together with, if applicable, the profit and loss accounts and balance sheets for DB Co throughout the Project Term accompanied by details of all assumptions, calculations and methodology used in their compilation and any other documentation necessary or desirable to operate the model.
- 1.246 “**Financial Obligations**” means the obligation to pay any application fees, third party fees, costs or charges (including all applicable Taxes thereon), the provision of any letters of credit, instruments of guarantee, bonds or security deposits, or any other financial security obligations.
- 1.247 “**Financing**” means the financing with the Lenders, that is consistent in all material respects with Schedule 32 - Financial Model and the Project Agreement, to finance the Project.

- 1.248 “FIPPA” means the *Freedom of Information and Protection of Privacy Act* (Ontario), R.S.O. 1990, c. F.31, as amended from time to time.
- 1.249 “Float” has the meaning given in Schedule 12 – Works Scheduling Requirements.
- 1.250 “Force Majeure” has the meaning given in Section 35.1(a) of the Project Agreement.
- 1.251 “*Funeral, Burial and Cremations Services Act (Ontario)*” means the *Funeral, Burial and Cremations Services Act*, S.O. 2002, c.33, as amended from time to time.
- 1.252 “Geotechnical Reliant Reports” means:
- (a) those reports listed in the definition of “Geotechnical Reports” as items (a) – (c), (g) – (m), (p), and (s) – (z); and
 - (b) in respect of those reports listed in the definition of “Geotechnical Reports” as items (d) – (f), (n) and (aa), the geotechnical borehole data included in such reports, excluding any data interpretation or extrapolation expressed therein, as clarified in the reliance letters included the Background Information pertaining to such reports.
- 1.253 “Geotechnical Instrumentation and Monitoring Plan” has the meaning given in Schedule 15 – Output Specifications.
- 1.254 “Geotechnical Reports” means, collectively, the following geotechnical reports:
- (a) [REDACTED];
 - (b) [REDACTED];
 - (c) [REDACTED];
 - (d) [REDACTED];
 - (e) [REDACTED];
 - (f) [REDACTED];
 - (g) [REDACTED];
 - (h) [REDACTED];
 - (i) [REDACTED];
 - (j) [REDACTED];
 - (k) [REDACTED];
 - (l) [REDACTED];
 - (m) [REDACTED];
 - (n) [REDACTED];

- (o) [REDACTED];
- (p) [REDACTED];
- (q) [REDACTED];
- (r) [REDACTED];
- (s) [REDACTED];
- (t) [REDACTED];
- (u) [REDACTED];
- (v) [REDACTED];
- (w) [REDACTED];
- (x) [REDACTED];
- (y) [REDACTED];
- (z) [REDACTED]; and
- (aa) [REDACTED].

- 1.255 “**Good Industry Practice**” means using standards, practices, methods and procedures to a good commercial and rail safety standard, conforming to Applicable Law and exercising that degree of skill and care, diligence, prudence and foresight which would reasonably and ordinarily be expected from a qualified, skilled and experienced person engaged in a similar type of undertaking under the same or similar circumstances.
- 1.256 “**Government Entity**” means any one or more of the Province and MOI.
- 1.257 “**Government Sensitive Information**” means any information which is designated as such by the City from time to time, or which a reasonable person having regard to the circumstances, would regard as sensitive, including (i) all confidential information that is designated as such by Applicable Law, and (ii) any record, the disclosure of which could be injurious to the interests of the City.
- 1.258 “**Governmental Activities**” means the provision of all governmental services and the conduct of all activities provided in connection or otherwise associated with the Lands, New City Infrastructure and New MTO Infrastructure by any Governmental Authority or Emergency Service Provider, and includes the City Activities.
- 1.259 “**Governmental Authority**” means any federal, provincial, territorial, regional, municipal or local governmental authority, quasi-governmental authority, court, government or self-regulatory organization, commission, board, tribunal, organization, or any regulatory, administrative or other agency, or any political or other subdivision, department, or branch of any of the foregoing, having legal jurisdiction in any way over the City, any aspect of the performance of the Project Agreement, the operation of the System or the Governmental Activities, in each case to the extent

- it has or performs legislative, judicial, regulatory, administrative or other functions within its jurisdiction.
- 1.260 **“Guaranteed Price”** is the amount referred to in Section 3.1(a) of the Project Agreement.
- 1.261 **“Guideway”** has the meaning given in Schedule 15-1 - Technical Terms and Reference Documents
- 1.262 **“Handover”** has the meaning given in Appendix B of Schedule 10 – Review Procedure
- 1.263 **“H&S Certification Default Event”** has the meaning given in Section 11.25(b) of the Project Agreement.
- 1.264 **“H&S Certification Maintenance Plan”** has the meaning given in Section 11.25(b)(vii)(B) of the Project Agreement.
- 1.265 **“H&S Certification Reinstatement Plan”** has the meaning given in Section 11.25(b)(vi)(B) of the Project Agreement.
- 1.266 **“H&S Construction Inspection”** has the meaning given in Section 15.2(a) of the Project Agreement.
- 1.267 **“H&S Construction Inspection Report”** has the meaning given in Section 15.1(b) of the Project Agreement.
- 1.268 **“H&S Construction Re-Inspection”** has the meaning given in Section 15.1(c)(ii) of the Project Agreement.
- 1.269 **“H&S Construction Re-Inspection Report”** has the meaning given in Section 15.1(c)(iii) of the Project Agreement.
- 1.270 **“Hazardous Substances”** means any contaminant, pollutant, mould, dangerous substance, toxic substance, liquid waste, industrial waste, gaseous waste, hauled liquid waste, hazardous material, or hazardous substance as defined in or identified pursuant to any Applicable Law.
- 1.271 **“Hedge Provider”** means a person that has entered into a Hedging Agreement with DB Co pursuant to the Lending Agreements, together with their successors and permitted assigns.
- 1.272 **“Hedging Agreement”** means an agreement relating to the hedging of interest rate risk entered into by DB Co and the Hedge Provider(s) pursuant to the Lending Agreements.
- 1.273 **“Highway Construction Defect”** has the meaning given in Section 11.15(c) of the Project Agreement.
- 1.274 **“Highway Corridor Lands”** has the meaning given in Schedule 20 – Lands.
- 1.275 **“Highway DB Co Commissioning”** means the DB Co Commissioning in respect of the Highway Works.
- 1.276 **“Highway Testing & Commissioning Plan”** means the Testing & Commissioning Plan for the Highway Works included in the Testing & Commissioning Program.

- 1.277 “**Highway Traffic Act (Ontario)**” means the *Highway Traffic Act*, R.S.O. 1990, c. H.8, as amended from time to time.
- 1.278 “**Highway Works**” means the Works as it relates to the New MTO Infrastructure, as generally described in Article 19 of Part 1 of Schedule 15-2.
- 1.279 “**Hold Points**” has the meaning given in Schedule 11 – Integrated Management System Requirements.
- 1.280 “**HST**” means the value-added tax imposed pursuant to Part IX of the *Excise Tax Act* (Canada), and any successor legislation thereto.
- 1.281 “**IHSA**” means Infrastructure Health and Safety Association, a not-for-profit occupational safety organization formed on January 1, 2010 that provides health and safety training material and services to Ontario construction, electrical utilities and transportation industries, and is accredited in Ontario to issue and grant Certificates of Recognition and Letters of Good Standing, or such other person so accredited in Ontario to issue and grant Certificates of Recognition and Letters of Good Standing.
- 1.282 “**IMS Audit**” has the meaning given in Schedule 11 – Integrated Management System Requirements.
- 1.283 “**IMS Director**” means that individual identified as such in Schedule 9 – Key Individuals, and such replacements or substitutes as may be permitted from time to time in accordance with this Project Agreement.
- 1.284 “**Income Tax Act (Canada)**” means the *Income Tax Act*, R.S.C., 1985, c. 1, as amended from time to time.
- 1.285 “**Indemnifiable Taxes**” has the meaning given in Section 4.17(b) of the Project Agreement.
- 1.286 “**Indemnifier**” has the meaning given in Section 46.3(a) of the Project Agreement.
- 1.287 “**Independent Certifier**” means the person appointed as the Independent Certifier pursuant to the Independent Certifier Agreement and as may be permitted pursuant to the Project Agreement.
- 1.288 “**Independent Certifier Agreement**” means the contract entered into between DB Co, the City and the Independent Certifier in substantially the form attached hereto as Schedule 6 – Independent Certifier Agreement.
- 1.289 “**Independent Safety Assessor**” means an independent party appointed by DB Co to assess:
- (a) the safety and security of the Works prior to Substantial Completion; and
 - (b) changes to the New City Infrastructure following Substantial Completion, if any.
- 1.290 “**Indirect Losses**” has the meaning given in Section 47.1(a) of the Project Agreement.
- 1.291 “**Infringing Material**” has the meaning given in Section 46.1(g) of the Project Agreement.
- 1.292 “**Initial Capital Investment Amount**” has the meaning given in Schedule 21 – Construction Period Payments.

- 1.293 “**Initial Countdown Notice**” has the meaning given in Section 25.5(a) of the Project Agreement.
- 1.294 “**Injurious Affection**” has the meaning given in the *Expropriations Act*, R.S.O. 1990, c. E. 26, as amended from time to time.
- 1.295 “**Innovation Proposal**” has the meaning given in Section 31.2(b) of the Project Agreement.
- 1.296 “**Internal IMS Audit**” has the meaning given in Schedule 11 – Integrated Management System Requirements.
- 1.297 “**Intrusion and Access Control System**” has the meaning given in Schedule 15-1 - Technical Terms and Reference Documents.
- 1.298 “**Inspection and Test Plan**” has the meaning given in Schedule 11 – Integrated Management System Requirements.
- 1.299 “**Insurance**” means the insurance contemplated in Schedule 25 – Insurance and Performance Security Requirements.
- 1.300 “**Insurance Policies**” has the meaning given in Schedule 30 – Insurance Trust Agreement.
- 1.301 “**Insurance Proceeds**” has the meaning given in Schedule 30 – Insurance Trust Agreement.
- 1.302 “**Insurance Trust Account**” means [REDACTED] at [REDACTED].
- 1.303 “**Insurance Trust Agreement**” means the insurance trust agreement to be entered into between the City, the Lenders’ Agent, DB Co and the Account Trustee in the form set out in Schedule 30 - Insurance Trust Agreement.
- 1.304 “**Integrated Management Plans**” or “**IMP**” have the meaning given in Schedule 11 – Integrated Management System Requirements.
- 1.305 “**Integrated Management System**” and “**IMS**” have the meaning given in Schedule 11 – Integrated Management System Requirements.
- 1.306 “**Intellectual Property**” means all intellectual and industrial property, including without limitation: (i) Trade-Marks; (ii) patents; (iii) copyrights; (iv) inventions, whether or not patentable, whether or not reduced to practice or whether or not yet made the subject of a pending patent application or applications; (v) ideas and conceptions of potentially patentable subject matter, including, without limitation, any patent disclosures, whether or not reduced to practice and whether or not yet made the subject of a pending patent application or applications; (vi) trade secrets and confidential, technical or business information (including ideas, formulas, compositions, designs, inventions, and conceptions of inventions whether patentable or unpatentable and whether or not reduced to practice); (vii) whether or not confidential, technology (including know-how and show-how), manufacturing and production processes and techniques, methodologies, research and development information, drawings, specifications, designs, plans, proposals, technical data, copyrightable works, marketing and business data, pricing and cost information, business and marketing plans; (xiv) copies and tangible embodiments of all the foregoing, in whatever form or medium; (ix) all rights to obtain and rights to apply for any of the foregoing and all rights therein provided by multinational treaties or conventions; (x) all rights under any agreements or instruments with respect to items in (i) to (ix)

above; and (xi) all rights to sue and recover and retain damages and costs and attorneys' fees for present and past infringement or other violation of any of the intellectual property rights hereinabove set out.

- 1.307 **“Intellectual Property Rights”** means all right, title and interest in, to and under the Intellectual Property in or associated with the Project Data and all Intellectual Property which, or the subject matter of which, is at any time before or after Commercial Close created, brought into existence, acquired, used or intended to be used by DB Co, any Subcontractor or by other third parties (for such third parties' use by or on behalf of or for the benefit of DB Co) for any or all of the purposes of:
- (a) the Works, including the design and construction of the New City Infrastructure and the New MTO Infrastructure (excluding Intellectual Property Rights of third parties, such as CAD software, that is used only in the process of design and construction); or
 - (b) the Project Agreement.
- 1.308 **“Interest Reference Rate”** means the reference benchmark rate of interest identified in the Financial Model and used in the calculation of the Project Debt Interest Cost, and for greater clarity, is the base rate of interest exclusive of any stated or imbedded spread, (including credit, swap or other types of spread) or fees.
- 1.309 **“Interface Agreement”** means that interface agreement entered into by DB Co, the City and RTG upon the execution and delivery of this Project Agreement, in the form attached hereto as Schedule 36 – Interface Agreement.
- 1.310 **“Irrecoverable Tax”** has the meaning given in Section 4.13(b) of the Project Agreement.
- 1.311 **“Issued For Construction”** has the meaning given in Section 3.12 of Schedule 10 – Review Procedure.
- 1.312 **“Jointly Developed Materials”** has the meaning given in Section 41.4(a) of the Project Agreement.
- 1.313 **“Key Individuals”** means those DB Co Parties listed in Schedule 9 - Key Individuals.
- 1.314 **“Key Works Milestones”** has the meaning given in Schedule 12 – Works Scheduling Requirements.
- 1.315 **“Lands”** has the meaning given in Schedule 20 – Lands.
- 1.316 **“Lane Closure”** has the meaning given in Schedule 34 – Mobility Matters.
- 1.317 **“Lane Closure Adjustment”** has the meaning given in Schedule 34 – Mobility Matters.
- 1.318 **“Latent Defect Warranty Period”** means the balance of the period after a Warranty Period during which DB Co remains responsible for correcting and Making Good of any Construction Latent Defect in accordance with Section 11.16(b)(iii) of the Project Agreement.
- 1.319 **“Legislative Holdback”** means the basic holdback to be retained pursuant to section 22(1) of the CA. For greater certainty, the amount of the holdback required by Part IV of the CA may be

- reduced by the amount of the holdback which has been paid by DB Co or the Construction Contractor in respect of Subcontracts certified complete under Section 33 of the CA in accordance with Section 25 of the CA.
- 1.320 “**Lenders**” means any or all of the persons acting arm’s length to DB Co and each DB Co Party who provide the Financing, and for greater clarity, excludes the Hedge Provider(s) or any other hedge providers and their respective permitted successors and assigns and any Affiliate of DB Co or a DB Co Party.
- 1.321 “**Lenders’ Agent**” has the meaning given in Schedule 4 – Lenders’ Direct Agreement.
- 1.322 “**Lenders’ Consultant**” means any consultant appointed from time to time by the Lenders. Nothing contained in the Project Documents and no action taken by the Lenders’ Consultant in connection with the Works or the Project Documents shall constitute direction and/or control by the City, DB Co or the Lenders.
- 1.323 “**Lenders’ Direct Agreement**” means the direct agreement to be entered into between the City, the Lenders’ Agent and DB Co in the form set out in Schedule 4 - Lenders’ Direct Agreement.
- 1.324 “**Lending Agreements**” means any or all of the agreements or instruments to be entered into by DB Co or any of its Affiliates relating to the Financing, including, for greater certainty, the Security Documents and the Hedging Agreements.
- 1.325 “**Letter of Credit Provider**” means the provider of a Standby Letter of Credit, and “**Letter of Credit Provider(s)**” means all providers of the Standby Letter(s) of Credit.
- 1.326 “**Letter of Good Standing**” means the document issued by IHSA to a person confirming that the internal maintenance audit performed by such person regarding its health and safety management systems has been approved by IHSA, and that such person has successfully completed such internal audit pursuant to the terms and conditions of the COR Program.
- 1.327 “**Licensor**” has the meaning given in Schedule 24 – Intellectual Property.
- 1.328 “**Limitations Act, 2002 (Ontario)**” means the *Limitations Act, 2002*, S.O. 2002, c.24, as amended from time to time.
- 1.329 “**Limited Modification Rights**” has the meaning given in Schedule 24 – Intellectual Property.
- 1.330 “**Listed DB Co PLAA**” means those DB Co Permits, Licences, Approvals and Agreements listed in Appendix A to Schedule 35 – Permits, Licences, Approvals and Agreements.
- 1.331 “**LMSF**” means the light maintenance storage facility further described in Schedule 15 – Output Specifications.
- 1.332 “**Load-Path Diagram**” means a graphically illustrated diagram that indicates in all relevant detail (including by use of colour-coded arrows indicating the directions of forces caused by dead loads, live loads, vertical loads and lateral loads) how the structural loads are transferred throughout a building or structure that is to be the subject of a Demolition.
- 1.333 “**Longstop Date**” has the meaning given in Section 36.1(a)(ii) of the Project Agreement.

- 1.334 **“Look-ahead Schedule”** has the meaning given in Schedule 12 – Works Scheduling Requirements.
- 1.335 **“Maintenance Instructions”** means the maintenance data prepared and delivered by DB Co to the City pursuant to Section 25.7 of the Project Agreement.
- 1.336 **“Major Construction Defect”** means any Construction Defect in respect of the System Infrastructure which, when measuring its most severe consequences during the period prior to rectification of such Construction Defect, causes an Aggregate Vehicle Kilometres Availability Ratio of (i) between [REDACTED]% and [REDACTED]% during Peak Period(s), or (ii) between [REDACTED]% and [REDACTED]84% on a full day basis.
- 1.337 **“Major Existing Third Party Infrastructure”** means the following infrastructure:
- (a) [REDACTED];
 - (b) [REDACTED];
 - (c) [REDACTED];
 - (d) [REDACTED];
 - (e) [REDACTED];
 - (f) [REDACTED];
 - (g) [REDACTED];
 - (h) [REDACTED];
 - (i) [REDACTED];
 - (j) [REDACTED];
 - (k) [REDACTED];
 - (l) [REDACTED];
 - (m) [REDACTED];
 - (n) [REDACTED];
 - (o) [REDACTED];
 - (p) [REDACTED];
 - (q) [REDACTED];
 - (r) [REDACTED];
 - (s) [REDACTED];

- (t) [REDACTED];
- (u) [REDACTED];
- (v) [REDACTED];
- (w) [REDACTED];
- (x) [REDACTED];
- (y) [REDACTED];
- (z) [REDACTED];
- (aa) [REDACTED];
- (bb) [REDACTED];
- (cc) [REDACTED];
- (dd) [REDACTED];
- (ee) [REDACTED];
- (ff) [REDACTED];
- (gg) [REDACTED];
- (hh) [REDACTED];
- (ii) [REDACTED];
- (jj) [REDACTED];
- (kk) [REDACTED];
- (ll) [REDACTED];
- (mm) [REDACTED];
- (nn) [REDACTED];
- (oo) [REDACTED];
- (pp) [REDACTED];
- (qq) [REDACTED]; and
- (rr) [REDACTED].

1.338 “**Make Good**”, “**Made Good**”, “**Making Good**” and derivatives thereof, means, as applicable, repairing, restoring, refurbishing, rehabilitating, removing and replacing or performing filling

operation on: (a) the Works as required under the Project Agreement; or (b) any existing components disturbed (including Existing Infrastructure and Stage 1 Connection Infrastructure) due to the Works, to at least the condition existing at the commencement of the Works, in terms of construction integrity, finishes, alignment with existing adjoining surfaces, compatibility of materials, sound attenuation criteria, exfiltration/infiltration requirements, air/vapour barrier and thermal continuity.

- 1.339 **“Medium Construction Defect”** means any Construction Defect in respect of the System Infrastructure which, when measuring its most severe consequences during the period prior to rectification of such Construction Defect, causes an Aggregate Vehicle Kilometres Availability Ratio of (i) between [REDACTED]% and [REDACTED]% during Peak Period(s), or (ii) between [REDACTED]% and [REDACTED]% on a full day basis.
- 1.340 **“Medium Non-Conformance”** means any Non-Conformance, or combination of Minor Non-Conformances, that:
- (a) contains significant deficiencies or does not generally conform with the requirements of the Project Agreement; or
 - (b) the continued existence of which is reasonably expected to result in DB Co becoming unable to satisfy the requirements of Substantial Completion.
- 1.341 **“MFIPPA”** means the *Municipal Freedom of Information and Protection of Privacy Act* (Ontario), R.S.O. 1990, c. M.56, as amended from time to time.
- 1.342 **“Milestone”** has the meaning given in Schedule 12 – Works Scheduling Requirements.
- 1.343 **“Minor Construction Defect”** means any Construction Defect that is not a Medium Construction Defect, Major Construction Defect or Critical Construction Defect.
- 1.344 **“Minor Deficiencies”** means any defects, deficiencies and items of outstanding work (including in relation to seasonal work) arising from or related to the work required to achieve Substantial Completion, and that would not materially impair:
- (a) the public’s, System Users’, or the City’s use, normal operation, and enjoyment of the New City Infrastructure or any third parties use and enjoyment of the New MTO Infrastructure;
 - (b) the performance of the Governmental Activities;
 - (c) safety, security, or traffic or track flow on the New City Infrastructure or New MTO Infrastructure in any relevant respect; or
 - (d) the performance of maintenance services in respect of the System Infrastructure by RTG.
- For greater certainty Minor Deficiencies shall not be applicable to nor shall Minor Deficiencies include Minor Deficiency Nominated Signalling Subcontractor Works.
- 1.345 **“Minor Deficiency Nominated Signalling Subcontractor Works”** means defects, deficiencies and items of outstanding work arising from or related to the Nominated Signalling Subcontractor Works.

1.346 “**Minor Deficiencies List**” has the meaning given in Section 25.10 of the Project Agreement.

1.347 “**Minor Non-Conformance**” means any Non-Conformance that:

- (a) generally conforms to the requirements of the Project Agreement, but in which immaterial deficiencies have been found that require correction in order to bring the Works fully into compliance with the Project Agreement; or
- (b) the continued existence of which is not reasonably expected to result in DB Co becoming unable to satisfy the requirements for Substantial Completion but may result in a Minor Deficiency.

1.348 “**Mislocated Utility Infrastructure**” means:

- (i) Utility Infrastructure that is discovered more than 200mm horizontally from the provided surveyed point via any Quality Level A investigation in the Subsurface Utility Engineering (SUE) Report;
- (ii) Utility Infrastructure that is discovered more than 150mm vertically from the provided surveyed point via any Quality Level A investigation in a Subsurface Utility Engineering (SUE) Report;
- (iii) Utility Infrastructure that is discovered more than 1500mm horizontally from the location provided via any Quality Level B investigation in a Subsurface Utility Engineering (SUE) Report;
- (iv) Utility Infrastructure that is discovered more than 2000mm horizontally from the location provided in the Quality Level C investigation in a Subsurface Utility Engineering (SUE) Report;
- (v) Utility Infrastructure that is discovered more than 3000mm horizontally from the location provided in the Quality Level D investigation in a Subsurface Utility Engineering (SUE) Report;
- (vi) Utility Infrastructure that is owned by the City that is discovered more than 600mm vertically from the location provided in a Subsurface Utility Engineering (SUE) Report; and
- (vii) Utility Infrastructure that is discovered more than 3000mm horizontally from the location provided in the Roll Plans.

1.349 “**Modification**” has the meaning given in Schedule 24 – Intellectual Property.

1.350 “**MOECC**” means the Ontario Ministry of the Environment and Climate Change, and any successor ministry thereto.

1.351 “**MOI**” means Her Majesty the Queen in right of Ontario as represented by the Minister of Infrastructure, and includes any successors thereto or persons exercising delegated power under the Minister’s authority.

- 1.352 “**MOL**” means Her Majesty the Queen in right of Ontario as represented by the Minister of Labour, and includes any successors thereto or persons exercising delegated power under the Minister’s authority.
- 1.353 “**Monthly Progress Report**” means a monthly progress report submitted by DB Co in accordance with Part 2 of Schedule 33 – Works Reports
- 1.354 “**MTO**” means Her Majesty the Queen in right of Ontario, as represented by the Minister of Transportation, and includes any successors thereto or persons exercising delegate power and such Minister’s authority.
- 1.355 “**MTO Jointly Developed Materials**” has the meaning given in Section 41.4(a)(ii) of the Project Agreement.
- 1.356 “**MTO Standards**” means the standards of MTO set out in Schedule 15 – Output Specifications.
- 1.357 “**Navigation Protection Act (Canada)**” means the *Navigation Protection Act*, R.S.C., 1985, c. N-22, as amended from time to time.
- 1.358 “**NCC**” means the National Capital Commission.
- 1.359 “**NCC Act**” means the *National Capital Act (Canada)*.
- 1.360 “**NCC Agreement In Principle**” means the agreement made between the City and the NCC on the 10th of May, 2016.
- 1.361 “**NCC Approval In Principle**” means the approval issued to the City by the NCC under the *National Capital Act* for the Western Light Rail Train (WLRT) project on January 23, 2017.
- 1.362 “**NCC FLUDTA**” means the federal land use, design and transaction approval of the NCC under the NCC Act required in respect of the change of use of, or erection, alteration, extension or demolition of a building or other work on, Crown Lands which are “public lands” within the “National Capital Region” (as such terms are defined in the NCC Act), as indicated in Schedule 35 – Permits, Licenses, Approvals and Agreements, which approval may include and be subject to conditions.
- 1.363 “**Near-Critical Activity(s)**” or “**Near Critical Path(s)**” means those Activities with a Float of less than 10 calendar days.
- 1.364 “**New City Infrastructure**” means the System Infrastructure and the New Municipal Infrastructure.
- 1.365 “**New MTO Infrastructure**” means the new, modified or improved infrastructure, as described in Schedule 15 - Output Specifications, to be installed, relocated, upgraded, reinstated, restored, downsized, designed and/or built by DB Co for MTO in accordance with the Project Agreement and in accordance with the applicable MTO Standards.
- 1.366 “**New Municipal Infrastructure**” means the new, modified or improved infrastructure described as such in Schedule 15 – Output Specifications, including as generally described in Section 2.3 of Part 1 Schedule 15-2, and all associated data, records, drawings, plans, reports and systems related thereto, all as described in the Project Agreement.

- 1.367 **“New Municipal Infrastructure Component”** means a component or element of the New Municipal Infrastructure, as set out in the Works Schedule.
- 1.368 **“New Municipal Infrastructure Component Acceptance”** means the point in time at which the City Engineer determines that an individual New Municipal Infrastructure Component has been completed in accordance with the Project Agreement and all requirements for New Municipal Infrastructure Component Acceptance described in the Output Specifications in respect of New Municipal Infrastructure Works have been satisfied; the New Municipal Infrastructure Component Works Requirements have been satisfied; and the issuance by the City Engineer of a New Municipal Infrastructure Component Acceptance Certificate.
- 1.369 **“New Municipal Infrastructure Component Acceptance Certificate”** means, in respect of an individual New Municipal Infrastructure Component, the certificate issued by the City Engineer to DB Co confirming acceptance of the applicable New Municipal Infrastructure Component.
- 1.370 **“New Municipal Infrastructure Component Acceptance Date”** means, in respect of an individual New Municipal Infrastructure Component, the date on which the City Engineer has issued a New Municipal Infrastructure Component Acceptance Certificate in respect of such New Municipal Infrastructure Component.
- 1.371 **“New Municipal Infrastructure Component Acceptance Notice”** has the meaning given in Section 11.27(d) of this Project Agreement.
- 1.372 **“New Municipal Infrastructure Component Works Requirements”** has the meaning given in Section 11.27(d) of this Project Agreement.
- 1.373 **“New Municipal Infrastructure Works”** means the design, construction, installation, testing and completion of the New Municipal Infrastructure as set out in the Output Specifications.
- 1.374 **“New Municipal Infrastructure Works Acceptance”** means the receipt by DB Co of New Municipal Infrastructure Component Acceptance Certificates for all New Municipal Infrastructure Components and completion and satisfaction of all Final New Municipal Infrastructure Works Requirements.
- 1.375 **“New Municipal Infrastructure Works Acceptance Date”** means the date in which New Municipal Infrastructure Works Acceptance is achieved.
- 1.376 **“New Municipal Infrastructure Works Component Countdown Notice”** has the meaning given in Section 11.27(c) of this Project Agreement.
- 1.377 **“No Default Payment Compensation Amount”** means, with respect to an amount and a specified period of time, such amount multiplied by (i) such period of time in days divided by the actual number of days in the current year multiplied by (ii) the rate of interest per annum in effect on each such day quoted by [REDACTED] from time to time as its reference rate for Canadian Dollar demand loans made to its commercial customers in Canada and which it refers to as its “prime rate”, as such rate may be changed by it from time to time.
- 1.378 **“Nominated Signalling Subcontract”** means that executed Subcontract between Construction Contractor and the Nominated Signalling Subcontractor substantially in the form attached as Schedule 13 – Nominated Signalling Subcontract to the RFP.

- 1.379 “**Nominated Signalling Subcontract Cash Allowance Account**” means the account established by the City in accordance with Section 11.31 of the Project Agreement for reimbursement of the costs of the Nominated Signalling Subcontractor Works.
- 1.380 “**Nominated Signalling Subcontract Milestone**” means a “Payment Milestone” (as defined in the Nominated Signalling Subcontract) set out in Schedule B – Subcontract Price and Payment Milestones of the Nominated Signalling Subcontract.
- 1.381 “**Nominated Signalling Subcontractor**” means [REDACTED].
- 1.382 “**Nominated Signalling Subcontractor Works**” means the scope of works to be undertaken by the Nominated Signalling Subcontractor in accordance with the Nominated Signalling Subcontract.
- 1.383 “**Nominated Signalling Contractor Works Cash Allowance**” has the meaning given in Section 11.31(c) of the Project Agreement.
- 1.384 “**Nominated Signalling Subcontractor Works Gainshare**” means the amount of \$[REDACTED].
- 1.385 “**Non-Conformance**” has the meaning given in Schedule 11 – Integrated Management System Requirements.
- 1.386 “**Non-Conformance Tracking System**” has the meaning given in Schedule 11 – Integrated Management System Requirements.
- 1.387 “**Non-Debt Compensation Amount**” has the meaning given in Section 33.6(b)(i)(A) of the Project Agreement.
- 1.388 “**Non-Default Termination Sum**” has the meaning given in Schedule 23 – Compensation on Termination.
- 1.389 “**Non-Disclosure Agreement**” has the meaning given in Section 6.3(f) of Schedule 27 – Dispute Resolution Procedure.
- 1.390 “**Non-Renewed Warranty Letter of Credit**” has the meaning given in Section 11.18(i) of the Project Agreement.
- 1.391 “**Non-Resident**” means a person that is, at the relevant time, a non-resident of Canada for the purposes of the *Income Tax Act* (Canada).
- 1.392 “**Notice**” has the meaning given in Section 51.1(a) of the Project Agreement.
- 1.393 “**Notice of Delegation**” has the meaning given in Section 25.16(b) of the Project Agreement.
- 1.394 “**Notice of Dispute**” has the meaning given in Section 1.3 of Schedule 27 – Dispute Resolution Procedure.
- 1.395 “**Notice of Project**” means a notice of project filed with the Ministry of Labour in compliance with O. Reg 213/91 under the *Occupational Health and Safety Act* (Ontario).

- 1.396 “**Occupational Health and Safety Act (Ontario)**” means the *Occupational Health and Safety Act*, R.S.O. 1990, C. o.1, as amended from time to time.
- 1.397 “**OHSAS 18001**” means the international standard for occupational health and safety management systems developed by the Occupational Health and Safety Advisory Services Project Group, a British body formed to develop the standard.
- 1.398 “**OHSAS 18001 Accreditation**” means, in respect of a person, such person having received certification in respect of its health and safety management systems that such systems comply with the requirements of OHSAS 18001.
- 1.399 “**Ontario Heritage Act (Ontario)**” means the *Ontario Heritage Act*, R.S.O. 1990, c. O.18, as amended from time to time.
- 1.400 “**Ontario Infrastructure and Lands Corporation Act, 2011, S.O. 2011**” means the *Ontario Infrastructure and Lands Corporation Act, 2011*, S.O. 2011, c. 9, Sch. 32, as amended from time to time.
- 1.401 “**Order**” has the meaning given in Schedule 30 - Insurance Trust Agreement.
- 1.402 “**Other Contractor**” means an Additional Contractor or a Third Party Contractor.
- 1.403 “**Other Works**” means the Additional Works and the Third Party Works.
- 1.404 “**Output Specifications**” means Schedule 15 – Output Specifications.
- 1.405 “**Overhead Contact System**” sometimes referred to as “Overhead Catenary System” has the meaning given in Schedule 15-1 - Technical Terms and Reference Documents.
- 1.406 “**Ownership**” has the meaning given in Schedule 24 – Intellectual Property.
- 1.407 “**PAR Meeting**” has the meaning given in Section 14.6(f) of the Project Agreement.
- 1.408 “**PAR Meeting Expiry Date**” has the meaning given in Section 14.6(g) of the Project Agreement.
- 1.409 “**Party**” means either the City or DB Co, and “**Parties**” means collectively the City and DB Co.
- 1.410 “**Party Representative**” has the meaning given in Section 2.1 of Schedule 27 – Dispute Resolution Procedure.
- 1.411 “**Patents**” includes all national (including the United States and Canada), regional and multinational statutory invention registrations, patents, patent registrations, patent applications, provisional patent applications, industrial designs, industrial models, including all reissues, divisions, continuations, continuations-in-part, extensions and re-examinations, and all rights therein provided by multinational treaties or conventions and all improvements to the inventions disclosed in each such registration, patent or application.
- 1.412 “**Pavement Design Report**” means a report prepared for the purpose of providing recommendations for removal, resurfacing, and/or reconstruction of existing or new pavement structure based on collected pavement and subsurface data.

- 1.413 **“Payment Certifier”** means the professional architect of record or the engineer of record for the Project.
- 1.414 **“Payment Compensation Amount”** means, with respect to an amount and a specified period of time, (i) such amount multiplied by (ii) such period of time in days divided by the actual number of days in the current year multiplied by (iii) the rate of interest per annum in effect on each such day equal to [REDACTED]% over the rate of interest per annum quoted by [REDACTED] from time to time as its reference rate for Canadian Dollar demand loans made to its commercial customers in Canada and which it refers to as its “prime rate”, as such rate may be changed by it from time to time.
- 1.415 **“Payment Period”** has the meaning given in Schedule 21 – Construction Period Payments.
- 1.416 **“PBS”** has the meaning given in Schedule 12 – Works Scheduling Requirements.
- 1.417 **“PBS Update”** has the meaning given in Schedule 12 – Works Scheduling Requirements.
- 1.418 **“PBS Submittal”** has the meaning given in Schedule 12 – Works Scheduling Requirements.
- 1.419 **“Peak Period”** means:
- (a) between the hours of 06:30 and 9:00 on each weekday which is not a statutory holiday in the Province of Ontario; and
 - (b) between the hours of 14:45 and 18:00 on each weekday which is not a statutory holiday in the Province of Ontario.
- 1.420 **“Performance Guarantee of Construction Guarantor”** means each performance guarantee given by the Construction Guarantors in the form set out in Schedule 29 – Form of Performance Guarantee of Construction Guarantor.
- 1.421 **“Performance Standards Regulation”** means Ontario Regulation 260/08 made under the *Professional Engineers Act* (Ontario).
- 1.422 **“Permits, Licences, Approvals and Agreements”** means the City Permits, Licences, Approvals and Agreements and the DB Co Permits, Licences, Approvals and Agreements, and **“Permits, Licences, Approvals or Agreements”** means any of the foregoing.
- 1.423 **“Permitted Borrowing”** means:
- (a) any advance to DB Co under the Lending Agreements;
 - (b) any additional financing approved by the City in accordance with Section 1.9 of Schedule 22 - Variation Procedure to the Project Agreement; and
 - (c) any amendment, waiver or exercise of a right under the Lending Agreements made during the Step-in Period that does not increase the City’s liabilities under the Project Agreement whether actual or contingent, present or future, known or unknown.
- 1.424 **“Personal Information”** means all personal information (as the term “personal information” is defined in the *Personal Information Protection and Electronic Documents Act* (Canada)) in the

- custody or control of DB Co or any DB Co Party other than personal information of the employees of DB Co or the DB Co Parties and other than personal information that is wholly unrelated to the Works and not derived directly or indirectly from the City in respect of the Project.
- 1.425 **“Personal Information Protection and Electronic Documents Act (Canada)”** means the *Personal Information Protection and Electronic Documents Act*, S.C. 2000, c. 5, as amended from time to time.
- 1.426 **“Planned Value”** has the meaning given in Schedule 12 – Works Scheduling Requirements.
- 1.427 **“Police Service”** means the Royal Canadian Mounted Police, the Ontario Provincial Police, the Ottawa Police Service and any other law enforcement agency with jurisdiction pursuant to Applicable Law, as applicable.
- 1.428 **“Post-Installation Checkout”** or **“PICO”** has the meaning given in Schedule 14 – Testing & Commissioning.
- 1.429 **“Pre-Final Design Development”** or **“PFDD”** has the meaning given in Schedule 10 – Review Procedure.
- 1.430 **“Prequalification Submission”** means DB Co’s response to the request for qualifications issued in respect of the Project on September 13, 2016.
- 1.431 **“Prequalified Subcontractor”** means any Subcontractor that was identified in the list of subcontractors submitted as part of DB Co’s Prequalification Submission, as amended pursuant to the process set out in the Request for Proposals.
- 1.432 **“Proceeding At Risk”** has the meaning given in Section 14.6(g) of the Project Agreement.
- 1.433 **“Proceeding At Risk Matter”** has the meaning given in Section 14.6(a) of the Project Agreement.
- 1.434 **“Proceeding At Risk Notice”** has the meaning given in Section 14.6(a) of the Project Agreement.
- 1.435 **“Proceedings Against the Crown Act (Ontario)”** means the *Proceedings Against the Crown Act*, R.S.O. 1990, c. P.27, as amended from time to time.
- 1.436 **“Procurement Monitoring and Implementation Plan”** has the meaning given in Section 11.24(a) of the Project Agreement.
- 1.437 **“Product”** means or **“Products”** mean material, machinery, equipment and fixtures forming the Works but does not include equipment or machinery used to prepare, fabricate, convey or erect the Works, which is referred to as construction machinery and equipment.
- 1.438 **“Professional Engineer”** means a professional engineer licensed by Professional Engineers Ontario to practice in the Province of Ontario.
- 1.439 **“Prohibited Act”** has the meaning given in Section 50.1(a) of the Project Agreement.

- 1.440 “**Project**” has the meaning given in the recitals to the Project Agreement.
- 1.441 “**Project Agreement**” has the meaning given in the recitals to the Project Agreement.
- 1.442 “**Project Agreement Arbitration**” has the meaning given in Section 11.1 of Schedule 27 – Dispute Resolution Procedure.
- 1.443 “**Project Co**” has the same meaning as “RTG”.
- 1.444 “**Project Co Party**” has the same meaning as “RTG Party”; and “**Project Co Parties**” has the same meaning as “RTG Parties”.
- 1.445 “**Project Data**” has the meaning given in Schedule 24 – Intellectual Property.
- 1.446 “**Project Debt Interest Cost**” means the budgeted amount of aggregate interest charges in respect of the Debt Amount used to calculate the Cost of the Financing portion of the Guaranteed Price.
- 1.447 “**Project Documents**” means the Ancillary Documents and the Lending Agreements.
- 1.448 “**Project Know-How**” means all ideas, concepts, alternatives, methodologies, processes, recommendations and suggestions developed by or through DB Co or any DB Co Party and revealed to or discovered by the City, whether before or after Commercial Close, which may be connected in any way to:
- (a) the Works, including the design and construction of the New City Infrastructure and the New MTO Infrastructure; or
 - (b) the Project Agreement.
- 1.449 “**Project Operations**” means the performance of the Works and the performance of all other obligations of DB Co under the Project Agreement.
- 1.450 “**Project Term**” means the period commencing on the date of the Project Agreement and expiring at midnight on the earlier of the Termination Date or latest Final Completion Date.
- 1.451 “**Project Zone of Influence**” has the meaning described in Part 3-7 (Instrumentation and Monitoring) of Schedule 15 – Output Specification.
- 1.452 “**Proprietor**” has the meaning given in Section 42.6(a) of the Project Agreement.
- 1.453 “**Protesters**” has the meaning given in Section 11.13(a) of the Project Agreement.
- 1.454 “**Province**” means Her Majesty the Queen in right of Ontario.
- 1.455 “**PS Services**” means those procurement support services performed by RTG in accordance with the PS Services Variation in respect of the scope, planning and administration of the City’s procurement of the Works pursuant to this Project Agreement.
- 1.456 “**PS Services Variation**” means that contract variation effective April 19, 2017, under the Stage 1 Project Agreement, governing performance of the PS Services under such project agreement.

- 1.457 **“Rail Transit Specific Change in Law”** means any Change in Law which principally affects or principally relates only to the design or construction of rail transit systems.
- 1.458 **“Railway Approvals”** means all consents, approvals, permissions and agreements, and amendments thereto, required to be obtained from a Railway Company pursuant to a Railway Order or Applicable Laws, for the carrying out of Works on land or improvements of a Railway Company, but does not include any Railway Orders.
- 1.459 **“Railway Company”** means CN, VIA Rail and any other railway company that owns or operates a rail service, any part of which is on any part of the Lands during the Project Term and **“Railway Companies”** means all of them.
- 1.460 **“Railway Order”** means any order of the Canadian Transportation Agency:
- (a) granted in favour of the City allowing or providing for:
 - (i) infrastructure comprising or to comprise New City Infrastructure or New MTO Infrastructure to be located upon and across land or improvements of a Railway Company; and
 - (ii) the construction, maintenance and use of such infrastructure upon and across such land or improvements; or
 - (b) for the carrying out of any Works on land or improvements of a Railway Company, and all amendments thereto.
- 1.461 **“Record Drawings”** means signed and sealed drawings prepared by the Professional Engineer or Architect, using As Built Drawings, after verifying the process in which the actual conditions of the completed project or applicable components as they are constructed, including any changes that were initiated due to site conditions or other causes and where all such changes are clearly identified through redlines in the As Built Drawings or by means of any other format agreed by the City.
- 1.462 **“Recoverable Tax”** has the meaning given in Section 4.13(c) of the Project Agreement.
- 1.463 **“Recovery Amount”** has the meaning given in Section 46.3(g) of the Project Agreement.
- 1.464 **“Recovery Schedule”** has the meaning given in Schedule 12 – Works Scheduling Requirements.
- 1.465 **“Recovery Schedule Report”** has the meaning given in Schedule 12 – Works Scheduling Requirements.
- 1.466 **“Refinancing”** has the meaning given in Schedule 28 – Refinancing.
- 1.467 **“Reference Documents”** means those documents identified as such in Article 3 of Schedule 15-1.
- 1.468 **“Reimbursement Event”** has the meaning given in Section 27.5(a) of the Project Agreement.
- 1.469 **“Reinstatement Plan”** has the meaning given in Section 11.9(f) of the Project Agreement.

- 1.470 “**Reinstatement Work**” has the meaning given in Section 11.9(b) of the Project Agreement.
- 1.471 “**Release**” has the meaning given in Schedule 17 – Environmental Obligations.
- 1.472 “**Relevant Change in Law**” means a Discriminatory Change in Law or a Rail Transit Specific Change in Law.
- 1.473 “**Relevant Conviction**” means a charge or conviction, at any time within the previous 6 years, of any offense: (i) of moral turpitude in Canada or elsewhere; (ii) for which records exist under the *Criminal Records Act*; or (iii) otherwise designated as a Relevant Conviction by the City from time to time, and that conviction remains in effect at that time and is one for which a pardon has not been granted.
- 1.474 “**Relief Event**” has the meaning given in Section 34.1(a) of the Project Agreement.
- 1.475 “**Remaining Systems Integration Works**” means those Systems Integration Works to be performed by City Parties in respect of integration of the Confederation Line East Extension and Confederation Line West Extension with the Existing Confederation Line, as described in Schedule 14 – Testing & Commissioning.
- 1.476 “**Remaining Works**” means those Works described in Article 18 of Part 1 of Schedule 15-2.
- 1.477 “**Remaining Works Cash Amount**” has the meaning given in Section 4.2(g) of the Project Agreement.
- 1.478 “**Remaining Works DB Co Commissioning**” means the DB Co Commissioning in respect of the Remaining Works.
- 1.479 “**Remaining Works Letter of Credit**” has the meaning given in Section 11.18A(a) of the Project Agreement.
- 1.480 “**Remaining Works Minor Deficiencies**” means any defect, deficiencies and items of outstanding work arising from or related to the Remaining Works, including any Minor Deficiencies.
- 1.481 “**Remaining Works Minor Deficiency Inspection Request**” has the meaning given in Section 25.12A(a) of the Project Agreement.
- 1.482 “**Remaining Works Minor Deficiencies List**” has the meaning given in Section 25.12A(a) of the Project Agreement.
- 1.483 “**Remaining Works Testing & Commissioning Plan**” means the Testing & Commissioning Plan for the Remaining Works included in the Testing & Commissioning Program.
- 1.484 “**Remaining Works Warranty Letter of Credit**” has the meaning given in Section 11.18B(a) of the Project Agreement.
- 1.485 “**Remaining Works Warranty Period**” means a period beginning on the West Final Completion Date and expiring on the date 2 years after such West Final Completion Date.

- 1.486 **“Remaining Works Warranty Works”** has the meaning given in Section 11.17(a)(iii) of the Project Agreement.
- 1.487 **“Request for Art Payment”** has the meaning given in Section 11.30(g) of the Project Agreement.
- 1.488 **“Request for Nominated Signalling Contractor Works Payment”** has the meaning given in Section 11.31(f) of the Project Agreement.
- 1.489 **“Request for Utility Works Payment”** has the meaning given in Section 11.29(h) of the Project Agreement.
- 1.490 **“Request for Proposals”** or **“RFP”** means the request for proposals issued in respect of the Project on June 26, 2017, as amended from time to time.
- 1.491 **“Restricted Person”** means any person who, or any member of a group of persons acting together, any one of which:
- (a) has, directly or indirectly, its principal or controlling office in a country that is subject to any economic or political sanctions imposed by Canada or Ontario;
 - (b) has as its primary business the illegal manufacture, sale, distribution or promotion of narcotics substances or arms, or is or has been involved in terrorism;
 - (c) in the case of an individual, (i) he or she has been convicted of any indictable offence less than five years prior to the date at which the consideration of whether such individual is a “Restricted Person” is made hereunder, whether or not such person received a custodial sentence; or (ii) he or she has been sentenced to a custodial sentence, other than a suspended sentence, for any regulatory offence other than under the *Highway Traffic Act* (Ontario) or corresponding legislation in any other jurisdiction less than five years prior to the date at which the consideration of whether such individual is a “Restricted Person” is made hereunder;
 - (d) in the case of a person other than an individual, (i) it or any of the members of its (or its general partner’s) board of directors or its senior executive managers has been convicted of any indictable offence less than five years prior to the date at which the consideration of whether such person is a “Restricted Person” is made hereunder, whether or not such person received a custodial sentence; or (ii) any of the members of its (or its general partner’s) board of directors or its senior executive managers has been sentenced to a custodial sentence, other than a suspended sentence, for any regulatory offence other than under the *Highway Traffic Act* (Ontario) or corresponding legislation in any other jurisdiction less than five years prior to the date at which the consideration of whether such person is a “Restricted Person” is made hereunder;
 - (e) has as its primary business the acquisition of distressed assets or investments in companies or organizations which are or are believed to be insolvent or in a financial standstill situation or potentially insolvent;
 - (f) is subject to a material claim of the City under any proceedings (including regulatory proceedings) which have been concluded or are pending at the time at which the consideration of whether such person is a “Restricted Person” is made hereunder, and

which (in respect of any such pending claim, if it were to be successful) would, in the City's view, in either case, be reasonably likely materially to affect the ability of DB Co to perform its obligations under the Project Agreement; or

- (g) has a material interest in the production of tobacco products.
- 1.492 **“Revenue Service Vehicle Kilometres”** means the total distance travelled by Vehicles in revenue service during a specified period, measured in Kilometres and reported to the City by RTG in RTG's monthly performance monitoring reports under the Stage 1 Project Agreement.
- 1.493 **“Review Procedure”** means the procedure set out in Schedule 10 - Review Procedure.
- 1.494 **“Review Procedure Activities”** means:
- (a) performance of the requirements of Schedule 10 – Review Procedure for all Works Submittals required to be delivered prior to Substantial Completion, including:
 - (i) all Submittals by DB Co;
 - (ii) City review periods and responses regarding Works Submittals;
 - (iii) amendment by DB Co, if required; and
 - (iv) re-submission by DB Co, if required;
 - (b) any other submission activities required by DB Co pursuant to the Project Agreement
- 1.495 **“Review Procedure Activities Register”** means a register of Review Procedure Activities which shall include the submission dates and review periods for all Works Submittals required under Schedule 10 – Review Procedure, Schedule 12 – Work Scheduling Requirements, and elsewhere in the Project Agreement.
- 1.496 **“RFP Financial Submission Deadline”** means October 22, 2018.
- 1.497 **“RFP Technical Submission Deadline”** means September 28, 2018.
- 1.498 **“Road Cut Permit”** has the meaning given in Schedule 15-1 - Technical Terms and Reference Documents.
- 1.499 **“Road Safety Audit Certificate”** has the meaning given in Schedule 15-1 - Technical Terms and Reference Documents.
- 1.500 **“Road Section”** has the meaning given in Part B of Schedule 34 – Mobility Matters.
- 1.501 **“Roadway”** has the meaning given in Schedule 15-1 - Technical Terms and Reference Documents.
- 1.502 **“Roadway Works”** has the meaning given in Schedule 15-1 - Technical Terms and Reference Documents.
- 1.503 **“Roll Plans”** means the following documents included in the Background Information:

- (a) [REDACTED]; and
 - (b) [REDACTED].
- 1.504 “RTG” means Rideau Transit Group General Partnership, a general partnership established under the laws of Ontario [REDACTED] and each of their permitted successors and assigns.
- 1.505 “RTG City Party Works” the RTG Systems Integration Works and the RTG Interface and Design Management Works.
- 1.506 “RTG Interface and Design Management Works” means the work and activities performed, or required to be performed by RTG or any RTG Party to assist with the design review, quality control management and testing and commissioning oversight, from a System Infrastructure maintenance and life cycle perspective pursuant to that contract variation effective April 24, 2019, under the Stage 1 Project Agreement, governing performance of such work and activities but excluding for clarity any RTG System Integration Work.
- 1.507 “RTG Party” means:
- (a) [REDACTED] (collectively the “RTG CC”)
 - (b) [REDACTED] (collectively the “RTG MC”);
 - (c) any person engaged by RTG, RTG CC or RTG MC from time to time as may be to procure or manage the provision of the scope of work under the project agreement dated February 12, 2013 between the City and RTG, as permitted by such project agreement; and
 - (d) in respect of each of the above, their subcontractors of any tier, agents, employees, officers and directors,
- and “RTG Parties” shall be construed accordingly
- 1.508 “RTG Stage 1 PA Works” means any work and activities performed, or required to be performed by RTG or any RTG Party pursuant to the Stage 1 Project Agreement, and the contract variations executed thereunder, but excluding the RTG City Party Works.
- 1.509 “RTG Systems Integration Works” means those Remaining Systems Integration Works performed, or required to be performed by RTG or any RTG Party in respect of integration of the Confederation Line East Extension and Confederation Line West Extension with the Existing Confederation Line, as described in Schedule 14 – Testing & Commissioning.
- 1.510 “RTG Works” means the RTG Stage 1 PA Works and RTG City Party Works.
- 1.511 “S&TCS” means signalling and train control system.
- 1.512 “Safety” has the meaning given in Schedule 15-1 - Technical Terms and Reference Documents.
- 1.513 “Schedule” means a schedule to the Project Agreement.
- 1.514 “Scheduled Final Completion Date” means either the East Scheduled Final Completion Date or West Scheduled Final Completion Date, as applicable.

- 1.515 **“Scheduled Revenue Service Vehicle Kilometres”** means the total revenue service vehicle kilometres required in a specified period by the City through the booking process set out in Article 3.3 of Appendix A to Schedule 15-3 of the Stage 1 Project Agreement, measured in kilometres and reported by RTG in RTG’s monthly performance monitoring reports under the Stage 1 Project Agreement.
- 1.516 **“Scheduled Substantial Completion Date”** means either the East Scheduled Substantial Completion Date or West Scheduled Substantial Completion Date, as applicable.
- 1.517 **“Security”** has the meaning given in Schedule 4 – Lenders’ Direct Agreement.
- 1.518 **“Security Documents”** has the meaning given in Schedule 4 – Lenders’ Direct Agreement.
- 1.519 **“Sensitive Information”** means financial or commercial information which would, if disclosed to a competitor of DB Co or any DB Co Party, give that competitor a competitive advantage over DB Co or such DB Co Party and thereby prejudice the business of DB Co or such DB Co Party.
- 1.520 **“Severe Market Disruption”** means any occurrence of exceptional circumstances in financial markets in Europe, the United States of America and/or Canada which:
- (a) results in the suspension or cessation of all or substantially all lending activity in national or relevant international capital or interbank markets; and
 - (b) adversely affects access by DB Co to such markets.
- 1.521 **“Shop Drawings”** means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by DB Co to illustrate details of a portion of the Works, indicating materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of the Works.
- 1.522 **“Site”** means, at any time and from time to time, that portion of the Lands:
- (a) on which DB Co or any DB Co Party is engaged in any Construction Activities or Demolition activities or is otherwise engaged in completing the Works;
 - (b) on which any of the Works have been commenced but not completed in their entirety;
 - (c) that are hoarded, cordoned, or otherwise fenced off by DB Co, and any Lands immediately surrounding such hoarding, cordons or fencing; or
 - (d) within the active construction footprint of the Works.
- 1.523 **“Site Acceptance Test”** or **“SAT”** has the meaning given in Schedule 14 – Testing & Commissioning.
- 1.524 **“Site Conditions”** means the condition of the Lands; including the physical, geophysical, climatic, ecological, environmental, geotechnical and archaeological conditions.
- 1.525 **“Small Works”** means any works, including facilities and equipment, of a minor nature that are requested by the City to be performed having an individual cost or aggregate cost with other

- linked works, including facilities and equipment, of a minor nature, not exceeding \$[REDACTED] (index linked), or as otherwise agreed from time to time, but excluding any works, including facilities and equipment, which will increase the likelihood of a Construction Period Quality Failure, or will increase the cost to DB Co of carrying out the Works.
- 1.526 “**Special Utility Debt Compensation Amount**” has the meaning given in Section 33.6(b)(i)(A) of the Project Agreement.
- 1.527 “**Species-at-Risk**” means any member of a species, subspecies, variety or genetically or geographically distinct population of animal, plant or other organism that is listed in the Species at Risk in Ontario List maintained pursuant to the ESA and any analogous federal list under the *Species at Risk Act* (Canada), and any other species that has been classified as being threatened or endangered under Applicable Law.
- 1.528 “**Stage 1 Connection Infrastructure**” means that portion of the Existing Confederation Line, to which the System Infrastructure is be directly connected, including in respect of the East Works, rail, drainage, OCS, traction power, CTS and train control at the Existing Confederation Line’s termination point at Blair station and, in respect of the West Works, rail, drainage, OCS, traction power, CTS and train control at the Existing Confederation Line’s termination point at Tunney’s Pasture.
- 1.529 “**Stage 1 Connection Infrastructure Final Report**” means a report to be issued to DB Co following RTG’s completion of construction and commissioning of such Stage 1 Connection Infrastructure, describing the specifications and actual as-built condition of the Stage 1 Connection Infrastructure.
- 1.530 “**Stage 1 Connection Infrastructure Preliminary Report**” means the documentation provided to DB Co in the folder titled “Stage 1 Connection Infrastructure Preliminary Report” in the electronic data room established in accordance with the RFP, describing the specifications for, and anticipated as-built condition of, the Stage 1 Connection Infrastructure.
- 1.531 “**Stage 1 Project Agreement**” means that project agreement between the City and RTG dated February 12, 2013, as varied and amended from time to time.
- 1.532 “**Stage 1 Systems Information**” means the documentation provided to DB Co in the folder titled “Stage 1 Systems Integration” in the electronic data room established in accordance with the RFP.
- 1.533 “**Stakeholders**” means individuals and organizations with an interest in the Project, including those listed in Schedule 15 - Output Specifications, but excluding the City.
- 1.534 “**Stakeholder Agreement**” has the meaning given in Section 10.3(f) of the Project Agreement.
- 1.535 “**Standards & Guidelines for Conservation of Provincial Heritage Properties**” means the Standards & Guidelines for Conservation of Provincial Heritage Properties issued under the *Ontario Heritage Act* (Ontario) on April 28, 2010, as amended from time to time.
- 1.536 “**Standby Letter of Credit**” means a letter of credit attached as Schedule 7A – Standby Letter(s) of Credit, and “**Standby Letter(s) of Credit or Standby Letters of Credit**” means all letters of credit attached as Schedule 7A – Standby Letter(s) of Credit.

- 1.537 “**Start-Up Meeting**” has the meaning given in Section 11.2(a) of the Project Agreement.
- 1.538 “**Station**” has the meaning given in Schedule 15-1 - Technical Terms and Reference Documents
- 1.539 “**Step-in Period**” has the meaning given in Schedule 4 – Lenders’ Direct Agreement.
- 1.540 “**Stormwater management**” has the meaning given in Schedule 15-1 - Technical Terms and Reference Documents.
- 1.541 “**Structure**” has the meaning given in Schedule 15-1 - Technical Terms and Reference Documents.
- 1.542 “**Subcontract**” or “**Subcontracts**” means the contracts entered into by or between DB Co and any Subcontractor or between any Subcontractor at any tier, including the Construction Contractor, and any other Subcontractor at any tier in relation to any aspect of the Works.
- 1.543 “**Subcontractor**” means any subcontractor of DB Co engaged by or through DB Co to perform any of the Works, including the Construction Contractor, any Supplier or consultant, and any subcontractor of any other subcontractor at any tier.
- 1.544 “**Subcontractor’s Direct Agreement**” means the agreement to be entered into among the City, DB Co, the Construction Contractor and certain Subcontractors determined in accordance with the terms of the Project Agreement in the form set out in Schedule 3 – Subcontractor’s Direct Agreement.
- 1.545 “**Submittal(s)**” means a Works Submittal.
- 1.546 “**Subsequent Notice**” means any East Subsequent Notice or West Subsequent Notice.
- 1.547 “**Substantial Completion**” means either East Substantial Completion or West Substantial Completion, as applicable.
- 1.548 “**Substantial Completion Certificate**” means either the East Substantial Completion Certificate or West Substantial Completion Certificate, as applicable.
- 1.549 “**Substantial Completion Date**” means either the East Substantial Completion Date or West Substantial Completion Date, as applicable.
- 1.550 “**Substantial Completion Notice**” has the meaning given in Section 25.4(b) of the Project Agreement.
- 1.551 “**Substantial Completion Payment**” means either the East Substantial Completion Payment or West Substantial Completion Payment, as applicable.
- 1.552 “**Substantial Completion Payment Date**” means either the East Substantial Completion Payment Date or West Substantial Completion Payment Date, as applicable.
- 1.553 “**Subsurface Utility Engineering (SUE) Reports**” means:
- (a) [REDACTED]; and
 - (b) [REDACTED].

- 1.554 “**Supplier**” means a person who supplies to DB Co, or to any Subcontractor, any equipment, materials, supplies or services as part of, or for, the Works.
- 1.555 “**Systems**” has the meaning given in Schedule 15-1.
- 1.556 “**System Extension**” has the meaning given in Schedule 37 – Extension and Additional Phases.
- 1.557 “**System Infrastructure**” means the new, modified or improved infrastructure described as such in Schedule 15 – Output Specifications, including as generally described in Section 2.2 of Part 1 of Schedule 15-2, and all associated data, records, drawings, plans, reports and systems related thereto, all as described in the Project Agreement.
- 1.558 “**Systems Integration Dispute**” has the meaning given in Section 1.1(n) of Schedule 14 – Testing & Commissioning.
- 1.559 “**Systems Integration Management Plan**” or “**SIMP**” has the meaning given in Schedule 15-2, Part 1, Article 11 – Systems Integration Program.
- 1.560 “**Systems Integration Test**” or “**SIT**” has the meaning given in Schedule 14 – Testing & Commissioning.
- 1.561 “**Systems Integration Verifier**” has the meaning given in Section 1.1(n) of Schedule 14 – Testing & Commissioning.
- 1.562 “**Systems Integration Works**” means the overall sequential integration of each of the Confederation Line East Extension and the Confederation Line West Extension with the Existing Confederation Line and the integration of each with the Existing Confederation Line system such that the Confederation Line East Extension, Confederation Line West Extension and the Existing Confederation Line function together as one coherent working rail transit system as envisaged by Schedule 15 – 2 Part 1 and Schedule 15 – 2 Part 3 and Schedule 14 – Testing & Commissioning.
- 1.563 “**System Integrator**” means the role performed by DB Co in relation to Systems Integration as described in Schedule 14 – Testing & Commissioning.
- 1.564 “**System User**” means any member of the public, any City Party and any other person that is on or about the New City Infrastructure or is otherwise making use of the New City Infrastructure for any purpose, including customers, employees, consultants or contractors of the City.
- 1.565 “**Tax**” or “**Taxes**” means any and all taxes, levies, imposts, duties, fees, withholdings, assessments, deductions or charges whatsoever, imposed, assessed, levied or collected by any Governmental Authority, together with interest thereon and penalties with respect thereto, and includes all HST except where stated to the contrary, provided however that “**Taxes**” shall not include the City Taxes.
- 1.566 “**Technical Information**” has the meaning given in Schedule 24 – Intellectual Property.
- 1.567 “**Technical Reports**” means the Environmental Reports, the Geotechnical Reports, the Archaeological Reports, and the Cultural Heritage Reports.
- 1.568 “**Termination Date**” means the earlier of the Expiry Date and such other date, if any, on which termination of the Project Agreement takes effect in accordance with its terms.

- 1.569 **“Testing & Commissioning Coordinator”** has the meaning given in Section 1.2 of Schedule 14 – Testing & Commissioning.
- 1.570 **“Testing & Commissioning Plan”** means the testing and commissioning plan developed by DB Co in accordance with Schedule 14 – Testing & Commissioning for any of the East Works, West Works, Highway Works or Remaining Works, comprising part of the Testing & Commissioning Program.
- 1.571 **“Testing & Commissioning Program”** means the program, comprised of DB Co’s Testing & Commissioning Plans for each of the East Works, West Works, Highway Works or Remaining Works, submitted by DB Co in accordance with Schedule 14 – Testing and Commissioning and the Review Procedure, and assigned either “NO COMMENT” or “MINOR COMMENT”.
- 1.572 **“Testing & Commissioning Schedule”** has the meaning given in Section 8 of Schedule 12 – Works Scheduling Requirements.
- 1.573 **“Testing & Commissioning Team”** has the meaning given in Section 1.4 of Schedule 14 – Testing & Commissioning.
- 1.574 **“Third Party Arbitration”** has the meaning given in Section 11.1 of Schedule 27 – Dispute Resolution Procedure.
- 1.575 **“Third Party Contractors”** means any person (not being, for the avoidance of doubt, DB Co or any DB Co Party, Additional Contractors, RTG or any RTG Party) that carries out any Third Party Works.
- 1.576 **“Third Party Facilities”** means telephone facilities, infrastructure and other property of Utility Companies and Railway Companies and other public facilities and associated equipment, plant, materials and apparatus installed and operated or to be installed and operated on the Lands by any transit authority, communications provider, Utility Company, Railway Company or other third party (not including, for the avoidance of doubt, DB Co or any DB Co Party).
- 1.577 **“Third Party Lands”** means the Highway Corridor Lands.
- 1.578 **“Third Party Litigation”** has the meaning given in Section 11.2 of Schedule 27 – Dispute Resolution Procedure.
- 1.579 **“Third Party Works”** means any work performed by a Third Party Contractor on the Lands, including works in relation to,
- (a) an Encumbrance;
 - (b) Existing Infrastructure (other than Existing Infrastructure owned by the City or MTO);
 - (c) Third Party Facilities; and
 - (d) Utility Work and work pursuant to a Utility Agreement, Railway Order or an encroachment permit or other permitting authority of any Governmental Authority under Applicable Law.
- 1.580 **“TOCC”** means transit operations control centre.

- 1.581 **“Total Capital Cost Incurred to Date”** has the meaning given in Schedule 21 – Construction Period Payments.
- 1.582 **“Track”** has the meaning given in Schedule 15-1 - Technical Terms and Reference Documents.
- 1.583 **“Traction Power”** has the meaning given in Schedule 15-1 - Technical Terms and Reference Documents.
- 1.584 **“Traction Power Load Flow Study”** means a study that determines the number, locations and ratings of the traction power (TP) substations needed to support train operations. Determines the configuration and conductor sizes of the along-track dc distribution system. Sizes the major traction power equipment, such as substations’ dc circuit breakers and dc feeders.
- 1.585 **“Trade-Marks”** means all trademarks, service marks, trade dress, logos, distinguishing guises and indicia, trade names, corporate names, business names, domain names, whether or not registered, including all common law rights, and registrations, applications for registration and renewals thereof, including, but not limited to, all marks registered in the Canadian Intellectual Property Office and the trademark offices of other nations throughout the world, and all rights therein provided by multinational treaties or conventions.
- 1.586 **“Traffic and Transit Management Plan”** or **“TTMP”** has the meaning given in Schedule 15-1.
- 1.587 **“Transitway”** has the meaning given in Schedule 15-1 - Technical Terms and Reference Documents.
- 1.588 **“Transit System”** means any operating transit system that DB Co may encounter during the performance of its obligations under this Project Agreement.
- 1.589 **“Tree Compensation Plan”** has the meaning given in Schedule 15-1 - Technical Terms and Reference Documents.
- 1.590 **“Tree Mitigation Plan”** has the meaning given in Schedule 15-1 - Technical Terms and Reference Documents.
- 1.591 **“Trespassers”** has the meaning given in Section 11.13(a) of the Project Agreement.
- 1.592 **“Trial Running”** has the meaning given in Schedule 15-1 - Technical Terms and Reference Documents.
- 1.593 **“Tunnel”** has the meaning given in Schedule 15-1 - Technical Terms and Reference Documents
- 1.594 **“Underground Structures”** has the meaning given in Schedule 15-1 - Technical Terms and Reference Documents.
- 1.595 **“Universal Design”** has the meaning given in Schedule 15-1 - Technical Terms and Reference Documents.
- 1.596 **“Unpaid Construction Period Payment”** has the meaning given in Schedule 21 – Construction Period Payments.

- 1.597 “**Utilities**” means energy/power supplies, communications, data transmission and waste recovery, including electricity, natural gas/fuel oil, water, sanitary waste and storm water.
- 1.598 “**Utility Baseline Report**” means the utility baseline report included herein as Schedule 38 – Utility Baseline Report, as may be amended in accordance with its terms.
- 1.599 “**Utility Agreement**” means any agreement entered into by DB Co with a Utility Company in connection with the design removal, construction, installation, repair, preservation, relocation or maintenance of Utility Infrastructure in, on, under, over or adjacent to the Lands, and includes any site or other permits issued thereunder or pursuant thereto, all as amended, supplemented or replaced from time to time.
- 1.600 “**Utility Company**” means the owner or operator of any Utility Infrastructure or any company or companies designated by DB Co to provide Utilities.
- 1.601 “**Utility Company Self-Performed Works**” means the temporary and permanent installation, protection, removal, relocation, upgrading, reinstatement, restoration, downsizing, designing, and/or building works relating to Utility Infrastructure carried out by a Utility Company under a Utility Agreement in connection with or as part of the Project Operations, and identified as being subject to a Cash Allowance in Article 8 of Part 2 of Schedule 15-2 of the Output Specifications.
- 1.602 “**Utility Company Works Cash Allowance**” has the meaning given in Section 11.29(f) of the Project Agreement.
- 1.603 “**Utility Infrastructure**” means privately, publicly or cooperatively owned lines, facilities or systems for transmitting or distributing electricity, lighting, data, communications, gas, oil and petroleum products, water, storm water or sewage, wireless, or other similar commodity or substance which serve the public directly or indirectly, including underground, surface and overhead facilities as well as facilities which use common poles, ducts or conduits on a shared basis, and all related infrastructure.
- 1.604 “**Utility Works**” means the DB Co Utility Works and the Utility Company Self-Performed Works.
- 1.605 “**Utility Works Cost**” means the actual cost of performing the Utility Company Self Performed Works.
- 1.606 “**Utility Works Fee**” has the meaning given in Section 11.29(g) of the Project Agreement.
- 1.607 “**Variation**” has the meaning given in Schedule 22 - Variation Procedure.
- 1.608 “**Variation Confirmation**” has the meaning given in Schedule 22 - Variation Procedure.
- 1.609 “**Variation Directive**” has the meaning given in Schedule 22 - Variation Procedure.
- 1.610 “**Variation Enquiry**” has the meaning given in Schedule 22 - Variation Procedure.
- 1.611 “**Variation Procedure**” means the procedure set out in Schedule 22 - Variation Procedure.
- 1.612 “**Vehicles**” has the meaning given in Schedule 15-1 - Technical Terms and Reference Documents.

- 1.613 “**VIA**” means Via Rail Canada and its successors.
- 1.614 “**Warranty Cash Amount**” means either the East Warranty Cash Amount or West Warranty Cash Amount.
- 1.615 “**Warranty Letter of Credit**” has the meaning given in Section 11.18(a) of the Project Agreement.
- 1.616 “**Warranty Period**” means each of the East Warranty Period, West Warranty Period and Remaining Works Warranty Period, as applicable.
- 1.617 “**Warranty Protocol**” has the meaning given in Schedule 36 – Interface Agreement.
- 1.618 “**Warranty Request**” has the meaning given in Schedule 36 – Interface Agreement.
- 1.619 “**Warranty Work**” means all work, including any work to correct Construction Defects and Construction Latent Defects to satisfy the warranties provided pursuant to Section 11.16, and in accordance with the applicable Warranty Period. For clarity, this shall include all work required to Make Good any damage to other works caused by the repairing of such defects, deficiencies or failures to comply to the Project Agreement.
- 1.620 “**Weekday**” means Monday, Tuesday, Wednesday, Thursday, or Friday.
- 1.621 “**West Anticipated Final Completion Date**” means the date (which, for greater certainty, will be on or before the West Scheduled Final Completion Date) on which DB Co anticipates that West Final Completion will be achieved.
- 1.622 “**West Anticipated Substantial Completion Date**” has the meaning given in Section 25.5(a)(ii) of the Project Agreement.
- 1.623 “**West Completion Holdback**” has the meaning given in Section 25.10(b) of the Project Agreement.
- 1.624 “**West Construction Defect**” has the meaning given in Section 11.15(b) of the Project Agreement.
- 1.625 “**West DB Co Commissioning**” means the DB Co Commissioning in respect of the West Works other than the Highway Works.
- 1.626 “**West Final Completion**” means the completion of the West Works in accordance with the Project Agreement, including completion of all West Minor Deficiencies, Remaining Works, Remaining Works Minor Deficiencies.
- 1.627 “**West Final Completion Countdown Notice**” has the meaning given in Section 25.13(a)(ii) of the Project Agreement.
- 1.628 “**West Final Completion Certificate**” means the certificate to be issued by the Independent Certifier in accordance with Section 25.14(g) of the Project Agreement in respect of West Final Completion.

- 1.629 “**West Final Completion Date**” means the date on which West Final Completion is achieved as evidenced by the West Final Completion Certificate, as such date shall be stated therein.
- 1.630 “**West Final Completion Notice**” has the meaning given in Section 25.14(c) of the Project Agreement.
- 1.631 “**West Further Revised Substantial Completion Date**” has the meaning given in Section 25.5(k) of the Project Agreement.
- 1.632 “**West Initial Countdown Notice**” has the meaning given in Section 25.5(a)(ii) of the Project Agreement.
- 1.633 “**West Minor Deficiencies**” has the meaning given in Section 25.10(b) of the Project Agreement.
- 1.634 “**West Minor Deficiencies List**” has the meaning given in Section 25.10(b) of the Project Agreement.
- 1.635 “**West Revised Substantial Completion Date**” has the meaning given in Section 25.5(h) of the Project Agreement.
- 1.636 “**West Scheduled Substantial Completion Date**” means May 25, 2025, as such date may be amended pursuant to Section 32 of the Project Agreement.
- 1.637 “**West Scheduled Final Completion Date**” means the date that is two years following the West Substantial Completion Date.
- 1.638 “**West Subsequent Notice**” has the meaning given in Section 25.5(h) of the Project Agreement.
- 1.639 “**West Substantial Completion**” means the point at which, in respect of the West Works, (i) the New City Infrastructure and New MTO Infrastructure comprising the West Works, other than the Remaining Works, have been completed in accordance with the Project Agreement; (ii) the Payment Certifier appointed pursuant to Section 17.3(g) of the Project Agreement has certified the substantial performance of the Design and Construction Contract and the related certificate of substantial performance has been published, each in accordance with the CA; and (iii) all requirements for West Substantial Completion described in the West Testing & Commissioning Plan and Highway Testing & Commissioning Plan, other than in respect of West Minor Deficiencies, the Remaining Works, the Remaining Works Minor Deficiencies and Trial Running have been satisfied in respect of the New City Infrastructure as a whole.
- 1.640 “**West Substantial Completion Certificate**” means the certificate to be issued by the Independent Certifier in accordance with Section 25.4(d) of the Project Agreement.
- 1.641 “**West Substantial Completion Date**” means the date on which West Substantial Completion is achieved as evidenced by the West Substantial Completion Certificate, as such date shall be stated therein.
- 1.642 “**West Substantial Completion Notice**” has the meaning given in Section 25.4(b)(ii) of the Project Agreement.
- 1.643 “**West Substantial Completion Payment**” means the amount of \$[REDACTED], less the West Completion Holdback as at the West Substantial Completion Payment Date.

- 1.644 “**West Substantial Completion Payment Date**” means the date that is 2 Business Days after the West Substantial Completion Date.
- 1.645 “**West Testing & Commissioning Plan**” means the Testing & Commissioning Plan for the West Works (other than Highway Works) included in the Testing & Commissioning Program.
- 1.646 “**West Warranty Cash Amount**” has the meaning given in Section 4.2(c)(ii) of the Project Agreement.
- 1.647 “**West Warranty Letter of Credit**” has the meaning given in Section 11.18(a)(ii) of the Project Agreement.
- 1.648 “**West Warranty Period**” means:
- (a) in respect of the West Works other than in respect of New Municipal Infrastructure and New MTO Infrastructure, a period beginning on the West Substantial Completion Date and expiring on the date 2 years after such West Substantial Completion Date;
 - (b) in respect of each New Municipal Construction Component comprising part of the West Works, a period beginning on the New Municipal Infrastructure Component Acceptance Date for such New Municipal Construction Component, and expiring on the date 2 years after such New Municipal Infrastructure Component Acceptance Date; and
 - (c) in respect of New MTO Infrastructure, a period beginning on the applicable Handover for such New MTO Infrastructure, and expiring on the date 2 years after such Handover.
- 1.649 “**West Warranty Work**” has the meaning given in Section 11.17(a)(ii) of the Project Agreement.
- 1.650 “**West Works**” means the Works as it relates to the Confederation Line West Extension, as generally described in Article 19 of Part 1 of Schedule 15-2, and all Highway Works related thereto.
- 1.651 “**Witness Point**” has the meaning given in Schedule 11 – Integrated Management System Requirements.
- 1.652 “**Works**” means the design, construction, installation, testing, commissioning and completion of the New City Infrastructure and the New MTO Infrastructure, and the rectification of any Minor Deficiencies, Remaining Works Minor Deficiencies, Warranty Work, all other work under the Permits, Licences, Approvals and Agreements, and all work which is implied by the Project Agreement and that is necessary for the stability or safe and proper design, construction, installation, testing, commissioning and completion of the New City Infrastructure and the New MTO Infrastructure, except for all work which is expressly described in this Project Agreement, including Schedule 35 – Permits, Licences, Approvals and Agreements, as being the responsibility of the City.
- 1.653 “**Works Area Micro-Schedule**” has the meaning given in Schedule 12 – Works Scheduling Requirements.
- 1.654 “**Works Change in Law**” means any Change in Law that:
- (a) is not a Relevant Change in Law;

- (b) occurs after the date that is 30 days prior to the RFP Technical Submission Deadline;
 - (c) requires DB Co to perform any work of alteration, addition, Demolition, extension or variation in the quality or function of the New City Infrastructure or the New MTO Infrastructure which is similar in nature to the Works but is not Works or capital replacement work which DB Co would otherwise be required to perform in order to comply with its obligations under the Project Agreement; and
 - (d) was not reasonably foreseeable at the RFP Technical Submission Deadline by an experienced contractor carrying out activities and/or performing design and/or other operations similar to those to be carried out and/or performed by any DB Co Party in relation to the Project.
- 1.655 “**Works Committee**” has the meaning given in Section 14.1(a) of the Project Agreement.
- 1.656 “**Works Committee End Date**” has the meaning given in Section 14.3(a) of the Project Agreement.
- 1.657 “**Works Report**” means those updates and reports to be issued by DB Co in accordance with Schedule 33 – Works Reports.
- 1.658 “**Works Schedules**” has the meaning given in Schedule 12 – Works Scheduling Requirements.
- 1.659 “**Works Submittals**” has the meaning given in Section 1.1 of Schedule 10 - Review Procedure.
- 1.660 “**WSIB**” means the Ontario Workplace Safety and Insurance Board that is responsible for administering the *Workplace Safety and Insurance Act*, 1997, S.O. ch.16, Sch. A (Ontario).
- 1.661 “**Zone of Influence**” has the meaning given in Schedule 15-1 - Technical Terms and Reference Documents.
2. **Interpretation.** The Project Agreement shall be interpreted according to the following provisions, unless the context requires a different meaning:
- 2.1 The tables of contents, headings, marginal notes and references to them in the Project Agreement are for convenience of reference only, shall not constitute a part of the Project Agreement, and shall not be taken into consideration in the interpretation of, or affect the meaning of, the Project Agreement.
- 2.2 Except where the context requires otherwise (irrespective of whether some, but not all, references in a Schedule specifically refer to that Schedule or to other portions of the Project Agreement) references to specific Sections, Articles, Clauses, Paragraphs, Subparagraphs, Schedules, and other divisions of the Project Agreement are references to such Sections, Articles, Clauses, Paragraphs, or Subparagraphs of, Schedules to, or divisions of the Project Agreement and the terms “Section”, “Article” and “Clause” are used interchangeably and are synonymous.
- 2.3 Except where the context requires otherwise, references to specific Sections, Articles, Clauses, Paragraphs, Subparagraphs, Schedules, and other divisions of the Project Agreement followed by a number are references to the whole of the Section, Article, Clause, Paragraph, Subparagraphs, Schedule or other division of the Project Agreement as applicable, bearing that number, including all subsidiary provisions containing that same number as a prefix.

- 2.4 Except where the context requires otherwise, references in the Output Specifications to specific Parts, Sections, Articles, Clauses, Paragraphs, Subparagraphs, Schedules, and other divisions of the Output Specifications shall be construed such that each such reference on a page of the Output Specifications will be read to be preceded by and to include the prefix Section number or other reference at the top of the applicable page, and all cross-references to any Section in Schedule 15 – Output Specifications shall be interpreted to include the applicable prefix Section number or other reference.
- 2.5 The Schedules to the Project Agreement are an integral part of the Project Agreement and a reference to the Project Agreement includes a reference to the Schedules.
- 2.6 All references in the Project Agreement to a Schedule shall be to a Schedule of the Project Agreement.
- 2.7 All capitalized terms used in a Schedule shall have the meanings given to such terms in Schedule 1, unless stated otherwise in a particular Schedule in which case such definition shall have the meaning given to it in that Schedule solely for the purposes of that Schedule.
- 2.8 The language of the Output Specifications and other documents comprising the Project Agreement is in many cases written in the imperative for brevity. Clauses containing instructions, directions or obligations are directed to DB Co and shall be construed and interpreted as if the words “DB Co shall” immediately preceded the instructions, directions or obligations.
- 2.9 Words importing persons or parties are to be broadly interpreted and include an individual, corporation, limited liability company, joint stock company, firm, partnership, joint venture, trust, unincorporated organization, Governmental Authority, unincorporated body of persons or association and any other entity having legal capacity, and the heirs, beneficiaries, executors, administrators or other legal representatives of a person in such capacity.
- 2.10 Unless the context otherwise requires, wherever used herein the plural includes the singular, the singular includes the plural, and each of the masculine, feminine and neuter genders include all other genders.
- 2.11 Unless otherwise provided in the Project Agreement, all accounting and financial terms used in the Project Agreement shall be interpreted and applied in accordance with Canadian GAAP.
- 2.12 References to any standard, principle, agreement or document include (subject to all relevant approvals and any other provisions of the Project Agreement concerning amendments) a reference to that standard, principle, agreement or document as amended, supplemented, restated, substituted, replaced, novated or assigned.
- 2.13 References to any Applicable Law, including any statutes or other Applicable Law specifically referred to herein, whether or not amendments or successors to such Applicable Law are referred to herein, are to be construed as references to that Applicable Law as from time to time amended or to any Applicable Law covering the same or similar subject matter from time to time replacing, extending, consolidating or amending the same.
- 2.14 References to a statute shall include all regulations, by-laws, ordinances and orders made under or pursuant to the statute.

- 2.15 References to persons shall include their successors and assigns. References to a public organization shall include their successors and assigns, and if a public organization ceases to exist or ceases to perform its functions without a successor or assign, references to such public organization shall be deemed to include a reference to any public organization or any organization or entity which has taken over either or both the functions and responsibilities of such public organization.
- 2.16 A reference in the Project Agreement or in any Project Document to any right, power, obligation or responsibility of any Governmental Authority shall be deemed to be a reference to the Governmental Authority that, pursuant to Applicable Laws has such right, power, obligation or responsibility at the relevant time.
- 2.17 References to a deliberate act or omission or deliberate or negligent act or omission of any City Party shall be construed having regard to the interactive nature of the activities of the City Party and DB Co and further having regard to:
- (a) acts contemplated by the Output Specifications; or
 - (b) acts otherwise provided for in the Project Agreement.
- 2.18 The words in the Project Agreement shall bear their natural meaning.
- 2.19 Each of DB Co's and the City's respective obligations shall be construed as separate obligations owed to the other.
- 2.20 References containing terms such as:
- (a) "hereof", "herein", "hereto", "hereinafter", and other terms of like import are not limited in applicability to the specific provision within which such references are set forth but instead refer to the Project Agreement taken as a whole; and
 - (b) "includes" and "including", whether or not used with the words "without limitation" or "but not limited to", shall not be deemed limited by the specific enumeration of items but shall, in all cases, be deemed to be without limitation and construed and interpreted to mean "includes without limitation" and "including without limitation".
- 2.21 In construing the Project Agreement, the rule known as the *ejusdem generis* rule shall not apply nor shall any similar rule or approach apply to the construction of the Project Agreement and, accordingly, general words introduced or followed by the word "other" or "including" or "such as" or "in particular" shall not be given a restrictive meaning because they are followed or preceded (as the case may be) by particular examples intended to fall within the meaning of the general words.
- 2.22 Where the Project Agreement states that an obligation shall be performed "no later than" or "within" or "by" a stipulated date or event which is a prescribed number of days after a stipulated date or event, the latest time for performance shall be 5:00 p.m. on the last day for performance of the obligation concerned, or, if that day is not a Business Day, 5:00 p.m. on the next Business Day.
- 2.23 Where the Project Agreement states that an obligation shall be performed "no later than" or "by" a prescribed number of days before a stipulated date or event or "by" a date which is a prescribed

- number of days before a stipulated date or event, the latest time for performance shall be 5:00 p.m. on the last day for performance of the obligation concerned, or if that day is not a Business Day, 5:00 p.m. on the next Business Day.
- 2.24 Where the Project Agreement states that an obligation shall be performed “on” a stipulated date, the latest time for performance shall be 5:00 p.m. on that day, or, if that day is not a Business Day, 5:00 p.m. on the next Business Day.
- 2.25 Any reference to time of day or date means the local time or date in Ottawa, Ontario. Any reference to a stipulated “day” which is not specifically referred to as a “Business Day” shall be deemed to be a calendar day measured from midnight to midnight.
- 2.26 Unless otherwise indicated, time periods will be strictly construed.
- 2.27 Whenever the terms “will” or “shall” are used in the Project Agreement in relation to DB Co or the City they shall be construed and interpreted as synonymous and to read “DB Co shall” or “the City shall” as the case may be.
- 2.28 Any reference to currency is to Canadian currency and any amount advanced, paid or calculated is to be advanced, paid or calculated in Canadian currency.
- 2.29 Unless otherwise identified in the Project Agreement, all units of measurement in any documents submitted by DB Co to the City shall be in accordance with the SI system of units.
- 2.30 Terms not defined herein and used in the Project Agreement which have a technical meaning commonly understood by the transit system and railway system construction industry will be construed as having that meaning unless the context otherwise requires.
- 2.31 Save where expressly stated otherwise, references to amounts or sums expressed to be “indexed” or “index linked” are references to amounts or sums which require adjustment to reflect the effects of inflation. Such adjustment shall be calculated in accordance with the following formula:
- $$\text{Adjusted amount or sum} = \text{Amount or sum} \times \frac{\text{CPI}_n}{\text{CPI}_o}$$
- 2.32 The terms “properly inferable”, “readily apparent” and “readily discoverable” as used in this Project Agreement, shall be interpreted by taking into consideration DB Co’s and any DB Co Party’s experience and the investigations, inspections and examinations of the Background Information and in respect of the Lands, including the Existing Infrastructure and Stage 1 Connection Infrastructure, carried out by DB Co or by any DB Co Party during the Request for Proposals process or other due diligence; and by taking into consideration reasonable, normal course and industry standard investigations, inspections or other due diligence; in each case in accordance with Good Industry Practice.

SCHEDULE 2

COMPLETION DOCUMENTS

In this Schedule 2, “certified” shall mean that the relevant document is certified as a true and complete copy in full force and effect and unamended as of the date of the relevant certificate by an officer or director of the relevant corporation.

1. DOCUMENTS TO BE DELIVERED BY DB CO

Unless an original document is specifically required, a certified copy of each of the following documents (in each case, executed by the parties to such agreement other than City, RTG and the Independent Certifier) and in form and substance satisfactory to City, acting reasonably, is to be delivered by DB Co to City on or prior to the Financial Close Target Date:

- 1.1 an original of this Project Agreement;
- 1.2 an original of the Lenders’ Direct Agreement;
- 1.3 an original of the Independent Certifier Agreement;
- 1.4 an original of the Insurance Trust Agreement;
- 1.5 an original notice of appointment of the DB Co Representative;
- 1.6 the Lending Agreements;
- 1.7 the Design and Construction Contract;
- 1.8 an original of the Performance Guarantee of Construction Guarantor;
- 1.9 an original of the Construction Contractor’s Direct Agreement;
- 1.10 an original of the Interface Agreement
- 1.11 those assignable subcontracts and Subcontractor’s Direct Agreements designated by City in accordance with the Project Agreement;
- 1.12 one printed copy of the Financial Model and two copies on universal serial bus (USB) flash drive;
- 1.13 the PBS-1, in form and substance satisfactory to City;
- 1.14 original Letter of Credit required in accordance with the Project Agreement or as the City may direct in accordance with the Insurance Trust Agreement;
- 1.15 a certificate of insurance and draft policies of insurance for the insurances required to be taken out by the Construction Contractor in accordance with this Project Agreement;
- 1.16 [Intentionally Deleted];

- 1.17 a certificate of an officer of DB Co substantially in the form attached as Appendix B to this Schedule 2;
- 1.18 a certificate of an officer of the Construction Contractor substantially in the form attached as Appendix B to this Schedule 2;
- 1.19 a certificate of an officer of the Construction Guarantor substantially in the form attached as Appendix B to this Schedule 2;
- 1.20 an original of the opinion from counsel to DB Co, the Construction Contractor, the Construction Guarantor, and such other DB Co Parties as City may reasonably require substantially in the form attached as Appendix C to this Schedule 2 and otherwise acceptable to City and its counsel;
- 1.21 [not used];
- 1.22 evidence that the COR-Certified Construction DB Co Party has its COR Certification in good standing (or to the extent that the COR-Qualified Construction DB Co Party does not have its COR Certification by Financial Close, evidence that the COR-Qualified Construction DB Co Party has its current OHSAS 18001 Accreditation in good standing and has made an application to IHSA for its COR Certification);
- 1.23 in respect of each partner of the Construction Contractor, a WSIB clearance certificate, or if a WSIB clearance certificate is not available, equivalent documentation from another jurisdiction, current to the date of Commercial Close;
- 1.24 in respect of each partner of the Construction Contractor, a CAD-7, or, if a CAD-7 is not available, equivalent documentation from another jurisdiction, current to the date of Commercial Close;
- 1.25 in respect of each partner of the Construction Contractor, a Workplace Injury Summary Report (WISR) or, if a WISR is not available, equivalent documentation from another jurisdiction, current to the date of Commercial Close;
- 1.26 the executed Nominated Signalling Subcontract; and
- 1.27 such other documents as the parties may agree, each acting reasonably.

2. DOCUMENTS TO BE DELIVERED BY CITY

Unless an original document is specifically required, a certified copy of each of the following documents (in each case, where City is a party to such document, executed by City) is to be delivered by City to DB Co on or prior to the Financial Close Target Date:

- 2.1 an original of this Project Agreement;
- 2.2 an original of the Lenders' Direct Agreement;

- 2.3 an original of the Independent Certifier Agreement (executed by the City and the Independent Certifier);
- 2.4 an original of the Insurance Trust Agreement;
- 2.5 an original of the Subcontractor's Direct Agreements designated by City in accordance with the Project Agreement;
- 2.6 an original notice of appointment of the City Representative;
- 2.7 a certificate of an officer of City substantially in the form attached as Appendix D to this Schedule 2;
- 2.8 an original of the Interface Agreement (executed by the City and RTG);
- 2.9 an original of the Performance Guarantee of Construction Guarantor;
- 2.10 an original of the Construction Contractor's Direct Agreement;
- 2.11 any reliance letters addressed to the Lenders and DB Co in respect of the geotechnical data reports, etc.;
- 2.12 an original opinion from counsel to the City in respect of customary corporate and enforceability matters and otherwise acceptable to DB Co and its counsel, addressed to DB Co, the Construction Contractor, the Lenders' Agent and the Lender; and
- 2.13 such other documents as the parties may agree, each acting reasonably.

**APPENDIX A
[INTENTIONALLY DELETED]**

APPENDIX B
FORM OF DB CO/DB CO PARTY OFFICER'S CERTIFICATE

Certificate of an Officer of

[●]

(the “Corporation”)

TO: THE CITY OF OTTAWA

AND TO: NORTON ROSE FULBRIGHT CANADA LLP

AND TO: [_____]

I, [●], being the [●] of the Corporation and an authorized signatory of the Corporation and being duly authorized by the Corporation to deliver this certificate, hereby make the following certifications and confirmations for and on behalf of the Corporation and without incurring personal liability and that the same may be relied upon by you without further inquiry:

1. Constatting Documents

- (a) The Corporation is a subsisting corporation duly incorporated under the laws of [the **Province of Ontario**].
- (b) Attached hereto as **Schedule “A”** are true and complete copies of the articles, together with all amendments thereto, of the Corporation (the “Articles”). The Articles are in full force and effect on the date hereof and no other articles have been issued and no proceeding has been taken or is contemplated to the date hereof to authorize the Corporation to amend, surrender or cancel the Articles.
- (c) Attached hereto as **Schedule “B”** are true and complete copies of the by-laws of the Corporation (the “**By-laws**”) enacted on or before the date hereof. The By-laws have been in full force and effect from and after the date thereof as set out therein and are in full force and effect, unamended as of the date hereof. No proceeding has been taken to the date hereof to authorize the Corporation to amend the By-laws and neither the directors nor the shareholders of the Corporation have passed, confirmed or consented to any resolutions amending or varying the By-laws.
- (d) Attached hereto as **Schedule “C”** is a true and complete copy of a unanimous shareholders’ agreement between the shareholders of the Corporation and the Corporation (the “**Unanimous Shareholders’ Agreement**”) executed on or before the date hereof. The Unanimous Shareholders’ Agreement has been in full force and effect from and after the date thereof as set out therein and is in full force and effect, unamended as of the date hereof.
- (e) The minute books and corporate records of the Corporation made available to [●] are the original minute books and corporate records of the Corporation and contain all minutes of meetings, resolutions and proceedings of the shareholders and directors of the Corporation to the date hereof and there have been no meetings, resolutions or

proceedings authorized or passed by the shareholders or directors of the Corporation to the date hereof not reflected in such minute books and corporate records. Such minute books and corporate records are true, complete and correct in all material respects and there are no changes, additions or alterations necessary to be made thereto to make such minute books and corporate records true, complete and correct in all material respects.

- (f) At the date hereof, no winding-up, liquidation, dissolution, insolvency, bankruptcy, amalgamation, arrangement, reorganization or continuation proceedings in respect of the Corporation have been commenced or are being contemplated by the Corporation, and the Corporation has no knowledge of any such proceedings having been commenced or contemplated in respect of the Corporation by any other party.
- (g) At the date hereof, the Corporation is up-to-date in the filing of all returns and other documents required to be filed by it by governmental authorities, including under corporate, securities and tax legislation, and no notice of any proceedings to cancel its certificate of incorporation or otherwise to terminate its existence has been received by the Corporation.
- (h) Pursuant to the Unanimous Shareholders' Agreement, the powers of the directors of the Corporation to manage the business and affairs of the Corporation, whether such powers arise from the [Business Corporations Act (Ontario) (the "Act")], the Articles or the By-laws of the Corporation, or otherwise, are restricted to the fullest extent permitted by law, and, in accordance with the Act and the Unanimous Shareholders' Agreement, the shareholders of the Corporation have and enjoy and may exercise and perform all the rights, powers, and duties of the directors of the Corporation to manage the business and affairs of the Corporation.
- (i) There are no provisions in the Articles, By-laws, Unanimous Shareholders' Agreement or in any other agreement binding on the Corporation which:
 - (i) restrict or limit the powers of the Corporation to enter into:
 - (A) a certain project agreement with City made as of [●], 201[●] (as the same may be amended, supplemented, restated or otherwise modified from time to time, the "Project Agreement") pursuant to which the Corporation will design, build and finance the Confederation Line Extension Project;
 - (B) a lenders' direct agreement between the Corporation, City and the Lenders' Agent;
 - (C) a design and construction contract between the Corporation and [] (the "Construction Contractor");
 - (D) an insurance trust agreement between the Corporation, City, the Lenders' Agent and [REDACTED];

(E) [NTD: List other documents delivered at Financial Close.],
(collectively, the “Documents”); or

- (ii) restrict or limit the authority of the directors or shareholders of the Corporation by resolution to delegate the powers set out in subparagraph (i) to a director or an officer of the Corporation.

2. Resolutions

- (a) Annexed hereto, forming part hereof and marked as **Schedule “D”** are true and complete copies of the resolutions of the [directors/shareholders] of the Corporation (the “**Resolutions**”), which have been duly and validly passed in accordance with applicable law, constituting authority and approval for the Corporation, inter alia, to enter into the Documents. The Resolutions are the only resolutions of the Corporation pertaining to the subject matter thereof and the same are in full force and effect, unamended as of the date hereof.
- (b) The authorization, execution and delivery of each Document contemplated in the Resolutions, and the performance by the Corporation of its obligations thereunder, do not constitute or result in a violation or breach or default under:
- (i) the Articles, By-laws or the Unanimous Shareholders’ Agreement;
- (ii) to the best of my knowledge and belief after due diligence, any order of any Canadian or [Ontario] governmental body by which it is bound;
- (iii) to the best of my knowledge and belief after due diligence, the terms of any agreement or instrument under which any of its property or assets is bound; or
- (iv) to the best of my knowledge and belief after due diligence, any writ, judgment, injunction, determination or award which is binding on the Corporation or any of its properties.
- (c) To the best of my knowledge and belief after due diligence, there is no claim, action, suit, proceedings, arbitration, investigation or inquiry before any governmental agency, court or tribunal, foreign or domestic, or before any private arbitration tribunal, pending or threatened against the Corporation, or involving its properties or business. To the best of my knowledge and belief after due diligence, no administrative or court decree is outstanding in respect of the Corporation or its assets.
- (d) To the best of my knowledge and belief after due diligence, no consent, approval or other order of any Canadian or [Ontario] governmental authority which has not been obtained is required to permit the Corporation to execute and deliver the Documents.

3. No Breach or Default

Neither the execution and delivery by the Corporation of the Documents nor the consummation of the transactions therein contemplated nor the fulfilment or compliance with the terms thereof will

contravene or result in a breach of any of the terms, conditions or provisions of, or constitute a default under the Articles, By-laws, Unanimous Shareholders’ Agreement or under any other agreement binding on the Corporation.

4. Specimen Signatures

The persons whose names are set forth below are, at the date hereof, officers and/or directors of the Corporation, duly elected or appointed to the office or offices set forth opposite their respective names and authorized to execute the Documents on behalf of the Corporation. The signatures set forth opposite their respective names are the true signatures of those persons:

| NAME | POSITION | SIGNATURE |
|------|----------|-----------|
| | | _____ |
| | | _____ |
| | | _____ |
| | | _____ |

5. Capital

Listed below are all of the issued and outstanding shares in the capital of the Corporation and the registered owner of such shares:

| ISSUED SHARES | REGISTERED OWNER |
|---------------|------------------|
| | |
| | |
| | |

Attached hereto as **Schedule “E”** are true copies of all certificates in respect of such issued and outstanding shares. The Corporation has issued no securities, including (without limitation) securities convertible or exchangeable into shares and/or securities in respect of debt, other than such issued and outstanding shares as are listed above.

DATED this _____ day of _____, 201[●].

Name:

Title:

APPENDIX C
FORM OF DB CO/DB CO PARTY OPINION

[INSERT DATE]

The City of Ottawa

Norton Rose Fulbright Canada LLP

We have acted as counsel to [] (“DB Co”), [] (the “Construction Contractor”) and [•] (the “Construction Guarantor”) in connection with the alternative financing and procurement transaction whereby DB Co has agreed to enter into a design, build and finance agreement for the new Confederation Line Extension Project in Ottawa, Ontario. [NTD: Additional parties to be added depending on consortium structure and/or the financing package.]

This opinion is being delivered pursuant to Section 1 of Schedule 2 to the project agreement made as of [•], 201[•] between City and DB Co (as the same may be amended, supplemented, restated or otherwise modified from time to time, the “Project Agreement”).

All capitalized terms used but not otherwise defined in this opinion shall have the respective meanings ascribed thereto in the Project Agreement.

In our capacity as counsel to DB Co, the Construction Contractor and the Construction Guarantor, we have participated in the preparation and negotiation, and have examined an executed copy, of each of the following documents (unless otherwise indicated, all documents are dated as of [•], 201[•]):

1. the Project Agreement; and
2. the following project documents (collectively, the “Implementation Documents”):
 - (a) the Design and Construction Contract;
 - (b) the Lenders’ Direct Agreement;
 - (c) the Construction Contractor’s Direct Agreement;
 - (d) the Subcontractor’s Direct Agreements designated by City in accordance with the Project Agreement;
 - (e) the Lending Agreements
 - (f) the Insurance Trust Agreement; and

(g) the Performance Guarantee of Construction Guarantor.

The Project Agreement and the Implementation Documents are hereinafter collectively referred to as the “**Documents**”, and each is individually referred to as a “**Document**”. **[NTD: Additional documents to be added depending on consortium structure and/or the financing package.]**

We are qualified to practise law in the Province of Ontario. We have made no investigation of the laws of any jurisdiction other than Ontario, and the opinions expressed below are confined to the laws of Ontario and the federal laws of Canada applicable therein as at the date hereof.

We do not act as corporate counsel to **[DB Co, the Construction Contractor or the Construction Guarantor]**, nor have we participated in the general maintenance of their corporate records and corporate proceedings. Therefore, in expressing certain of the opinions below, we have, where indicated, relied exclusively, and without any independent investigation or enquiry, on certificates of public officials and a certificate of an officer of each of DB Co, the Construction Contractor and the Construction Guarantor dated as of the date hereof (the “**Officer’s Certificates**”) as to certain factual matters.

Searches and Reliance

We have conducted, or have caused to be conducted, the searches identified in Schedule “A” (the “**Searches**”) for filings or registrations made in those offices of public record listed in Schedule “A”. The Searches were conducted against the current name and all former names of DB Co and the Construction Contractor (including, in each case, both the English and French versions, if any). The results of the Searches are set out in Schedule “A”.

We have also made such investigations and examined originals or copies, certified or otherwise identified to our satisfaction, of such certificates of public officials and of such other certificates, documents and records as we have considered necessary or relevant for purposes of the opinions expressed below, including, without limitation, the Officer’s Certificates.

We have relied exclusively, and without any independent investigation or enquiry, on the Officer’s Certificates and the certificates of public officials with respect to certain factual matters.

In connection with the opinions set forth in paragraphs 1, 2 and 3 below, we have relied exclusively on Certificates of Status issued by the **[Ministry of Government Services (Ontario)]** of even date, copies of which are attached as Schedule “B”.

In connection with the opinions set forth in paragraphs **[5, 8, 11, 17 and 20]** below, we have relied exclusively, and without any independent investigation or enquiry, upon the opinion of **[●]** dated **[●]**, 20**[●]** (the “**CC Opinion**”), a copy of which has been delivered to you. To the extent that the CC Opinion contains assumptions, qualifications, limitations or definitions, or is expressed as relying on any certificate(s) or other documents identified therein, the opinions herein expressed in reliance on the CC Opinion should be read as incorporating the identical assumptions, qualifications, limitations, definitions and reliances. In connection with the opinions set forth in paragraphs 6, 9, 12, 15, 18 and 21 below, we have relied exclusively, and without any independent investigation or enquiry, upon the opinion of **[•]** dated **[•]**, 20**[•]** (the “**CG Opinion**”), a copy of which has been delivered to you. To the extent that the CG Opinion contains assumptions, qualifications, limitations or definitions, or is expressed as relying on any certificate(s) or other documents identified therein,

the opinions herein expressed in reliance on the CG Opinion should be read as incorporating the identical assumptions, qualifications, limitations, definitions and reliances.

Assumptions

For the purposes of the opinions expressed herein, we have assumed:

1. The genuineness of all signatures, the authenticity of all documents submitted to us as originals, the conformity to originals of all documents submitted to us as certified, true, conformed, photostatic or notarial copies or facsimiles thereof and the authenticity of the originals of such certified, true, conformed, photostatic or notarial copies or facsimiles.
2. Each of the parties (other than DB Co, the Construction Contractor and the Construction Guarantor) to each of the Documents is and was, at all relevant times, a subsisting corporation, partnership, limited partnership, limited liability company or trust, as applicable, under the laws of its jurisdiction of formation.
3. Each of the parties (other than DB Co, the Construction Contractor and the Construction Guarantor) has (and had) the corporate power, authority and capacity to own its property and assets and to carry on its business as such business is now (or as was then) being carried on by it, has (or had) all requisite corporate power, authority and capacity to execute and deliver each Document to which it is party and to perform its obligations thereunder, has taken all necessary corporate action, as applicable, to authorize the execution and delivery of each Document to which it is a party and the performance of its obligations thereunder, and has duly executed and delivered each Document to which it is a party and each Document to which it is a party is a legal, valid and binding obligation of such party enforceable against it in accordance with its terms.
4. The completeness, truth and accuracy of all facts set forth in the Officer's Certificates.
5. The completeness, truth and accuracy of all facts set forth in official public records and certificates and other documents supplied by public officials.
6. Value has been given by each of the parties (other than DB Co, the Construction Contractor and the Construction Guarantor) to DB Co, the Construction Contractor and the Construction Guarantor.

Opinions

Based upon and subject to the foregoing, and to the qualifications, exceptions and limitations hereinafter expressed, we are of the opinion that, as of the date hereof:

Incorporation and Existence

1. DB Co is a corporation incorporated under the laws of [the Province of Ontario] and has not been dissolved.
2. The Construction Contractor is a corporation incorporated under the laws of [the Province of Ontario] and has not been dissolved.

3. The Construction Guarantor is a corporation incorporated under the laws of [the Province of Ontario] and has not been dissolved.

Corporate Power and Capacity

4. DB Co has the corporate power and capacity to own or lease its properties and assets, to carry on its business as it is currently being conducted and as it is contemplated to be conducted under the Project Agreement, and to enter into and perform its obligations under each of the Documents to which it is a party.
5. The Construction Contractor has the corporate power and capacity to own or lease its properties and assets, to carry on its business as it is currently being conducted and as it is contemplated to be conducted under the Documents, and to enter into and perform its obligations under each of the Documents to which it is a party.
6. The Construction Guarantor has the corporate power and capacity to own or lease its properties and assets, to carry on its business as it is currently being conducted and as it is contemplated to be conducted under the Documents, and to enter into and perform its obligations under each of the Documents to which it is a party.

Corporate Authorization

7. DB Co has taken all necessary corporate action to authorize the execution and delivery of, and the performance of its obligations under, each of the Documents to which it is a party.
8. The Construction Contractor has taken all necessary corporate action to authorize the execution and delivery of, and the performance of its obligations under, each of the Documents to which it is a party.
9. The Construction Guarantor has taken all necessary corporate action to authorize the execution and delivery of, and the performance of its obligations under, each of the Documents to which it is a party.

Execution and Delivery

10. DB Co has duly executed and delivered each of the Documents to which it is a party.
11. The Construction Contractor has duly executed and delivered each of the Documents to which it is a party.
12. The Construction Guarantor has duly executed and delivered each of the Documents to which it is a party.

Enforceability

13. Each of the Documents to which DB Co is a party constitutes a legal, valid and binding obligation of DB Co, enforceable against it in accordance with its terms.

14. Each of the Documents to which the Construction Contractor is a party constitutes a legal, valid and binding obligation of the Construction Contractor, enforceable against it in accordance with its terms.
15. Each of the Documents to which the Construction Guarantor is a party constitutes a legal, valid and binding obligation of the Construction Guarantor, enforceable against it in accordance with its terms.

No Breach or Default

16. The execution and delivery by DB Co of the Documents to which it is a party does not, and the performance by DB Co of its obligations under each such Document in accordance with its terms will not, breach or constitute a default under (i) its articles, by-laws or unanimous shareholders' agreement, or (ii) the provisions of any law, statute, rule or regulation to which DB Co is subject.
17. The execution and delivery by the Construction Contractor of the Documents to which it is a party does not, and the performance by the Construction Contractor of its obligations under each such Document in accordance with its terms will not, breach or constitute a default under (i) its articles, by-laws or unanimous shareholders' agreement, or (ii) the provisions of any law, statute, rule or regulation to which the Construction Contractor is subject.
18. The execution and delivery by the Construction Guarantor of the Documents to which it is a party does not, and the performance by the Construction Guarantor of its obligations under each such Document in accordance with its terms will not, breach or constitute a default under (i) its articles, by-laws or unanimous shareholders' agreement, or (ii) the provisions of any law, statute, rule or regulation to which the Construction Guarantor is subject.

Regulatory Approvals

19. No authorization, consent, permit or approval of, or other action by, or filing with or notice to, any governmental agency or authority, regulatory body, court, tribunal or other similar entity having jurisdiction is required in connection with the execution and delivery by DB Co of the Documents to which it is a party and the performance of its obligations thereunder.
20. No authorization, consent, permit or approval of, or other action by, or filing with or notice to, any governmental agency or authority, regulatory body, court, tribunal or other similar entity having jurisdiction is required in connection with the execution and delivery by the Construction Contractor of the Documents to which it is a party and the performance of its obligations thereunder.
21. No authorization, consent, permit or approval of, or other action by, or filing with or notice to, any governmental agency or authority, regulatory body, court, tribunal or other similar entity having jurisdiction is required in connection with the execution and delivery by the Construction Guarantor of the Documents to which it is a party and the performance of its obligations thereunder.

Qualifications

Our opinions herein are subject to the following qualifications and reservations, namely:

1. The enforceability of any Document and the rights and remedies set out therein or any judgment arising out of or in connection therewith is subject to and may be limited by any applicable bankruptcy, reorganization, winding-up, insolvency, moratorium or other laws of general application affecting creditors' rights from time to time in effect.
2. The enforceability of each of the Documents and the rights and remedies set out therein is subject to and may be limited by general principles of equity, and no opinion is given as to any specific remedy that may be granted, imposed or rendered, including equitable remedies such as those of specific performance and injunction, or the availability of equitable defences.
3. The enforceability of any Document will be subject to the limitations contained in the *Limitations Act, 2002* (Ontario), and we express no opinion as to whether a court may find any provision of any Document to be unenforceable as an attempt to vary or exclude a limitation period under that *Act*.
4. Pursuant to the *Currency Act* (Canada), a judgment in money rendered by a Court in the Province of Ontario must be awarded in Canadian currency and such judgment may be based on a rate of exchange in effect other than the day of payment of the judgment.
5. To the extent that a particular contractual provision is characterized by a Court as a penalty and not as a genuine pre-estimate of damages, it will not be enforceable.
6. A Court may not treat as conclusive those certificates and determinations which the Documents state are to be so treated.
7. A receiver or receiver and manager appointed pursuant to the provisions of any Document, for certain purposes, may not be treated by a Court as being solely the agent of DB Co notwithstanding any agreement to the contrary.
8. The ability to recover or claim for certain costs or expenses may be subject to judicial discretion.
9. With respect to any provisions of the Documents pursuant to which the parties to such Documents are permitted or required to submit a dispute arising out of such Documents to arbitration, we express no opinion as to the enforceability of such arbitration provisions in all circumstances since under the *Arbitration Act, 1991* (Ontario) a court of competent jurisdiction in Ontario may, in its discretion and upon certain grounds, refuse to stay judicial proceedings in which event an arbitration under such arbitration provisions may not be commenced or continued. In addition, the *Arbitration Act, 1991* (Ontario) provides that a court may hear an appeal of an arbitration award on a question of law, or set aside an arbitration award or declare it invalid, in each case on certain prescribed grounds.
10. Any requirement in any of the Documents that interest be paid at a higher rate after than before default may not be enforceable.

11. The effectiveness of provisions which purport to relieve a person from a liability or duty otherwise owed may be limited by law, and provisions requiring indemnification or reimbursement may not be enforced by a Court, to the extent that they relate to the failure of such person to perform such duty or liability.
12. No opinion is expressed as to the enforceability of any provision contained in any Document which purports to sever from the Document any provision therein which is prohibited or unenforceable under applicable law without affecting the enforceability or validity of the remainder of the document.
13. No opinion is expressed regarding any waiver of service of process, presentment, demand, protest or notice of dishonour which may be contained in any of the Documents.
14. Any award of costs is in the discretion of a Court of competent jurisdiction.
15. The enforceability of rights of indemnity set out in the Documents may be limited under applicable law to the extent that they directly or indirectly relate to liabilities imposed by law on City for which it would be contrary to public policy to require DB Co to indemnify City or to the extent that they constitute the indirect enforcement of a foreign revenue or penal law.
16. We express no opinion as to the enforceability by any person who is not a party to the Documents of any provision therein that purports to bind or affect or confer a benefit on such person.

This opinion is being delivered solely in connection with the transaction addressed herein and may not be relied upon by any person other than the addressees, and their successors and permitted assigns, or for any purpose other than the transaction addressed herein.

Yours very truly,

[INSERT NAME OF LAW FIRM]

Appendix D
FORM OF CERTIFICATE OF AN OFFICER OF
[City]
(the “Corporation”)

TO: [_____]

AND TO: [_____]

AND TO: [_____]

AND TO: [_____]

RE: Project agreement (as amended, supplemented or modified from time to time, the “**Project Agreement**”) dated the [●] day of [●], 201[●] between **THE CITY OF OTTAWA** (“City”), and [_____] (“**DB Co**”)

I, [●], the [●] of the Corporation and an authorized signatory of the Corporation and being duly authorized by the Corporation to deliver this certificate, hereby make the following certifications and confirmations for and on behalf of the Corporation and without incurring personal liability and that the same may be relied upon by you without further inquiry:

1. Attached hereto as [●] is a true and complete copy of (i) the resolutions of the directors of the Corporation regarding the execution of public works projects assigned to the Corporation and certain other matters set forth therein; and (ii) an excerpt of the resolutions of the directors of the Corporation relating to delegation of signing authority (collectively, the “[●]”), which have been duly and validly passed in accordance with applicable law. The Execution Resolutions are the only resolutions of the Corporation pertaining to the subject matter thereof and the same is in full force and effect, unamended as of the date hereof.
2. Attached hereto as **Schedule “B”** is a true and complete copy of the resolutions of the directors the Corporation approving the selection of DB Co as the designated proponent for the Confederation Line Phase 2 Project (the “**Project Resolutions**”). The Project Resolutions are the only resolutions of the Corporation pertaining to the subject matter thereof and the same is in full force and effect, unamended as of the date hereof.
3. The following named persons, on or as of the date hereof, are duly elected or appointed officers of the Corporation, as evidenced by the holding of the office or offices set forth opposite their names, are proper signing officers of the Corporation and are authorized to execute and deliver Contracts Documents (as such a term is defined in the Execution Resolutions referenced in Item 1(i) above) relating to the Project (as defined in the Project Agreement) on behalf of the Corporation.

The signatures set forth opposite their respective names are the true signatures of those persons.

| Name | Position | Signature |
|------|----------|-----------|
| [●] | _____ | _____ |

[●]

[●]

[●]

DATED this _____ day of _____, 201[●].

Name:

Title:

**SCHEDULE 3-1
SUBCONTRACTOR'S DIRECT AGREEMENT**

THIS AGREEMENT is made as of the 24th day of April, 2019

BETWEEN:

THE CITY OF OTTAWA

(“City”)

– AND –

EAST WEST CONNECTORS GP, [REDACTED]

(“DB Co”)

– AND –

[REDACTED]

(the “Construction Contractor”)

– AND –

[REDACTED]

(the “Subcontractor”)

WHEREAS:

- A. City and DB Co have entered into the Project Agreement, which requires DB Co to enter into, and to cause the Construction Contractor and the Subcontractor to enter into, this Subcontractor's Direct Agreement with City.
- B. DB Co and the Construction Contractor have entered into the Design and Construction Contract, which requires the Construction Contractor to enter into, and cause the Subcontractor to enter into, this Subcontractor's Direct Agreement with City.

NOW THEREFORE in consideration of the mutual covenants and agreements of the Parties hereinafter contained and for other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the Parties covenant and agree as follows:

1. DEFINITIONS

In this Schedule 3 – Subcontractor's Direct Agreement, unless the context indicates a contrary intention, terms which are defined in the Project Agreement (and not otherwise defined in this Schedule 3 – Subcontractor's Direct Agreement) shall have meanings given to them in the Project Agreement and the following terms shall have the following meanings:

- (a) “Default Notice” has the meaning given in Section 5(a).

- (b) “**Novation Notice**” has the meaning given in Section 6(b).
- (c) “**Party**” means City, DB Co, the Construction Contractor or the Subcontractor, and “**Parties**” means, collectively, City, DB Co, the Construction Contractor and the Subcontractor.
- (d) “**Subcontract**” means the design subcontract entered into by and between DB Co and the Subcontractor on December 12, 2018.
- (e) “**Substitute**” has the meaning given in Section 6(b).

2. INTERPRETATION

This Subcontractor’s Direct Agreement shall be interpreted according to the following provisions, unless the context requires a different meaning:

- (a) The headings in this Subcontractor’s Direct Agreement are for convenience of reference only, shall not constitute a part of this Subcontractor’s Direct Agreement, and shall not be taken into consideration in the interpretation of, or affect the meaning of, this Subcontractor’s Direct Agreement.
- (b) Unless the context otherwise requires, references to specific Sections, Clauses, Paragraphs, Subparagraphs, and other divisions are references to such Sections, Clauses, Paragraphs, Subparagraphs, or divisions of this Subcontractor’s Direct Agreement and the terms “Section” and “Clause” are used interchangeably and are synonymous.
- (c) Words importing persons or parties are to be broadly interpreted and include an individual, corporation, limited liability company, joint stock company, firm, partnership, joint venture, trust, unincorporated organization, Governmental Authority, unincorporated body of persons or association and any other entity having legal capacity, and the heirs, beneficiaries, executors, administrators or other legal representatives of a person in such capacity.
- (d) Unless the context otherwise requires, wherever used herein the plural includes the singular, the singular includes the plural, and each of the masculine, feminine and neuter genders include all other genders.
- (e) References to any standard, principle, agreement or document include (subject to all relevant approvals and any other provisions of this Subcontractor’s Direct Agreement concerning amendments) a reference to that standard, principle, agreement or document as amended, supplemented, restated, substituted, replaced, novated or assigned.
- (f) The words in this Subcontractor’s Direct Agreement shall bear their natural meaning.
- (g) References containing terms such as:
 - (i) “hereof”, “herein”, “hereto”, “hereinafter”, and other terms of like import are not limited in applicability to the specific provision within which such references are set forth but instead refer to this Subcontractor’s Direct Agreement taken as a whole; and

- (ii) “includes” and “including”, whether or not used with the words “without limitation” or “but not limited to”, shall not be deemed limited by the specific enumeration of items but shall, in all cases, be deemed to be without limitation and construed and interpreted to mean “includes without limitation” and “including without limitation”.
- (h) In construing this Subcontractor’s Direct Agreement, the rule known as the *ejusdem generis rule* shall not apply nor shall any similar rule or approach to the construction of this Subcontractor’s Direct Agreement and, accordingly, general words introduced or followed by the word “other” or “including” or “in particular” shall not be given a restrictive meaning because they are followed or preceded (as the case may be) by particular examples intended to fall within the meaning of the general words.
- (i) Where this Subcontractor’s Direct Agreement states that an obligation shall be performed “no later than” or “within” or “by” a stipulated date or event which is a prescribed number of days after a stipulated date or event, the latest time for performance shall be 5:00 p.m. on the last day for performance of the obligation concerned, or, if that day is not a Business Day, 5:00 p.m. on the next Business Day.
- (j) Where this Subcontractor’s Direct Agreement states that an obligation shall be performed “on” a stipulated date, the latest time for performance shall be 5:00 p.m. on that day, or, if that day is not a Business Day, 5:00 p.m. on the next Business Day.
- (k) Any reference to time of day or date means the local time or date in Toronto, Ontario.
- (l) Unless otherwise indicated, time periods will be strictly construed.
- (m) Whenever the terms “will” or “shall” are used in this Subcontractor’s Direct Agreement they shall be construed and interpreted as synonymous and to read “shall”.

3. CONFLICT IN DOCUMENTS

- (a) In the event of ambiguities, conflicts or inconsistencies between or among this Subcontractor’s Direct Agreement, the Construction Contractor’s Direct Agreement, the Project Agreement and the Design and Construction Contract, this Subcontractor’s Direct Agreement shall prevail.
- (b) In the event of ambiguities, conflicts or inconsistencies between or among this Subcontractor’s Direct Agreement and the Lenders’ Direct Agreement, the Lenders’ Direct Agreement shall prevail.

4. AGREEMENTS

- (a) If the Subcontractor gives the Construction Contractor any notice of any default(s) under the Subcontract that may give the Subcontractor a right to terminate the Subcontract or to treat it as having been repudiated by the Construction Contractor or to discontinue the Subcontractor’s performance thereunder, then the Subcontractor shall concurrently provide DB Co and City with a copy of such notice, an executed copy of the Subcontract and set out in reasonable detail the default(s).

5. NO TERMINATION BY SUBCONTRACTOR WITHOUT DEFAULT NOTICE

The Subcontractor shall not exercise any right it may have to terminate the Subcontract or to treat it as having been repudiated by the Construction Contractor or to discontinue the Subcontractor's performance thereunder unless:

- (a) the Subcontractor first delivers an executed copy of the Subcontract and a written notice (a "Default Notice") to City setting out in reasonable detail the default(s) on which the Subcontractor intends to rely in terminating the Subcontract or to treat it as having been repudiated by the Construction Contractor or to discontinue the Subcontractor's performance thereunder; and
- (b) within a period of 5 Business Days of City receiving the Default Notice the default(s) on which the Subcontractor intends to rely in terminating the Subcontract or to treat it as having been repudiated by the Construction Contractor or to discontinue the Subcontractor's performance thereunder have not been remedied; and provided that if, within such period of 5 Business Days, City agrees to pay the Subcontractor's reasonable costs of continued performance, such period of 5 Business Days shall be extended to 45 days.

6. NOVATION OF THE SUBCONTRACT

- (a) The Subcontractor acknowledges and agrees that where the Design and Construction Contract has been terminated:
 - (i) by DB Co;
 - (ii) as a result of the termination of the Project Agreement; or
 - (iii) due to the insolvency of the Construction Contractor,

the Subcontract shall not terminate solely by reason of the termination of the Design and Construction Contract unless City shall have failed to request a novation of the Subcontract pursuant to Section 6(b) within 20 days following the date of such termination.

- (b) City may at any time, if the Project Agreement and the Design and Construction Contract have been terminated, deliver a notice (a "**Novation Notice**") electing to novate the Subcontract either to City or a third party designated by City in the Novation Notice (the "**Substitute**"), provided that City can demonstrate to the Subcontractor, acting reasonably, that the Substitute shall have sufficient financial resources, or shall be supported by a satisfactory guarantee, to carry out the obligations of the Substitute under the Subcontract.
- (c) Subject to Section 6(d), upon receipt by the Subcontractor of a Novation Notice:
 - (i) the Construction Contractor and the Subcontractor will be deemed to be released from their existing and future obligations under the Subcontract to each other (except with respect to any and all indemnities from the Construction Contractor or the Subcontractor to the other in respect of the period prior to the receipt of the Novation Notice), and City or the Substitute, as applicable, and the Subcontractor

will be deemed to assume those same existing and future obligations towards each other (except in respect of the aforesaid indemnities);

- (ii) the existing and future rights of the Construction Contractor against the Subcontractor under the Subcontract and vice versa will be deemed to be cancelled (except with respect to any and all indemnities from the Construction Contractor or the Subcontractor to the other in respect of the period prior to the receipt of the Novation Notice), and City or the Substitute, as applicable, and the Subcontractor will be deemed to acquire those same existing and future rights against each other (except in respect of the aforesaid indemnities), subject to any applicable credit from the Subcontractor to City if City pays for the Subcontractor's reasonable costs of continued performance pursuant to Section 5;
 - (iii) any guarantee, bond or covenant in favour of the Construction Contractor from any third party in respect of any term, provision, condition, obligation, undertaking or agreement on the part of the Subcontractor to be performed, observed or carried out by the Subcontractor as contained in, referred to, or inferred from the Subcontract shall be assigned, novated or granted, as required by City or the Substitute, as applicable, each acting reasonably, to City or the Substitute, as applicable, and the Subcontractor shall cause such assignment, novation or grant on substantially the same terms and conditions as the original guarantee, bond or covenant, provided, however, that where Construction Contractor shall continue to hold, or shall continue to be entitled to or have rights under, such guarantee, bond or covenant as security for any obligations of the Subcontractor, the assignment, novation or grant of the guarantee, bond or covenant to the extent of any such obligations to Construction Contractor shall be conditional on the satisfaction of those obligations to Construction Contractor; and
 - (iv) at City's request, the Subcontractor shall enter into, and shall cause any guarantor, covenantor or surety under any guarantee, bond or covenant referred to in Section 6(c)(iii) to enter into, and City shall or shall cause the Substitute to enter into, as applicable, all such agreements or other documents as reasonably necessary to give effect to the foregoing, including, without limitation, an agreement between City or the Substitute, as applicable, and the Subcontractor, acceptable to City and the Subcontractor, each acting reasonably, on substantially the same terms as the Subcontract.
- (d) The Construction Contractor shall, at its own cost, cooperate fully with City and the Substitute in order to achieve a smooth transfer of the Subcontract to City or the Substitute, as applicable, and to avoid or mitigate in so far as reasonably practicable any inconvenience, including the administration of the Subcontract, ongoing supervisory activities and scheduling.
- (e) The rights granted by Section 6(b) shall be of no force or effect if, at any time the Subcontractor receives a Novation Notice, the Subcontractor has already received notice in writing from another entity entitled to the benefit of step-in rights relating to the Subcontract that it is or has validly exercised those step-in rights. If the Subcontractor receives any such notice on the same day as a Novation Notice, the Novation Notice shall be effective, except where the other notice is given by the Lenders, in which case such other notice and not the Novation Notice shall be effective.

- (f) If City gives a Novation Notice within the time provided hereunder at any time after the Subcontractor has terminated the Subcontract or treated it as having been repudiated by Construction Contractor or discontinued the Subcontractor's performance thereunder in accordance with the terms of this Subcontractor's Direct Agreement, the Subcontractor agrees that the Subcontract shall be reinstated and deemed to have continued despite any termination or treatment as having been repudiated, and City shall pay the Subcontractor's reasonable costs for re-commencing the obligations it has under the Subcontract and the Subcontractor shall be entitled to reasonable compensation and/or relief for re-commencing such obligations, having regard to the additional costs and delays incurred as a result of having terminated the Subcontract or having treated it as being repudiated by Construction Contractor or having discontinued its performance thereunder.
- (g) The Subcontractor acknowledges that if City novates the Subcontract to itself pursuant to Section 6(b), City shall have the right to further novate the Subcontract to a Substitute in accordance with and otherwise on, and subject to, the terms and conditions of this Subcontractor's Direct Agreement.

7. SUBCONTRACTOR LIABILITY

- (a) The liability of the Subcontractor hereunder shall not be modified, released, diminished or in any way affected by:
 - (i) any independent inspection, investigation or enquiry into any matter which may be made or carried out by or for City, or by any failure or omission to carry out any such inspection, investigation or enquiry; or
 - (ii) the appointment by City of any other person to review the progress of or otherwise report to City in respect of the Project, or by any action or omission of such person whether or not such action or omission might give rise to any independent liability of such person to City,

provided always that nothing in this Section 7 shall modify or affect any rights which the Subcontractor might have otherwise had to claim contribution from any other person whether under statute or common law.

- (b) In the event City delivers a Novation Notice, the Subcontractor shall have no greater liability to City or any Substitute than it would have had to Construction Contractor under the Subcontract, and the Subcontractor shall be entitled in any proceedings by City or any Substitute to rely on any liability limitations in the Subcontract.

8. DB CO AND CONSTRUCTION CONTRACTOR AS PARTY

- (a) DB Co acknowledges and agrees that the Construction Contractor shall not be in breach of the Design and Construction Contract by complying with its obligations hereunder.
- (b) Construction Contractor acknowledges and agrees that the Subcontractor shall not be in breach of the Subcontract by complying with its obligations hereunder.

9. ASSIGNMENT

- (a) Construction Contractor shall not, without the prior written consent of City, assign, transfer, charge, subcontract, subparticipate or otherwise dispose of any interest in this Subcontractor's Direct Agreement except to the extent entitled to do so under the Design and Construction Contract.
- (b) City may assign or otherwise dispose of the benefit of the whole or part of this Subcontractor's Direct Agreement to any person to whom City may assign or otherwise dispose of its interest in the Project Agreement pursuant to Section 49.2 of the Project Agreement but only in conjunction therewith, and shall provide written notice to DB Co, the Construction Contractor and the Subcontractor of such assignment or disposition.
- (c) The Construction Contractor shall not, without the prior written consent of City and DB Co, assign, transfer, charge, subcontract, subparticipate or otherwise dispose of any interest in this Subcontractor's Direct Agreement except as may be permitted under the Design and Construction Contract.
- (d) The Subcontractor shall not, without the prior written consent of City and DB Co, assign, transfer, charge, subcontract, subparticipate or otherwise dispose of any interest in this Subcontractor's Direct Agreement except as may be permitted under the Subcontract.

10. NOTICES

- (a) All notices, requests, demands, instructions, certificates, consents and other communications required or permitted under this Subcontractor's Direct Agreement shall be in writing (whether or not "written notice" or "notice in writing" is specifically required by the applicable provision of this Subcontractor's Direct Agreement) and served by sending the same by registered mail, facsimile or by hand (in each case, with a copy by electronic submission), as follows:

If to City:

City of Ottawa
110 Laurier Ave West
Ottawa, Ontario K1P 1J1
Mail code: [REDACTED]

Attn.: [REDACTED]
With an electronic copy, for information purposes only, to:
[REDACTED]

If to DB Co:

East West Connectors GP
[REDACTED]

Attn: [REDACTED]

Email: [REDACTED]

with a copy to:

[REDACTED]

Attn.: [REDACTED]

Email: [REDACTED]

If to the Construction Contractor:

[REDACTED]

Attn: [REDACTED]

Email: [REDACTED]

If to the Subcontractor:

[REDACTED]

Attn.: [REDACTED]

Email: [REDACTED]

- (b) Where any notice is provided or submitted to a Party via facsimile, an original of the notice sent via facsimile shall promptly be sent by regular mail or registered mail. For greater certainty, a notice given via facsimile shall not be invalid by reason only of a Party's failure to comply with this Section 10(b).
- (c) Any Party to this Subcontractor's Direct Agreement may, from time to time, change any of its contact information set forth in Section 10(a) by prior notice to the other Parties, and such change shall be effective on the Business Day that next follows the recipient Party's receipt of such notice unless a later effective date is given in such notice.
- (d) Subject to Sections 10(e), 10(f) and 10(g):
 - (i) a notice given by registered mail shall be deemed to have been received on the third Business Day after mailing;
 - (ii) a notice given by hand delivery shall be deemed to have been received on the day it is delivered; and
 - (iii) a notice given by facsimile shall be deemed to have been received on the day it is transmitted by facsimile.
- (e) If the Party giving the notice knows or ought reasonably to know of difficulties with the postal system which might affect negatively the delivery of mail, any such notice shall not be mailed but shall be made or given by personal delivery or by facsimile transmission in accordance with this Section 10.

- (f) If any notice delivered by hand or transmitted by facsimile is so delivered or transmitted, as the case may be, either on a day that is not a Business Day or on a Business Day after 4:00 p.m. (recipient's local time), then such notice shall be deemed to have been received by such recipient on the next Business Day.
- (g) A notice given by facsimile shall be deemed to have been received by the recipient on the day it is transmitted only if a facsimile transmission report (maintained by the sender) indicates that the transmission of such notice was successful.

11. AMENDMENTS

- (a) This Subcontractor's Direct Agreement may not be varied, amended or supplemented except by an agreement in writing signed by duly authorized representatives of the Parties and stating on its face that it is intended to be an amendment, restatement or other modification, as the case may be, to this Subcontractor's Direct Agreement.

12. WAIVER

- (a) No waiver made or given by a Party under or in connection with this Subcontractor's Direct Agreement shall be binding or effective unless the waiver is in writing, signed by an authorized representative of the Party giving such waiver, and delivered by such Party to the other Parties. No waiver made with respect to any right, power or remedy in one instance will be deemed to be a waiver with respect to any other instance involving the exercise of such right, power, or remedy or with respect to any other right, power, or remedy.
- (b) Failure by any Party to exercise any of its rights, powers or remedies hereunder or its delay to do so shall not constitute a waiver of those rights, powers or remedies. The single or partial exercise of a right, power or remedy shall not prevent its subsequent exercise or the exercise of any other right, power or remedy.

13. RELATIONSHIP BETWEEN THE PARTIES

The Parties are independent contractors. This Subcontractor's Direct Agreement is not intended to and does not create or establish between the Parties any relationship as partners, joint venturers, employer and employee, master and servant, or, except as provided in this Subcontractor's Direct Agreement, of principal and agent.

14. ENTIRE AGREEMENT

Except where provided otherwise in this Subcontractor's Direct Agreement, this Subcontractor's Direct Agreement constitutes the entire agreement between the Parties in connection with its subject matter and supersedes all prior representations, communications, negotiations and understandings, whether oral, written, express or implied, concerning the subject matter of this Subcontractor's Direct Agreement.

15. SEVERABILITY

Each provision of this Subcontractor's Direct Agreement shall be valid and enforceable to the fullest extent permitted by law. If any provision of this Subcontractor's Direct Agreement is declared invalid, unenforceable or illegal by the courts of a competent jurisdiction, such provision may be severed

and such invalidity, unenforceability or illegality shall not prejudice or affect the validity, enforceability and legality of the remaining provisions of this Subcontractor's Direct Agreement. If any such provision of this Subcontractor's Direct Agreement is invalid, unenforceable or illegal, the Parties shall, acting in good faith, promptly negotiate new provisions to eliminate such invalidity, unenforceability or illegality and to restore this Subcontractor's Direct Agreement as near as possible to its original intent and effect.

16. ENUREMENT

This Subcontractor's Direct Agreement shall enure to the benefit of, and be binding on, each of the Parties and their respective successors and permitted transferees and assigns.

17. GOVERNING LAW AND JURISDICTION

- (a) This Subcontractor's Direct Agreement shall be governed by and construed in accordance with the laws of Ontario and the laws of Canada applicable therein and shall be treated in all respects as an Ontario contract, without regard to conflict of laws principles.
- (b) The Parties agree that the courts of the Province of Ontario and all courts competent to hear appeals therefrom shall have exclusive jurisdiction to hear and settle any action, suit, proceeding or dispute in connection with this Subcontractor's Direct Agreement and hereby irrevocably attorn to the exclusive jurisdiction of such courts.
- (c) Nothing in this Subcontractor's Direct Agreement affects the rights, protections and immunities of the Crown under the *Proceedings Against the Crown Act* (Ontario).

18. FURTHER ASSURANCE

Each Party shall do all things, from time to time, and execute all further documents necessary to give full effect to this Subcontractor's Direct Agreement.

19. LANGUAGE OF AGREEMENT

Each Party acknowledges having requested and being satisfied that this Subcontractor's Direct Agreement and related documents be drawn in English. Chacune des parties reconnaît avoir demandé que ce document et ses annexes soient rédigés en anglais et s'en déclare satisfaite.

20. COUNTERPARTS

This Subcontractor's Direct Agreement may be executed in one or more counterparts. Any single counterpart or a set of counterparts executed, in either case, by all the Parties shall constitute a full, original and binding agreement for all purposes. Counterparts may be executed either in original or electronic form provided that any Party providing its signature in electronic form shall promptly forward to such Party an original signed copy of this Subcontractor's Direct Agreement which was so faxed.

[SIGNATURE PAGES IMMEDIATELY FOLLOW]

IN WITNESS WHEREOF the Parties have executed this Subcontractor's Direct Agreement as of the date first above written.

THE CITY OF OTTAWA

Per: _____

Name: **[REDACTED]**

Title: **[REDACTED]**

EAST WEST CONNECTORS GP

Per: _____
Name: [REDACTED]
Title: [REDACTED]

Per: _____
Name: [REDACTED]
Title: [REDACTED]

I/We have authority to bind the partnership

[REDACTED]

Per: _____
Name: **[REDACTED]**
Title: **[REDACTED]**

Per: _____
Name: **[REDACTED]**
Title: **[REDACTED]**

Per: _____
Name: **[REDACTED]**
Title: **[REDACTED]**

Per: _____
Name: **[REDACTED]**
Title: **[REDACTED]**

We have authority to bind the partnership

[REDACTED]

Per: _____
Name: [REDACTED]
Title: [REDACTED]

I have authority to bind the corporation.

[REDACTED]

Per: _____
Name: [REDACTED]
Title: [REDACTED]

I have authority to bind the corporation.

SCHEDULE 3-2

SUBCONTRACTOR'S DIRECT AGREEMENT

THIS AGREEMENT is made as of the 24th day of April, 2019

BETWEEN:

THE CITY OF OTTAWA

(“City”)

– AND –

EAST WEST CONNECTORS GP, [REDACTED]

(“DB Co”)

– AND –

[REDACTED]

(the “Construction Contractor”)

– AND –

[REDACTED]

(the “Subcontractor”)

WHEREAS:

- A. City and DB Co have entered into the Project Agreement, which requires DB Co to enter into, and to cause the Construction Contractor and the Subcontractor to enter into, this Subcontractor's Direct Agreement with City.
- B. DB Co and the Construction Contractor have entered into the Design and Construction Contract, which requires the Construction Contractor to enter into, and cause the Subcontractor to enter into, this Subcontractor's Direct Agreement with City.

NOW THEREFORE in consideration of the mutual covenants and agreements of the Parties hereinafter contained and for other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the Parties covenant and agree as follows:

21. DEFINITIONS

In this Schedule 3 – Subcontractor's Direct Agreement, unless the context indicates a contrary intention, terms which are defined in the Project Agreement (and not otherwise defined in this Schedule 3 – Subcontractor's Direct Agreement) shall have meanings given to them in the Project Agreement and the following terms shall have the following meanings:

- (a) “Default Notice” has the meaning given in Section 5(a).

- (b) “**Novation Notice**” has the meaning given in Section 6(b).
- (c) “**Party**” means City, DB Co, the Construction Contractor or the Subcontractor, and “**Parties**” means, collectively, City, DB Co, the Construction Contractor and the Subcontractor.
- (d) “**Subcontract**” means the Nominated Signalling Subcontract.
- (e) “**Substitute**” has the meaning given in Section 6(b).

22. INTERPRETATION

This Subcontractor’s Direct Agreement shall be interpreted according to the following provisions, unless the context requires a different meaning:

- (a) The headings in this Subcontractor’s Direct Agreement are for convenience of reference only, shall not constitute a part of this Subcontractor’s Direct Agreement, and shall not be taken into consideration in the interpretation of, or affect the meaning of, this Subcontractor’s Direct Agreement.
- (b) Unless the context otherwise requires, references to specific Sections, Clauses, Paragraphs, Subparagraphs, and other divisions are references to such Sections, Clauses, Paragraphs, Subparagraphs, or divisions of this Subcontractor’s Direct Agreement and the terms “Section” and “Clause” are used interchangeably and are synonymous.
- (c) Words importing persons or parties are to be broadly interpreted and include an individual, corporation, limited liability company, joint stock company, firm, partnership, joint venture, trust, unincorporated organization, Governmental Authority, unincorporated body of persons or association and any other entity having legal capacity, and the heirs, beneficiaries, executors, administrators or other legal representatives of a person in such capacity.
- (d) Unless the context otherwise requires, wherever used herein the plural includes the singular, the singular includes the plural, and each of the masculine, feminine and neuter genders include all other genders.
- (e) References to any standard, principle, agreement or document include (subject to all relevant approvals and any other provisions of this Subcontractor’s Direct Agreement concerning amendments) a reference to that standard, principle, agreement or document as amended, supplemented, restated, substituted, replaced, novated or assigned.
- (f) The words in this Subcontractor’s Direct Agreement shall bear their natural meaning.
- (g) References containing terms such as:
 - (i) “hereof”, “herein”, “hereto”, “hereinafter”, and other terms of like import are not limited in applicability to the specific provision within which such references are set forth but instead refer to this Subcontractor’s Direct Agreement taken as a whole; and

- (ii) “includes” and “including”, whether or not used with the words “without limitation” or “but not limited to”, shall not be deemed limited by the specific enumeration of items but shall, in all cases, be deemed to be without limitation and construed and interpreted to mean “includes without limitation” and “including without limitation”.
- (h) In construing this Subcontractor’s Direct Agreement, the rule known as the *ejusdem generis rule* shall not apply nor shall any similar rule or approach to the construction of this Subcontractor’s Direct Agreement and, accordingly, general words introduced or followed by the word “other” or “including” or “in particular” shall not be given a restrictive meaning because they are followed or preceded (as the case may be) by particular examples intended to fall within the meaning of the general words.
- (i) Where this Subcontractor’s Direct Agreement states that an obligation shall be performed “no later than” or “within” or “by” a stipulated date or event which is a prescribed number of days after a stipulated date or event, the latest time for performance shall be 5:00 p.m. on the last day for performance of the obligation concerned, or, if that day is not a Business Day, 5:00 p.m. on the next Business Day.
- (j) Where this Subcontractor’s Direct Agreement states that an obligation shall be performed “on” a stipulated date, the latest time for performance shall be 5:00 p.m. on that day, or, if that day is not a Business Day, 5:00 p.m. on the next Business Day.
- (k) Any reference to time of day or date means the local time or date in Toronto, Ontario.
- (l) Unless otherwise indicated, time periods will be strictly construed.
- (m) Whenever the terms “will” or “shall” are used in this Subcontractor’s Direct Agreement they shall be construed and interpreted as synonymous and to read “shall”.

23. CONFLICT IN DOCUMENTS

- (a) In the event of ambiguities, conflicts or inconsistencies between or among this Subcontractor’s Direct Agreement, the Construction Contractor’s Direct Agreement, the Project Agreement and the Design and Construction Contract, this Subcontractor’s Direct Agreement shall prevail.
- (b) In the event of ambiguities, conflicts or inconsistencies between or among this Subcontractor’s Direct Agreement and the Lenders’ Direct Agreement, the Lenders’ Direct Agreement shall prevail.

24. AGREEMENTS

- (a) If the Subcontractor gives the Construction Contractor any notice of any default(s) under the Subcontract that may give the Subcontractor a right to terminate the Subcontract or to treat it as having been repudiated by the Construction Contractor or to discontinue the Subcontractor’s performance thereunder, then the Subcontractor shall concurrently provide DB Co and City with a copy of such notice, an executed copy of the Subcontract and set out in reasonable detail the default(s).

25. NO TERMINATION BY SUBCONTRACTOR WITHOUT DEFAULT NOTICE

The Subcontractor shall not exercise any right it may have to terminate the Subcontract or to treat it as having been repudiated by the Construction Contractor or to discontinue the Subcontractor's performance thereunder unless:

- (a) the Subcontractor first delivers an executed copy of the Subcontract and a written notice (a "Default Notice") to City setting out in reasonable detail the default(s) on which the Subcontractor intends to rely in terminating the Subcontract or to treat it as having been repudiated by the Construction Contractor or to discontinue the Subcontractor's performance thereunder; and
- (b) within a period of 5 Business Days of City receiving the Default Notice the default(s) on which the Subcontractor intends to rely in terminating the Subcontract or to treat it as having been repudiated by the Construction Contractor or to discontinue the Subcontractor's performance thereunder have not been remedied; and provided that if, within such period of 5 Business Days, City agrees to pay the Subcontractor's reasonable costs of continued performance, such period of 5 Business Days shall be extended to 45 days.

26. NOVATION OF THE SUBCONTRACT

- (a) The Subcontractor acknowledges and agrees that where the Design and Construction Contract has been terminated:
 - (i) by DB Co;
 - (ii) as a result of the termination of the Project Agreement; or
 - (iii) due to the insolvency of the Construction Contractor,

the Subcontract shall not terminate solely by reason of the termination of the Design and Construction Contract unless City shall have failed to request a novation of the Subcontract pursuant to Section 6(b) within 20 days following the date of such termination.

- (b) City may at any time, if the Project Agreement and the Design and Construction Contract have been terminated, deliver a notice (a "**Novation Notice**") electing to novate the Subcontract either to City or a third party designated by City in the Novation Notice (the "**Substitute**"), provided that City can demonstrate to the Subcontractor, acting reasonably, that the Substitute shall have sufficient financial resources, or shall be supported by a satisfactory guarantee, to carry out the obligations of the Substitute under the Subcontract.
- (c) Subject to Section 6(d), upon receipt by the Subcontractor of a Novation Notice:
 - (i) the Construction Contractor and the Subcontractor will be deemed to be released from their existing and future obligations under the Subcontract to each other (except with respect to any and all indemnities from the Construction Contractor or the Subcontractor to the other in respect of the period prior to the receipt of the Novation Notice), and City or the Substitute, as applicable, and the Subcontractor

will be deemed to assume those same existing and future obligations towards each other (except in respect of the aforesaid indemnities);

- (ii) the existing and future rights of the Construction Contractor against the Subcontractor under the Subcontract and vice versa will be deemed to be cancelled (except with respect to any and all indemnities from the Construction Contractor or the Subcontractor to the other in respect of the period prior to the receipt of the Novation Notice), and City or the Substitute, as applicable, and the Subcontractor will be deemed to acquire those same existing and future rights against each other (except in respect of the aforesaid indemnities), subject to any applicable credit from the Subcontractor to City if City pays for the Subcontractor's reasonable costs of continued performance pursuant to Section 5;
 - (iii) any guarantee, bond or covenant in favour of the Construction Contractor from any third party in respect of any term, provision, condition, obligation, undertaking or agreement on the part of the Subcontractor to be performed, observed or carried out by the Subcontractor as contained in, referred to, or inferred from the Subcontract shall be assigned, novated or granted, as required by City or the Substitute, as applicable, each acting reasonably, to City or the Substitute, as applicable, and the Subcontractor shall cause such assignment, novation or grant on substantially the same terms and conditions as the original guarantee, bond or covenant, provided, however, that where Construction Contractor shall continue to hold, or shall continue to be entitled to or have rights under, such guarantee, bond or covenant as security for any obligations of the Subcontractor, the assignment, novation or grant of the guarantee, bond or covenant to the extent of any such obligations to Construction Contractor shall be conditional on the satisfaction of those obligations to Construction Contractor; and
 - (iv) at City's request, the Subcontractor shall enter into, and shall cause any guarantor, covenantor or surety under any guarantee, bond or covenant referred to in Section 6(c)(iii) to enter into, and City shall or shall cause the Substitute to enter into, as applicable, all such agreements or other documents as reasonably necessary to give effect to the foregoing, including, without limitation, an agreement between City or the Substitute, as applicable, and the Subcontractor, acceptable to City and the Subcontractor, each acting reasonably, on substantially the same terms as the Subcontract.
- (d) The Construction Contractor shall, at its own cost, cooperate fully with City and the Substitute in order to achieve a smooth transfer of the Subcontract to City or the Substitute, as applicable, and to avoid or mitigate in so far as reasonably practicable any inconvenience, including the administration of the Subcontract, ongoing supervisory activities and scheduling.
- (e) The rights granted by Section 6(b) shall be of no force or effect if, at any time the Subcontractor receives a Novation Notice, the Subcontractor has already received notice in writing from another entity entitled to the benefit of step-in rights relating to the Subcontract that it is or has validly exercised those step-in rights. If the Subcontractor receives any such notice on the same day as a Novation Notice, the Novation Notice shall be effective, except where the other notice is given by the Lenders, in which case such other notice and not the Novation Notice shall be effective.

- (f) If City gives a Novation Notice within the time provided hereunder at any time after the Subcontractor has terminated the Subcontract or treated it as having been repudiated by Construction Contractor or discontinued the Subcontractor's performance thereunder in accordance with the terms of this Subcontractor's Direct Agreement, the Subcontractor agrees that the Subcontract shall be reinstated and deemed to have continued despite any termination or treatment as having been repudiated, and City shall pay the Subcontractor's reasonable costs for re-commencing the obligations it has under the Subcontract and the Subcontractor shall be entitled to reasonable compensation and/or relief for re-commencing such obligations, having regard to the additional costs and delays incurred as a result of having terminated the Subcontract or having treated it as being repudiated by Construction Contractor or having discontinued its performance thereunder.
- (g) The Subcontractor acknowledges that if City novates the Subcontract to itself pursuant to Section 6(b), City shall have the right to further novate the Subcontract to a Substitute in accordance with and otherwise on, and subject to, the terms and conditions of this Subcontractor's Direct Agreement.

27. SUBCONTRACTOR LIABILITY

- (a) The liability of the Subcontractor hereunder shall not be modified, released, diminished or in any way affected by:
 - (i) any independent inspection, investigation or enquiry into any matter which may be made or carried out by or for City, or by any failure or omission to carry out any such inspection, investigation or enquiry; or
 - (ii) the appointment by City of any other person to review the progress of or otherwise report to City in respect of the Project, or by any action or omission of such person whether or not such action or omission might give rise to any independent liability of such person to City,

provided always that nothing in this Section 7 shall modify or affect any rights which the Subcontractor might have otherwise had to claim contribution from any other person whether under statute or common law.

- (b) In the event City delivers a Novation Notice, the Subcontractor shall have no greater liability to City or any Substitute than it would have had to Construction Contractor under the Subcontract, and the Subcontractor shall be entitled in any proceedings by City or any Substitute to rely on any liability limitations in the Subcontract.

28. DB CO AND CONSTRUCTION CONTRACTOR AS PARTY

- (a) DB Co acknowledges and agrees that the Construction Contractor shall not be in breach of the Design and Construction Contract by complying with its obligations hereunder.
- (b) Construction Contractor acknowledges and agrees that the Subcontractor shall not be in breach of the Subcontract by complying with its obligations hereunder.

29. ASSIGNMENT

- (a) Construction Contractor shall not, without the prior written consent of City, assign, transfer, charge, subcontract, subparticipate or otherwise dispose of any interest in this Subcontractor's Direct Agreement except to the extent entitled to do so under the Design and Construction Contract.
- (b) City may assign or otherwise dispose of the benefit of the whole or part of this Subcontractor's Direct Agreement to any person to whom City may assign or otherwise dispose of its interest in the Project Agreement pursuant to Section 49.2 of the Project Agreement but only in conjunction therewith, and shall provide written notice to DB Co, the Construction Contractor and the Subcontractor of such assignment or disposition.
- (c) The Construction Contractor shall not, without the prior written consent of City and DB Co, assign, transfer, charge, subcontract, subparticipate or otherwise dispose of any interest in this Subcontractor's Direct Agreement except as may be permitted under the Design and Construction Contract.
- (d) The Subcontractor shall not, without the prior written consent of City and DB Co, assign, transfer, charge, subcontract, subparticipate or otherwise dispose of any interest in this Subcontractor's Direct Agreement except as may be permitted under the Subcontract.

30. NOTICES

- (a) All notices, requests, demands, instructions, certificates, consents and other communications required or permitted under this Subcontractor's Direct Agreement shall be in writing (whether or not "written notice" or "notice in writing" is specifically required by the applicable provision of this Subcontractor's Direct Agreement) and served by sending the same by registered mail, facsimile or by hand (in each case, with a copy by electronic submission), as follows:

If to City:

City of Ottawa
110 Laurier Ave West
Ottawa, Ontario K1P 1J1
Mail code: [REDACTED]

Attn.: [REDACTED]
With an electronic copy, for information purposes only, to:
[REDACTED]

If to DB Co:

East West Connectors GP
[REDACTED]

Attn: [REDACTED]

Email: [REDACTED]

with a copy to:

[REDACTED]

Attn.: [REDACTED]

Email: [REDACTED]

If to the Construction Contractor:

[REDACTED]

Attn: [REDACTED]

Email: [REDACTED]

If to the Subcontractor:

[REDACTED]

Attn.: [REDACTED]

Email: [REDACTED]

- (b) Where any notice is provided or submitted to a Party via facsimile, an original of the notice sent via facsimile shall promptly be sent by regular mail or registered mail. For greater certainty, a notice given via facsimile shall not be invalid by reason only of a Party's failure to comply with this Section 10(b).
- (c) Any Party to this Subcontractor's Direct Agreement may, from time to time, change any of its contact information set forth in Section 10(a) by prior notice to the other Parties, and such change shall be effective on the Business Day that next follows the recipient Party's receipt of such notice unless a later effective date is given in such notice.
- (d) Subject to Sections 10(e), 10(f) and 10(g):
 - (iv) a notice given by registered mail shall be deemed to have been received on the third Business Day after mailing;
 - (v) a notice given by hand delivery shall be deemed to have been received on the day it is delivered; and
 - (vi) a notice given by facsimile shall be deemed to have been received on the day it is transmitted by facsimile.
- (e) If the Party giving the notice knows or ought reasonably to know of difficulties with the postal system which might affect negatively the delivery of mail, any such notice shall not be mailed but shall be made or given by personal delivery or by facsimile transmission in accordance with this Section 10.

- (f) If any notice delivered by hand or transmitted by facsimile is so delivered or transmitted, as the case may be, either on a day that is not a Business Day or on a Business Day after 4:00 p.m. (recipient's local time), then such notice shall be deemed to have been received by such recipient on the next Business Day.
- (g) A notice given by facsimile shall be deemed to have been received by the recipient on the day it is transmitted only if a facsimile transmission report (maintained by the sender) indicates that the transmission of such notice was successful.

31. AMENDMENTS

- (a) This Subcontractor's Direct Agreement may not be varied, amended or supplemented except by an agreement in writing signed by duly authorized representatives of the Parties and stating on its face that it is intended to be an amendment, restatement or other modification, as the case may be, to this Subcontractor's Direct Agreement.

32. WAIVER

- (a) No waiver made or given by a Party under or in connection with this Subcontractor's Direct Agreement shall be binding or effective unless the waiver is in writing, signed by an authorized representative of the Party giving such waiver, and delivered by such Party to the other Parties. No waiver made with respect to any right, power or remedy in one instance will be deemed to be a waiver with respect to any other instance involving the exercise of such right, power, or remedy or with respect to any other right, power, or remedy.
- (b) Failure by any Party to exercise any of its rights, powers or remedies hereunder or its delay to do so shall not constitute a waiver of those rights, powers or remedies. The single or partial exercise of a right, power or remedy shall not prevent its subsequent exercise or the exercise of any other right, power or remedy.

33. RELATIONSHIP BETWEEN THE PARTIES

The Parties are independent contractors. This Subcontractor's Direct Agreement is not intended to and does not create or establish between the Parties any relationship as partners, joint venturers, employer and employee, master and servant, or, except as provided in this Subcontractor's Direct Agreement, of principal and agent.

34. ENTIRE AGREEMENT

Except where provided otherwise in this Subcontractor's Direct Agreement, this Subcontractor's Direct Agreement constitutes the entire agreement between the Parties in connection with its subject matter and supersedes all prior representations, communications, negotiations and understandings, whether oral, written, express or implied, concerning the subject matter of this Subcontractor's Direct Agreement.

35. SEVERABILITY

Each provision of this Subcontractor's Direct Agreement shall be valid and enforceable to the fullest extent permitted by law. If any provision of this Subcontractor's Direct Agreement is declared invalid, unenforceable or illegal by the courts of a competent jurisdiction, such provision may be severed

and such invalidity, unenforceability or illegality shall not prejudice or affect the validity, enforceability and legality of the remaining provisions of this Subcontractor's Direct Agreement. If any such provision of this Subcontractor's Direct Agreement is invalid, unenforceable or illegal, the Parties shall, acting in good faith, promptly negotiate new provisions to eliminate such invalidity, unenforceability or illegality and to restore this Subcontractor's Direct Agreement as near as possible to its original intent and effect.

36. ENUREMENT

This Subcontractor's Direct Agreement shall enure to the benefit of, and be binding on, each of the Parties and their respective successors and permitted transferees and assigns.

37. GOVERNING LAW AND JURISDICTION

- (a) This Subcontractor's Direct Agreement shall be governed by and construed in accordance with the laws of Ontario and the laws of Canada applicable therein and shall be treated in all respects as an Ontario contract, without regard to conflict of laws principles.
- (b) The Parties agree that the courts of the Province of Ontario and all courts competent to hear appeals therefrom shall have exclusive jurisdiction to hear and settle any action, suit, proceeding or dispute in connection with this Subcontractor's Direct Agreement and hereby irrevocably attorn to the exclusive jurisdiction of such courts.
- (c) Nothing in this Subcontractor's Direct Agreement affects the rights, protections and immunities of the Crown under the *Proceedings Against the Crown Act* (Ontario).

38. FURTHER ASSURANCE

Each Party shall do all things, from time to time, and execute all further documents necessary to give full effect to this Subcontractor's Direct Agreement.

39. LANGUAGE OF AGREEMENT

Each Party acknowledges having requested and being satisfied that this Subcontractor's Direct Agreement and related documents be drawn in English. Chacune des parties reconnaît avoir demandé que ce document et ses annexes soient rédigés en anglais et s'en déclare satisfaite.

40. COUNTERPARTS

This Subcontractor's Direct Agreement may be executed in one or more counterparts. Any single counterpart or a set of counterparts executed, in either case, by all the Parties shall constitute a full, original and binding agreement for all purposes. Counterparts may be executed either in original or electronic form provided that any Party providing its signature in electronic form shall promptly forward to such Party an original signed copy of this Subcontractor's Direct Agreement which was so faxed.

[SIGNATURE PAGES IMMEDIATELY FOLLOW]

IN WITNESS WHEREOF the Parties have executed this Subcontractor's Direct Agreement as of the date first above written.

THE CITY OF OTTAWA

Per: _____

Name: **[REDACTED]**

Title: **[REDACTED]**

EAST WEST CONNECTORS GP

Per: _____
Name: [REDACTED]
Title: [REDACTED]

Per: _____
Name: [REDACTED]
Title: [REDACTED]

I/We have authority to bind the partnership

[REDACTED]

Per: _____
Name: [REDACTED]
Title: [REDACTED]

Per: _____
Name: [REDACTED]
Title: [REDACTED]

Per: _____
Name: [REDACTED]
Title: [REDACTED]

Per: _____
Name: [REDACTED]
Title: [REDACTED]

We have authority to bind the partnership

[REDACTED]

Per: _____
Name:
Title:

I have authority to bind the corporation.

SCHEDULE 4

LENDERS' DIRECT AGREEMENT

THIS LENDERS' DIRECT AGREEMENT is made as of the 24th day of April, 2019.

BETWEEN:

THE CITY OF OTTAWA (“City”)

AND:

[REDACTED]

(the “**Lenders’ Agent**”)

AND:

EAST WEST CONNECTORS GP [REDACTED]

(“**DB Co**”)

WHEREAS:

- A. City and DB Co have entered into the Project Agreement.
- B. Under the Lending Agreements, the Financing is to be provided to DB Co by the Lenders to partially finance the Works under the Project Agreement, conditional, among other things, on DB Co executing and delivering the Lending Agreements.
- C. The Lenders’ Agent has agreed to enter into this Lenders’ Direct Agreement with City and DB Co in relation to the Lending Agreements, the exercise of its rights under the Lending Agreements and the remedying of breaches by DB Co under the Project Agreement.
- D. With a view to ensuring that City is able to properly and effectively discharge its duties, functions and responsibilities under Applicable Law, DB Co, the Lenders’ Agent and the Lenders commit to working collaboratively, responsibly and cooperatively with City throughout the duration of the Project Agreement.

NOW THEREFORE in consideration of the mutual covenants and agreements of the Parties hereinafter contained and for other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the Parties covenant and agree as follows:

1 DEFINITIONS AND INTERPRETATION

- 1.1** In this Schedule 4 - Lenders’ Direct Agreement, all capitalized terms not otherwise defined in this Schedule 4 - Lenders’ Direct Agreement shall have the meanings ascribed to them in the Project Agreement and unless the context otherwise requires:

- (a) **“Appointed Representative”** means any of the following to the extent so identified in an Appointed Representative Notice:
 - (i) the Lenders’ Agent, the Lenders or any Affiliate of either of them;
 - (ii) a receiver or receiver and manager or any permutation thereof of DB Co appointed under the Security Documents;
 - (iii) a trustee in bankruptcy or court appointed receiver of DB Co;
 - (iv) an administrator of DB Co;
 - (v) a person directly or indirectly owned or controlled by the Lenders’ Agent or the Lenders; or
 - (vi) any other person approved by City (such approval not to be unreasonably withheld or delayed).
- (b) **“Appointed Representative Notice”** has the meaning given in Section 8(b).
- (c) **“City Project Documents”** means the Project Agreement and all other documents to which both the City and DB Co are parties pursuant to or in connection with the Project Agreement.
- (d) **“Default Notice”** has the meaning given in Section 7(b)(i).
- (e) **“Enforcement Action”** means any acceleration of amounts due and owing to the Lenders under any of the Lending Agreements and/or any enforcement proceeding or enforcement action commenced or taken under any of the Security Documents.
- (f) **“Enforcement Event”** means an event of default as defined in the Lending Agreements, or any other event which permits an Enforcement Action.
- (g) **“Exercise Date”** has the meaning given in Section 12(b).
- (h) **“Indebtedness Notice”** has the meaning given in Section 7(b)(ii).
- (i) **“Lender Representative”** means a representative (which may be the Lenders’ Agent) acting as agent or trustee for and on behalf of all of the lenders lending to a Suitable Substitute.
- (j) **“Lenders’ Agent”** means [REDACTED] acting as agent for and on behalf of the Lenders.
- (k) **“Lenders’ Construction Contractor Direct Agreement”** means the direct agreement among the Lenders’ Agent, the Construction Contractor and DB Co.
- (l) **“Lenders’ Direct Agreement”** means this lenders’ direct agreement.

- (m) “**Notice Period**” means the period starting on the date of delivery of a Default Notice and ending 120 days later.
- (n) “**Novation Date**” has the meaning given in Section 10(a).
- (o) “**Novation Notice**” has the meaning given in Section 10(a).
- (p) “**Party**” means the City, DB Co or the Lenders’ Agent, and “**Parties**” means collectively, the City, DB Co and the Lenders’ Agent.
- (q) “**Security**” means the Insurance and any other security interests granted to the Lenders’ Agent pursuant to the Security Documents.
- (r) “**Security Documents**” means all security granted by DB Co to the Lenders (or any trustee or agent thereof, including the Lenders’ Agent) pursuant to or in connection with the Lending Agreements, including but not limited to:
 - (i) the Lenders’ Construction Contractor Direct Agreement;
 - (ii) general security agreement between DB Co, [REDACTED] and the Lenders’ Agent dated the date of the Project Agreement;
 - (iii) limited recourse guarantee and pledge between [REDACTED] and the Lenders’ Agent dated the date of the Project Agreement;
 - (iv) limited recourse guarantee and pledge between [REDACTED] and the Lenders’ Agent dated the date of the Project Agreement;
 - (v) limited recourse guarantee and pledge between [REDACTED] and the Lenders’ Agent dated the date of the Project Agreement;
 - (vi) limited recourse guarantee and pledge between [REDACTED] and the Lenders’ Agent dated the date of the Project Agreement;
 - (vii) general blocked account agreement between DB Co, the Lenders’ Agent and [REDACTED] dated the date of the Project Agreement;
 - (viii) springing blocked account agreement between DB Co, the Lenders’ Agent and [REDACTED], dated the date of the Project Agreement;
 - (ix) Performance Guarantee of Construction Guarantor entered into by the Construction Guarantor in favour of DB Co dated the date of the Project Agreement; and
 - (x) assignment of insurances by DB Co, subject to the terms of the Insurance Trust Agreement.
- (s) “**Step-In Date**” means the date on which the City receives a Step-In Notice from the Lenders’ Agent.

- (t) **“Step-In Notice”** means the notice given by the Lenders’ Agent to the City pursuant to Section 8(a) stating that the Lenders’ Agent is exercising its step-in rights under this Lenders’ Direct Agreement.
- (u) **“Step-In Period”** means the period from the Step-In Date up to and including the earlier of:
 - (i) the Step-Out Date;
 - (ii) the Termination Date (provided that the City has complied with its obligations in Section 7 of this Lenders’ Direct Agreement);
 - (iii) the date that a transfer of DB Co’s rights and obligations under the City Project Documents to a Suitable Substitute pursuant to Section 10 becomes effective; and
 - (iv) if the Step-In Date occurs prior to the latest Substantial Completion Date, the earlier of:
 - (A) the date falling 180 days after the Longstop Date; or
 - (B) the date falling 2 years after the Step-In Date.
- (v) **“Step-Out Date”** means the date falling 30 days after the date on which the City receives a Step-Out Notice.
- (w) **“Step-Out Notice”** has the meaning given in Section 9(a).
- (x) **“Subsequent Indebtedness Notice”** has the meaning given in Section 7(c).
- (y) **“Suitable Substitute”** means a person, approved in writing by the City in accordance with Sections 10(b) and 10(c), which:
 - (i) has the legal capacity, power and authority to become a party to and perform the obligations of DB Co under the City Project Documents; and
 - (ii) employs individuals having the appropriate qualifications, experience and technical competence, and having the resources available to it (including committed financial resources and subcontracts) that are sufficient to enable it to perform the obligations of DB Co under the City Project Documents.

2 INTERPRETATION

This Lenders’ Direct Agreement shall be interpreted according to the following provisions, unless the context requires a different meaning:

- (a) The headings in this Lenders’ Direct Agreement are for convenience of reference only, shall not constitute a part of this Lenders’ Direct Agreement, and shall not be taken into

consideration in the interpretation of, or affect the meaning of, this Lenders' Direct Agreement.

- (b) Unless the context otherwise requires, references to specific Sections, Clauses, Paragraphs, Subparagraphs, and other divisions are references to such Sections, Clauses, Paragraphs, Subparagraphs, or divisions of this Lenders' Direct Agreement and the terms "Section" and "Clause" are used interchangeably and are synonymous.
- (c) Words importing persons or parties are to be broadly interpreted and include an individual, corporation, limited liability company, joint stock company, firm, partnership, joint venture, trust, unincorporated organization, Governmental Authority, unincorporated body of persons or association and any other entity having legal capacity, and the heirs, beneficiaries, executors, administrators or other legal representatives of a person in such capacity.
- (d) Unless the context otherwise requires, wherever used herein the plural includes the singular, the singular includes the plural, and each of the masculine, feminine and neuter genders include all other genders.
- (e) References to any standard, principle, agreement or document include (subject to all relevant approvals and any other provisions of this Lenders' Direct Agreement concerning amendments) a reference to that standard, principle, agreement or document as amended, supplemented, restated, substituted, replaced, novated or assigned.
- (f) The words in this Lenders' Direct Agreement shall bear their natural meaning.
- (g) References containing terms such as:
 - (i) "hereof", "herein", "hereto", "hereinafter", and other terms of like import are not limited in applicability to the specific provision within which such references are set forth but instead refer to this Lenders' Direct Agreement taken as a whole; and
 - (ii) "includes" and "including", whether or not used with the words "without limitation" or "but not limited to", shall not be deemed limited by the specific enumeration of items but shall, in all cases, be deemed to be without limitation and construed and interpreted to mean "includes without limitation" and "including without limitation".
- (h) In construing this Lenders' Direct Agreement, the rule known as the *ejusdem generis rule* shall not apply nor shall any similar rule or approach to the construction of this Lenders' Direct Agreement and, accordingly, general words introduced or followed by the word "other" or "including" or "in particular" shall not be given a restrictive meaning because they are followed or preceded (as the case may be) by particular examples intended to fall within the meaning of the general words.
- (i) Where this Lenders' Direct Agreement states that an obligation shall be performed "no later than" or "within" or "by" a stipulated date or event which is a prescribed number of days after a stipulated date or event, the latest time for performance shall be 5:00 p.m. on

the last day for performance of the obligation concerned, or, if that day is not a Business Day, 5:00 p.m. on the next Business Day.

- (j) Where this Lenders' Direct Agreement states that an obligation shall be performed "on" a stipulated date, the latest time for performance shall be 5:00 p.m. on that day, or, if that day is not a Business Day, 5:00 p.m. on the next Business Day.
- (k) Any reference to time of day or date means the local time or date in Ottawa, Ontario.
- (l) Unless otherwise indicated, time periods will be strictly construed.
- (m) Whenever the terms "will" or "shall" are used in this Lenders' Direct Agreement they shall be construed and interpreted as synonymous and to read "shall".

3 CONFLICT OF DOCUMENTS

In the event of any ambiguity, conflict or inconsistency between the provisions of this Lenders' Direct Agreement, the Project Agreement and the Construction Contractor's Direct Agreement, the provisions of this Lenders' Direct Agreement shall prevail and govern to the extent of such ambiguity, conflict or inconsistency.

4 TERM

- (a) This Lenders' Direct Agreement shall terminate automatically on the earliest of:
 - (i) the date on which all amounts which may be or become owing to the Lenders under the Lending Agreements have been irrevocably paid in full;
 - (ii) the Termination Date (provided that the City has complied with its obligations in Section 7 of this Lenders' Direct Agreement); and
 - (iii) the date that any transfer of DB Co's rights and obligations under the City Project Documents to a Suitable Substitute pursuant to Section 10 becomes effective and the agreements contemplated in Section 10(e)(iii) are executed and delivered by the parties thereto.
- (b) Within 30 days following its occurrence, the Lenders' Agent shall provide notice to the City of the date referred to in Section 4(a)(i).

5 AGREEMENTS AND SECURITY

- (a) DB Co and the Lenders' Agent shall not amend or modify the Lending Agreements, or any of them, except where DB Co is permitted to do so pursuant to Section 8.3 of the Project Agreement.
- (b) DB Co shall not, prior to the latest Substantial Completion Date, exercise any rights of voluntary prepayment, voluntary redemption, or other voluntary repayment of loan, as applicable, under the Lending Agreements without the prior written consent of the City, acting in its sole discretion. In exercising its sole discretion to grant consent, the City

shall be entitled to request and consider, and DB Co shall be required to provide within 10 Business Days following a request by the City, amongst other things and not limited to, the following:

- (i) written certification by an officer of DB Co of the remaining Project Costs (as defined in the Lending Agreements) accrued and unpaid or expected to be incurred to achieve all remaining Substantial Completions and to fund any Project Accounts (as defined in the Lending Agreements) then not funded and required to be funded at or prior to the then anticipated prepayment and/or redemption (as approved by [REDACTED] (as defined in the Lending Agreements)) by the latest Substantial Completion Date;
 - (ii) written certification by an officer of DB Co that no Funding Shortfall (as defined in the Lending Agreements) would reasonably be expected to arise as a consequence of such prepayment and/or redemption, including any related cancellation of unutilized commitments, if applicable, under the Lending Agreements;
 - (iii) written confirmation from the Lenders' Consultant, addressed to the City, that the DB Co's calculation in Section 5(b)(i) and DB Co's certification in Section 5(b)(ii) is, in the opinion of the Lenders' Consultant, correct;
 - (iv) written confirmation from the Lenders' Consultant, addressed to the City, that no incremental delay in achieving the any Substantial Completion Date (beyond the applicable Scheduled Substantial Completion Date) would reasonably be expected as a consequence of such prepayment and/or redemption and related cancellation of unutilized commitments, if applicable, under the Lending Agreements; and
 - (v) written confirmation from the Lenders' Consultant, addressed to the City, that the remaining Substantial Completion Dates are likely to occur on or prior to the then Scheduled Substantial Completion Dates.
- (c) DB Co and the City shall not amend or modify the City Project Documents (other than in accordance with the terms of those agreements) without the prior written consent of the Lenders' Agent, not to be unreasonably withheld or delayed, which consent shall not be withheld if the relevant amendment or modification shall not (i) materially adversely affect the ability of the Lenders to exercise their rights under the Security, (ii) materially adversely affect the value of the Security, or (iii) increase the liability of the Lenders or DB Co under the relevant agreement. The Lenders' Agent shall respond to any request for consent under this Section 5(c) within 30 days following receipt thereof.
- (d) DB Co acknowledges and consents to the arrangements set out in this Lenders' Direct Agreement, and agrees not to do or omit to do anything that may prevent any other Party from enforcing its rights under this Lenders' Direct Agreement.
- (e) The Lenders' Agent acknowledges having received a copy of the Project Agreement.

- (f) The City acknowledges having received copies of the Lending Agreements, and confirm that they are in form and substance satisfactory to the City as at the date of Financial Close.
- (g) The City acknowledges notice of and consents to the Security, and confirm that they have not received notice of any other security interest granted over DB Co's rights under any of the City Project Documents.
- (h) DB Co and the City agree that upon the occurrence of an Enforcement Event, if so directed in writing by the Lenders' Agent upon giving reasonable notice, the City shall pay any sum which they are obliged to pay to DB Co under the Project Agreement to a bank account specified by the Lenders' Agent.
- (i) Prior to the irrevocable payment in full of all amounts owing to the Lenders under the Lending Agreements, the City shall not take any action to wind-up, liquidate, dissolve or appoint a receiver or receiver and manager of DB Co or to institute or sanction a voluntary arrangement or any other bankruptcy or insolvency proceedings in relation to DB Co.
- (j) The Lenders' Agent shall cause the Lenders' Consultant to provide the City with a copy of any written assessment or report prepared by the Lenders' Consultant in relation to the status or progress of the Works under the Design and Construction Contract, including but not limited to, any certificate of payment, concurrently with its delivery to the Lenders' Agent. The Lenders' Agent acknowledges and agrees that this Section 5(j) shall constitute sufficient authority for the Lenders' Consultant to provide, without delay, a copy of any and all of its written assessments and reports to the City.
- (k) The City shall provide the Lenders' Agent with copies of any notice of default given to DB Co under the Project Agreement at the same time such notice is given to DB Co.

6 ENFORCEMENT OF SECURITY BY LENDERS' AGENT

- (a) The Lenders' Agent shall promptly notify the City of any Enforcement Event, any Enforcement Action, any notice from the Lenders to DB Co to accelerate the maturity of any amounts owing by DB Co to the Lenders under the Lending Agreements or any notice from the Lenders to DB Co to demand repayment of any amounts owing by DB Co to the Lenders under the Lending Agreements.
- (b) The Lenders' Agent may assign, transfer or otherwise dispose of any right, title or interest it may have in, or rights or obligations it may have pursuant to, the Security Documents to a successor agent in accordance with the terms of the Lending Agreements except where:
 - (i) such assignment, transfer or other disposition would constitute a Refinancing and the provisions of Schedule 28 - Refinancing to the Project Agreement have not been complied with in connection therewith; or
 - (ii) the person to whom such assignment, transfer or other disposition is to be made, or an Affiliate of such person, is a Restricted Person or a person whose standing

or activities may compromise (i) the City's reputation or integrity, or (ii) the nature of the public transit system in the City of Ottawa or the Province of Ontario so as to affect public confidence in the public transit system in the City of Ottawa, the Province of Ontario or the Project.

- (c) Any Lender may assign, transfer or otherwise dispose of any right, title or interest it may have in, or rights or obligations it may have pursuant to, the Lending Agreements in accordance with the terms of the Lending Agreements.

7 TERMINATION OF PROJECT AGREEMENT BY THE CITY

- (a) Subject only to the rights expressly afforded to the Lenders' Agent pursuant to, and the restrictions set forth in, this Section 7, the City may, at any time, serve notice terminating the Project Agreement if it is entitled to do so under the terms of the Project Agreement.
- (b) At any time other than during the Step-In Period (with the restriction on termination during the Step-In Period set out in Section 7(d)), the City shall not exercise any right it may have to terminate or serve notice terminating the Project Agreement for a DB Co Event of Default unless:
 - (i) the City promptly delivers written notice (a **"Default Notice"**) to the Lenders' Agent setting out the DB Co Event of Default in reasonable detail;
 - (ii) not later than 30 days after the date of a Default Notice, the City delivers written notice (an **"Indebtedness Notice"**) to the Lenders' Agent setting out:
 - (A) all amounts owed by DB Co to the City and any other existing liabilities and unperformed obligations of DB Co to the City of which the City is aware (having made reasonable enquiry), in each case, as of the date on which the City sent the Default Notice; and
 - (B) all amounts which will become owing by DB Co to the City and any other liabilities and obligations of DB Co to the City of which the City is aware (having made reasonable enquiry), in each case, on or before the end of the Notice Period; and
 - (iii) the Notice Period has expired and the Lenders' Agent has not delivered a Step-In Notice.
- (c) At any time after the City sends an Indebtedness Notice but before the City receives a Step-In Notice, if the City discovers amounts that have become owing by DB Co to the City or any other liabilities or obligations of DB Co to the City that have come due but which were not included in the Indebtedness Notice, the City shall deliver written notice (a **"Subsequent Indebtedness Notice"**) to the Lenders' Agent setting out those amounts, liabilities or obligations.
- (d) During the Step-In Period, the City shall not terminate the Project Agreement on grounds:

- (i) that the Lenders' Agent has served a Step-In Notice or enforced any Security Document; or
 - (ii) arising prior to the Step-In Date of which the City was aware (having made due inquiry) and whether or not continuing at the Step-In Date unless:
 - (A) the grounds arose prior to the latest Substantial Completion Date, and the latest Substantial Completion Date does not occur on or before the date falling 180 days after the Longstop Date; or
 - (B) the grounds (whenever they first arose) did not give rise to any right to terminate the Project Agreement until after the Step-In Date; or
 - (iii) arising solely in relation to DB Co.
- (e) The City shall be entitled to terminate the Project Agreement by written notice to DB Co and the Appointed Representative:
- (i) if any amount referred to in Section 7(b)(ii)(A) has not been paid to the City on or before the Step-In Date;
 - (ii) if any amount referred to in Section 7(b)(ii)(B) has not been paid on or before the last day of the Notice Period;
 - (iii) if amounts included in a Subsequent Indebtedness Notice have not been paid on or before the date falling 30 days after the date on which the Subsequent Indebtedness Notice is delivered to the Lenders' Agent; or
 - (iv) on grounds arising after the Step-In Date in accordance with the terms of the Project Agreement.

8 STEP-IN RIGHTS

- (a) Subject to Section 8(b) and without prejudice to rights of the Lenders' Agent to enforce the Security, the Lenders' Agent may give the City a Step-In Notice at any time:
- (i) during which a DB Co Event of Default is subsisting (whether or not a Default Notice has been served); or
 - (ii) during the Notice Period;
 - (iii) during which an Enforcement Event is subsisting.
- (b) At least 5 Business Days before the Lenders' Agent delivers a Step-In Notice, the Lenders' Agent shall deliver written notice (an "**Appointed Representative Notice**") to the City of:
- (i) its intention to deliver a Step-In Notice; and

- (ii) the identity of its proposed Appointed Representative.
- (c) Upon issuance of a Step-In Notice, the Appointed Representative shall assume, jointly with DB Co, all of DB Co's rights under the City Project Documents.
- (d) During the Step-In Period, the City shall deal with the Appointed Representative instead of DB Co in connection with all matters related to the City Project Documents. DB Co agrees to be bound by all such dealings between the City and the Appointed Representative to the same extent as if they had been between the City and DB Co.

9 STEP-OUT RIGHTS

- (a) The Appointed Representative may, at any time during the Step-In Period, deliver written notice (a "**Step-Out Notice**") to the City to terminate the Step-In Period on the Step-Out Date.
- (b) On expiry of the Step-In Period:
 - (i) the rights and obligations of the Appointed Representative in relation to the City under the City Project Documents arising prior to the expiry of the Step-In Period will be assumed by DB Co to the exclusion of the Appointed Representative;
 - (ii) the City will no longer deal with the Appointed Representative and will deal with DB Co in connection with all matters related to the City Project Documents; and
 - (iii) the Appointed Representative and the City shall be and hereby are released from all obligations and liabilities to one another under the City Project Documents.
- (c) There will not be more than one Step-In Period in respect of any one Default Notice.

10 NOVATION TO SUITABLE SUBSTITUTE

- (a) Subject to Section 10(b), at any time:
 - (i) after an Enforcement Event has occurred;
 - (ii) during the Notice Period; or
 - (iii) during the Step-In Period,

the Lenders' Agent may deliver to the City and any Appointed Representative written notice (a "**Novation Notice**") that it wishes to transfer DB Co's rights and obligations under the City Project Documents to a proposed transferee, together with all information reasonably necessary for the City to decide whether the proposed transferee is a Suitable Substitute. The Novation Notice shall specify a Business Day not less than 30 days from the date on which the City receives the Novation Notice ("**Novation Date**") for the transfer of DB Co's rights and obligations under the City Project Documents to the proposed transferee in accordance with the provisions of Section 10(e).

- (b) The City shall promptly notify the Lenders' Agent of any additional information it requires in order to assess whether the proposed transferee is a Suitable Substitute. The City shall notify the Lenders' Agent, in writing, as to whether the person to whom the Lenders' Agent proposes to transfer DB Co's rights and liabilities under the City Project Documents is approved by the City as a Suitable Substitute, on or before the date falling 30 days after the later of the date of receipt by the City of the Novation Notice and the date of receipt of any additional information requested by the City. For greater certainty, if the City fails to respond within such period, the City shall be deemed not to have approved the proposed transferee.
- (c) The City shall not unreasonably withhold or delay its approval of a proposed transferee as a Suitable Substitute, but it shall, without limitation, be reasonable for the City to withhold its approval if:
 - (i) there are unremedied breaches under the Project Agreement which are capable of being remedied by the Appointed Representative or the Suitable Substitute and there is no rectification plan acceptable to the City, acting reasonably, in respect of such breaches;
 - (ii) the proposed transferee is a Restricted Person or other person who is not permitted to be a DB Co Party pursuant to the Project Agreement; or
 - (iii) the proposed security interests to be granted by the Suitable Substitute to the Lender Representative are materially different from the Security, materially adversely affect the ability of the Suitable Substitute to perform under the City Project Documents or have the effect of increasing any liability of the City, whether actual or potential.
- (d) If the City withholds its approval of a proposed transferee as a Suitable Substitute in accordance with Section 10(c), the Lenders' Agent may give one or more subsequent Novation Notices pursuant to the provisions of Section 10(a) containing changed particulars relating to the same proposed transferee or particulars relating to another proposed transferee which the Lenders' Agent has good cause to believe will be acceptable to the City, acting reasonably, provided that only one Novation Notice may be outstanding at any one time.
- (e) On the Novation Date:
 - (i) DB Co and the City will be released from their obligations under the City Project Documents to each other, and the Suitable Substitute and the City will assume those same obligations towards each other;
 - (ii) each of the rights of DB Co against the City under the City Project Documents and the rights of the City against DB Co under the City Project Documents will be cancelled, and the Suitable Substitute and the City will acquire those same rights against each other;
 - (iii) the Parties will enter into, and the Lenders' Agent shall cause the Suitable Substitute and the Lender Representative to enter into, all such agreements or

other documents as are reasonably necessary to give effect to the foregoing, including:

- (A) an agreement between the City and the Suitable Substitute, on substantially the same terms as the Project Agreement; and
 - (B) an agreement among the City, the Suitable Substitute and the Lender Representative on substantially the same terms as this Lenders' Direct Agreement;
- (iv) any subsisting ground for termination by the City of the Project Agreement will be deemed to have no effect and any subsisting Default Notice will be automatically revoked.

11 TRANSFERS

The City shall, at DB Co's cost and expense, take whatever action the Lenders' Agent, the Appointed Representative or a Suitable Substitute may reasonably require for perfecting any assumption or transfer of or release pursuant to Sections 8, 9 or 10, including the execution of any transfer or assignment, and the giving of any notice, order or direction and the making of any registration which, in each case, the Lenders' Agent, the Appointed Representative or the Suitable Substitute reasonably requires.

12 CONSTRUCTION CONTRACTOR'S DIRECT AGREEMENT

- (a) Notwithstanding any provision in the Construction Contractor's Direct Agreement, the City hereby undertakes that it will not exercise any rights they may have under or arising out of any of the Construction Contractor's Direct Agreement, except as provided in Sections 12(b) to 12(f) inclusive.
- (b) Following termination of the Project Agreement (other than as a result of a novation pursuant to this Lenders' Direct Agreement) in accordance with this Lenders' Direct Agreement, the City shall from such date (the "**Exercise Date**") be entitled to exercise its rights under the Construction Contractor's Direct Agreement to step in to and/or novate the Design and Construction Contract in accordance with the Construction Contractor's Direct Agreement.
- (c) Following the Exercise Date, the City shall not do anything to prejudice the rights which are not transferred to them pursuant to the Construction Contractor's Direct Agreement.
- (d) Where all amounts which may be or become owing by DB Co to the Lenders under the Lending Agreements have been irrevocably paid in full, the Lenders' Agent shall promptly release and discharge all Security in respect of the Design and Construction Contract assumed or novated by the City pursuant to the Construction Contractor's Direct Agreement.
- (e) Notwithstanding the terms of the Construction Contractor's Direct Agreement and any other provisions of this Section 12, the Construction Contractor (and any guarantor thereof) shall remain responsible, and be liable, to DB Co in respect of all costs, claims,

damages, losses and liabilities which shall have arisen out of or in connection with the Design and Construction Contract in respect of the period prior to the Exercise Date.

- (f) Without prejudice to Sections 12(a) to 12(e) inclusive, the City shall not, prior to the date on which this Lenders' Direct Agreement terminates:
- (i) claim, recover, retain or receive (or seek to claim, recover, retain or receive) any amount under the Construction Contractor's Direct Agreement (and/or the Design and Construction Contract) from the Construction Contractor;
 - (ii) take any action to wind-up, liquidate, dissolve or appoint a receiver or receiver and manager of the Construction Contractor or to institute or sanction a voluntary arrangement or any other bankruptcy or insolvency proceedings in relation to the Construction Contractor; or
 - (iii) compete with the rights of the Lenders' Agent on a winding-up or other insolvency or bankruptcy of the Construction Contractor, nor claim to be subrogated to any rights of the Lenders' Agent or any Lender.

The City agrees and undertakes that if it receives any amount in contravention of the provisions of this Section 12(f), it will immediately turn the same over to the Lenders' Agent for the account of the Lenders' Agent and the Lenders and, pending such payment, hold the same in trust for the Lenders' Agent and the Lenders.

13 SUBCONTRACTOR'S DIRECT AGREEMENT

Notwithstanding any provision in a Subcontractor's Direct Agreement, the City hereby undertakes that it will not exercise any rights they may have under or arising out of any Subcontractor's Direct Agreement unless:

- (a) the Project Agreement and the Design and Construction Contract have been terminated;
- (b) the City is entitled to terminate the Project Agreement pursuant to the terms thereof and of this Lender's Direct Agreement; or
- (c) the City is entitled to exercise its rights under the Construction Contractor's Direct Agreement pursuant to Section 12(b).

14 PERFORMANCE GUARANTEE OF CONSTRUCTION GUARANTOR

Notwithstanding any provision in the Performance Guarantee of Construction Guarantor, the City hereby undertakes that it will not exercise any rights it may have under or arising out of the Performance Guarantee of Construction Guarantor unless:

- (a) the Project Agreement has been terminated; or
- (b) the City is entitled to terminate the Project Agreement pursuant to the terms thereof and of this Lenders' Direct Agreement.

15 NOTICE OF DB CO DELAY OR PROCEEDING AT RISK

- (a) The Parties acknowledge that, if DB Co is deemed to be failing to maintain the schedule pursuant to Schedule 12 – Works Scheduling Requirements, or Proceeding At Risk pursuant to Section 14.6(g) of the Project Agreement, the City may, in its sole discretion, give notice to the Lenders' Agent that DB Co is failing to maintain the schedule or Proceeding At Risk, together with the relevant information supporting the City's opinion that DB Co is failing to maintain the schedule or Proceeding At Risk.

16 ASSIGNMENT

- (a) No Party to this Lenders' Direct Agreement may assign, transfer or otherwise dispose of any part of its rights or obligations under this Lenders' Direct Agreement save as provided in this Section 16.
- (b) DB Co may assign, transfer or otherwise dispose of the benefit of this Lenders' Direct Agreement to any person to whom DB Co assigns, transfers or otherwise disposes of its interest in the Project Agreement pursuant to Section 49.1 of the Project Agreement and the provisions of the Lending Agreements, and shall provide written notice to the City and the Lenders' Agent of such assignment, transfer or other disposition. Such assignee, as a condition precedent to any such assignment, transfer or other disposition, shall assume the obligations and acquire the rights of DB Co under this Lenders' Direct Agreement pursuant to an assumption agreement with, and in form and substance satisfactory to, the City and the Lenders' Agent, each acting reasonably. The City and the Lenders' Agent shall, at DB Co's cost and expense, do all things and execute all further documents as may be necessary in connection therewith.
- (c) The City may assign, transfer or otherwise dispose of the benefit of the whole or part of this Lenders' Direct Agreement to any person to whom the City assigns, transfers or otherwise disposes of its interest in the Project Agreement pursuant to Section 49.2 of the Project Agreement, and shall provide written notice to DB Co and the Lenders' Agent of such assignment, transfer or other disposition. Such assignee, as a condition precedent to any such assignment, transfer or other disposition, shall assume the obligations and acquire the rights of the City under this Lenders' Direct Agreement pursuant to an assumption agreement with, and in form and substance satisfactory to, DB Co and the Lenders' Agent, each acting reasonably. DB Co and the Lenders' Agent shall, at the City's cost and expense, do all things and execute all further documents as may be necessary in connection therewith.
- (d) The Lenders' Agent may only assign, transfer or otherwise dispose of any interest in this Lenders' Direct Agreement as permitted by the Lending Agreements, and shall provide written notice to DB Co and the City of such assignment, transfer or other disposition; provided that, notwithstanding any provision to the contrary in the Lending Agreements, the Lenders' Agent may not assign, transfer or otherwise dispose of any interest in this Lenders' Direct Agreement to a Restricted Person. The Lenders' Agent, as a condition precedent to any such assignment, transfer or other disposition, shall cause the assignee to enter into a new agreement with DB Co and the City on substantially the same terms as this Lenders' Direct Agreement and DB Co and the City shall enter into such new agreement with the assignee. DB Co and the City shall, at the Lenders' Agent's cost and

expense, do all things and execute all further documents as may be necessary in connection therewith.

17 NOTICES

- (a) All notices, requests, demands, instructions, certificates, consents and other communications required or permitted under this Lenders' Direct Agreement shall be in writing (whether or not "written notice" or "notice in writing" is specifically required by the applicable provision of this Lenders' Direct Agreement) and served by sending the same by registered mail or by hand (in each case, with a copy by electronic submission), as follows:

If to the City:

City of Ottawa
110 Laurier Ave West
Ottawa, Ontario K1P 1J1
Mail code: [REDACTED]

Attention: [REDACTED]
With an electronic copy, for information purposes only, to: [REDACTED]

If to the Lenders' Agent:

[REDACTED]

Fax No.: [REDACTED]

Email: [REDACTED]

Attn.: [REDACTED]

If to DB Co:

East West Connectors GP
[REDACTED]

Attn.: [REDACTED]

Email: [REDACTED]
[REDACTED]

with a copy to:

[REDACTED]

Attn.: [REDACTED]

Email: [REDACTED]

If to the Construction Guarantor:

[REDACTED]

Fax No.: [REDACTED]
Attn.: [REDACTED]

and

[REDACTED]

Fax No.: [REDACTED]
Attn.: [REDACTED]

with a copy to:

[REDACTED]

Fax No.: [REDACTED]
Attn.: [REDACTED]

and

[REDACTED]

Fax No.: [REDACTED]
Attn.: [REDACTED]

- (b) Any Party to this Lenders' Direct Agreement may, from time to time, change any of its contact information set forth in Section 17(a) by prior notice to the other Parties, and such change shall be effective on the Business Day that next follows the recipient Party's receipt of such notice unless a later effective date is given in such notice.
- (c) Subject to Sections 17(d) and 17(e):
 - (i) a notice given by registered mail shall be deemed to have been received on the third Business Day after mailing; and
 - (ii) a notice given by hand delivery shall be deemed to have been received on the day it is delivered.
- (d) If the Party giving the notice knows or ought reasonably to know of difficulties with the postal system which might affect negatively the delivery of mail, any such notice shall not be mailed but shall be made by personal delivery in accordance with this Section 17.
- (e) If any notice delivered by hand or transmitted by facsimile is so delivered or transmitted either on a day that is not a Business Day or on a Business Day after 4:00 p.m. (recipient's local time), then such notice shall be deemed to have been received by such recipient on the next following Business Day.

18 AMENDMENTS

This Lenders' Direct Agreement may not be varied, amended or supplemented except by an agreement in writing signed by duly authorized representatives of the Parties and stating on its face that it is intended to be an amendment, restatement or other modification, as the case may be, to this Lenders' Direct Agreement.

19 WAIVER

- (a) No waiver made or given by a Party under or in connection with this Lenders' Direct Agreement shall be binding or effective unless the waiver is in writing, signed by an authorized representative of the Party giving such waiver, and delivered by such Party to the other Parties. No waiver made with respect to any right, power or remedy in one instance will be deemed to be a waiver with respect to any other instance involving the exercise of such right, power, or remedy or with respect to any other right, power, or remedy.
- (b) Failure by any Party to exercise any of its rights, powers or remedies hereunder or its delay to do so shall not constitute a waiver of those rights, powers or remedies. The single or partial exercise of a right, power or remedy shall not prevent its subsequent exercise or the exercise of any other right, power or remedy.

20 RELATIONSHIP BETWEEN THE PARTIES

The Parties are independent contractors. This Lenders' Direct Agreement is not intended to and does not create or establish between the Parties any relationship as partners, joint venturers, employer and employee, master and servant, or, except as provided in this Lenders' Direct Agreement, of principal and agent.

21 ENTIRE AGREEMENT

Except where provided otherwise in this Lenders' Direct Agreement, this Lenders' Direct Agreement constitutes the entire agreement between the Parties in connection with its subject matter and supersedes all prior representations, communications, negotiations and understandings, whether oral, written, express or implied, concerning the subject matter of this Lenders' Direct Agreement.

22 SEVERABILITY

Each provision of this Lenders' Direct Agreement shall be valid and enforceable to the fullest extent permitted by law. If any provision of this Lenders' Direct Agreement is declared invalid, unenforceable or illegal by the courts of a competent jurisdiction, such provision may be severed and such invalidity, unenforceability or illegality shall not prejudice or affect the validity, enforceability and legality of the remaining provisions of this Lenders' Direct Agreement. If any such provision of this Lenders' Direct Agreement is invalid, unenforceable or illegal, the Parties shall, acting in good faith, promptly negotiate new provisions to eliminate such invalidity, unenforceability or illegality and to restore this Lenders' Direct Agreement as near as possible to its original intent and effect.

23 ENUREMENT

This Lenders' Direct Agreement shall enure to the benefit of, and be binding on, each of the Parties and their respective successors and permitted transferees and assigns.

24 GOVERNING LAW AND JURISDICTION

- (a) This Lenders' Direct Agreement shall be governed by and construed in accordance with the laws of Ontario and the laws of Canada applicable therein and shall be treated in all respects as an Ontario contract, without regard to conflict of laws principles.
- (b) The Parties agree that the courts of the Province of Ontario and all courts competent to hear appeals therefrom shall have exclusive jurisdiction to hear and settle any action, suit, proceeding or dispute in connection with this Lenders' Direct Agreement and hereby irrevocably attorn to the exclusive jurisdiction of such courts.
- (c) Nothing in this Lenders' Direct Agreement affects the rights, protections and immunities of the Crown under the *Proceedings Against the Crown Act* (Ontario).

25 DISPUTE RESOLUTION PROCEDURE

The Parties agree that the dispute resolution procedure provided for in Schedule 27 - Dispute Resolution Procedure to the Project Agreement shall not apply to any dispute under this Lenders' Direct Agreement.

26 FURTHER ASSURANCE

Each Party shall do all things, from time to time, and execute all further documents necessary to give full effect to this Lenders' Direct Agreement.

27 LANGUAGE OF AGREEMENT

Each Party acknowledges having requested and being satisfied that this Lenders' Direct Agreement and related documents be drawn in English. Chacune des parties reconnaît avoir demandé que ce document et ses annexes soient rédigés en anglais et s'en déclare satisfaite.

28 COUNTERPARTS

This Lenders' Direct Agreement may be executed in one or more counterparts. Any single counterpart or a set of counterparts executed, in either case, by all the Parties shall constitute a full, original and binding agreement for all purposes. Counterparts may be executed either in original or faxed form provided that any Party providing its signature in faxed form shall promptly forward to such Party an original signed copy of this Lenders' Direct Agreement which was so faxed.

29 CONFIDENTIALITY

The Lenders' Agent agrees to comply with the obligations imposed on DB Co by the provisions of Section 42 of the Project Agreement, *mutatis mutandis*, provided that the Lenders' Agent will be

permitted to disclose to any relevant regulatory authority only such Confidential Information (as defined in the Project Agreement) as is necessary for the Lenders' Agent to comply with Applicable Law.

[SIGNATURE PAGES IMMEDIATELY FOLLOW]

IN WITNESS WHEREOF the Parties have executed this Lenders' Direct Agreement as of the date first above written.

THE CITY OF OTTAWA

Per: _____

Name: **[REDACTED]**

Title: **[REDACTED]**

I have authority to bind the corporation.

[REDACTED]

Per: _____

Per: _____

I/We have authority to bind the corporation.

EAST WEST CONNECTORS GP

Per: _____

Name: [REDACTED]

Title: [REDACTED]

Per: _____

Name: [REDACTED]

Title: [REDACTED]

I/We have authority to bind the corporation.

SCHEDULE 5

CONSTRUCTION CONTRACTOR'S DIRECT AGREEMENT

THIS AGREEMENT is made as of the 24th day of April, 2019

BETWEEN:

THE CITY OF OTTAWA

(the “City”)

- AND -

EAST WEST CONNECTORS GP, [REDACTED]

(“DB Co”)

- AND -

[REDACTED]

(the “Construction Contractor”)

- AND -

[REDACTED]

(each a “Construction Guarantor”, collectively the “Construction Guarantors”)

WHEREAS:

- A. The City and DB Co have entered into the Project Agreement, which requires DB Co to enter into, and to cause the Construction Contractor and the Construction Guarantors to enter into, this Construction Contractor's Direct Agreement with the City.
- B. DB Co and the Construction Contractor have entered into the Design and Construction Contract, which requires the Construction Contractor and the Construction Guarantor to enter into this Construction Contractor's Direct Agreement with the City.

NOW THEREFORE in consideration of the mutual covenants and agreements of the Parties hereinafter contained and for other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the Parties covenant and agree as follows:

1. DEFINITIONS

In this Schedule 5 – Construction Contractor's Direct Agreement, unless the context indicates a contrary intention, terms which are defined in the Project Agreement (and not otherwise defined in this in this Schedule 5 – Construction Contractor's Direct Agreement) shall have meanings given to them in the Project Agreement and the following terms shall have the following meanings:

- (a) “**Default Notice**” has the meaning given in Section 5(a).
- (b) “**Party**” means the City, the Construction Contractor, each of the Construction Guarantors or DB Co, and “**Parties**” means, collectively, the City, the Construction Contractor, the Construction Guarantors and DB Co.
- (c) “**Step-In Notice**” has the meaning given in Section 6(a).
- (d) “**Substitute**” has the meaning given in Section 6(a).

2. INTERPRETATION

This Construction Contractor’s Direct Agreement shall be interpreted according to the following provisions, unless the context requires a different meaning:

- (a) The headings in this Construction Contractor’s Direct Agreement are for convenience of reference only, shall not constitute a part of this Construction Contractor’s Direct Agreement, and shall not be taken into consideration in the interpretation of, or affect the meaning of, this Construction Contractor’s Direct Agreement.
- (b) Unless the context otherwise requires, references to specific Sections, Clauses, Paragraphs, Subparagraphs, and other divisions are references to such Sections, Clauses, Paragraphs, Subparagraphs, or divisions of this Construction Contractor’s Direct Agreement and the terms “Section” and “Clause” are used interchangeably and are synonymous.
- (c) Words importing persons or parties are to be broadly interpreted and include an individual, corporation, limited liability company, joint stock company, firm, partnership, joint venture, trust, unincorporated organization, Governmental Authority, unincorporated body of persons or association and any other entity having legal capacity, and the heirs, beneficiaries, executors, administrators or other legal representatives of a person in such capacity.
- (d) Unless the context otherwise requires, wherever used herein the plural includes the singular, the singular includes the plural, and each of the masculine, feminine and neuter genders include all other genders.
- (e) References to any standard, principle, agreement or document include (subject to all relevant approvals and any other provisions of this Construction Contractor’s Direct Agreement concerning amendments) a reference to that standard, principle, agreement or document as amended, supplemented, restated, substituted, replaced, novated or assigned.
- (f) The words in this Construction Contractor’s Direct Agreement shall bear their natural meaning.
- (g) References containing terms such as:
 - (i) “hereof”, “herein”, “hereto”, “hereinafter”, and other terms of like import are not limited in applicability to the specific provision within which such references are

set forth but instead refer to this Construction Contractor's Direct Agreement taken as a whole; and

- (ii) “includes” and “including”, whether or not used with the words “without limitation” or “but not limited to”, shall not be deemed limited by the specific enumeration of items but shall, in all cases, be deemed to be without limitation and construed and interpreted to mean “includes without limitation” and “including without limitation”.
- (h) In construing this Construction Contractor's Direct Agreement, the rule known as the *ejusdem generis rule* shall not apply nor shall any similar rule or approach to the construction of this Construction Contractor's Direct Agreement and, accordingly, general words introduced or followed by the word “other” or “including” or “in particular” shall not be given a restrictive meaning because they are followed or preceded (as the case may be) by particular examples intended to fall within the meaning of the general words.
- (i) Where this Construction Contractor's Direct Agreement states that an obligation shall be performed “no later than” or “within” or “by” a stipulated date or event which is a prescribed number of days after a stipulated date or event, the latest time for performance shall be 5:00 p.m. on the last day for performance of the obligation concerned, or, if that day is not a Business Day, 5:00 p.m. on the next Business Day.
- (j) Where this Construction Contractor's Direct Agreement states that an obligation shall be performed “on” a stipulated date, the latest time for performance shall be 5:00 p.m. on that day, or, if that day is not a Business Day, 5:00 p.m. on the next Business Day.
- (k) Any reference to time of day or date means the local time or date in Ottawa, Ontario.
- (l) Unless otherwise indicated, time periods will be strictly construed.
- (m) Whenever the terms “will” or “shall” are used in this Construction Contractor's Direct Agreement they shall be construed and interpreted as synonymous and to read “shall”.

3. CONFLICT IN DOCUMENTS

- (a) In the event of ambiguities, conflicts or inconsistencies between or among this Construction Contractor's Direct Agreement, the Project Agreement and the Design and Construction Contract, this Construction Contractor's Direct Agreement shall prevail.
- (b) In the event of ambiguities, conflicts or inconsistencies between or among this Construction Contractor's Direct Agreement and the Lenders' Direct Agreement, the Lenders' Direct Agreement shall prevail.

4. AGREEMENTS

- (a) DB Co and the Construction Contractor shall not amend, modify, or depart from the terms of the Design and Construction Contract without the prior written consent of the City, acting reasonably, which consent shall not be withheld or delayed where such amendment, modification or departure does not materially and adversely affect the ability

of DB Co or the Construction Contractor to perform its obligations under this Construction Contractor's Direct Agreement and does not have the effect of increasing any liability of the City, whether actual or potential. The City shall respond to any request for consent under this Section 4(a) within 30 days following its receipt thereof. DB Co and the Construction Contractor shall provide to the City a written copy of all such amendments, modifications or departures. The Parties acknowledge and agree that this Section 4(a) shall not apply to Variations provided for under the Project Agreement.

- (b) Each of the Parties acknowledges having received a copy of the Project Agreement and the Design and Construction Contract.
- (c) If the Construction Contractor gives DB Co any notice of any default(s) under the Design and Construction Contract that may give the Construction Contractor a right to terminate the Design and Construction Contract or to treat it as having been repudiated by DB Co or to discontinue the Construction Contractor's performance thereunder, then the Construction Contractor shall concurrently provide the City with a copy of such notice and set out in reasonable detail the default(s).

5. NO TERMINATION BY CONSTRUCTION CONTRACTOR WITHOUT DEFAULT NOTICE

The Construction Contractor shall not exercise any right it may have to terminate the Design and Construction Contract or to treat it as having been repudiated by DB Co or to discontinue the Construction Contractor's performance thereunder unless:

- (a) the Construction Contractor first delivers a written notice (a "**Default Notice**") to the City setting out in reasonable detail the default(s) on which the Construction Contractor intends to rely in terminating the Design and Construction Contract or to treat it as having been repudiated by DB Co or to discontinue the Construction Contractor's performance thereunder; and
- (b) within a period of ten Business Days of the City receiving the Default Notice:
 - (i) the default(s) on which the Construction Contractor intends to rely in terminating the Design and Construction Contract or to treat it as having been repudiated by DB Co or to discontinue the Construction Contractor's performance thereunder have not been remedied; and
 - (ii) the Construction Contractor has not received a Step-In Notice from the City,

provided that if, within such period of ten Business Days, the City agrees to pay the Construction Contractor's reasonable costs of continued performance, such period of five Business Days shall be extended to 45 days.

6. STEP-IN RIGHTS

- (a) The City may at any time:
 - (i) within five Business Days or, if such period has been extended in accordance with Section 5, 45 days of the City receiving a Default Notice; or

- (ii) if the City has not received a Default Notice and if the City's right to terminate the Project Agreement has arisen and is continuing,

deliver a notice (a "**Step-In Notice**") electing to replace DB Co under the Design and Construction Contract either with the City or a third party designated by the City in the Step-In Notice (the "**Substitute**"), provided that the City can demonstrate to the Construction Contractor, acting reasonably, that the Substitute shall have sufficient financial resources, or shall be supported by a satisfactory guarantee, and have the legal capacity, power and authority, to carry out the obligations of the Substitute under the Design and Construction Contract.

- (b) Subject to Section 6(d), upon receipt by the Construction Contractor of a Step-In Notice:
 - (i) DB Co and the Construction Contractor will be deemed to be released from their existing and future obligations under the Design and Construction Contract to each other (except with respect to any and all indemnities from DB Co or the Construction Contractor to the other in respect of the period prior to the receipt of the Step-In Notice), and the City or the Substitute, as applicable, and the Construction Contractor will be deemed to assume those same existing and future obligations towards each other (except in respect of the aforesaid indemnities);
 - (ii) the existing and future rights of DB Co against the Construction Contractor under the Design and Construction Contract and vice versa will be deemed to be cancelled (except with respect to any and all indemnities from DB Co or the Construction Contractor to the other in respect of the period prior to the receipt of the Step-In Notice), and the City or the Substitute, as applicable, and the Construction Contractor will be deemed to acquire those same existing and future rights against each other (except in respect of the aforesaid indemnities), subject to any applicable credit from the Construction Contractor to the City if the City pays for the Construction Contractor's reasonable costs of continued performance pursuant to Section 5;
 - (iii) any guarantee, bond, covenant, letter of credit or similar performance security in favour of DB Co from any third party in respect of any term, provision, condition, obligation, undertaking or agreement on the part of the Construction Contractor to be performed, observed or carried out by the Construction Contractor as contained in, referred to, or inferred from the Design and Construction Contract shall be assigned, novated or granted, as required by the City or the Substitute, as applicable, each acting reasonably, to the City or the Substitute, as applicable, and the Construction Contractor shall cause such assignment, novation or grant on substantially the same terms and conditions as the original guarantee, bond, covenant, letter of credit or similar performance security, provided however that where DB Co shall continue to hold, or shall continue to be entitled to or have rights under, such guarantee, bond, covenant, letter of credit or similar performance security, as security for any obligations of the Construction Contractor, the assignment, novation or grant of the guarantee, bond or covenant, letter of credit or similar performance security to the extent of any such obligations to DB Co shall be conditional on the satisfaction of those obligations to DB Co; and

- (iv) at the City's request, the Construction Contractor shall enter into, and shall cause the Construction Guarantors and any other guarantor, covenantor or surety under any guarantee, bond or covenant referred to in Section 6(b)(iii) to enter into, and the City shall or shall cause the Substitute to enter into, as applicable, all such agreements or other documents as reasonably necessary to give effect to the foregoing, including, without limitation, an agreement between the City or the Substitute, as applicable, and the Construction Contractor, acceptable to the City and the Construction Contractor, each acting reasonably, on substantially the same terms as the Design and Construction Contract.
- (c) Subject to Section 6(d), DB Co shall, at its own cost, cooperate fully with the City and the Substitute in order to achieve a smooth transfer of the Design and Construction Contract to the City or the Substitute, as applicable, and to avoid or mitigate in so far as reasonably practicable any inconvenience, including the administration of the Design and Construction Contract, ongoing supervisory activities and scheduling.
- (d) The rights granted by Sections 6(b) and 6(c) shall be of no force or effect if, at any time the Construction Contractor receives a Step-In Notice, the Construction Contractor has already received notice in writing from another entity entitled to the benefit of step-in rights relating to the Design and Construction Contract that it is or has validly exercised those step-in rights. If the Construction Contractor receives any such notice on the same day as a Step-In Notice, the Step-In Notice shall be effective, except where the other notice is given by the Lenders, in which case such other notice and not the Step-In Notice shall be effective.
- (e) If the City gives a Step-In Notice within 60 days after the Construction Contractor has terminated the Design and Construction Contract or treated it as having been repudiated by DB Co or discontinued the Construction Contractor's performance thereunder in accordance with the terms of this Construction Contractor's Direct Agreement, the Construction Contractor agrees that the Design and Construction Contract shall be reinstated and deemed to have continued despite any termination or treatment as having been repudiated, and the City shall pay the Construction Contractor's reasonable costs for re-commencing the obligations it has under the Design and Construction Contract and the Construction Contractor shall be entitled to reasonable compensation and/or relief for re-commencing such obligations, having regard to the additional costs and delays incurred as a result of having terminated the Design and Construction Contract or having treated it as being repudiated by DB Co or having discontinued its performance thereunder.

7. CONSTRUCTION CONTRACTOR LIABILITY

- (a) The liability of the Construction Contractor hereunder shall not be modified, released, diminished or in any way affected by:
 - (i) any independent inspection, investigation or enquiry into any matter which may be made or carried out by or for the City, or by any failure or omission to carry out any such inspection, investigation or enquiry; or
 - (ii) the appointment by the City of any other person to review the progress of or otherwise report to the City in respect of the Project, or by any action or omission

of such person whether or not such action or omission might give rise to any independent liability of such person to the City,

provided always that nothing in this Section 7 shall modify or affect any rights which the Construction Contractor might have otherwise had to claim contribution from any other person whether under statute or common law.

- (b) In the event the City delivers a Step-In Notice, the City or any Substitute rights shall be subject to all of the rights and remedies available to the Construction Contractor under the Design and Construction Contract and the Construction Contractor shall have no greater liability to the City or any Substitute than it would have had to DB Co under the Design and Construction Contract, and the Construction Contractor shall be entitled in any dispute or proceedings involving the City or any Substitute to raise, enforce or rely on any defenses, conditions and liability limitations in the Design and Construction Contract.

8. DB CO AS PARTY

DB Co acknowledges and agrees that the Construction Contractor shall not be in breach of the Design and Construction Contract by complying with its obligations hereunder.

9. CONSTRUCTION GUARANTORS AS PARTY

The Construction Guarantors agree with the City that the Construction Guarantors have entered into a guarantee or covenant referred to in Section 6(b)(iii) and, subject to Sections 6(a) and (d), hereby consents to the assignment, novation or grant (including any conditional assignment, novation or grant) as provided herein immediately upon receipt by the Construction Contractor of a Step-In Notice and without the requirement of any further action on the part of the City, and agree that the Construction Guarantors shall in accordance with Section 6 enter into all such agreements or other documents as reasonably necessary to give effect to the foregoing. The Construction Guarantors enter into this Construction Contractor's Direct Agreement solely for the purposes of this Section 9.

10. ASSIGNMENT

- (a) DB Co shall not, without the prior written consent of the City, assign, transfer, charge, subcontract, subparticipate or otherwise dispose of any interest in this Construction Contractor's Direct Agreement except to the extent entitled to do so under the Project Agreement. Any permitted assignee of DB Co, as a condition precedent to any such assignment, transfer or other disposition, shall assume the obligations and acquire the rights of DB Co under this Construction Contractor's Direct Agreement pursuant to an assumption agreement with, and in a form and substance satisfactory to City and the Construction Contractor, each acting reasonably. City and the Construction Contractor shall, at DB Co's cost and expense, do all things and execute all further documents as may be necessary in connection therewith.
- (b) The City may assign or otherwise dispose of the benefit of the whole or part of this Construction Contractor's Direct Agreement to any person to whom the City may assign or otherwise dispose of their interest in the Project Agreement pursuant to Section 49.2 of the Project Agreement but only in conjunction therewith, and shall provide written notice to DB Co and the Construction Contractor of such assignment or disposition. Such

assignee, as a condition precedent to any such assignment or other disposition, shall assume the obligations and acquire the rights of City under this Construction Contractor's Direct Agreement pursuant to an assumption agreement with, and in form and substance satisfactory to, DB Co and the Construction Contractor, each acting reasonably. DB Co and the Construction Contractor shall, at City's cost and expense, do all things and execute all further documents as may be necessary in connection therewith.

- (c) The Construction Contractor shall not, without the prior written consent of the City and DB Co, assign, transfer, charge, subcontract, subparticipate or otherwise dispose of any interest in this Construction Contractor's Direct Agreement except as may be permitted under the Design and Construction Contract. Such assignee, as a condition precedent to any such assignment, transfer, charge, subcontract, subparticipate or other disposition, shall assume the obligations and acquire the rights of the Construction Contractor under this Construction Contractor's Direct Agreement pursuant to an assumption agreement with, and in a form and substance satisfactory to the City and DB Co, each acting reasonably. The City and DB Co shall, at the Construction Contractor's cost and expense, do all things and execute all further documents as may be necessary in connection therewith.

11. NOTICES

- (a) All notices, requests, demands, instructions, certificates, consents and other communications required or permitted under this Construction Contractor's Direct Agreement shall be in writing (whether or not "written notice" or "notice in writing" is specifically required by the applicable provision of this Construction Contractor's Direct Agreement) and served by sending the same by registered mail, facsimile or by hand (in each case, with a copy by electronic transmission), as follows:

If to the City :

City of Ottawa
110 Laurier Ave West
Ottawa, Ontario K1P 1J1
Mail code: [REDACTED]

Attention: [REDACTED]
With an electronic copy, for information purposes only, to: [REDACTED]

If to DB Co:

East West Connectors GP
[REDACTED]

Attn.: [REDACTED]
Email: [REDACTED]
[REDACTED]

with a copy to:

[REDACTED]

Attn.: [REDACTED]

Email: [REDACTED]

If to the Construction Contractor:

[REDACTED]

Attn: [REDACTED]

Email: [REDACTED]

If to the Construction Guarantors:

[REDACTED]

Fax No: [REDACTED]

Attn: [REDACTED]

and

[REDACTED]

Fax No: [REDACTED]

Attn: [REDACTED]

with a copy to:

[REDACTED]

Fax No: [REDACTED]

Attn: [REDACTED]

and

[REDACTED]

Fax No: [REDACTED]

Attn: [REDACTED]

- (b) Where any notice is provided or submitted to a Party via facsimile an original of the notice sent via facsimile shall promptly be sent by regular mail or registered mail. For greater certainty, a notice given via facsimile shall not be invalid by reason only of a Party's failure to comply with this Section 11(b).
- (c) Any Party to this Construction Contractor's Direct Agreement may, from time to time, change any of its contact information set forth in Section 11(a) by prior notice to the other Parties, and such change shall be effective on the Business Day that next follows

the recipient Party's receipt of such notice unless a later effective date is given in such notice.

- (d) Subject to Sections 11(e), 11(f) and 11(g):
 - (i) a notice given by registered mail shall be deemed to have been received on the third Business Day after mailing;
 - (ii) a notice given by hand delivery shall be deemed to have been received on the day it is delivered; and
 - (iii) a notice given by facsimile shall be deemed to have been received on the day it is transmitted by facsimile.
- (e) If the Party giving the notice knows or ought reasonably to know of difficulties with the postal system which might affect negatively the delivery of mail, any such notice shall not be mailed but shall be made or given by personal delivery or by facsimile transmission in accordance with this Section 11.
- (f) If any notice delivered by hand or transmitted by facsimile is so delivered or transmitted, as the case may be, either on a day that is not a Business Day or on a Business Day after 4:00 p.m. (recipient's local time), then such notice shall be deemed to have been received by such recipient on the next Business Day.
- (g) A notice given by facsimile shall be deemed to have been received by the recipient on the day it is transmitted only if a facsimile transmission report (maintained by the sender) indicates that the transmission of such notice was successful.

12. AMENDMENTS

This Construction Contractor's Direct Agreement may not be varied, amended or supplemented except by an agreement in writing signed by duly authorized representatives of the Parties and stating on its face that it is intended to be an amendment, restatement or other modification, as the case may be, to this Construction Contractor's Direct Agreement.

13. WAIVER

- (a) No waiver made or given by a Party under or in connection with this Construction Contractor's Direct Agreement shall be binding or effective unless the waiver is in writing, signed by an authorized representative of the Party giving such waiver, and delivered by such Party to the other Parties. No waiver made with respect to any right, power or remedy in one instance will be deemed to be a waiver with respect to any other instance involving the exercise of such right, power, or remedy or with respect to any other right, power, or remedy.
- (b) Failure by any Party to exercise any of its rights, powers or remedies hereunder or its delay to do so shall not constitute a waiver of those rights, powers or remedies. The single or partial exercise of a right, power or remedy shall not prevent its subsequent exercise or the exercise of any other right, power or remedy.

14. RELATIONSHIP BETWEEN THE PARTIES

The Parties are independent contractors. This Construction Contractor's Direct Agreement is not intended to and does not create or establish between the Parties any relationship as partners, joint venturers, employer and employee, master and servant, or, except as provided in this Construction Contractor's Direct Agreement, of principal and agent.

15. ENTIRE AGREEMENT

Except where provided otherwise in this Construction Contractor's Direct Agreement, this Construction Contractor's Direct Agreement constitutes the entire agreement between the Parties in connection with its subject matter and supersedes all prior representations, communications, negotiations and understandings, whether oral, written, express or implied, concerning the subject matter of this Construction Contractor's Direct Agreement.

16. SEVERABILITY

Each provision of this Construction Contractor's Direct Agreement shall be valid and enforceable to the fullest extent permitted by law. If any provision of this Construction Contractor's Direct Agreement is declared invalid, unenforceable or illegal by the courts of a competent jurisdiction, such provision may be severed and such invalidity, unenforceability or illegality shall not prejudice or affect the validity, enforceability and legality of the remaining provisions of this Construction Contractor's Direct Agreement. If any such provision of this Construction Contractor's Direct Agreement is invalid, unenforceable or illegal, the Parties shall, acting in good faith, promptly negotiate new provisions to eliminate such invalidity, unenforceability or illegality and to restore this Construction Contractor's Direct Agreement as near as possible to its original intent and effect.

17. ENUREMENT

This Construction Contractor's Direct Agreement shall enure to the benefit of, and be binding on, each of the Parties and their respective successors and permitted transferees and assigns.

18. GOVERNING LAW AND JURISDICTION

- (a) This Construction Contractor's Direct Agreement shall be governed by and construed in accordance with the laws of Ontario and the laws of Canada applicable therein and shall be treated in all respects as an Ontario contract, without regard to conflict of laws principles.
- (b) The Parties agree that the courts of the Province of Ontario and all courts competent to hear appeals therefrom shall have exclusive jurisdiction to hear and settle any action, suit, proceeding or dispute in connection with this Construction Contractor's Direct Agreement and hereby irrevocably attorn to the exclusive jurisdiction of such courts.
- (c) Nothing in this Construction Contractor's Direct Agreement affects the rights, protections and immunities of the Crown under the *Proceedings Against the Crown Act* (Ontario).

19. FURTHER ASSURANCE

Each Party shall do all things, from time to time, and execute all further documents necessary to give full effect to this Construction Contractor's Direct Agreement.

20. LANGUAGE OF AGREEMENT

Each Party acknowledges having requested and being satisfied that this Construction Contractor's Direct Agreement and related documents be drawn in English. Chacune des parties reconnaît avoir demandé que ce document et ses annexes soient rédigés en anglais et s'en déclare satisfaite.

21. COUNTERPARTS

This Construction Contractor's Direct Agreement may be executed in one or more counterparts. Any single counterpart or a set of counterparts executed, in either case, by all the Parties shall constitute a full, original and binding agreement for all purposes. Counterparts may be executed either in original or electronic form provided that any Party providing its signature in electronic form shall promptly forward to such Party an original signed copy of this Construction Contractor's Direct Agreement which was so faxed.

[SIGNATURE PAGES IMMEDIATELY FOLLOW]

IN WITNESS WHEREOF the Parties have executed this Construction Contractor's Direct Agreement as of the date first above written.

CITY OF OTTAWA

Per: _____
Name: [REDACTED]
Title: [REDACTED]

I have authority to bind the corporation

EAST WEST CONNECTORS GP

Per: _____

Name: [REDACTED]

Title: [REDACTED]

Per: _____

Name: [REDACTED]

Title: [REDACTED]

I/We have authority to bind the corporation.

[REDACTED]

Per: _____

Name: [REDACTED]

Title: [REDACTED]

Per: _____

Name: [REDACTED]

Title: [REDACTED]

Per: _____

Name: [REDACTED]

Title: [REDACTED]

Per: _____

Name: [REDACTED]

Title: [REDACTED]

We have authority to bind the partnership

[REDACTED]

Per: _____

Name: **[REDACTED]**

Title: **[REDACTED]**

I/We have authority to bind the Corporation

[REDACTED]

Per: _____

Name: **[REDACTED]**

Title: **[REDACTED]**

I/We have authority to bind the Corporation

[REDACTED]

Per: _____

Name: **[REDACTED]**

Title: **[REDACTED]**

I/We have authority to bind the Corporation

**SCHEDULE 6
INDEPENDENT CERTIFIER AGREEMENT**

THIS AGREEMENT is made as of the 25th day of April, 2019

BETWEEN:

THE CITY OF OTTAWA

(“City”)

- and -

EAST WEST CONNECTORS GP, [REDACTED]

(“DB Co”)

- and -

[REDACTED]

(the “Independent Certifier”)

WHEREAS:

- (A) The City and DB Co (collectively, the “**PA Parties**” and each, a “**PA Party**”) have entered into the Project Agreement.
- (B) Pursuant to the terms of the Project Agreement, the PA Parties wish to appoint the Independent Certifier, and the Independent Certifier wishes to accept such appointment, to perform certain services in connection with the Project Agreement.
- (C) The PA Parties and the Independent Certifier wish to enter into this Independent Certifier Agreement in order to record the terms by which the Independent Certifier shall perform such services.

NOW THEREFORE in consideration of the mutual covenants and agreements of the PA Parties and the Independent Certifier herein contained and for other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the PA Parties and the Independent Certifier covenant and agree as follows:

1 DEFINITIONS

1.1 Definitions

- (a) In this Independent Certifier Agreement, including the recitals and appendices, unless the context indicates a contrary intention, terms which are defined in the Project Agreement

(and not otherwise defined in this Independent Certifier Agreement) shall have meanings given to them in the Project Agreement and the following terms shall have the following meanings:

- (i) **“Certification Services”** means:
 - (A) all of the functions and obligations described in the Project Agreement as being the responsibility of the Independent Certifier;
 - (B) all of the functions and obligations conferred on the Independent Certifier under this Independent Certifier Agreement, including the functions described in Appendix A to this Independent Certifier Agreement; and
 - (C) all other functions or tasks which the Independent Certifier must do to comply with its obligations under this Independent Certifier Agreement.
- (ii) **“Certification Services Variation”** is any change to the Certification Services.
- (iii) **“Contract Material”** means all material:
 - (A) provided to the Independent Certifier or created or required to be created by either PA Party; and
 - (B) provided by or created or required to be created by the Independent Certifier as part of, or for the purpose of, performing the Certification Services, including documents, equipment, reports, technical information, plans, charts, drawings, calculations, tables, schedules and data (stored and recorded by any means).
- (iv) **“Contribution Agreement”** means either the agreement entered into by the City and the Government of Canada, represented by the Ministry of Infrastructure and Communities, or the agreement entered into by the City and the Government of Ontario, represented by the Ministry of Transportation, for the contribution of funding for the Project, and **“Contribution Agreements”** means both.
- (v) **“Contribution Agreement Party”** means either the Government of Canada, represented by the Ministry of Infrastructure and Communities, or the Government of Ontario, represented by the Ministry of Transportation, and **“Contribution Agreement Parties”** means both.
- (vi) **“Earned Value Measurement Techniques”** means the techniques used to measure Earned Value established by DB Co and agreed with the Independent Certifier in accordance with the “Practice Standard for Earned Value Management” (2nd Edition, published in 2011 by the Project Management Institute, Inc.).

- (vii) **“Fee”** means the fees payable by the City and DB Co to the Independent Certifier for the Certification Services, as such fees are specified and made payable in accordance with Appendix B to this Independent Certifier Agreement.
- (viii) **“IC Monthly Report”** has the meaning given in Appendix A to this Independent Certifier Agreement.
- (ix) **“IC Quarterly Report”** has the meaning given in Appendix A to this Independent Certifier Agreement.
- (x) **“Intellectual Property”** means any and all intellectual property rights, whether subsisting now or in the future, including rights of any kind in inventions, patents, copyright, trademarks, service marks, industrial designs, integrated circuit topography rights, applications for registration of any of the foregoing, and know- how, trade secrets, confidential information and trade or business names.
- (xi) **“PA Parties”** means both the City and DB Co, and **“PA Party”** means either the City or DB Co, as the context requires.
- (xii) **“Project Agreement”** means that certain project agreement made on or about the date hereof between the City and DB Co with respect to the design, construction and financing of the Confederation Line Extension Project.

2 INTERPRETATION

2.1 Interpretation

- (a) In this Independent Certifier Agreement, unless the context indicates a contrary intention:
 - (i) words denoting the singular number include the plural and vice versa;
 - (ii) words denoting individuals include corporations and vice versa;
 - (iii) headings are for convenience only and do not affect interpretation;
 - (iv) references to Clauses, Sections or Parts are references to Clauses, Sections or Parts of this Independent Certifier Agreement;
 - (v) references to this Independent Certifier Agreement or any contract, agreement or instrument are deemed to include references to this Independent Certifier Agreement or such other contract, agreement or instrument as amended, novated, supplemented, varied or replaced from time to time;
 - (vi) references to any party to this Independent Certifier Agreement includes its successors or permitted assigns;
 - (vii) words denoting any gender include all genders;

- (viii) references to any legislation or to any section or provision of any legislation include any statutory modification or re-enactment of any statutory provision substituted for legislation, section or provision, and ordinances, by laws, regulations and other statutory instruments issued under that legislation, section or provision;
- (ix) a reference to “\$” is to Canadian currency;
- (x) the terms “including” and “include” mean “including” or “include” (as applicable) without limitation;
- (xi) if a word or phrase is defined, then other parts of speech and grammatical forms of that word or phrase have a corresponding meaning; and
- (xii) unless otherwise indicated, all time periods will be strictly construed.

2.2 Obligations and Exercise of Rights by PA Parties

- (a) The obligations of the PA Parties under this Independent Certifier Agreement shall be several.
- (b) Except as specifically provided for in this Independent Certifier Agreement or the Project Agreement, the rights of the PA Parties under this Independent Certifier Agreement shall be jointly exercised by the PA Parties.

3 ROLE OF THE INDEPENDENT CERTIFIER

3.1 Engagement

- (a) The PA Parties hereby appoint the Independent Certifier, and the Independent Certifier hereby accepts such appointment, to carry out the Certification Services in accordance with this Independent Certifier Agreement. The Independent Certifier shall perform the Certification Services in accordance with this Independent Certifier Agreement.
- (b) Nothing in this Independent Certifier Agreement will be interpreted as giving the Independent Certifier any responsibility for performance of the design or construction, or for the certifications of the professionals of record.
- (c) Neither PA Party shall, without the prior written consent of the other PA Party, enter into any separate agreement with the Independent Certifier in connection with the Project, and DB Co shall ensure that no DB Co Party enters into any separate agreement with the Independent Certifier in connection with the Project. The Independent Certifier shall not enter into any separate agreement with either PA Party in connection with the Project without the prior written consent of the other PA Party.
- (d) The Independent Certifier shall make such observations and evaluations of any Works pursuant to a Variation in order to certify any monthly progress payment to DB Co of the value of work performed, provided the Independent Certifier shall be entitled to a Certification Services Variation Order pursuant to Sections 9.4 and 9.5 of this Independent Certifier Agreement.

- (e) The PA Parties acknowledge and agree that the Independent Certifier may rely on the assessment report prepared by the Independent Safety Assessor with respect to the safety certification of the System Infrastructure. The Independent Certifier acknowledges and agrees that, in carrying out the Certification Services, it shall be bound to the assessment report and shall consider the Independent Safety Assessor's views with respect to the safety of the System Infrastructure in making its determination as to whether Project Co has satisfied the conditions of Substantial Completion.
- (f) The PA Parties acknowledge and agree that notwithstanding anything to the contrary in this Agreement the Certification Services described in paragraph (bb) of Appendix A do not, nor shall such Certification Services be construed so as to, change, modify or have any impact whatsoever on the PA Parties' respective rights, entitlements and obligations as against each other pursuant to the provisions of the Project Agreement.
- (g) In carrying out the Certification Services, the Independent Certifier may rely upon the reports, findings and determination of the Systems Integration Verifier, pertaining to the Systems Integration Works, provided in accordance with the terms of the Project Agreement.

3.2 Acknowledgement of Independent Certifier

- (a) The Independent Certifier hereby acknowledges in favour of the PA Parties that it has received a copy of the Project Agreement.

3.3 Standard of Care

- (a) The Independent Certifier must exercise the standard and skill, care and diligence in the performance of the Certification Services that would be expected of an expert professional experienced in providing services in the nature of the Certification Services for projects similar to the Project.

3.4 Duty of Independent Judgment

- (a) In exercising its Certification Services, the Independent Certifier must:
 - (i) act impartially, honestly and independently in representing the interests of both PA Parties in accordance with the terms of the Project Agreement and this Independent Certifier Agreement;
 - (ii) act reasonably and professionally;
 - (iii) act in a timely manner:
 - (A) in accordance with the times prescribed in this Independent Certifier Agreement and the Project Agreement; or
 - (B) where no times are prescribed, within 10 days or such earlier time so as to enable the PA Parties to perform their respective obligations under the Project Agreement; and

- (iv) act in accordance with the joint directions of the PA Parties provided that the directions are not inconsistent with the other terms of this Independent Certifier Agreement or the terms of the Project Agreement and do not vary or prejudice the Independent Certifier's authority or responsibilities or the exercise by the Independent Certifier of its professional judgment under this Independent Certifier Agreement.
- (b) Although the Independent Certifier may take account of any opinions or representations made by the PA Parties, the Independent Certifier shall not be bound to comply with any opinions or representations made by either of them in connection with any matter on which the Independent Certifier is required to exercise its professional judgment.
- (c) The Independent Certifier acknowledges that the PA Parties may rely on the Certification Services, including determinations, findings and certifications made by the Independent Certifier, and accordingly, the Independent Certifier represents and warrants that will use its best skill and judgment in providing the Certification Services, and that information provided and/or submitted to the PA Parties in accordance with this Independent Certifier Agreement is true and accurate, and prepared in good faith to the best of the Independent Certifier's skill, judgment and knowledge.
- (d) The Independent Certifier acknowledges that all Certification Services, Contract Material and all determinations, findings, reports, certificates and other information delivered by the Independent Certifier to the City pursuant to the Project Agreement may be relied upon by the Contribution Agreement Parties, and that the Independent Certifier shall owe each an equal duty of care as is owed to the City hereunder, notwithstanding the fact that the Contribution Agreement Parties are not parties to this Independent Certifier Agreement or the Project Agreement. The Independent Certifier will confirm the foregoing directly to either Contribution Agreement Party, if requested by the City.

3.5 Authority to Act

- (a) The Independent Certifier:
 - (i) is an independent consultant and is not, and must not purport to be, a partner, joint venturer or agent of either PA Party;
 - (ii) other than as expressly set out in this Independent Certifier Agreement or the Project Agreement, has no authority to give any directions to a PA Party or its officers, directors, members, employees, contractors, consultants or agents; and
 - (iii) has no authority to waive or alter any terms of the Project Agreement, nor to discharge or release a party from any of its obligations under the Project Agreement unless jointly agreed by the PA Parties in writing.
- (b) The Independent Certifier will confirm the foregoing directly to either Contribution Agreement Party, if requested by the City.

3.6 Knowledge of the PA Parties' Requirements

- (a) The Independent Certifier warrants that:

- (i) it has informed and will be deemed to have informed itself fully of the requirements of the Project Agreement;
- (ii) it will inform itself fully of the requirements of such other documents and materials as may become relevant from time to time to the performance of the Certification Services;
- (iii) without limiting Sections 3.6(a)(i) or 3.6(a)(ii), it has and will be deemed to have informed itself fully of all time limits and other requirements for any Certification Service which the Independent Certifier carries out under the Project Agreement and this Independent Certifier Agreement;
- (iv) it has and will be deemed to have informed itself completely of the nature of the work necessary for the performance of the Certification Services and the means of access to and facilities at or on the Lands and Site including restrictions on any such access or protocols that are required; and
- (v) it has satisfied itself as to the correctness and sufficiency of its proposal for the Certification Services and that the Fee covers the cost of complying with all of the obligations under this Independent Certifier Agreement and of all matters and things necessary for the due and proper performance and completion of the Certification Services.

3.7 Co-ordination and Information by Independent Certifier

- (a) The Independent Certifier must:
 - (i) fully cooperate with the PA Parties and their consultants and advisors;
 - (ii) carefully co-ordinate the Certification Services with the work and services performed by the PA Parties;
 - (iii) carefully co-ordinate the Certification Services with the safety assessment performed by the Independent Safety Assessor;
 - (iv) without limiting its obligations under Sections 3.4 and 3.7(a)(ii), perform the Certification Services so as to avoid unreasonably interfering with, disrupting or delaying the work and services performed by the PA Parties;
 - (v) include both PA Parties in all discussions, meetings, or any other communications regarding the Project;
 - (vi) provide copies to the PA Parties of all reports, communications, certificates and other documentation that it provides to either PA Party; and
 - (vii) provide a copy of the Contract Material to each of the Contribution Agreement Parties at the same time as it is provided to the PA Parties. In respect of such Contract Material, either Contribution Agreement Party may make inquiries of the Independent Certifier and request further investigation or clarification in connection with, and subject to, its contribution agreement.

3.8 Conflict of Interest

- (a) The Independent Certifier warrants that:
 - (i) at the date of this Independent Certifier Agreement, no conflict of interest exists or is likely to arise in the performance of its obligations under this Independent Certifier Agreement, and the Independent Certifier further warrants that it has not been retained as a technical advisor to the Lenders or as an advisor to either of the PA Parties or any of their respective related entities in respect of the Project Agreement (including, but not limited to, acting as a transaction advisor to either PA Party); and
 - (ii) if, during the term of this Independent Certifier Agreement, any such conflict or risk of conflict of interest arises, the Independent Certifier will notify the PA Parties immediately in writing of that conflict or risk of conflict and take such steps as may be required by either of the PA Parties to avoid or mitigate that conflict or risk.

3.9 Independent Certifier Personnel

- (a) The Independent Certifier shall make reasonable efforts to ensure that the individuals listed in Appendix C remain involved in the performance of the Certification Services and, in particular, will not, for the duration of this Independent Certifier Agreement, require or request any such person to be involved in any other project on behalf of the Independent Certifier if, in the reasonable opinion of the PA Parties, such involvement would have a material adverse effect on the performance of the Certification Services.
- (b) Any replacement of the individuals listed in Appendix C is subject to the PA Parties' prior written approval.
- (c) The Independent Certifier shall ensure that its personnel providing the Certification Services in respect of the Commissioning Tests, and the Testing & Commissioning Program shall:
 - (i) possess a current professional designation of not less than membership in Professional Engineers Ontario, The Ontario Association of Certified Engineering Technicians and Technologists or such similar professional designation recognized in North America;
 - (ii) have demonstrated competence in the commissioning of comparable facilities and in having completed or monitored the commissioning of a comparable light rail transit system;
 - (iii) have an understanding of the appropriate standards, guidelines and policies related to commissioning for light rail transit systems, as well as other applicable transit commissioning standards; and
 - (iv) have an understanding of the commissioning process and the reports to be provided pursuant to this Independent Certifier Agreement and the Project Agreement, including not only the start-up procedures but the pre-commissioning and post- commissioning activities.

- (d) The Independent Certifier shall furnish City with evidence satisfactory to City of any such personnel's compliance with the foregoing requirements within a reasonable time prior to the proposed commencement of the Certification Services in respect of the Commissioning Tests, the Outline Commissioning Program and the Final Commissioning Program.
- (e) The Independent Certifier shall ensure that its personnel who will prepare and evaluate construction and development information for Works measurements for payment possess a current professional designation of not less than Professional Quantity Surveyors (PQS).

3.10 Minimize Interference

- (a) The Independent Certifier shall perform the Certification Services in such a way as to minimize any undue interference with the progress of the Works.

4 ROLE OF THE PA PARTIES

4.1 Assistance

- (a) The PA Parties agree to cooperate with and provide reasonable assistance to the Independent Certifier to familiarize the Independent Certifier with all necessary aspects of the Project to enable the Independent Certifier to carry out its obligations under this Independent Certifier Agreement.

4.2 Instructions in Writing

- (a) Unless otherwise provided in this Independent Certifier Agreement or the Project Agreement, all instructions to the Independent Certifier by the PA Parties shall be given in writing and accepted or endorsed by both of the PA Parties.

4.3 Information and Services

- (a) The PA Parties shall make available to the Independent Certifier, as soon as practicable from time to time, all information, documents and particulars necessary for the Independent Certifier to carry out the Certification Services, including such information, documents and particulars required in order for the Independent Certifier to certify Construction Period Payments and to determine whether any Substantial Completion and any Final Completion have occurred, and shall provide copies of all such information, documents and particulars to the other party hereto.

4.4 Additional Information

- (a) If any information, documents or particulars are reasonably required to enable the Independent Certifier to perform the Certification Services and have not been provided by the PA Parties, then:
 - (i) the Independent Certifier must give notice in writing to the DB Co Representative or the City Representative, as the case may be, of the details of

the information, documents or particulars demonstrating the need and the reasons why they are required; and

- (ii) DB Co or the City, as the case may be, must arrange the provision of the required information, documents or particulars.

4.5 Right to Enter and Inspect

- (a) Upon giving reasonable notice to the DB Co Representative, the Independent Certifier (and any person authorized by it) may enter and inspect the Lands, the New City Infrastructure, the New MTO Infrastructure or Works at any reasonable time in connection with the exercise or proposed exercise of rights under this Independent Certifier Agreement, subject to:
 - (i) observance of the reasonable rules of DB Co as to safety and security for the Lands, the New City Infrastructure, the New MTO Infrastructure or Works;
 - (ii) not causing unreasonable delay to the carrying out of the Works by reason of its presence at the Lands, the New City Infrastructure, the New MTO Infrastructure or Works; and
 - (iii) not causing any damage to the Lands, the New City Infrastructure, the New MTO Infrastructure or Works.

4.6 PA Parties Not Relieved

- (a) Neither PA Party shall be relieved from performing or observing its obligations, or from any other liabilities, under the Project Agreement as a result of either the appointment of, or any act or omission by, the Independent Certifier.

4.7 PA Parties not Liable

- (a) On no account will a PA Party be liable to another PA Party for any act or omission by the Independent Certifier whether under or purportedly under a provision of the Project Agreement, this Independent Certifier Agreement or otherwise, provided that any such act or omission shall not extinguish, relieve, limit or qualify the nature or extent of any right or remedy of either PA Party against or any obligation or liability of either PA Party to the other PA Party which would have existed regardless of such act or omission.

5 CERTIFICATION QUALITY PLAN

5.1 Certification Quality Plan

- (a) The Independent Certifier must:
 - (i) develop and implement a certification quality plan identifying the processes and outcomes of the Certification Services, including but not limited to timelines, deliverables and input required from the PA Parties, that complies with all requirements of the Independent Certifier's quality assurance accreditation, and is otherwise satisfactory to each of the City Representative and the DB Co Representative;

- (ii) within 14 days after the date of this Independent Certifier Agreement, provide such certification quality plan to each of the City Representative and the DB Co Representative;
- (iii) if satisfactory to each of the City Representative and the DB Co Representative, implement such certification quality plan; and
- (iv) if not satisfactory to each of the City Representative and the DB Co Representative, within 7 days after receiving notice thereof from either PA Party to that effect, revise and resubmit the certification quality plan to each of the City Representative and the DB Co Representative, and implement it if satisfactory to each of the City Representative and the DB Co Representative.

5.2 Certification Quality Plan not to Relieve Independent Certifier

- (a) The Independent Certifier will not be relieved of any responsibilities or obligations in respect of the performance of the Certification Services and will remain solely responsible for them notwithstanding:
 - (i) the obligation of the Independent Certifier to develop and implement a certification quality plan; or
 - (ii) any comment or direction upon, review or acceptance of, approval to proceed with or request to vary any part of the certification quality plan by either the City Representative or the DB Co Representative.

6 SUSPENSION

6.1 Notice

- (a) The Certification Services (or any part) may be suspended at any time by the PA Parties:
 - (i) if the Independent Certifier fails to comply with its obligations under this Independent Certifier Agreement, immediately by the PA Parties giving joint notice in writing to the Independent Certifier; or
 - (ii) in any other case, by the PA Parties giving 7 days joint notice in writing to the Independent Certifier.

6.2 Costs of Suspension

- (a) The Independent Certifier will:
 - (i) subject to the Independent Certifier complying with Article 9, be entitled to recover the extra costs incurred by the Independent Certifier by reason of a suspension directed under Section 6.1(a)(ii) valued as a Certification Services Variation under Article 9; and
 - (ii) have no entitlement to be paid any costs, expenses, losses or damages arising from a suspension under Sections 6.1(a)(i).

6.3 Recommencement

The Independent Certifier must immediately recommence the carrying out of the Certification Services (or any part) on receipt of a joint written notice from the PA Parties requiring it to do so.

7 INSURANCE AND LIABILITY

7.1 Independent Certifier's Professional Indemnity Insurance

- (a) The Independent Certifier must have in place at all times during the term of this Independent Certifier Agreement:
 - (i) professional liability insurance:
 - (A) in the amount of \$[REDACTED] per claim and \$[REDACTED] in the aggregate, a deductible of not more than \$[REDACTED] per claim and from an insurer and on terms satisfactory to each of the PA Parties; and
 - (B) covering liability which the Independent Certifier might incur as a result of a breach by it of its obligations owed by the Independent Certifier in a professional capacity to the PA Parties, or either of them, under or in connection with this Independent Certifier Agreement or the provision of the Certification Services; and
 - (ii) comprehensive general liability insurance in the amount of \$[REDACTED] per claim and in the aggregate, no deductible for personal injury or bodily injury, a deductible of not more than \$[REDACTED] per occurrence for property damage and from an insurer and on terms satisfactory to each of the PA Parties.
- (b) The Independent Certifier must provide copies of its insurance policies to each of the PA Parties upon execution of this Independent Certifier Agreement, and, at least 5 Business Days prior to the expiry date of any such insurance policy, the Independent Certifier must provide evidence of the renewal of any such insurance policy satisfactory to the PA Parties, acting reasonably.

7.2 Workers' Compensation Insurance

- (a) The Independent Certifier must, at its own cost and at all times during the term of this Independent Certifier Agreement, insure its liability (including its common law liability) as required under any applicable workers compensation statute or regulation in relation to its employees engaged in the Certification Services.

8 PAYMENT FOR SERVICES

8.1 Payment of Fee

- (a) In consideration of the Independent Certifier performing the Certification Services in accordance with this Independent Certifier Agreement, each PA Party shall pay [REDACTED] of the Fee to the Independent Certifier in accordance with the payment schedule specified in Appendix B.

- (b) The obligation of each PA Party to pay [REDACTED] of the Fee to the Independent Certifier is a several obligation, and neither PA Party shall have any liability in respect of the non- payment by the other PA Party of any fees or costs payable by such other PA Party under this Independent Certifier Agreement.
- (c) The Fee includes all taxes (except for HST), overheads and profit, all labour and materials, insurance costs, travel, hospitality, food and incidental expenses, and all other overhead including any fees or other charges required by law, to perform the Certification Services.
- (d) The PA Parties acknowledge and agree that if any approved amount due and payable by the PA Parties to the Independent Certifier in excess of \$[REDACTED] is outstanding for more than 60 days, the Independent Certifier shall not have any obligation to make any certification under the Project Agreement.

9 CERTIFICATION SERVICES VARIATIONS

9.1 Notice of Certification Services Variation

- (a) If the Independent Certifier believes, other than a “Certification Services Variation Order” under Section 9.4(c), that any direction by the PA Parties constitutes or involves a Certification Services Variation it must:
 - (i) within 7 days after receiving the direction and before commencing work on the subject matter of the direction, give notice to the PA Parties that it considers the direction constitutes or involves a Certification Services Variation; and
 - (ii) within 21 days after giving the notice under Section 9.1(a)(i), submit a written claim to each of the City Representative and the DB Co Representative which includes detailed particulars of the claim, the amount of the claim and how it was calculated.
- (b) Regardless of whether the Independent Certifier considers that such a direction constitutes or involves a Certification Services Variation, the Independent Certifier must continue to perform the Certification Services in accordance with this Independent Certifier Agreement and all directions, including any direction in respect of which notice has been given under this Section 9.1.

9.2 No Adjustment

- (a) If the Independent Certifier fails to comply with Section 9.1, the Fee will not be adjusted as a result of the relevant direction.

9.3 External Services

- (a) In the event that external personnel or consultants are required for expert opinion with respect to a Certification Services Variation, then, with the prior written approval of the PA Parties, any additional fees relating to such external personnel or consultants will be payable by the PA Parties at the agreed upon amount.

9.4 Certification Services Variation Procedure

- (a) The City Representative and the DB Co Representative may jointly issue a document titled “Certification Services Variation Price Request” to the Independent Certifier which will set out details of a proposed Certification Services Variation which the PA Parties are considering.
- (b) Within 7 days after the receipt of a “Certification Services Variation Price Request”, the Independent Certifier must provide each of the City Representative and the DB Co Representative with a written notice in which the Independent Certifier sets out the effect which the proposed Certification Services Variation will have on the Fee.
- (c) Each of the City Representative and the DB Co Representative may then jointly direct the Independent Certifier to carry out a Certification Services Variation by written document titled “Certification Services Variation Order” which will state either that:
 - (i) the Fee is adjusted as set out in the Independent Certifier’s notice; or
 - (ii) the adjustment (if any) to the Fee will be determined under Section 9.5.

9.5 Cost of Certification Services Variation

- (a) Subject to Section 9.2, the Fee will be adjusted for all Certification Services Variations or suspensions under Section 6.1(a)(ii) carried out by the Independent Certifier by:
 - (i) the amount (if any) stated in the “Certification Services Variation Order” in accordance with Section 9.4(c);
 - (ii) if Section 9.5(a)(i) is not applicable, an amount determined pursuant to the fee schedule in Appendix B; or
 - (iii) where such rates or prices are not applicable, a reasonable amount to be agreed between the PA Parties and the Independent Certifier or, failing agreement, determined by the City Representative and the DB Co Representative jointly.
- (b) Any reductions in the Fee shall be calculated on the same basis as any increases.

10 TERM AND TERMINATION

10.1 Term

- (a) Subject to earlier termination, this Independent Certifier Agreement will commence on the date of the Project Agreement and continue in full force until:
 - (i) the latest Final Completion Date; or
 - (ii) such other date as may be mutually agreed between the PA Parties and the Independent Certifier.

10.2 Notice of Breach

- (a) If the Independent Certifier commits a breach of this Independent Certifier Agreement, the PA Parties may give written notice to the Independent Certifier:
 - (i) specifying the breach; and
 - (ii) directing its rectification in the period specified in the notice being a period not less than 7 days from the date of service of the notice.

10.3 Termination for Breach

- (a) If the Independent Certifier fails to rectify the breach within the period specified in the notice issued under Section 10.2, the PA Parties may, without prejudice to any other rights of the PA Parties or either of them, immediately terminate this Independent Certifier Agreement.

10.4 Termination for Financial Difficulty or Change in Control

- (a) The PA Parties may, without prejudice to any other rights which the PA Parties or either of them may have, terminate this Independent Certifier Agreement immediately if:
 - (i) events have occurred or circumstances exist which, in the opinion of the PA Parties, may result in or have resulted in an insolvency or a Change in Control of the Independent Certifier; or
 - (ii) the Independent Certifier has communications with its creditors with a view to entering into, or enters into, any form of compromise, arrangement or moratorium of any debts whether formal or informal, with its creditors.

10.5 Termination for Convenience

- (a) Notwithstanding anything to the contrary in this Independent Certifier Agreement, the PA Parties may, at any time, jointly terminate this Independent Certifier Agreement upon 30 days written notice to the Independent Certifier. The PA Parties and the Independent Certifier agree that, notwithstanding the 30 days' notice of termination, the Independent Certifier shall continue on a day-to-day basis thereafter until a new Independent Certifier is appointed.

10.6 Independent Certifier's Rights upon Termination for Convenience

- (a) Upon a termination under Section 10.5, the Independent Certifier will:
 - (i) be entitled to be reimbursed by the PA Parties for the value of the Certification Services performed by it to the date of termination; and
 - (ii) not be entitled to any damages or other compensation in respect of the termination and (without limitation) any amount in respect of:
 - (A) the lost opportunity to earn a profit in respect of the Certification Services not performed at the date of termination; and

- (B) any lost opportunity to recover overheads from the turnover which would have been generated under this Independent Certifier Agreement but for it being terminated.

10.7 Procedure upon Termination

- (a) Upon completion of the Independent Certifier's engagement under this Independent Certifier Agreement or earlier termination of this Independent Certifier Agreement (whether under Section 10.3, 10.4 or 10.5 or otherwise), the Independent Certifier must:
 - (i) cooperate with the PA Parties with respect to the transition of the Certification Services to a replacement certifier;
 - (ii) deliver to the PA Parties all Contract Material and all other information concerning the Project held or prepared by the Independent Certifier during the execution of work under this Independent Certifier Agreement; and
 - (iii) as and when required by the PA Parties, meet with them and such other persons nominated by them with a view to providing them with sufficient information to enable the PA Parties to execute the Project or the persons nominated to provide the Certification Services.

10.8 Effect of Termination

- (a) Except as otherwise expressly provided in this Independent Certifier Agreement, termination of this Independent Certifier Agreement shall be without prejudice to any accrued rights and obligations under this Independent Certifier Agreement as at the date of termination (including the right of the PA Parties to recover damages from the Independent Certifier).

10.9 Survival

- (a) Termination of this Independent Certifier Agreement shall not affect the continuing rights and obligations of the PA Parties and the Independent Certifier under Sections 7, 8, 10.6, 10.7, 10.8, 11, 12.7, 12.8 and this Section 10.9 or under any other provision which is expressed to survive termination or which is required to give effect to such termination or the consequences of such termination.

11 INDEMNITY

11.1 PA Parties to Save Independent Certifier Harmless

- (a) The PA Parties hereby indemnify and save the Independent Certifier completely harmless from any actions, causes of action, suits, debts, costs, damages, expenses, claims and demands whatsoever, at law or in equity, arising directly or indirectly in whole or in part out of any action taken by the Independent Certifier within the scope of its duties or authority hereunder.
- (b) The indemnity provided under this Section 11.1 shall not extend:

- (i) to any breach of this Independent Certifier Agreement, or any part or parts hereof, by the Independent Certifier, its employees, servants, agents or persons for whom it is in law responsible, or any negligent or unlawful act or omission or willful misconduct of the Independent Certifier, its employees, servants or persons for whom it is in law responsible (in respect of which the Independent Certifier shall indemnify the PA Parties, as referred to in Section 11.2);
 - (ii) to any action taken by the Independent Certifier outside the scope of authority set forth in this Independent Certifier Agreement, or any part or parts hereof; or
 - (iii) to any debt, cost, expense, claim or demand for which insurance proceeds are recoverable by the Independent Certifier.
- (c) This indemnity shall survive the termination of this Independent Certifier Agreement.

11.2 Independent Certifier to Save PA Parties Harmless

- (a) The Independent Certifier hereby indemnifies and saves the PA Parties, and their affiliated entities, subsidiaries and their respective directors, officers, employees, agents, permitted successors and assigns, completely harmless from any actions, causes of action, suits, debts, costs, damages, expenses, claims and demands whatsoever, at law or in equity, arising directly or indirectly in whole or in part out of any breach of this Independent Certifier Agreement, or any part or parts hereof, by the Independent Certifier, its employees, servants, agents or persons for whom it is in law responsible, or any negligent or unlawful act or omission or willful misconduct of the Independent Certifier, its employees, servants or persons for whom it is in law responsible.
- (b) The indemnity provided under this Section 11.2 to a PA Party shall not apply to the extent:
- (i) any negligent or unlawful act or omission or willful misconduct of such PA Party, its employees, servants or persons for whom it is in law responsible (in respect of which such PA Parties shall indemnify the Independent Certifier, as referred to in Section 11.1) directly caused the losses described in Section 11.2(a); or
 - (ii) any insurance proceeds are recoverable by such PA Party in respect of the losses described in Section 11.2(a).
- (c) This indemnity shall survive the termination of this Independent Certifier Agreement.

11.3 Conduct of Claims

- (a) Claims made by a third person against a party having, or claiming to have, the benefit of an indemnity pursuant to this Independent Certifier Agreement shall be conducted in accordance with the conduct of claims procedure described in Appendix D – Conduct of Claims to this Independent Certifier Agreement.

12 GENERAL

12.1 Entire Agreement

- (a) Except where provided otherwise in this Independent Certifier Agreement, this Independent Certifier Agreement constitutes the entire agreement between the parties in connection with its subject matter and supersedes all prior representations, communications, negotiations and understandings, whether oral, written, express or implied, concerning the subject matter of this Independent Certifier Agreement.

12.2 Negation of Employment

- (a) The Independent Certifier, its officers, directors, members, employees, servants and agents and any other persons engaged by the Independent Certifier in the performance of the Certification Services will not by virtue of this Independent Certifier Agreement or the performance of the Certification Services become in the service or employment of the PA Parties for any purpose.
- (b) The Independent Certifier will be responsible for all matters requisite as employer or otherwise in relation to such officers, directors, members, employees, servants and agents and other persons who are engaged by the Independent Certifier.

12.3 Waiver

- (a) No waiver made or given by a party under or in connection with this Independent Certifier Agreement shall be binding or effective unless the waiver is in writing, signed by an authorized representative of the party giving such waiver, and delivered by such party to the other parties. No waiver made with respect to any right, power or remedy in one instance will be deemed to be a waiver with respect to any other instance involving the exercise of such right, power, or remedy or with respect to any other right, power, or remedy.
- (b) Failure by any party to exercise any of its rights, powers or remedies hereunder or its delay to do so shall not constitute a waiver of those rights, powers or remedies. The single or partial exercise of a right, power or remedy shall not prevent its subsequent exercise or the exercise of any other right, power or remedy.

12.4 Notices

- (a) All notices, requests, demands, instructions, certificates, consents and other communications required or permitted under this Independent Certifier Agreement shall be in writing (whether or not “written notice” or “notice in writing” is specifically required by the applicable provision of this Independent Certifier Agreement) and served by sending the same by registered mail, facsimile or by hand, as follows:

If to City:

City of Ottawa

110 Laurier Ave West

Ottawa, Ontario

K1P 1J1

Mail code: [REDACTED]

Attn: [REDACTED]

Email: [REDACTED]

If to DB Co: East West Connectors GP

[REDACTED]

Attn.: **[REDACTED]**
Email: **[REDACTED]**

with a copy to: **[REDACTED]**

[REDACTED]

Attn.: **[REDACTED]**
Email: **[REDACTED]**

If to Independent Certifier: **[REDACTED]**

[REDACTED]

Fax: **[REDACTED]**
Attn.: **[REDACTED]**
Email: **[REDACTED]**

- (b) Where any notice is provided or submitted to a party via facsimile, an original of the notice sent via facsimile shall promptly be sent by regular mail or registered mail. For greater certainty, a notice given via facsimile shall not be invalid by reason only of a party's failure to comply with this Section 12.4(b).
- (c) Any party to this Independent Certifier Agreement may, from time to time, change any of its contact information set forth in Section 12.4(a) by prior notice to the other Parties, and such change shall be effective on the Business Day that next follows the recipient party's receipt of such notice unless a later effective date is given in such notice.
- (d) Subject to Sections 12.4(e), 12.4(f) and 12.4(g):
 - (i) a notice given by registered mail shall be deemed to have been received on the third Business Day after mailing;
 - (ii) a notice given by hand delivery shall be deemed to have been received on the day it is delivered; and
 - (iii) a notice given by facsimile shall be deemed to have been received on the day it is transmitted by facsimile.
- (e) If the party giving the notice knows or ought reasonably to know of difficulties with the postal system which might affect negatively the delivery of mail, any such notice shall not be mailed but shall be made or given by personal delivery or by facsimile transmission in accordance with this Section 12.4.
- (f) If any notice delivered by hand or transmitted by facsimile is so delivered or transmitted, as the case may be, either on a day that is not a Business Day or on a Business Day after

4:00 p.m. (recipient's local time), then such notice shall be deemed to have been received by such recipient on the next Business Day.

- (g) A notice given by facsimile shall be deemed to have been received by the recipient on the day it is transmitted only if a facsimile transmission report (maintained by the sender) indicates that the transmission of such notice was successful.

12.5 Transfer and Assignment

- (a) The Independent Certifier:
 - (i) must not assign, transfer, mortgage, charge or encumber any right or obligation under this Independent Certifier Agreement without the prior written consent of the PA Parties, which each PA Party may give or withhold in its absolute discretion (including, in respect of the City, if so required pursuant to a Contribution Agreement); and
 - (ii) agrees that any assignment, transfer, mortgage, charge or encumbrance will not operate to release or discharge the Independent Certifier from any obligation or liability under this Independent Certifier Agreement.
- (b) For the purposes of this Section 12.5, an assignment will be deemed to have occurred where there is a Change in Control of the Independent Certifier after the date of this Independent Certifier Agreement.
- (c) Each of the PA Parties may assign, transfer, mortgage, charge or encumber any right or obligation under this Independent Certifier Agreement in accordance with the terms of the Project Agreement.

12.6 Governing Laws and Jurisdictions

- (a) This Independent Certifier Agreement shall be governed by and construed in accordance with the laws of Ontario and the laws of Canada applicable therein and shall be treated in all respects as an Ontario contract, without regard to conflict of laws principles.
- (b) The PA Parties and the Independent Certifier agree that the courts of the Province of Ontario and all courts competent to hear appeals therefrom shall have exclusive jurisdiction to hear and settle any action, suit, proceeding or dispute in connection with this Independent Certifier Agreement and hereby irrevocably attorn to the exclusive jurisdiction of such courts.
- (c) Nothing in this Independent Certifier Agreement affects the rights, protections and immunities of the Crown under the *Proceedings Against the Crown Act* (Ontario).

12.7 Confidentiality

- (a) The Independent Certifier must ensure that:
 - (i) neither it nor any of its officers, directors, members, employees, servants and agents disclose, or otherwise make public, any Contract Material or any other

information or material acquired in connection with or during the performance of the Certification Services without prior written approval of the PA Parties; and

- (ii) no Contract Material is used, copied, supplied or reproduced for any purpose other than for the performance of the Certification Services under this Independent Certifier Agreement.
- (b) The PA Parties may at any time require the Independent Certifier to give and to arrange for its officers, directors, members, employees, servants and agents engaged in the performance of the Certification Services to give written undertakings, in the form of confidentiality agreements on terms required by the PA Parties, relating to the non-disclosure of confidential information, in which case the Independent Certifier must promptly arrange for such agreements to be made.

12.8 Contract Material

- (a) The PA Parties and the Independent Certifier agree that the Independent Certifier does not and will not have any rights, including any Intellectual Property, in any Contract Material provided to the Independent Certifier or created or required to be created by either PA Party.
- (b) As between the PA Parties and the Independent Certifier, all title and ownership, including all Intellectual Property, in and to the Contract Material created or required to be created by the Independent Certifier as part of, or for the purposes of performing the Certification Services, is hereby assigned jointly to the PA Parties on creation, or where such title, ownership and Intellectual Property cannot be assigned before creation of the Contract Material, it will be assigned to the PA Parties on creation. In addition, to the extent that copyright may subsist in such Contract Material so created by the Independent Certifier, the Independent Certifier hereby waives all past, present and future moral rights therein and the Independent Certifier shall ensure that any agent or employee of Independent Certifier shall have waived all such moral rights. The PA Parties acknowledge and agree that as between the PA Parties, title, ownership and other rights to the foregoing shall be governed by the Project Agreement.
- (c) The Independent Certifier will do all such things and execute all such documents as reasonably requested by either of the PA Parties in order to confirm or perfect the assignment of Intellectual Property in the Contract Material referred to in Section 12.8(b).

12.9 Amendment

- (a) This Independent Certifier Agreement may not be varied, amended or supplemented except by an agreement in writing signed by duly authorized representatives of the PA Parties (provided that, in respect of the City, such agreement may be subject to its obligations under a Contribution Agreement and require the consent of a Contribution Agreement Party) and the Independent Certifier and stating on its face that it is intended to be an amendment, restatement or other modification, as the case may be, to this Independent Certifier Agreement.

12.10 Severability

- (a) Each provision of this Independent Certifier Agreement shall be valid and enforceable to the fullest extent permitted by law. If the courts of a competent jurisdiction shall declare any provision of this Independent Certifier Agreement invalid, unenforceable or illegal, such provision may be severed and such invalidity, unenforceability or illegality shall not prejudice or affect the validity, enforceability and legality of the remaining provisions of this Independent Certifier Agreement. If any such provision of this Independent Certifier Agreement is invalid, unenforceable or illegal, the parties shall, acting in good faith, promptly negotiate new provisions to eliminate such invalidity, unenforceability or illegality and to restore this Independent Certifier Agreement as near as possible to its original intent and effect.

12.11 Enurement

- (a) This Independent Certifier Agreement shall enure to the benefit of, and be binding on, each of the parties and their respective successors and permitted transferees and assigns.

12.12 Counterparts

- (a) This Independent Certifier Agreement may be executed in one or more counterparts. Any single counterpart or a set of counterparts executed, in either case, by all the parties shall constitute a full, original and binding agreement for all purposes. Counterparts may be executed either in original or faxed form provided that any party providing its signature in faxed form shall promptly forward to such party an original signed copy of this Independent Certifier Agreement which was so faxed.

12.13 Maintenance of Records

- (a) The Independent Certifier shall retain and maintain in safe storage, at its expense, complete and accurate records related to all work performed under this Independent Certifier Agreement (i) for a minimum period of 7 years or such longer period as required by Applicable Law, or (ii) until delivery of such Contract Material to the PA Parties in accordance with Section 10.7(a)(ii), and such records will be made available to the PA Parties and/or Contribution Agreement Parties upon request.

[EXECUTION PAGES IMMEDIATELY FOLLOW]

IN WITNESS WHEREOF the parties have executed this Independent Certifier Agreement as of the date first above written.

THE CITY OF OTTAWA

Per: _____

Name: **[REDACTED]**

Title: **[REDACTED]**

[EXECUTION PAGE FOR INDEPENDENT CERTIFIER AGREEMENT]

EAST WEST CONNECTORS GP

Per: _____

Name: [REDACTED]

Title: [REDACTED]

Per: _____

Name: [REDACTED]

Title: [REDACTED]

I/We have the authority to bind the
partnership

[EXECUTION PAGE FOR INDEPENDENT CERTIFIER AGREEMENT]

[REDACTED]

Per: _____

Name: [REDACTED]

Title: [REDACTED]

Per: _____

Name:

Title:

I/We have the authority to bind the
corporation

[EXECUTION PAGE FOR INDEPENDENT CERTIFIER AGREEMENT]

APPENDIX A

CERTIFICATION SERVICES

Without limiting the other provisions of this Independent Certifier Agreement and the Project Agreement, the Independent Certifier shall provide the following:

- (a) Receive and monitor drawings and documents related to the development of the design as necessary for the Independent Certifier to be informed as to the progress of the Works and to provide an opinion in the event of a Dispute related to the development of the design.
- (b) Receive and monitor progress reports as necessary for the Independent Certifier to be informed as to the progress of the Works, including review of the Works Reports.
- (c) Review information relating to Construction Period Quality Failures, Delay Events and Compensation Events.
- (d) Review information relating to Variation Enquiries, DB Co Variation Notices, Variations, Estimates, claims for extension of time and compensation and consult with the relevant party.
- (e) In accordance with Section 14.1(b) of the Project Agreement, attend meetings and participate, as necessary, in the activities of the Works Committee.
- (f) In accordance with Section 11.15 of the Project Agreement, determine whether the manner in which DB Co Makes Good any Construction Defects is acceptable.
- (g) In accordance with Section 11.15 of the Project Agreement, identify when it is not expedient for DB Co to correct any Construction Defects, and, where the City and DB Co do not agree on the amount to be deducted from the amount of the Guaranteed Price, being the difference in value between the Works as performed and that called for by the Project Agreement, the Independent Certifier shall determine such amount.
- (h) Review the draft Testing & Commissioning Program and the detailed tests, test methodology and expected test results proposed by DB Co and provide comments, including to report on the effectiveness of the Testing & Commissioning Program, to identify any errors or omissions, and to report any risks.
- (i) Monitor the Commissioning Tests (as indicatively described in Schedule 14 – Testing & Commissioning to the Project Agreement) and other tests, including re-tests, to be performed as set out in the Final Commissioning Program or as otherwise required for DB Co to achieve any Substantial Completion and any Final Completion.
- (j) Monitor and report on, at a minimum on a monthly basis as part of the IC Monthly Report or more regularly as deemed necessary, the requirements, progress and results of all commissioning.
- (k) Prior to any certification, consider the views and comments of both DB Co and the City in relation to the satisfaction of the conditions for certification.

- (l) Conduct and report inspections of the Works as necessary for the Independent Certifier to be satisfied that the Works are proceeding in accordance with the requirements of the Project Agreement. Report on the observations, findings and potential risks to certification as a result of the regular inspections as part of the IC Monthly Report.
- (m) Review relevant documentation, including the final Design Development Submittals, Construction Document Submittals, design certificates, construction certificates and approvals, Permits, Licences and Approvals, certifications, third party acceptance, shop drawings, site instructions, mock ups, Record Drawings, all quality management plans, sustainability requirements, certifications, test results, quality assurance audits, letters of assurance from professionals, schedules (including the Works Schedule) and reports (including the Works Report) provided to the Independent Certifier pursuant to the Project Agreement.
- (n) Monitor the requirements, progress and results of all DB Co Commissioning.
- (o) [Intentionally Deleted].
- (p) Identify any errors or omissions made during the conduct of any such Commissioning Tests referenced in item (i) above and to advise DB Co and City with respect to the implications of those errors and omissions, to the extent that the Independent Certifier may reasonably be aware.
- (q) Upon receipt of notice from DB Co requesting the issuance of the Substantial Completion Certificates or the Final Completion Certificates, as applicable, consider such request and, within the time period set out in the Project Agreement and in accordance with the Project Agreement, either:
 - (i) issue the applicable certificate; or
 - (ii) issue a report detailing the matters that the Independent Certifier considers are required to be performed prior to issuing the applicable certificate.
- (r) Upon notice from DB Co that the matters required to be performed prior to issuing the applicable certificate have been completed, re-inspect the Works or re-consider the matters specified to be performed.
- (s) Prepare, in consultation with DB Co and City, as soon as reasonably practicable and, in any event within, the time period specified in Sections 25.10(e) to 25.10(f) and 25.12A of the Project Agreement, the Minor Deficiencies Lists, and Remaining Works Minor Deficiencies Lists, which Minor Deficiencies Lists and Remaining Works Minor Deficiencies List will include an estimate of the cost and the time for rectifying the Minor Deficiencies or Remaining Works Minor Deficiencies, as applicable, and a schedule for the completion and rectification of the Minor Deficiencies or Remaining Works Minor Deficiencies, as applicable.
- (t) Certify completion of:
 - (i) Utility Company Self-Performed Works that are the subject of a Request for Utility Works Payment in accordance with Section 11.29 the Project Agreement;

- (ii) Art Cash Allowance Items that are the subject of a Request for Art Payment in accordance with Section 11.30 the Project Agreement; and
 - (iii) Nominated Signalling Subcontractor Works that are the subject of a Request for Nominated Signalling Subcontractor Works Payment in accordance with Section 11.31 the Project Agreement.
- (u) Prior to any Substantial Completion, review DB Co cash allowance expenditures against the installations in respect of the:
 - (i) Utility Company Self-Performed Works and the Utility Company Works Cash Allowance;
 - (ii) Art Cash Allowance Items and the Art Cash Allowance; and
 - (iii) Nominated Signalling Subcontractor Works and the Nominated Signalling Subcontractor Works Cash Allowance.
- (v) After any Substantial Completion, reconcile DB Co invoices for expenditure recovery against City budgets and the Utility Company Works Cash Allowance, Art Cash Allowance, and Nominated Signalling Subcontractor Works Cash Allowance.
- (w) Review and observe installation of all equipment, furniture, fixtures, information technology, communication equipment, telephone equipment and anything similar to the foregoing (collectively, the “**Installed Equipment**”) into or onto the Project by the City or any agent or contractor of the City either before or after any Substantial Completion and provide a report to the City and DB Co identifying any damage to the Project which has been caused as a result of the installation of such Installed Equipment into or onto the Project by City, its contractors and/or agents.
- (x) Provide any determinations contemplated in the Project Agreement, which determinations may be subject to final resolution between the PA Parties pursuant to Schedule 27 - Dispute Resolution Procedure to the Project Agreement.
- (y) Participate in and give the PA Parties and their counsel reasonable cooperation, access and assistance (including providing or making available documents, information and witnesses for attendance at hearings and other proceedings) in connection with any proceedings between the PA Parties that relate to the Certification Services.
- (z) Provide periodic reports to the PA Parties, as follows:
 - (i) a progress report on the progress of the Works no later than fifteen Business Days following the end of each month of the Construction Period in respect of the previous month or as otherwise agreed by the PA Parties (the “**IC Monthly Report**”); Commencing no less than 180 days prior to each Scheduled Substantial Completion Date, the IC Monthly Report shall contain specific reference to and listing of the work that needs to be done before such Substantial Completion Certificate or Final Completion Certificate can be issued; and,

- (ii) accompanying the IC Monthly Reports delivered for the months of May, August, November and February, a quarterly report (the “**IC Quarterly Report**”) for the quarters ending March 31st, June 30th, September 30th and December 31st respectively, that contains the following information certified in accordance with the standard of care set out in Section 3.3 of the Independent Certifier Agreement:
 - (A) the extent (expressed as a percentage) of completion of the Works as of the last day of the applicable quarter;
 - (B) the value of the Works completed as of the last day of the applicable quarter;
 - (C) the forecasted extent (expressed as a percentage) of completion of the Works as of the last day of the applicable quarter and for the next four quarters; and
 - (D) the forecasted value of the Works anticipated to be completed as of the last day of the applicable quarter and for the next four quarters.
- (aa) Provide the Certification Services with respect to Construction Period Payments set out in Schedule 21 – Construction Period Payments of the Project Agreement including cooperating with PA Parties (including their consultants and advisors) to establish the Earned Value Measurement Techniques to be used in the Certification Services, including review of the measurement methods proposed by DB Co for the purposes of measuring Earned Value, and agreement of any proposed changes to the Credit Rules, in accordance with Appendix E hereto (Attachment F to Schedule 21 of the Project Agreement).
- (bb) Provide advice on other matters that may arise that both PA Parties may jointly require.
- (cc) Review the reports and plans prepared by DB Co, and provide the determinations required from the Independent Certifier, pursuant to Article 13 of the Project Agreement.
- (dd) In implementing the Certification Services, identify any risks that may impede the issuance of a Substantial Completion Certificate or a Final Completion Certificate and inform the PA Parties thereof. Following the identification of any risks, monitor and report to the PA Parties on the progress as part of the IC Monthly Report until such risks are fully resolved.
- (ee) Develop and implement a certification quality plan identifying the processes and outcomes of the Certification Services including timelines, deliverables and a description of the input required from the PA Parties to carry out the Certification Services.
- (ff) Provide written opinions to the City and DB Co as to whether the City acted reasonably in delivering the Proceeding At Risk Notice pursuant to Section 14.6 of the Project Agreement.
- (gg) To the extent not already contemplated in the other Certification Services or otherwise in this Independent Certifier Agreement, review and certify the

determination of eligible costs under the Contribution Agreements to the Contribution Agreement Parties, including:

- (i) conducting a due diligence assessment of the schedule and cash flow forecast and certifying that this schedule and cash flow forecast is achievable, reviewing and certifying that eligible costs are reasonable and meet the eligible cost criteria in a Contribution Agreement, and reviewing and certifying the percentage of a Contribution Agreement Party's eligible costs of the total eligible costs under a Contribution Agreement;
- (ii) reviewing and certifying for each claim by the City under a Contribution Agreement, including interim claims, that all costs are eligible costs and that the work has been constructed and completed in accordance with the terms and conditions of the Contribution Agreement;
- (iii) confirming to the Contribution Agreement Parties that all information provided and/or submitted to the PA Parties and/or the Contribution Agreement Parties in accordance with this Agreement is true and accurate and prepared in good faith to the best of its skill, judgement and knowledge;
- (iv) Executing and delivering certificates in the form attached hereto as Appendix F when requested by the City.

APPENDIX B

INDEPENDENT CERTIFIER FEE

The Fee shall be invoiced by the Independent Certifier to each PA Party in accordance with Section 8 of this Agreement, using invoices in form and substance acceptable to the PA Parties, acting reasonably, on a monthly basis. The total fixed fee for all Certification Services described in Appendix A (other than item (bb) in Appendix A), shall be in the amount of \$[REDACTED], plus HST. Such fixed fee shall not be subject to escalation or adjustment except by Certification Services Variation. Each monthly invoice shall also include, and separately identify, any amounts claimed for services performed pursuant to any Certification Services Variation, and/or Certification Services jointly required by the PA Parties in accordance with item (bb) in Appendix A, for such payment period, and shall set out as a separate line item the HST payable. Each PA Party shall pay its respective portion of the Fee within 30 days of receipt of a complete and valid invoice.

The following hourly rates shall apply for Certification Services jointly required by the PA Parties in accordance with item (bb) in Appendix A, and may apply to Certification Services Variations in accordance with Sections 9.4 and 9.5 of the Independent Certifier Agreement. Hourly rates set out below are all inclusive and include applicable taxes (other than HST), all labour and materials, insurance costs, disbursements (examples: duplicating, delivery and communications) and all other overhead including any fees or other charges required by law. The PA Parties will not reimburse the Independent Certifier for any costs or expenses for hospitality, food or other incidental expenses.

| <u>Independent Certifier Personnel</u> | <u>Hourly Rate</u> |
|---|---------------------------|
| Senior Partner | \$[REDACTED] |
| Electrical QS Partner | \$[REDACTED] |
| Architectural / Structural QS Partner | \$[REDACTED] |
| Sr. Construction Specialist | \$[REDACTED] |
| Engineer | \$[REDACTED] |
| Mechanical Quantity Surveyor | \$[REDACTED] |
| Senior Associate | \$[REDACTED] |
| Associate | \$[REDACTED] |
| Senior Quantity Surveyor | \$[REDACTED] |
| Intermediate Quantity Surveyor | \$[REDACTED] |
| Junior Quantity Surveyor | \$[REDACTED] |
| Technical Support | \$[REDACTED] |

APPENDIX C

INDEPENDENT CERTIFIER PERSONNEL

The following personnel shall be involved in the performance of the Certification Services:

| Name | Position |
|-------------|--|
| [REDACTED] | Team Lead |
| [REDACTED] | Back-up Team Lead |
| [REDACTED] | Project Manager / Schedule Advisor / Payment Certifier |
| [REDACTED] | Chief Estimator |
| [REDACTED] | Lead Electrical & Commissioning |
| [REDACTED] | Lead Mechanical & Commissioning |
| [REDACTED] | Back-up Electrical & Commissioning |
| [REDACTED] | Project Coordinator & Document Control |
| [REDACTED] | Project Coordinator & Document Control |
| [REDACTED] | Back-up Mechanical & Commissioning |
| [REDACTED] | Engineering Advisory and Support |
| [REDACTED] | Document Control |

APPENDIX D

CONDUCT OF CLAIMS

This Appendix D shall apply to the conduct of claims, made by a third person against a party having, or claiming to have, the benefit of an indemnity pursuant to this Independent Certifier Agreement. The party having, or claiming to have, the benefit of the indemnity is referred to as the “**Beneficiary**” and a party giving the indemnity is referred to as an “**Indemnifier**”.

- (1) If the Beneficiary receives any notice, demand, letter or other document concerning any claim for which it appears that the Beneficiary is, or may become entitled to, indemnification under Section 11 of the Independent Certifier Agreement, the Beneficiary shall give written notice to each Indemnifier potentially obligated in respect thereof, as soon as reasonably practicable and in any event within 10 Business Days of receipt of the same. Such notice shall specify with reasonable particularity, to the extent that information is available, the factual basis for the claim and the amount of the claim.
- (2) Subject to Sections (3), (4) and (5) of this Appendix D, on the giving of such notice by the Beneficiary, where it appears that the Beneficiary is or may be entitled to indemnification from an Indemnifier in respect of all, but not part only, of the liability arising out of the claim, such Indemnifier shall (subject to providing the Beneficiary with a secured indemnity to the Beneficiary’s reasonable satisfaction against all costs and expenses that the Beneficiary may incur by reason of such action) be entitled to dispute the claim in the name of the Beneficiary at the Indemnifier’s own expense and take conduct of any defence, dispute, compromise, or appeal of the claim and of any incidental negotiations. The Beneficiary shall give such Indemnifier all reasonable cooperation, access and assistance for the purposes of considering and resisting such claim. The Beneficiary shall have the right to employ separate counsel in respect of such claim and the reasonable fees and expenses of such counsel shall be to the account of the Indemnifier only where representation of both the Indemnifier and the Beneficiary by common counsel would be inappropriate due to any actual or potential conflicting interests between the Indemnifier and the Beneficiary. If and to the extent that both City and DB Co are given notice in respect of the same claim, they shall cooperate in the conduct of the claim and give each other such reasonable access and assistance as may be necessary or desirable for purposes of considering, resisting and defending such claim.
- (3) With respect to any claim conducted by an Indemnifier:
 - (i) the Indemnifier shall keep the Beneficiary fully informed and consult with it about material elements of the conduct of the claim;
 - (ii) the Indemnifier shall not bring the name or reputation of the Beneficiary into disrepute;
 - (iii) the Indemnifier shall not pay, compromise or settle such claims without the prior consent of the Beneficiary, such consent not to be unreasonably withheld or delayed;
 - (iv) the Indemnifier shall not admit liability or fault to any third party without the prior consent of the Beneficiary, such consent not to be unreasonably withheld or delayed; and

- (v) the Indemnifier shall use commercially reasonable efforts to have the Beneficiary named as a beneficiary under any release given by the persons bringing the claim to which this Section (3) relates.
- (4) The Beneficiary shall be free to pay or settle any such claim on such terms as it thinks fit and without prejudice to its rights and remedies under this Independent Certifier Agreement if:
 - (i) none of the Indemnifiers is entitled to take conduct of the claim in accordance with Section (2);
 - (ii) none of the Indemnifiers notifies the Beneficiary of its intention to take conduct of the relevant claim as soon as reasonably practicable and in any event within 10 Business Days of the notice from the Beneficiary under Section (1) or each of the Indemnifiers notifies the Beneficiary that it does not intend to take conduct of the claim; or
 - (iii) none of the Indemnifiers complies in any material respect with Section (3).
- (5) The Beneficiary shall be free at any time to give notice to the applicable Indemnifier that the Beneficiary is retaining or taking over, as the case may be, the conduct of any defence, dispute, compromise or appeal of any claim, or of any incidental negotiations, to which Section (2) applies. For greater certainty, the Independent Certifier acknowledges and agrees that where City is the Beneficiary, City may retain or take over such conduct in any matter involving Personal Information (as it is defined in the Project Agreement) or any matter involving public policy. On receipt of such notice the applicable Indemnifier shall promptly take all steps necessary to transfer the conduct of such claim to the Beneficiary, and shall provide to the Beneficiary all relevant documentation and all reasonable cooperation, access and assistance for the purposes of considering and resisting such claim. If the Beneficiary gives any notice pursuant to this Section (5), then the applicable Indemnifier shall be released from any liabilities arising under the applicable indemnity hereunder in respect of the applicable claim.
- (6) If an Indemnifier pays to the Beneficiary an amount in respect of an indemnity and the Beneficiary subsequently recovers, whether by payment, discount, credit, saving, relief or other benefit or otherwise, a sum or anything else of value (the “Recovery Amount”) which is directly referable to the fact, matter, event or circumstances giving rise to the claim under the indemnity, the Beneficiary shall forthwith repay to that Indemnifier whichever is the lesser of:
 - (i) an amount equal to the Recovery Amount less any out-of-pocket costs and expenses properly incurred by the Beneficiary in recovering the same; and
 - (ii) the amount paid to the Beneficiary by such Indemnifier in respect of the claim under the relevant indemnity,

provided that there shall be no obligation on the Beneficiary to pursue any Recovery Amount and that the Indemnifier shall be repaid only to the extent that the Recovery Amount, aggregated with any sum recovered from the Indemnifier, exceeds the loss sustained by the Beneficiary except, however, that if the Beneficiary elects not to pursue a Recovery Amount, the Indemnifier shall be entitled to require an assignment to it of the right to do so.

- (7) Any person taking any of the steps contemplated by this Appendix D shall comply with the requirements of any insurer who may have an obligation to provide an indemnity in respect of any liability arising under this Independent Certifier Agreement.

APPENDIX E

CREDIT RULES

1. CREDIT RULES FOR THE EVALUATION OF EARNED VALUE

1.1 Purpose of Credit Rules

- (a) The Credit Rules set out requirements agreed between the City and DB Co for use and interpretation of the Earned Value Measurement Techniques, pursuant to Schedule 21 of the Project Agreement.

1.2 Change of Credit Rules

- (a) In the event that DB Co or the City propose a change to the Credit Rules, the Independent Certifier may agree to such proposed change to the Credit Rule, provided that:
 - (i) any proposed change to the Credit Rules will result in revised Credit Rules that:
 - (A) continue to meet the Earned Value Measurement Techniques; and
 - (B) follow the principles, guidance, and intent of the Credit Rules set out in this Attachment F, wherever possible;
 - (ii) any proposed change to the Credit Rules is subject to consultation with the City and DB Co at least three months prior to the first Construction Period that uses those revised Credit Rules;
 - (iii) the Independent Certifier considers any responses made by the City and DB Co to a proposed change to the Credit Rules and the Independent Certifier provides a report justifying its decision regarding acceptance or rejection of any proposal to change the Credit Rules; and
 - (iv) prior to the start of the first Construction Period that is to use the revised Credit Rules for the evaluation of Earned Value:
 - (A) the proposed changes to the Credit Rules are agreed to by the Independent Certifier; and
 - (B) both the City and DB Co receive the revised Credit Rules from the Independent Certifier.

1.3 Selection of Measurement Methods

- (a) In principle, when selecting the appropriate measurement methods from the Earned Value Measurement Techniques, the following principles shall be applied:
 - (i) for tangible work or tasks taking three Construction Period Months or more to perform, the measurement methods shall be considered in the following decreasing order of preference:

- (A) firstly, activity completion and physical measurement using the fixed formula 0/100 method; and
 - (B) secondly, weighted milestone;
- (ii) for tangible work or tasks taking one or two Construction Period Months to perform, the measurement methods shall be considered in the following decreasing order of preference:
 - (A) activity completion and physical measurement using the fixed formula 0/100 method; and
- (iii) for intangible work or tasks, the measurement methods shall be considered in the following decreasing order of preference:
 - (A) firstly, apportioned effort; and
 - (B) secondly, only where apportioned effort is not possible, level of effort.
- (b) Table 1 sets out the measurement methods that shall be used from the Earned Value Measurement Techniques for specific cost categories, unless there are technical reasons preventing these measurement methods from being used. The specific cost categories in Table 1 are set out in ‘Standard Cost Codes for Capital Projects – Definitions’, US Federal Transportation Administration.

| Table 1: Earned Value measurement methods for specific cost categories | | |
|---|---|---|
| Standard Cost Code | Description | Measurement Method from the Earned Value Measurement Techniques |
| 10 | Guideway | |
| 10.01 | Guideway: at-grade exclusive right-of-way (including trackwork) | Activity completion and physical measurement using the fixed formula 0/100 method |
| 10.04 | Guideway: aerial structure (including trackwork) | Activity completion and physical measurement using the fixed formula 0/100 method |
| 10.05 | Guideway: Built-up fill | Activity completion and physical measurement using the fixed formula 0/100 method |
| 10.06 | Guideway: underground cut & cover (including trackwork) | Activity completion and physical measurement using the fixed formula 0/100 method |
| 10.07 | Guideway: underground tunnel (including trackwork) | Activity completion and physical measurement using the fixed formula 0/100 method |
| 10.09 | Track: Direct fixation | Activity completion and physical measurement using the fixed formula 0/100 method |
| 10.10 | Track: Embedded | Activity completion and physical measurement using the fixed formula 0/100 method |
| 10.11 | Track: Ballasted | Activity completion and physical measurement using the fixed formula 0/100 method |

| Table 1: Earned Value measurement methods for specific cost categories | | |
|---|---|---|
| Standard Cost Code | Description | Measurement Method from the Earned Value Measurement Techniques |
| 10.12 | Track: Special (switches, turnouts) | Activity completion and physical measurement using the fixed formula 0/100 method |
| 20 | Stations, Stops, Terminals, Intermodals | |
| 20.01 | At-grade station; stop; shelter; mall; terminal; platform | Activity completion and physical measurement using the fixed formula 0/100 method |
| 20.03 | Underground station; stop; shelter; mall; terminal; platform | Activity completion and physical measurement using the fixed formula 0/100 method |
| 20.05 | Joint development | Activity completion and physical measurement using the fixed formula 0/100 method |
| 30 | Support Facilities: Yards, Shops and Admin Buildings | |
| 30.01 | Administration Building: Office, sales, storage, revenue counting | Activity completion and physical measurement using the fixed formula 0/100 method |
| 30.03 | Heavy maintenance facility | Activity completion and physical measurement using the fixed formula 0/100 method |
| 30.05 | Yard and Yard Track | Activity completion and physical measurement using the fixed formula 0/100 method |
| 40 | Sitework and Special Conditions | |
| 40.01 | Demolition; clearing; earthwork | Activity completion and physical measurement using the fixed formula 0/100 method |
| 40.02 | Site utilities; utility relocation | Activity completion and physical measurement using the fixed formula 0/100 method |
| 40.03 | Hazardous material; contaminated soil mitigation; ground water treatments | Activity completion and physical measurement using the fixed formula 0/100 method |
| 40.04 | Environmental mitigation, e.g. wetlands, historic/archeologic, parks | Activity completion and physical measurement using the fixed formula 0/100 method |
| 40.05 | Site structures including retaining walls; sound walls and other structures | Activity completion and physical measurement using the fixed formula 0/100 method |
| 40.06 | Pedestrian and bike access and accommodation; landscaping | Activity completion and physical measurement using the fixed formula 0/100 method |
| 40.07 | Automobile; bus; van access ways including roads; parking lots | Activity completion and physical measurement using the fixed formula 0/100 method |
| 40.08 | Temporary facilities | Activity completion and physical measurement using the fixed formula 0/100 method |
| 50 | Systems | |
| 50.01 | Train control and signals | Activity completion and physical measurement using the fixed formula 0/100 method |

| Table 1: Earned Value measurement methods for specific cost categories | | |
|--|---|---|
| Standard Cost Code | Description | Measurement Method from the Earned Value Measurement Techniques |
| 50.02 | Traffic signals and crossing protection | Activity completion and physical measurement using the fixed formula 0/100 method |
| 50.03 | Traction power supply and substations | Activity completion and physical measurement using the fixed formula 0/100 method |
| 50.04 | Traction power distribution and catenary | Activity completion and physical measurement using the fixed formula 0/100 method |
| 50.05 | Communications | Activity completion and physical measurement using the fixed formula 0/100 method |
| 50.06 | Fare collection system and equipment | Activity completion and physical measurement using the fixed formula 0/100 method |
| 50.07 | Central control | Activity completion and physical measurement using the fixed formula 0/100 method |
| 80 | Professional Services and Agency Costs | |
| 80.01 | Preliminary design | Weighted milestone |
| 80.02 | Final design | Weighted milestone |
| 80.03 | Project management for design and construction | Apportioned effort |
| 80.04 | Construction administration and management | Apportioned effort |
| 80.05 | Professional liability and other insurance costs | Weighted milestone |
| 80.06 | Legal; permits; review fees by other agencies, cities, etc; | Weighted milestone |
| 80.07 | Surveys, testing (quality related), investigation, inspection | Weighted milestone or apportioned effort |
| 80.08 | Start up; testing and commissioning | Weighted milestone or apportioned effort |

- (c) The measurement methods associated with procurement of materials shall be in accordance with the following principles:
- (i) except as set out in Section 1.3(c)(ii), the costs of materials used in construction shall be included in the cost of each construction task and shall be evaluated for the purposes of Earned Value as part of each construction task using physical measurement; and
 - (ii) the costs of rail and large long-lead equipment manufactured off-site before installation, such as transformers and packaged air conditioning units, shall be evaluated for the purposes of Earned Value using the fixed formula measurement method, based on the payment terms of the supply contract, except that [REDACTED]% of any payments made by DB Co to the supplier will not be credited for the purposes of Earned Value until the rail or large equipment manufactured off-site is delivered to the Lands or a bonded warehouse.
- (d) The measurement methods associated with procurement of plant, such as cranes and road vehicles, shall be in accordance with the following principles:

- (i) the costs of plant, such as cranes and road vehicles, shall be evaluated for the purposes of Earned Value using the fixed formula measurement method, based on the payment terms of the supply contract, except that [REDACTED]% of any payments made by DB Co to the supplier will not be credited for the purposes of Earned Value until the plant is delivered to the Lands or a bonded warehouse.
- (e) In order to make the measurement of Earned Value more efficient during mobilization, DB Co may choose to identify a tranche of its mobilization cost, the amount of which will be equal to the mobilization cost agreed to between DB Co and the Lenders or Lenders' Consultant of the Cost of the Works that shall be automatically credited for the purposes of measuring Earned Value at Financial Close (the "**Mobilization Credit**"), where:
 - (i) the sum of the costs identified to the Mobilization Credit and the costs identified to the cost codes from Table 1 shall remain equal to the Cost of the Works;
 - (ii) the scope of activity associated with the Mobilization Credit shall be documented by DB Co to the satisfaction of the Independent Certifier before the end of the second Construction Period Month in order to avoid double counting with the Earned Value for activities that are not included within the Mobilization Credit; and
 - (iii) the Earned Value for the activities included within the Mobilization Credit shall be credited as Earned Value without using a measurement method from the Earned Value Management Techniques.

APPENDIX F

CONTRIBUTION AGREEMENT CERTIFICATES

[Federal and Provincial certificates to be appended.]

SCHEDULE 7A
STANDBY LETTER OF CREDIT

[See Attached]

SCHEDULE 7B

(East Warranty Letter of Credit and West Warranty Letter of Credit are attached)

[REDACTED]

EAST WARRANTY LETTER OF CREDIT

Letter of Credit: #[•]

Date: [•]

City of Ottawa
[•]

Attn: [•]

Dear Sirs/Madams:

RE: Confederation Line Extension

At the request of our client, [•] (“**DB Co**”), we, [insert name and address of issuing bank], hereby issue in favour of the City of Ottawa (the “**City**”), an irrevocable standby letter of credit (the “**Letter of Credit**”) in the amount of [REDACTED].

The amount available under this Letter of Credit is payable to the City at any time, and from time to time, upon (a) receipt by us of a written demand for payment, accompanied by a certificate signed by an officer of the City certifying that the City is entitled to draw on this Letter of Credit pursuant to Section 11.18 of a project agreement dated [•] (as amended from time to time, the “**Project Agreement**”) and (b) presentation of the original of this Letter of Credit.

This Letter of Credit will expire at 5:00 p.m. on [insert expiry date] (the “**Expiry Date**”), and the City may call for payment of any amount outstanding under this Letter of Credit at any time up to 5:00 p.m. on that date should this Letter of Credit not be extended.

It is a condition of this Letter of Credit that it shall be automatically extended, without amendment, for one year from the expiration date hereof, or any future expiration date, unless, at least 30 days prior to any expiration date, we notify you, in writing, by courier, that we elect not to consider this Letter of Credit renewed for any such additional period. Upon receipt by you of such notice, you may draw the full amount hereunder by means of your demand in accordance with the preceding paragraph.

Partial drawings are permitted.

We hereby agree that demands delivered under this Letter of Credit will be duly honoured upon presentation provided that all terms and conditions herein have been complied with.

Written demands drawn under this Letter of Credit shall state on their face that they are drawn under Letter of Credit #[•].

It is understood that [insert name of issuing bank] is obligated under this Letter of Credit for payments of monies only.

The Project Agreement is referred to herein for reference purposes only and does not form part of the terms of this Letter of Credit.

This Letter of Credit is subject to the Uniform Customs and Practice for Documentary Credits (2007 Revision) of the International Chamber of Commerce (ICC Publication No. 600) (the “UCP”) with the exception of Articles 18-30 inclusive (other than Article 29a, which shall apply) and Articles 31b, 31c and 32 except to the extent, if any, inconsistent with the express terms of this Letter of Credit.

Notwithstanding Article 36 of the UCP, if this Letter of Credit expires during an interruption of business as contemplated in such Article 36, we shall honour any demand made under this Letter of Credit prior to the Expiry Date, within 30 days after the date on which such interruption of business ends (and we shall notify you promptly when it does so end). For matters not covered by such publication, this Letter of Credit shall be governed by and construed in accordance with the laws of the Province of Ontario.

Yours very truly,

[NAME OF ISSUING BANK]

By: _____
Name:
Title:

By: _____
Name:
Title:

WEST WARRANTY LETTER OF CREDIT

Letter of Credit: #[•]

Date: [•]

City of Ottawa
[•]

Attn: [•]

Dear Sirs/Madams:

RE: Confederation Line Extension

At the request of our client, [•] (“**DB Co**”), we, [insert name and address of issuing bank], hereby issue in favour of the City of Ottawa (the “**City**”), an irrevocable standby letter of credit (the “**Letter of Credit**”) in the amount of [REDACTED].

The amount available under this Letter of Credit is payable to the City at any time, and from time to time, upon (a) receipt by us of a written demand for payment, accompanied by a certificate signed by an officer of the City certifying that the City is entitled to draw on this Letter of Credit pursuant to Section 11.18 of a project agreement dated [•] (as amended from time to time, the “**Project Agreement**”), and (b) presentation of the original of this Letter of Credit.

This Letter of Credit will expire at 5:00 p.m. on [insert expiry date] (the “**Expiry Date**”), and the City may call for payment of any amount outstanding under this Letter of Credit at any time up to 5:00 p.m. on that date should this Letter of Credit not be extended.

It is a condition of this Letter of Credit that it shall be automatically extended, without amendment, for one year from the expiration date hereof, or any future expiration date, unless, at least 30 days prior to any expiration date, we notify you, in writing, by courier, that we elect not to consider this Letter of Credit renewed for any such additional period. Upon receipt by you of such notice, you may draw the full amount hereunder by means of your demand in accordance with the preceding paragraph.

Partial drawings are permitted.

We hereby agree that demands delivered under this Letter of Credit will be duly honoured upon presentation provided that all terms and conditions herein have been complied with.

Written demands drawn under this Letter of Credit shall state on their face that they are drawn under Letter of Credit #[•].

It is understood that [insert name of issuing bank] is obligated under this Letter of Credit for payments of monies only.

The Project Agreement is referred to herein for reference purposes only and does not form part of the terms of this Letter of Credit.

This Letter of Credit is subject to the Uniform Customs and Practice for Documentary Credits (2007 Revision) of the International Chamber of Commerce (ICC Publication No. 600) (the “UCP”) with the exception of Articles 18-30 inclusive (other than Article 29a, which shall apply) and Articles 31b, 31c and 32 except to the extent, if any, inconsistent with the express terms of this Letter of Credit.

Notwithstanding Article 36 of the UCP, if this Letter of Credit expires during an interruption of business as contemplated in such Article 36, we shall honour any demand made under this Letter of Credit prior to the Expiry Date, within 30 days after the date on which such interruption of business ends (and we shall notify you promptly when it does so end). For matters not covered by such publication, this Letter of Credit shall be governed by and construed in accordance with the laws of the Province of Ontario.

Yours very truly,

[NAME OF ISSUING BANK]

By: _____
Name:
Title:

By: _____
Name:
Title:

SCHEDULE 7C
REMAINING WORKS LETTER OF CREDIT
[REDACTED]

Letter of Credit: #[•]

Date: [•]

City of Ottawa
[•]

Attn: [President and Chief Executive Officer]

Dear Sir/Madam:

RE: Confederation Line Extension

At the request of our client, [•] (“DB Co”), we, [insert name and address of issuing bank], hereby issue in favour of the City of Ottawa (the “City”), as beneficiary, an irrevocable standby letter of credit (the “Letter of Credit”) in the amount of [REDACTED].

The amount available under this Letter of Credit is payable to the City, at any time and from time to time, upon (a) receipt by us of a written demand for payment, accompanied by a certificate signed by an officer of the City certifying the City is entitled to draw on this Letter of Credit pursuant to Section 11.18A of a project agreement dated [•] (as amended from time to time, the “Project Agreement”), and (b) presentation of the original of this Letter of Credit.

This Letter of Credit will expire at 5:00 p.m. on [insert expiry date] (the “Expiry Date”), and the City may call for payment of any amount outstanding under this Letter of Credit at any time up to 5:00 p.m. on that date should this Letter of Credit not be extended.

It is a condition of this Letter of Credit that it shall be automatically extended, without amendment, for one year from the expiration date hereof, or any future expiration date, unless, at least 30 days prior to any expiration date, we notify you, in writing, by courier, that we elect not to consider this Letter of Credit renewed for any such additional period. Upon receipt by you of such notice, you may draw the full amount hereunder by means of your demand.

Partial drawings are permitted.

We hereby agree that demands delivered under this Letter of Credit will be duly honoured upon presentation provided that all terms and conditions herein have been complied with.

Written demands drawn under this Letter of Credit shall state on their face that they are drawn under Letter of Credit #[•].

It is understood that **[insert name of issuing bank]** is obligated under this Letter of Credit for payments of monies only.

The Project Agreement is referred to herein for reference purposes only and does not form part of the terms of this Letter of Credit.

This Letter of Credit is subject to the Uniform Customs and Practice for Documentary Credits (2007 Revision) of the International Chamber of Commerce (ICC Publication No. 600) (the “UCP”) with the exception of Articles 18-30 inclusive (other than Article 29a, which shall apply) and Articles 31b, 31c and 32 except to the extent, if any, inconsistent with the express terms of this Letter of Credit. Notwithstanding Article 36 of the UCP, if this Letter of Credit expires during an interruption of business as contemplated in such Article 36, we shall honour any demand made under this Letter of Credit prior to the Expiry Date, within 30 days after the date on which such interruption of business ends (and we shall notify you promptly when it does so end). For matters not covered by such publication, this Letter of Credit shall be governed by and construed in accordance with the laws of the Province of Ontario.

Yours very truly,

[NAME OF ISSUING BANK]

By: _____
Name:
Title:

By: _____
Name:
Title:

SCHEDULE 8

LIST OF DB CO PARTIES

[REDACTED]

SCHEDULE 9

KEY INDIVIDUALS

At Commercial Close, DB Co shall notify the City of the status of the accreditations, including licences, courses and certifications, required to be obtained by the Key Individuals, as defined under the “Qualifications” column in the table below. For those accreditations not yet obtained at Commercial Close, DB Co shall notify the City of the status of such accreditations upon six months after Commercial Close. If such accreditations have not been granted by the applicable licencing or accreditation entities within six months of Commercial Close, the City, at its discretion, may exercise its right in accordance Section 12.4(c) of the Project Agreement to require replacement of the applicable Key Individual with an individual possessing the required accreditations.

A. Key Individuals – Works

| Position | Function | Qualifications | Name and Contact Information | Liquidated Damages Amount |
|-----------------------|--|---|-------------------------------------|--|
| DB Co Representative | The DB Co Representative shall have full authority to act on behalf of DB Co, and shall be responsible for overall authority and leadership of DB Co, and all DB Co parties, in accordance with the Project Agreement. | The DB Co Representative shall have a minimum of 10 years’ experience. This shall include executive and P3 experience. *RFQ, Project Executive | [REDACTED] | <ul style="list-style-type: none">- \$[REDACTED] pursuant to Section 12.4 (a) of the Project Agreement- \$[REDACTED] per day, pursuant to Section 12.4 (b) of the Project Agreement |
| Design Build Director | The Design Build Director shall be responsible for ensuring that all activities with respect to the Works are fully integrated with each other. | The Design Build Director shall have a minimum of 15 years’ experience. This shall include design, construction and P3 or Design-Build experience, on projects of similar scope and complexity. | [REDACTED] | <ul style="list-style-type: none">- \$[REDACTED] pursuant to Section 12.4 (a) of the Project Agreement- \$[REDACTED] per day, pursuant to Section 12.4 (b) of the Project Agreement |

| Position | Function | Qualifications | Name and Contact Information | Liquidated Damages Amount |
|-----------------------------|---|--|------------------------------|---|
| Design Manager | <p>The Design Manager shall be responsible for:</p> <ul style="list-style-type: none"> (i) coordinating all designs produced by the Design Team; (ii) ensuring the schedule for Design Development Submittals is reflected in each update of the Works Schedule; (iii) coordinating with the City Representative, or its designate, to prioritize the review of each of the Works Submittals, if necessary; and (iv) ensuring obligations set out in Schedule 10 – Review Procedure are fulfilled for each Works Submittal. | <p>The Design Manager shall be a Professional Engineer, with a current license to practice in the Province of Ontario, or obtained within 6 months of Commercial Close.</p> <p>Minimum of 15 years' of design experience. This shall include P3 or Design Build experience on rail projects of similar scope and complexity.</p> <p>*RFQ, Design Manager</p> | [REDACTED] | <ul style="list-style-type: none"> - \$[REDACTED] pursuant to Section 12.4 (a) of the Project Agreement - \$[REDACTED] per day, pursuant to Section 12.4 (b) of the Project Agreement |
| Systems Integration Manager | <p>The Systems Integration Manager shall have the responsibilities set out in Schedule 14 – Testing and Commissioning and Schedule 15-2 Part 1.</p> | <p>The LRT Systems Integration Manager shall have a degree in engineering from a recognized university and a minimum of 15 years' experience in systems design, requirements</p> | [REDACTED] | <ul style="list-style-type: none"> - \$[REDACTED] pursuant to Section 12.4 (a) of the Project Agreement - \$[REDACTED] per day, pursuant to Section 12.4 (b) of the Project Agreement |

| Position | Function | Qualifications | Name and Contact Information | Liquidated Damages Amount |
|---------------------------------------|---|--|------------------------------|---|
| | | traceability, interface capture and management, integration management plan development, systems test plan and procedure development, test program management and systems commissioning. Experience managing and coordinating systems integration activities. | | |
| Testing and Commissioning Coordinator | The Testing and Commissioning Coordinator shall have the responsibilities set out in Schedule 14 – Testing and Commissioning. | The Testing & Commissioning Coordinator shall have a minimum of 10 years' experience in the management and oversight of the testing and commissioning of System Infrastructure of similar scope and complexity. | [REDACTED] | <ul style="list-style-type: none"> - \$[REDACTED] pursuant to Section 12.4 (a) of the Project Agreement - \$[REDACTED] per day, pursuant to Section 12.4 (b) of the Project Agreement |
| Utility Work Manager | The Utility Work Manager shall be responsible for all activities required to fulfill DB Co's obligations as set out in Schedule 15-2, Part 2, Article 8 and will act as a single point of contact on all utility related matters. | <p>The Utility Work Manager shall have a minimum of 10 years' experience, in Utility Works on projects of similar scope and complexity.</p> <p>*RFQ, Utility Coordination</p> | [REDACTED] | <ul style="list-style-type: none"> - \$[REDACTED] pursuant to Section 12.4 (a) of the Project Agreement - \$[REDACTED] per day, pursuant to Section 12.4 (b) of the Project Agreement |
| Traffic Manager | The Traffic Manager shall have the responsibilities as set | The Traffic Manager shall be a Professional Engineer, with | [REDACTED] | <ul style="list-style-type: none"> - \$[REDACTED] pursuant to Section 12.4 (a) of the |

| Position | Function | Qualifications | Name and Contact Information | Liquidated Damages Amount |
|------------------|--|--|------------------------------|---|
| | out in Article 6.3 of Schedule 15-2 Part 7 | a current license to practice in the Province of Ontario, or obtained within 6 months of Commercial Close, with 15 years of traffic engineering experience, of which 10 years' must include experience on projects with similar traffic impact. *RFQ, Traffic Manager | | Project Agreement - \$[REDACTED] per day, pursuant to Section 12.4 (b) of the Project Agreement |
| Design Architect | The Design Architect shall have the responsibilities as set out in Schedule 15-2, Part 4 | The Design Architect shall be a licensed Architect, with a current licence issued by the Ontario Association of Architects to practice in the Province of Ontario, or obtained within 6 months of Commercial Close, with a minimum of 15 years' experience designing transit projects of similar scope and complexity and possess Design Build and/or P3 experience. | [REDACTED] | - \$[REDACTED] pursuant to Section 12.4 (a) of the Project Agreement - \$[REDACTED] per day, pursuant to Section 12.4 (b) of the Project Agreement |
| Lead Architect | The Lead Architect shall have the responsibilities as set out in Schedule 15-2, Part 4 | The Lead Architect shall be an Architect, with a current licence issued by the Ontario Association of Architects to practice in the Province of | [REDACTED] | - \$[REDACTED] pursuant to Section 12.4 (a) of the Project Agreement - \$[REDACTED] per day, pursuant to Section 12.4 |

| Position | Function | Qualifications | Name and Contact Information | Liquidated Damages Amount |
|-----------------------|--|--|------------------------------|---|
| | | Ontario, or obtained within 6 months of Commercial Close, with a minimum of 15 years' experience designing transit projects of similar scope and complexity and possess Design Build and/or P3 experience. *RFQ, Architecture | | (b) of the Project Agreement |
| Environmental Manager | The Environmental Manager(s) shall have the responsibilities set out in Schedule 17 – Environmental Obligations. | <p>The Environmental Manager shall have a degree from a recognized university with specialization in environmental studies and a minimum 15 years' experience, including environmental management, on projects of similar scope and complexity.</p> <p>The Environmental Manager shall have successfully completed, or shall complete within six months or Commercial Close, a recognized ISO 14001 Lead Auditor Course.</p> <p>*RFQ, Managing Systems</p> | [REDACTED] | <ul style="list-style-type: none"> - \$[REDACTED] pursuant to Section 12.4 (a) of the Project Agreement - \$[REDACTED] per day, pursuant to Section 12.4 (b) of the Project Agreement |

| Position | Function | Qualifications | Name and Contact Information | Liquidated Damages Amount |
|---|---|---|------------------------------|---|
| | | Director (Environmental) | | |
| Director of Communications and Stakeholder Engagement | The Director of Communications and Stakeholder Engagement shall be responsible for all activities required to fulfill DB Co's obligations as set out in Schedule 18 – Communication and Stakeholder Engagement Obligations. | <p>The Director of Communications and Stakeholder Engagement shall have a degree from a recognized university or college in communications, media relations or other relevant speciality, with a minimum of 10 years' experience in communications and stakeholder engagement on transit or transportation construction projects of similar scope and complexity, and is bilingual in Canada's two official languages (English and French).</p> <p>*RFQ, Stakeholder Communications and Public Engagement</p> | [REDACTED] | <ul style="list-style-type: none"> - \$[REDACTED] pursuant to Section 12.4 (a) of the Project Agreement - \$[REDACTED] per day, pursuant to Section 12.4 (b) of the Project Agreement |
| Construction Manager | The Construction Manager shall be responsible for all Construction Activities and compliance of Construction Activities with the Project Agreement. | The Construction Manager shall have a degree from a recognized university or college in engineering, management, or other relevant specialty, with a | [REDACTED] | <ul style="list-style-type: none"> - \$[REDACTED] pursuant to Section 12.4 (a) of the Project Agreement - \$[REDACTED] per day, pursuant to Section 12.4 (b) of the Project |

| Position | Function | Qualifications | Name and Contact Information | Liquidated Damages Amount |
|--------------|--|---|------------------------------|---|
| | | <p>minimum of 15 years heavy civil transit orientated construction experience on projects of similar scope and complexity.</p> <p>*RFQ, Construction Manager</p> | | Agreement |
| IMS Director | The IMS Director shall have the responsibilities set out in Schedule 11 – Integrated Management Systems. | <p>The IMS Director shall be a certified QMS 2000 Series Auditor; or at a minimum have successfully completed a recognized ISO 9001, ISO 14001, OHSAS 18001 or OHSAS 45001 Lead Auditor Course; or shall become certified as a QMS 2000 Series Auditor, or shall successfully complete a recognized ISO 9001, ISO 14001, OHSAS 18001, or OHSAS 45001 Lead Auditor Course, within six months of Commercial Close.</p> <p>Minimum of 15 years' experience, including IMS/Quality Management, on projects of similar scope and complexity.</p> | [REDACTED] | <ul style="list-style-type: none"> - \$[REDACTED] pursuant to Section 12.4 (a) of the Project Agreement - \$[REDACTED] per day, pursuant to Section 12.4 (b) of the Project Agreement |

| Position | Function | Qualifications | Name and Contact Information | Liquidated Damages Amount |
|-----------------------|---|---|------------------------------|---|
| OHS Manager | The OHS Manager shall have the responsibilities set out in Schedule 11 – Integrated Management System | <p>The OHS Manager shall be a Canadian Registered Safety Professional (CRSP) having successfully completed the courses required under the COR program, and an OHSAS 18001 or OHSAS 45001 Lead Auditor course, or shall become a Canadian Registered Safety Professional (CRSP) and complete the courses required under the COR program, and an OHSAS 18001 or OHSAS 45001 Lead Auditor course within six months of Commercial Close.</p> <p>Minimum of 10 years' experience in the development, implementation and audit of an IMS-OHS for projects of similar scope and complexity.</p> <p>*RFQ, Health & Safety</p> | [REDACTED] | <ul style="list-style-type: none"> - \$[REDACTED] pursuant to Section 12.4 (a) of the Project Agreement - \$[REDACTED] per day, pursuant to Section 12.4 (b) of the Project Agreement |
| Highway Works Manager | The Highway Works Manager shall have the responsibilities set out in Schedule 15-2 Part | The Highway Works Manager shall be a Professional Engineer, with a | [REDACTED] | - \$[REDACTED] pursuant to Section 12.4 (a) of the Project Agreement |

| Position | Function | Qualifications | Name and Contact Information | Liquidated Damages Amount |
|---|--|--|------------------------------|---|
| | 9. | current license to practice in the Province of Ontario, or obtained within 6 months of Commercial Close, and shall possess a minimum of 15 years' relevant experience, including urban freeway projects of similar scope and size. | | - \$[REDACTED] per day, pursuant to Section 12.4 (b) of the Project Agreement |
| Safety and Security Certification Manager | The Safety and Security Certification Manager shall have the responsibilities set in Schedule 15-2 Part 1. | The Safety and Security Certification Manager shall have a minimum of 15 years' experience in the development and implementation of SSCP. | [REDACTED] | - \$[REDACTED] pursuant to Section 12.4 (a) of the Project Agreement - \$[REDACTED] per day, pursuant to Section 12.4 (b) of the Project Agreement |

SCHEDULE 10

REVIEW PROCEDURE

ARTICLE 1 WORKS SUBMITTALS

- 1.1 The provisions of this Schedule 10 shall apply to the Design Development Submittals, the Construction Document Submittals, the Design Data and any and all items, documents and anything else required or specified by the Project Agreement, including all Works Submittals listed in Appendices A and B to this Schedule 10, in respect of:
- (a) the East Works to be submitted to, reviewed or otherwise processed by the City in accordance with the Review Procedure prior to East Substantial Completion, or after East Substantial Completion in respect of the completion of East Minor Deficiencies, including any and all subsequent revisions, amendments and changes thereto; and
 - (b) the West Works to be submitted to, reviewed or otherwise processed by the City in accordance with the Review Procedure prior to West Substantial Completion, or after West Substantial Completion in respect of the completion of West Minor Deficiencies, including any and all subsequent revisions, amendments and changes thereto.
- (collectively and individually, “Works Submittal” or “Works Submittals” as applicable in this Schedule 10).
- 1.2 For clarity, the provisions of this Schedule 10, including any deadlines for submission or review set out herein, shall not apply to any processing or review of any Permits, Licences, Approvals and Agreements.
- 1.3 Subject to Article 1.2, if the City fails to meet the timelines set out in this Schedule 10 with respect to its review of any Submittals, including due to delay caused by the City Design Team, RTG, NCC or MTO, such failure shall be deemed to be a failure by the City to comply with the timelines set out in this Schedule 10.
- 1.4 In general, Works Submittals shall consist of the following. Specific requirements for each of these Work Submittals are detailed further in Appendices A and B.
- (a) Design Development Submittals:
 - (i) Prior to the preparation of each Pre-Final Design Development Submission, DB Co shall develop a basis of design report for each discipline, based on the Project Agreement and PSOS requirements. The basis of design report shall describe the technical approach planned for the Project as well as the technical requirements, security mitigation and measures to be employed, design codes and parameters to be used;
 - (ii) Pre-Final Design Development (PFDD), which is the stage of design development where the design details of the relevant Works Submittal are established and drawings and specifications for construction have been

developed but are not yet fully finalised;

- (iii) Final Design Development (FDD), which is the stage of design development where the design details of the relevant Works Submittal are finalised and the construction drawings and construction specifications for the designed element are also finalised.
 - (b) Construction Document Submittals;
 - (c) other reports, studies, matrices and plans listed in this Schedule 10 and in Appendices A and B to this Schedule 10;
 - (d) other reports, studies and plans identified in the relevant sections of the Project Agreement; and
 - (e) Works Schedules in accordance with Schedule 12 – Works Scheduling Requirements and as per Article 3.13.
- 1.5 DB Co shall be responsible for determining any and all necessary Works Submittals, as specified in the relevant sections of the Project Agreement.
- 1.6 Other reports, studies and plans shall be submitted as follows:
- (a) DB Co shall be responsible for determining the timing of the preparation of reports, studies and plans required in the preparation of the PFDD, FDD and Construction Document Submittals, unless timing of these reports, studies and plans are identified in this Schedule 10 or in other relevant sections of the Project Agreement. DB Co shall include the timing and submission sequence of all reports, studies and plans which will inform the Design Development Submittals in the schedule of Works Submittals pursuant to Section 11.2(b)(vi) of the Project Agreement. DB Co shall prepare a minimum of one hard copy and one electronic upload of submissions of reports, studies and plans for review by the City as follows:
 - (i) Draft format; and
 - (ii) Final format (signed and sealed).
 - (b) DB Co shall be responsible for preparing and submitting additional updated submissions of reports, studies and plans, if the validity of such is altered due to design changes or if more frequent submissions are identified in this Schedule 10 or in other relevant sections of the Project Agreement.
- 1.7 Compliance Verification & Validation Matrix:
- (a) DB Co shall use the Requirements Management tool to report on compliance with the Output Specifications and other requirements in the form of a Compliance Verification & Validation Matrix. The Compliance Verification & Validation Matrix shall provide line-by-line reporting of all applicable requirements and provide full traceability between requirements and compliance demonstration, including preliminary and final design references, quality assurance & control, testing &

commissioning (including but not limited to FAT, PICO, SAT, SIT, and system-wide testing); and

- (b) DB Co shall submit the Compliance Verification & Validation Matrix in accordance with this Schedule 10 as part of the Basis for Design submittal, at the Pre-Final Design Development stage, the Final Design Development stage, after system-wide testing, prior to trial running and at final completion.

1.8 Design review workshops

- (a) DB Co shall schedule and coordinate design review workshops in advance of issuing Pre-Final Design Development Submittals;
- (b) The DB Co Representative shall arrange the design review workshops in consultation with the City Representative;
- (c) The Parties shall cooperate to develop a reasonable schedule for the design review workshops and shall incorporate such schedule into the Current PBS;
- (d) DB Co shall circulate to the City Representative an agenda for each of the design review workshops no later than 5 Business Days prior to the relevant design review workshop;
- (e) The design review workshops shall be held in person in the City of Ottawa, Ontario, except where otherwise agreed by the Parties, acting reasonably; and
- (f) In advance of a design review workshop, DB Co may submit to the City Design Team for comment any interim drafts of any designs or plans required under this Project Agreement, which submissions shall be used to inform the City on the development of New City Infrastructure and New MTO Infrastructure design and provide an opportunity for dialog on compliance with the requirements of the Project Agreement. For greater certainty, interim submissions shall be informal and shall not be reviewed in accordance with Schedule 10 - Review Procedure.

1.9 Design working groups

- (a) In order to discuss and obtain input to the design development, DB Co and the Design Team shall hold design working groups with the City and the City Design Team upon the following terms:
 - (i) DB Co shall propose, in consultation with the City Representative, a logical breakdown of design disciplines or submittals that should each be the subject of individual monthly or biweekly design working groups as mutually agreed;
 - (ii) the City and DB Co shall mutually agree if multiple design disciplines or submittals should be discussed in a particular design working group to benefit a wholesome discussion on overlapping design matters;

- (iii) each design working group shall be held monthly or biweekly, in the City of Ottawa, unless the City agrees otherwise in writing;
- (iv) the Parties shall cooperate to develop a reasonable schedule for the design working groups and shall incorporate such schedule into the Current PBS;
- (v) DB Co shall circulate to the City and the City Design Team an agenda for each of the design working groups no later than 10 Business Days prior to the relevant design working groups held on a monthly basis and 5 Business Days for prior to the relevant design working groups held on a biweekly basis;
- (vi) in advance of a design working groups, DB Co may submit to the City Design Team any interim drafts of any designs or plans required under this Project Agreement, which submissions shall be used to inform the City on the development of New City Infrastructure and New MTO Infrastructure design and provide an opportunity for dialog on compliance with the requirements of the Project Agreement. For clarity, these submissions shall be informal and shall not be reviewed in accordance with Schedule 10 - Review Procedure;
- (vii) the design working groups shall be held in person, with attendance from the relevant DB Co and City subject matter experts, except where otherwise agreed by the Parties, acting reasonably;
- (viii) DB Co shall maintain minutes of the design working groups and, within 5 Business Days after each design working group, DB Co shall provide to the City and the City Design Team a copy of the minutes, together with a copy of any notes, drawings, or diagrams relevant to the design working group; and
- (ix) the City and DB Co agree that the subject matter of the design working groups shall not be regarded as Submittals to which Schedule 10 - Review Procedure applies, and that the City shall not be bound by the input provided in connection with the design working group.

ARTICLE 2 SCHEDULE FOR WORKS SUBMITTALS

- 2.1 DB Co shall schedule the Review Procedure Activities, including the submission dates for all Works Submittals and the City review period in accordance with this Schedule 10.
- 2.2 The Works Schedule and any amendment to the Works Schedule shall allow:
 - (a) a period of 15 Business Days (or such longer period as the Parties may agree) from the date of receipt for the City's review of and response to each Works Submittal for all Works;
 - (b) a period of 20 Business Days (or such longer period as the Parties may agree) from the date of receipt for the City's review of and response to each Works Submittal

containing elements of the Works to be constructed within or adjacent to NCC Lands. Refer to the Lands Table in Schedule 20 – Lands for the extent of these Lands; or

- (c) a period of 20 Business Days (or such longer period as the Parties may agree) from the date of receipt for the City's review of and response to each Works Submittal containing elements of New MTO Infrastructure,

which period of time may be subject to adjustment, as agreed upon with the City.

- 2.3 DB Co shall submit all Works Submittals no later than the dates identified in the Current PBS, as defined in Schedule 12 – Works Scheduling Requirements. The City Representative shall review and respond to each Works Submittal in accordance with the review periods set forth in Article 2.2 of this Schedule 10 – Review Procedure or as otherwise agreed to between the Parties.

- 2.4 If, at any time:

- (a) a Revised PBS is under review by the City, then the City shall be afforded an additional period of time, not to exceed an additional ten Business Days, for processing such Works Submittals;
- (b) DB Co submits a volume of Works Submittals not contemplated by the Current PBS, then the City Representative shall, within five Business Days of receipt of such Works Submittal or Works Submittals, provide DB Co with a reasonable estimate of the time necessary for processing such Works Submittal or Works Submittals which estimate DB Co shall take into account for the purposes of Schedule 12 – Works Scheduling Requirements; or
- (c) a Works Submittal was, or Works Submittals were, received for review later than indicated in the Current PBS, such that the City Representative cannot review the Works Submittal or Works Submittals within the time permitted in the Current PBS, then the City shall be afforded an additional period of time, not to exceed an additional five Business Days, for processing such Works Submittals.

- 2.5 Documentation or data that has been submitted, deemed compliant, and service proven for the Existing Confederation Line may be reused and shall be resubmitted for the purposes of the Confederation Line Extension project, and will be considered compliant, except for such changes as may be necessary to satisfy the requirements of the Confederation Line Extension.

ARTICLE 3 GENERAL REQUIREMENTS FOR WORKS SUBMITTALS

- 3.1 Unless otherwise specified by the City Representative, DB Co shall issue all Works Submittals to the City in the format described in Appendices A and B, and one printed copy of each Works Submittal to the Independent Certifier.
- 3.2 DB Co shall be responsible for creating and maintaining an Electronic Data Management System (EDMS), as a tracking log to monitor, as a minimum, the approval of submittals and the resolution of comments. This system shall:

- (a) be used as a repository for all electronic submittal uploads and document control;
 - (b) be in place and operational within 30 days after Financial Close;
 - (c) be deemed reasonably acceptable to the City prior to implementation;
 - (d) follow the City IT policy and address cyber security issues with supporting mitigation;
 - (e) as a minimum comprise the following:
 - (i) a cloud-based single platform, compatible with City technology security policies for cloud storage, which provides an easily configurable solution;
 - (ii) user group security and restricted authorization function;
 - (iii) browsing by project, folder or file name with drag and drop function;
 - (iv) collaboration functions with the ability to electronically approve and stamp documents;
 - (v) text searchable functions for PDF and native files;
 - (vi) seamless integration;
 - (vii) audit trail;
 - (viii) pre-defined workflow & quality management systems;
 - (ix) read-only, real-time access for the City Representative and their nominated personnel;
 - (x) version control and notification capability;
 - (xi) analytics and reporting function; and
 - (xii) a review function with customizable mark-up tools.
 - (f) undergo routine system shutdowns and/or maintenance outside working hours, if necessary;
- 3.3 DB Co shall, at its own cost and risk, compile and maintain a Review Procedure Activities Register, to be uploaded to the EDMS as detailed in Appendix A, to track the status of each Works Submittal through every stage of preparation, submission, and review by the City, and approval by the applicable third party. DB Co shall submit documentation on the proposed design, functionality, and usage of the Review Procedure Activities Register to the City Representative in accordance with Schedule 10 – Review Procedure no later than Financial Close. The Review Procedure Activities Register shall:
- (a) be updated on a daily basis by DB Co and be accessible in real time by the City, any

- other entity as requested by the City and DB Co, through the EDMS, unless otherwise permitted by the City;
- (b) be operational no later than 30 days after Financial Close;
 - (c) include identification of the following:
 - (i) the submittal date and contents of all Works Submittals;
 - (ii) the date of receipt and content of all returned Works Submittals;
 - (iii) status of comments on all Work Submittals in accordance with Article 4.1;
 - (iv) vulnerability or security breaches;
 - (v) tracking ID's (in a format reasonably acceptable to the City) supporting the requirements of Article 3.8.
 - (d) include a tracking log to monitor the resolution of comments.
- 3.4 All Works Submittals shall be in English.
- 3.5 All Works Submittals required by the Project Agreement and/or by Applicable Law to be signed or sealed by persons with professional designations, registered in the Province of Ontario (including, where applicable, by registered professional engineers, professional geoscientists, architects or landscape architects) shall be so signed and sealed, unless the Works Submittal is being submitted in Draft format in accordance with Article 1.6(a)(i) of this Schedule 10, or as an Interim submission in accordance with Article 1.8(f) of this Schedule 10.
- 3.6 All Works Submittals shall:
- (a) include copies of all documents to be reviewed;
 - (b) be uploaded to the EDMS and include an electronic file-naming convention reasonably acceptable to the City; and
 - (c) clearly identify the purpose of the Works Submittal, DB Co's proposed course of action relating to the Works Submittal and the Project Operations that are the subject of the Works Submittal.
- 3.7 All Works Submittals shall, where applicable, refer to and be in accordance with the relevant provisions of the Output Specifications, any other applicable Schedule to the Project Agreement, and to any Design Data that has previously been subject to review.
- 3.8 Each Works Submittal shall be clearly identified as a Works Submittal and shall be delivered with appropriate covering documentation, which shall include:
- (a) a summary table which lists all revisions or changes from previous Works Submittals; and

- (b) a list of all attached Works Submittals and for each Works Submittal;
 - (i) identification of whether the Works Submittal contains System Infrastructure, New Municipal Infrastructure, New MTO Infrastructure, and elements of Works on or adjacent to NCC Lands.
 - (ii) the document number(s) or drawing number(s);
 - (iii) revision numbers (if applicable);
 - (iv) document or drawing title(s);
 - (v) name of entity that prepared the Works Submittal;
 - (vi) name and signature of the Design Manager and other Key Individual(s) responsible for content of the Works Submittal;
 - (vii) quality control documentation in accordance with Schedule 11 – Integrated Management System Requirements;
 - (viii) the Works Submittal history, including reviewer and checker initials, date and delivery information, log number of all previous submissions of that Works Submittal, Project Agreement provisions, comments from reviewers from the previous Works Submittal, all outstanding comments, and responses to addressing those comments, all submitted in a format reasonably acceptable to the City; and
 - (ix) identification of any previous Works Submittal superseded by the current Works Submittal.
- 3.9 To facilitate the City’s distribution of Works Submittals to the NCC and the MTO, all Works Submittals that are to be reviewed by the NCC, or MTO shall be separated accordingly and submitted individually.
- 3.10 Each Works Submittal shall be organized into relevant sections. Each Work Submittal shall contain pertinent correspondence, shall be arranged by subject matter in chronological order, and shall include the final calculations, reports and backup information. All Works Submittals shall include, without limitation, copies of all final approvals, design reports, correspondence and calculations, in both electronic and hard copy.
- 3.11 [Not used].
- 3.12 Issued For Construction Works Submittals
 - (a) Construction Document Submittals submitted in accordance with this Schedule 10 – Review Procedure and assigned comments “NO COMMENT” or “MINOR COMMENT” with all of the comments resolved, shall become Issued For Construction and DB Co shall stamp them as “Issued For Construction”. Works Submittals used for the construction of any part or parts of the Project prior to being entitled to proceed, as noted above, shall not be stamped as Issued For Construction.

- (b) DB Co shall submit copies of all drawings that are Issued For Construction, together with manuals and instructions, to the City Representative and to the Independent Certifier.
- (c) Major revisions to Issued For Construction documents shall be submitted for review as Construction Document Submittals, being stamped “Issued For Construction” upon being entitled to proceed in accordance with this Section 10 – Review Procedure. For minor revisions to Issued For Construction documents, DB Co shall notify the City (which notice shall include appropriate drawings/revisions) but is not required to submit re-issued plans or reports, provided the City reserves the right to treat minor revisions as a major revision and require submission at any time several minor revisions have been made, or if the City determines in its sole discretion that a minor revision is a major revision. Issued For Construction documents are required for the certification of construction detailed in Appendices A and B of this Schedule 10.
- (d) In the case of artwork supply and fabrication, DB Co shall, prior to issuance, submit all related tender packages for review of compliance by the City.

3.13 Works Schedule Re-baseline Submittals

- (a) DB Co shall prepare Works Schedules re-baselines in accordance with Schedule 12 – Works Scheduling Requirements. DB Co shall submit the Works Schedules re-baselines for review in accordance with this Schedule 10.
- (b) All non-draft submissions shall include DB Co Representative’s dated signature on the front cover of each document.
- (c) All Works Schedules submitted to the City shall be submitted in two electronic file formats. The first format shall be in the native file format of the software used to generate and manage the Works Schedules, which shall be the exported .XER file for the latest version of Primavera Professional Project Management (PPM). The second format shall be a word-searchable high resolution colour PDF version. Upon City’s request, DB Co shall provide the details of the software and any additional software plug-ins used by DB Co, a copy of any templates, and the details for any software settings it has used in its scheduling software, such as calendar settings, user and administrative preferences, schedule settings, and any other information required to enable the City to replicate the Works Schedules submitted by DB Co using the native file formats provided by DB Co.
- (d) At each submission, DB Co shall provide at least two hardcopies of the PBS printed in colour in a reasonable scale and on an appropriate paper size. DB Co shall submit one .XER file used to generate the Works Schedule re-baseline and the resultant PDF.
- (e) All tabular information including numerical data or calculations shall be submitted in two electronic file formats. The first format shall be in the Microsoft Excel file format that would allow the City to review formulas and manipulate the data for the purpose of evaluation and the second format shall be a high resolution PDF version.

- (f) The filename of each of the electronic files submitted shall indicate the project name acronym, schedule type, revision number and the schedule status date in the format ‘YYYYMMDD’ - e.g. PBS-4 for Confederation Line East shall be named “CLE PBS-4 – 20180731”.
- (g) The requirements of Article 4 shall apply to all PBS Submittals.

ARTICLE 4 COMMENTS

- 4.1 The City Representative shall review and respond to each Works Submittal in accordance with the time periods specified in Article 2.2. The City Representative shall return Works Submittals to DB Co with a copy to the Independent Certifier and assign one of the following four comments:
 - (a) “NO COMMENT”;
 - (b) “MINOR COMMENT”;
 - (c) “MAJOR COMMENT”; or
 - (d) “CRITICAL COMMENT”.
- 4.2 The comment “NO COMMENT” will be assigned to those Works Submittals that, in the opinion of the City Representative, generally conform to the requirements of the Project Agreement, recognising the degree of design development. DB Co shall comply with and implement such Works Submittals.
- 4.3 The comment “MINOR COMMENT” will be assigned to those Works Submittals that, in the opinion of the City Representative, generally conform to the requirements of the Project Agreement, recognising the degree of design development, but in which non-material deficiencies have been found by the City Representative’s review. DB Co shall correct these Works Submittals in the submission immediately subsequent, and shall comply with and implement such Works Submittals after correction, including in accordance with the comments. If the City Representative assigns to a Works Submittal the additional comment “RE-SUBMIT”, then,
 - (a) DB Co shall correct and re-submit such Works Submittal, in its entirety and at its own cost, to the City Representative no later than 20 Business Days after the comment has been provided to DB Co, or as agreed between DB Co and the City Representative and as set out in writing.
 - (b) If at any time it is discovered that DB Co has not corrected the deficiencies on Works Submittals stamped “MINOR COMMENT”, then DB Co will be required to modify the Works Submittals and Project Operations as required to ensure that the Works comply with the Output Specifications, any other applicable Schedule to the Project Agreement, and the DB Co Proposal Extracts and DB Co may be required, at the City Representative’s discretion, to resubmit the relevant Works Submittals.
 - (c) In such circumstances the City Representative shall act promptly in considering

whether such deficiencies have been corrected. At the City Representative's discretion, comments addressed as "MINOR COMMENT" that have not been addressed in the subsequent submission may be escalated to "MAJOR COMMENT" or "CRITICAL COMMENT".

- (d) No extension of time will be given or additional compensation paid in respect of any such modification or re-submittal.
- 4.4 The comment "MAJOR COMMENT" or "CRITICAL COMMENT" will be assigned to those Works Submittals that, in the opinion of the City Representative, contain significant deficiencies or do not generally conform to the requirements of the Project Agreement, including this Schedule 10.
 - (a) DB Co shall correct and re-submit these Works Submittals within 20 Business Days after the comment has been provided to DB Co, or such other time period, as agreed between DB Co and the City Representative and as set out in writing.
 - (b) The City Representative will then review such re-submitted Works Submittals and assign a comment to the corrected Works Submittal. The Works Submittals shall be corrected, revised and resubmitted, in their entirety, as often as may be required to obtain a comment that permits DB Co to proceed.
 - (c) No extension of time will be given or additional compensation paid in respect of any such modification or re-submittal. In addition to the above, a Works Submittal with a "CRITICAL COMMENT" comment will be a Proceeding At Risk Matter in accordance with Section 14.6(a) of the Project Agreement.
- 4.5 Where the City Representative issues the comment "MINOR COMMENT", "MAJOR COMMENT" or "CRITICAL COMMENT", the City Representative shall provide reasons for the comment, referencing the particulars of the Section(s) of the Project Agreement that the Works Submittal fails to satisfy. DB Co shall schedule a meeting between the DB Co Representative and the City Representative to discuss the resolution of "MAJOR COMMENT" and "CRITICAL COMMENT" comments. At the City Representative's discretion, a meeting may be requested to resolve "MINOR COMMENT" comments. The City Representative shall not address the following in their comments:
 - (a) spelling and/or grammar unless the design intent could be misinterpreted through such matters; and
 - (b) personal preferences regarding (i) design approach, (ii) construction methodology and/or (iii) selection of materials.
- 4.6 If, at any time after assigning any comment to a Works Submittal, the City Representative or DB Co discovers any significant deficiencies or any failure to conform to the requirements of the Project Agreement, the City Representative may revise the comment assigned to any Works Submittal. If the Parties agree or it is determined in accordance with Article 5 of this Schedule that the revised comment is correct, DB Co shall make all such corrections to the Works Submittals and the Project Operations. No extension of time will be given or additional compensation paid in respect of any such modification or re-submittal.

- 4.7 For the purpose of facilitating and expediting the review and correction of Works Submittals, the City Representative and the DB Co Representative shall meet, as may be mutually agreed, to discuss and review any outstanding Works Submittals and any comments thereon.
- 4.8 Where a Works Submittal is voluminous, the City Representative at his or her discretion may elect to stamp only the cover page or first sheet of the Works Submittal with the appropriate comment, if any, and return to DB Co the cover page or first page together with individual pages or sheets on which comments are made, together with an explanation of the status of all pages not returned to DB Co. Any pages returned without such an explanation as to their status shall be deemed to be “NO COMMENT” by the City.
- 4.9 In lieu of returning a Works Submittal, the City Representative may, by letter, notify DB Co of the comment assigned to the Works Submittal and if such comment is “MINOR COMMENT”, “MAJOR COMMENT” or “CRITICAL COMMENT”, then the notification shall contain comments in sufficient detail for DB Co to identify the correction sought.
- 4.10 At the City Representative’s discretion, DB Co may be requested to attend a meeting to discuss the resolution of any unresolved comments.

ARTICLE 5 DISPUTES

- 5.1 If DB Co disputes any act of the City or the City Representative in respect of a Works Submittal under this Schedule 10, DB Co shall promptly notify the City Representative and the Independent Certifier of the details of such Dispute and shall submit the reasons why DB Co believes a different comment should be assigned, together with appropriate supporting documentation. The City Representative shall review the Works Submittal, the reasons and supporting documentation and within five Business Days after receipt thereof shall either confirm the original comment or notify DB Co of a revised comment. If the City Representative confirms the original comment, DB Co may request that the Independent Certifier resolve the Dispute and render a decision within five Business Days of such request.
- 5.2 If either Party is not satisfied, acting reasonably, with the resolution of the Independent Certifier, subject to Article 10.2, either Party may refer the matter for determination in accordance with Schedule 27 - Dispute Resolution Procedure.
- 5.3 Notwithstanding the provisions of Articles 5.1 and 5.2, the City Representative may direct that DB Co revise the Works Submittals in accordance with the comments of the City Representative and proceed to perform and complete the Works on the basis of such revised Works Submittals. For clarity, such direction shall be considered a Dispute and DB Co may proceed in accordance with this Article 5 and Schedule 27 – Dispute Resolution Procedure.

ARTICLE 6 EFFECT OF REVIEW

- 6.1 Subject to Section 11.1(j) of the Project Agreement, any review and comment by the City or the City Representative of any Works Submittals are for general conformity to the obligations and requirements of the Project Agreement, and any such review and comment shall not relieve DB Co of the risk and responsibility for the Project Operations and for meeting all of DB Co’s obligations under and requirements of the Project Agreement, and shall not create any new or additional obligations or liabilities for the City. Without limiting the generality of

the foregoing, any and all errors or omissions in Works Submittals or of any review and comment shall not exclude or limit DB Co's obligations or liabilities in respect of the Works under the Project Agreement or exclude or limit the City's rights in respect of the Works under the Project Agreement.

ARTICLE 7 WORKS SUBMITTAL EXPLANATION

- 7.1 At any time, the City Representative may, acting reasonably, require DB Co or any DB Co Parties, including DB Co's consultants and any other relevant personnel, at no additional cost to the City, to explain to the City Representative and the City advisors the intent of DB Co's Works Submittals, including in relation to any design and any associated documentation and as to its satisfaction of the Output Specifications or any other Schedule to the Project Agreement, as applicable. DB Co shall provide the explanation to the City Representative within five Business Days (or such longer period as the Parties may agree) from the date of receipt of the request from the City Representative.

ARTICLE 8 REVISIONS

- 8.1 DB Co shall ensure that each Works Submittal keeps the same unique reference number throughout the review process, and that subsequent revisions of the same Works Submittal are identified by a sequential revision number. Correspondence related to such Works Submittal shall reference the reference number and revision number.
- 8.2 Re-submittals shall clearly show all revisions from the previous Works Submittal. Bound documents, including reports and manuals, shall contain a preface that clearly states how revisions are marked and the previous revision number against which the revisions have been marked. A consistent format for mark-ups of documents shall be used (e.g. deletions struck out and additions underscored). Revised portions of drawings shall be clearly marked (with appropriate means to visually distinguish between the parts of the drawing that are revised and the parts that are not revised) and the revision number and description of the revision shall be included on the drawing. Drawings produced during Design Development shall be exempt from requirements in Article 8.2.
- 8.3 All revisions must be able to be integrated into the As-built Drawings and the Record Drawings.
- 8.4 DB Co shall keep all Design Data current. If any Design Data is revised as part of a Works Submittal, all other Design Data relying on or based on that Design Data shall also be revised accordingly. All such revised Design Data shall also be submitted with the Works Submittal to which it relates.
- 8.5 [Not Used]

ARTICLE 9 AUDIT BY THE CITY REPRESENTATIVE

- 9.1 Without limiting any other right under the Project Agreement, the City Representative shall have the right to audit all Works Submittals, including comparing all Works Submittals to previous Works Submittals.

- 9.2 If during an audit or at any other time it is discovered by the City or DB Co (or resolved pursuant to Article 9.3) that any Works Submittals were not correctly implemented, DB Co shall at its sole cost immediately take all necessary steps to correct and modify the applicable Works Submittals and the Project Operations to which they relate and shall advise the City Representative of all such corrections and modifications.
- 9.3 Any Dispute concerning the implementation of a Works Submittal, subject to Article 5.1, shall be referred in the first instance to the Independent Certifier for resolution.

ARTICLE 10 VARIATIONS

- 10.1 [Not used].
- 10.2 If, having received comments from the City Representative on any Works Submittal, DB Co considers that compliance with those comments would amount to a Variation, DB Co shall, within ten (10) Business Days of receipt of and before complying with the comments, provide written Notice to the City of the same and, if it is agreed by the Parties that a Variation would arise if the comments were complied with, the City may, at their election, issue a Variation Enquiry (which shall be dealt with in accordance with Schedule 22 - Variation Procedure) or amend their comment on the Works Submittal. If the Parties do not agree that a Variation would arise if the comments were complied with, either party may proceed to resolve the matter in accordance with Article 5.3, including for clarity, the exercise by the City of their rights under Article 5.3. Subject to the foregoing sentence, any failure by DB Co to notify the City in accordance with this Article 10.2 that DB Co considers that compliance with any comments of the City Representative would amount to a Variation shall constitute an irrevocable acceptance by DB Co that any compliance with the City Representative's comments shall be without cost to the City and without any extension of time.

ARTICLE 11 GENERAL

- 11.1 Any capitalized terms used in the appendices to this Schedule 10 – Review Procedure, that are not defined in this Schedule 10 – Review Procedure or in Schedule 1 – Definitions and Interpretation, shall have the meanings given to them in Schedule 15-1 – Technical Terms and Reference Documents.

ARTICLE 12 COMPLIANCE WITH MTO MINIMUM DESIGN AND CONSTRUCTION CERTIFICATION REQUIREMENTS

- 12.1 In respect of the New MTO Infrastructure, DB Co shall comply with all of the obligations set forth in Appendix B.

APPENDIX A – MINIMUM WORKS SUBMITTAL REQUIREMENTS

ARTICLE 1 FORMAT FOR WORKS SUBMITTALS

1.1 All Works Submittals shall be submitted to the City in hardcopy and electronic format as follows:

- (a) Hardcopy requirements:
 - (i) one set of all Work Submittals shall be submitted in reduced format drawings (11” x 17”) and design briefs; and
 - (ii) one set of Works Submittals which are not drawings shall be submitted in 8.5” x 11” format, unless otherwise specified.
- (b) Electronic copy requirements:
 - (i) an electronic copy in the format set out in this Appendix A, together with its native file in standard format, or as prescribed by the City acting reasonably;
 - (ii) CAD drawings shall be provided in accordance with the City of Ottawa’s CADD Standards Manual, or otherwise in accordance with MTO CADD standards, for New MTO Infrastructure. DB shall confirm drawing conventions and standards, including AutoCAD and InRoads standards, title block and stationing convention, with the City prior to commencing design drawing production; and
- (c) All Works Submittals (or as otherwise agreed upon by the Parties) shall be uploaded to the EDMS. All other Submittals not otherwise specified shall be uploaded to the EDMS.

ARTICLE 2 SUBMITTALS

- 2.1 The following is a detailed list of the Works Submittals that DB Co is required to provide to the City for review and comment in accordance with this Schedule 10.
 - 2.2 Additional Works Submittals may be requested by the City Representative at any time in order to understand the Works, and DB Co shall be required to provide same to the City for review in accordance with this Schedule 10. A description of the minimum content of each Work Submittal provided is set out in the following sections.
 - 2.3 Works Submittal deliverables which are applicable to satisfying the requirements of multiple Works Submittal sections are permitted to be
-

reused, granted they meet all the requirements of each Works Submittal section they are applied to.

2.4 Submission Requirements

(a) The Works Submittal Requirements are detailed in the tables below.

[REDACTED]

ATTACHMENT 1

Sample Design Certificates

Certificate Ref No. []

DESIGN CERTIFICATE (GENERAL)

In respect of :

(Provide submittal details)

Project Agreement between the City and DB Co dated XX XX, XXXX (“the Project Agreement”) relating to the Project. Defined terms and expressions used in the Project Agreement have the same meanings in this Certificate.

Form of Certificate to be used by the Design Team for certifying the design of the Works to the extent that such Works components have been constructed, installed, altered, upgraded, and/or augmented, in accordance with Schedule 15-2 – Design and Construction Requirements.

1. We certify that we have the requisite professional qualifications, skill and experience to prepare the Design Data referred to herein in accordance with the requirements of the Project Agreement and all relevant Output Specifications.
2. We certify that we have prepared the Design Data for [.....] listed in the Schedule hereto in accordance with all applicable requirements contained in the Design Management Plan and utilizing the standards of care, skill and diligence that, in accordance with the standards of our profession, are required of experienced professionals undertaking the preparation of such Design Data, and that in our professional opinion such Design Data:
 - a. complies with all applicable Output Specifications, as amended by the following:
 - (i) **[List, if any, the changes made by the issue of Variation(s)];**
 - b. complies with all applicable design requirements of the Project Agreement;

- c. complies with all applicable standards, codes and current Good Industry Practice; and
- d. accurately describes and depicts the Works to be undertaken.

SCHEDULE

[Include here drawing numbers and titles, reports, calculations, etc.]

Certified by:

Design Team (representative)

Name:

Title:

Date:

Professional Registration Number:

Affix Professional Seal

Signed:

Construction Contractor representative

Name:

Date:

This Certificate is:

- i. reviewed*
- ii. reviewed as noted as follows*
- iii. returned marked “rejected” as follows:*

* delete as appropriate

Signed:

City Representative

Name:

Date:

Certificate Ref No. []

DESIGN CERTIFICATE (ENVIRONMENTAL)

In respect of :

(Provide submittal details)

Project Agreement between the City and DB Co dated XX XX, XXXX (“the Project Agreement”) relating to the Project. Defined terms and expressions used in the Project Agreement have the same meanings in this Certificate.

Form of certificate to be used by the Design Team and the Environmental Director for certifying the design of environmental works incorporated in the Works in accordance with the Project Agreement.

1. We certify that we have the requisite professional qualifications, skill and experience to prepare the Design Data referred to herein in accordance with the requirements of the Project Agreement and all relevant Output Specifications.
2. We certify that we have prepared the Design Data for [.....] [Name and list of all elements of the environmental works] in the Schedule hereto in accordance with all applicable requirements contained in the Design Management Plan and utilizing the standards of care, skill and diligence that, in accordance with the standards of our profession, are required of experienced professionals undertaking the preparation of such Design Data, and that in our professional opinion:
 - a) the said Design Data complies with all applicable Output Specifications, including Technical Appraisal Form No. [.....] dated [.....], as amended by the following:
 - i) **[List, if any, the changes made by the issue of Variation(s), and any Addenda to the foregoing Technical Appraisal Form];**
 - b) the said Design Data complies with all applicable design requirements of the Project Agreement;
 - c) the said Design Data complies with all applicable standards, codes, environmental permits licences approvals and authorizations, and current Good Industry Practice; and
 - d) the said Design Data accurately describes and depicts the Works to be undertaken.

SCHEDULE

[Include here drawing numbers and titles and reports, calculations, etc.]

Certified by:

Design Team (representative)

Name:

Title:

Date:

Professional Registration Number:

Affix Professional Seal

Signed:

Environmental Director

Name:

Title:

Date:

Professional Registration Number:

Affix Professional Seal

This Design Certificate is:

- i. reviewed*
- ii. reviewed as noted as follows*
- iii. returned marked “rejected” as follows:*

* delete as appropriate

Signed:

City Representative

Name:

Date:

ATTACHMENT 2

Sample Construction Certificate

Certificate Ref. No. []

CONSTRUCTION CERTIFICATE

In respect of :

(Provide submittal details)

Project Agreement between the City and DB Co dated XX XX, XXXX (“the Project Agreement”) relating to the Project. Defined terms and expressions used in the Project Agreement have the same meanings in this Certificate.

Form of Certificate to be used by the Design Team for certifying, as applicable:

- a) the substantial completion of construction activities in respect of those components of the [East][West] Works set out in paragraph 1 of this Construction Certificate;
- b) the Total Completion of construction activities in respect of the [East][West] Works, including Minor Deficiencies; or
- c) the total completion of construction activities in respect of any Reinstatement Work carried out by the Construction Contractor pursuant to Section 30 **[Damage and Destruction]** in accordance with a Reinstatement Plan.

in accordance with Schedule 15-2 – Design and Construction Requirements.

Construction Contractor’s Statement

We certify that [name and element of the Works in respect of the [East][West] Substantial Completion Certificate][the Works in respect of the [East][West] Final Completion Certificate][the [East][West] Works in respect of the Final Completion Certificate

(Reinstatement Work)] has been designed, constructed, **[substantially completed], [totally completed],** commissioned and tested in all respects in accordance with: **[Note to Proponents: Inapplicable language to be deleted.]**

- a) the relevant Design Data and Design Certificates in each case to which there has been no objection under the Review Procedure; and
- b) the provisions of the Project Agreement, including all applicable Output Specifications, as amended by the following Variation(s):
 - (i) **[List, if any, the changes made by the issue of Variation(s), and any Addenda to the foregoing Technical Appraisal Form];**

Signed.....

Construction Contractor representative

Name.....

Date.....

Design Team's Statement

1. We certify that we have examined the [name and element of the [East][West] Works in respect of the [East][West] Substantial Completion Certificate][the [East][West] Works in respect of the [East][West] Final Completion Certificate][the [East][West] Works in respect of the Final Completion Certificate (Reinstatement Work)] in accordance with the requirements for examination of the Works contained in the Design Management Plan and the Construction Management Plan and utilizing the standards of care, skill and diligence that, in accordance with the standards of our profession, are required of experienced professionals undertaking such

examinations, and that in our professional opinion [the said element of the [East][West] Works][the [East][West] Works] has been designed, constructed, [substantially completed][totally completed], commissioned and tested in accordance with: **[Note to Proponents: Inapplicable language to be deleted.]**

(a) the relevant Design Data and Design Certificates in each case to which there has been no objection under the Review Procedure; and

(b) the provisions of the Project Agreement, including all applicable Output Specifications, as amended by the following Variation(s):

[List, if any, the changes made by the issue of Variation(s), and any Addenda to the foregoing Technical Appraisal Form];

Signed.....

Design Team (representative)

Name.....

Title.....

Date.....

Professional Registration Number:

Affix Professional Seal

Receipt of this Certificate is acknowledged.

Signed.....

Independent Certifier

Name.....

Date.....

Professional Registration Number:

Affix Professional Seal

This Certificate is:

- i. reviewed*
- ii. reviewed as noted as follows*
- iii. returned marked “rejected” as follows:*

* delete as appropriate

Signed:

City Representative

Name:

Date:

APPENDIX B

MINIMUM DESIGN AND CONSTRUCTION

SUBMITTAL AND CERTIFICATION REQUIREMENTS FOR NEW MTO INFRASTRUCTURE

1. DEFINITIONS

- 1.1 “**Appropriate Person**” has the meaning given in Article 3.1 (b) (iii)
- 1.2 “**Bluetooth Reader**” has the meaning given in Article 1.6 of Part A of Schedule 15-2, Part 9 – Highway Works.
- 1.3 “**Checking Team**” has the meaning given in Article 2.9 of Part A of Schedule 15-2, Part 9 – Highway Works.
- 1.4 “**Deck**” has the meaning given in Article 1.6 of Part A of Schedule 15-2, Part 9 - Highway Works.
- 1.5 “**Design Criteria**” has the meaning given in Article 1.6 of Part A of Schedule 15-2, Part 9 - Highway Works.
- 1.6 “**Design Manager**” has the meaning given in Schedule 9 – Key Individuals.
- 1.7 “**Foundation**” has the meaning given in Article 1.6 of Part A of Schedule 15-2, Part 9 - Highway Works.
- 1.8 “**Handover**” means, as applicable, the successful handover, by DB Co of, the New MTO Infrastructure, or a component thereof, to City or, where Notice of Delegation has been provided by City in respect of New MTO Infrastructure, to MTO, in accordance with Section 25.16 of the Project Agreement including, for clarity, the receipt of City’s or MTO’s (as the case may be) confirmation that Handover has been successfully achieved and the provision of the Notice to the City in accordance with Section 25.16(g) of the Project Agreement.
- 1.9 “**Highway**” has the meaning given in Article 1.6 of Part A of Schedule 15-2, Part 9 - Highway Works.
- 1.10 “**Independent Checking Team**” has the meaning given in Article 1.6 of Part A of Schedule 15-2, Part 9 - Highway Works.
- 1.11 “**Independent Structural Design Check Certificate**” means the form provided as Attachment 4 to this Appendix B.
- 1.12 “**MTO Design Management Plan**” has the meaning given in Section 2.1(a) of this Appendix B.

- 1.13** “**Overhead Sign Support Structure**” has the meaning given in Article 1.6 of Part A of Schedule 15-2, Part 9 - Highway Works.
- 1.14** “**Pavement**” has the meaning given in Article 1.6 of Part A of Schedule 15-2, Part 9 - Highway Works.
- 1.15** “**Pavement Markings**” has the meaning given in Article 1.6 of Part A of Schedule 15-2, Part 9 - Highway Works.
- 1.16** “**Regulatory Sign**” has the meaning given in Article 1.6 of Part A of Schedule 15-2, Part 9 - Highway Works.
- 1.17** “**Retaining Wall**” has the meaning given in Article 1.6 of Part A of Schedule 15-2, Part 9 - Highway Works.
- 1.18** “**Roads**” has the meaning given in Article 1.6 of Part A of Schedule 15-2, Part 9 - Highway Works.
- 1.19** “**Road Safety Audit**” has the meaning given in Article 10 of Part B of Schedule 15-2, Part 9 - Highway Works.
- 1.20** “**Road Safety Audit Certificate**” has the meaning given in Article 10.8(a) of Part B of Schedule 15-2, Part 9 - Highway Works.
- 1.21** “**Significant and Complex Structures**” has the meaning given in Article 1.6 of Part A of Schedule 15-2, Part 9 - Highway Works.
- 1.22** “**Structure**” has the meaning given in Article 1.6 of Part A of Schedule 15-2, Part 9 - Highway Works.
- 1.23** “**Substructure**” has the meaning given in Article 1.6 of Part A of Schedule 15-2, Part 9 - Highway Works.
- 1.24** “**Superstructure**” has the meaning given in Article 1.6 of Part A of Schedule 15-2, Part 9 - Highway Works.
- 1.25** “**Technical Appraisal Form**” or “**TAF**” means a form substantially in the format attached as Attachment 1 - Sample Contents for a Structural TAF to Appendix B of Schedule 10 - Review Procedure.
- 1.26** “**Temporary Works**” means works that are performed to serve a specific temporary function in the execution of the Works and in respect of which any resulting infrastructure is removed at such time when its temporary use is no longer required”
- 1.27** “**VDS**” has the meaning given in Article 1.6 of Part A of Schedule 15-2, Part 9 - Highway Works.
- 1.28** “**VMS**” has the meaning given in Article 1.6 of Part A of Schedule 15-2, Part 9 - Highway Works.

2. MTO DESIGN MANAGEMENT PLAN AND TECHNICAL APPRAISAL FORMS

2.1 Submission of MTO Design Management Plan

- (a) Within 90 days following Financial Close, DB Co shall submit a Design Management Plan in respect of New MTO Infrastructure (the “**MTO Design Management Plan**”) to the City in accordance with Schedule 10 - Review Procedure. The MTO Design Management Plan shall include:
 - (i) the organization chart, including the Design Manager and Highway Works Manager, for all design activities;
 - (ii) the procedures to be used for designing and checking each of the designs;
 - (iii) the identification of the Checking Team and Independent Checking Team;
 - (iv) the contents and format of Design Development Submittals, as well as the Construction Document Submittals;
 - (v) a design review and audit schedule, indicating dates that DB Co plans to:
 - (A) conduct internal audits of the design verification process;
 - (B) submit Design Development Submittals and Construction Document Submittals; and
 - (C) undertake design review workshops in accordance with Section 1.8 of this Schedule 10. MTO shall be included as an invitee.
 - (vi) the process and schedule for Road Safety Audits;
 - (vii) a work breakdown structure for design indicating the Design Team and associated designers;
 - (viii) a drawing tree indicating the organization and hierarchy of DB Co’s drawings;
 - (ix) appropriate metrics to measure the progress of the design for each discipline;
 - (x) the process for certifying construction including the identification and organization of the personnel responsible for verifying construction compliance with the Design Data and the provisions of the Project Agreement to enable the Design Team representative to sign and seal the Construction Certificates; and

- (xi) the Review Procedure Activities Register (as also referenced in Schedule 12 – Works Scheduling Requirements), including plans for weekly or bi-weekly updates of this register and common platform where such register is shared with the City.
- (b) Any subsequent amendments or updates to the MTO Design Management Plan shall be submitted by DB Co to the City in accordance with Schedule 10 - Review Procedure.

2.2 Compliance with MTO Design Management Plan

- (a) DB Co shall implement and comply with the initial MTO Design Management Plan which has been reviewed by the City in accordance with Schedule 10 - Review Procedure, and any subsequent amendments or updates to the initial MTO Design Management Plan made following a review by the City in accordance with Schedule 10 - Review Procedure, in connection with all Design Data prepared or adopted in connection with the Output Specifications, the Environmental Obligations, and any other design or Construction Activities in the Project Agreement within the Highway Corridor Lands.

2.3 TAF Submission Requirements

- (a) Each Final Design Development Submittal package submitted by DB Co shall be accompanied by a completed Technical Appraisal Form (TAF).
- (b) In any case where submitted Design Data involves any mechanical, electrical and/or intelligent transportation system functions, or similar specialization, DB Co shall submit to the City in accordance with Schedule 10 - Review Procedure a TAF in respect of such data and functions.
- (c) In any case where the New MTO Infrastructure involves the complete or partial demolition of an existing Structure, DB Co shall submit to the City in accordance with Schedule 10 - Review Procedure a TAF in respect of such complete or partial demolition.

2.4 TAF Form and Content

- (a) Each TAF submitted by DB Co pursuant to Section 2.3 of this Appendix B shall be in the format shown in Attachment 1 - Sample Contents for a Structural TAF to this Schedule 10 and shall:
 - (i) for Final Design Development Submittals, include the relevant Design Criteria, environmental and ground considerations, and interface requirements, together with a listing of the design documentation included in the design package; and
 - (ii) be signed by:

- (A) the DB Co Representative; and
- (B) the Design Manager or Appropriate Person as necessary.

2.5 TAF Variation

- (a) Any variation to a TAF which has been subject to the Review Procedure during design, assessment or any Construction Activity shall be submitted in accordance with Schedule 10 - Review Procedure as an addendum to the TAF.

3. DESIGN AND CONSTRUCTION SUBMISSIONS, REVIEW AND REPORTS

3.1 MTO Design and Construction Certification

- (a) The following terms shall have the following meanings:
- (i) **“MTO Construction Certificate (Interim)”** means the certificate(s) entitled “MTO Construction Certificate (Interim)” in the form set out in Attachment 3 to this Appendix B to be issued by DB Co pursuant to Section 3.1(d) of this Appendix B of Schedule 10 – Review Procedure;
 - (ii) **“MTO Construction Certificate (Completion)”** means the certificate(s) entitled “MTO Construction Certificate (Completion)” in the form set out in Attachment 3 to this Appendix B to be issued by DB Co pursuant to Section 3.1(d) of this Appendix B of Schedule 10 – Review Procedure;
 - (iii) **“MTO Construction Certificates”** means the MTO Construction Certificate (Interim) and the MTO Construction Certificate (Completion) and **“MTO Construction Certificate”** means any one of them.
 - (iv) **“MTO Design Certificate (Environmental)”** means the certificate(s) entitled “MTO Design Certificate (Environmental)” in the form set out in Attachment 2 to this Appendix B to be issued by DB Co pursuant to Section 3.1(c) of Appendix F of Schedule 10 – Review Procedure;
 - (v) **“MTO Design Certificate (General)”** means the certificate(s) entitled “MTO Design Certificate (General)” in the form set out in Attachment 2 to this Appendix B to be issued by DB Co pursuant to Section 3.1(c) of this Appendix B of Schedule 10 – Review Procedure;
 - (vi) **“MTO Design Certificates”** means the MTO Design Certificate (General) and the MTO Design Certificate (Environmental) and **“MTO Design Certificate”** means any one of them.
- (b) MTO Design and Construction Certification Procedure
- (i) DB Co shall implement and ensure compliance with the procedure set out in this Section 3.1 (the **“MTO Design and Construction Certification Procedure”**) until Handover of the New MTO Infrastructure.
 - (ii) The MTO Design and Construction Certification Procedure shall apply to all Design Data prepared or adopted in connection with the New MTO Infrastructure, including any further design development or changes to a design once a TAF has been subjected to the Review Procedure.

- (iii) DB Co shall ensure that all certification procedures referred to in the Design and Construction Certification Procedure are complied with by the appropriate persons referred to therein, including the Design Team, and any independent team or engineer within the Design Team, as the case may be (together, the “Appropriate Persons”) and that all Appropriate Persons are at all relevant times duly authorized and qualified to carry out such procedures and to sign the relevant certificates. Any failure by any Appropriate Person to fulfill the obligations required of them under the MTO Design and Certification Procedure shall be a breach of the DB Co’s obligations under the Project Agreement.
 - (iv) DB Co shall submit all MTO Design Certificates and MTO Construction Certificates, together with the supporting documentation, to the City for review, acting reasonably, in accordance with Schedule 10 - Review Procedure. The submitted MTO Design Certificates and MTO Construction Certificates shall have original signatures, seals and registration numbers (as required in the form provided in Attachment 2 and 3 to Appendix B of Schedule 10 – Review Procedure).
- (c) MTO Design Certificates
 - (i) DB Co shall prepare and issue a separate MTO Design Certificate (in the form as provided in Attachment 2 of Appendix B) for New MTO Infrastructure for each submitted Construction Document Submittal review package, to the City for review in accordance with the Review Procedure. All MTO Design Certificates prepared and issued by DB Co shall be:
 - (A) either the MTO Design Certificate (General) or MTO Design Certificate (Environmental), as applicable;
 - (B) signed and sealed by a principal of the Design Team, and the responsible professional, who shall be a Professional Engineer or a registered Architect;
 - (C) signed by the DB Co Representative; and
 - (D) in the case only of MTO Design Certificates (Environmental), signed by the Environmental Director.
 - (ii) Any person who signs a MTO Design Certificate shall clearly print his or her name and the position held in his or her organization on the MTO Design Certificate.
- (d) MTO Construction Certificates
 - (i) DB Co shall prepare and issue MTO Construction Certificates (in the form as provided in Attachment 3 to Appendix B of Schedule 10 –

Review Procedure) for New MTO Infrastructure to the City for review in accordance with the Review Procedure:

- (A) in the case of MTO Construction Certificate (Interim), within 15 Business Days following the end of each calendar month (for that calendar month), from Financial Close until the date of delivery of written confirmation of completion of Handover of the New MTO Infrastructure pursuant to Article 25.16(f)(v) of the Project Agreement;
 - (B) in the case of MTO Construction Certificate (Completion) at least 10 Business Days prior to the delivery of written confirmation of completion of Handover of the New MTO Infrastructure pursuant to Article 25.16(f)(v) of the Project Agreement.
- (ii) All MTO Construction Certificates prepared and issued by DB Co shall be:
- (A) signed by the Construction Contractor representative;
 - (B) signed and sealed by the responsible professional who shall be a Professional Engineer or a registered Architect, and a principal of the Design Team;
 - (C) signed by the DB Co Representative; and
 - (D) for each MTO Construction Certificate (Completion) issued between Financial Close to Handover of the New MTO Infrastructure, signed by the Independent Certifier acknowledging receipt.
- (iii) Any person who signs a MTO Construction Certificate shall clearly print his or her name and the position held in his or her organization on the MTO Construction Certificate.

3.2 Format of Design and Construction Submissions

- (a) DB Co shall provide all Submittals in the format detailed in Appendix A of this Schedule 10 – Review Procedure.
- (b) [Intentionally deleted]
- (c) [Intentionally deleted]
- (d) For greater clarity, drawings for DB Co System Infrastructure, New City Infrastructure and New Utility Company Infrastructure to be constructed by DB Co within the Highway Corridor Lands shall be in accordance with the applicable standards of the City and Utility Companies, respectively.

- (e) [Intentionally deleted]

3.3 Design and Construction Submission Review

- (a) The Design Development Submittals and Construction Document Submittals from all design disciplines shall be submitted to the City in accordance with Schedule 10 - Review Procedure. The Pre-Final Design Development, Final Design Development and Construction Document Submittals shall consist of the relevant TAF(s) together with all final design drawings, supporting Design Data and calculations required in accordance with the design requirements outlined in the Project Agreement, in particular and including Schedule 15-2, Part 9 - Highway Works, and this Appendix B.
- (b) Each Design Development Submittal and Construction Document Submittal package shall cover a specific geographic segment of the Highway Works and shall include the submission requirements pertaining to all disciplines, as identified in this Appendix B. DB Co may subdivide the Highway Works into the submission of a maximum of three Design Development Submittal packages (maximum of two for Highway 417, and maximum of one for Highway 416).
- (c) DB Co shall not submit any Construction Document Submittal until Pre-Final Design Development Submittals have been submitted and reviewed pursuant to this Schedule 10 for all aspects of Highway Works.

3.4 Temporary Works

- (a) As a minimum, design submissions for Temporary Works shall include those items intended for public use and/or potentially affecting public safety. Final designs for these Temporary Works shall be submitted to the City in accordance with Schedule 10 - Review Procedure.
- (b) Design Data relating to any Temporary Works shall be checked as follows:
 - (i) any such Design Data prepared by or on behalf of the Construction Contractor requires an independent check by the Design Team; and
 - (ii) any such Design Data prepared by the designer requires an independent check by a Checking Team which may be from the designer but shall be independent of the Design Team.
- (c) In performing the check referred to in paragraph (b) above, the designer shall satisfy itself that:
 - (i) the Design Data meets the project requirements and otherwise complies with the requirements of the Project Agreement;

- (ii) the Temporary Works (as a whole and the constituent parts) are satisfactory for the safe and proper discharge of DB Co's relevant obligations; and
 - (iii) the Design Data reflects the requirements of the relevant governmental authorities for all affected Highways or other Roads or areas used by or accessible to the public other than the New MTO Infrastructure.
- (d) Where any Temporary Works may endanger public safety on other road or area used by or accessible to the public other than the New MTO Infrastructure, DB Co shall consult the relevant Governmental Authority and the Design Data shall reflect the requirements of such Governmental Authority.
- (e) Road Safety Audit Certificate shall be submitted as part of the Submittals in respect of Temporary Works in accordance with Article 10 (Road Safety Audit) of Part B of Schedule 15-2, Part 9 - Highway Works.

4. DESIGN DEVELOPMENT SUBMITTALS

4.1 General

- (a) In accordance with the MTO Design Management Plan and requirements of the Design and Construction Certification Procedure, DB Co and the City shall agree on the design information to be submitted for review in the Design Development Submittals, the schedule of such submissions and the scope of the review. The minimum requirements for the Design Development Submittals are outlined in this Appendix B.
- (b) The content of such interim design submissions shall be appropriate to the subject and discipline. The information provided shall be adequate to show that the design is proceeding in compliance with the Project Agreement for all disciplines and is taking into consideration the relevant construction activities.
- (c) Design Development Submittals shall be prepared and shall have indices and sectional dividers. The design folders shall contain pertinent correspondence, shall be arranged by subject matter in chronological order, and shall include the design criteria, design development calculations and backup information. Design submissions shall include copies of all approvals, design reports, correspondence and calculations.
- (d) The Road Safety Audit Certificate shall be submitted as part of Design Development Submittals in accordance with Schedule 15-2, Part 9, Part B, Article 10 (Road Safety Audit).

4.2 Pre-Final Design Development Submission

(a) General

- (i) DB Co shall prepare and submit any necessary draft addenda to the MTO Design Criteria (as described in MTO Directive PHM-B-021) based on DB Co's design.

(b) Roadway Design

- (i) The Pre-Final Design Development Submittals shall contain the following:
 - (A) all design drawings, including complete removals, new construction, laning and geometrics, profiles, typical and template cross-sections, and drainage;
 - (B) all staging drawings that include traffic management requirements to complete the work as well as any operational constraints related to construction operations and/or traffic management;

- (C) Explicit Safety Analysis Report;
- (D) Ball Bank Indicator Report;
- (E) Road Safety Audit Reports;
- (F) a detailed summary of critical constructability considerations;
- (G) fencing plan and design; and
- (H) ramp gate location plan and design.

(c) **Drainage Design**

- (i) The Pre-Final Design Development Submittals shall:
 - (A) address both temporary and permanent drainage design;
- (ii) The Pre-Final Design Development Submittals shall contain the following:
 - (A) all design parameters and requirements in accordance with Article 7 (Drainage and Erosion Control Design Criteria) of Part B of Schedule 15-2, Part 9 - Highway Works;
 - (B) the technical analysis and application documentation for a Permit to Take Water or EASR registration (if required);
 - (C) all drawings of drainage systems including storm sewer design sheets;
 - (D) updated floodplain mapping;
 - (E) detail drawings of water course realignments, drainage conveyance systems, and stormwater management facilities;
 - (F) Erosion and Sediment Control Plan; and
 - (G) Drainage and Stormwater Management Report, including digital modelling files.

(d) **Structures, Culvert, Submerged Culverts, High Mast Lighting Footings and Overhead Sign Support Structure**

- (i) The Pre-Final Design Development Submittals shall contain the following:
 - (A) Structural Design Reports for any Underpass or Overpass Structures and Graham Creek Culvert being rehabilitated or

replaced as part of Highway Works (calculations need not be provided at this stage);

(B) Structure Survey Reports; and

(C) Movement Plans.

(e) Retaining Wall and Noise Barrier Design

(i) The Pre-Final Design Development Submittals shall contain the following:

(A) geotechnical foundation report or reference to the applicable section of the Geotechnical Report;

(B) descriptions of maintenance considerations; and

(C) all design drawings.

(f) Geotechnical Foundation Design

(i) The Pre-Final Design Development Submittals shall contain the following:

(A) Geotechnical Report;

(B) Geotechnical Instrumentation and Monitoring Plan; and

(C) Plans and procedures for groundwater control.

(g) Pavement Design

(i) The Pre-Final Design Development Submittals shall contain the following:

(A) Pavement Design Report; and

(B) proposed Pavement design, depicted as cross-section drawings.

(h) Electrical, Signing and Pavement Markings Design

(i) The Pre-Final Design Development Submittals shall include electrical (including signals, lighting and telecommunications), signing and pavement marking plans in accordance with the requirements of Schedule 15-2, Part 9 - Highway Works, Part B, Article 6 and Schedule 15-2, Part 9 - Highway Works, Part B, Article 8.

(ii) The Pre-Final Design Development Submittals shall contain the following:

- (A) Design drawings for all electrical systems shall contain the following:
 - (I) electrical equipment and all associated support structure locations;
 - (II) lighting calculations where appropriate;
 - (III) service locations;
 - (IV) layout drawings showing electrical lighting poles, ducts, chambers, power distribution and/or supply cabinets; and
 - (V) wiring diagrams depicting low voltage power distribution as well as high voltage wiring where applicable.
- (B) Design drawings for the telecommunications conduit network, if applicable, shall contain the following:
 - (I) network diagram showing conduit locations; and
 - (II) design drawings showing the locations for all interconnection points.
- (C) Signage submissions shall contain the following:
 - (I) overhead Sign Support Structures and extruded ground-mounted Signs structure details and design calculations;
 - (II) sign design sheets for all custom guide signs;
 - (III) sign details and shop drawings for all support structures and footings; and
 - (IV) note all cantilever and sign bridge Structures submissions shall be undertaken in accordance with the MTO Sign Support Manual.
- (D) PHM-125 signal drawings shall be submitted for all temporary and permanent signals and shall contain the following:
 - (I) all Regulatory Signs that assist in the signal operations (to be included on drawing and in a legend);
 - (II) Signal hardware excluding underground provisions and electrical wiring;

- (III) Vehicle detection and nearby accesses;
 - (IV) Pavement Markings including lanes, crosswalks, stopbars and through/turning arrows;
 - (V) active transportation accommodations;
 - (VI) MTO PHM-125 standard template;
 - (VII) Hard copies in 1:500 scale; and
 - (VIII) Electronic copies in AutoCAD format.
- (E) The Temporary Signing Plan, Permanent Signing Plan, Temporary Pavement Marking Plan, and Permanent Pavement Marking Plan.
- (i) **Landscaping and Site Restoration**
- (i) The Pre-Final Design Development Submittals shall contain the following:
- (A) detailed landscape drawings that reflect any design changes, and document public consultation conducted as part of the development of the landscape drawings (drawings shall be of a suitable scale for legibility, and provide enlarged detailing where needed);
 - (B) a report detailing how the Highway Works design adheres to Context Sensitive Design requirements; and,
 - (C) tree removal and mitigation plan drawings.
- (j) **Advanced Traffic Management Systems**
- (i) The Pre-Final Design Development Submittals shall contain the following:
- (A) all design parameters and requirements in accordance with Article 11 (Advanced Traffic Management Systems Civil Requirements) of Part B of Schedule 15-2, Part 9 - Highway Works.
 - (B) design drawings that contain the following:
 - (I) layout drawings detailing the CCTV camera, VMS, Bluetooth Reader, communication system, and cabinet locations including all conduit and electrical chambers with device labelling;

- (II) detector input file connections;
- (III) communication schematics and fibre allocation table;
- (IV) electrical wiring diagrams;
- (V) civil infrastructure associated with ATMS;
- (VI) any modified MTOD including OPSD, and installation drawings; and
- (VII) temporary and removals drawings.

(k) **Traffic Engineering**

- (i) The Pre-Final Design Development Submittals shall contain the following:
 - (A) Traffic Analysis Report, which shall include comprehensive traffic analysis along with all supporting documentation and calculations;
 - (B) a detailed summary of critical traffic management considerations;
 - (C) signal timing sheets and phasing diagrams associated with the design of signalized intersections; and
 - (D) the Haul Route Plan.

(l) **Environmental Design**

- (i) The Pre-Final Design Development Submittals shall contain the following:
 - (A) applicable drawings that include:
 - (I) ecological restoration areas including Species-at-Risk and any environmentally sensitive areas, and all restoration areas;
 - (II) all fisheries compensation plan areas to secure Fisheries Act Authorizations from Fisheries and Oceans Canada;
 - (III) all drainage and stormwater management pond areas; and
 - (IV) erosion and sediment control measures.

- (B) riparian restoration and terrestrial reclamation/revegetation drawings that, as a minimum, describe timing requirements, seed mixes and applications rates of hydroseeding and site specific restoration plans, including species type, size and spacing for riparian areas, areas of higher sensitivity, and areas prone to erosion or shallow slope movement;
 - (C) environmental design drawings that show environmental mitigation and compensation features and any environmental features to be constructed;
 - (D) environmental design documentation including:
 - (I) regulatory agency review and acceptance documentation for the Environmental Management System specific to the Highway Works;
 - (II) all licenses, notifications, permits, authorisations and approvals specific to the Highway Works; and
 - (III) all assessments, studies, surveys, monitoring reports, and plans specific to the Highway Works.
 - (E) an environmental design criteria checklist that lists general environmental commitments and assurances, environmental design commitments, site specific environmental features and environmental mitigation/compensation plans including all commitments, assurances and plans relating to archaeological features; and
 - (F) stakeholder issues, environmental issues and mitigation plans.
- (m) **Utility Design**
- (i) The Pre-Final Design Development Submittals shall contain the following:
 - (A) Utility Infrastructure Relocation Plans, as generally described in Schedule 10, Article 2, and including the additional requirements identified in Schedule 15-2, Part 9; and
 - (B) Protection measures for Utilities to be protected in place during the Highway Works.

4.3 Final Design Development Submission

(a) General

- (i) All Final Design Development Submittals shall address any comments of the City from the Design Workshops, internal design reviews, quality control, and design reports.
- (ii) Quantity Sheets shall be provided by DB Co and shall be prepared using the latest version of the MTO's Contract Preparation System (CPS).
- (iii) DB Co shall prepare and submit any necessary addenda to the MTO Design Criteria (as described in MTO Directive PHM-B-021) based on DB Co's design. This will be the final submittal for approval by MTO.
- (iv) The Final Design Development Submittals shall contain all specifications, special provisions and operational constraints for the Works.

(b) Roadway Design

- (i) The Final Design Development Submittals shall contain the following:
 - (A) updated information from the Pre-Final Design Development Submittals; and
 - (B) Cross-section drawings.

(c) Drainage Design

- (i) The Final Design Development Submittals shall contain the following:
 - (A) updated information from the Pre-Final Design Development Submittals.

(d) Structures, Culvert, Submerged Culverts, High Mast Lighting Footings and Overhead Sign Support Structure

- (i) The Final Design Development Submittals shall contain the following:
 - (A) updated information from the Pre-Final Design Development Submittals.

(e) Retaining Wall and Noise Barrier Design

- (i) The Final Design Development Submittals shall contain the following:
 - (A) updated information from the Pre-Final Design Development Submittals; and
 - (B) a neat, bound, indexed set of design calculations for the walls initialled by the responsible engineer, who shall be a duly experienced Professional Engineer of the appropriate discipline.

(f) **Geotechnical Foundation Design**

(i) The Final Design Development Submittals shall contain the following:

(A) updated information from the Pre-Final Design Development Submittals.

(g) **Pavement Design**

(i) The Final Design Development Submittals shall contain the following :

(A) updated information from the Pre-Final Design Development Submittals.

(h) **Electrical, Signing and Pavement Markings Design**

(i) The Final Design Development Submittals shall contain the following:

(A) updated information from the Pre-Final Design Development Submittals.

(i) **Landscaping and Site Restoration**

(i) The Final Design Development Submittals shall contain the following:

(A) updated information from the Pre-Final Design Development Submittals.

(j) **Advanced Traffic Management Systems**

(i) The Final Design Development Submittals shall contain the following:

(A) updated information from the Pre-Final Design Development Submittals; and

(B) Pre-Installation Test Plan (PIT), Proof of Performance Test Plan (POP), and System Integration Test Plan (SIT).

(k) **Traffic Engineering**

(i) The Final Design Development Submittals shall contain the following:

(A) updated information from the Pre-Final Design Development Submittals.

(l) **Environmental Design**

(i) The Final Design Development Submittals shall contain the following:

- (A) updated information from the Pre-Final Design Development Submittals; and
 - (B) draft Design and Construction Report (DCR).
- (m) **Utility Design**
 - (i) The Final Design Development Submittals shall contain the following:
 - (A) Updated information from the Final Design Development Submittals, including all draft materials required for an Encroachment Permit application.

5. CONSTRUCTION DOCUMENT SUBMISSION

5.1 General

- (a) Construction Document Submittals shall be prepared and shall have indexes and sectional dividers. The design folders shall contain pertinent correspondence, shall be arranged by subject matter in chronological order, and shall include the design criteria, design calculations and backup information. Design submissions shall include copies of all approvals, design reports, correspondence and calculations.
- (b) Final design drawings and reports shall be developed to a stage that is ready to be signed and sealed by the responsible Engineer, who shall be a duly experienced Professional Engineer of an appropriate discipline.
- (c) The Road Safety Audit Certificate shall be submitted as part of Construction Document Submittals in accordance with Schedule 15-2, Part 9 - Highway Works, Part B, Article 10 (Road Safety Audit).
- (d) DB Co shall document changes and describe the design work that has been developed since the Design Development Submittals or previous design stage of Construction Document Submittals.
- (e) All Construction Document Submittals shall address any comments of the City from Design Review Workshops, internal design reviews, quality control, and design reports.
- (f) The Construction Document Submittals shall contain resolution of all issues identified during Design Development Submittal reviews.
- (g) Quantity Sheets shall be provided by DB Co and shall be prepared using the latest version of the MTO's Contract Preparation System (CPS).
- (h) The Construction Document Submittals shall contain all specifications, special provisions and operational constraints for the Works.

5.2 Roadway Design

- (a) The Construction Document Submittals shall contain the following:
 - (i) updated information from the Final Design Development Submittals.

5.3 Drainage Design

- (a) The Construction Document Submittals shall contain the following:
 - (i) updated information from the Final Design Development Submittals.

5.4 Structures, Culvert, Submerged Culverts, High Mast Lighting Footings and Overhead Sign Support Structure

- (a) The Construction Document Submittals shall contain the following:
 - (i) updated information from the Final Design Development Submittals.

5.5 Retaining Wall and Noise Barrier Design

- (a) The Construction Document Submittals shall contain the following:
 - (i) updated information from the Final Design Development Submittals;
 - (b) For proprietary Retaining Walls, the responsible engineer, who shall be a duly experienced Professional Engineer of the appropriate discipline, shall certify the design and construction of the Retaining Walls.

5.6 Geotechnical Foundation Design

- (a) The Construction Document Submittals shall contain the following:
 - (i) updated information from the Final Design Development Submittals.

5.7 Pavement Design

- (a) The Construction Document Submittals shall contain the following:
 - (i) updated information from the Final Design Development Submittals.

5.8 Electrical, Signing and Pavement Markings Design

- (a) The Construction Document Submittals shall contain the following:
 - (i) updated information from the Final Design Development Submittals.

5.9 Landscaping and Site Restoration

- (a) The Construction Document Submittals shall contain the following:
 - (i) updated information from the Final Design Development Submittals.

5.10 Intelligent Transportation Systems

- (a) The Construction Document Submittals shall contain the following:
 - (i) updated information from the Final Design Development Submittals.

5.11 Traffic Engineering

- (a) The Construction Document Submittals shall contain the following:
 - (i) updated information from the Final Design Development Submittals.

5.12 Environmental Design

- (a) The Construction Document Submittals shall contain the following:
 - (i) updated information from the Final Design Development Submittals;
 - (ii) Design and Construction Report;
 - (iii) Final Eligibility Letter for EA Clearance / Environmental Clearance Letter, and comments and responses during the completed 30 day review period; and
 - (iv) Contract drawings as required and in conformity to Design and Construction Reports (DCR).

5.13 Utility Design

- (a) The Construction Document Submittals shall contain the following:
 - (i) Updated information from the Final Design Development Submittals, including all draft materials required for an Encroachment Permit application (or a copy of the application if already submitted to MTO).

5.14 Issued for Construction Drawings

- (a) DB Co shall submit signed and sealed copies of all drawings and specifications that are “Issued for Construction”, together with manuals, instructions to the Construction Contractor and other relevant information as requested by the City Representative, to the City Representative and to the Independent Certifier.
- (b) Issued for Construction documents shall be signed and sealed by the responsible engineer, who shall be a Professional Engineer.

5.15 Record Drawings

- (a) DB Co shall provide a detailed log (spreadsheet format) identifying all Record Drawings. The detailed log shall include, as a minimum, the drawing number for all Record Drawings with a summary of the changes made during the Construction Period.

6. CHECKING OF STRUCTURAL DESIGN

- 6.1** In accordance with Article 4.2 (General Requirements) of Part B of Schedule 15-2, Part 9 - Highway Works, for relevant design submissions submitted in accordance with the Review Procedure, DB Co shall submit an Independent Structural Design Check Certificate, in the form provided as Attachment 4 to this Appendix B.

ATTACHMENT 1

Sample Contents for a Structural TAF

SAMPLE CONTENTS FOR A STRUCTURAL TAF

Ref. No:

1. PROJECT DESCRIPTION

- 1.1 Name and location of structure
- 1.2 Permitted traffic speed (for a Bridge give over and/or under)

2. PROPOSED STRUCTURE

- 2.1 Description of Structure
- 2.2 Structural type *(Include reasons for choice)*
- 2.3 Foundation type *(Include reasons for choice)*
- 2.4 Span arrangements *(Include reasons for choice)*
- 2.5 Barrier type
- 2.6 Proposed arrangements for inspection and maintenance
- 2.7 Materials and finishes

3. DESIGN/ASSESSMENT CRITERIA

- 3.1 Live Loading, Clearances
 - 3.1.1 Bridge code loading
 - 3.1.2 Design vehicle
 - 3.1.3 Other live loading
 - 3.1.4 Provision for exceptional abnormal loads:
 - 3.1.4.1 Gross weight
 - 3.1.4.2 Axle load and spacing
 - 3.1.4.3 Location of vehicle track on deck cross-section
 - 3.1.5 Any special loading not covered above
 - 3.1.6 Minimum clearances provided (vertical and horizontal)
 - 3.1.7 Authorities consulted and any special conditions required

- 3.2 List of relevant design documents

4. STRUCTURAL ANALYSIS

- 4.1 Methods of analysis proposed for Superstructure, Substructure and Foundations
- 4.2 Description and diagram of structure to be used for analysis
- 4.3 Assumptions intended for calculation of structural element property and stiffness
- 4.4 Proposed earth pressure coefficients (k_a , k_o , or k_p) to be used in design of earth retaining elements

5. GROUND CONDITIONS

- 5.1 Acceptance of interpretative recommendations of the soils report to be used in the design and reasons for any proposed departures
- 5.2 Describe Foundations fully including the reasons for adoption of allowable and proposed bearing pressures/pile loads, strata in which Foundations are located, provision for skin friction effects on piles and for lateral pressures due to compression of underlying strata, etc.
- 5.3 Differential settlement to be allowed for in design of structure
- 5.4 Anticipated ground movements or settlement due to embankment loading, flowing water, and measures proposed to deal with these defects as far as they affect the structure
- 5.5 Results of tests of ground water (e.g. pH value, chloride or sulphate content) and any counteracting measures proposed (as applicable)
- 5.6 Anticipated ground movements or settlement due to seismic loading, measures proposed to deal with these impacts as far as they affect the structure

6. CHECKING

- 6.1 Name of proposed Checking Team

7. DRAWINGS AND DOCUMENTS

- 7.1 List of drawings (including numbers) and documents accompanying the submission. To include:
 - 7.1.1 a location plan;
 - 7.1.2 a preliminary general arrangement drawing; and

7.1.3 relevant parts of the ground investigation report.

8. THE ABOVE DESIGN AND CONSTRUCTION PROPOSALS ARE SUBMITTED FOR REVIEW.

Signed: _____

[Design Manager]

Name: _____

Engineering Qualifications: _____

Date: _____

Professional Registration Number:

Affix Professional Seal

Signed: _____

DB Co Representative

Name: _____

Date: _____

Professional Registration Number:

Affix Professional Seal

ATTACHMENT 2

Form of MTO Design Certificates

Certificate Ref No. []

MTO DESIGN CERTIFICATE (GENERAL)

In respect of :..... (Provide
submittal details e.g. Roadway, Structures, Drainage, Geotechnical, etc.)

*Project Agreement between the City and DB Co dated [●] (“the Project Agreement”)
relating to the Project. Defined terms and expressions used in this certificate have the meanings
given in the Project Agreement.*

*This form of certificate is to be used by the Design Team and DB Co for certifying the
design of the New MTO Infrastructure to the extent that such New MTO Infrastructure
components have been constructed, installed, altered, upgraded, and/or augmented, in
accordance with Schedule 15-2 – Output Specifications - Design and Construction.*

1. We certify that we have the requisite professional qualifications, skill and
experience to prepare the Design Data referred to herein in accordance with the requirements of
the Project Agreement and all relevant Output Specifications.

2. We certify that we have prepared the Design Data for [.....] listed
in the schedule hereto in accordance with all applicable requirements contained in the [MTO
Design Management Plan] [Design Quality Management Plan] and utilizing the standards of
care, skill and diligence that, in accordance with the standards of our profession, are required of
experienced professionals undertaking the preparation of such Design Data, and that in our
professional opinion such Design Data [Note to Proponents: Inapplicable language to be
deleted/]:

i. complies with all applicable [Output Specifications], including Technical
Appraisal Form No. [.....] dated [.....] as amended by the following [Note to
Proponents: Inapplicable language to be deleted.]:

**[List, if any, the changes made by the issue of Variation(s) and any addenda
to the foregoing Technical Appraisal Form];**

ii. complies with all applicable design requirements of the Project Agreement;

iii. complies with Applicable Law and Good Industry Practice; and

iv. accurately describes and depicts the New MTO Infrastructure to be undertaken.

SCHEDULE

[Include here drawing numbers and titles, reports, calculations, etc.]

Certified by: _____

[Design Team (principal)]

Name: _____

Title: _____

Date: _____

Professional Registration Number:

Affix Professional Seal

Signed: _____

DB Co Representative

Name: _____

Date: _____

Certificate Ref No. []

MTO DESIGN CERTIFICATE (ENVIRONMENTAL)

Project Agreement between the City and DB Co dated [●] (“the Project Agreement”) relating to the Project. Defined terms and expressions used in this certificate have the meanings given in the Project Agreement.

This form of certificate is to be used by the Design Team, Environmental Director and DB Co for certifying the design of environmental works incorporated in the New MTO Infrastructure in accordance with the Project Agreement.

1. We certify that we have the requisite professional qualifications, skill and experience to prepare the Design Data referred to herein in accordance with the requirements of the Project Agreement and all relevant Design and Construction Specifications.
2. We certify that we have prepared the Design Data for [.....] [Name and list of all elements of the environmental works] in the schedule hereto in accordance with all applicable requirements contained in the Design Quality Management Plan and utilizing the standards of care, skill and diligence that, in accordance with the standards of our profession, are required of experienced professionals undertaking the preparation of such Design Data, and that in our professional opinion such Design Data:
 - i. complies with all applicable [Design and Construction Specifications], including Technical Appraisal Form No. [.....] dated [.....], as amended by the following [Note to Proponents: Inapplicable language to be deleted.]:

[List, if any, the changes made by the issue of Variation(s), and any addenda to the foregoing Technical Appraisal Form];
 - ii. complies with all applicable requirements of Schedule 17 - Environmental Obligations;
 - iii. complies with all applicable design requirements of the Project Agreement;
 - iv. complies with Applicable Law and Good Industry Practice; and
 - iv. accurately describes and depicts the New MTO Infrastructure to be undertaken.

SCHEDULE

[Include here drawing numbers and titles, reports, calculations, etc.]

Certified by: _____

[Design Team (principal)][Designer for OM&R Provider (principal)] **[Note to Proponents: Inapplicable language to be deleted.]**

Name: _____

Title: _____

Date: _____

Professional Registration Number:

Affix Professional Seal

Signed: _____

Environmental Director

Name: _____

Title: _____

Date: _____

Professional Registration Number:

Affix Professional Seal

Signed: _____

DB Co Representative

Name: _____

Date: _____

ATTACHMENT 3

Form of MTO Construction Certificates

Certificate Ref. No. []

MTO CONSTRUCTION CERTIFICATE (INTERIM)

Project Agreement between the City and DB Co dated [●] (“the Project Agreement”) relating to the Project. Defined terms and expressions used in this certificate have the meanings given in the Project Agreement.

This form of certificate is to be used by the Design Team, Construction Contractor and DB Co for certifying in accordance with Section 3.1(d) of this Appendix B to Schedule 10 – Review Procedure, the Construction Activities in accordance with Schedule 15 – Output Specifications to the Project Agreement. This certificate is effective as of [date].

Construction Contractor’s Statement

1. We certify that all the New MTO Infrastructure up to the effective date of this certificate has been designed, constructed, tested, and if applicable commissioned, and is in accordance with:

- i. the relevant Design Data and any Design Certificates issued to date in each case to which there has been no objection under the Review Procedure;
- ii. Applicable Law and Good Industry Practice; and
- iii. the provisions of the Project Agreement, including all applicable Design and Construction Specifications [as amended by the following Variation(s): [.....]].

with the exception of:

- i **[Non-Conformance Report(s) in “open” status]**

Signed: _____

[Construction Contractor representative]

Name: _____

Date: _____

Design Team's Statement

2. We certify that we have examined the New MTO Infrastructure up to the effective date of this certificate in accordance with the requirements for examination of the Works contained in the Design Quality Management Plan and the Construction Quality Management Plan and utilizing the standards of care, skill and diligence that, in accordance with the standards of our profession, are required of experienced professionals undertaking such examinations, and that in our professional opinion the New MTO Infrastructure and exception(s) stated in the Construction Contractor's Statement above has been designed, constructed, tested and commissioned, as applicable, and is in accordance with:

- i. the relevant Design Data and any Design Certificates issued to date in each case to which there has been no objection under the Review Procedure;
- ii. Applicable Law and Good Industry Practice; and
- iii. the provisions of the Project Agreement, including all applicable Design and Construction Specifications [as amended by the following Variation(s): [.....]].

Signed: _____

[Design Team (principal)]

Name: _____

Title: _____

Date: _____

Professional Registration Number: _____

Affix Professional Seal

Signed: _____

DB Co Representative

Name: _____

Date: _____

Receipt of this Certificate is acknowledged.

Signed: _____

Independent Certifier

Name: _____

Title: _____

Date: _____

Certificate Ref. No. []

MTO CONSTRUCTION CERTIFICATE (COMPLETION)

Project Agreement between the City and DB Co dated [●] (“the Project Agreement”) relating to the Project. Defined terms and expressions used in this certificate have the meanings given in the Project Agreement.

This form of certificate is to be used by the Design Team, Construction Contractor and DB Co for certifying in accordance with Section 3.1(d) of this Appendix B to Schedule 10 – Review Procedure, the Construction Activities in accordance with Schedule 15 – Output Specifications to the Project Agreement.

Construction Contractor’s Statement

1. We certify that [name(s) and element(s) of the New MTO Infrastructure] [the New MTO Infrastructure in respect of Handover] has been designed, constructed, [commissioned and tested] and has met the requirements for [Handover] in accordance with: *[Note to Proponents: Inapplicable language to be deleted.]*

- i. the relevant Design Data and Design Certificates in each case to which there has been no objection under the Review Procedure;
- ii. Applicable Law and Good Industry Practice; and
- iii. the provisions of the Project Agreement, including all applicable Design and Construction Specifications [as amended by the following Variation(s): [.....]].

Signed: _____

[Construction Contractor representative]

Name: _____

Date: _____

Design Team's Statement

2. We certify that we have examined the [name(s) and element(s) of the New MTO Infrastructure] [the New MTO Infrastructure in respect of Handover] in accordance with the requirements for examination of the Works contained in the Design Quality Management Plan and the Construction Quality Management Plan and utilizing the standards of care, skill and diligence that, in accordance with the standards of our profession, are required of experienced professionals undertaking such examinations, and that in our professional opinion [the said element of the New MTO Infrastructure][the New MTO Infrastructure] has been designed, constructed, [commissioned and tested] and has met the requirements for [Handover] in accordance with: *[Note to Proponents: Inapplicable language to be deleted.]*

- i. the relevant Design Data and Design Certificates in each case to which there has been no objection under the Review Procedure;
- ii. Applicable Law and Good Industry Practice; and
- iii. the provisions of the Project Agreement, including all applicable Design and Construction Specifications [as amended by the Variation(s) listed in paragraph 1.(iii) above].

Signed: _____

[Design Team (principal)]

Name: _____

Title: _____

Date: _____

Professional Registration Number: _____

Affix Professional Seal

Signed: _____

DB Co Representative

Name: _____

Date: _____

Receipt of this Certificate is acknowledged.

Signed: _____

Independent Certifier

Name: _____

Title: _____

Date: _____

ATTACHMENT 4

Certificate Form

Certificate Ref. No []

INDEPENDENT STRUCTURAL DESIGN CHECK CERTIFICATE

Defined terms and expressions used in this certificate have the meanings given in the agreement between the City and DB Co dated [●] (“the Project Agreement”) relating to the Project.

This form of certificate is to be used by the Independent Checking Team for certifying the design of structures incorporated in the New MTO Infrastructure, in accordance with Part B of Schedule 15-2 Schedule 15-2, Part 9 - Highway Works to the Project Agreement.

1. We certify that we have the requisite professional qualifications, skill and experience to perform an independent check of the Design Data referred to herein in accordance with the requirements of the Project Agreement.

2. We certify that we have performed an independent check (as required by the Project Agreement for Significant and Complex Structures) of the Design Data for [.....] **[Name of the Structure and list of all elements of the Structure included in the Design Data]** listed in the Schedule hereto and utilizing the standards of care, skill and diligence that, in accordance with the standards of our profession, are required of experienced professionals undertaking such an independent check, and that in our professional opinion:

- i. the said Design Data meets performance expectations outlined in the Project Agreement, **[including Technical Appraisal Form]** No. [.....] dated [.....], as amended by the following:

[List, if any, the changes made and any addenda to the foregoing Technical Appraisal Form]; and

- ii. the design, methodologies and assumptions are consistent with Good Industry Practice.

SCHEDULE

[Include here drawing numbers and titles and reports, calculations, etc.]

Signed: _____

Independent Checking Team (principal)

Name: _____

Title: _____

Date: _____

Professional Registration Number: _____

Affix Professional Seal

Signed: _____

DB Co Representative

Name: _____

Date: _____

SCHEDULE 11

INTEGRATED MANAGEMENT SYSTEM REQUIREMENTS

[REDACTED]

**SCHEDULE 12
WORKS SCHEDULING REQUIREMENTS**

[REDACTED]

SCHEDULE 13

DB CO PROPOSAL EXTRACTS

[REDACTED]

SCHEDULE 14

TESTING & COMMISSIONING

1. SYSTEM TESTING & COMMISSIONING

1.1 General

- (a) DB Co shall plan, schedule, coordinate and execute an overall system Testing & Commissioning Program for the Works.
- (b) Remaining Systems Integration Works shall include:
 - (i) updating and testing the existing head end management platform at the TOCC and BCC, excluding S&TCS as set out in more detail in Schedule 15;
 - (ii) updating and testing the on-board CBTC system; and
 - (iii) such other design, construction and activities specified in the System Integration Management Plan or this Project Agreement to be the responsibility of either the City or RTG.
- (c) DB Co shall ensure that the Works comply with the requirements of this Schedule 14 as follows:
 - (i) The East Works, West Works, and Remaining Works testing and commissioning activities shall comply with the requirements of Section 1 through Section 1.7;
 - (ii) DB Co Trial Running participation shall comply with section 1.8
 - (iii) The Highway Works testing and commissioning activities shall comply with the requirements of this Schedule 14, and Appendix A.
- (d) DB Co shall perform testing and commissioning of the Works in four phases:
 - (i) East Works;
 - (ii) West Works;
 - (iii) Highway Works; and
 - (iv) Remaining Works.
- (e) DB Co shall develop, and the Testing & Commissioning Program shall be comprised of, distinct Testing & Commissioning Plans for each of the four testing and commissioning phases referred to in Section 1.1(d) above.
- (f) The timing of the Testing & Commissioning Program shall support a minimum of 90 days between East Substantial Completion and West Substantial Completion.

- (g) DB Co shall submit the four-part Testing & Commissioning Program within the following timeframes in accordance with Schedule 10 – Review Procedure;
 - (i) Preliminary - within 12 months of Financial Close
 - (ii) Final – no later than 180 days prior to the start of testing and commissioning activities.
 - (iii) IFC – no later than 60 days prior to start of testing and commissioning activities
- (h) DB Co’s Testing & Commissioning Plans will identify FAT, SAT, SIT and the testing and commissioning requirements pursuant to this Schedule 14, Schedule 15-2, Part 1 Article 11 - Systems Integration Program, and Schedule 15-2 Part 3 - Systems.
- (i) [Intentionally deleted]
- (j) Without prejudice to Sections 11.12(j), (k), 18.5 and 18.7 of the Project Agreement, DB Co shall provide all required resources, work processes and management authority to exercise control over the planning, scheduling, co-ordination, prioritization, and delivery of the Works in order to mitigate in accordance with Good Industry Practice, systems integration risks and secure successful project completion (collectively the “**Systems Integrator**” role).
- (k) DB Co shall comply with Good Industry Practice for all required testing and commissioning activities set out in this Schedule 14, Schedule 15-2 Part 1 Article 11- Systems Integration Program, and Schedule 15-2 Part 3 - Systems. DB Co shall provide all of the documentation to the City in accordance with the requirements of Schedule 10 - Review Procedure.
- (l) In order for DB Co to achieve East Substantial Completion and West Substantial Completion, DB Co, in its role as Systems Integrator, shall be responsible for the integration testing of the systems elements described in SIT below and as outlined under this Schedule 14 – Testing & Commissioning.
- (m) DB Co shall develop the Systems Integration Management Plan (SIMP) as referenced in 15-2 Part 1 Article 11 – Systems Integration Program. The Systems Integration Management Plan (SIMP) shall include the SIT to be executed as part of the Testing & Commissioning Program.
- (n) The City and DB Co shall jointly appoint an arm’s length independent third party expert (the “**Systems Integration Verifier**”) to:
 - (i) provide a fast track dispute resolution process for the Parties for disputes related to the integration and function of the communications systems (“**Systems Integration Disputes**”) as outlined in Schedule 27 – Dispute Resolution Procedure;
 - (ii) during the installation, testing, and commissioning phases, review and comment for compliance and clarity on all Submittals related to communications and Train Control;

- (iii) receive upon request any documents that pertain to: (A) integration, testing and commissioning plans, (B) traceability documents, and (C) test and commissioning procedures;
- (iv) review and provide confirmation of successful completion of the Remaining Systems Integration Works; and
- (v) either: (A) issue a report confirming successful completion of Systems Integration Works; or (B) issue a report detailing the matters that the Systems Integration Verifier considers are required to be performed prior to the successful completion of the Systems Integration Works.

1.2 Testing & Commissioning Coordinator

- (a) DB Co shall appoint a testing and commissioning coordinator (the “**Testing & Commissioning Coordinator**”) to perform the obligations of DB Co as set out in this Schedule 14.
- (b) The Testing & Commissioning Coordinator shall have the qualifications as outlined in Schedule 9 – Key Individuals.

1.3 Testing & Commissioning Responsibilities

- (a) DB Co shall be responsible for preparing and executing the Testing & Commissioning Plans required to successfully demonstrate that the New City Infrastructure has been designed, constructed and functions in accordance with the Project Agreement. The Testing & Commissioning Plans shall outline the methods and procedures to be utilized to verify compliance with the technical requirements of the Project. The Testing & Commissioning Plans shall be structured to ensure a systematic and thorough evaluation of all individual subsystem components.
- (b) The Testing & Commissioning Coordinator shall be responsible for directing the efforts of DB Co’s Testing & Commissioning Plans and the Testing & Commissioning Team, all aspects of the testing and commissioning process, including coordinating access to test locations, support requirements, test efforts and test activities, and providing overall monitoring of testing and commissioning activities. Additionally, the DB Co Testing & Commissioning Coordinator shall be responsible for coordinating the systems integration testing and system commissioning activities as identified in this Schedule 14, Schedule 15-2, Part 1 Article 11- Systems Integration Program, and Schedule 15-2 Part 3 - Systems.
- (c) DB Co’s Testing & Commissioning Program shall include the following:
 - (i) relationship to safety and security management and other related safety and security requirements;
 - (ii) organization chart of the Testing & Commissioning Team, as per Section 1.4, and their discipline responsibilities including preparation of test plans, procedures, reports, recording of test data, review of test data, reporting and resolution of test failures and anomalies, and coordination of each test effort;

- (iii) resumes of key personnel involved detailing years of experience;
 - (iv) planned resources;
 - (v) specific requirements for the City or other third party interfaces;
 - (vi) testing and commissioning procedures as per Section 1.5; and
 - (vii) testing requirements, sequencing and estimated durations for each test, as defined in Section 1.6 and in accordance with Schedule 12 – Works Scheduling Requirements.
- (d) The Testing & Commissioning Program shall demonstrate how DB Co intends to validate and verify that the functional and technical requirements, performance criteria, quality and safety aspects of the System Infrastructure have been met and that the System Infrastructure has been designed and constructed in conformance with the Project Agreement.
- (e) The Testing & Commissioning Program shall be developed and modified as required to address the evolution of the Project, provided that any amendment to the Testing & Commissioning Program shall be submitted to the City in accordance with Schedule 10 – Review Procedure.
- (f) DB Co shall be responsible for implementing or directing through the SIMP all testing and commissioning activities required to achieve East Substantial Completion, West Substantial Completion, East Final Completion, or West Final Completion (including completion of Remaining Works), , as applicable. Testing and commissioning activities shall include but are not limited to:
- (i) Pre-delivery Tests
 - A. **DB Co Component Testing** – components manufactured by DB Co suppliers shall be inspected and tested in the factory. Component testing shall be undertaken by all DB Co equipment suppliers. The results of all DB Co component testing shall be available for inspection or audit by the City;
 - B. **First Article Testing** – shall be conducted on the first production unit of any DB Co supplied equipment prior to first shipment from the factory to ensure the units are suitable in all respects for the purpose intended;
 - C. **Qualification Testing or Type Testing**– one or more samples of critical DB Co supplied components, which are newly designed and developed and, where prior qualification cannot be demonstrated in a similar and representative environment, shall be subject to qualifications testing. Qualifications testing shall be performed to show compliance of the DB Co supplied equipment with standards as required by the Project Agreement; and
 - D. **Factory Acceptance Test (FAT)** – where appropriate and reasonably practical, DB Co supplied components that will be brought together to

provide subsystems and systems, that have not previously been demonstrated in service on the Existing Confederation Line, shall first be tested in the factory in a representative operating environment against an agreed upon set of factory acceptance or factory integration test procedures. Once successfully completed, the DB Co supplied system can be deployed to site for installation/verification tests; and,

(ii) Post Installation Checkout (**PICO**).

Post Installation Checkout tests, audits and inspections shall form part of the scope of East Works and West Works to be performed by DB Co in connection with obligations under Schedule 14 – Testing & Commissioning to achieve both East Substantial Completion and West Substantial Completion. Once the deployed component, subsystem, or system has been installed, it shall be verified against the installation drawings to ensure correct installation and that no damage has been sustained in the installation process. Installation of equipment, cabinets, power, grounding, cabling and other equipment shall be compared against installation drawings for correct locations, routing, connectivity, etc. In terms of sequencing these audits/inspections shall be performed as a pre-requisite to the start of the Site Acceptance Testing regime described below.

The Systems Integration Verifier will be notified 21 days in advance of specified PICO, witness PICO and sign-off on all specified PICO verification documentation, related to integration to the extent the same required attendance and sign-off by the System Integration Verifier, as specified in the SIMP

(iii) Site Acceptance Tests (**SAT**)

Site Acceptance tests, audits and inspections shall form part of the scope of East Works and West Works to be performed by DB Co in connection with obligations under Schedule 14 – Testing and Commissioning to achieve both East Substantial Completion and West Substantial Completion. In terms of sequencing these tests shall be conducted following PICO and in accordance with DB Co's Testing & Commissioning Schedule (as defined in Section 1.6 below). Following successful completion of PICO (with no major deficiencies), the components, subsystems or systems installed by DB Co shall undergo start-up tests and then be tested against an agreed upon set of SAT procedures. SAT testing of a system may include some level of integration but is intended to test subsystems independently. The Systems Integration Verifier will be notified 21 days in advance of SAT, witness SAT and sign-off on all SAT reports. The Systems Integration Verifier will be notified in advance of any SAT regression test intended to re-test any equipment that failed the initial SAT, witness SAT regression test and sign-off on all SAT regression test reports. The Systems Integration Verifier will provide written confirmation that DB Co has successfully completed SAT.

Where power, including Traction Power, shall be applied during SAT, site safety procedures will be prepared to reflect this new hazard on the testing and commissioning site.

(iv) Systems Integration Testing (**SIT**)

- A. Once two or more systems have completed SAT, they will be brought together to commence SIT. SIT will also reflect that some system suppliers are expected to be unable to demonstrate all technical requirements without integration with other supplier systems. SIT shall therefore concentrate on intersystem functionality and performance under normal, abnormal, and emergency scenarios. The Systems Integration Verifier will be notified in advance of any SIT regression test intended to re-test any equipment that failed the initial SIT, witness SIT regression test and sign-off on all SIT regression test reports. The Systems Integration Verifier will provide written confirmation that DB Co has successfully completed SIT.
- B. SIT shall include but not be limited to the following tests:
- i. SCADA & Power Supply & Distribution System Integration Tests
 - ii. Vehicle and Infrastructure Integration Tests
 - iii. SCADA and Tunnel Ventilation System Integration Tests
 - iv. BMS and Station Systems Integration Tests
 - v. LMSF and Mainline Integration Tests
 - vi. Vehicle and CBTC System Integration Tests
 - vii. Vehicle and Communications Systems Integration Tests
 - viii. P25 Radio Tests
 - ix. General Integration Tests
- C. SIT shall include but not be limited to the following demonstrations of operational performance requirements, based on the Vehicles achieving the performance characteristics provided by the City:
- i. DB Co shall confirm their SI design is capable of supporting the required minimum headway of two minutes.
 - ii. DB Co shall demonstrate the maximum travel times specified in Schedule 15-2 Part 1 Clause 3.4 (d), while respecting the minimum dwell times specified in Schedule 15-2 Part 1 Clause 3.4 (f);
 - iii. DB Co shall demonstrate other operational capabilities of the SI that can be tested independently of the Existing Confederation Line, including operations in normal, abnormal, and emergency scenarios.

- D. The City shall provide vehicles and Operators as needed by DB Co to successfully complete SIT based on the resource requirements documented in the City-approved test plans and test procedures.
- (g) System Testing & Commissioning Verification
- (i) The following commissioning checklist items shall be verified by the Systems Integration Verifier as has having been performed or provided as part of the East Works and West Works in connection with obligations under this Schedule 14 – Testing & Commissioning as conditions to achieving East Substantial Completion and West Substantial Completion:
 - A. all System Infrastructure has been installed, tested and certified pursuant to Schedule 15 – Output Specifications;
 - B. all required static and dynamic testing has been completed;
 - C. successful completion of SIT of the East Works, or West Works, as the case may be, to demonstrate that the systems operate in accordance with the requirements of this Project Agreement;
 - D. all specified contractual documentation has been delivered by DB Co;
 - E. all tools and test equipment to maintain the System Infrastructure have been delivered by DB Co;
 - F. DB Co’s required training of operations and maintenance staff has been successfully completed in accordance with Schedule 15-2 Part 1;
 - G. all documentation including drawings and User and Maintenance Manuals have been submitted to the City in accordance with Schedule 10 – Review Procedure;
 - H. DB Co has identified specialized tools and test equipment necessary to maintain the system and all specialized tools and test equipment have been delivered to the City in accordance with Schedule 15 – Output Specifications;
 - I. all New Municipal Infrastructure is installed, tested and certified pursuant to the contractual obligations;
 - J. the Compliance Verification and Validation Matrix has been completed;
 - K. there are no outstanding defects affecting rail systems functionality, including track, signals and communications;
 - L. there are no major safety defects in the System Infrastructure that could affect the safety of personnel or equipment or the safe running of the Systems Infrastructure;

- M. all Stations are substantially complete with only Minor Deficiencies remaining; and
 - N. all hardware, software and licenses for DB Co scope necessary to operate and maintain the System Infrastructure have been delivered by DB Co.
- (h) The Testing & Commissioning Program shall provide for the oversight and monitoring of testing and commissioning activities for the duration of the Project Operations by the City and System Integration Verifier as outlined in 1.3 (g). The City reserves the right to witness any test, audit or inspection.
- (i) In addition to the tests specified in Schedule 15-2 and this Schedule 14 the City and the System Integration Verifier shall have the right, when acting reasonably, to identify specific testing requirements that shall require validation.
- (j) DB Co shall prepare and submit individual test plans and procedures, in accordance with Schedule 10 – Review Procedure for all tests of New City Infrastructure a minimum of 30 days in advance of such tests. DB Co shall provide the City with a minimum of 21 days advance notice of such tests. .
- (k) The DB Co Testing & Commissioning Coordinator shall convene a meeting of the Testing & Commissioning Team to review the Testing & Commissioning Program, set testing and commissioning parameters, designate the responsibilities of the various parties and establish the documentation requirements for each stage of the Works and the commissioning process.
- (l) The DB Co Testing & Commissioning Coordinator shall submit monthly reports to the City and the Systems Integration Verifier detailing the progress of testing and commissioning activities.
- (m) DB Co, in implementing the Testing & Commissioning Program, shall verify that all requirements of the Testing & Commissioning Program have been met, including that:
 - (i) the New City Infrastructure has been installed and is operating in accordance with the requirements of this Project Agreement;
 - (ii) the performance of the New City Infrastructure meets the requirements of the Output Specifications and this Project Agreement;
 - (iii) As-built Drawings, Record Drawings, Design Certificates, Construction Certificates, LEED Certification for Moodie LMSF, and operating and maintenance manuals have been provided in accordance with this Project Agreement.
- (n) The City shall provide orientation to the System Infrastructure constructed by DB Co to the Ottawa Emergency Services, including; the Fire Departments, Paramedics, and Police pursuant to Schedule 15-2, Part 1.

1.4 Testing & Commissioning Team

- (a) The Testing & Commissioning Team shall be comprised of:

- (i) DB Co Testing & Commissioning Coordinator;
 - (ii) DB Co Testing & Verification Manager;
 - (iii) Systems Integration Verifier
 - (iv) representatives of the City;
 - (v) Independent Certifier; and
 - (vi) where applicable, Subcontractors and representatives of the equipment manufacturers.
- (b) DB Co and each of its Subcontractors shall assign, where applicable, individuals from each relevant trade to the Testing & Commissioning Team and shall ensure that representatives of the City and relevant Systems and equipment manufacturers and testing agencies are present during the DB Co Testing & Commissioning Team meetings.
- (c) DB Co shall provide all necessary labour, materials, equipment, testing apparatus and incidentals necessary to verify performance test of each item of New City Infrastructure provided as part of the Works.
- (d) After Financial Close, the Testing & Commissioning Team shall, when applicable, meet monthly to review the progress of the development of the Testing & Commissioning Program. 60 days prior to the commencement of testing, the Testing & Commissioning Team shall, when applicable, meet weekly to review the progress and schedule of testing and commissioning activities.

1.5 Testing and Commissioning Procedures

- (a) DB Co shall ensure that all regulation and code references in the Reference Documents, in addition to the provisions of Schedule 15 – Output Specifications have been fully complied with.
- (b) The DB Co Testing & Commissioning Coordinator shall plan, prepare documentation and execute the Testing & Commissioning Program process and procedures. Specifically, the DB CO Testing & Commissioning Coordinator or DB Co Testing & Verification Manager shall:
 - (i) prepare test plans, schedules and resource requirements;
 - (ii) prepare test procedures;
 - (iii) oversee the performance of tests and documentation of test results;
 - (iv) oversee re-testing, if necessary; and
 - (v) submit certified test reports.
- (c) DB Co shall ensure that each of the requirements set out in this Schedule 14 and those identified in Schedule 15 – Output Specifications are met.

- (d) Training:
 - (i) DB Co shall provide operational and maintenance training and manuals for all System Infrastructure including, but not limited to:
 - A. Traction Power/OCS
 - B. S&TCS;
 - C. Communications;
 - D. Fire/life safety and safety and security systems;
 - E. Track and right of way;
 - F. Station facilities equipment and systems;
 - G. LMSF facilities equipment and systems; and
 - H. Tunnel and guideway facilities equipment and systems.
 - (ii) DB Co shall provide a training schedule, training plans and agenda for each training session to the City, submitted in accordance with Schedule 10 - Review Procedure.
 - (iii) The DB Co Testing & Commissioning Coordinator or designated delegate shall attend a sample of every training session to ensure the agenda is maintained and that quality training is provided. One training session for each category shall be video recorded in digital format. The video shall be submitted to the City on appropriate media for City viewing and labelled accordingly.
 - (iv) Training shall be conducted at the operating station for Systems or such DB Co supplied equipment.
 - (v) All training sessions shall be logged and personnel shall be recorded as receiving training. Further refreshers shall be scheduled in line with safety, quality and training requirements.
 - (vi) Operational and maintenance training shall be completed prior to achievement of Substantial Completion.
 - (vii) RTG/City Party shall be responsible for providing training related to Remaining Systems Integration Works.

1.6 DB Co Testing & Commissioning Submittals

- (a) DB Co shall prepare and submit to the City, test plans and procedures and test forms, verification forms and performance test forms for all equipment and Systems. Test plans and procedures should provide full traceability to the requirements of Schedule 15 – Output Specifications. Test procedures should include but not be limited to the following:

- (i) test objectives including compliance matrices identifying the relevant Project Agreement clauses that are being verified and validated;
 - (ii) required safety methods and prerequisite training required;
 - (iii) associated tests and pass/fail criteria;
 - (iv) reference specifications/standards and supporting literature;
 - (v) staffing requirements including requirements from the City or other third parties;
 - (vi) test methods;
 - (vii) required instrumentation, equipment, facilities and supporting systems;
 - (viii) test location;
 - (ix) pass/fail criteria;
 - (x) identification of professional personnel and resumes of those responsible for sign-off; and
 - (xi) test results and recommendations.
- (b) DB Co shall submit test plans and procedures to the City for review and approval a minimum of 60 days prior to the respective test.
- (c) DB Co shall create the Testing & Commissioning Schedule as specified in Schedule 12 – Works Scheduling Requirements. The Testing & Commissioning Schedule shall include: RTG’s static and dynamic testing; SIT activities related to the Remaining Systems Integration Works; SIT of Vehicle/S&TCS integration; and the SIT demonstrations of operational performance requirements.
- (d) DB Co shall clearly identify all upcoming testing and commission activities in Informal Implementation Schedules, as defined in Schedule 12- Works Scheduling Requirements.
- (e) DB Co shall prepare and submit monthly updates on the progress of testing and commissioning activities in accordance with Schedule 33 – Works Report Requirements.
- (f) DB Co shall prepare and submit to the City detailed commissioning manuals for each item of New City Infrastructure provided as part of the East Works, West Works, Highway Works and Remaining Works, as applicable (the “**Manuals**”) in accordance with Schedule 10 – Review Procedure.
- (g) The Manuals shall include:
- (i) name and logo as directed by the City;
 - (ii) name of the Project;
 - (iii) Project number;

- (iv) identification of each item of System Infrastructure, New Municipal Infrastructure or Highway Works, as applicable;
 - (v) the date that each system item was tested/verified;
 - (vi) the signature of the DB Co Testing & Commissioning Coordinator;
 - (vii) issue and date;
 - (viii) document version control;
 - (ix) document amendments table;
 - (x) test reports;
 - (xi) configuration control records;
 - (xii) equipment check sheets (start-up, verification and performance) for each item of the System Infrastructure, New Municipal Infrastructure or Highway Works, as applicable, provided as part of the Works; and
 - (xiii) interim and final acceptance check sheets for each item of the System Infrastructure, New Municipal Infrastructure or Highway Works, as applicable.
- (h) DB Co shall prepare and submit operations and maintenance manuals in accordance with the requirements of Schedule 10 - Review Procedure.
 - (i) DB Co shall prepare and submit configuration control records in the format provided by the City and in accordance with the requirements of Schedule 10 - Review Procedure.
 - (j) DB Co shall provide a minimum of two years' worth of consumables for all elements of the System Infrastructure in accordance with the manufacturers' recommendations for maintenance for each element, in addition to the spare parts requirements under the Interface Agreement.

1.7 Coordination with the City and Independent Certifier

- (a) The DB Co Testing & Commissioning Coordinator shall co-ordinate with the City and Independent Certifier throughout the testing and commissioning process. This co-ordination shall include:
 - (i) review of test, verification and performance test forms;
 - (ii) review of testing progress management forms and performance testing;
 - (iii) review of the DB Co Testing & Commissioning Program;
 - (iv) review of the Testing & Commissioning Schedule;
 - (v) witnessing of installation and performance testing;

- (vi) review of the training curriculum and materials as outlined in Schedule 15-2, Part 1, Article 17 – Operations Training, and scheduling;
 - (vii) review of the operations and maintenance manuals;
 - (viii) sample witnessing of seasonal performance testing as applicable;
 - (ix) review of the test reports;
 - (x) attendance at Testing & Commissioning Team meetings; and
 - (xi) reporting progress of the Testing & Commissioning Program.
- (b) The Independent Certifier shall review compliance matrices to ensure traceability between testing requirements and testing procedures.

1.8 Trial Running

- (a) After Substantial Completion the City will undertake Trial Running of the System Infrastructure on the East Works and West Works to validate that the fully integrated system functions in accordance with the requirements of this Project Agreement. Without prejudice to Sections 11.12(j), (k), 18.5 and 18.7 of the Project Agreement, Trial Running for the East Works, and West Works shall demonstrate that the specified travel times, headways and operational performance requirements outlined in Schedule 15-2, Part 1, Article 3 can be achieved, based on the Vehicles achieving the performance characteristics provided by the City. Trial Running shall be integrated with regular revenue service on the Existing Confederation Line operating segment and extended along the East Works, or West Works, as the case may be. Passengers shall not be carried on the new operating segments during the Trial Running period. The Trial Running shall simulate the operation of the full regular scheduled service on the System Infrastructure for a minimum 21 day period. For the purposes of this Project Agreement, Trial Running shall be deemed completed upon completion of the minimum 21 days of Trial Running without an interruption due to warranty work for at least 14 consecutive days. Completion of Trial Running shall be a condition of East Final Completion and West Final Completion, as the case may be, provided that Trial Running completion has not been achieved within 90 days of the relevant Substantial Completion Date for reasons other than due to the fault of DB Co or any DB Co Party, Trial Running shall be deemed to have been completed for the purposes of the Final Completion under this Project Agreement.
- (i) The fundamental objective of Trial Running is to test and exercise the respective System Infrastructure, including all subsystems, that comprise the relevant works, operating personnel and operating procedures to demonstrate the East Works and West Works can reliably implement passenger service without interruptions. This can be subdivided into the following key objectives:
 - (A) to validate the performance of the East and West System Infrastructure with operating and maintenance staff who are trained on the operation

and maintenance of the System Infrastructure and Standard Operating Procedures;

- (ii) The following are DB Co's responsibility during Trial Running
 - (A) DB Co's Testing and Commissioning Team shall participate on a day to day basis. DB Co shall actively participate with the City Representative in the daily meetings to; review performance, service availability and delay issues as they relate to East Works or West Works and review any maintenance and rehabilitation services on the East Works or West Works for the System Infrastructure that could potentially affect System Infrastructure operation or public safety.
 - (B) DB Co shall use the Trial Running period to review the operating data and evaluate system reliability, availability, and maintainability performance for the East Works and West Works. Using prescribed procedures, data on service deviations will be collected and assigned against the specific subsystems down to the Line Replaceable Unit (LRU) level. The database shall provide verification of system reliability to the LRU level.

APPENDIX A INSPECTION, COMMISSIONING AND HANDOVER

NEW MTO INFRASTRUCTURE

For clarity, the obligations of DB Co in this Appendix A are in addition to and not in substitution of any other requirements for commissioning of the Works and/or any other requirements in respect of the New MTO Infrastructure contained in the Project Agreement or this Schedule 14, including, for clarity, the process and requirements set out in Section 25 of the Project Agreement. The obligations in this Appendix A are in respect of New MTO Infrastructure only.

1. INSPECTION, COMMISSIONING AND HANDOVER

1.1 Interim Inspection of New MTO Infrastructure

- (a) DB Co shall comply with all requirements set out in this Schedule 14 – Testing & Commissioning (including, for clarity, this Appendix A) as well as all requirements set out in Section 25.16 of the Project Agreement in connection with interim inspections of New MTO Infrastructure.
- (b) DB Co shall notify the City of achievement of all milestones set out in the Inspection and Test Plan in respect of New MTO Infrastructure as well as all Witness Points and Hold Points in respect of New MTO Infrastructure.

1.2 Final Inspection of New MTO Infrastructure

- (b) DB Co shall comply with all requirements set out in this Schedule 14 – Testing & Commissioning (including this Appendix A) as well as all requirements set out in Section 25.16 of the Project Agreement in connection with final inspections of New MTO Infrastructure.
- (c) Prior to final inspection of New MTO Infrastructure, DB Co shall, in addition to all other requirements set out in Section 25.16 of the Project Agreement:
 - (i) remove all temporary work no longer required from the site subject to final inspection, including but not limited to fencing, sign board, samples, and any other items not considered to be part of New City Infrastructure or New MTO Infrastructure, except for those items required for ongoing Works; and
 - (ii) clean all New MTO Infrastructure prior to Handover following final inspection of such New MTO Infrastructure including:
 - (A) sweeping/spraying of roads, boulevards and sidewalks;
 - (B) flushing of sewers; and
 - (C) cleaning out of catch basins, maintenance holes, and valve chambers, all taking into account ongoing Works.
- (d) The final inspection of New MTO Infrastructure shall be completed pursuant to Section 25.16 of the Project Agreement. The Final Inspection Checklist included in Exhibit 1 to this Appendix shall be signed off by all representatives completing the final inspection.

1.3 Pre-Conditions to Handover of New MTO Infrastructure

In addition to any other requirements in the Project Agreement, DB Co shall complete the following activities prior to, and as a condition of, Handover of New MTO Infrastructure:

- (a) paving of all road surfaces;
- (b) completion of all structures and drainage systems;
- (c) full operation of all traffic lighting and signalization;
- (d) completion of all permanent pavement markings at all intersections and on all major roads;
- (e) installation of all regulatory, warning and guide signing;
- (f) installation of all median and roadside barrier and other safety devices;
- (g) installation of all illumination;
- (h) installation of all ITS/ATMS equipment and civil infrastructure;
- (i) installation of all safety devices;
- (j) signing of the New MTO Infrastructure in accordance with PHM-125;
- (k) return of all construction staging areas located on the MTO Lands to their original condition or a condition otherwise acceptable to City;
- (l) issuance of a completed and signed Stage 4 Road Safety Audit Certificate in respect of the Highway Work to the City Representative;
- (m) clearing and removal of all debris, superfluous materials and equipment from Highway Corridor Lands, as defined in Schedule 20 - Lands;
- (n) submission to the City Representative of all MTO Construction Certificates in respect of Handover, in accordance with Appendix B of Schedule 10 – Review Procedure; and
- (o) submission to the City Representative of a complete set of As-built Drawings, and Record Drawings in accordance with the requirements of Article 16 of Schedule 15-2 Part 1.

EXHIBIT 1 TO APPENDIX A – NEW MTO INFRASTRUCTURE

Commissioning Requirements and Sign Off

| Item | Comments | Sign-Off |
|--|--|--|
| Final Inspection of the Highway Works representation from <ul style="list-style-type: none"> • Independent Certifier • DB Co | <p>The Project Agreement is intended to allow the Independent Certifier to review the completed Highway Work and ensure that there are no safety issues and that correct signing is in place.</p> <p>It is also important to confirm that all legislative and regulatory requirements are in place such as regulations for stop signs or speed limit signs.</p> <p>Items for review include <u>but are not limited to</u>:</p> <ul style="list-style-type: none"> • Signs (correct and supported by required regulations) • Pavement markings Alignment • Signals- temporary removals and permanent in place • Bike Lanes/Ped sidewalks in conformance with contract • Utility company sign offs Traffic signal operations • Illumination • PHM-125 signed • Commercial and private entrances • Any safety devices are correctly located and operational i.e. guide rail, illumination, active advance warning signs etc. • Final electrical inspection • All contractor testing documentation available and submitted to City Zone painting restored • Maintenance activities completed • All guiderail installed and verification of mounting heights • Signs restored and replaced if damaged by contractor • Erosion control temporary devices removed • All claims resolved | <p>No obvious safety issues are present on this section of highway and all legislative and regulatory requirements are in place.</p> <hr/> <p>DB Co, P.Eng.</p> <hr/> <p>Independent Certifier</p> |

SCHEDULE 15
OUTPUT SPECIFICATIONS
[REDACTED]

SCHEDULE 15-1

TECHNICAL TERMS AND REFERENCE DOCUMENTS

PART 1 TECHNICAL TERMS AND REFERENCE DOCUMENTS..... 1

 ARTICLE 1 DEFINITIONS..... 1

 ARTICLE 2 ACRONYMS..... 24

 ARTICLE 3 REFERENCE DOCUMENTS..... 41

PART 1
TECHNICAL TERMS AND REFERENCE DOCUMENTS

ARTICLE 1 DEFINITIONS

100-Year Storm means a storm event with a return period of one hundred (100) years (1-percent annual exceedance probability), as described in the City of Ottawa Sewer Design Guidelines.

100-Year Plus 20% Storm means a 100-Year Storm calculated on the basis of a 20% increase of the City's Intensity Duration Frequency (IDF) curves.

Access Point means radio transceivers connected to the CBTC network that allow network communications between trains and wayside CBTC equipment.

Accident means an unforeseen event or occurrence which causes death, injury or property damage. Any event involving the revenue service operation of a rail fixed guideway system if as a result:

- An individual dies;
- An individual suffers bodily injury and immediately receives medical treatment away from the scene of the accident; or
- A collision, derailment, or fire causes substantial property damage.

Alert Level has the meaning given in Schedule 15-2, Part 2, Article 7 – Geotechnical Design Criteria and Requirements.

Ancillary Facilities means those facilities, buildings, or structures adjacent to or directly linked to Stations. They can also be standalone facilities or structures located within or adjacent to the alignment. They include the following elements:

- Pedestrian overpass or underpass structures;
- Passenger shelter structures;
- Structures containing mechanical, electrical, communications or other service equipment;
- TPSS Buildings;
- Signal equipment enclosures;
- Parking areas;
- Entrances;
- PPUDO;
- Public washrooms;

- Bus terminals;
- Bus layby areas; and
- Bus Operations support building (including bus supervisor office).

Applicable Codes has the meaning ascribed to “Applicable Law” in Schedule 1 – Definitions and Interpretation.

Art Consultant means the person or persons responsible for the administration of the Art Program on behalf of the City.

Art Program includes both temporary and permanent artwork projects that may be linked, permanently affixed to and / or integrated into the architectural and / or landscape Design along the streets, Guideway, park land, or on the exterior or within the interior of the Stations.

Authorities Having Jurisdiction has the meaning given in NFPA 130.

Automatic Train Control means a vital system for controlling train movement.

Automatic Train Operation means a non-vital overlay for controlling train speed and operation within the limits allowed by the ATP system. Automatic Train Operation provides automatic station stopping, door opening and closing and automatic operation between stations.

Automatic Train Operation Mode means an LRV Train operation mode in which CBTC Automatic Train Operation capabilities are enabled on top of ATP.

Automatic Train Protection means a vital system for enforcing safe train movement and speeds.

Automatic Train Protection Only Mode means a mode of LRV train operation in which only CBTC ATP functions are enabled.

Automatic Train Supervision means a non-vital system providing supervisory commands to adjust train speeds and station dwell times and to request interlocking systems to set up and cancel routes.

Availability means the probability that a system or system element will be operational when required. Mathematically, the ratio of the mean time between failure and the sum of the mean time between failure and the mean down time.

Backup Control Centre means an emergency control center facility providing a remote location complete with the basic functioning systems to dispatch, monitor, and control operations of the OLRT in case the TOCC at 875 Belfast is unavailable.

Baseline Storm Sewer Outfall means the outfall of the 3.0m x 1.8m storm sewer to Pinecrest Creek, located immediately north of the property at [REDACTED].

Basic Day Demand is as defined in Schedule 15-2, Part 2, Article 8 – Utility Infrastructure Design Criteria.

Blast Assessment Report is as defined in Schedule 15-2, Part 2, Article 7 – Geotechnical Design Criteria and Requirements.

Bridge means a structure that provides a Roadway, railway or walkway for the passage of vehicles, pedestrians or cyclists (or other similar forms of transportation) across an obstruction, gap or facility that is greater than 3 metres in span.

Central Instrument House means a wayside control room housing all the controls for an interlocking or group of interlockings.

Certifiable Elements Lists has the meaning given in Schedule 15-2, Part 1, Article 7 – System Safety Certification.

Certification Program Representative has the meaning given in Schedule 15-2, Part 1, Article 7 – System Safety Certification.

Checked Redundancy Principle has the meaning given in Schedule 15-2, Part 1, Article 7 – System Safety Certification.

Civil Works means the installation or relocation of duct banks, manholes, hand wells, vaults, transformer bases, and pads, or underground support structures in speciality structures.

Closed Circuit Television means a video transmission system monitoring a location, recording images and presenting the images to a central location.

Commissioning means the inspection of all components to verify that they are designed, installed, tested, operated and maintained according to the operational requirements of the owner or final client, including Utility Companies.

Communication and Stakeholder Engagement Plan has the meaning given in Schedule 18 – Communications and Stakeholder Engagement Obligations.

Communication Based Train Control means a system of tracking train movement and safely controlling that movement based upon communications between trains and wayside controllers.

Compensating Construction has the meaning given to that term in the OBC.

Complete Streets means the incorporation of physical elements that allow a street to offer safety, comfort and mobility for all users of the street regardless of their age, ability, or mode of transportation.

Concourse Level means the intermediate level of a Station that connects Platform Level and entry level.

Confederation Line means all of the Existing Confederation Line, the Confederation Line East Extension and the Confederation Line West Extension.

Confederation Line Extension means both the Confederation Line East Extension and the Confederation Line West Extension.

Confederation Line Regulations means the bylaws, guidelines, policies, regulations, rules, standards, safety management system requirements and Security management system requirements, or similar instruments or requirements, adopted by the City from time to time in relation to the regulation of the design, construction, operation, maintenance, Safety and Security of, as well as the rates and conditions of service of, the Confederation Line, including the System Infrastructure.

Connaught Tunnel has the meaning given in Schedule 15-2, Part 1 – General Requirements.

Connecting Track has the meaning given in Schedule 15-2, Part 2, Article 3 – Trackwork.

Construction Safety Management Plan has the meaning given in Schedule 15-2, Part 1, Article 10 – Construction Safety Management.

Controller means a City employee that will be assigned to the TOCC and will be responsible for all dispatching functions for the system.

Corrosion Control and Stray Current Mitigation Coordination Management Plan has the meaning given in Schedule 15-2, Part 3, Article 12 – Corrosion Control.

Counting Stations and Loops is as defined in Schedule 15-2, Part 9 – Highway Works.

Crime Prevention through Environmental Design means the design, maintenance, and use of the built environment in order to reduce both the incidence and fear of crime. It involves the application of these three core principles: natural surveillance, natural access control, and territorial reinforcement.

Cross-Acceptance means the status achieved by a product that has been accepted by one authority to the relevant Standards and is acceptable to other authorities without the necessity for further assessment.

Crossride means a crosswalk for bikes that allow cyclists to remain on their bikes and safely cross through intersections, identified with thick painted blocks on either side, sometimes enhanced with arrowed bicycle stencils and/or green paint.

Culvert means a structure that forms an opening through soil to allow the passage of surface water, wildlife or pedestrians under a Roadway, railway or roadside entrance.

Cut-and-Cover means a construction method for Underground Structures where the structure is constructed in an excavated trench or pit from the bottom up or the top down and covered with backfill. Underground Structures to be constructed by Cut-and-Cover methods are Tunnels, Underground Station Boxes, portals, shafts and Tunnel pump stations.

Daily Lane Closure Report has the meaning given in Schedule 15-2, Part 7, Appendix D – Daily Lane Closure Report.

Daily Traffic Management Site Record has the meaning given in Schedule 15-2, Part 7, Appendix B – Daily Traffic Management Site Record.

Daily Traffic Monitoring Report has the meaning given in Schedule 15-2, Part 7, Appendix C – Daily Traffic Monitoring Report.

Data Management Protocol (DMP) has the meaning given in Schedule 15-2, Part 2, Article 7, Geotechnical Design Criteria and Requirements.

Deadhead Bus means a bus carrying no passengers and generating no revenue, usually travelling to/from the garage or to/from the start of a bus route.

Demolition Plan has the meaning given in Schedule 15-2, Part 1, Article 14 – Demolition, Removals and Disposal.

Design Criteria means established parameters used during design.

Design Life means the period of time specified by the Owner during which an asset is intended to remain in service.

Design Safety means safety achieved by the integration of safety features into the system design characteristics to prevent or minimize the probability of operation in an unsafe manner.

Designated Waiting Area means TSA used in Schedule 15-2, Part 4, Appendix B and C.

Developer's Guide has the meaning given in Schedule 15-2, Part 2, Article 9 – Protection of Existing Adjacent Structures.

Drainage means the interception and removal of surface water or groundwater by constructed or natural means.

Dwell Time means the amount of time a Train resides at a Station measured from the time the Train wheels come to a stop to the time the Train wheels start moving.

Earth Borrow means a loose soil, sand, silt, or clay stratum that is capable of sustaining the growth of proposed trees and shrubs.

East Portal has the meaning given in Schedule 15-2, Part 1, Article 2 – Physical Layout.

Electromagnetic Interference/Compatibility Control Plan has the meaning given in Schedule 15-2, Part 3 – Systems.

Elements of Continuity has the meaning given in Schedule 15-2, Part 4, Article 2 – Architectural Design Criteria.

Elements of Variability has the meaning given in Schedule 15-2, Part 4, Article 2 – Architectural Design Criteria.

Elevated Guideway means a Guideway elevated above grade by means of a Structure.

Emergency Guard Rail (Steel Inner) is intended to contain and guard a derailed truck, keeping the Vehicle upright and on the Track structure.

Emergency Response Plan has the meaning given in Schedule 15-2, Part 1, Article 8 – Security and Emergency Management.

Emergency Services means Emergency Services Provider as defined in Schedule 1 – Definitions and Interpretation.

Emergency Stop Buttons has the meaning given in Schedule 15-2, Part 3, Article 10 – Signalling and Train Control System.

Emergency Stop Devices has the meaning given in Schedule 15-2, Part 3, Article 10 – Signalling and Train Control System.

Emergency Stop Key Switches has the meaning given in Schedule 15-2, Part 3, Article 10 – Signalling and Train Control System.

Emergency Traffic Plan has the meaning given in Schedule 15-2, Part 7 – Traffic and Transit Management and Construction Access.

Engineering Safety and Assurance Case means the final safety case, providing documented safety evidence demonstrating that the product (i.e. a System, sub-system or equipment) complies with the specified safety requirements and demonstrating that the System is safe for revenue operation.

Environmental Management Plan has the meaning given in Schedule 17 – Environmental Obligations.

Erosion and Sediment Control Plan means the approach, techniques and measures used to prevent erosion during the construction process, to deal with suspended sediment at the source and minimize sediment transport from leaving the construction site, as per Schedule 15-2, Part 2 – Civil and Guideway, and Schedule 17 – Environmental Obligations.

Excavated and Imported Materials Management Plan has the meaning given in Schedule 17 – Environmental Obligations.

Existing Adjacent Structures means existing property, building, Bridge, retaining structure, Foundation, existing and under-construction Structure, railway, road surface, Drainage Culvert, Tunnel, excavations, Utility, temporary construction Utility, and man-made features of interest or other Structures located within the Project ZOI.

Existing Confederation Line means that portion of the Confederation Line located between and including Blair Station in the east and Tunney's Pasture Station in the west, including all associated Trackwork, which was the subject of a previous procurement by the City.

Existing Tree Protection/Monitoring Plan has the meaning given in Schedule 15-2, Part 6 – Urban Design, Landscape Architecture and Connectivity Requirements.

Facilities means the above-grade structures, at-grade structures, below-grade structures, mechanical elements, electrical elements, interior areas, and exterior areas described in Schedule 15-2, Part 4 – Stations, Part 5 – LMSF, and Part 6 – Urban Design, Landscape Architecture and Connectivity, including but not limited to: Stations, LMSF and Associated Facilities.

Failure means the event, or inoperable state, in which any item or part of an item does not, or would not perform as previously specified, regardless of the operational state of the subsystem.

Failure Review Board has the meaning given in Schedule 15-2, Part 1, Article 7 – System Safety Certification.

Fail Safe means a characteristic of a system and its elements, the object of which is to ensure that any fault or malfunction will not result in an unsafe condition.

Fail Safe Principle has the meaning given in Schedule 15-2, Part 1, Article 7 – System Safety Certification.

Fare Paid Zone means the area within transit stations in which Passengers shall have paid a fare and allows customers to transfer between modes of transit without passing through fare control barriers, revalidating fare payment on either the bus or when entering a train station, or passing in and out of a proof of payment zone.

Fault Tree Analysis means a systematic analysis of single and multiple events used for identifying the probability of occurrence of an undesired event using AND gates, OR gates, and Boolean algebra. FTA's produce graphic representations of failures and events which may result in a pre-selected top-level event to occur.

Federal Lands mean all lands owned and managed by all federal government departments.

Federally Mandated Stations means those stations within the project that are subject to Federal Land Use Agreement letters.

Fire Life Safety means those aspects of safety specifically related to the prevention, detection and response to fire, smoke and toxicity hazards.

Fire Life Safety and Security Committee means the committee that acts as a review board of the activities, analyses, and reports generated on fire/life safety issues.

Fire Life Safety System means: (a) emergency exit buildings, emergency pathways, emergency walkways, Tunnel cross passages, emergency stairs, emergency doors and emergency way-finding signage any other elements provided for the purposes of emergency egress; and (b) fire alarms, fire sprinkler systems, fire extinguishers, fire standpipe, emergency ventilation systems, fire fighter telephones, emergency lighting, emergency and standby power sources, and emergency response vehicles; and (c) any other assets provided for the purposes of fire/life safety and evacuation.

First Article Inspection means a design verification and design history file and a formal method of providing a reported measurement for a given manufacturing process.

Fitups means infrastructure required to operate a bus stop or a bus station, such as, but not limited to, shelters, benches, signage, garbage cans, lighting, PIDS, and power and communications necessary to support the elements.

Flooding means overflowing or ponding of water at the surface in areas that are not intended to be submerged.

Flyover Structure means the Guideway Structure to be constructed for the purposes of carrying the Guideway from the north side of OR174 to the median of OR174.

Foundation means a structure that transfers loads to the earth.

Generic Product means a product independent of applications, fulfilling predefined boundary conditions, interfaces and functionality.

Generic Application means a generic application can be re-used for a class/type of application with common functions.

Geotechnical Instrumentation and Monitoring Plan has the meaning given in Schedule 15-2 Part 2, Article 7 – Geotechnical Design Criteria and Requirements.

Greenfield has the meaning given in the City of Ottawa Sewer Design Guidelines.

Ground Movement means the movement of ground directly or indirectly caused by construction activities. Ground Movement may manifest itself in such ways as surface settlement, ground settlement, the movement of retained excavation systems, the movement of slopes, and the ground vibrations arising from construction activities.

Grounding and Bonding Plan has the meaning given in Schedule 15-2, Part 3, Article 1 – Introduction.

Guideway means the part of a passenger LRT system on which the Track is located, with a boundary marked by right-of-way fences, curbs and parapets or in a Tunnel; Guideway shall include the areas of intersections with City roads formed if the Guideway's curb-line had been continued over the City road.

Haul Route Plan has the meaning given in Schedule 15-2, Part 7 – Traffic and Transit Management and Construction Access.

Hazard means any real or potential condition that can cause injury, death, or damage to or loss of equipment or property.

Hazard Analysis means any analysis performed to identify hazardous conditions for the purpose of their elimination or control.

Hazard Log has the meaning given in Schedule 15-2, Part 1, Article 7 – System Safety Certification.

Hazard Resolution means the analysis and subsequent actions taken to reduce, to the lowest level practical, the risk associated with an identified Hazard.

HWY 417 E-N/S Pinecrest Rd Ramp Tunnel has the meaning given in Schedule 15-2, Part 1 – General Requirements.

Incident Control Panel means a restricted access panel which permits the Emergency Services to gain fire telephone contact with the TOCC and other fire telephones. The ICP shall contain the fire alarm annunciation panel, required safety documentation and maps, and a PA microphone. Additionally, only at Underground Stations, the ICP shall include a ventilation control panel, telephone dial pad access to the Station's nominated area of refuge, and video feed monitoring.

Infill has the meaning given in the City of Ottawa Sewer Design Guidelines.

Initial Works means the Works undertaken by DB Co in the first 120 days following Commercial Close.

Interface Hazard Analysis means a process of identifying hazards and analysing their causes at System or equipment boundaries, and the derivation of requirements to limit the likelihood and consequences of hazards to a tolerable level.

Intermittent Period means a period time that occurs at irregular intervals. (Ex: changing traffic patterns for peak hours versus non-peak hours, day versus night, weekday versus weekend).

Intrusion Access Control System has the meaning given in Schedule 15-2, Part 3 – Systems.

Landscape Plan has the meaning given in Schedule 15-2, Part 6 – Urban Design, Landscape Architecture and Connectivity.

Lane Closure Measurement and Verification Plan has the meaning given in Schedule 15-2, Traffic and Transit Management and Construction Access.

Lane Shift means a transfer of traffic along lane(s) of the same route and which, using existing Roadway lanes or surfaces, guides traffic around the work zone.

Lead Track has the meaning given in Schedule 15-2, Part 2, Article 3 – Trackwork.

Legal Survey means a survey that is prepared by an Ontario Land Surveyor for the Registration or Deposit in the Provincial Land Registry Office to facilitate a conveyance by providing a Registerable description, effect an expropriation or to confirm the location of a property boundary.

Level of Service has the meaning as described in the City of Ottawa's Transportation Impact Assessment Guidelines, when used in Schedule 15-2, Part 7 – Traffic and Transit Management and Construction Access.

Light Rail Vehicles means a form of urban rail public transportation that generally has a lower capacity and lower speed than heavy rail and metro systems, but higher capacity and higher speed than traditional street-running tram systems. The term is typically used to refer to rail systems with rapid transit-style features that usually use electric rail cars operating mostly in private rights-of-way. LRVs are typically powered by a pantograph collecting power from an overhead catenary.

Long Term Lane Closure means a closure of any vehicular lane, including but not limited to traffic, transit and cycling lanes, for a period of longer than two weeks.

Low Impact Development means a SWM strategy that seeks to mitigate the impacts of increased runoff and stormwater pollution by managing runoff as close to its source as possible.

Mainline Track has the meaning given in Schedule 15-2, Part 2, Article 3 – Trackwork.

Mainline Storage Track or Storage Track has the meaning given in Schedule 15-2, Part 2, Article 3 – Trackwork.

Maintainability means the quality of the combined features of equipment design and installation that facilitates the accomplishment of inspection, test, checkout, servicing, repair, and overhaul with a minimum of time, skill, and resources in the planned maintenance environments.

Maintainability Program Plan has the meaning given in Schedule 15-2, Part 1, Article 7 - System Safety Certification.

Maintenance Vehicles means vehicles that are capable of being rail-mounted and used by staff in the performance of maintenance duties on System Infrastructure.

Major Municipal Roads means a City freeway, Arterial Roadway or Major Collector Road as defined in the latest City of Ottawa Transportation Master Plan.

Manual Release Mode means a latched mode of train operation for moving trains at restricted speeds when communications with the wayside CBTC systems has failed.

Maximum Daily Demands is as defined in Schedule 15-2, Part 2, Article 8 – Utility Infrastructure Design Criteria.

Mechanical and Electrical Design Philosophy means the overall concept describing how the mechanical and electrical subsystems that make up the Tunnel Ventilation System should work and thus driving the TVS design.

Minor Municipal Roads means a Collector Road or Local Road as defined in the latest City of Ottawa Transportation Master Plan.

Moodie Yard Control Centre means a facility within the LMSF established to monitor and control yard and shop operations of Train movements, video observation of maintenance functions, intrusion control, IAC Security, and BMS system monitoring from one location.

Movement Authority means the limit of train movement allowed to a Train by the Zone Controller.

Multi-Use Path means a formalized travel surface intended for a wide variety of non-motorized travelers that is physically separated from motorized vehicular traffic, with the exception of bridges, sidewalks and walkways.

Natural Channel Design means an approach to channel design and management using naturally occurring stream processes such that new or reconstructed stream channels and their associated floodplain riparian systems are designed to be functional, stable, healthy, productive, and sustainable, in a way that restores or replicates natural channel system form and functions.

Night Period means the period of time between 22:00 and 5:00 hrs, when used in Schedule 15-2, Part 7 – Traffic and Transit Management and Construction Access, and Part C of Schedule 15-2, Part 9 – Highway Works.

Noise and Vibration Control Plan has the meaning given in Schedule 17 – Environmental Obligations.

Non-Revenue Vehicles means vehicles that are used by staff in the performance of maintenance and operational duties on the OLRT and its related facilities.

Non-Station Entrance refers to any openings of adjacent buildings where air/smoke may penetrate.

OC Transpo Trainers means City employee(s) or contractor who has been trained and certified to instruct OC Transpo employees in certain classifications who are assigned to or have any duties and responsibilities on the system. These classifications include but are not limited to Operator, Station attendant, customer service staff, Controllers, supervisors and superintendents, and security personnel.

Off Peak Period means any period of time which is not a Peak Period or Night Period, when used in Schedule 15-2, Part 7 – Traffic Transit Management and Construction Access, and Part C of Schedule 15-2, Part 9 – Highway Works.

Onboard Computer means a Communications Based Train Control computer located on a rail vehicle that calculates train location and enforces Movement Authorities and Speed Restrictions based on communication with wayside CBTC systems and its own Track Database.

Operations and Maintenance Conformance Checklist has the meaning given in Schedule 15-2, Part 1, Article 7 – Safety Certification.

Operator means the driver of a Revenue Vehicle, which is a City employee who has been trained and certified to operate on the Confederation Line.

Operator Training means a program of Operator training a City employee must attend prior to becoming a certified Operator.

O-Train means the rail system operated by OC Transpo, including both the Confederation Line and the Trillium Line.

Ottawa Traffic Operations Centre means the MTO's traffic management centre (TMC) for coordinated highway management systems. It is at this TMC that the data from the highway system is collected and processed, fused with other operational and control data, synthesized to produce "information", and distributed to stakeholders such as the media, other agencies, and the traveling public.

Over-Dimensional Vehicle is as defined under the City of Ottawa By-law No. 2003-497.

Overhead means a structure where a roadway goes over the railway when used in Schedule 15-2, Part 2, Article 4 – Structural Design Criteria and Requirements.

Overhead Contact System sometimes referred to as **Overhead Catenary System** means a system that distributes DC power from the Traction Power System to the Vehicle via a pantograph on the Vehicle. The OCS consists of a conductive messenger wire suspending a contact wire between poles and/or attachments along the OLRT to provide the DC propulsion power requirements of the Vehicle to the train consist maintaining continuous contact between the pantograph and the contact wire.

Overpass means a structure where the major road goes over a lower category road when used in Schedule 15-2, Part 2, Article 4 – Structural Design Criteria and Requirements.

Park and Ride means parking lots located adjacent to Transitway stations or important transit nodes that are readily accessible by the public from the nearest major roadway.

Parkway Tunnel has the meaning given in Schedule 15-2, Part 1 – General Requirements.

Passengers means passengers and users of the Confederation Line and System Infrastructure.

Passenger Pick-Up and Drop-Off means a designated pick-up and drop-off area for Passengers from private vehicles adjacent to a Station.

Pavement means all structural elements or layers including granular, above the subgrade of a road and shoulders, such as a road, shoulder, sidewalk, plaza or other artificially-covered thoroughfare.

Peak Period means the AM and PM periods each weekday as determined by the City, which encompasses 6:30 to 9:30 hrs and 15:00 to 18:30 hrs, when used in Schedule 15-2, Part 7 – Traffic and Transit Management and Construction Access, and Part C of Schedule 15-2, Part 9 – Highway Works.

Pedestrian Access Plan means a plan that outlines and shows the pedestrian flow, directions, route, volumes to and from and around all facilities, Guideway and Stations, as per Schedule 15-2, Part 1 – General, Part 6 – Urban Design, Landscape Architecture and Connectivity, and Part 7 – Traffic and Transit Management and Construction Access.

Pedestrian Control Plan has the meaning given in Schedule 15-2, Part 6 – Urban Design, Landscape Architecture and Connectivity, and Schedule 15-2, Part 7 – Traffic and Transit Management and Construction Access.

Pedestrian Walkway means any facility that is intended for use by pedestrians, including pedestrian pathways, sidewalks and MUPs.

Permit to Take Water required for any taking of more than a total of 50,000 litres of water in a day under the *Ontario Water Resources Act*.

Permitted Periods for Closures means the periods during which DB Co may implement closures, full closures, detour routes, Lane Shifts and diversions in respect of the various Roadways, as set forth in Schedule 15-2, Part 7 – Traffic and Transit Management and Construction Access.

Physical Constraints means existing Structures (Bridges, Tunnels, buildings, retaining walls), existing Stations, environmentally protected elements (water bodies, SAR, archeological sites, etc) and the Lands. Physical Constraints shall be at the sole discretion of the City.

Platform means that portion of the Station where Trains and or buses stop to load and unload Passengers. There are two basic types of O-Train Platform configuration: centre loading which has the Platform located between each set of Tracks, and side loading, which has the Platforms located on the outside of each set of Tracks. Both Platform types are in use on the system.

Platform Level means the level of a Station with Platform(s) used by Passengers to board and alight from Trains.

Pocket Track has the meaning given in Schedule 15-2, Part 2, Article 3 – Trackwork.

Pre-delivery Test has the meaning given in Schedule 14 – Commissioning.

Preventive Maintenance Plan means the plan establishing the preventive maintenance which is required for the system, as per Schedule 15-2, Part 1, Article 7 – System Safety Certification.

Private Approach Permit has the meaning given in Schedule 15-2, Part 7 – Traffic and Transit Management and Construction Access.

Project means the Confederation Line Extension Project, which consists of the Design and Construction Works for the extension to the Existing Confederation Line system.

Property Access and Business Continuity Plan has the meaning given in Schedule 15-2, Part 7 – Traffic and Transit Management and Construction Access.

Protected Intersection has the meaning given in Schedule 15-2, Part 2, Article 6, Clause 6.19(h)(ix) and Appendix F of Schedule 15-2, Part 7 – Traffic and Transit Management and Construction Access.

Provincial Highways means Highway 416 and Highway 417.

Public Art Plan has the meaning given in Schedule 15-2, Part 1, Article 12 – Artwork.

RAM Prediction Report means a report outlining the System's RAM targets, calculation methodologies and the supporting analysis demonstrating the ability of the proposed solution to meet the System's RAM targets based on prescribed Standards.

Reference Concept means the plans, drawings, reports and other information prepared during the preliminary design for the Project and which reside in the Project Data Room.

Reference Documents means the references, codes, standards, specifications, guidelines, policies, reports, publications, manuals, bulletins and other such documents listed throughout the Output Specification.

Reference Plan is defined in Ontario Regulation 43/96 Part I as a plan deposited under section 150 of the Land Titles Act or section 80 or 81 of the Registry Act and includes any other plan deposited as a reference plan. Part IV describes the requirements, contents, and procedures to be followed for a Reference Plan.

Relevant Authority means any applicable Governmental Authority.

Reliability means the probability that the system or subsystem will perform satisfactorily for a given period of time when used under stated conditions.

Reliability/Availability Program Plan has the meaning given in Schedule 15-2, Part 1, Article 7– System Safety Certification.

Remedial Action Plan has the meaning given in Schedule 17 – Environmental Obligations.

Replacement-In-Kind means replacement of identical or similar nature that satisfies the original design specification.

Requirements Management Plan has the meaning given in Schedule 15-2, Part 3, Article 1 – Introduction.

Response Action Plan has the meaning given in Schedule 15-2, Part 2 – Civil and Guideway.

Restraining Rail is an additional rail installed alongside of the gauge side of the low (inner) rail of a sharp radius curve which share with the running rails the lateral forces generated while the Train is traversing the curve. Restraining rail is to enhance safety by providing additional Vehicle truck guidance, divide lateral wheel forces between two rails, reducing forces on the rail fastening system and divide rail wear over two rail surfaces increasing the time between running rail replacements.

Revenue Vehicles or **Vehicles** are the Light Rail Vehicles which operate on the Confederation Line.

Review Level has the meaning given in Schedule 15-2, Part 2, Article 9 – Protection of Existing Adjacent Structures.

Risk means exposure to the chance of an event resulting in injury or loss.

Risk Assessment has the meaning given in Schedule 15-2, Part 1, Article 8 – Security and Emergency Management.

Risk Log has the meaning given in Schedule 15-2, Part 1, Article 8 – Security and Emergency Management.

Road Close Permit has the meaning given in Schedule 15-2, Part 7 – Traffic and Transit Management and Construction Access.

Road Cut Permit has the meaning given in Schedule 15-2, Part 7 – Traffic and Transit Management and Construction Access.

Road Safety Design Reviews means Design safety reviews that are to be carried out in accordance with Schedule 15-2, Part 2, Article 6 – Roadways, Bus Terminals and Lay-bys.

Road Safety Audit means an audit carried out in accordance Schedule 15-2, Part 2, Article 6 – Roadways, Bus Terminals and Lay-bys.

Road Safety Audit Team means a group of individuals appointed by DB Co from time to time to carry out Road Safety Audits in respect of the Works.

Road Safety Auditor has the meaning given in Schedule 15-2, Part 2, Article 6 – Roadways, Bus Terminals and Lay-bys.

Road Safety Audit Certificates has the meaning given in Schedule 15-2, Part 2, Article 6 – Roadways, Bus Terminals and Lay-bys.

Roadway means the driving surfaces including travelled lanes, auxiliary lanes, ramps, shoulders and shoulder rounding.

Roadway Works is defined as the design and construction of all temporary or permanent Roadway modifications, improvements or new construction of municipal or federal Roadway infrastructure, including but not limited to travelled lanes, auxiliary lanes, bike lanes, shoulders, boulevards, accesses, intersections, interchanges and the associated ramps, related to the scope of Stage 2 Project.

Safety means freedom from harm resulting from unintentional acts or circumstances.

Safety Case means the submission of Safety evidence at prescribed intervals in the Project lifecycle. It has the meaning outlined in EN 50129.

Safety Certification Manager means a position that is responsible for developing and implementing the safety certification program.

Safety Certification Report has the meaning given in Schedule 15-2, Part 1, Article 7 – System Safety Certification.

Safety Critical means a designation placed on a system, subsystem, element, component, device or function denoting that satisfactory operation of such is mandatory to safety assurance of patrons, personnel, equipment, or facilities. Such a designation dictates incorporation of special safety design features.

Safety Integrity Level means a relative level of risk-reduction provided by a safety function, or to specify a target level of risk reduction. The requirements for a given SIL are not consistent among all of the functional safety standards. In the functional safety standards based on the IEC 61508 standard, four SILs are defined, with SIL 4 the most dependable and SIL 1 the least. A SIL is determined based on a number of quantitative factors in combination with qualitative factors such as development process and safety life cycle management.

Safety Management System means the Safety protocol (including without limitation the activities, resources, procedures, methodologies, responsibilities and organizational structure) which DB Co shall establish in consultation with the City, taking into account the Design and Construction Specifications and is implemented to ensure the Safety of the system and compliance with the Safety Standards, and which is authorized by the City Manager and filed with the City Manager, adherence to which Safety protocol shall be mandatory in all operations and maintenance activities.

Safety Requirements Traceability Matrix is a means of tracking all Project Safety requirements identified by the PA or DB Co to ensure Safety elements are captured and fulfilled for the System with a direct link to the source of the Safety requirement.

Safety Verification Matrix has the meaning given in Schedule 15-2, Part 1, Article 7 – System Safety Certification.

Seasonal Load Restriction regulations are applicable to commercial vehicles or trailers with a gross vehicle weight in excess of 5 tonnes or 11,000 lbs per axle that are prohibited on roads where restriction signage is posted or on all truck routes identified on the most current City of Ottawa Urban and Rural Truck Route Maps.

Security means freedom from harm resulting from intentional acts or circumstances.

Security Management System means the Security protocol (including without limitation the activities, resources, procedures, methodologies, responsibilities and organizational structure) which DB Co shall establish in consultation with the City, taking into account the Design and Construction Specifications and the initial Threat and Vulnerability Assessment, and implement to ensure the Security of the system and compliance with the Safety standards, and which is authorized by the City Manager and filed with the City Manager, adherence to which Security protocol shall be mandatory in all operations and maintenance activities.

Security Requirements Traceability Matrix has the meaning given in Schedule 15-2, Part 1, Article 8 – Security and Emergency Management. For clarity, the Security Requirement Traceability Matrix is a matrix format document used to verify and certify that the Security requirements have been incorporated in the design and certify that all Security requirements of the design are constructed and/or installed in accordance with the Project Agreement.

Security Verification Matrix has the meaning given in Schedule 15-2, Part 1, Article 8 – Security and Emergency Management.

Service Life means the actual period of time during which a Structure performs its design function without unforeseen costs for maintenance and repair.

Signalling and Train Control System has the meaning given in Schedule 15-2, Part 3 – Systems.

Site Office has the meaning given in Schedule 15-2, Part 1, Article 9 – Project Office.

Site Specific Safety Plan(s) is a component of the CSMP and has the meaning given in Schedule 15-2, Part 1, Article 10 – Construction Safety Management.

Special Trackwork refers to all rail installations where Tracks converge, diverge or cross. Standard Trackwork is made simply from rolled rails of a constant cross-section, while rails in several special Trackwork components are cast or machined and have cross-sections that vary along their length.

Stage 1 Road Safety Audit means a Pre-Final Design Road Safety Audit as described in Schedule 15-2, Part 2, Article 6 – Roadways, Bus Terminals and Lay-bys.

Stage 2 Road Safety Audit means a Final Design Road Safety Audit as described in Schedule 15-2, Part 2, Article 6 – Roadways, Bus Terminals and Lay-bys.

Stage 3a Road Safety Audit means a Temporary Traffic Control On-site Road Safety Audit as described in Schedule 15-2, Part 2, Article 6 – Roadways, Bus Terminals and Lay-bys.

Stage 3b Road Safety Audit means a Construction Road Safety Audit as described in Schedule 15-2, Part 2, Article 6 – Roadways, Bus Terminals and Lay-bys.

Stage 4 Road Safety Audit means a Post Construction Road Safety Audit as described in Schedule 15-2, Part 2, Article 6 – Roadways, Bus Terminals and Lay-bys.

Station means a Facility where Trains and or buses stop to pick up or drop off customers. The Station primarily consists of Platform areas for Passenger loading/unloading, fare control equipment, and Passenger information. Other related components include; service rooms, stairs, ramps, escalators, elevators, advertising, public art, and Train and bus Operator support Facilities, customer amenities, etc. On the Ottawa system, Confederation Line stations are classified, and are not mutually exclusive as follows:

- **At Grade Station:** A Station at which the platform is at grade, above grade, below grade, and meets the criteria for an open station as defined in NFPA 130
- **Transfer Station:** Station with the incorporation of Facilities to support the transfer of Passengers between modes of transportation or between the O-Train Lines within a Fare Paid Zone.

- **Underground Station:** An enclosed Station as defined by NFPA 130 in which the platform is constructed fully underground or enclosed within a building.
- **Terminal Station:** A Station that is located at the terminus of a line.
- **Line Station:** Station that is located along the alignment providing service in both directions of the line.

Stormwater Management means the integrated process of capturing, treating and/or controlling of stormwater runoff to maintain the natural hydrologic cycle, prevent undesirable stream erosion, prevent an increased risk of flooding, and protect water quality of receiving waters.

Stormwater Management Practice means the combination of strategies, techniques and measures used on or off-site for Stormwater Management.

Stray Current Monitoring Plan has the meaning given in Schedule 15-2, Part 3, Article 13 – Traction Power System.

Structure means any building, Bridge, Tunnel, structural Culvert, or retaining wall.

Subsystem means a major functional subassembly or grouping of items or equipment which is essential to operational completeness of a system.

Supervisory Control and Data Acquisition means the system that allows the supervision and control of wayside and Station Equipment and devices from TOCC. SCADA collects alarm and indication functions for transmission and implements control commands initiated from TOCC and other control locations. The SCADA functions are an addition to local control, alarm, and indications associated with each equipment or system.

Supply Point is defined in the [REDACTED] Conditions of Service.

Sustainability Plan has the meaning given in Schedule 17 – Environmental Obligations.

System Assurance Program has the meaning given in Schedule 15-2, Part 1, Article 7 – System Safety Certification.

System RAMS Program has the meaning given in Schedule 15-2, Part 1, Article 7 – System Safety Certification

System Safety means the application of operating, technical, and management techniques and principles to the safety aspects of a system throughout its life to reduce hazards to the lowest practical level through the most effective use of available resources.

System Safety and Assurance Program has the meaning given in Schedule 15-2, Part 1, Article 7 – System Safety Certification.

System Safety Certification means the process of verifying compliance with a set of formal safety requirements. The requirements are defined by a safety certification plan, design criteria and technical specifications and applicable codes and industry standards. Specifically, certifiable elements need to be identified, verification activities need to be performed and documented, and certificates of conformance need to be signed and issued by the responsible and accountable parties as described in Schedule 15-2, Part 1, Article 7 - System Safety Certification.

System Safety Program Plan means the implementation details of how the safety program and requirements of the Project will be achieved.

System Security Certification means the process of verifying compliance with a set of formal Security requirements. The requirements are defined by a System Security Certification Plan, design criteria and technical specifications and applicable codes and industry standards. Specifically, certifiable elements need to be identified, verification activities need to be performed and documented, and certificates of conformance need to be signed and issued by the responsible and accountable parties as described in Schedule 15-2, Part 1, Article 8 - Security and Emergency Management.

Systems means the combination of mechanical elements, hardware elements and software elements connected with a passenger LRT system as described in Clause 1.1 of Schedule 15-2, Part 3 – Systems.

Systems Engineering means an interdisciplinary field of engineering and engineering management that focuses on how to design and manage complex systems over their life cycles.

Systems Engineering Management Plan has the meaning given in Schedule 15-2, Part 3, Article 1 – Introduction.

Systems Integration Management means managing the process of bringing together the component sub-systems into one system (an aggregation of subsystems cooperating so that the system is able to deliver the overarching functionality) and ensuring that the subsystems function together as a system.

Systems Integration Management Plan has the meaning given in Schedule 15-2, Part 1, Article 11 – Systems Integration Program.

Systems Integrator has the meaning given in Schedule 14 – Commissioning.

Tail Track has the meaning given in Schedule 15-2, Part 2, Article 3 – Trackwork.

Temperature Rise Test has the meaning given in Schedule 15-2, Part 3, Article 13 – Traction Power System.

Threat and Vulnerability Assessment has the meaning given in Schedule 15-2, Part 1, Article 7 – System Safety Certification.

Threat Log has the meaning given in Schedule 15-2, Part 1, Article 7 – System Safety Certification.

Ticket Machine means a piece of City supplied and installed equipment where customers purchase tickets for OCT services.

Track means the system of ballast, rails, ties and fastenings composing the track structure.

Track Database means a database containing all station, switch, curve and end of track locations, all grades, and all civil and temporary speed restriction zones, and all work zones and all speed limits through these zones and over all switches in either position. The Track Database is used by the Onboard Computer to calculate a safe speed profile and station stopping braking profiles.

Track Design and Construction Test Plan has the meaning given in Schedule 15-2, Part 2 – Civil and Guideway.

Trackwork means all work related to the construction of a complete LRT Passenger system track structure from subgrade to top of rail including the design, supply, installation and Quality Control of ballast and sub-ballast, ballast curbs, ties, rails, guardrails, fastenings, subdrains, Special Trackwork, end of Track devices, Track drains, rail welds, rail insulated joints, direct-fixation baseplates as well as concrete slab inserts, and other Track materials.

Traction Power or **Traction Power System** means an electrical network of power conversion substations receiving MV electrical power from the Utility, transforming the power to a lower usable voltage, and converting the power from AC to DC power to supply the Train consists operating along the Confederation Line.

Traffic Advisory Temporary Signage Plan is a sub-plan of the TTMP and has the meaning given in Schedule 15-2, Part 7 – Traffic and Transit Management and Construction Access.

Traffic and Transit Management Communications Plan is a sub-plan of the TTMP and has the meaning given in Schedule 15-2, Part 7 – Traffic and Transit Management and Construction Access.

Traffic and Transit Management Monitoring Plan is a sub-plan of the TTMP and has the meaning given in Schedule 15-2, Part 7 – Traffic and Transit Management and Construction Access.

Traffic and Transit Management Plan means a written plan, and a series of sub-plans, describing all direct and indirect impacts on all road users, including pedestrians, cyclists, transit vehicles and private vehicles of all types, at each stage of DB Co's construction sequencing plan, and outlining DB Co's measures and strategies to manage the impacts on road user traffic, parking, access for Emergency Services, as well as access to businesses and properties during construction. A Traffic and Transit Management Plan shall comply with the relevant standards, guidelines, policies and procedures of the City, OC Transpo, NCC and MTO as applicable. Further requirements are found in Schedule 15-2, Part 7, Article 6 – Traffic and Transit Management Plan.

Traffic Control Device(s) is a term used to describe any person, sign, signal, marking or device placed upon, over or adjacent to a roadway by or at the direction of a Relevant Authority or their designate, for the purpose of regulating, warning, guiding or informing a vehicle operator or pedestrian of an existing condition or hazard.

Traffic Control Persons/Personnel means a person duly trained and authorized to direct traffic at a Work zone through the use of the Traffic Control Sign (STOP/SLOW Paddle).

Traffic Control Plan has the meaning given in Schedule 15-2, Part 7 – Traffic and Transit Management and Construction Access.

Traffic Control Supervisor(s) has the meaning given in Schedule 15-2, Part 7 – Traffic and Transit Management and Construction Access.

Traffic Engineer has the meaning given in Schedule 15-2, Part 7 – Traffic and Transit Management and Construction Access.

Traffic Incident Management Plan has the meaning given in Schedule 15-2, Part 7 – Traffic and Transit Management and Construction Access.

Traffic Management Committee has the meaning given in Schedule 15-2, Part 7 – Traffic and Transit Management and Construction Access.

Traffic Management Implementation Plan has the meaning given in Schedule 15-2, Part 7 – Traffic and Transit Management and Construction Access.

Traffic Manager has the meaning given in Schedule 15-2, Part 7 – Traffic and Transit Management and Construction Access.

Traffic Risk Assessment Plan is a sub-plan of the TTMP and has the meaning given in Schedule 15-2, Part 7 – Traffic and Transit Management and Construction Access.

Train means a 2-car consist of Vehicles.

Train Control or **Train Control System** means a Safety Critical computer based control system for Vehicle identification, Vehicle location control and monitoring, maintaining safe headway between vehicles, Vehicle speed control, maintaining safe brake rates, Vehicle route selection and fleet management, interlocking control and power consumption optimization.

Transit Information Panel has the meaning given in Schedule 15-2, Part 4 – Stations.

Transit Management Plan is a sub-plan of the TTMP and has the meaning given in Schedule 15-2, Part 7 – Traffic and Transit Management and Construction Access.

Transit Priority Lanes is as defined by the City of Ottawa.

Transit Priority Signal means a traffic signal used to assign right-of-way to public transit vehicles over all other vehicular and pedestrian traffic movements within a signalized intersection.

Transitway is a dedicated road network system that is open only to OC Transpo and emergency vehicles, which includes physically separated right of way from mixed traffic and on-street bus lanes.

Transitway Lane Closure Measurement and Verification Plan has the meaning given in Schedule 15-2, Part 7 – Traffic and Transit Management and Construction Access.

Transportation Services Control Centre is the communications control center responsible for all dispatching, supervision, and monitoring of all functions within the OLRT system.

Tree Compensation Plan has the meaning given in Schedule 15-2, Part 6 – Urban Design, Landscape Architecture and Connectivity Requirements.

Tree Mitigation Plan means a plan to audit, monitor, protect, and preserve trees to comply with City regulations, as per Schedule 15-2, Part 6 – Urban Design, Landscape Architecture and Connectivity Requirements.

Trial Running means a twenty-one (21) consecutive day period that may commence upon the successful completion of testing and commissioning. Upon successful completion of trial running, the integrated system will be ready for revenue service.

Tunnels means Structures located below finished grade containing the Guideway, but excluding Underground Station Boxes.

Underground Station Boxes means Stations that are located below finished grade.

Underground Structures means Tunnels and Underground Station Boxes constructed using Cut and Cover methods excluding buried pipes and utilities, bridge foundations and above ground station foundations.

Underpass means a structure where the major road goes under the lower category road when used in Schedule 15-2, Part 2, Article 4 – Structural Design Criteria and Requirements.

Universal Design means the design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design.

Utility Infrastructure Relocation Plan has the meaning given in Schedule 15-2, Part 2, Article 8 - Utility Infrastructure Design Criteria.

Vital Microprocessor Interlocking System means a vital microprocessor based system for controlling switches and signals at an interlocking. This system may also be known as a CBI controller.

Voice/Data Radio System has the meaning given in Schedule 15-2, Part 3 – Systems.

Weekend Period(s) means the period of time from a Saturday at 0:00 hrs to Sunday at 23:59 hrs.

West Portal has the meaning given in Schedule 15-2, Part 1, Article 2 – Physical Layout.

Winter Season means the period from November 14 in any calendar year, until April 15 the following calendar year, inclusive of these dates.

Winter Season Plan has the meaning given in Schedule 15-2, Part 7 – Traffic and Transit Management and Construction Access.

Yard Control Centre means a facility within the MSF established to monitor and control yard and shop operations of train movements, video observation of maintenance functions, intrusion control, IAC Security, and BMS system monitoring from one location.

Yard Track has the meaning given in Schedule 15-2, Part 2, Article 3 – Trackwork.

Zone Controller means a microprocessor based system which tracks train location, signal and switch positions and which provide Movement Authority limits to trains.

Zone of Influence means the area within the subsurface and surface boundaries where Ground Movement arising from DB Co construction activities is expected to occur.

ARTICLE 1 ACRONYMS

AADT means annual average daily traffic.

AAMA means American Architectural Manufacturers Association.

AAR means Association of American Railroads.

AASHTO means American Association of State Highway and Transportation Officials.

AC means alternating current.

ACI means American Concrete Institute.

ACP means access control panels.

ADA means *Americans with Disabilities Act*.

AESS means Architecturally Exposed Structural Steel.

AHJ means Authority Having Jurisdiction.

AHRI means Air-conditioning, Heating, and Refrigeration Institute.

AIC means Amp Interrupting Capacity.

AISC means American Institute of Steel Construction.

AISI means American Iron and Steel Institute.

ALCTV means Automotive Lifts – Safety Requirements for Construction, Testing and Validation.

ALI means Automotive Lift Institute.

AMCA means Air Movement and Control Association.

AMS means Aerospace Material Specifications.

ANSI means American National Standards Institute.

AODA means *Accessibility for Ontarians with Disabilities Act*.

AP means Access Point.

APTA means American Public Transportation Association.

AREMA means American Railway Engineering Maintenance-of-Way Association.

ASCE means American Society of Civil Engineers.

ASHRAE means American Society of Heating, Refrigerating and Air-Conditioning Engineers.

ASL means anticipated service life.

ASME means American Society of Mechanical Engineers.

ASSE means American Society of Safety Engineers.

ASTM means American Society for Testing and Materials.

ATC means Automatic Train Control.

ATM means automatic teller machine (bank machine).

ATMS means advanced traffic management system.

ATO means Automatic Train Operation.

ATP means Automatic Train Protection.

ATS means Automatic Train Supervision or automatic transfer switch.

AWG means American Wire Gauge.

AWMAC means Architectural Woodwork Manufacturers Association of Canada.

AWS means American Welding Society.

AWS BRH means American Welding Society Brazing Handbook.

AWS WHB means American Welding Society Welding Handbook.

AWWA means American Water Works Association.

G&B means grounding and bonding.

BAR means Blast Assessment Report.

BAS means building automation system.

BCC means Backup Control Centre.

BCI means bridge condition index, in accordance with MTO's bridge condition rating procedure.

BDA means bi-directional amplifier.

BHN means brinell hardness number.

BIA means business improvement association.

BIL means basic impulse level.

BMS means building management system.

BNC means Bayonet Neill-Concelman connector.

BRT means bus Rapid Transit.

BSS means British Standards Society.

BTS means base transceiver station.

BYCC means Belfast Yard Control Centre

CADD means computer aided design and drafting.

CaGBC means Canadian Green Building Council.

CALA means Canadian Association for Laboratory Accreditation.

CBI means computer based interlocking.

CBTC means Communication Based Train Control.

CCIL means Canadian Council of Independent Laboratories.

CCIP means Cement and Concrete Industry Publications.

CCOHS means Canadian Centre for Occupational Health and Safety.

CCTV means Closed Circuit Television.

CEAA means Canadian Environmental Assessment Agency.

CEC means Canadian Electrical Code.

CEL means Certifiable Elements Lists.

CFD means computational fluid dynamics.

CFEM means Canadian Foundation Engineering Manual.

CFR means Code of Federal Regulations.

[REDACTED]

CGSB means Canadian General Standards Board.

CHBDC means Canadian Highway Bridge Design Code ((CHBDC) CAN/CSA S6-06).

CIAR means Construction Impact Assessment Report.

CIAR-1 means Level 1 Construction Impact Assessment Report.

CIAR-2 means Level 2 Construction Impact Assessment Report.

CIH means Central Instrument House(s).

CIL means central instrument location.

CISC means Canadian Institute of Steel Construction.

CMAA means Crane Manufacturers Association of America.

CMMS means computerized maintenance management system.

[REDACTED]

CNLA means Canadian Nursery Landscape Association.

COADS means City of Ottawa Accessibility Design Standards.

COMAP means City of Ottawa Municipal Accessibility Plan.

CPCI means Canadian Precast/Prestressed Concrete Institute.

CPR means cardiopulmonary resuscitation.

CPTED means Crime Prevention through Environmental Design.

[REDACTED]

CPR means cardiac pulmonary respiration.

CRCA means Canadian Roofing Contractors Association.

CRI means colour rendering index.

CSA means Canadian Standards Association.

CSMP means Construction Safety Management Plan.

CSRS means Canadian Spatial Reference System.

CSSBI means Canadian Sheet Steel Building Institute.

CTS means communications transmission system.

CWB means Canadian Welding Bureau.

CWR means continuous welded rail.

DAQ means delivered audio quality.

DAS means distributed antenna system.

DC means direct current.

DCS means data communications system.

DF(F) means direct fixation (fastener).

DFO means Department of Fisheries and Oceans (Canada).

DLA means dynamic load allowance.

DMP means Data Management Protocol.

DOORS means dynamic object oriented requirements systems.

DOT means U.S. Department of Transportation.

DSD means Decision Sight Distance.

DSS means designated substance survey.

DTFM means dual toner multi-frequency.

DVD means digital versatile disk.

DWA means TSA used in Schedule 15-2, Part 4, Appendix B and C.

E&M means electrical and mechanical.

EA means Environmental Assessment.

EAS means existing adjacent structure(s).

EB means an eastbound direction or emergency brake (depending upon context).

ECA means Environmental Compliance Approval.

ECL means Existing Confederation Line.

EEB means emergency exit building.

EEMAC means Electrical Equipment Manufacturers Association of Canada.

EGFP means equipment ground fault protection.

EHFI means elevator hands free intercom.

EIA means Electronic Industry Association.

EMC means electromagnetic compatibility.

EMI means electromagnetic interference.

ERP means Emergency Response Plan or Emergency Response Providers.

ESA means Electrical Standards Association or Electrical Safety Authority.

ESB means Emergency Stop Buttons.

ESC means Erosion and Sediment Control (part of Erosion and Sediment Control Plan).

ESP means Emergency Service Providers.

ESS means Emergency Stop Key Switches.

ETEL means emergency telephones.

FAI means First Article Inspection.

FAT means Factory Acceptance Test as defined in Schedule 14 – Commissioning.

FCC means U.S. Federal Communications Commission.

FDAS means fire detection and alarm system.

FHWA means Federal Highway Administration.

FLS means Fire Life Safety.

FLSSC means Fire Life Safety and Security Committee.

FLUDTA means Federal Land Use, Design and Transaction Approval.

FMEA means Failure Mode and Effects Analysis.

FMECA means Failure Mode, Effect, and Criticality Analysis.

FODF means fiber optic distribution frame.

FRACAS means Failure Reporting and Corrective Action System.

FRP means fibre reinforced plastic.

FTA means Federal Transit Administration or Fault Tree Analysis.

FTEL means firefighters' telephones.

GANNA means Glass Association of North America.

GBC means Green Building Council.

GDSOH means Geometric Design Standards for Ontario Highways (Ministry of Transportation).

GDGCR means Geometric Design Guide for Canadian Roads (Transportation Association of Canada).

GFI means ground fault interrupter.

GFRP means glass fibre reinforced polymer.

GIDS means Guideway intrusion detection system.

GIMP means Geotechnical Instrumentation and Monitoring Plan.

GSC means geological survey of Canada.

GUI means graphic user interface.

HINT means elevator help intercoms.

HFI means yard intercoms.

HMI means Hoist Manufacturers Institute or Human Machine Interface.

[REDACTED]

[REDACTED]

HOV means high-occupancy vehicle.

HSDR means high speed data radio.

HV means high voltage.

HVAC means heating, ventilation and air conditioning system.

I/O means input/output.

IAC means intrusion access control.

IBC means International Building Code.

ICD means interface control documents.

ICEA means Insulated Cable Engineers Association.

ICES means Interference-Causing Equipment Standards (Industry Canada).

ICNIRP means International Commission on Non-Ionizing Radiation Protection.

ICP means Incident Control Panel.

IEC means International Electrotechnical Commission.

IED means intelligent electronic device.

IEEE means Institute of Electrical and Electronics Engineers.

IES and **IESNA** means Illuminating Engineering Society of North America.

IFC means issued for construction.

IP means internet protocol.

IPI means In-Place-Inclinometers.

ISD means Intersection Sight Distance.

ISFP means City of Ottawa Integrated Street Furniture Policy and Design Guidelines.

ISO means International Standards Organization.

ITA means International Tunnelling Association.

ITEL means passenger assistance information telephones.

ITS means intelligent transportation system.

JHSC means joint health and safety committee.

LAN means local area network.

LCD means liquid-crystal display.

LED means light emitting diode.

LEED means Leadership in Energy and Environmental Design.

LID means Low Impact Development.

LKI means landmark kilometre inventory.

LMSF means Light Maintenance and Storage Facility.

LOS means Level of Service.

LRT means light rail transit.

LRV means Light Rail Vehicle.

LSD means limits state design

LV means low voltage.

LVC means length of vertical curve.

LSZH means low smoke zero halogen.

MA means Movement Authority.

MCC means motor control centre.

MDE means Maximum Design Earthquake.

MERV means Minimum Efficiency Reporting Value.

MEMS means micro-electro-mechanical systems.

MHIA means Materials Handling Industry of America.

MIL means U.S Military Standard.

MNECB means Model National Energy Code for Buildings.

MNR means Ontario Ministry of Natural Resources.

MOECC means Ontario Ministry of the Environment and Climate Change.

MOL means Ministry of Labour.

MOW means maintenance of way

MSE means mechanically stabilized earth.

MTBF means mean time between failures.

MTBSAF means mean time between service affecting failures.

MTEL means maintenance telephones

MTM means Modified Transverse Mercator.

MTO means Ontario Ministry of Transportation.

MTTR means mean time to repair.

MUP means Multi-Use Pathway.

MUTCD means Manual for Uniform Traffic Control Device.

MV means medium voltage.

MW means megawatts.

MYCC means the Moodie Yard Control Centre.

NACE means National Association of Corrosion Engineers.

NAD means North American Datum.

NB means a northbound direction.

NBC means National Building Code of Canada.

NC means Noise Level Criteria.

NCC means National Capital Commission.

NCMA means National Concrete Masonry Association.

NECA means National Electrical Contractors Association.

NEMA means National Electrical Manufacturer's Association.

NESC means National Electrical and Safety Code.

NETA means InterNational Electrical Testing Association.

NFCC means National Fire Code of Canada.

NFPA means National Fire Protection Association.

NGD means negative grounding device.

NHI means National Highway Institute.

NICD means network interface control document.

NMI means New Municipal Infrastructure.

NPA means National Particleboard Association.

NPCC means Northeast Power Coordinating Council.

NRCA means National Roofing Contractors Association.

NSF means National Sanitation Foundation.

NTP means notice to proceed.

NVR means Network Video Recorder.

OBC means Ontario Building Code.

OCS means Overhead Contact System and Overhead Catenary System.

ODE means Operating Design Earthquake.

ODV means Over-Dimensional Vehicle.

OEC means Ontario Electrical Code.

OESC means Ontario Electrical Safety Code.

OFC means Ontario Fire Code.

OGDL means open graded drainage layer

OGS means oil/grit separators

OHA means operating hazard analysis.

OHS means the *Occupational Health and Safety Act* (Ontario).

OLRT means Ottawa Light Rail Transit.

ON and **ONT** mean Ontario.

ONVIF means open network video interface forum.

OPP means Ontario Provincial Police.

OPS means Ontario Provincial Standard or Ottawa Police Services.

OPSD means Ontario Provincial Standard Drawings.

OPSS means Ontario Provincial Standard Specifications.

OR means Ottawa Road.

ORPP means the Ottawa River Parkway pipe.

OSIM means Ontario Structure Inspection Manual.

OSIMS means Ontario Structure Inspection Management Systems.

OTOC means Ottawa Traffic Operations Centre.

OTM means Ontario Traffic Manual.

OWS means operation work station.

PA means Public Address.

PABX means private automatic branch exchange.

PAU means power alarm unit.

PBD means performance based design.

PBX means Private Branch Exchange.

PDI means Plumbing and Drainage Institute.

PED means platform edge door.

PEO means Professional Engineers of Ontario.

PERP means Ontario Provincial Emergency Response Plan.

PGFP means personal ground fault protection.

PHA means Preliminary Hazard Analysis.

PHL means Preliminary Hazard List.

PIC means public information centre.

PICO means Post Installation Checkout as defined in Schedule 14 – Commissioning.

PID(S) means Passenger Information Display (Systems).

PIS means public information system.

PIU means power interface unit.

PLC means Programmable Logic Controller.

PPHPD means passenger per hour per direction.

PPUDO means Passenger Pick-Up and Drop-Off.

PRP means Property Request Plan.

PSPC means Public Services and Procurement Canada.

PTTW means Permit to Take Water.

PTZ means Pan Tilt Zoom.

PVC means polyvinyl chloride.

PVDF means polyvinylidene fluoride.

PVI means point of vertical intersection.

PVMS means portable variable-message signs.

PXO means pedestrian crossover(s).

RAM means Reliability, Availability and Maintainability.

RCMP means Royal Canadian Mounted Police.

RFID means Radio Frequency Identification.

RFQ means request for qualifications.

RH means relative humidity.

RMA means Roadway Modification Approval.

RMP means Requirements Management Plan.

RMS means root mean square.

ROW means right-of-way.

RRFB means rectangular rapid flashing beacon.

RSS means radio standards specification in Schedule 15-2, Part 3 – Systems.

RSS means retained soil system in Schedule 15-2, Part 2 – Civil and Guideway.

RTM means requirements traceability matrix.

RTSB means real time streaming protocol.

RTU means remote terminal units.

RU means remote unit.

RVCA means Rideau Valley Conservation Authority.

S&I means service and inspection.

S&TCS means Signalling and Train Control System.

SAE means Society of Automotive Engineers.

SAP means System Assurance Program.

SAR means species at risk.

SAT means Site Acceptance Test as defined in Schedule 14 – Commissioning.

SB means a southbound direction.

SCADA means Supervisory Control and Data Acquisition.

SCIL means Safety Critical items list.

SCM means Safety Certification Manager.

SCR means Silicon Controlled Rectifier.

SeCM means Security Certification Manager

SEMP means System Engineering Management Plan.

SER means signal equipment room.

SES means “Subway Environment Simulation” software, originally referenced in the “Subway Environmental Design Handbook” (US Department of Transportation, Washington, DC, USA).

SeVM means Security Verification Matrix.

SI means System Infrastructure.

SIA means Security Industry Association.

SIMP means systems integration management plan.

SINAD means signal-to-noise and distortion ratio.

SIT means Systems Integration Test as defined in Schedule 14 – Commissioning.

SJAM means Sir John A MacDonald.

SLR means Seasonal Load Restriction.

SLS means Serviceability Limit State.

SMACNA means Sheet Metal and Air-conditioning Contractors’ National Association.

SNCA means South Nation Conservation Authority.

SNMP means simple network management protocol.

SOE means support of excavation.

SOP means standard operating practice/procedure.

SPL means sound pressure level.

SRAC means Safety related application conditions.

SSAP means System Safety and Security Assurance Plan.

SSCP means System Safety Certification Plan.

SSCRT means Safety and Security Certification Review Team.

SSD means Stopping Sight Distance.

SSeCP means System Security Certification Plan.

SSePP means System Security Program Plan.

SeRTM means Security Requirement Traceability Matrix.

SSORC means Safety and Security Operations Review Committee.

SSPC means Society for Protective Coatings.

SSPP means System Safety Program Plan.

SRTM means Security Requirement Traceability Matrix.

SSVM means System Safety Verification Matrix.

STD means standard.

STEL means staff telephones.

STI means speech transmission index.

STO means Société de transport de l'Outaouais or semi-automatic Train operation.

SVM means Safety Verification Matrix.

SWGR means switch gear.

SWM means stormwater management.

SWMP means Stormwater Management Practice.

T&DI means Transportation and Development Institute.

TAC means Transportation Association of Canada.

TC means Transport Canada.

TCB means temporary concrete barrier.

TCD means Traffic Control Device.

TCP means Traffic Control Plan or Traffic Control Person or Transmission Control Protocol (depending upon context).

TCRP means Transit Cooperative Research Program.

TFTP means Trivial File Transfer Protocol.

THR means Tolerable Hazard Rate.

TIA means Transportation Impact Assessment (City of Ottawa).

TIAC means Thermal Insulation Association of Canada.

TIMP means Traffic Incident Management Plan.

TIP means Transit Information Panel.

TMIP means Traffic Management Implementation Plan.

TOCC means Transit Operations Control Centre.

TOD means Transit-Oriented Development.

TOR means Top of Rail.

TPRU means Traction Power Rectifier Unit.

TPS means Traction Power System.

TPSS means Traction Power substation(s).

TSA means transsecure area.

TSS means total suspended solids.

TTEL means Tunnel telephones.

TTMP means Traffic and Transit Management Plan.

TVA means Threat and Vulnerability Analysis.

TVS means Tunnel Ventilation System.

TWSI means tactile walking strip indicators.

UAD means Urban Arterial Divided.

UDP means user datagram protocol.

UIC means International Union of Railways.

ULC means Underwriter's Laboratories of Canada.

ULS means Ultimate Limit State.

UPS means uninterruptible power supply.

VFD means Variable-Frequency Drive.

VISSIM means the microscopic multi-modal traffic flow simulation software package used to develop traffic models.

VLAN means virtual local area network.

VMIS means Vital Microprocessor Interlocking System.

VMS means Vehicle Monitoring System or variable message sign.

VOBC means Vehicle on-board controller.

VOC means volatile organic compound.

VoIP means Voice over Internet Protocol.

WAN means Wide Area Network.

WB means a westbound direction.

WNC means West Nepean Collector

WSD means Working Stress Design.

ZOI means Zone of Influence.

ARTICLE 2 REFERENCE DOCUMENTS

1.1 General

- (a) Codes, standards, manuals, installation, application and maintenance instructions, and other reference documents referred to in the Project Specific Output Specifications, unless otherwise specified and unless otherwise stated in governing legislation, shall be the latest published editions at the date of Commercial Close.
- (b) DB Co shall conform to codes, standards, manuals, installation, application and maintenance instructions, and other Reference Documents referred to in the Output Specification.
- (c) If there is a question regarding whether any product, material, component, assembly or system is in conformance with applicable requirements, the City reserves the right to have such products, materials, components, assemblies or systems tested at DB Co's cost to prove or disprove conformance. The cost for testing will be borne by the City in the event of conformance with the Output Specification, or by DB Co in the event of non-conformance.
- (d) Refer to the Project Agreement and the Ontario Building Code for definitions applicable to the Project.

1.2 Reference Documents

Reference Documents in Schedule 15

Description of Reference Documents

| | |
|-----------------|--|
| 14 CFR 25.853 | Code of Federal Regulations, Title 14: Aeronautics and Space; Part 25.853 – Compartment Interiors |
| 29 CFR 1910.19 | Code of Federal Regulations, Title 29: Labor; Part 1910.19 – Special Provisions for Air Contaminants |
| 40 CFR 82 | Code of Federal Regulations, Title 40: Protection of Environment; Part 82 – Protection of Stratosphere Ozone |
| 49 CFR 223 | Code of Federal Regulations, Title 49: Transportation; Part 223 – Safety Glazing Standards - Locomotives, Passenger Cars and Cabooses |
| 49 CFR Part 238 | Code of Federal Regulations, Title 49: Transportation; Part 238 – Passenger Equipment Safety Standards |
| AAMA 611 | AAMA 611 Voluntary Specification for |

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AAMA 620

Anodized Architectural Aluminum

AAMA 620 Voluntary Specification for High Performance Organic Coatings on Coil Coated Architectural Aluminum

AAMA Aluminum Curtain Wall Design Guide Manual (CW-DG-1-96)

American Architectural Manufacturers Association (AAMA)

AAR M-101

AAR M-101 Carbon Steel Axles

AAR Manual of Standards and Recommended Practices

Association of American Railroads (AAR)

AAR RP-585

AAR RP-585 Wiring and Cable Specification

AAR S-501

AAR S-501 Specification for Wire and Cables

AASHTO Guide for the Design of Pavement Structures

American Association of State Highway and Transportation Officials (AASHTO), 1993

AASHTO Guide Specifications for Design and Construction of Segmental Concrete Bridges

AASHTO Guide Specifications for Horizontally Curved Highway Bridges

AASHTO Guide Specifications for Strength Evaluation of Existing Steel and Concrete Bridges

AASHTO Guide Specifications for Structural Design of Sound Barriers

AASHTO Guide Specifications – Thermal Effects in Concrete Bridge Structures

AASHTO Manual for Condition Evaluation of Bridges

ACI 201.2R

ACI 201.2R Guide to Durable Concrete

ACI 347.3R

ACI 347.3R Guide to Formed Concrete Surfaces

ACI 358.1

ACI 358.1 Analysis and Design of Reinforced and Prestressed – Concrete Guideway Structures

ACI 360R

ACI 360R Design of Slabs on Grade

ACI 365

ACI 365 Service Life Prediction

ACI Publication 201.2R

ACI Publication 201.2R Guide to Durable

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ACI Publication 222R

Concrete

ACI Publication 222R Protection of Metals in Concrete Against Corrosion

ACI Publication 506.2

ACI Publication 506.2 Below Grade Shotcrete Used as Permanent Support

ACI Publication SP-77

ACI Publication SP-77 Sulphate Resistance of Concrete

Accessibility for Ontarians with Disabilities Act (AODA)

Advanced Traffic Management Systems (ATMS) Contract Design, Estimating and Documentation (CDED) Manual, Volume 4

Volume 4 - Electrical Contract Design, Estimating & Documentation Advanced Traffic Management Systems, MTO, latest version

Advanced Traffic Management Systems (ATMS) Design Guidelines

ATMS Design Standards, MTO

AESS Supplement

Modern Steel Construction, May 2003

AISC Code of Standard Practice for Steel Buildings and Bridges

American Institute of Steel Construction (AISC), March 2005

AISC Design Guide Series 9

AISC Design Guide Series 9 – Torsional Analysis of Structural Steel Members

AISI/ASTM A167

AISI/ASTM A167 Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip

Alberta Transportation Highway Geometric Design Guide

Alberta Transportation Highway Geometric Design Guide, January 2004

Americans with Disabilities Act (ADA)

AMCA Standard 210

Air Movement and Control Association International (AMCA) Standard 210, “Laboratory Methods of Testing Fans for Rating Purposes”

AMCA Standard 300

AMCA Standard 300, “Test Code for Sound Rating Air Moving Devices”

AMCA Standard 301

AMCA Standard 301, “Methods for Calculating Fan Sound Ratings from Laboratory Test Data”

AMCA Standard 500-L

AMCA Standard 500-L Laboratory Methods of Testing Louvers for Rating

AMS 5050 E

AMS 5050 E Steel Tubing, Seamless, 0.15 Carbon, Maximum, Annealed

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| ANSI/ALI ALCTV-2006 | ANSI/ALI ALCTV-2006 Safety Requirements for the Installation and Service of Automotive Lifts |
| ANSI/ASCE/T&DI 21 | ANSI/ASCE/T&DI 21 Automated People Mover Standards – Parts 1-4 |
| ANSI/ASHRAE 135 | ANSI/ASHRAE 135 BACnet A Data Communication Protocol for Building Automation and Control Networks |
| ANSI/AWWA C105 | ANSI/AWWA C105 Polyethylene Encasement for Ductile-Iron Pipe Systems |
| ANSI/IEEE 515.1 | ANSI/IEEE 515.1 Testing, Design, Installation, and Maintenance of Electrical Resistance Heat Tracing for Commercial Applications |
| ANSI/IESNA RP-22 | ANSI/IESNA RP-22 Tunnel Lighting |
| ANSI/SIA A92 | ANSI/SIA A92 Elevating and Vehicle Lift Devices |
| ANSI B1.20.1 | ANSI B1.20.1 Pipe Threads, General Purpose (Inch) |
| ANSI C34.2 | ANSI C34.2 Semiconductor Power Rectifiers |
| ANSI C37 | ANSI C37 Low Voltage Power Circuit Breaker |
| ANSI C57 | ANSI C57 Power Transformers |
| ANSI Z26.1 | ANSI Z26.1 Safety Code for Safety Glazing Materials for Glazing Motor Vehicles Operating on Land Highways |
| ANSI Z97.1 | ANSI Z97.1 Safety Glazing Materials Used in Buildings |
| ANSI Z358.1 | ANSI Z358.1 Emergency Eyewash and Shower Equipment |
| An Urban Design Strategy for Sussex Dr., Rideau St. and Colonel By | |
| APTA Guidelines for the Design of Rapid Transit Facilities | American Public Transportation Association, 1981 |
| Heavy Duty Transportation System Elevator Design Guidelines | American Public Transportation Association (APTA) |
| APTA Heavy Duty Escalator Design | American Public Transportation Association |

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| Guideline | (APTA) |
| APTA Manual for the Development of System Safety Program Plans for Commuter Railroads | American Public Transportation Association; Commuter Rail Safety Management Program, May 2006 |
| APTA RP-E-002 | APTA RP-E-002 Wiring of Passenger Equipment |
| APTA RP-E-004 | APTA RP-E-004 Gap and Creepage Distance |
| APTA RP-E-007 | APTA RP-E-007 Storage Batteries and Battery Compartments |
| APTA RP-E-009 | APTA RP-E-009 |
| APTA RP-M-001 | APTA RP-M-001 Air Connections, Location and Configuration of, for Passenger Cars Equipped with AAR Long Shank Tight Lock or Similar Long Shank Type Couplers |
| APTA RP-M-009 | APTA RP-M-009 New Truck Design |
| APTA SS-C&S-004 | APTA SS-C&S-004 Austenitic Stainless Steel for Railroad Passenger Equipment |
| APTA SS-C&S-015 | APTA SS-C&S-015 Aluminum and Aluminum Alloys for Passenger Equipment Car Body Construction |
| APTA SS-E-005 | APTA SS-E-005 Grounding and Bonding |
| APTA SS-E-013 | APTA SS-E-013 Emergency Lighting System Design for Passenger Cars |
| APTA SS-M-015-06 | APTA SS-M-015-06 Wheel Flange Angle for Passenger Equipment |
| APTA SS-PS-004 | APTA SS-PS-004 Low-Location Exit Path Marking |
| AREMA | Manual for Railway Engineering, AREMA |
| AREMA Communications and Signal Manual | AREMA |
| AREMA Manual For Railway Engineering, Volume 2, Chapter 28, Temporary Structure for Construction | AREMA |
| ASCE Guidelines for Tunnel Lining Design, | ASCE Technical Committee on Tunnel Lining Design, edited by T. O'Rourke, 1984 |

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| ASHRAE 52.2 | ASHRAE 52.2 Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size |
| ASHRAE 55 | ASHRAE 55 – Thermal Environmental Conditions for Human Occupancy, 2010 Edition. |
| ASHRAE 62.1 | ASHRAE 62.1 – Ventilation for Acceptable Indoor Air Quality |
| ASHRAE 90.1 | ASHRAE 90.1 – Energy Standard for Buildings Except Low-Rise Residential Buildings – permitted for construction after December 31, 2011 |
| ASHRAE 189.1 | ASHRAE 189.1 – Design of High-Performance, Green Buildings |
| ASHRAE Handbook | HVAC Applications, Division 13, “Enclosed Vehicular Facilities”, 2007 |
| ASME/ANSI B16.3 | ASME/ANSI B16.3 Malleable Iron Threaded Fittings |
| ASME/ANSI B16.5 | ASME/ANSI B16.5 Pipe Flanges and Flanged Fittings |
| ASME/ANSI B16.22 | ASME/ANSI B16.22 Wrought Copper and Copper Alloy Solder Joint Pressure Fittings |
| ASME A17.1 | ASME A17.1 Safety Code for Elevators and Escalators |
| ASME A112.19.2 / CSA B45.1 | ASME A112.19.2 / CSA B45.1 Ceramic Plumbing Fixtures |
| ASME B30.2 | ASME B30.2 Overhead and Gantry Cranes (Top Running Bridge, Single or Multiple Girder, Top Running Trolley Hoist) |
| ASME B30.10 | ASME B30.10 Hooks |
| ASME 30.11 | ASME 30.11 Monorails and Underhung Cranes |
| ASME B30.16 | ASME B30.16 Overhead Joists (Underhung) |
| ASME B31.1 | ASME B31.1 Power Piping |
| ASME B31.5 | ASME B31.5 Refrigeration Piping and Heat Transfer Components |
| ASME RT-1 | ASME RT-1 Safety Standard for Structural |

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| | Requirements for Light Rail Vehicles |
| ASSE 1052 | ASSE 1052 Performance Requirements for Hose Connection Backflow Preventers |
| ASTM | ASTM Standards |
| ASTM A1 | ASTM A1 Carbon Steel Tee Rails |
| ASTM A6 | ASTM A6 General Requirements for Rolled Structural Steel Bars, Plates, Shapes and Sheet Piling |
| ASTM A53 | ASTM A53 Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless |
| ASTM A82 / A82M | ASTM A82 / A82M Steel Wire, Plain for Concrete Reinforcement |
| ASTM A105 | ASTM A105 Carbon Steel Forgings for Piping Applications |
| ASTM A106 | ASTM A106 Seamless Carbon Steel Pipe for High-Temperature Service |
| ASTM A123 | ASTM A123 Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products |
| ASTM A153M-03e | ASTM A153M-00 Zinc Coating (Hot Dip) on Iron and Steel Hardware |
| ASTM A167 | ASTM A167 Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip |
| ASTM A185 | ASTM A185 Steel Welded Wire Reinforcement, Plain, for Concrete |
| ASTM A193 | ASTM A193 Alloy-Steel and Stainless Steel Bolting for High Temperature or High Pressure Service and Other Special Purpose Applications |
| ASTM A197 | ASTM A197 Cupola Malleable Iron |
| ASTM A234 | ASTM A234 Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service |
| ASTM A240 | ASTM A240 Chromium and Chromium-Nickel Stainless Steel Plate, Sheet and Strip for Pressure Vessels and for General Applications |
| ASTM A269 | ASTM A269 Seamless and Welded Austenitic Stainless steel Tubing for General Service |

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| ASTM A276-04 | ASTM A276-04 Stainless Steel Bars and Shapes |
| ASTM A307 | ASTM A307 Carbon Steel Bolts and Studs |
| ASTM A325M | ASTM A325M Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength |
| ASTM A416/416M-06 | ASTM A416/416M-06 Steel Strand, Uncoated Seven-Wire for Prestressed Concrete |
| ASTM A421/421M-05 | ASTM A421/421M-05 Uncoated Stress-Relieved Steel Wire for Prestressed Concrete |
| ASTM A496/A496M | ASTM A496/A496M Steel Wire, Deformed for Concrete Reinforcement |
| ASTM A497/A497M | ASTM A497/A497M Steel Welded Wire Reinforcement, Deformed, for Concrete |
| ASTM A515 | ASTM A515 Pressure Vessel Plates, Carbon Steel, for Intermediate- and Higher-Temperature Service |
| ASTM A516 | ASTM A516 Pressure Vessel Plates, Carbon Steel, for Moderate- and Lower Temperature Service |
| ASTM A563 | ASTM A563 Carbon and Alloy Steel Nuts |
| ASTM A568 | ASTM A568 General Requirements for Steel, Sheet, Carbon, Structural, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled |
| ASTM A588 | ASTM A588 High-Strength Low-Alloy Structural Steel |
| ASTM A606 | ASTM A606 Steel, Sheet and Strip, High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, with Improved Atmospheric Corrosion Resistance |
| ASTM A653/A653M | ASTM A653/A653M Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process |
| ASTM A666 | ASTM A666 Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate and Flat Bar |
| ASTM A775/A775M | ASTM A775/A775M Epoxy Coated Reinforcing Steel Bars |

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|-----------------|--|
| ASTM B33 | ASTM B33 Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes |
| ASTM B209 | ASTM B209 Aluminum and Aluminum Alloy Sheet and Plate |
| ASTM B221 | ASTM B221 Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wires, Profiles and Tubes |
| ASTM B280 | ASTM B280 Seamless Copper Tube for Air Conditioning and Refrigeration Field Service |
| ASTM B584 | ASTM B584 Copper Alloy Sand Castings for General Applications |
| ASTM C67 | ASTM C67 Sampling and Testing Brick and Structural Clay Tile |
| ASTM C260 | ASTM C260 Air-Entraining Admixtures for Concrete |
| ASTM C452-75 | ASTM C452-75 Potential Expansion of Portland-Cement Mortars Exposed to Sulfate |
| ASTM C494/C494M | ASTM C494/C494M Standard Specification for Chemical Admixtures for Concrete |
| ASTM C507-95a | ASTM C507-95a Reinforced Concrete Elliptical Culvert, Storm Drain and Sewer Pipe |
| ASTM C534 | ASTM C534 Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form |
| ASTM C542 | ASTM C542 Lock-Strip Gaskets |
| ASTM C547 | ASTM C547 Mineral Fiber Pipe Insulation |
| ASTM C553 | ASTM C553 Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications |
| ASTM C568 | ASTM C568 Limestone Dimension Stone |
| ASTM C612 | ASTM C612 Mineral Fiber Block and Board Thermal Insulation |
| ASTM C615 | ASTM C615 Granite Dimension Stone |
| ASTM C716 | ASTM C716 Installing Lock-Strip Gaskets and Infill Glazing Materials |
| ASTM C864 | ASTM C864 Dense Elastomeric Compression |

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|-------------------|---|
| | Seal Gaskets, Setting Blocks and Spacers |
| ASTM C881/C881M | ASTM C881/C881M Epoxy-Resin-Base Bonding Systems for Concrete |
| ASTM C936 | ASTM C936 Solid Concrete Interlocking Paving Units |
| ASTM C1017/C1017M | ASTM C1017/C1017M Chemical Admixtures for Use in Producing Flowing Concrete |
| ASTM C1026 | ASTM C1026 Measuring the Resistance of Ceramic Tile to Freeze-Thaw Cycling |
| ASTM C1036 | ASTM C1036 Flat Glass |
| ASTM C1048 | ASTM C1048 Heat-Treated Flat Glass—Kind HS, Kind FT Coated and Uncoated Glass |
| ASTM C1059/C1059M | ASTM C1059/C1059M Latex Agents for Bonding Fresh to Hardened Concrete |
| ASTM C1166 | ASTM C1166 Lock-Strip Gaskets |
| ASTM C1172 | ASTM C1172 Laminated Architectural Flat Glass |
| ASTM C1184 | ASTM C1184 Structural Silicone Sealants |
| ASTM C1242 | ASTM C1242 Selection, Design and Installation of Dimension Stone Attachment Systems |
| ASTM D395 | ASTM D395 Rubber Property – Compression Set |
| ASTM D422-63 | ASTM D422-63 Particle-Size Analysis of Soils |
| ASTM D516 | ASTM D516 Sulfate Ion in Water |
| ASTM D695 | ASTM D695 Compressive Properties of Rigid Plastics |
| ASTM D790 | ASTM D790 Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials |
| ASTM D2205-85 | ASTM D2205-85 Traffic Paints |
| ASTM D2240 | ASTM D2240 Rubber Property – Durometer Hardness |
| ASTM D2244-85 | ASTM D2244-85 Calculation of Colour Differences from Instrumentally Measured Colour Coordinates |

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| ASTM D2850-95 | ASTM D2850-95 Unconsolidated-Undrained Triaxial Compression Test on Cohesive Soils |
| ASTM D2922 | ASTM D2922 Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth) |
| ASTM D3222 | ASTM D3222 Unmodified Poly(Vinylidene Fluoride) (PVDF) Molding Extrusion and Coating Materials |
| ASTM D3675 | ASTM D3675 Surface Flammability of Flexible Cellular Materials Using a Radiant Heat Energy Source |
| ASTM D3960-87 | ASTM D3960-87 Determining Volatile Organic Content (VOC) of Paints and Related Coatings |
| ASTM D4976 | ASTM D4976 Polyethylene Plastics Molding and Extrusion Materials |
| ASTM D5856-95 | ASTM D5856-95 Water in Petroleum Products and Bituminous Materials by Distillation |
| ASTM D6359-99 | ASTM D6359-99 Minimum Retroreflectance of Newly Applied Pavement Marking Using Portable Hand-Operated Instruments |
| ASTM E84 | ASTM E84 Surface Burning Characteristics of Building Materials |
| ASTM E90 | ASTM E90 Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements |
| ASTM E119 | ASTM E119 Fire Tests of Building Construction and Materials |
| ASTM E162 | ASTM E162 Surface Flammability of Materials Using a Radiant Heat Energy Source |
| ASTM E274-06 | ASTM E274-06 Standard Test Method for Skid Resistance of Paved Surfaces using a Full Scale Tire |
| ASTM E283-04 | ASTM E283-04 Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen |
| ASTM E330 | ASTM E330 Structural Performance of Exterior |

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| | Windows, Doors, Skylights and Curtain Walls |
| ASTM E331 | ASTM E331 Water Penetration of Exterior Windows, Skylights, Doors and Curtain Walls by Uniform Static Air Pressure Difference |
| ASTM E501-06 | ASTM E501-06 Standard Specification for Standard Rib Tire for Skid Resistance Tests |
| ASTM E648 | ASTM E648 Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source |
| ASTM E662 | ASTM E662 Specific Optical Density of Smoke Generated by Solid Material |
| ASTM E1347 | ASTM E1347 Colour and Colour Difference Measurement by Tristimulus |
| ASTM E1332 | ASTM E1332 Rating Outdoor-Indoor Sound Attenuation |
| ASTM E1710 | ASTM E1710 Test Method for Measurement of Retroreflective Pavement Marking Materials with CEN-Prescribed Geometry Using a Portable Retroreflectometer |
| ASTM F436 | ASTM F436 Standard Specification for Hardened Steel Washers |
| ASTM F519 | ASTM F519 Mechanical Hydrogen Embrittlement Evaluation of Plating/Coating Processes and Service Environments |
| ASTM F593 | ASTM F593 Stainless Steel Bolts, Hex Cap Screws and Studs |
| ASTM F738M | ASTM F738M Stainless Steel Metric Bolts, Screws, and Studs |
| ASTM F836M | ASTM F836M Style 1 Stainless Steel Metric Nuts |
| ASTM G51 | ASTM G51 Measuring pH of Soil for Use in Corrosion Testing |
| ASTM G57 | ASTM G57 Field Measurement of Soil Resistivity Using the Wenner Four-Electrode Method |
| AWMAC | Quality Standards for Architectural Woodwork |

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| AWS A5.0 | AWS A5.0 Filter Metal Procurement Guidelines |
| AWS BRH | AWS BRH American Welding Society Brazing Handbook |
| AWS C1.1 | AWS C1.1 Resistance Welding |
| AWS D1.1 | AWS D1.1 Structural Welding Code – Steel |
| AWS D1.2 | AWS D1.2 Structural Welding Code – Aluminum |
| AWS D1.3 | AWS D1.3 Structural Welding Code – Sheet Steel |
| AWS D1.6 | AWS D1.6 Structural Welding Code – Stainless Steel |
| AWS D14.1 | AWS D14.1 Welding of Industrial and Mill Cranes and Other Material Handling Equipment |
| AWS D15.1 | AWS D15.1 Railroad Welding Specification – Cars and Locomotives |
| AWS WHB | AWS WHB American Welding Society Welding Handbook |
| Bayview/Somerset Area Secondary Plan | |
| Bikeways Design Manual, Mar 2014 | Bikeways Design Manual, Mar 2014 |
| Bridge Clearance and Load Restriction Manual (OSCLIS) | Ontario, Ministry of Transportation, Bridge Office, Bridge Clearance and Load Restriction Manual, Ministry of Transportation, 2007 |
| Bridge Condition Index (BCI): An Overall Measure of Bridge Condition, July 2009, MTO | Methodology for calculating and reporting the BCI. |
| Bridge Office Memorandum #2015-05 – November 30, 2015 | Bridge Office Memorandum #2015-05 – November 30, 2015 |
| BSS-7239 | BSS-7239 Test Method for Toxic Gas Generation by Materials on Combustion |
| Canada’s Capital Core Area Sector Plan | |
| Canadian Artists’ Representation / Le Front des artistes canadiens (CARFAC) | Guidance on economic and legal rights for artists engaged in visual arts, as available on the CARCC website |
| Canadian Conservation Institute | Industry best practice for art handling and conservation in locations with existing artwork, |

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| | as available on the Canadian Conservation Institute website |
| Canadian Road Safety Audit Guide (TAC) | Canadian Guide to Road Safety Audits, Ottawa: TAC, April 2004 |
| Canadian Transportation Agency | Code of Practice, Passenger Terminal Accessibility |
| Canadian Transportation Agency | Code of Practice, Passenger Rail Car Accessibility and Terms and Conditions of Carriage by Rail of Persons with Disabilities |
| Canadian Transportation Agency | Code of Practice, Removing Communication Barriers for Travelers with Disabilities |
| Canadian Transportation Agency | Code of Practice, Intercity Bus |
| CAN/CGSB-1-GP 12C | Standard Paint Colours |
| CAN/CGSB 1.181 | CAN/CGSB 1.181 Ready-Mixed Organic Zinc-Rich Coating |
| CAN/CGSB 12.1-M | CAN/CGSB 12.1-M, Tempered or Laminated Safety Glass |
| CAN/CGSB 12.11-M | CAN/CGSB 12.11-M Wired Safety Glass |
| CAN/CGSB 12.20-M | CAN/CGSB 12.20-M Structural Design of Glass for Buildings |
| CAN/CGSB 12.3-M | CAN/CGSB 12.3-M Flat, Clear Float Glass |
| CAN/CGSB 12.8-M | CAN/CGSB 12.8-M Insulating Glass Units |
| CAN/CGSB 75.1-M | CAN/CGSB 75.1-M Tile, Ceramic |
| CAN/CGSB 85.100 | CAN/CGSB 85.100 Painting |
| CAN/CGSB-109.4 | CAN/CGSB-109.4-2000, Passenger Information Symbols Standard |
| CAN/CSA A5 | CAN/CSA A5 Portland Cement |
| CAN/CSA A16 | CAN/CSA A16 Design of Steel Structures |
| CAN/CSA A23.1 | CAN/CSA A23.1 Concrete Materials and Methods of Concrete Construction |
| CAN/CSA A23.2 | CAN/CSA A23.2 Methods of Testing for Concrete |
| CAN/CSA A23.3 | CAN/CSA A23.3 Design of Concrete Structures |
| CAN/CSA A23.4 | CAN/CSA A23.4 Precast Concrete - Materials |

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| CAN/CSA A23.5 | CAN/CSA A23.5 Supplementary Cementing Materials |
| CAN/CSA A165 | CAN/CSA A165 Concrete Masonry Units |
| CAN/CSA A179 | CAN/CSA A179 Mortar and Grout for Unit Masonry |
| CAN/CSA A251 | CAN/CSA A251 Qualification Code for Architectural and Structural Precast Concrete |
| CAN/CSA A370 | CAN/CSA A370 Connectors for Masonry |
| CAN/CSA A371 | CAN/CSA A371 Masonry Construction for Buildings |
| CAN/CSA A440 | CAN/CSA A440 Window, Door, and Skylight Installation |
| CAN/CSA A3000 | CAN/CSA A3000 Cementitious Materials Compendium |
| CAN/CSA B44 | CAN/CSA B44 Safety Code for Elevators |
| CAN/CSA B45 | CAN/CSA B45 Plumbing Fixtures |
| CAN/CSA B52 | CAN/CSA B52 Mechanical Refrigeration Code |
| CAN/CSA B139 | CAN/CSA B139 Installation Code for Oil Burning Equipment |
| CAN/CSA B167-96 | CAN/CSA B167-96 Maintenance and Inspection of Overhead Cranes, Gantry Cranes, Monorails, Hoists and Trolleys |
| CAN/CSA B651-04 | CAN/CSA B651-04 Accessible Design for the Built Environment |
| CAN/CSA C22.1-09 | CAN/CSA C22.1-09 Canadian Electrical Code, Part I – Safety Standard for Electrical Installations |
| CAN/CSA C22.2-09 | CAN/CSA C22.2-09 Canadian Electrical Code, Part II – General Requirements |
| CAN/CSA C22.2 No. 94 | CAN/CSA C22.2 No. 94 Electrical Enclosures |
| CAN/CSA C22.3 No. 1 & 8 | CAN/CSA C22.3 No. 1 & 8 Overhead Systems |
| CAN/CSA C22.3 No. 4 | CAN/CSA C22.3 No. 4-1974(R1995) Control of Electromechanical Corrosion of Underground Metallic Structures |

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| CAN/CSA C390-10 | CAN/CSA C390-10 Energy Efficiency Test Methods for Three-Phase Induction Motors |
| CAN/CSA G30.5 | CAN/CSA G30.5 Welded Steel Wire Fabric for Concrete Reinforcement |
| CAN/CSA G30.18 | CAN/CSA G30.18 Grade 400W, Billet-steel Bars, Deformed |
| CAN/CSA G40.20 | CAN/CSA G40.20 General Requirements for Rolled or Welded Structural Quality Steel |
| CAN/CSA G40.21 | CAN/CSA G40.21 Structural Quality Steels |
| CAN/CSA-G164-M | CAN/CSA-G164-M Hot Dip Galvanizing of Irregularly Shaped Articles |
| CAN/CSA O86 | CAN/CSA O86 Engineering Design in Wood |
| CAN/CSA Q396 | CAN/CSA Q396 Software Quality Assurance Standards |
| CAN/CSA Q632-90 | CAN/CSA Q632-90 Reliability and Maintainability Management Guidelines |
| CAN/CSA S6 | CAN/CSA S6 Canadian Highway Bridge Design Code (CHBDC) |
| CAN/CSA S16 | CAN/CSA S16 Limit States Design of Steel Structures |
| CAN/CSA S136-M | CAN/CSA S136-M Design of Cold-Formed Steel Structural Members |
| CAN/CSA S304.1 | CAN/CSA S304.1 Design of Masonry Structures |
| CAN/CSA S413 | CAN/CSA S413 Parking Structures |
| CAN/CSA S478 | CAN/CSA S478 Guideline on Durability in Buildings |
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| CAN/CSA S806 | CAN/CSA S806 Design & Construction of Building Structures with Fibre Reinforced Polymer |
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Ontario Traffic Manual, Book 19, ATMS 2010

Ontario Traffic Manual, Book 19, ATMS 2010 December 2007

Ontario Water Resources Act

R.S.O. 1990

OPES 0910-1B

January 2008 Electronic Controllers

OPES 1920-1A

July 2008 Infrared Road Surface Temperature Indicating System Controllers

OPS

Ontario Provincial Standard for Roads and Public Works (OPS)

OPSD

Ontario Provincial Standard Drawings (OPSD)

OPSS

Ontario Provincial Standards Specifications

Ottawa Cycling Plan

Ottawa Cycling Plan (OCP)

Reference Documents in Schedule 15

Description of Reference Documents

| | |
|--|--|
| Ottawa DOTT Recommended Plan | Ottawa DOTT Recommended Plan |
| Ottawa Escarpment Area District Plan | |
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| Ottawa Official Plan | Ottawa Official Plan (OP) |
| Ottawa Pedestrian Plan | Ottawa Pedestrian Plan |
| Ottawa Train Yards Site Servicing Report | David McManus Engineering Ltd., 2001 |
| Ottawa Transit-Oriented Development Guidelines | Ottawa Transit-Oriented Development (TOD) Guidelines |
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| Overhead Sign Structures Reference Spreadsheet | Required file format for overhead sign inventory data capture |
| Overhead Sign Support Maintenance Inspection Form, MTO | Overhead Sign Support Maintenance Inspection Form, MTO |
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| [REDACTED] | [REDACTED] |
| Policy and Guidelines on Disability and the Duty to Accommodate | Ontario Human Rights Commission |
| Portable Temporary Traffic Signals Policy, Oct 2012 | Portable Temporary Traffic Signals Policy, Oct 2012 |
| Post-Tensioned Box Girder Bridge Manual | Post-Tensioning Institute (PTI) Post-Tensioned Box Girder Bridge Manual |
| <i>Professional Engineers Act</i> | <i>Professional Engineers Act</i> R.S.O. 1990, CHAPTER P.28 |
| Province of Ontario Emergency Response Plan (PERP) | Emergency Response Plan, Province of Ontario, 2008 |
| Provincial Engineering Memorandum Traffic Office #2014-01, September 18, 2014 | A design guideline for the implementation of accessible pedestrian signals (APS) taking into consideration the requirements of AODA Ontario Regulation 413/12 and TAC guidelines |
| PVMS Best Practices Manual V4 05-09 | PVMS Best Practices Manual V4 05-09 |
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Reference Documents in Schedule 15

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| | |
|--|--|
| Recommendations for Prestressed Rock and Soil Anchors | Post-Tensioning Institute (PTI) Recommendations for Prestressed Rock and Soil Anchors |
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| Roadside Safety Manual | MTO |
| Rock Tunneling with Steel Supports | Proctor, R.V. and White, T.L., Youngstown, Ohio: Commercial Shearing, Inc., 1988 |
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| Secondary Plan for the Central Area | City of Ottawa |
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| Shotcrete Lining Design: Factors of Influence | John M. and Mattle B. (2003), RETC 2003 Proceedings, 726-734 |
| Sign Sheeting Standards for Regulatory, Warning and Temp Condition Signs, Oct 2013 | Sign Sheeting Standards for Regulatory, Warning and Temp Condition Signs, Oct 2013 |
| SMACNA Architectural Sheet Metal Manual | Sheet Metal and Air-conditioning Contractors' National Association (SMACNA), 2003 |
| SMACNA HVAC Duct Construction Standards | SMACNA |
| Species-at-Risk Permits | See Schedule 17 Environmental Obligations |
| Specification for Tunnelling | British Tunnelling Society and Institution of Civil Engineers (latest edition) |
| Specifications Covering Use of Aluminum in Passenger Carrying Railway Vehicles | |
| SSPC SP10 | SSPC SP10 Surface Preparations - Near-White Blast Cleaning |
| Standard Respecting Pipeline Crossings Under Railways | |
| Structural Financial Analysis Manual | Structural Financial Analysis Manual, April 1993 |

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Description of Reference Documents

Structural Manual: Division 1 Exceptions to the Canadian Highway Bridge Design
CAN/CSA-S6-14

Structural Manual - Division 1, Exceptions to the Canadian Highway Bridge Design Code
CAN/CSA-S6-14 for Ontario

Subway Environmental Design Handbook

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Technical Report No. 63, Guidance for the Design of Steel-Fibre-Reinforced Concrete

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Toxics Reduction Act

S.O. 2009

Transit Cooperative Research Program (TCRP) Report 57 Track Design Handbook for Light Rail Transit

Transportation Association of Canada – 7.0 Design and Operation of Road Maintenance Yards (September 2003)

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Tunnel Lining Design Guide

Tunney's Pasture Master Plan

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UIC605OR Protection from Corrosion

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User's Guide – NBC: Structural Commentaries (Part 4)

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Colours Used in Government Procurement, Dec 15, 1989

| Calendar Year Service Level System | | Stage 2 Service Planning Summary | | | | | | | | | | | | | | | | | | Stage 2 Service Planning Summary | | | | | | | | | | | | | | | | | | |
|--|-------|----------------------------------|-----------|-----------|-----------------|--------------|------------|-----------------------|-----------------|--------------|------------|------------|-----------------|--------------|------------|------------|-----------------|--------------|------------|----------------------------------|-----------------|--------------|------------|----------|-----------------|--------------|------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| | | 2018-2019 | | 2020-2021 | | 2022 | | 2023 | | 2024-2025 | | 2026-2029 | | 2031-2035 | | 2036-2040 | | 2041-2046 | | 2047-2048 | | | | | | | | | | | | | | | | | | |
| | | Stage 1 | | Stage 1 | | Stage 1 | | Stage 1 + Confed East | | Stage 2 | | Stage 2 | | Stage 2 | | Stage 2 | | Stage 2 | | Stage 2 | | | | | | | | | | | | | | | | | | |
| Summary Totals | | 10,700 | 11,360 | 12,000 | 10,537 | 10,537 | 12,000 | 13,091 | 14,400 | 14,400 | 14,400 | 14,400 | 14,400 | 14,400 | 14,400 | 14,400 | 14,400 | 14,400 | 14,400 | 14,400 | 14,400 | | | | | | | | | | | | | | | | | |
| Minimum Service Capacity - AM Peak (pphpl) | | 30 | 32 | 34 | 46 | 64 | 74 | 88 | 88 | 88 | 88 | 88 | 88 | 88 | 88 | 88 | 88 | 88 | 88 | 88 | 88 | | | | | | | | | | | | | | | | | |
| Peak Vehicles in Service | | 32 | 34 | 38 | 50 | 72 | 90 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | | | | | | | | | | | | | | | | | |
| Total Fleet Size | | 73,809 | 76,707 | 78,771 | 120,238 | 162,542 | 171,259 | 181,614 | 191,386 | 191,386 | 191,386 | 191,386 | 191,386 | 191,386 | 191,386 | 191,386 | 191,386 | 191,386 | 191,386 | 191,386 | 191,386 | | | | | | | | | | | | | | | | | |
| Annual Revenue Train Hours | | 73,809 | 76,707 | 78,771 | 120,238 | 162,542 | 171,259 | 181,614 | 191,386 | 191,386 | 191,386 | 191,386 | 191,386 | 191,386 | 191,386 | 191,386 | 191,386 | 191,386 | 191,386 | 191,386 | 191,386 | | | | | | | | | | | | | | | | | |
| Aggregate Annual Driver Hours Target | | 1,646,807 | 1,777,991 | 1,910,043 | 6,910,000 | 9,960,000 | 10,788,000 | 11,310,000 | 12,060,000 | 12,060,000 | 12,060,000 | 12,060,000 | 12,060,000 | 12,060,000 | 12,060,000 | 12,060,000 | 12,060,000 | 12,060,000 | 12,060,000 | 12,060,000 | 12,060,000 | | | | | | | | | | | | | | | | | |
| Annual Revenue Vehicle Kilometres | | 1,646,807 | 1,777,991 | 1,910,043 | 6,910,000 | 9,960,000 | 10,788,000 | 11,310,000 | 12,060,000 | 12,060,000 | 12,060,000 | 12,060,000 | 12,060,000 | 12,060,000 | 12,060,000 | 12,060,000 | 12,060,000 | 12,060,000 | 12,060,000 | 12,060,000 | 12,060,000 | | | | | | | | | | | | | | | | | |
| Time periods | | Start | End | Head-way | Rev Train Hours | Driver Hours | Rev Veh Km | Head-way | Rev Train Hours | Driver Hours | Rev Veh Km | Head-way | Rev Train Hours | Driver Hours | Rev Veh Km | Head-way | Rev Train Hours | Driver Hours | Rev Veh Km | Head-way | Rev Train Hours | Driver Hours | Rev Veh Km | Head-way | Rev Train Hours | Driver Hours | Rev Veh Km | | | | | | | | | | | |
| Monday-Thursday | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Early morning | 5:00 | 6:30 | 8:00 | 13.3 | 13.3 | 721 | 8:00 | 13.3 | 13.3 | 721 | 8:00 | 13.8 | 27.6 | 856 | 8:00 | 20.5 | 38.5 | 1,404 | 8:00 | 20.5 | 38.5 | 1,404 | 8:00 | 20.5 | 38.5 | 1,404 | 8:00 | 20.5 | 38.5 | 1,404 | | | | | | | | |
| Morning peak | 6:30 | 9:00 | 3:22 | 37.5 | 37.5 | 2,258 | 3:10 | 40.0 | 40.0 | 2,395 | 3:00 | 42.4 | 42.4 | 2,530 | 3:25 | 27.5 | 57.5 | 1,663 | 3:25 | 40.0 | 80.0 | 2,687 | 3:00 | 45.0 | 92.5 | 3,060 | 2:45 | 50.0 | 100.0 | 3,338 | 2:30 | 55.0 | 110.0 | 3,672 | 2:30 | 55.0 | 110.0 | 3,672 |
| Midday | 9:00 | 14:45 | 4:42 | 63.3 | 63.3 | 3,720 | 4:22 | 69.0 | 69.0 | 3,949 | 4:11 | 74.8 | 74.8 | 4,179 | 4:46 | 51.8 | 103.5 | 3,502 | 4:46 | 74.8 | 141.8 | 5,281 | 4:11 | 80.5 | 155.3 | 6,014 | 3:50 | 100.0 | 176.3 | 6,565 | 3:20 | 97.8 | 189.8 | 7,217 | 3:20 | 97.8 | 189.8 | 7,217 |
| Afternoon peak | 14:45 | 18:00 | 4:05 | 42.3 | 42.3 | 2,421 | 3:50 | 45.5 | 45.5 | 2,570 | 3:38 | 45.5 | 45.5 | 2,570 | 3:08 | 29.3 | 63.8 | 1,784 | 4:05 | 42.3 | 87.8 | 3,263 | 3:38 | 48.5 | 97.5 | 3,263 | 3:10 | 117.0 | 173.0 | 3,941 | 3:05 | 117.0 | 173.0 | 3,941 | 3:05 | 117.0 | 173.0 | 3,941 |
| Early evening | 18:00 | 21:30 | 5:00 | 38.5 | 38.5 | 2,125 | 5:00 | 38.5 | 38.5 | 2,125 | 5:00 | 38.5 | 38.5 | 2,125 | 5:00 | 31.5 | 63.0 | 2,084 | 5:00 | 42.0 | 80.5 | 3,063 | 5:00 | 42.0 | 80.5 | 3,063 | 5:00 | 42.0 | 80.5 | 3,063 | 5:00 | 42.0 | 80.5 | 3,063 | 5:00 | 42.0 | 80.5 | 3,063 |
| Late evening | 21:30 | 23:00 | 8:00 | 10.5 | 10.5 | 569 | 8:00 | 10.5 | 10.5 | 569 | 8:00 | 10.5 | 10.5 | 569 | 8:00 | 9.0 | 18.0 | 558 | 8:00 | 12.0 | 22.5 | 821 | 8:00 | 12.0 | 22.5 | 821 | 8:00 | 12.0 | 22.5 | 821 | 8:00 | 12.0 | 22.5 | 821 | 8:00 | 12.0 | 22.5 | 821 |
| Night | 23:00 | 1:00 | 15:00 | 8.0 | 8.0 | 405 | 15:00 | 8.0 | 8.0 | 405 | 15:00 | 6.0 | 12.0 | 397 | 15:00 | 4.0 | 20.0 | 194 | 15:00 | 4.0 | 20.0 | 194 | 15:00 | 4.0 | 20.0 | 194 | 15:00 | 4.0 | 20.0 | 194 | 15:00 | 4.0 | 20.0 | 194 | 15:00 | 4.0 | 20.0 | 194 |
| Friday | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Early morning | 5:00 | 6:30 | 8:00 | 13.3 | 13.3 | 721 | 8:00 | 13.3 | 13.3 | 721 | 8:00 | 13.8 | 27.6 | 856 | 8:00 | 20.5 | 38.5 | 1,404 | 8:00 | 20.5 | 38.5 | 1,404 | 8:00 | 20.5 | 38.5 | 1,404 | 8:00 | 20.5 | 38.5 | 1,404 | 8:00 | 20.5 | 38.5 | 1,404 | 8:00 | 20.5 | 38.5 | 1,404 |
| Morning peak | 6:30 | 9:00 | 3:22 | 37.5 | 37.5 | 2,258 | 3:10 | 40.0 | 40.0 | 2,395 | 2:40 | 42.5 | 42.5 | 2,534 | 3:25 | 27.5 | 57.5 | 1,663 | 3:25 | 40.0 | 80.0 | 2,687 | 3:00 | 45.0 | 92.5 | 3,060 | 2:45 | 50.0 | 100.0 | 3,338 | 2:30 | 55.0 | 110.0 | 3,672 | 2:30 | 55.0 | 110.0 | 3,672 |
| Midday | 9:00 | 14:45 | 4:42 | 63.3 | 63.3 | 3,720 | 4:22 | 69.0 | 69.0 | 3,949 | 4:11 | 74.8 | 74.8 | 4,179 | 4:46 | 51.8 | 103.5 | 3,502 | 4:46 | 74.8 | 141.8 | 5,281 | 4:11 | 80.5 | 155.3 | 6,014 | 3:50 | 100.0 | 176.3 | 6,565 | 3:20 | 97.8 | 189.8 | 7,217 | 3:20 | 97.8 | 189.8 | 7,217 |
| Afternoon peak | 14:45 | 18:00 | 4:08 | 42.3 | 42.3 | 2,421 | 3:50 | 45.5 | 45.5 | 2,570 | 3:38 | 45.5 | 45.5 | 2,570 | 3:08 | 29.3 | 63.8 | 1,784 | 4:08 | 42.3 | 87.8 | 3,263 | 3:38 | 48.5 | 97.5 | 3,263 | 3:10 | 117.0 | 173.0 | 3,941 | 3:05 | 117.0 | 173.0 | 3,941 | 3:05 | 117.0 | 173.0 | 3,941 |
| Early evening | 18:00 | 21:30 | 5:00 | 38.5 | 38.5 | 2,125 | 5:00 | 38.5 | 38.5 | 2,125 | 5:00 | 38.5 | 38.5 | 2,125 | 5:00 | 31.5 | 63.0 | 2,084 | 5:00 | 42.0 | 80.5 | 3,063 | 5:00 | 42.0 | 80.5 | 3,063 | 5:00 | 42.0 | 80.5 | 3,063 | 5:00 | 42.0 | 80.5 | 3,063 | 5:00 | 42.0 | 80.5 | 3,063 |
| Late evening | 21:30 | 23:00 | 8:00 | 10.5 | 10.5 | 569 | 8:00 | 10.5 | 10.5 | 569 | 8:00 | 10.5 | 10.5 | 569 | 8:00 | 9.0 | 18.0 | 558 | 8:00 | 12.0 | 22.5 | 821 | 8:00 | 12.0 | 22.5 | 821 | 8:00 | 12.0 | 22.5 | 821 | 8:00 | 12.0 | 22.5 | 821 | 8:00 | 12.0 | 22.5 | 821 |
| Night | 23:00 | 2:00 | 8:00 | 21.0 | 21.0 | 1,139 | 8:00 | 21.0 | 21.0 | 1,139 | 8:00 | 21.0 | 21.0 | 1,139 | 8:00 | 24.0 | 45.0 | 1,641 | 8:00 | 24.0 | 45.0 | 1,641 | 8:00 | 24.0 | 45.0 | 1,641 | 8:00 | 24.0 | 45.0 | 1,641 | 8:00 | 24.0 | 45.0 | 1,641 | 8:00 | 24.0 | 45.0 | 1,641 |
| Saturday | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Daytime | 6:00 | 19:00 | 5:00 | 147.6 | 147.6 | 4,073 | 5:00 | 147.6 | 147.6 | 4,073 | 5:00 | 147.6 | 147.6 | 4,073 | 5:00 | 147.6 | 147.6 | 4,073 | 5:00 | 147.6 | 147.6 | 4,073 | 5:00 | 147.6 | 147.6 | 4,073 | 5:00 | 147.6 | 147.6 | 4,073 | 5:00 | 147.6 | 147.6 | 4,073 | 5:00 | 147.6 | 147.6 | 4,073 |
| Evening | 19:00 | 23:00 | 8:00 | 28.0 | 28.0 | 752 | 7:52 | 28.0 | 28.0 | 772 | 7:26 | 28.0 | 28.0 | 816 | 8:00 | 24.0 | 48.0 | 744 | 8:00 | 32.0 | 60.0 | 1,094 | 7:27 | 32.0 | 64.0 | 1,175 | 6:50 | 36.0 | 68.0 | 1,282 | 6:12 | 40.0 | 76.0 | 1,410 | 6:12 | 40.0 | 76.0 | 1,410 |
| Night | 23:00 | 2:00 | 8:00 | 21.0 | 21.0 | 569 | 8:00 | 21.0 | 21.0 | 569 | 8:00 | 18.0 | 36.0 | 558 | 8:00 | 24.0 | 45.0 | 821 | 8:00 | 24.0 | 45.0 | 821 | 8:00 | 24.0 | 45.0 | 821 | 8:00 | 24.0 | 45.0 | 821 | 8:00 | 24.0 | 45.0 | 821 | 8:00 | 24.0 | 45.0 | 821 |
| Sunday | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Daytime | 6:00 | 19:00 | 5:00 | 125.6 | 125.6 | 3,486 | 5:00 | 125.6 | 125.6 | 3,486 | 5:00 | 125.6 | 125.6 | 3,486 | 5:00 | 105.0 | 210.0 | 3,473 | 5:00 | 144.0 | 276.0 | 5,252 | 5:00 | 144.0 | 276.0 | 5,252 | 5:00 | 144.0 | 276.0 | 5,252 | 5:00 | 144.0 | 276.0 | 5,252 | 5:00 | 144.0 | 276.0 | 5,252 |
| Evening | 19:00 | 23:00 | 10:00 | 24.0 | 24.0 | 697 | 10:00 | 24.0 | 24.0 | 697 | 10:00 | 24.0 | 24.0 | 697 | 10:00 | 24.0 | 48.0 | 875 | 10:00 | 24.0 | 48.0 | 875 | 10:00 | 24.0 | 48.0 | 875 | 10:00 | 24.0 | 48.0 | 875 | 10:00 | 24.0 | 48.0 | 875 | 10:00 | 24.0 | 48.0 | 875 |

Notes:
- Initial Service Level 3a reflects early opening of Confederation Line East; Service Levels 4-9 reflect full Stage 2 build out
- Service Plan 3a-9 reflects OC Transpo service configuration for Stage 2 (Peak periods 3 of 4 trains to Trim, 1 of 4 to Blair; Off peak all to Trim)
- Service Plan 1-9 reflects OC Transpo policy headways used as basis for Stage 1 Service Plan
- Service Plan 1-9 reflects (REDACTED) proposal of single car service on weekends from Stage 1

Notes:
- Initial Service Level 3a reflects early opening of Confederation Line East; Service Levels 4-9 reflect full Stage 2 build out
- Service Plan 3a-9 reflects OC Transpo service configuration for Stage 2 (Peak periods 3 of 4 trains to Trim, 1 of 4 to Blair; Off peak all to Trim)
- Service Plan 1-9 reflects OC Transpo policy headways used as basis for Stage 1 Service Plan
- Service Plan 1-9 reflects (REDACTED) proposal of single car service on weekends from Stage 1

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**SCHEDULE 15-2
DESIGN AND CONSTRUCTION REQUIREMENTS**

**PART 1
GENERAL REQUIREMENTS**

ARTICLE 1 REFERENCE DOCUMENTS AND SUBMITTALS

1.1 Application of the Reference Documents, Standards and Procedures, City Standards, Ontario Provincial Standards for Roads and Public Works and Other Manuals, Codes and Standards

- (a) The Works shall be performed in accordance with the applicable Reference Documents, and with the following amendments:
- (i) Requirements related to design and submission requirements and quality assurance in the Reference Documents do not apply; rather, the Output Specifications and express requirements of this Project Agreement, including Schedule 11 – Integrated Management System Requirements, respectively shall apply;
 - (ii) Requirements and specifications in the Reference Documents related to equipment for performing the Works do not apply;
 - (iii) Sections within the Reference Documents that are not applicable to this form of agreement, such as payment terms, do not apply;
 - (iv) Any and all references to “approval by the Contract Administrator” or other such reference in the Reference Documents, in terms of acceptance of materials, permission to proceed, work methodology or end product, shall be construed as being the responsibility of DB Co, but each such instance shall be in consultation with applicable Governmental Authorities;
 - (v) DB Co shall consult with the City to determine which Reference Documents submissions are to be submitted under Schedule 10 – Review Procedure;
 - (vi) DB Co shall, when required in the Reference Documents to submit for approval samples of any products proposed by DB Co, submit such samples with supporting documentation to the City in accordance with Schedule 10 – Review Procedure; and
 - (vii) The OPS specifications that apply to the Work shall only include the municipal and provincial common standards in OPS Volumes 1 through 4 and the municipal-oriented specifications in OPS Volumes 7 and 8, unless specified otherwise in Schedule 15 – Output Specifications.

1.2 Reference Documents

- (a) Without limiting any other provision in this Project Agreement, the Reference Documents shall apply to the Works as described in Schedule 15-2 – Design and Construction Requirements.

1.3 Order of Precedence

- (a) Unless otherwise expressly provided in Schedule 15-2 – Design and Construction Requirements, if there is any conflict between any of the provisions of this Project Agreement and any of the Reference Documents, the following shall apply in descending order of precedence:
 - (i) Applicable laws and regulations;
 - (ii) the provisions of this Project Agreement;
 - (iii) City Standards and Procedures;
 - (iv) OPS; and,
 - (v) any other applicable Reference Documents.

1.4 Reference Concept

- (a) Any use by DB Co of any or all aspects of the Reference Concept in performing the design and construction Works shall be entirely at DB Co's own risk. Use of the Reference Concept as a basis for DB Co's design for any part of the Project does not guarantee the City approval of DB Co's design.

1.5 Submittals

- (a) DB Co shall be responsible for determining any and all necessary Works Submittals, as specified in the relevant sections of this Schedule 15-2 – Design and Construction Requirements, whether or not a specific reference to Schedule 10 – Review Procedure is specifically mentioned.

ARTICLE 2 PHYSICAL LAYOUT

2.1 Existing Infrastructure

- (a) Existing Infrastructure is comprised of, but not limited to, the following major components;
- (i) Nine Transitway Stations which are being converted to LRT Stations
 - A. Westboro Station;
 - B. Dominion Station;
 - C. Lincoln Fields Station;
 - D. Iris Station;
 - E. Pinecrest Station;
 - F. Baseline Station;
 - G. Bayshore Station;
 - H. Place D'Orléans Station; and
 - I. Trim Road Station.
 - (ii) Culvert Structures
 - A. Bilberry Creek Culvert under Highway OR174 (SN224510);
 - B. Box Culvert under Highway OR174 (SN894040);
 - C. Taylor Creek Culvert under Highway OR174 (SN894050);
 - D. Box Culvert under West Guideway (SN018230);
 - E. ORPP under Carling Avenue (STM69595, STM69596, STM69600, STM69601, STM69602, STM65654);
 - F. Graham Creek Culvert;
 - G. Stillwater Creek Culvert;
 - H. Southwest Transitway – Pinecrest Creek Kenson Park Culvert (SN018360); and,
 - I. Southwest Transitway – Pinecrest Creek Baseline Road Culvert (SN018370).

2.2 System Infrastructure

- (a) The Project shall generally include the following SI:
 - (i) Approximately 28.1 km of Track consisting of at grade surface Track, Elevated Guideway Track and three below-grade Track sections.
 - (ii) Sixteen Stations, with 2 new Underground Stations and 14 new At Grade Stations, 3 of which are Terminal Stations. Of these 16 Stations, 8 of them are existing Transitway Stations which are being converted to LRT Stations.
 - (iii) LMSF located west of Moodie Drive, including maintenance building, storage building and Trackwork.
 - (iv) Existing Structures to be incorporated into the alignment as described in Clause 2.9 (b) of this Part 1.
 - (v) Modifications at Existing Confederation Line Terminal Stations including Tunney's Pasture Station and Blair Station.
- (b) For clarity, SI includes the entire extent of the infrastructure constructed in, on, over or under any part of the Lands as part of the Works, but excluding NMI and New MTO Infrastructure.
- (c) SI includes all aspect of the Works required for the operation of the system, including, but not limited to:
 - (i) All Stations and associated Facilities;
 - (ii) LMSF and associated Facilities;
 - (iii) Systems;
 - (iv) Guideway;
 - (v) Utilities associated with Guideway.

2.3 New Municipal Infrastructure

- (a) The project shall include NMI Structures as identified in Schedule 15-2, Part 2, Appendix E – Confederation Line Extension Structures.
- (b) The Project includes other NMI as outlined in Clause 15.4 of this Part 1 and generally includes infrastructure associated with Roadways, City Utilities, and bus Stations.

2.4 General Alignment Requirements

- (a) The alignment falls within existing City ROW and the permanent takings as shown on the PRP drawings. DB Co shall design the alignment within the Lands as prescribed in Schedule 20 – Lands.
- (b) A portion of the design and construction of the Project shall be comprised of the conversion of the existing Transitway into the proposed LRT alignment at the following locations: from Blair Road Station to the new proposed Flyover Structure along OR174, from Tunney's Pasture Station to Dominion Station, from Lincoln Fields Station to Baseline Station, and from Pinecrest Station to Moodie Station.
- (c) The alignment shall be underground for the following sections:
 - (i) The Parkway Tunnel, with the East Portal located anywhere north of Rochester Field but no further west than the point with coordinates of easting: 362486.106 and northing: 5028002.223 using Modified Transverse Mercator (MTM) Zone 9 horizontal datum referenced to WGS84 (NAD 83), through NCC lands and the Richmond Road/Byron Linear Park Corridor, to the West Portal which shall daylight to the south of Richmond Road and to the north of Lincoln Fields Station. The distance from the south sidewalk of Richmond Road to the West Portal opening shall accommodate MUP connections with the south Richmond Road sidewalk over the roof of the Tunnel. Two stations shall be located in the Parkway Tunnel underground section, Cleary and New Orchard Stations which shall be below grade and open at the surface as defined in Schedule 15-2, Part 4 – Stations. The Parkway Tunnel alignment shall be located to maximize horizontal separation with the building foundations at [REDACTED] and [REDACTED] with the objective of providing similar length horizontal offset distances between the alignment and these two buildings. The vertical and horizontal alignment of the Tunnel in the vicinity of Cleary Avenue and Richmond Road shall be located such that the Tunnel can be designed and constructed without interfering with the existing West Nepean Collector underground utility. Refer to Schedule 15-2, Part 8 – Underground Structures for Tunnel design and construction requirements for the segment of the alignment crossing the WNC.
 - (ii) The Connaught Tunnel – a Tunnel that traverses under Connaught Ave; the portals shall be located such that the length of the Tunnel is minimized and the noise and vibration criteria specified in Section 17 for Project Operations is met with the additional requirement that the east portal be located no further west than the point with coordinates of easting 361139 and northing 5024493 using Modified Transverse Mercator (MTM) Zone 9 horizontal datum referenced to WGS84 (NAD 83). To provide some flexibility to DB Co for alignment optimization the above east portal westernmost coordinates may be modified to allow for a maximum 10m shift to the west on an axis parallel to the alignment with the design intent to maximize park space and pedestrian connectivity over the Tunnel. Shaft openings from the Tunnel to grade shall only be permitted for Tunnel ventilation and shall be located for the length of Connaught Tunnel

between the southern shoulder of Connaught Ave and the OC Transpo Storage Garage building and parking area located at 2550 Queensview Drive.

- (iii) The Baseline Tunnel – an existing tunnel that is located beneath the existing Baseline Station between Navajo Drive to the north and College Avenue to the south. This is a terminus of the LRT with two Tracks for the revenue operation and two additional Tracks for Non-Revenue Vehicles and temporary storage of Revenue Vehicles.
- (iv) The HWY 417 E-N/S Pinecrest Rd Ramp Tunnel – a Tunnel that traverses under HWY 417 E-N/S Pinecrest Rd Ramp with open trench Guideway and underpass structures for the HWY 417 S-W and Pinecrest Rd Ramp.
- (d) The remaining alignment consists of new at grade Guideway Construction, open trench depressed Guideway Construction and the Construction of new elevated Structures.
- (e) Six Transfer Stations shall be constructed – one at each of the alignment Terminal Stations – Trim Road Station, Moodie Station and Baseline Station and at three Line Stations at Bayshore, Place d'Orléans, and Lincoln Fields. Provisions for fare paid bus transfer Platforms, bus layby berths and circulation shall be designed and constructed at these locations.
- (f) Guideway Requirements
 - (i) The Guideway shall be completely fenced and segregated from any pedestrian and vehicular traffic. Fencing location, type and height shall be as outlined in Schedule 15-2, Part 6, Article 2 – Design Criteria.
 - (ii) See Schedule 15-2, Part 2, Clause 1.3 for Emergency egress and access requirements.
 - (iii) High rail vehicle access locations shall be provided at the following locations:
 - A. Trim Station;
 - B. Blair Station (the current Existing Confederation Line access);
 - C. Baseline Station; and,
 - D. Moodie LMSF.

2.5 Tunnel Requirements

- (a) DB Co shall be responsible for the complete design and construction of the Underground Structures using Cut-and-Cover methods, including but not limited to Tunnels, the access and ventilation shafts; Underground Station boxes; any required underground Facilities; mechanical and electrical facilities; and any other requirements for design and construction of the Tunnels.

- (b) The upper limit of the Cut-and-Cover Tunnels shall include clearances for required Utility crossings and appurtenant mechanical, electrical and systems facilities to the following limits:
 - (i) within Federal Lands between Cleary Station and Dominion Station the upper limit of the Tunnel roof shall be no less than 2.5m below final grade;
 - (ii) located under City roadways the upper limit of the Tunnel roof shall be no less than 2m below the top of final grade; and,
 - (iii) Reduced cover shall also be permitted where it is necessary for the Cut-and-Cover Tunnel alignment to ascend to the portals.
- (c) Rock bolts and/or tie backs shall remain within the lateral and upper limits of the alignment envelope and within the boundaries of property forming part of the Lands and identified as System Infrastructure Lands in Schedule 20 – Lands. Notwithstanding the foregoing, DB Co may install excavation support elements such as rock bolts and tie-backs not forming part of any permanent structure outside of property designated as System Infrastructure Lands to the extent that a right to undertake such installation has been secured and granted to DB Co pursuant to either Schedule 20 – Lands or Section 16(7) of the Project Agreement.

2.6 Systems Requirements

- (a) DB Co shall be responsible for the design, construction and Subsystem testing of Systems required for the safe and efficient operation of the System.
- (b) Systems includes
 - (i) Traction Power;
 - (ii) Tunnel Ventilation
 - (iii) Communications;
 - (iv) OCS;
 - (v) EMI /EMC;
 - (vi) Corrosion Control/Stray Current; and,
 - (vii) Static/Sub-system Testing.
- (c) The City shall be responsible for the specification development, design, interface management, installation, integration and Commissioning of the following Systems required for safe and efficient operations:
 - (i) Revenue Vehicles;

- (ii) Non-revenue vehicles; and,
- (d) DB Co shall design the system such that the distance from the Train stop location on the Platform, to the start of the rail arrestor or buffer stop at Terminal Stations shall be a minimum of 30m for Baseline Station and a minimum of 50m for Trim Station, unless otherwise defined.
 - (i) DB Co shall ensure all SI including the S&TCS is designed to support these minimum dimensions while still meeting all requirements.
 - (ii) DB Co shall be fully responsible for any additional work, system modifications, and regulatory approvals that may be required to ensure these minimum dimensions are met.

2.7 Facilities Requirements – Stations

- (a) DB Co shall provide Stations and Facilities in accordance with the following:
 - (i) The Stations shall be designed to meet the functional, accessibility, aesthetics, environmental, Safety, Security, operational and technical requirements of the City as contained and described in the Project Agreement.
 - (ii) Stations shall be designed to include the following as described in the Project Agreement:
 - A. Park and Ride Facilities and PPUDOs;
 - B. Service parking and laneways;
 - C. Bicycle Facilities; and,
 - D. Bus Facilities.
 - (iii) All Underground and At Grade Stations shall be designed in accordance with all applicable standards regarding accessibility and FLS, including but not limited to, Emergency egress, lighting and ventilation.
 - (iv) The Stations shall be designed for a fare control system to be supplied and installed by the City. DB Co shall ensure that all fare gate equipment is fully protected from the weather, including rain and snow in accordance with Schedule 15-2, Part 4, Clause 2.7(b)(iii)Bi.
 - (v) All Stations shall be designed to accommodate the design requirements of the City's Vehicle as well as buses where required.
 - (vi) All Stations shall be designed and constructed with access for maintenance personnel and equipment as required in Schedule 15-2, Part 4 – Stations.

(vii) The Stations shall be located along the corridor as described below:

A. Confederation Line East Extension:

- i. Blair Station is an existing Station serving as the interim eastern terminus of the Existing Confederation Line. DB Co shall modify the existing bus terminal and access to accommodate the extension of the Track, Guideway and to satisfy the bus Facility requirements.
- ii. Montreal Road Station shall be a new Line Station located at the crossing of OR174 and Montreal Road. The Station entrances shall have fare controlled access from both the eastbound and westbound lanes of Montreal Road with the Platform located directly above.
- iii. Jeanne d'Arc Station shall be a new Station located at the crossing of OR174 and Jeanne d'Arc Boulevard. The Station shall be served by two fare controlled entrances located on Jeanne d'Arc Boulevard. One entrance shall serve the northbound lane one shall serve the south bound lane;
- iv. Orléans Boulevard Station shall be a new Station located at the crossing of OR174 and Orléans Boulevard. The Station shall be served by two fare controlled entrances located on Orléans Boulevard. One entrance shall serve the northbound lane one shall serve the south bound lane;
- v. Place d'Orléans Station is an existing Transitway Station that is located adjacent to Place d'Orléans Shopping Centre and OR174. The Station shall be converted to serve as a Transfer Station. A pedestrian bridge spanning OR174 connecting the Park and Ride, the bus terminal and Place d'Orléans Shopping Center shall remain as a non-fare controlled connection in the final configuration. The bus terminal shall be directly connected to the O-Train Platforms and shall be within the Fare Paid Zone. The Station shall be served by four fare controlled entrances, two from the pedestrian bridge, one from the existing shopping center parking lot and one from Champlain Street; and,
- vi. Trim Road Station is an existing Transitway Station that is currently located southeast of the intersection of Trim Road and OR174. The existing Station shall be converted to a Terminal Station serving as the eastern terminus of the System. The existing bus terminal and Park and Ride will be reconfigured and capacity expanded to meet the needs of the Project including additional surface parking. The Station shall be served by one fare controlled

entrance located adjacent to the new Park and Ride Facility; with provision for two additional entrances; one adjacent to the south bound lanes of future Trim Road overpass and one entrance from the northeast near the existing City works yard.

B. Confederation Line West Extension:

- i. Tunney's Pasture is an existing Transitway station serving as the interim western terminus of the Existing Confederation Line. DB Co shall modify the existing bus terminal to satisfy the reduced bus terminal requirements within the Lands;
- ii. Westboro Station is an existing Station along the Transitway. The new Westboro Station shall be located on Scott Street between Tweedsmuir and Athlone Avenues. Off street bus Platforms and bus layby Facilities shall be located north of the existing Transitway trench. One fare controlled entrance shall be located from Scott Street and one from the non-Fare Paid Zone from the north;
- iii. Dominion Station is an existing Station along the Transitway. The new Dominion Station Platform shall be located within the existing Transitway trench, the Station fare controlled entrance shall be located between Dominion and Berkley Avenues;
- iv. Cleary Station is a new Station located between Richmond Road and Byron Avenue, west of Cleary Avenue within Byron Park. The fare controlled entrance shall be located no less than 25m east of the east curb line of Sherbourne Road;
- v. New Orchard Station shall be a new Station located between Richmond Road and Byron Avenue, immediately east of New Orchard Avenue within Byron Park. The fare controlled entrance shall be located immediately east of New Orchard Avenue;
- vi. Lincoln Fields Station is an existing Station of the Transitway network. The new Station shall be located in the vicinity of the existing Transitway Facility north of Carling Avenue, and consist of three Tracks with related Platforms. The new Station shall be integrated with the new bus Facility and PPUDO. The bus Facility shall be within the Fare Paid Zone. There shall be three fare controlled entrances; one from Carling Avenue near the new pedestrian crosswalk; one from the west at the level of the existing Transitway; and one from Carling Avenue near the existing bus entrance driveway;

- vii. Iris Station is an existing Station on the Transitway network. The new Station shall be located below the new Iris Street Bridge, with access from Iris Street located on the south side of Iris Street and fare controlled entrances on both the east and west side of the guideway;
- viii. Baseline Station is an existing bus Station on the Transitway. The new LRT Station Platform shall be located between College Avenue and Navaho Drive beneath the landscaped plaza just west of [REDACTED]. A Station fare controlled entrance and bus Facilities within the Fare Paid Zone shall be located south of College Avenue and west of the existing Park and Ride with a new pedestrian bridge connecting to the [REDACTED]. A second entrance shall be provided in the plaza north of College Avenue.
- ix. Queensview Station shall be a new Station located to the north of Highway 417. DB Co shall design and construct the Station in a side Platform configuration. The Station shall be integrated with a new pedestrian bridge connecting the north and south side of Highway 417. The fare controlled entrance shall be located north of Highway 417;
- x. Pinecrest station is an existing Station along the Transitway. The new Pinecrest Station shall be located on the north side of Highway 417 west of Pinecrest Road. The fare controlled entrance shall be located west of Pinecrest Road and North of Highway 417;
- xi. Bayshore Station is an existing station along the Transitway that is currently located adjacent to Bayshore Shopping Centre and Highway 417. The Station shall be converted to serve as a Transfer Station with integrated fare controlled bus Facilities, within the Fare Paid Zone, and a future direct connection to Bayshore Mall. The Station shall have fare controlled entrances at the north side of the bus terminal, one at grade and one at the existing pedestrian level; and,
- xii. Moodie Station is an existing Transitway Station that is currently located southeast of the intersection of Moodie Drive and Corkstown Road. The existing Station shall be converted to a Terminal Station serving as the western terminus of the Confederation Line. The Station shall be served by a minimum of one fare controlled entrance.

2.8 Facilities Requirements – LMSF

- (a) The proposed LMSF shall be located in the vicinity of Moodie Station.

- (b) LMSF shall be designed to meet the functional, accessibility, aesthetic, environmental, Safety, operational, and technical requirements of the City as contained in this Project Agreement.
- (c) LMSF shall be constructed within the Lands.
- (d) LMSF shall be designed and constructed to assure Revenue Vehicles are service ready in accordance with the Revenue Service schedule.
- (e) The LMSF shall be designed in accordance with any applicable standards regarding accessibility and FLS, including but not limited to, Emergency egress, lighting and ventilation, as pertain to a vehicle storage facility.

2.9 Structure Requirements

- (a) New Structures
 - (i) DB Co shall be responsible for the complete demolition and removal, of any existing Structures that have been made redundant as a result of new Structures.
 - (ii) DB Co shall be responsible for any impacts to existing Structures as a result of new Structures.
 - (iii) New Structures located along the Confederation Line East Extension shall include:
 - A. Montreal Road Flyover;
 - B. Westbound OR174 Bridge over Montreal Road;
 - C. Montreal Road Station Bridge;
 - D. Eastbound OR174 Bridge over Montreal Road; and,
 - E. Pedestrian Bridge at Trim Station.
 - (iv) New Structures located along the Confederation Line West Extension are:
 - A. Goldenrod Bridge Structure at Tunney's Pasture;
 - B. Roosevelt Pedestrian Bridge;
 - C. U Approach – Depressed Guideway Parkway East Portal;
 - D. U Approach – Depressed Guideway Parkway West Portal;
 - E. SJAM Parkway at Churchill Avenue Pedestrian Overpass;
 - F. SJAM Parkway at Cleary Avenue Pedestrian Overpass;

- G. U Approach - Depressed Guideway Connaught East Portal;
- H. U Approach - Depressed Guideway Connaught West Portal;
- I. Carling Avenue Bridge;
- J. Pedestrian Bridge at [REDACTED];
- K. Lincoln Fields Split Structure;
- L. Pedestrian Bridge at Queensview Station;
- M. Highway 417 Westbound Off-Ramp at Pinecrest Road;
- N. Highway 417 Westbound On-Ramp at Pinecrest Road;
- O. Pinecrest Road Bridge;
- P. Holly Acres Bridge;
- Q. Highway 417 S-W On-Ramp at Moodie Drive;
- R. Moodie Drive Bridge;
- S. Highway 417 N-W On-Ramp at Moodie Drive;
- T. Iris Street Bridge;
- U. Pinecrest Creek Culvert under Iris;
- V. Pinecrest Creek Culvert under Alignment; and,
- W. Baseline Station Pedestrian Bridge.

(b) Existing Structures to be used for the Guideway:

- (i) DB Co shall perform such investigations and design as may be required to ensure that any existing Structure can be used to support the Guideway. The design check shall be completed in accordance with all Applicable Codes and standards.
- (ii) DB Co shall perform design checks and investigations on all existing Structures which are to become Vehicle carrying Structures. DB Co shall evaluate all SI Structures to ascertain the BCI number of each Structure. BCI shall be calculated in accordance with the procedure contained in the MTO report "Bridge Condition Index (BCI) An Overall Measure of Bridge Condition". DB Co shall perform all necessary construction work to ensure each SI Structure achieves a minimum BCI of 80 at substantial completion. Substructure and soffit deficiencies on all existing structures spanning the alignment shall be repaired in accordance with Schedule

15-2, Part 2, Article 4 – Structural Design Criteria and Requirements and all Applicable Codes and standards.

- (iii) DB Co shall design and construct such modifications and ensure that all Applicable Codes are met, should such design checks demonstrate that modification is required to any portion of the Structure.
- (iv) A detailed condition assessment report shall be submitted in accordance with Schedule 10 – Review Procedure for all existing Structures being modified or rehabilitated. The condition assessment shall include the details of the proposed modifications and/or rehabilitation.
- (v) Existing Structures to be used along Confederation Line East Extension shall be:
 - A. Bilberry Creek Culvert under Highway OR174 (SN224510);
 - B. Box Culvert under Highway OR174 (SN894040); and,
 - C. Taylor Creek Culvert under Highway OR174 (SN894050).
- (vi) Existing Structures to be used along Confederation Line West Extension are:
 - A. Box Culvert under West Guideway (SN018230);
 - B. Graham Creek Culvert;
 - C. Stillwater Creek Culvert;
 - D. Southwest Transitway – Pinecrest Creek Kenson Park Culvert (SN018360); and,
 - E. Southwest Transitway – Pinecrest Creek Baseline Road Culvert (SN018370).
- (c) Existing Structures to be removed, replaced, modified or rehabilitated
 - (i) DB Co shall be responsible for:
 - A. The complete planning, demolition and removal, of any existing Structures that have been identified for removal or replacement;
 - B. The complete planning, design and construction of any replacement of existing structures;
 - C. The complete planning, design, modification or rehabilitation of any existing Structures; and,

- D. The complete coordination with external agencies and stakeholders during demolition staging and construction staging.

2.10 Design and Construction Requirements to Accommodate Future Works

- (a) DB Co shall protect for, by not precluding, future work in the design and construction of certain elements of the Project.
- (b) These future works are described below:
- (i) Future western extension of the Confederation Line either from Bayshore/Moodie or Baseline Station including the necessary Bridge Structures to allow the Moodie LRT to be extended to the west as part of the Kanata LRT;
 - (ii) Future eastern extension from Trim Station;
 - (iii) Future Cumberland Transitway at Blair Road;
 - (iv) Future Station Platform extensions if necessary to achieve 24,000 pphpd;
 - (v) The future connection of the Trillium Line Track alignment at Bayview Station to the Confederation Line alignment connecting to eastbound and westbound Tracks between Bayview Station and Lebreton Station;
 - (vi) The future northerly interprovincial extension of the Trillium Line alignment at Bayview Station to the existing Prince of Wales Bridge over the Ottawa River;
 - (vii) Future expansion of the Baseline storage and cleaning facility to accommodate up to 22 Vehicles;
 - (viii) Future extension of the Confederation Line beyond Baseline to the south;
 - (ix) Future widening of OR 174 from Blair Rd to Trim Rd so that the future Roadway is contained within the existing OR174 ROW;
 - (x) The future development of the City works yard on the northeast quadrant of the OR174/Trim interchange including but not limited to a future entrance to Trim Station on the north side of OR 174;
 - (xi) Future bridge crossing of OR 174 at 10th Line Road;
 - (xii) New side Platform Stations at [REDACTED], 10th Line Road and Orléans Town Centre;
 - (xiii) Future widening of Jeanne D'Arc Blvd;
 - (xiv) Future expansion of Highway 417 to the north, west of Moodie Drive and outlined in Schedule 15-2, Part 5 – LMSF;

- (xv) Future Trim Road overpass (existing Trim Road alignment) and interchange with OR 174;
- (xvi) Future Baseline Station Transit priority project;
- (xvii) Future Baseline Station pedestrian bridges as outlined in the CentrepoinTE Development Plan;
- (xviii) Connection of the east end of Bayshore Station to Bayshore Shopping Centre; and,
- (xix) Future expansion of Highway 417 from Highway 416 to Maitland Avenue.

ARTICLE 3 OPERATIONAL PERFORMANCE REQUIREMENTS

3.1 Introduction

- (a) DB Co shall provide the System that is seamlessly integrated with the Existing Confederation Line infrastructure and capable of delivering public transit service in a safe, reliable and efficient manner, and in accordance with the following operational performance parameters.

3.2 General

- (a) Operation of rail service will be the responsibility of the City. DB Co shall meet the operational needs and the functionality of the new System through the design and construction Work and shall validate the operational capabilities of the final SI design through performance simulation and demonstrate the operational capabilities of the SI as part of testing and commissioning.
- (b) DB Co shall be responsible to demonstrate through simulations and operational testing, that the Confederation Line East Works and West Works meets the operational needs and required functionality of the Project Agreement.
- (c) DB Co shall be responsible for the Subsystem testing on the systems they have designed and installed. DB Co shall be responsible for Systems Integration and Commissioning and System Safety Certification and System Security Certification of new SI and NMI.
- (d) Meeting the high capacity operational needs of the City shall require design and construction of the Confederation Line East Extension and Confederation Line West Extension that is highly integrated with the Existing Confederation Line and highly reliable across all major rail Systems including: Vehicle, Train Control and Signalling, Traction Power and Overhead Contact System, Stations, Tunnel Ventilation Systems, Track and Special Trackwork.
- (e) DB Co shall also provide O&M manuals for any systems and equipment being supplied and installed by DB Co, and provide associated O&M training, as per a training plan and scheduled agreed to by the City. These manuals will provide operations and maintenance staff with written instructions and documentation regarding the operation of, and the maintenance procedures associated with, each new system and related piece of equipment.

3.3 Operational Design and Construction Requirements

- (a) Operational Headways
 - (i) DB Co shall design and construct the SI to reliably support the sustained operational Headways identified in Clause 3.4 (c). Notwithstanding the above, DB Co shall design and construct the SI to support a minimum design headway of

2 minutes or less in accordance with the requirements of Schedule 15-2, Part 3, Article 10 – Signalling and Train Control System.

- (ii) DB Co shall design and construct the SI to reliably support a sustained operational headway of 15 minutes during a single Track outage at any location throughout the SI to support maintenance activities and/or continued operation during unplanned outages. Terminal to terminal trip time shall not significantly increase during single tracking operations, other than as a result of speed reductions applied through maintenance work zones. For clarity, the Train Control design shall support full reverse running performance, and crossovers shall be sized to minimize any delays associated with crossover movements.
- (b) Train Consist and Platform Lengths:
 - (i) The maximum Train consist length and Platform length shall be consistent with the Existing Confederation Line and designed in accordance with Schedule 15-2, Part 4 – Stations.
 - (ii) DB Co shall be responsible to ensure that the first and last door locations of the Train consist, Station Platform lengths and Train Control system are fully integrated in a manner that provides reliable Train berthing under all operating conditions for safe detraining and entraining of Passengers, utilizing all doors without undue Train performance degradation. DB Co shall be responsible for the optimal integration of the CBTC system, Platform length and placement, and for considering the Vehicle parameters that minimize any Train performance degradation while achieving reliable and consistent Train berthing at each Station. DB Co shall define and implement the optimal speed profile for this purpose to be programmed and enforced in the Train Control System.
- (c) Operating Configurations
 - (i) DB Co shall design and construct the SI to support the specific operating configurations to be operated by the City, as follows:
 - A. Weekday peak periods service patterns
 - i. During weekday AM and PM peak periods, three service patterns will operate, as follows:
 - 1 Baseline Station to Trim Station;
 - 2 Moodie Station to Trim Station; and,
 - 3 Moodie Station to Blair Station.
 - ii. These three service patterns will operate with the following relative frequencies of service:

- 1 Two out of every four trips operating through the core will operate between Baseline Station and Trim Station;
 - 2 One out of every four trips operating through the core will operate between Moodie Station and Trim Station; and,
 - 3 One out of every four trips operating through the core will operate between Moodie Station and Blair Station.
- iii. These service patterns will operate at the headways detailed in the table below and in accordance with Appendix C of this Part 1.

| AM PEAK | 2031 (Service Level 6) | 2048 (Service Level 9) |
|---|---------------------------|---------------------------|
| Segment | Operating Headway m:ss | Operating Headway m:ss |
| System Core: Between Lincoln Fields and Blair | 2:45 | 2:30 |
| Between Moodie and Lincoln Fields | 5:30 | 5:00 |
| Between Baseline and Lincoln Fields | 5:30 | 5:00 |
| Between Blair and Trim | 3:38* | 3:20* |
| * These headways are average headways, reflecting that three of four trips operate to/from Trim during the peak periods. (16.5 trips per hour per direction in 2031; 18 trips per hour per direction in 2048) | | |

- B. Weekday Off-Peak Periods (before 11:00pm) and Weekends/Holidays:
- i. Half of Trains shall operate between Moodie Station and Trim Station; and,
 - ii. Half of Trains shall operate between Baseline Station and Trim Station.
- C. Weekday Evenings (after 11:00pm):
- i. Four Trains per hour shall operate between Baseline Station and Trim Station;
 - ii. Four Trains per hour shall operate between Moodie Station and Lincoln Fields Station; and,
 - iii. Coordinated transfers will be scheduled at Lincoln Fields Station.

(ii) Lincoln Fields Station

- A. The Transfer Station shall be a three Track Station with 2 centre Platforms or one centre Platform and one side Platform and a fare paid bus terminal. All three Tracks shall be utilized for the loading and unloading of Passengers.
- B. The SI in the area of Lincoln Fields shall be designed to allow for efficient movement of Trains into and out of the Lincoln Fields Pocket (center) Track to support the following Train movements:
- i. Eastbound:
 - 1 Moodie to Lincoln Fields.
 - 2 Baseline to Lincoln Fields.
 - 3 Lincoln Fields to Trim.
 - ii. Westbound:
 - 1 Lincoln Fields to Moodie.
 - 2 Lincoln Fields to Baseline.
 - 3 Trim to Lincoln Fields.
- C. Crossovers shall be designed to minimize diverging and conflicting movements.

(d) Maximum Trip Times

- (i) To ensure an efficient and effective service, the System shall support trip times that are no greater than the maximum segment trip times over the Confederation Line East Extension and Confederation Line West Extension during the peak period shown in Table 1-3.1. Segment trip times shall be demonstrated using stochastic operations simulation modeling of the proposed System under ATO operations in accordance with the parameters in this Clause 3.4.
- (ii) The maximum travel time over the identified segments during the peak period, from wheel start at the beginning Station to wheel stop at the ending Station, including intermediate Dwell Times, shall not exceed the following:

Table 1-3.1 Maximum Peak Period Trip Times by Segment

| From | To | EB Time | WB Time |
|----------------|----------------|---------|---------|
| Moodie | Lincoln Fields | 9.0 min | 8.8 min |
| Baseline | Lincoln Fields | 4.6 min | 4.7 min |
| Lincoln Fields | Tunney's | 8.8 min | 8.8 min |

| | | | |
|-------|---------|----------|----------|
| | Pasture | | |
| Blair | Trim | 14.4 min | 15.3 min |

(e) Simulation Requirements

- (i) DB Co shall verify compliance with the minimum design headway of 2 minutes, 2031 (Service Level 6) and 2048 (Service Level 9) headways shown in Clause 3.4 (c) and with maximum travel times contained in Table 1-3.1, through operations simulation of the proposed Confederation Line East Extension and Confederation Line West Extension reflecting DB Co's design according to the following requirements:

- A. For the purposes of simulation, operating performance factors (such as, but not limited to: acceleration, braking, maximum allowable speed adherence) shall be adjusted such that Station-to-Station travel times are 6% longer than the ideal Station-to-Station travel times (i.e. Station-to-Station travel times that could be achieved with full acceleration and braking rates; with perfect adherence to maximum allowable speeds; and perfect timing of brake application) to account for sub-optimal performance reflecting real-world conditions. DB Co shall adjust and calibrate the operating performance factors to achieve the 6% increase in run time and shall document the adjustments in the simulation report. For purposes of calibrating the operating performance factors, the Station-to-Station travel times on the Moodie to Lincoln Fields segment (excluding dwell times) shall be utilized. The adjusted operating performance factors shall be applied to all respective Trains on all segments in all simulations
- B. For purposes of simulations, stochastic variation of Dwell Times shall be applied in accordance with Clause 3.4(f) below.
- C. For clarity, the stochastic variation of Dwell Times, and a 6% adjustment of the performance factors shall be included in the simulated run time which shall comply with the maximum trip times in Table 1-3.1.

(ii) Infrastructure

- A. The simulation shall reflect DB Co's final design of the SI on the Confederation Line East Extension and Confederation Line West Extension (including Track alignment, special Trackwork, curvature, grades, and Station Platform limits).

(iii) Rolling Stock

- A. The simulation shall reflect the parameters of the [REDACTED] at AW2 loading.

- (iv) The simulation shall capture the influence of the CBTC signal system as outlined in Schedule 15-2, Part 3 - Systems.
- (f) Dwell Time
 - (i) For simulation analysis purposes, stochastic dwell time variation shall be simulated through stochastic variation in the form of a uniform distribution of plus and minus 5 seconds applied to the nominal dwell times at each Station in Table 1-3.2.

Table 1-3.2: Dwell Time Assumptions

| Dwell Time (sec) | | |
|------------------|-----------|-----------|
| Station | Eastbound | Westbound |
| Moodie | - | - |
| Bayshore | 27 | 20 |
| Pinecrest | 20 | 20 |
| Queensview | 20 | 20 |
| | | |
| Baseline | - | - |
| Iris | 20 | 20 |
| | | |
| Lincoln Fields | 23 | 20 |
| New Orchard | 20 | 20 |
| Cleary | 20 | 20 |
| Dominion | 20 | 20 |
| Westboro | 20 | 20 |
| Tunney's Pasture | 27 | 21 |
| Blair | 20 | 29 |
| Montreal | 20 | 20 |
| Jeanne d'Arc | 20 | 24 |
| Orléans Blvd | 20 | 20 |
| Place d'Orléans | 20 | 32 |
| Trim | - | - |

- (ii) Passenger loading and unloading time at terminal Stations shall be considered part of the terminal layover time, and shall not be included in the calculation of maximum travel time.
- (iii) If any randomized dwell times from the uniform probability distribution result in values less than 20 seconds, they shall be adjusted upward to a minimum of 20 seconds in the simulation.

3.4 Operational Testing

- (a) System Integration Testing

- (i) DB Co shall confirm their SI design is capable of supporting the required minimum headway of two minutes.
 - (ii) DB Co shall demonstrate the maximum travel times specified in Clause 3.4 (d), while respecting minimum dwell times specified in Clause 3.4 (f).
 - (iii) DB Co shall demonstrate other operational capabilities of the SI that can be tested independently of the Existing Confederation Line, including operations in normal, abnormal, and Emergency scenarios.
- (b) Trial Running
 - (i) DB Co shall demonstrate through Trial Running of the SI for the East Works, and West Works that the following planned operational parameters can be achieved;
 - A. Service Level 3A headways for the East Works and Service Level 4 for the West Works as specified in Appendix C of this Part 1;
 - B. the operational performance; and,
 - C. the reliability requirements specified in Schedule 14 – Testing and Commissioning.

ARTICLE 4 DESIGN AND CONSTRUCTION

4.1 General Construction Requirements

- (a) DB Co shall be responsible for the design and construction of the Project and all other Construction Activities, including completion, Commissioning and testing of the Project, which shall be performed in strict accordance with the design and construction requirements and in such a manner as to comply with all applicable Project Agreement requirements.
- (b) Limits of construction, occupation and all works, except for site access, construction of detours and associated Works, shall be within the Lands, Temporary Easements and Permanent Easements as shown hatched on the PRP's. See Schedule 20 – Lands for additional information.
- (c) DB Co shall only construct or implement Site access, detours and associated Works on existing City/public rights-of-way/property if those Site access, detours and associated Works have been approved by the City as part of DB Co's TTMP.
- (d) Construction Mobilization and Staging Areas
 - (i) The only Properties that can be utilized as Construction mobilization or staging areas, as defined in Schedule 20 – Lands are indicated on the property table located in Schedule 20, Part B – Lands Table.
- (e) DB Co shall restore or rehabilitate any disturbed areas within or extending beyond the limits of the Works, including but not limited to, road alignment, paving, Trackwork, monitoring wells, landscaped areas including plantings and /or sodding. These areas shall be cleaned of debris and have any temporary paving or structures removed and replaced with planting soil or restored to the same or better condition or as directed by the City in accordance with the requirements of Schedule 15-2, Part 6, Article 2 – Design Criteria. DB Co shall complete a review of the adjacent land uses and site development for these locations and shall select the most appropriate groundcover.
 - (i) DB Co shall protect all City and Third Party Facilities adjacent to the Works.
 - A. Protect and/or transplant existing fencing, trees, landscaping, natural features, bench marks, buildings, Pavement, monitoring wells, surface or underground utility lines which are to remain. If damaged, restore to original or better condition unless directed otherwise. DB Co shall make reference to Schedule 15-2, Part 6, Article 2 – Design Criteria.
 - B. DB Co shall replace any damaged trees designated to remain in accordance with City Urban Forestry guidelines.

- C. DB Co shall be responsible for installing, maintaining and removing any temporary facilities necessary to access the site, including but not limited to fences, gates, constructions, granular, silt fences and TCD.
 - D. DB Co shall be responsible for the removal, safe storage, and restoration of furnishings and other assets of BIA as necessary for the Works.
- (f) DB Co shall perform the following for all Lands:
 - (i) Develop hoarding plans in accordance with the NCC hoarding specifications, and fencing plans shall be submitted in accordance with Schedule 10 – Review Procedure. The boundaries of the Construction sites shall be fenced. The boundaries of mobilization sites shall be hoarded. The hoarding/fencing plans shall include details on location, height, materials and expected timing of installation and removal.
 - (ii) In addition, for Lands subject to FLUDTA, hoarding plans shall be in accordance with the NCC hoarding specifications. No use or access to adjacent NCC lands shall be permitted without the express approval by the NCC.
 - (iii) Maintain the construction hoarding and fencing in a good condition of repair at all times.
 - (iv) DB Co shall install and maintain promotional and advertising materials to be provided by the City in accordance with Schedule 18 – Communications and Stakeholder Engagement Obligations.
- (g) Construction site camera systems:
 - (i) The City intends to provide a camera system to be installed by DB Co at each construction Site, at a location selected by the City. DB Co shall provide power and internet connectivity to each location selected by the City. The power shall be a hard wired connection, unless a specific arrangement is made between DB Co and the City for solar power to be used. The internet connectivity shall be high speed, through telephone or cable lines, unless a specific arrangement is made between DB Co and the City for an LTE cellular connection to be used.
 - A. The construction Sites shall be each of the Stations, as well as Tunney's Pasture Station (total of 18 locations).
 - B. The system being developed is closed, password protected, and not publicly accessible. Upon completion of the system, the City shall provide DB Co with live access to the system. The City shall own the system and the content, and reserves the right to utilize the system in order to create timelapse videos showing construction progress over time that may be shown to the public as a promotional tool. The system shall

adhere to the City of Ottawa's Surveillance System for Transit Network Access and Privacy Policy.

- (ii) In the event that, upon completion of the system, DB Co wishes to have an additional camera system at any Site beyond the one that the City shall provide, DB Co can purchase the unit from the City at cost, and install it on their site at their own cost.
- (iii) In the event that the City wishes to have an additional camera system at any Site, DB Co shall install it and provide power and internet connectivity as described in (i) above.

4.2 Surveys

(a) Control Survey

- (i) A control survey of the alignment has been completed by the City for this Project. Existing and new monuments were used in establishing the Project Control survey.
- (ii) DB Co shall evaluate its requirements for a control survey in order to perform the design and construction Work and determine if additional monuments are required. Any such additional monuments shall be of the same order as the control survey provided and shall be installed by DB Co and shall be surveyed to tie into the Project survey control coordinate system. DB Co shall prepare a survey report including field notes, measurements, adjustments, Station descriptions and reference tie drawing of each additional survey monument installed and provide a record to the City.
- (iii) DB Co shall be solely responsible for protecting and maintaining all existing survey control monuments. In the event that Project survey control monuments have been disturbed or destroyed during the Project, then DB Co shall re-establish the survey control at construction completion and provide a survey report to the City for approval at no cost to the City.
- (iv) The Project control survey shall be used as the basis for all Works.
- (v) Horizontal Control
 - A. Modified Transverse Mercator, MTM 3 degree, zone 9 central meridian 76 degrees 30 minutes West'; and,
 - B. NAD83 original as well as in NAD 83 CSRS format.

- C. The horizontal coordinates for control points are 2nd order as defined by the Specification and Recommendations for Control Surveys and Survey Markers 1978, Natural Resources Canada, Part 2 – Horizontal Control.
- D. All surveys made for the Project shall be referenced and adjusted to the Control Survey monuments in the DB Control network and shall be adjusted by holding these monuments fixed. The adjustments to the data shall be coordinated with the City. The accuracy of these surveys shall be second order.

(vi) Vertical Control

- A. The vertical control shall be based on the Canadian Geodetic Vertical Datum of CGCD1928 using HT2 Geoid Model.
- B. The vertical control survey shall be conducted in accordance with Specification and Recommendations for Control Surveys and Survey Markers 1978, Natural Resources Canada, Part 1 - Vertical Control, Levelling. Vertical Deep Benchmarks shall meet or exceed 1st Order Vertical levelling criteria. Non Deep Benchmarks typically set on sidewalks shall be verified for marker stability with a minimum of one adjacent marker prior to accepting the published elevations.

(b) Aerial Photo and Digital Mapping

- (i) Detailed topographic mapping was compiled for the Project based on 2012, 2013 or 2014, 6cm aerial imagery with an accuracy of 18cm or better 90% of the time with some possible errors up to 36cm 10% of the time. Additional aerial mapping is compiled by combining November 2015 6cm aerial imagery with high accuracy aerial LiDar, where appropriate. Accuracy is 12cm or better 90% of the time, with some possible errors up to 25cm, up to 10% of the time. The aerial mapping has been supplemented with field audit surveys for site specific locations.
- (ii) Aerial triangulation was based on the Project-specific control survey datum and the datum photo control points.
- (iii) DB Co shall evaluate their requirements for topographic mapping and augment the aerial triangulation adjustment with additional ground control, if required.
- (iv) In the event that DB Co requires additional or updated topographic mapping, then the orthophotos and digital vector mapping shall be performed in the Project control survey coordinate system.

(c) Legal Surveys

- (i) Legal surveys, in the form of a reference plan of survey, intended for fee simple, permanent or temporary easement acquisition to support the Project shall be performed by the City.
 - (ii) The entire corridor shall be surveyed in the form of parts on reference plans.
 - (iii) DB Co shall ensure that, in those areas where the proposed construction is to take place within 1m of a property limit, that a licensed Ontario Land Surveyor is engaged to stake out the property limit in the field and prepare field notes and sketches to document the fieldwork.
- (d) **Post Completion Survey**
 - (i) DB Co shall provide, at its own cost and expense, a post-completion survey, in the form of a topographic survey of the entire corridor accurate to a scale of 1:1000, in CADD format, georeferenced to the Project control not more than 90 days after the latest Final Completion Date.
 - (ii) DB Co shall be solely responsible for protecting and maintaining all existing legal survey reference monuments. In the event that Project survey monuments have been disturbed or destroyed during the Project, then DB Co shall re-establish the survey monuments at the time of the post-completion survey and provide a survey report to the City for approval at no cost to the City. The survey shall be submitted in accordance with Schedule 10 – Review Procedure.
- (e) DB Co shall complete a pre-construction condition survey of the Lands covered by Third Party Access Agreements (as defined in Schedule 20 – Lands) and adjacent lands and shall provide the report to the City, not less than eight calendar days prior to the commencement of the Works. Under no circumstances shall DB Co commence the Works until the pre-construction condition survey is provided to the City. DB Co shall complete a post-construction condition survey of the Lands covered by Third Party Access Agreements and adjacent lands and shall provide the report to the City not less than eight calendar days following the completion of the Works. The surveys shall record, by way of photographs, videos and written reports, the status, grading, fencing, monitoring wells, and visible condition of the Lands covered by Third Party Access Agreements and immediately adjacent property.

4.3 Design Requirements

- (a) **Design Components and Design Life**
 - (i) DB Co shall design the components of the Project to meet the requirements outlined in Table 1-4.1.

Table 1-4.1: Design Components and Design Life

| | Design Life Required (years) |
|---|------------------------------|
| New Bridge Structures | 75 |
| New Retaining Walls | 75 |
| New Culverts | 75 |
| New Flexible Pavement (including intervening rehabilitation with initial Design Life of minimum 20 years) | 40 |
| New Rigid or Composite Pavement (including intervening rehabilitation with initial Design Life of minimum 30 years) | 55 |
| Elevated Guideway | 75 |
| Stations – Finishes | 40 |
| Stations – At-Grade Station Structures | 50 |
| Stations – Underground Station Structures | 100 |
| Artwork | 30 |
| Ancillary Facilities – Structures | 50 |
| Ancillary Facilities – Finishes | 40 |
| Ancillary Facilities – EEBs and Tunnel Ventilation Structures | 100 |
| Ancillary Facilities – Bus shelters | 15 |
| Tunnel – Structure | 100 |
| Tunnel – Fit Out | 20 |
| Track – Ballast | 20 |
| Track – Fixed | 20 |
| Ties - Concrete | 40 |
| Ties - Hardwood | 25 |
| Switches & Cross-overs | 20 |
| LMSF Site Buildings | 40 |
| Maintenance Building – Shop Equipment | 30 |
| Signalling | 30 |
| Communications | 20 |
| CBTC System | 30 |
| Catenary | 40 |
| Traction Power Equipment | 40 |
| | |

(b) Climate Data for Design

- (i) DB Co shall use the climate data presented in Table 1-4.2 where required for design, unless otherwise specified:

Table 1-4.2: Climate Data

| | |
|-----------------------------|------|
| Extreme Maximum Temperature | 38°C |
|-----------------------------|------|

| | |
|-----------------------------|---------|
| Extreme Minimum Temperature | -39°C |
| | |
| Extreme Daily Rainfall | 135mm |
| Extreme Daily Snowfall | 56cm |
| Extreme Daily Precipitation | 135mm |
| Extreme Snow Depth | 135cm |
| | |
| Maximum Hourly Wind Speed | 80km/h |
| Maximum Wind Gust Speed | 135km/h |
| | |

4.4 Site Work

(a) General

(i) Existing Conditions

- A. Existing conditions shall be verified and documented by DB Co.
- B. DB Co shall identify and document all underground and surface Utility lines and buried objects prior to any construction activities and/or excavation operations.

(ii) Backfill

- A. Backfill work completed by DB Co shall achieve a performance characteristic not less than the adjacent undisturbed soils and to the satisfaction of the property owner, when backfilling in areas that will not carry any load from the works and other areas other than areas regulated by any applicable standards.

(b) Conduit Drainage

(i) Underground

- A. All underground conduit, duct banks, and maintenance holes for electrical, communication, and systems shall be designed and constructed to prevent the accumulation of water and formation of ice in any component within the SI.

(ii) Non-Underground

- A. All conduit and raceways for electrical, communication, and systems shall be designed and constructed to prevent the accumulation of water to prevent moisture from entering any equipment within the SI.

ARTICLE 5 IMPLEMENTATION CONSTRAINTS

5.1 General Implementation Constraints

(a) General Requirements

- (i) The intent of this section is not to define or limit DB Co's approach to the construction or the means and methods that may be chosen but to bring awareness to the Project constraints that shall be adhered to in the planning and delivery of the Works.
- (ii) DB Co shall reinstate to original condition, unless otherwise indicated elsewhere in the documents and at DB Co expense, all Lands, Roadways, MUPs and assets affected by the implementation of the Confederation Line.
- (iii) The construction planning for this Project shall consider the existing operations of the City, and the impacts to the street network within the City, as well as considering adjacent residences and businesses, with respect to pedestrian and property access and other environmental impacts. The construction sequencing shall be performed in such a manner that the existing Transitway is maintained at a service level similar to existing conditions for the maximum amount of time.
- (iv) For all Lands and Lands subject to FLUDTA, DB Co shall maintain fencing at all times around the boundaries of the construction sites. No use or access will be permitted to adjacent NCC Lands without the express approval by the NCC.

(b) Access to Adjacent Properties

- (i) DB Co shall provide access to all adjacent properties, tenants, and residential drives and building entrances, including access points for fire department connections and for waste removal except as otherwise permitted. Fire department access shall be maintained to conform to all code requirements. Should an existing entrance or access have to be closed or reduced, DB Co shall coordinate with the impacted parties to provide an alternative solution to have continuous access.
- (ii) DB Co shall accommodate for pedestrian access throughout the Project providing safe passage for pedestrians impacted by the Work. Pedestrian access shall be in conformance with the AODA, CSA accessibility requirements, and the COADS, where applicable. DB Co shall prepare and implement a Pedestrian Access Plan detailing pathways, signage and Structures to accommodate pedestrian traffic nearby and through the Project site. The plan shall be submitted in accordance with Schedule 10 – Review Procedure.

(c) Work Hours Limitations

- (i) DB Co shall abide by all federal, provincial, and municipal statutes regarding hours of work, except for when working within the area around the proposed Cleary Work in the vicinity of the intersection of Cleary Avenue and Richmond Road) as detailed below, in which case DB Co shall not be permitted to work at any time on Sunday. Should DB Co need to work hours outside of the statutes or the exception provision detailed here, DB Co shall provide a plan describing the Work activities, construction equipment required, proposed hours of work and mitigation efforts with respect to noise and other environmental considerations potentially impacted with the increased work hours. This plan shall be approved by the applicable Governmental Authority with respect to the specific statute. Consultation with the affected community shall be conducted in accordance with the provisions of Schedule 18 – Communication and Stakeholder Engagement Obligations.
 - A. The area bounded by the Cleary work area limitation is defined by the intersection of the following:
 - i. To the south - Byron Avenue
 - ii. To the north - the existing SJAMP
 - iii. To the east – the eastern property boundary of [REDACTED]
 - iv. To the west – the western property boundary of [REDACTED]
- (ii) DB Co shall be aware of the local community and political public events that may impact the work on the Project.

5.2 Construction Planning and Constraints

- (a) NCC and City MUPs shall remain open to public use during construction. DB Co shall provide temporary detours and temporary signage indicating detours if pathway closures are required. See Schedule 15-2, Part 6 - Urban Design, Landscape Architecture and Connectivity Requirements for further information.
- (b) Rock excavation using drill and blast methods may be used for construction of the Underground Structures in accordance with the blasting requirements of Schedule 15-2, Part 2 – Civil and Guideway, Article 7- Geotechnical Design Criteria and Requirements, Article 9 – Protection of Existing Adjacent Structures and the following project constraints
 - (i) Blasting shall be permitted for rock excavation of the Parkway Tunnel including New Orchard Station and the east and west portal Structures with the exception that drill and blast shall not be permitted where the Tunnel runs parallel to the WNC utility. The approximate limits of the Parkway Tunnel no-blast zone run from the intersection of Cleary Avenue with Richmond Road to the intersection of Lockhart Avenue with Richmond

Road. A minimum stand-off distance of 15m shall be provided between the beginning of drill and blast work and the WNC outside of this no-blast zone with the final stand-off distance to be determined by DB Co based on the results of the blast design CIAR of Schedule 15-2, Part 2 - Civil and Guideway, Article 9 – Protection of Existing Adjacent Structures.

- (ii) Blasting shall not be permitted for rock excavation of the Connaught Tunnel and the depressed guideway west of Connaught Tunnel.
- (c) DB Co shall limit their material and equipment storage to within the construction boundaries and per Temporary Easement and Permanent Easement as shown hatched on the PRP's Schedule 20 – Lands for additional information.
- (d) Properties that can be utilized as construction staging areas are identified in Schedule 20 – Lands. Should DB Co require additional properties beyond those shown to be provided, it is the responsibility of DB Co to acquire any additional property as prescribed in Schedule 20 - Lands.
- (e) See Schedule 15-2, Part 7 - Traffic and Transit Management and Construction Access for restrictions associated with events and holidays.
- (f) Refer to Schedule 17 – Environmental Obligations for requirements for working around SARS.
- (g) MTO Constraints/Highway 417
 - (i) DB Co shall ensure that all work performed in the vicinity of and affecting the Highway 417 is as per MTO requirements. DB Co shall refer to Schedule 15-2, Part 9 – Highway 417 Works, and Schedule 15-2, Part 7 – Traffic and Transit Management and Construction Access, for MTO requirements.
 - (ii) DB Co shall ensure that there is coordination between the TTMP required for the West Works (as per Schedule 15-2, Part 7 - Traffic and Transit Management and Construction Access) and the Highway Works TTMP (as per Schedule 15-2, Part 9 – Highway Works) by contacting involved parties from both TTMPs, so that there is no conflict between the two TTMPs.
- (h) NCC/Linear Park/SJAM/Connaught Park – NCC work restrictions
 - (i) DB Co shall perform no work on Federal Lands without the plans and designs having first been approved by the NCC Board of Directors and a letter of approval signed by the NCC Executive Director, Capital Planning.
 - (ii) DB Co shall notify the NCC in writing of road closures during construction one week in advance.
 - (iii) DB Co shall maintain an open area between the EBL and WBL pedestrian underpass structures on the SJAM Parkway.

- (iv) DB Co shall ensure that when determining mobilization sites, access roads and SJAM Parkway detours from Dominion Station to Cleary Station, they respect the restrictions regarding tree removal identified in Schedule 15-2, Part 6 – Urban Design, Landscape Architecture and Connectivity Requirements.
 - (v) Protected zones
 - A. DB Co shall install protective snow fence to secure the periphery of zones of tree preservation. Snow fence shall be kept in good condition at all times.
 - B. If any trees, other than those identified in the plans are to be cut, DB Co shall address a request to the staff responsible for this approval for review and, if acceptable, obtain all necessary permits.
 - (vi) DB Co shall complete the Work required for the installation of the site servicing for the Kitchissippi Lookout as outlined in Schedule 15-2, Part 2 – Appendix G by February 28, 2020, in order to permit NCC to begin construction on the planned pavilion.
 - (i) Systems Constraints
 - (i) Tie-in of systems with the Existing Confederation Line as identified below shall be subject to the work time restrictions identified so as to not negatively impact the operation of the Existing Confederation Line except as described below. Additional work hours may be available depending on the type of work, time of day and location. All requests for additional work time shall be submitted to the City in writing. The requests shall include a full and comprehensive plan for installation, testing, and certification subject to approval by the City. Formal engineering change management and software engineering change management processes to be implemented, subject to approval of the City, prior to any software changes, upgrades, or testing take place. Any changes that remain in place must be certified for safe operation.
 - A. Tracks at Tunney’s Pasture Station and Blair Station can be shut down a total of six times over 48 hour weekends for tie-in systems work as follows:
 - i. Both Tracks at each Station once;
 - ii. The eastbound Track only at each Station once;
 - iii. The westbound Track only at each Station once.
- The weekend shut downs shall not exceed 48 hours, must be scheduled six months in advance, and are subject to City approval pending a review of major events and holidays.

- B. Track: non-revenue hours;
 - C. Train Control: non-revenue hours;
 - D. Communications: non-revenue hours;
 - E. OCS: non-revenue hours;
 - F. Traction Power: non-revenue hours.
- (ii) Testing support requirements shall be coordinated with the City during the weekly maintenance coordination meetings.
 - (iii) A maintenance window or a series of maintenance windows (non-revenue hours) shall be scheduled to add new elements to the existing CMMS system, including Track, OCS, signaling apparatus, communications elements, etc.
 - (iv) A cutover/transition plan shall be developed for the upgrade of the CMMS – which will identify the pre-work/test configuration, all key staff, actions and constraints-- a failsafe/fall back plan shall be established in case of any system failures require DB Co to revert back to the pre-test system configuration.
 - (v) Communications systems elements to be added shall be implemented during revenue hours (SCADA, PA/PIDS, intrusion & access control, CCTV cameras, fire/life Safety devices, etc.) but overall systems field device tests and access control tests shall be done during non-revenue hours: a cutover plan shall be provided, and this shall be approved by OC Transpo before implementation.
 - (vi) Tunnel portal intrusion system installation and testing shall be coordinated in the field and at the TOCC during non-revenue hours.
- (j) Structures constraints:
 - (i) Green's Creek Culverts
 - A. DB Co shall comply with NCC, DFO, City and other Governmental Authorities' regulations before accessing work areas and commencing work at Green's Creek.
 - (ii) Pedestrian Bridge at [REDACTED]
 - A. DB Co shall ensure that the new Woodroffe Pedestrian Bridge is constructed and commissioned prior to the removal of the existing Woodroffe Pedestrian Bridge.
 - (k) Noise and Vibration Mitigation

- (i) DB Co shall abide by all federal, provincial and municipal statutes regarding noise levels, noise mitigation, and vibration mitigation. Prior to commencement of construction, DB Co shall prepare and implement a Noise and Vibration Control Plan in accordance with Schedule 17 – Environmental Obligations prepared by a Professional Engineer describing the predicted construction noise and mitigation measures required to meet the noise level limitations.
- (l) Transit system constraints:
 - (i) All construction work with the exception of bus stops, within 60m of any OC Transpo infrastructure, shall be subject to review and approval by OC Transpo with respect to existing or new OC Transpo infrastructure and shall receive OC Transpo's written approval prior to construction.
 - (ii) Preceding any full closure of any portion of the Transitway, DB Co shall complete all temporary Stations and associated facilities for that portion of the Transitway at least 48 hours prior to cutover. Refer to Schedule 15-2, Part 7 – Traffic and Transit Management and Construction Access. In addition, all associated detours for the City bus circulation shall be in service by the City before this portion of the Transitway is allowed to be closed.
 - (iii) The closure and removal of the exiting Transitway Bridge over OR174 shall not be permitted until the implementation of the detour routes for existing buses that utilize this Bridge is completed.
 - (iv) DB Co shall not close West Transitway Segment W-1 (Tunney's Pasture to Dominion), prior to December 19, 2021.
 - (v) DB Co shall ensure the pedestrian Bridge connecting the existing central Station building and the existing north Station buildings at and vertical circulation elements of each, inclusive of elevators and stairs, at Bayshore Station, remain available for bus service customers for the duration of the Project. Temporary off peak closures may be permitted with prior approval from the City.
- (m) Coordination with City Works
 - (i) Coordination with others
 - A. DB Co is notified that Third Party Contractors and City staff will need access to the construction Site at various times and locations during the course of the Work. Therefore, DB Co shall provide the following:
 - i. Coordinating their level of completeness to the City so that the City's coordination with Third Party Contractors can be performed at the appropriate time;
 - ii. Coordinate the timing of the access to minimize disturbances;

- iii. Provide Site access to the Third Party contractors and City staff;
- iv. Provide staging and storage areas to the Third Party Contractors and City staff for their work;
- v. Provide access for the City's delivery and set up of City equipment (furniture, appliances, computer equipment, etc.) in City spaces;
- vi. At the City's request, provide up to date as built drawings of the sites at the time of the coordination; and,
- vii. DB Co is required to provide the City with access to and storage space within the Moodie LMSF in accordance with the following requirements:
 - 1 Provide access to LMSF offices and general storage Facilities six months prior to Substantial Completion. Office and storage areas shall be available for access and storage.
 - 2 Provide access to LMSF maintenance Facilities three months prior to Substantial Completion. Maintenance Facilities shall be available for access and storage.
 - 3 Provide access to LMSF Vehicle Storage Tracks nine months prior to Substantial Completion. Vehicle storage area shall be available for occupation. At this time, the Track switches and OCS are not required to be powered.
 - 4 Provide full access to LMSF Vehicle Storage Tracks three months prior to Substantial Completion. At this time, the Track switches and OCS shall be operational and powered.
 - 5 Provide access to the MYCC six months prior to Substantial Completion.

B. Anticipated coordination issues are, but are not limited to, the following:

- i. Fare control equipment installation
 - 1 Installation by OC Transpo requires one month notice prior to the installation and one week per Station for the actual installation. Access shall be staggered so that installation can be performed one Station at a time. The installation shall be scheduled to begin no more than four months prior to Trial Running.
- ii. OC Transpo spaces

- 1 Access for fit out by OC Transpo shall be provided four months prior to Trial Running.
 - iii. Vendors within Stations
 - 1 Access to vendors and their contractors shall be provided three months prior to Trial Running.
 - iv. Various Communications issues including:
 - 1 Voice and Data Radio: Access for installation shall be provided two months prior to Train movements.
 - 2 Cellular telephone: Access for installation shall be provided two months prior to Trial Running.
 - 3 Nexus PIDS: Access for installation shall be provided two months prior to Trial Running.
 - 4 City Network IT: Access for installation shall be provided two months prior to Trial Running.
- (n) Lands Constraints
- (i) Bayshore Shopping Centre:
 - A. DB Co shall appoint a representative to co-ordinate and communicate the Work requirements on the Bayshore Shopping Centre Lands. Bayshore Shopping Centre will also provide a point of contact for such coordination.
 - B. DB Co shall provide 30 calendar days' notice to the City and the Bayshore Shopping Centre point of contact, prior to commencing any Work on the Shopping Centre Lands, as identified in Schedule 20 – Lands.
 - C. DB Co shall ensure that a minimum on one-lane of traffic is maintained on the Shopping Centre Lands during the Work.
 - i. Should DB Co require closure of a second lane, blocking access over the Shopping Centre Lands completely, DB Co shall obtain the approval from Bayshore Shopping Centre point of contact a minimum of 48 hours in advance of the date on which the closure of the second lane is to take place.
 - D. DB Co shall provide TCP to direct traffic, if requested by Bayshore Shopping Centre a minimum of 48 hours in advance of the date on which the TCP are required.

- E. DB Co shall erect appropriate signage directing pedestrian traffic to the appropriate mall entrance and vehicular traffic to the parking structure.
 - F. The Shopping Centre Lands shall not be available for use by DB Co between November 15 and January 1 of any calendar year. DB Co shall ensure that any reinstatement required to ensure that the internal roadways located on the Shopping Centre Lands are entirely available for use during this period and is completed to the satisfaction of the Bayshore Shopping Centre point of contact.
 - G. Additional constraints on the use of the Lands are provided in Schedule 20 – Lands.
- (ii) Place d’Orleans Shopping Centre
- A. DB Co shall ensure that delivery of any site office trailers to this location shall not block traffic to and from the shopping centre and shall be delivered during off peak hours.

ARTICLE 6 REGULATORY STRUCTURE AND OBLIGATIONS

6.1 General Requirements

- (a) DB Co acknowledges that the City has the authority under the Delegation Agreement to regulate any matters covered by Parts III and IV of the Canada Transportation Act and by the Railway Safety Act relating to the design, construction, operation, maintenance, Safety and Security, as well as the rates and conditions of service of the system.
- (b) DB Co shall comply with adopted Confederation Line Regulations as it relates to the design and construction and Safety and Security of the system
- (c) DB Co acknowledges that the Confederation Line Regulations are part of the definition of Applicable Laws in this Project Agreement as adopted by the City.
- (d) DB Co and the City acknowledge that the Confederation Line Regulations and support documentation may not be required to support or facilitate all aspects of, or all activities comprising, the Work, or the system. The appropriate scope, detail and timetable for adoption of modified or supplemental Confederation Line Regulations shall be based on the City's responsibility to regulate the design, construction, operation, maintenance, Safety and Security of the system in a prudent and timely manner generally consistent with other regulatory authorities of municipal light rail transit systems in Canada and elsewhere, having regard to; the Delegation Agreement; the design, technical features and anticipated operating conditions of the system; and the Safety and Security of the public.

6.2 Scope of Service

- (a) Modified or supplemental Confederation Line Regulations and support documentation will be consistent with the requirements of this Project Agreement, and based on generally recognized and/or adopted codes, standards, practices, design references, Safety and Security principles and guidelines for other light rail transit systems operating in comparable conditions.
- (b) DB Co shall provide to the City for review in accordance with Schedule 10 – Review Procedure and the City's Safety Certification Plan and Security Certification Plan, the following elements taking into considerations the Existing Confederation Line existing analysis and findings:
 - (i) System Safety Program Plan;
 - (ii) SSSeCP;
 - (iii) TVA; and,
 - (iv) PHA.

ARTICLE 7 SYSTEM SAFETY CERTIFICATION

7.1 General Requirements

- (a) The Work specified in this Article, as well as portions of Article 8 of this Part 1 that refer to Security, consists of DB Co's requirement to develop and implement a SSAP. The purpose of the SSAP is to ensure the Project systems and equipment are safe and secure including:
 - (i) Design and operating hazards and Security vulnerabilities are identified, evaluated, and properly controlled or mitigated, prior to the commencement of passenger service.
 - (ii) All critical system elements are evaluated for compliance with the identified Safety and Security requirements during the design, conform to the drawings and specification during construction/installation, and function as required during testing, and start-up phases of the Project.
 - (iii) The Project is operationally safe and secure for customers, employees, emergency response personnel, and the general public prior to entering revenue service.
 - (iv) All Project equipment, facilities, plans, procedures, and training programs are systematically reviewed for compliance with established system Safety and Security requirements, and so verified prior to implementation of revenue service.
- (b) Requirements for human factors are integral part of this program and shall be integrated into the development and implementation of the SSAP plans. The system Safety and assurance requirements shall apply to all DB Co functions during all phases of the Work including design, construction, installation, testing, pre-revenue operations, in-service support, warranty, retrofits and field modifications.
- (c) Objectives: The primary objective for DB Co is to deliver a Project that meets or exceeds Safety, Security and systems assurance related governmental rules, regulations, standards and industry best practices, and applicable requirements throughout the Project. Thus, leading to delivery of a safe and reliable system for the City, its employees, DB Co, customers and the public at large.
- (d) DB Co's design shall be compliant with Safety and Security criteria, codes, and regulations including Ontario Human Rights Commission Policy and Guidelines on Disability and the Duty to accommodate requirements, with Safety and Security of Passengers and employees as the most important requirement of the Project.
- (e) DB Co shall be responsible for compliance with the Project's SSCP developed by the City through strict conformance to contractual obligations. DB Co shall manage its Work and that of its Subcontractors' through design, construction and integrated testing in such a way as to support the overall success of the Safety and Security certification process and the ultimate acceptance by the City.

- (f) In the event that a subsystem or equipment being supplied by DB Co for the Confederation Line Extension has a Safety Case(s) (Generic Product, Generic Application) for the Existing Confederation Line that has been approved by the City, with no modifications to form, fit or function from the Existing Confederation Line, then DB Co may state in the respective Safety Case certified by similarity and append the previous approval and necessary documentation. The Project's SSCP shall be followed for Cross-Acceptance as described therein.
- (g) In the event that a Safety Case(s) has been provided for a subsystem or equipment that has been approved by the City for the Existing Confederation Line that is to be supplied for this Project, with minor modifications to form, fit or function from the Existing Confederation Line, then DB Co shall perform the respective Safety analyses on the respective change/modification to the design. These analyses along with the respective approved Safety Case and a description of the change/modification shall be submitted to the City for approval to proceed. DB Co shall ensure the Project's SSCP is followed for the change/modification with the respective Safety evidence as well as the Cross-Acceptance criteria.
- (h) DB Co shall be responsible for performing the Safety Certification tasks as specified herein and in accordance with EN 50126, EN 50128, EN 50129. These tasks shall be managed and performed in accordance with the Project SSCP.
- (i) DB Co shall provide a SCM to develop and implement the Safety Certification processes. The SCM shall develop and implement the Safety Certification program to verify the inclusion of Safety items in the design, construction, testing, and commissioning of the Project. The SCM shall oversee and manage all aspects of the Safety Certification effort. The SCM shall be a Professional Engineer.

7.2 References

- (a) Develop and implement the System Safety and Assurance Program Plans in accordance with the following guidelines and documents. Where the referenced documents provided below, conflict with these specifications, these specifications shall govern:
 - (i) NFPA 101 Life Safety Code (2015) and other relevant NFPA codes and standards.
 - (ii) NFPA 130, Fixed Guideway Transit and Passenger Rail Systems.
 - (iii) MIL-HDBK-470A, Designing and Developing Maintainable Products and Systems (Volume II), December 1997.
 - (iv) MIL-HDBK-781A, Handbook for Reliability Test Methods, Plans and Environments for Engineering, Development Qualification and Production, April 1996.

- (v) EN 50126-1:2017, Railway Applications – The Specification and Demonstration of Reliability, Availability, Maintainability and Safety (RAMS).
- (vi) EN 50126-2:2007, Railway Applications – The Specification and Demonstration of Reliability, Availability, Maintainability and Safety (RAMS) – Guide to the application of EN50126-1 for safety.
- (vii) EN 50128:2011, Railway Applications – Communication, signalling and processing systems – Software for railway control and protection systems.
- (viii) EN 50129:2003, Railway Applications – Communication, signalling and processing systems – Safety related electronic systems for signalling.
- (ix) IEC 61508, Functional safety of electrical/electronic/programmable electronic safety-related systems.
- (x) RIAC Handbook 217Plus.
- (xi) Electronic Parts Reliability Data EPRD-2014, Reliability Information Analysis Center, Quanterion Solutions Incorporated
- (xii) Non-Electronic Parts Reliability Data NPRD-2016, Quanterion Solutions Incorporated
- (xiii) MIL STD 756B, Reliability Modeling and Prediction or EN 61078, Analysis techniques for dependability – Reliability block diagram and boolean methods.
- (xiv) MIL STD-781D, Reliability Testing for Engineering Development, Qualification and Production - Exponential Distribution or IEC 60605, Equipment Reliability Testing.
- (xv) MIL STD-470A, Maintainability Program Requirements (for Systems and Equipment) or IEC 60706, Guide on maintainability of equipment..
- (xvi) Procedures for Performing a Failure Mode Effects and Criticality Analysis, MIL-STD-1629A or EN 60812, Analysis techniques for system reliability – Procedures for failure mode and effects analysis.

7.3 System Safety Requirements

- (a) General
 - (i) DB Co's Safety program shall establish the Safety requirements and verify Safety of the design through analyses and collaboration with the various disciplines. This approach helps assure that the Work provides for health and Safety provisions affecting maintenance and operations personnel that equal or exceed the requirements of the Ontario OHSA and AODA.

(b) Safety Technical Requirements for Systems Design

- (i) Safety shall be DB Co's primary design and performance requirement for the Project. The Confederation Line Extension shall operate in a safe manner under all operating conditions. Safety components shall be designed according to the Safety principles (see below), and shall incorporate high Reliability parts, selective redundancy, and warning and protective devices, as required, to contribute to the achievement of the specified requirements. In addition, Safety shall be provided for when elements fail or malfunction.
- (ii) The Safety of the Confederation Line Extension, when operating under normal conditions, shall preclude inadvertent/incorrect actions and/or procedures used by operating personnel. In no case shall procedures be substituted to accomplish any Safety functions provided by specific aspects, components, Subsystems and/or equipment. Frequent and/or infrequent use shall not be a reason to justify unsafe or marginally safe design. At all other times (when carrying out maintenance and/or failure recovery), there shall be minimum dependence on correctness of actions and/or procedures used by operating and maintenance personnel.
- (iii) Whenever any hazardous condition occurs, regardless of the cause, and the condition results in a conflicting concern between human Safety and equipment Safety; the conflict shall be resolved in favour of human Safety.
- (iv) DB Co shall be responsible for designing, supplying, constructing, installing, testing and verifying and certifying the system in accordance with the requirements of the Project Agreement and the Safety principles customarily recognized by the transit industry for light rail systems. DB Co shall be responsible throughout the course of the Project for bringing to the attention of the City, in writing, any change in Laws, rules, orders, Regulations and Codes, and any condition(s), whether caused by its design, any Project Agreement requirement, or any other basis, which it believes might result in, or has resulted in, an unsafe condition. DB Co shall remain fully responsible for rectifying any such condition.

(c) Safety Principles

- (i) The following Safety principles shall be incorporated into the Design and operations of systems, Subsystems, components, and parts.
 - A. Hazard control shall follow the order of precedence:
 - i. Design to eliminate Hazards;
 - ii. design to control Hazards;
 - iii. use Safety devices;

- iv. use warning devices;
 - v. implement special procedures;
 - vi. accept the Hazard; and,
 - vii. eliminate the system/ subsystem/equipment.
- B. DB Co shall eliminate Unacceptable Hazards through design.
- C. DB Co shall design and construct the system to eliminate single-point failures in the system that result in an unacceptable or undesirable Hazard condition.
- D. DB Co shall design and construct the system to eliminate unacceptable or undesirable Hazard conditions under normal operating conditions.
- E. The system design shall require positive actions to be taken in a prescribed manner to either begin or continue system operation.
- F. The Safety of the system in the normal automatic operating mode shall not depend on the correctness of actions or procedures used by operating personnel.
- G. If one failure combined with a second failure can cause an unacceptable or undesirable Hazard condition, the first failure shall be detected and the system shall achieve a known safe state before the second failure can occur.
- H. Software faults shall not cause an unacceptable or undesirable Hazard condition.
- I. A failure on Safety Critical equipment shall be detected and reported back to Central Control.
- J. The criteria for accepting a Hazard risk level shall be in accordance with the Hazard Log provided by the City from Stage 1 and the Safety Management System.
- K. Maintenance activities required to preserve or achieve acceptable risk levels shall be performed. Personnel qualifications required to adequately implement these activities shall also be identified.
- L. Consideration at all times to the Safety of workers, Passengers and staff of the DB Co and the City.

- (ii) Two principles of Safety, a Fail Safe Principle and a Checked Redundancy Principle, shall govern the design of Safety Critical components and Subsystems. One or both of these principles shall be used to provide a safe Confederation Line Extension system. These principles are defined as follows:
 - A. Fail Safe Principle - The Fail Safe Principle applies to both hardware and software configurations, and states the occurrence of any failure of Safety Critical hardware or software, or any combination thereof, shall not result in a condition known to be unsafe. The Fail Safe Principle shall be applied where a failure of any critical element is likely to occur more than once in 10^6 (one million) hours of active service on the Confederation Line. For hardware this shall include, as a minimum, failure modes.
 - B. Checked Redundancy Principle - The Checked Redundancy Principle applies to both Safety Critical hardware and software configurations, and states that the probability of any failure or combination of failures that would result in a condition known to be unsafe shall pose no greater risk than that associated with Fail Safe design. In the event of a Failure, the Failure shall be detected, reported/alarmed and negated (maintain fail-safe state). Each function of a component or Subsystem designed in accordance with the Checked Redundancy Principle shall provide a level of Safety equivalent to that provided by the same function designed in accordance with the Fail Safe Principle.
- (iii) The checked redundant control configuration, whether hardware or software, shall incorporate at least two parallel control units processing a common system characteristic, and means of comparing the output of the control units. If there is agreement from the comparison, the system may be allowed to respond in accordance with the output of the control units. If there is disagreement, the action resulting from that output shall not occur, and the system shall immediately revert to a safe state. For example, if a Vehicle is in motion, the brakes shall be applied, and if the Vehicle is not in motion, it shall not be allowed to move.
- (iv) The following characteristics shall be incorporated into the checked redundancy design.
 - A. The checking process shall, in itself, be Fail Safe or checked redundant; "agreement" shall not be indicated unless the control units output agree.
 - B. The checking process shall include the comparison of control units related to Safety.
 - C. Any failure of redundancy affecting the Safety of the system shall be detected. Where software is used; errors in programming shall be considered failures.

- D. All parallel control units shall be completely independent. No common environmental or power fluctuations, errors, faults, or other problems, shall cause related errors in the output of the control units. Common software modes of failure shall be prevented by the following methods, or by similar methods, if approved:
 - i. Independent, different programming in the parallel control units.
 - ii. The use of logically complemented programs for the parallel elements of functions involving the ATP Subsystem.
- E. The checking process shall be comprehensive and as frequent as the number of operations of the device or function, to provide a risk comparable to that of Fail Safe design.
- F. Unless a comparative agreement occurs in the checking process, timely action shall intervene to provide Safety.

(d) SCIL

- (i) DB Co shall develop a preliminary SCIL. This list shall include all equipment involved in performing a Safety Critical function as determined by a Failure Mode, Effects and Criticality Analysis or functional Fault Tree Analysis. The SCIL shall be submitted to the City for approval and updated as required throughout the Project lifecycle. Relays certified as "vital" or Safety type shall have failure characteristics as defined by the AAR.

(e) System Safety Design Approach

- (i) Hazard Analyses have been performed by the City for the Existing Confederation Line. DB Co shall review the Hazard Log and take into consideration as a PHL. The Hazard resolutions shall be submitted to the City in accordance with Schedule 10 – Review Procedure.
- (ii) Additionally the Safety program shall be developed by DB Co to identify Hazards through the preparation of formal Hazard analyses which have been identified in the systems requirements for the specific system elements. The Hazards identified in the various analyses and the mitigation measures proposed will be reviewed and analyzed by the City for acceptance.
- (iii) DB Co shall be provided the Hazard Log from the Existing Confederation Line by the City for review and continued development for this Project based on DB Co's Hazard Analyses. DB Co shall track all identified Hazards throughout the Project and have the capability to provide status reports to the City and SSCRT for review.

- (iv) DB Co shall identify all Safety Critical functions and allocate the respective Safety Integrity Level of each with supporting analyses.
- (v) PHA: DB Co shall be responsible for identifying Hazards that are specific to the Confederation Line Extension which shall be included and analyzed independently from the City's Hazard Log developed for the Existing Confederation Line. Additional Hazards identified and subsequent analysis shall be compiled into an independent Hazard Log and submitted to the City for its review. DB Co shall address and incorporate applicable mitigations from the Confederation Line PHA into the design of the Project.
 - A. Mitigations shall include design considerations, Safety devices, warning devices or recommendations for adopting special procedures or training. The resolution process shall verify but not be limited to the following:
 - i. That the resolution of a Hazard in one system does not create a new Hazard in another system;
 - ii. That Hazards involving interfaces between two or more systems have been analyzed and resolved;
 - iii. That all program participants are providing required analyses in a timely manner, and that determination is made where delinquent receipt is delaying Hazard Resolution; and,
 - iv. That proper resolutions are implemented for areas identified with Hazard Resolutions requiring a change in system design or development of special procedures.
 - B. Any subsequent Hazard Analysis that may be required shall be performed in accordance with EN 50126 and the Hazard Management Procedure.
 - C. Mitigations shall be compiled into an independent Hazard Log that identifies Hazards and, proposed mitigations to those Hazards. All references shall state document, revision number, section and paragraph number.
- (vi) Perform additional Hazard analysis as deemed necessary and agreed to, by the City for, but not limited to, the following system elements:
 - A. Signaling and Train Control
 - B. Traction Power
 - C. Communications
 - D. Special Trackwork

- E. Electrical
- F. Elevators/Escalators
- G. FLS (Systems, including ventilation)
- (vii) Safety analyses techniques shall include, but may not be limited to:
 - A. System/Sub-System Hazard Analysis/Interface Hazard Analysis
 - B. Software Hazard Analysis
 - C. Failure Mode, Effects and Criticality Analysis
 - D. Fault Tree Analysis
- (viii) OHA: DB Co shall perform an OHA to identify and analyze Hazards associated with personnel and procedures during production, installation, testing, training, and Emergencies. DB Co shall provide for corrective measures to be taken to minimize the possibility that a human error or procedure will result in injury or system damage.

7.4 Development of Safety Design Criteria

- (a) DB Co shall prepare Safety Design Criteria and submit in accordance with Schedule 10 – Review Procedure at the commencement of the design effort to provide applicable Safety and Security guidelines for proper design, construction, and testing, of the system. The purpose for separate Design Criteria documents involves the control or restriction of information that due to its sensitive and confidential nature or content that may, if disclosed or released, identify vulnerabilities to critical infrastructures or systems. The separation of these documents allows for one criterion to be updated without impact to the other.
 - (i) The Safety Design Criteria shall be submitted within 120 days of Financial Close.
- (b) The Design Criteria shall ensure that the Safety elements identified for the Project will become part of requirements that shall be addressed by DB Co through the development of specifications, drawings, design reviews, and final acceptance.

7.5 Safety and Security Certification

- (a) DB Co's management responsibilities shall include, but are not limited to, the following:
 - (i) DB Co shall implement a Safety and Security Certification Program which shall be compliant with the City's System Safety Certification Plan and System Security Certification Plan, which shall ensure by verifying the inclusion of all Safety and Security items in the design, construction, and testing of the

Confederation Line Extension. An SSCRT, independent of the design activities, shall oversee the certification effort.

- (ii) DB Co shall utilize the SSCP developed by the City that describes and outlines the Project's Safety and Security Certification process which will be compliant to the City's SSCP. The SSCP developed by the City will describe roles, responsibilities, staffing, schedule and a description of the process, at a minimum. DB Co will be responsible to develop a project specific SSCP to describe how they will be compliant to the City's SSCP and provide a deliverable timeline in-line with the Project schedule.
- (iii) DB Co shall participate in meetings with the SSCRT, FLSSC and SSORC.
 - A. SSCRT:
 - i. Shall oversee DB Co's SSCP and SSeCP;
 - ii. Shall conduct meetings at a minimum of quarterly to discuss Safety and Security concerns;
 - iii. Shall review DB Co's certification activities; and,
 - iv. Shall consist of DB Co's SCM and SeCM to liaise with the SSCRT to report status, open items and Hazard, Threat and Risk management/resolution.
 - B. FLSSC:
 - i. DB Co shall ensure the respective Emergency response agencies are involved including Fire, Police, Emergency Responders, etc.
 - ii. The FLSSC shall be a liaison with respective City representatives and local authorities as defined by DB Co.
 - iii. The FLSSC shall review standards and Safety and Security related designs, tests to verify compliance with FLS codes and Emergency preparedness.
 - C. SSORC:
 - i. The SSORC shall review plans, manuals, rules and procedures necessary for Revenue Service operation.
- (iv) Cooperation and facilitation of Safety and Security Certification audits of the Work shall include.
 - A. Coordinating, documenting and performing training as specified in the Project Agreement.

- B. Maintaining and updating files and submitting required documentation on a timely and sequential milestone schedule basis. Preparing Safety and Security Certification progress reports each month, which shall include submitting a record copy of Safety and Security Certification files to the City.
- (b) DB Co's responsibilities are defined in Table 1-7.1 below. DB Co shall be responsible for the performance of the task activity identified in the SSCP and Safety Management System shall be followed when conducting the tasks below. This Table also includes the RAM deliverables described in Clause 7.8.

Table 1-7.1 - DB Co Deliverable Requirements by Project Phase

| PROJECT PHASE | EN 50126 LIFECYCLE PHASE | DB CO RAM TASKS | DB CO SAFETY TASKS |
|---------------------------------|---|--|--|
| PRELIMINARY / CONCEPTUAL DESIGN | 1. Concept | Review Project Agreement RAM requirements Evaluate past RAM data and experience Preliminary RAM Allocation | Review and update the City's Safety Certification Plan |
| | 2. System definition and application conditions | RAM Program Plan Preliminary RAM Allocation Establish RAM Assurance Plan, can be part of SSAP RAM Audits (Internal and 3 rd party) | SSAP Safety Audits (Internal and 3 rd party) SSPP Review, update and continue to develop the City provided Hazard Log from Existing Confederation Line |
| | 3. Risk Analysis | Preliminary identification of reliability critical items | SSAP Update System Preliminary Hazard Analysis System Risk Analysis Interface Risk Analysis Review and update Hazard Log Software Safety Plan |

| PROJECT PHASE | EN 50126 LIFECYCLE PHASE | DB CO RAM TASKS | DB CO SAFETY TASKS |
|--|---|--|---|
| DETAILED / FINAL DESIGN | 4. System Requirements | Capture RAM requirements in SRTM | Hazard Log update |
| | | Update RAM Program Plan, as required | Allocation of THR →SIL Function Apportionment |
| | | Update RAM portion of SSAP, as required | Update SSPP |
| | | RAM Demonstration Plan | Safety Verification and Validation Plan |
| | 5. Apportionment of System Requirements | RAM Allocation Report FMECA (Can be same as Safety provided it includes all information) Reliability Critical Items List Provide Lifecycle Costing for Operations and Maintenance period | Review/Establish Non-Conformance Procedures and Reports |
| | | | Safety Audits (Internal and 3 rd party) |
| | | | SSAP update * as required |
| | | | SSPP update * as required |
| | | | Software Safety Plan update * as required |
| | | | PHA |
| System Risk Analysis / Subsystem Risk Analysis | | | |
| Interface Risk Analysis | | | |
| OHA | | | |
| FMECA | | | |
| FTA | | | |
| Develop Safety Critical Items List | | | |
| IMPLEMENTATION | 6. Design and Implementation | RAM Prediction Report | Integrated System Safety Case |
| | | Review and update RAM portion of SSAP, as required | Update Hazard Analysis (Subsystem/Interface), OHA |
| | | | FMECA |
| | | | Test Plans and Procedures |
| | | | SIL Safety Function Assignment |
| T AND MANUFACTURING | 7. Manufacturing | Review First Article Inspection | Hazard Log Update |
| | | Maintainability Demonstration | Verification and Validation Report(s) |
| | | FRACAS Procedure | Assess Safety Related Training |
| | | | Operation and Maintenance Manuals |
| CONSTRUCTION AND INSTALLATION | 8. Installation | Spares List (with separate section for Safety Critical and reliability critical items) | SSAP Update |
| | | | Validation Report(s) |

| PROJECT PHASE | EN 50126 LIFECYCLE PHASE | DB CO RAM TASKS | DB CO SAFETY TASKS |
|--|----------------------------------|---|---|
| TESTING & COMMISSIONING | 9. System Validation | Review and update RAM Demonstration Plan as required RAM Demonstration Report FRACAS Report | System Safety Case System Test Reports Update OHA SRAC, as required Safety Audits (Internal and 3rd party) |
| | 10. System Acceptance | RAM Demonstration Report Acceptance by City for Revenue Operation | Hazard Log Update Engineering Safety and Assurance Case |
| HANDING OVER OPERATIONS AND MAINTENANCE OBJECTIVES | 11. Operation and Maintenance | Review and confirm acceptance of RAM Demonstration Report during Warranty Period (Monthly Report) FRACAS Report | Warranty FRACAS Review and update Hazard Log Review and Update Engineering Safety and Assurance Case Transfer and Implement SSAP for Operations Safety Audits (Internal and 3rd party) |
| | 12. Performance Monitoring | RAM Demonstration Report until Warranty Expiry and Acceptance by City Maintain FRACAS Report | No Safety deliverables required unless assumptions found to be invalid. |
| | 13. Modification and Retrofit | Assess RAM implications as required | Hazard Log Update Engineering Safety and Assurance Case Update as appropriate Update Operations and Maintenance Manuals |

7.6 Safety Activities

- (a) DB Co shall follow the SSCP, and Safety Management System when conducting the Safety activities listed in Table 1-7.1 above, along with the respective standards listed therein:
- (b) Witness point: Witness point selection is a City responsibility with the purpose of defining selected points or locations where the City wishes to formally witness testing. DB Co shall be responsible for scheduling and performing the tests that include those City-selected points; and, for notifying the City at least fourteen (14) business days in advance of the date and time of the test. Notification procedures shall be established prior to witness point testing, scheduling or performance. Selected areas shall include items of high risk, where concerns of compliance have been raised, or those selected by random

sampling. The City shall have the right to attend and witness any and all testing that takes place.

- (c) Safety-related tests: DB Co shall verify that Subsystems and systems function safely as specified and do not contain or create unforeseen Hazards. Safety-related tests cover both intra-discipline and integrated tests. All Safety-related tests shall be included in the Test Program Plan contained within its own section. The respective Safety-related tests and results shall be documented within Test Reports to provide Safety evidence for the respective Safety Case. Safety tests shall include, at a minimum:
- (i) An initial Safety-related testing conformance checklist shall be prepared for the design level of the Project Agreement documents. DB Co shall update the Safety-related testing conformance checklist and submit it for review. DB Co shall verify that all Safety-related tests identified in the specifications and other Project Agreement documents are successfully performed and the completed tests have been verified within defined test parameters and the systems and Subsystems function safely as specified, do not contain or create unforeseen Hazards or vulnerabilities, and contain specified Safety or Security features. All requirements on the checklists shall be verified and submitted to the City for review;
 - (ii) At a minimum, each of the identified Safety requirements for a Safety Critical items (unit) and respective Safety function shall be simulated and tested to verify and certify performance in normal modes and associated sequences and the failure modes and effects, as applicable. These tests shall demonstrate the Safety requirements stated herein have been met. Should the Safety testing identify any Safety issue, they shall be listed in the Safety test reports, indicating remediation and corrective action necessary. All remediation and corrective actions required by DB Co shall be completed within fourteen calendar days and documented in a Non-Conformance Report to ensure traceability. All remediation and corrective actions shall be completed prior to the completion of the Work and pre-revenue testing and training. DB Co shall audit all tasks.
 - (iii) Safety Testing Documentation - Safety testing shall be separately identified to allow recognition of Safety tests. DB Co shall include a matrix in the SVM (output from the Hazard Log), addressing Safety tests only, which shall receive the concurrence by signature of the responsible person as defined by DB Co's organization chart. The matrix shall identify Safety parameters and/or other Safety considerations and a cross-reference to the test. This matrix shall be kept current throughout the Project lifecycle and shall include the identification of the test reports which confirm verification of the Safety requirements. The references to the Safety tests along with reports shall be checked before every Safety Case submission to ensure that there have been no revisions or modifications.
 - (iv) Notification - DB Co shall notify the City in writing thirty calendar days prior to the start of any Safety or Security test. If any of the data indicate conditions which could potentially result in lack of proper Safety or protection of operations; DB Co shall immediately indicate proposed remedies and/or corrective actions.

- (v) Scheduling - All Safety tests shall be successfully completed by DB Co prior to system or equipment acceptance.
- (vi) Safety Test Reports - DB Co shall ensure test reports which contain Safety verifications shall receive the concurrence, by signature, of the responsible person, defined by DB Co's organization chart. Safety Test Reports must be attached to the respective Safety Case and referenced within the SVM to demonstrate compliance.
 - A. DB Co shall report any noncompliance/non-conformance with Applicable Codes and regulatory requirements noted as a result of Safety-related testing. All non-compliances shall be rectified in accordance with Applicable Codes and regulations.
- (d) Safety training and drills: DB Co is responsible for proper coordination and successful completion of this task. They shall participate and provide support as defined herein. The purpose of the training and drills verification process is to verify that key Safety-related training on new equipment and procedures is adequate and appropriate for the tasks performed under typical and Emergency conditions. DB Co shall schedule, arrange, invite participants, provide equipment, and set up locations for drills to occur. Where indicated elsewhere herein, DB Co shall also provide instructors to assist performing the training in both Safety and Security.
- (i) Verifying safe system operation through drills and exercises is an integral part of a closed-loop, pro-active System Safety process. The methodology employed by the training/drill/exercise process is to obtain written verification from the City that:
 - A. Training and drills are adequate and appropriate for the assigned task, and contain instructions on Safety features for typical and Emergency conditions;
 - B. Lessons learned from training and drills performed, are reviewed and documented and that additional Hazards, vulnerabilities, or open Safety issues identified have been resolved; and,
 - C. Known issues concerning training and drills, which impact Safety, have been satisfactorily resolved.
- (ii) Safety information on conformed methods and procedures necessary to maintain safe conditions shall be generated by DB Co and included in a Safety Training Program, to be provided by DB Co, for Safety training consideration of construction, operations and maintenance personnel. At a minimum, each of the Safety training requirements disclosed by the PHA and OHA shall be included in the training program and associated documents.

- (e) DB Co shall be responsible for establishing and maintaining a Hazard Log to record and track Hazards for resolution as addressed in the Hazard Analysis. The Hazard Log shall describe all identified Hazards, the measures taken to resolve each Hazard (references citing document, revision, section number) and the results of reviews, comments and approvals by the City and other outside agencies. All Hazards shall be tracked through to resolution. DB Co shall submit the most current copy of Hazard Log to the City for review upon request. After all tracked Hazards are resolved, DB Co shall prepare a SVM document and submit in accordance with Schedule 10 – Review Procedure.
- (f) FLS – DB Co shall be responsible for compliance with FLS requirements included in federal, provincial, local codes and regulations, and the Project Agreement. DB Co shall incorporate these requirements into the design and construction of the Project and include all applicable FLS elements in the appropriate SeRTM.
- (g) DB Co shall support the approval process by participating in reviews, inspections and technical discussions between the City and local jurisdictional authorities and other Governmental Authorities, and incorporating the resulting agreements into the design and construction. DB Co shall be responsible for verifying that DB Co's completed design complies with the resolutions of FLS issues, and is acceptable to the applicable Governmental Authorities.
- (h) Safety Certification Report (Engineering Safety and Assurance Case)
 - (i) A signed report shall be prepared by DB Co, prior to Confederation Line East Extension or Confederation Line West Extension Substantial Completion, attesting to the overall Safety and Security of the Confederation Line for public use. This shall include resolution to all non-conformance Hazards and vulnerabilities previously identified through DB Co's detailed Safety Analysis. Upon completion of the Work and pre-revenue testing and training, DB Co shall issue to the City and the SSCRT a signed and sealed Final Safety Certificate.
 - (ii) The signed Safety Certification Report shall certify to the City that the Work has been designed and constructed in accordance with the Project Agreement Safety requirements, and DB Co has used the Safety and Security principles customarily applied in the transit industry for transit systems in North America and Canada. The report shall further certify the Confederation Line Extension either meets or exceeds all applicable Federal, Provincial, City, and local Laws, Ordinances, rules, Regulations, Statutes, industry Codes, and other standards and requirements, whichever are the more stringent requirements.
 - (iii) As a basis for making this formal certification, DB Co shall perform a detailed accounting of all correspondence and documentation to verify and certify all Safety and Security requirements, activities, tests, inspections, non-conformances, remediation's and actions have been completed and satisfied, documenting these results in a Safety and Security Certification Report which shall be submitted to the City in accordance with Schedule 10 – Review Procedure.

7.7 Format for SSVM

- (a) DB Co shall provide an SSVM in the following format, noting that this shall be an output from the Hazard Log
 - (i) Item Number;
 - (ii) Safety Requirement;
 - (iii) Document Reference:
 - A. Document Name; and
 - B. Article Number;
 - (iv) Evidence:
 - A. Method of Verification by DB Co;
 - B. Method of Validation by Audit Team;
 - C. Validated By (Name of Auditor);
 - D. Date; and
 - E. Remarks.
- (b) SSRTM
 - (i) DB Co shall develop SSRTM for the Project as an output from the Compliance Verification and Validation Matrix. It shall be used to verify and certify that the Safety requirements have been incorporated in the design and certify that all Safety requirements of the design are constructed and/or installed and tested in accordance with the Project Agreement.

7.8 Reliability, Availability, Maintainability

- (a) System Assurance
 - (i) Introduction
 - A. The SSAP shall encompass system RAM. The primary objectives of system assurance are to ensure RAM, Safety and Quality plans, processes and procedures are followed, implemented and in-line with the PA and applicable regulations and standards.
 - B. The general design concepts which shall be incorporated are, but not limited to: use of standards, proven designs; reliable equipment, use of

interchangeable, modular components; extensive and prominent labeling of parts, wires, etc.; use of standard, prewired harnesses; use of weatherproof seals and latches.

- C. The systems assurance requirements are specified for specific system elements contract specifications. The DB Co shall develop and implement a system RAM Program encompassing system RAM engineering and meet quantitative RAM goals and requirements, which shall be demonstrated through analysis and test. The RAM requirements shall apply to all systems, Subsystems and assemblies, software, hardware and firmware provided for the Confederation Line Extension. The requirements apply during all phases of the Works.

(b) RAM Approach

- (i) DB Co shall follow, implement and meet RAM Program requirements including qualitative and quantitative requirements contained in the specific system elements requirements.
- (ii) Quantitative RAM goals/requirements shall be apportioned by the DB Co for Subsystems/equipment/components comprising the system elements. In addition to the quantitative goals to be met, the DB Co shall meet requirements defined for RAM Program Plan, specific analyses, RAM prediction, and RAM demonstration tests.

(c) RAM Program Plan

- (i) DB Co shall prepare a detailed RAM Program Plan in general accordance with applicable provisions of EN 50126-3. It shall include, at a minimum the following:
 - A. Description of the System;
 - B. RAM Requirements and critical items;
 - C. Task listing and time phasing for each task, including RAM deliverables as stated in Table 1-7.1.
 - D. Organization and responsibilities of key personnel, including the formation of a Failure Review Board.
 - E. Techniques for allocation of quantitative requirements to lower level functional elements.
 - F. Interfaces between RAM and other closely related programs, and support to efforts such as:
 - i. Logistic support and maintenance planning;

- ii. Design;
 - iii. Quality assurance and quality control;
 - iv. Standardization;
 - v. Systems engineering; and
 - vi. Personnel Subsystem program (human engineering, life support, training, and personnel resources).
- G. Methods for assuring that sub-contractors' RAM efforts are consistent with overall system requirements.
- H. Provision for source selection, first article inspection, and surveillance of sub-contractor's' RAM activities.
- I. Analytical methods to be used during design and development for demonstrating compliance with RAM requirements and goals.
- J. Procedures and controls, including piece part selection and screening, manufacturing process controls, procurement controls, and test procedures, to be utilized during production to ensure achievement of RAM requirements.
- K. Provisions to evaluate design changes for possible effects upon Subsystem and functional level requirements and goals.
- L. Description of Failure management and collection.
- (ii) DB Co shall follow, implement and meet Maintainability requirements such that for each system element and its constituent equipment, it shall be designed to permit ease of access for maintenance. Maintenance personnel shall have access to perform all maintenance functions, including failure location and isolation, disassembly and reassembly, removal/replacement, and repair as well as routine inspection/testing. The installation, maintenance, removal and replacement accessibility requirements for all serviceable equipment shall be coordinated and demonstrated. Equipment access ways, lifting eyes and other needed equipment accessibility features shall be provided.
- (iii) Quantitative Maintainability goals/requirements shall be apportioned by the DB Co for system elements within its scope. In addition to the quantitative goals to be met, the RAM Program Plan shall address Maintainability analyses, predications, and demonstration tests.
- (iv) DB Co shall develop the design of the SI in a way that considers maintenance of the assets through industry-standard maintenance practice. DB Co shall ensure

that no design element shall result in a gross (non-industry-standard) inefficiency in the delivery of the maintenance services for the SI.

- (d) Maintenance Approach - Develop a maintenance concept as part of the Operation and Maintenance Manuals taking the following into considerations:
 - (i) System parameters as specified above.
 - (ii) Maintenance Assumptions:
 - A. Troubleshooting and repair shall be done by an individual with a high school graduation, and who has had 2 years of relevant qualifying technical school training and 2 years of experience; has attended the maintenance training programs at a minimum.
 - B. Spare parts recommended by the DB Co will be available.
 - C. Maintenance will be performed at three discrete levels: on-line, off-line, and bench.
 - i. On-line maintenance is that performed on an in-place and operational equipment element. Test points or built-in indicators shall facilitate identification of interfaces with other system elements. On-line maintenance shall not disrupt service.
 - ii. Off-line maintenance is that performed on in-place but out-of-service equipment elements.
 - iii. Bench maintenance is that which is performed on out-of-place and service equipment elements. This maintenance is to be performed in a shop area where standard test equipment and fixtures are available. Test equipment and procedures shall allow maintenance to the lowest pluggable component part level.
 - (iii) The maintenance concept shall define the repair, corrective, and preventive maintenance program plans, policies, and support requirements for all equipment supplied under this Contract. It shall:
 - A. Minimize each level of maintenance consistent with the specification requirements and system Reliability goals.
 - B. Recommend policies and practices which ensure that, at the time of a failure, qualified maintenance personnel will be promptly notified and will have the necessary documentation, tools, test equipment, and spare parts to affect the repair in a minimum of time.
 - (iv) The maintenance concept shall develop recommendations for:

- A. Depth and frequency of maintenance requirements at each level;
- B. Facilities required;
- C. Support equipment and tools required;
- D. Skill levels and numbers of personnel required;
- E. Subsystem, component, and piece part repair policy; and
- F. Detailed fault isolation and troubleshooting procedures, diagnostic equipment, and special test equipment.

(e) Maintainability Design Features

(i) The Subsystems and components shall incorporate the following design features:

- A. Accessibility: All routinely serviced Subsystems and components shall be readily accessible for service and inspection. Accessibility of components shall be proportional to frequency of maintenance and repair. No active electrical or mechanical components that can foreseeably require maintenance shall be structurally embedded to preclude convenient access for repair or replacement.
- B. Modular Design: Modular design principles shall be employed to the greatest extent practicable. Components shall be packaged together in replaceable subassemblies according to the logical function that they perform. Components or subassemblies requiring occasional removal shall preferably be plug-in units.
- C. Interchangeability: Assemblies or components that are functionally interchangeable shall be physically interchangeable. Assemblies or components that are not functionally interchangeable shall not be physically interchangeable.
- D. Adjustments: The need for adjustments shall be avoided. Where adjustment points cannot be avoided, they shall be readily accessible, adequately identified, and self-locking to prevent inadvertent adjustment or drift.
- E. Special Tools: The number of special tools required for maintenance and repair shall be minimized. However, if they are required, they shall be defined and furnished in a quantity determined as part of the Work of this Contract.
- F. Panels and Openings: Panels and openings shall be of sufficient quantity, size, and placement to permit ready access from normal work areas and positions. Adjustment controls, fittings, and such, shall be directly

accessible through panels and openings. Self-retaining fasteners shall be used wherever possible. Special access opening tools shall not be used unless considered necessary to prevent vandalism.

- G. Cable Connections: Cable connectors shall be spaced far enough apart so that they can be grasped firmly for connecting and disconnecting. Connectors shall be properly labeled and keyed so that they cannot be interchanged or improperly installed. Signal and power pins shall not be adjacent.
- H. Lifting Assists: Handles, lifting lugs, or reviewed functional equivalents shall be provided on components of 18 kg (40 lbs) or more.
- I. Visual Inspection: Visual inspection of equipment shall be unobstructed.
- J. Test Points: Built-in test points shall be provided and marked. Major components having test panels or test points shall be located for easy accessibility and shall permit external monitoring of critical functions. Test points shall be protected against environmental damage and human error.
- K. Fault Isolation: Failure indicators shall be provided and identified. Systematic fault isolation procedures shall be developed and included in the maintenance manuals.
- L. Labeling: All test points, fault indicators, modules, wire junctions, pipes, tubes, wires, etc., shall be identified by name plates, color coding, number coding, or other means to assist maintenance personnel. All ROMs, PROMs, and EPROMs shall be labeled with the version and date of stored software.
- M. Hardware: Standard, commercially available industrial components and hardware shall be used wherever possible.
- N. Vandalism: The use of vandal and damage resistant materials shall be used whenever possible.

(f) Preventive Maintenance Plan

- (i) DB Co shall develop and submit a detailed Preventive Maintenance Plan as part of each Operation and Maintenance Manual based upon the maintenance concepts and established Maintainability requirements. The Preventive Maintenance Plan shall provide all preventive maintenance tasks needed to maintain each Subsystem/equipment, supplied under this Contract, as close as possible to new condition. The preventive maintenance task analysis shall include all servicing, inspections, scheduled overhaul, or any task required on a scheduled basis. The elapsed time to perform specific

tasks shall be defined in the analysis, and in maintenance and servicing manuals. All tasks will be sorted and grouped by time interval (ex. daily, weekly, monthly, etc.), as well as by Subsystem.

- (ii) In addition to preventive maintenance tasks recommended by equipment manufacturers to enhance the Reliability/Availability of their equipment, many Safety Critical preventive maintenance tasks will be required as a means of detecting Safety-significant latent failures, which would otherwise remain latent until another subsequent failure resulted in a potentially hazardous event. The Safety Critical preventive maintenance tasks are a direct result of performing Safety analyses on all required Subsystems. The DB Co shall use a clear and deliberate method to identify all Safety Critical preventive maintenance tasks in the Preventive Maintenance Plan.
- (g) DB Co shall apportion and allocate availability, MTBF, MTBSAF and MTTR values as applicable to the various systems elements and Subsystems using a reliability block diagram model, which shall support and meet the top level RAM goals/requirements. DB Co may use the beneficial effects of redundancy and repair rate (repair rate= reciprocal of MTTR) to reduce the effective Failure frequency and thus increase the effective MTBF of system elements and Subsystems due to equipment redundancy, and the ability to repair one failed unit in time before the second (redundant) unit fails. DB Co shall demonstrate through analysis and testing that the apportioned Availability/MTBF values which support the top level inherent Reliability/Availability are achievable and the equipment shall demonstrate such Availability/MTBF through analysis and testing.
- (h) MTBF shall be calculated as the total number of equipment operating hours for the entire population of like items, divided by the number of failures requiring unscheduled corrective maintenance action anywhere within the said population of items during said total accrued operating hours by said population of items. A Failure, in redundant system, shall be defined as loss of function. The function shall not be deemed “lost” until all the redundant items in the “cut-set” of redundant items have failed. Thus the DB Co shall benefit from the effects of redundancy and repair rate to reduce the effective failure frequency of the system/Subsystems (i.e., increase the effective MTBF) due to redundancy in configuration. Also, scheduled preventive maintenance to inspect/ repair/ replace items during non-revenue-service hours, shall not be considered chargeable failure for MTBF calculation.
- (i) RAM Prediction Report
 - (i) DB Co shall submit a RAM Prediction Report to demonstrate its proposed equipment will meet RAM goals/requirements. DB Co shall not furnish any equipment until calculations or data is approved by the City.
 - (ii) Reliability calculations shall use reliability block diagram, reliability model, probability of success equation, and preventive maintenance strategies to achieve required MTBF. Substantiated field data, Electronic Parts Reliability Data – 2014,

Non-Electronic Parts Reliability Data – 2017 and RIAC Handbook 217Plus shall be used for reliability data in order of precedence. Any assumptions made shall be documented in the RAM Prediction Report, as a minimum shall include de-rating factors for environment, temperature, application and stress and redundancy configurations for MTBSAF calculations, as applicable

- (iii) DB Co may propose alternate method of calculating Reliability, such as providing service records for proven equipment, provided DB Co can demonstrate similar function and environmental conditions, for approval by the City.
 - (iv) DB Co shall conduct a Maintainability analysis to be included within the RAM Prediction Report to ensure the Maintainability requirements listed herein have been achieved. DB Co shall follow IEC 60706 in general accordance.
- (j) RAM Demonstration Plan and Report:
 - (i) DB Co shall develop a RAM Demonstration Plan outlining the equipment to be tested, acceptance criteria and test conditions to be applied. DB Co shall submit to the City for review and approval.
 - (ii) During testing and commissioning, DB Co shall provide the City a RAM Demonstration Report outlining the performance of the System in accordance to the RAM Demonstration Plan for review and acceptance.
 - (iii) DB Co shall review monthly reports throughout the Warranty Period to ensure the RAM requirements are being met.
- (k) FRACAS Procedure and Report
 - (i) DB Co shall develop a FRACAS program and submit to the City for review and approval. The program shall outline the organization in place to support the program and the approach taken by DB Co to detect, collect, diagnose and correct the respective failure as a minimum.
 - (ii) DB Co shall develop and submit to the City, on a monthly basis starting at testing and commissioning and ending upon receipt from the City the end of the Warranty Period, a detailed FRACAS Report, indicating all system element failures to the Lowest Line Replaceable Unit by subsystem, corrective actions to be implemented and work orders traced to the respective corrective action, identification of any pattern failures and a summary of the most frequent failing elements.
- (l) FMECA
 - (i) DB Co shall provide to the City for review and approval a FMECA following EN 60812. The FMECA shall identify each respective RAM Failure Category. DB Co

may submit a single FMECA for RAM and Safety provided the respective criticalities are defined for each.

(m) RAM Failure Category

- (i) Significant Failure: A failure that prevents Train movement or causes a delay to service greater than an operating headway in effect.
- (ii) Major Failure: A failure that must be rectified for the rolling stock to achieve its specified performance and does not cause a delay to service more than a headway in effect.
- (iii) Minor Failure: Any failure of equipment and that of which does not meet the criteria of Major or Significant.

(n) RAM Measurement Methodology

- (i) MTBF: All failures that are attributed to all RAM Failure Categories. Failures which involve No Fault Found and Nothing To Report shall be tracked via the FRACAS program.
 - A. MTBF (hours): $\text{Operating Hours in Period} / \Sigma \text{ All failures (Minor, Major, Significant)}$
- (ii) MTBSAF: applies to the RAM Failure Category of Significant.
 - A. MTBSAF (hours): $\text{Operating Hours in Period} / \Sigma \text{ Significant Failures}$
- (iii) MTTR: shall be calculated for equipment elements as defined as either an LRU or LLRU. All elements defined with the same part number or piece of equipment performing the same function within the failed unit shall be used for the calculation. Note the MTTR shall be calculated for all in-service corrective maintenance and out-of-service corrective maintenance
 - A. MTTR (hours): $\text{Cumulative Repair Time for the respective element over the sampling Period} / \text{Number of Work Orders for the respective element}$

(o) RAM Targets:

- (i) RAM Targets are defined in Schedule 15-2, Part 3 - Systems. The RAM targets specified therein shall be demonstrated by DB Co. If DB Co is not able to meet the specified RAM targets, justification and evidence shall be provided for approval by the City.

ARTICLE 8 SECURITY AND EMERGENCY MANAGEMENT

8.1 General Security and Emergency Management Requirements

- (a) The Work specified in this Article consists of the development and implementation of a Security and Emergency Management requirements. Requirements for physical and cyber security and Emergency preparedness of City ESP are integral part of this Project. These security and Emergency preparedness requirements shall apply to all DB Co functions during all phases of the Work including design, construction, installation, testing, pre-revenue operations, in-service support, warranty, retrofits and field modifications. As well, DB Co shall ensure Security is considered in the development and implementation of the plans, training and supporting documentation including the development and implementation of a SSAP. The purpose of the SSAP is to ensure the Project Facilities, systems and equipment are as secure as reasonably possible including:
- (i) Design and operating security vulnerabilities are identified, evaluated, and properly controlled or mitigated, prior to the commencement of Passenger service.
 - (ii) All Critical system elements are evaluated for compliance with the identified security requirements during the design, conform to the drawings and specification during construction/installation, and function as required during testing, and start-up phases of the Project.
 - (iii) The Project is operationally secure for customers, employees, ESP, and the general public prior to entering Revenue Service.
 - (iv) All Project equipment, Facilities, plans, procedures, and training programs are systematically reviewed for compliance with established system Security requirements, and so verified prior to implementation of Revenue Service.
- (b) Objectives: The primary mission of the Confederation Line Extension is to provide the City with a safe, secure, reliable, and attractive public rail transportation system. As such, the Confederation Line Extension shall incorporate security values that affect all levels of the Confederation Line Project activities including; the planning, design, procurement, construction, testing, commissioning, and operations and maintenance. The primary objective is to deliver a Project that meets or exceeds Security and Emergency preparedness-related governmental rules, regulations, standards and industry best practices, and applicable requirements throughout the Project. DB Co personnel, consultants, and contractors associated with the Project are charged with the responsibility to deliver a secure system for the City, its employees, customers, and public at large as well as ensuring ESP are ready to respond to Emergency events through formal training and documentation development.
- (c) The Work shall be accomplished by incorporating Security design features, facilitating Emergency response training drills (which will include on site (Guideway and Stations) and on-Train familiarization sessions, in classroom instructions, tabletop exercises and live exercises using Train, Stations, Guideway and maintenance Facilities) and

implementing contractual training for the safe and efficient handling of both normal and Emergency conditions. The design of the Project shall include provisions to enable safe and timely evacuation of Passengers and personnel from all fixed Structures, disabled Vehicles and Facilities. The provisions shall also include necessary safeguards to protect Passengers, personnel and ESP during evacuation and shall minimize exposure to all Hazards, including those due to moving Vehicles and potential falls, weather issues and vulnerabilities due to intentional acts.

- (d) The Project design shall be compliant with Security criteria, codes, and regulations and the Duty to accommodate security requirements of passengers and employees as the most important requirement of the Project.
- (e) DB Co shall be responsible for compliance with the Project's SSeCP developed by the City through strict conformance to contractual obligations. DB Co shall manage its Work and that of its Subcontractors' through design, construction and integrated testing in such a way as to support the overall success of the Security certification process and the ultimate acceptance by the City.
- (f) At the City's request, DB Co shall support the City in the review and update the current ERP to reflect elements of the new SI. DB Co's support to updating the ERP shall be timely and in accordance with the City's schedule.
- (g) The ERP shall be modified, revised or changed, as appropriate, to address specific issues, needs, threats, Hazards, vulnerabilities, or concerns, including those identified in the Threat Log, Risk Log, PHA, Risk Assessment, Hazard analysis and FMECA related to the new SI developed during the Project Term.
- (h) It is understood that the updated ERP shall be incorporated into the City of Ottawa Emergency Response Plan, and the Province of Ontario PERP.
- (i) DB Co shall be responsible for performing Security Certification tasks as specified herein in accordance with U.S. Department of Transportation, Federal Transit Administration's Handbook for Transit Safety and Security Certification, Final Report, November 2002; FTA-MA-90-5006-02-01. These tasks shall be managed and performed in accordance with the Project SSeCP.
- (j) DB Co shall provide a SeCM to develop and implement the Security Certification processes. The SeCM shall develop and implement the security certification program to verify the inclusion of Security items in the design, construction, testing, and Commissioning of the Project. The SeCM shall oversee and manage all aspects of the security certification effort.

8.2 References

- (a) Develop and implement the Security and Emergency Preparedness Plans, documentation and training in accordance with the following guidelines and documents. Where the

referenced documents provided below, conflict with these specifications, these specifications shall govern:

- (i) For Security: Handbook for Transit Safety and Security Certification, Final Report, November 2002; DOT, FTA-MA-90-5006-02-01.
- (ii) Public Transportation System Security and Emergency Preparedness Planning Guide, January 2003, Final Report, U.S. DOT, FTA, DOT-VNTSC-FTA-03-01.
- (iii) Transit Security Design Considerations, Final Report, November 2004, US DOT, FTA, DOT-VNTSC-FTA-05-02.
- (iv) CPTED principles, City of Ottawa, Urban Design, A Reference Guide to Creating Great Places and Great Spaces, Planning, Transit and the Environment, Publication #2103, Summer 2007.
- (v) NFPA 130.
- (vi) ASIS International security strategies and procedures.
- (vii) Transport Canada Rail Codes of Practice for Rail and Transit Operations.
- (viii) Pathway Lighting Policy, City of Ottawa Policy on Lighting Pathways.

8.3 Security and Emergency Response Principles

- (a) The following security and emergency response principles shall be followed in the Design and development of security plans and procedures, emergency responder training and overall Emergency Responder preparedness.
- (b) Security: The three fundamental principles of security are:
 - (i) Confidentiality: The principle of Confidentiality means that the System's operational and management control assets can be accessed only by authorized parties
 - (ii) Integrity: The principle of integrity means that the System's operational and management control assets can only be modified or changed by authorized parties in authorized ways
 - (iii) Availability: The principle of availability means that the System's operational and management control assets should be available to authorized parties at all times.
- (c) Emergency response principles include:
 - (i) Emergency response procedures shall be designed and developed to align with industry accepted principles and follow the current City emergency response protocols;

- (ii) Emergency Responder Systems training shall include access, familiarization sessions and tours, and operation of Safety, security and Emergency response systems;
 - (iii) Emergency response training and familiarization shall consider City Protocols for escalation of emergency events;
 - (iv) Emergency response procedures shall account for changes to the threat as outlined in the Threat Log and Risk Log; and,
 - (v) Emergency response shall be validated through tabletops and a full scale exercises.
- (d) Emergency response shall consider the Safety of City ESP at all times.

8.4 Development of Security Design Criteria

- (a) DB Co shall prepare Security Design Criteria at the commencement of the design effort to provide applicable Security guidelines for proper design including CPTED, construction, testing, and preparation of the operation of the security systems. The purpose for Design Criteria documents involves the control or restriction of information that due to its sensitive and confidential nature or content that may, if disclosed or released, identify vulnerabilities to critical infrastructures or systems. The separation of these documents allows for one criterion to be updated without impact to the other.
- (b) The Design Criteria shall ensure that the Security elements identified for the Project will become part of requirements that shall be addressed by DB Co through the development of specifications, drawings, design reviews, and final acceptance. These security elements include where appropriate, and to meet the requirements as identified in the Threat Log and Risk Log:
 - (i) Perimeter fencing;
 - (ii) Alarms;
 - (iii) Fare gates;
 - (iv) Security laminates;
 - (v) CCTV cameras
 - (vi) PA systems;
 - (vii) Security signage;
 - (viii) Intrusion detection;
 - (ix) Locks;

- (x) Key control;
 - (xi) Roll down coiling grills;
 - (xii) Blast mitigation;
 - (xiii) Vehicular barriers;
 - (xiv) Security lighting; and
 - (xv) Cyber protection for IT and SCADA systems.
- (c) The Security Design Criteria shall be submitted within 150 days of Financial Close.

8.5 Security Design Approach

- (a) DB Co shall follow the Security Management System when designing and developing the Security Plan and Procedures. As outlined Schedule 15-2, Part 1, Article 10, there is a requirement to develop and implement a systematic, explicit, and comprehensive process for managing security risks. DB Co will develop a System Security Plan to support security integration.
- (b) The Security Design Approach shall be founded in the TVA and Risk Assessment. As such, DB Co shall review, update and continue to develop the City-provided TVA from Existing Confederation Line. DB Co shall be responsible for identifying threats and vulnerabilities that are specific to the Confederation Line Extensions which shall be included and analyzed independently from the City's TVA and Threat Log and Risk Log. Throughout the Project, DB Co shall develop and maintain an updated TVA to identify, mitigate, and/or control threats and vulnerabilities that might arise from design and operational deficiencies associated with the Project. Additional threats and vulnerabilities identified and analyzed shall be submitted to the City in accordance with Schedule 10 – Review Procedure.
- (c) Specific Security requirements for Confederation Line Extension facilities or the supporting systems will be based on a Risk Assessment that is conducted by DB Co. during the earliest stages of the Project and documented within the Risk Log. DB Co shall address and incorporate applicable mitigations identified by the Confederation Line Extension TVA and Risk Assessment as outlined at Schedule 10 – Review Procedure. Mitigation of security physical and cyber threats are to apply to the following:
- (i) Train Control;
 - (ii) Maintenance Storage Facilities;
 - (iii) Confederation Line Extension Stations;
 - (iv) Guideway;

- (v) Tunnel;
 - (vi) Control centres;
 - (vii) Fare collection;
 - (viii) IAC;
 - (ix) CCTV System;
 - (x) OCS and
 - (xi) Vehicle.
- (d) Mitigations shall include design considerations, security devices, warning devices or recommendations for adopting special procedures or training. These mitigations shall consider an integrated security approach, CPTED principles and security defence in depth. The resolution process shall verify the following:
- (i) That the resolution of a threat or vulnerability in one system does not create a new one in another system;
 - (ii) That threats or vulnerabilities involving interfaces between two or more systems have been analyzed and resolved;
 - (iii) That all program participants provide required analyses results in a timely manner, and that determination is made where delinquent receipt is delaying vulnerability resolution; and,
 - (iv) That proper resolutions are implemented for areas identified with vulnerability mitigations requiring a change in system design or development of special procedures or additional training for ESP or City staff.
- (e) The TVA methodology and the Risk Assessment process of identifying the likelihood of occurrence and the severity of impact shall be applied and performed in accordance with Public Transportation System Security and Emergency Preparedness Planning Guide, January 2003, Final Report, U.S. DOT, FTA, DOT-VNTSC-FTA-03-01.
- (f) Mitigations shall be compiled into an independent Threat log and Risk Log that identifies threats, vulnerabilities and among other things, proposed mitigations to vulnerabilities.
- (g) The criteria for accepting a threat Risk level shall be in accordance with the TVA provided by the City from the Existing Confederation Line and the Security Management System
- (h) Document confidentiality and control. The TVA, the Threat Log, Risk Log and the information contained within the documents shall be confidential, restricted and controlled to only those people with the need to know and access the information therein.

DB Co shall establish controls and criteria for accessing the documents and information. When no longer necessary, the documents shall be destroyed beyond reconstruction or recognition.

8.6 Security Certification

- (a) DB Co's management responsibilities shall include, but are not limited to, the following:
- (i) DB Co shall implement a System Security Certification Program which shall be compliant with the City's SSCP, which shall ensure by verifying the inclusion of all Security items in the design, construction, and testing of the Confederation Line Extension. The SSCRT shall oversee the certification effort.
 - (ii) DB Co shall utilize the SSeCP developed by the City that describes and outlines the Project's Security Certification process which will be compliant to the City's SSeCP. The SSeCP developed by the City will describe roles, responsibilities, staffing, schedule, deliverables and a description of the process, at a minimum. DB Co will be responsible to develop a project specific SSeCP to describe how they will be complaint to the City's SSeCP and provide a deliverable timeline in-line with the Project schedule.
 - (iii) DB Co shall participate in meetings with the SSCRT, FLSSC and SSORC.
 - (iv) Cooperation and facilitation of Security Certification audits of the Work shall include.
 - A. Coordinating, documenting and performing training as specified in the Project Agreement.
 - B. Maintaining and updating files and submitting required documentation on a timely and sequential milestone schedule basis. Preparing Security Certification progress reports each month, which shall include submitting a record copy of Security Certification files to the City.
- (b) DB Co's responsibilities are defined in Table 1-8.1. DB Co shall be responsible for the performance of the task activity identified in Table 1-8.1. The SSeCP and Security Management System shall be followed when conducting tasks below:

Table 1-8.1

| PROJECT PHASE | EN 50126 LIFECYCLE PHASE | DB CO SECURITY TASKS |
|---------------------------------|--|--|
| PRELIMINARY / CONCEPTUAL DESIGN | 1. Concept | Review and update the City's Security Certification Plan |
| | 2. System definition and application conditions | SSAP |
| | | Security Audits (Internal and 3 rd party) |
| | | SSePP |
| | | Review, update and continue to develop the City-provided TVA from Existing Confederation Line |
| | 3. Risk Analysis | SSAP Update |
| | | System Risk Analysis |
| | | Interface Risk Analysis |
| | | Review and update TVA |
| | | Cybersecurity Assessment and Management |
| | | Review and update Threat Log and Risk Log |

| PROJECT PHASE | EN 50126 LIFECYCLE PHASE | DB CO SECURITY TASKS |
|-------------------------------|---|--|
| DETAILED / FINAL DESIGN | 4. System Requirements | Threat Log and Risk Log Review and Update Update SSeCP Security Audits (Internal and 3 rd party) |
| | 5. Apportionment of System Requirements | SSAP Update SSeCP update *as required System Risk Analysis / Subsystem Risk Analysis Threat Log and Risk Low Review and Update Cybersecurity Assessment and Management Review and Update |
| IMPLEMENTATION | 6. Design and Implementation | Emergency Preparedness (Preliminary) Test Plans and Procedures |
| TESTING AND MANUFACTURING | 7. Manufacturing | Threat Log and Risk log Review and Update Verification and Validation Report(s) Assess Security Related Training Operation and Maintenance Manuals |
| CONSTRUCTION AND INSTALLATION | 8. Installation | SSAP Update Validation Report(s) |
| TESTING & COMMISSIONING | 9. System Validation | Security Audits (Internal and 3rd party) |
| HANDING OVER | 10. System Acceptance | Threat Log and Risk Log Update Transfer and Implement SSAP for Operations |
| MAINTENANCE OR DEFECT | 11. Operation and Maintenance | Review and update Threat Log and Risk Log Update Operations and Maintenance Manuals Security Audits (Internal and 3rd party) |

8.7 Security Activities and System Testing

- (a) DB Co shall follow the Security Management System when conducting the Security activities, listed in Table 1-8.1 above, along with the respective standards listed therein. The agreed-upon design countermeasures identified within the 2013 Threat Vulnerability Assessment and the corresponding Threat Log and Risk Log shall be incorporated.
- (b) Security Review Documentation - DB Co shall include a matrix in the SeVM (output from the Threat Log and Risk Log) addressing Security tests, which shall receive the concurrence by signature of the responsible person as defined by DB Co's organization chart. The matrix shall identify Security parameters and/or other Security considerations and a cross-reference to the test following the Review Procedure outlined at Schedule 10. This matrix shall be kept current throughout the Project lifecycle and shall include the identification of the test reports which confirm verification of the Security requirements.
- (c) Security Systems - DB Co shall comply with the security requirements to support systems as outlined in the references below:
 - (i) LRT Systems Design Submission— Schedule 3 Part 1 Tech Sub Requirements;
 - (ii) PA system broadcast – Schedule 15-2, Part 3, Article 4;
 - (iii) CCTV System – Schedule 15-2, Part 3, Article 7;
 - (iv) Signaling and Control System – Schedule 15-2, Part 3, Article 10;
 - (v) Traction Power System – Schedule 15-2, Part 3, Article 13;
 - (vi) Overhead Contact System – Schedule 15-2, Part 3, Article 14.
- (d) System Security Certification Process – DB Co shall conduct system security certification process using a minimum of the five steps outlined below:
 - (i) Identification of Certifiable Elements and Sub-Elements;
 - (ii) Identification of Security Requirements for each Certifiable Element and Sub-Element;
 - (iii) Verification and/or validation of Security Requirements;
 - (iv) Tracking, review, update and documentation of certification tasks in Security Certification Checklists; and,
 - (v) Issuance of Certification for Certifiable Element or Sub- Element's conformance to all associated Security Requirements
- (e) Witness point: Witness point selection is a City responsibility with the purpose of defining selected points or locations where the City wishes to formally witness testing.

DB Co shall be responsible for scheduling and performing the tests that include those City-selected points; and, for notifying the City at least 14 Business Days in advance of the date and time of the test. Notification procedures shall be established prior to witness point testing, scheduling or performance. Selected areas shall include items of high risk, where concerns of compliance have been raised, or those selected by random sampling. The City shall have the right to attend and witness any and all testing that takes place.

- (f) Security systems tests: DB Co shall verify that Security systems function in accordance with promulgated specifications. All security systems tests shall be included in the Test Program Plan contained within its own section. The respective security systems tests and results shall be documented within Test Reports. Security systems tests shall include, at a minimum:
- (i) An initial security systems testing conformance checklist shall be prepared for the design level of the Project Agreement documents. DB Co shall update the security systems testing conformance checklist and submit it for review. DB Co shall verify that security systems tests identified in the specifications and other Project Agreement documents are successfully performed and the completed tests have been verified within defined test parameters and the systems and Subsystems function safely as specified, do not contain or create unforeseen vulnerabilities, and contain specified Security features. All requirements on the checklists shall be verified and submitted to the City for review;
 - (ii) At a minimum, each of the identified security requirements for a security system shall be simulated and tested to verify and certify performance in normal modes and associated sequences and the failure modes and effects, as applicable. These tests shall demonstrate the security systems requirements stated herein have been met. Should the security systems testing identify any issue, they shall be listed in the security systems test reports, indicating remediation and corrective action necessary. All remediation and corrective actions required by DB Co shall be completed within fourteen calendar days and documented in a Non-Conformance Report to ensure traceability. All remediation and corrective actions shall be completed prior to the completion of the Work and pre-revenue testing and training. DB Co shall audit all tasks.
 - (iii) Security Systems Testing Documentation - Security Systems testing shall be separately identified to allow recognition of security systems tests. DB Co shall include a matrix in the SeVM (output from the Threat Log and Risk Log), addressing security tests only, which shall receive the concurrence by signature of the responsible person as defined by DB Co's organization chart. The matrix shall identify security parameters and/or other considerations and a cross-reference to the test. This matrix shall be kept current throughout the Project lifecycle and shall include the identification of the test reports which confirm verification of the security requirements. The references to the Security Systems tests along with reports shall be checked before every submission to ensure that there have been no revisions or modifications.

- (iv) Notification - DB Co shall notify the City in writing thirty calendar days prior to the start of any security systems test. If any of the data indicate conditions which could potentially result in lack of proper protection of operations, DB Co shall immediately indicate proposed remedies and/or corrective actions.
- (v) Scheduling - All Security tests shall be successfully completed by DB Co prior to system or equipment acceptance.
- (vi) Security Test Reports - DB Co shall ensure test reports which contain verifications shall receive the concurrence, by signature, of the responsible person, defined by DB Co's organization chart. Security Systems Reports must be referenced within the SeVM to demonstrate compliance.
 - A. DB Co shall report any non-compliance/non-conformance with Applicable Codes and regulatory requirements noted as a result of security systems testing. All non-compliances shall be rectified in accordance with Applicable Codes and regulations.
- (g) Security training and drills: DB Co is responsible for proper coordination and successful completion of this task. They shall participate and provide support as defined herein. The purpose of the training and drills verification process is to verify that key security systems training on new equipment and procedures is adequate and appropriate for the tasks performed under typical and Emergency conditions. DB Co shall schedule, arrange, invite participants, provide equipment, and set up locations for drills to occur. Where indicated elsewhere herein, DB Co shall also provide instructors to assist performing the training in Security.
- (i) Verifying security system operation through drills and exercises is an integral part of the Security Systems process. The methodology employed by the training/drill/exercise process is to obtain written verification from the City that:
 - A. Training and drills are adequate and appropriate for the assigned task, and contain instructions on Security features for typical and Emergency conditions;
 - B. Lessons learned from training and drills are performed, reviewed and documented to identify threats, vulnerabilities, or open Security issues have been resolved; and,
 - C. Known issues concerning training and drills, which impact Security, have been satisfactorily resolved.
- (ii) Security information on conformed methods and procedures necessary to maintain security conditions shall be generated by DB Co and included in a Security Training Program, to be provided by DB Co, for Security training consideration of construction, operations and maintenance personnel. At a

minimum, each of the security training requirements shall be included in the training program and associated documents.

- (h) DB Co shall be responsible for establishing and maintaining a Threat Log and Risk Log to record and track Threats for resolution. The Threat Log and Risk Log shall describe all identified threats, the measures taken to resolve each threat (references citing document, revision, section number) and the results of reviews, comments and approvals by the City and other outside agencies. All Threats and Risks shall be tracked through to resolution. DB Co shall submit the most current copy of Threat Log and Risk Log to the City for review upon request. After all tracked Threats and Risks are resolved, DB Co shall prepare a Security Verification Matrix document and submit in accordance with Schedule 10 – Review Procedure.
- (i) FLS – DB Co shall be responsible for compliance with FLS requirements included in federal, provincial, local codes and regulations, and the Project Agreement. DB Co shall incorporate these requirements into the design and construction of the Project and include all applicable FLS elements in the appropriate SeRTM.
 - (i) DB Co shall support the approval process by participating in reviews, inspections and technical discussions between the City and local jurisdictional authorities and other Governmental Authorities, and incorporating the resulting agreements into the design and construction. DB Co shall be responsible for verifying that DB Co's completed design complies with the resolutions of FLS issues, and is acceptable to the applicable Governmental Authorities.
 - (ii) Certificates of Conformance will be signed as certified by the DB Co Security and signed as approved by the OLRT-C Technical Director, and submitted to the City as per Schedule 10 – Review Procedure.

8.8 Format for Security Verification Matrix

- (a) DB Co shall provide an SeVM in the following format, noting that this shall be an output from the Threat Log and Risk Log:
 - (i) Item Number;
 - (ii) Security Requirement;
 - (iii) Document Reference:
 - A. Document Name; and,
 - B. Article Number;
 - (iv) Evidence:
 - A. Method of Verification by DB Co;

- B. Method of Validation by Audit Team;
- C. Validated By (Name of Auditor);
- D. Date; and,
- E. Remarks.

(b) Security Requirement Traceability Matrix

- (i) DB Co shall develop SeRTM for the Project as an output from the Compliance Verification and Validation Matrix. It shall be used to verify and certify that the Security requirements have been incorporated in the design and certify that all Security requirements of the design are constructed and/or installed and tested in accordance with the Project Agreement.

8.9 Construction Site Security

- (a) The information provided in this section is intended to establish the minimum requirements to be satisfied in the development of a Construction Security Plan for this Project. DB Co's Construction Security Plan shall establish the procedures required to provide the security measures necessary to achieve site security.
- (b) The following issues shall be addressed in the Construction Security Plan and with the processes established by the DB Co, in consultations with City authorities:
 - (i) DB Co shall be responsible for providing security control capability for the physical sites throughout all phases of the Project. The physical security plan must incorporate identifiable elements of protection, detection, and response capabilities. The security measures must be aligned to ensure identifiable security perimeters are established and access controls to and monitoring of the secured areas are established and achievable for the life of the Project.
 - (ii) Adequate security safeguards shall be established to ensure the protection of the sites is provided on a continuous basis for the life of the Project. The measures will be sufficient to mitigate incursion to the sites.
 - (iii) Policies and procedures shall be developed and implemented to ensure that any site security force is appropriately trained and prepared to provide initial response to security incidents.
 - (iv) The Security Plan shall provide flexibility in the security approach to permit adjustments to the sites as the project develops. This is to allow DB Co to shift the site perimeters as needed to meet construction schedules.

8.10 Emergency Responder Preparedness

- (a) DB Co shall provide support to the City in the review and update of Emergency response procedures in a timely manner to enable ESP to be ready for Revenue Service. This support shall include:
 - (i) Review and update of current Emergency response procedures;
 - (ii) Development and delivery of up to four train the trainer sessions for up to 40 Emergency response trainers for each session(to be completed six months prior to Substantial Completion);
 - (iii) Provision familiarization training session and tours on stations, guideway, maintenance facilities, trains and systems for ESP and supporting teams(to be completed three months prior to Substantial Completion);
 - (iv) Development and delivery of up to five tabletops exercises of up to 50 ESP each to address specific topics and issues as designed by the City;
 - (v) Delivery of content to update the City of Ottawa Emergency Responder Application related to Confederation Line Extension; and,
 - (vi) Development and delivery of a full scale exercise to include all City ESP to validate Emergency response procedures.
- (b) DB Co shall provide support to the City for Familiarization Training of Emergency Responder Trainers on functionality of Emergency Responder Systems to include:
 - (i) CCTV;
 - (ii) ETELS;
 - (iii) FTELS;
 - (iv) AEDs;
 - (v) GIDs;
 - (vi) ICPs;
 - (vii) Train lifting equipment;
 - (viii) PA; and,
 - (ix) IAC.

8.11 Emergency Responder Training

- (a) DB Co shall provide training programs, with special emphasis on ESP, for all City ESP to enable a train the trainer Emergency response program.

ARTICLE 9 PROJECT OFFICE

9.1 General Requirements – City Offices

- (a) DB Co shall provide climate controlled offices (the “Site Offices”), at pre-determined, locations set out in Table 1.9-1 along the active construction sites of the Project alignment. The intent is that site offices will form the basis of the City compliance monitoring team.

TABLE 1.9.1: SITE OFFICE LOCATIONS AND SIZING

| Site Office Locations | Required Square footage (based on 17 m ² per person) |
|-------------------------------|--|
| Moodie LMSF | 46 m ² |
| Baseline Station | 46 m ² |
| Pinecrest Station | 46 m ² |
| Lincoln Fields | 46 m ² |
| Rochester Field/Richmond Road | 46 m ² |
| Montreal Road Station | 46 m ² |
| Trim Road Station | 46 m ² |

- (b) With reference to the above Table 1-9-1, unless otherwise specified, DB Co shall locate the site offices on mobilization sites as per Schedule 20 – Lands.
- (c) DB Co shall supply a trailer site for the City of Ottawa management staff at the following locations: [REDACTED]. References to PRP shall be the latest version.
- (d) DB Co shall ensure that Site Offices shall meet the requirements of AODA, have entrance/exit signs and lighting and meet the requirements of the Ontario Codes and Guides for Buildings; Fire; Sewage; Plumbing and Electrical and the Ontario Ministry of Labour and WSIB.
- (e) DB Co shall be responsible for providing site office including all maintenance and operational costs for a period lasting from 30 days prior to, until 30 days after DB Co construction Work in the area of each site office location.
- (f) The Site Offices shall include the following:
- (i) a secure climate controlled, site office area, including all improvements and fixturing costs and all required furniture as per the City standards.
 - (ii) one meeting room capable of holding 4-6 persons and 8-10 persons for larger site offices with 50” TV and required connections for laptop display; one restroom, one large heavy duty shredder and kitchen amenities including counter, sink and

under sink storage, small refrigerator, microwave, kettle, coffee machine, storage space for supplies and personal protective equipment.

- (iii) secure door with controlled access that is only accessible by the City. Signage at each site office identifying the occupant and indicate a telephone number in case of Emergency.
- (iv) cleaning service agreements and costs for daily services of Site Office including rubber entrance mats, commercial grade and bristled scraper type boot cleaners.
- (v) voice and data cabling evaluation and installation costs, with specific location for outlets and all other requirements to be agreed in consultation with the City IT Representative.
- (vi) equipment including computers, monitors, keyboards and mouse, phones, printers, copiers and fax machines, polycoms, will be provided and maintained by the City.
- (vii) selection and costs related to the provision of data and voice services will be provided by the City.
- (viii) office supplies and stationary will be provided by the City.
- (ix) temporary buildings and trailers will be removed upon Work completion and areas restored to match existing surrounding areas by DB Co.
- (x) Three reserved parking spaces for the City exclusive use at each site office and maintenance of parking spaces, sidewalks and paved areas at and adjacent to the site in a safe condition.

9.2 General Requirements – Contractor Offices

- (a) DB Co shall be permitted to provide local site offices for construction operations at each Station construction site including those not designated as mobilization site in Schedule 20 – Lands. Those Station locations not designated as mobilization sites shall have limited material and equipment storage restricted to material and equipment specific to that station location required to construct that specific Station.
- (b) DB Co shall ensure that site offices shall meet the requirements of AODA, have entrance/exit signs and lighting and meet the requirements of the OBC and OFC and other relevant codes and the MOL and WSIB.
- (c) DB Co shall be permitted to provide limited onsite parking spaces for DB Co employees and subcontractors at those Station locations not designated as mobilization sites.
- (d) DB Co shall be permitted to provide limited subcontractor trailer space at those Station locations not designated as mobilization sites

- (e) DB Co shall be responsible for all maintenance and operational costs in association with site offices identified in this Clause 9.2 for the duration of DB Co's occupancy of the Lands.
- (f) At those Station locations not designated as mobilization sites, temporary buildings and trailers shall be removed upon Station construction completion and areas restored to match existing surrounding areas by DB Co.

ARTICLE 10 CONSTRUCTION SAFETY MANAGEMENT

10.1 General Requirements

- (a) DB Co shall prepare the CSMP in accordance with the criteria contained in this Article and all Applicable Laws, and applicable standards.
- (b) The CSMP shall be prepared and submitted in accordance with Schedule 10 – Review Procedure. DB Co shall coordinate with applicable Governmental Authorities to ensure existing maintenance and Safety plans are not violated.
- (c) DB Co shall have an active WSIB account in good standing and shall make available a valid Clearance Certificate from the WSIB, upon request.
- (d) The construction planning for this Project shall consider the existing operations of the City and OC Transpo, and the impacts to the street network within the City, as well as considering adjacent residences, landowners and businesses, with respect to pedestrian and property access and other environmental impacts.

ARTICLE 11 SYSTEMS INTEGRATION PROGRAM

11.1 General Description

- (a) As the Systems Integrator on the Confederation Line, DB Co shall establish and maintain a systematic, documented, comprehensive, and verifiable systems integration process based on the IEC 15288 standard (Systems and software engineering -- System life cycle processes) to be applied throughout the duration of the Project beginning with requirements management, concept development, design, procurement, manufacture, implementation, integration and testing, through successful commissioning of both the Confederation Line East Extension and Confederation Line West Extension. This process shall ensure that interfaces and interaction between infrastructure, Facilities, subsystems, software, and operations and maintenance personnel have been identified and engineered to function together as a system. At a minimum, DB Co's system integration effort shall systematically identify and formally document all human interfaces with the elements of the system and all interfaces with external systems. External systems interfaces include Existing Confederation Line, other Facilities, existing systems, existing facilities, traffic, communities, and other agencies affected by the Project. DB Co shall define methods to confirm compatibility between system elements, and perform the necessary tests or other verification to demonstrate that every element functions and performs properly, both individually and as part of the complete system. As the Systems Integrator, DB Co shall provide all required resources, work processes and management authority to exercise control over the planning, scheduling, co-ordination, prioritization, and delivery of the Works in order to mitigate foreseen systems integration risks, secure successful Project completion and deliver an operationally resilient railway into Project service.
- (b) In the course of complying with the provisions of this Project Agreement, various physical and functional interfaces of DB Co's equipment may depend on facilities, equipment, or services of organizations not under DB Co's control for successful operation. The majority of interfaces exist within the DB Co Agreement between DB Co and its consultants, subcontractors and suppliers, while the remaining interfaces exist between new and existing facilities and equipment furnished by the City and with other third parties such as utilities and other contractors. It is necessary that all interfaces be identified and controlled by DB Co to assure the design at the interface is understood and agreed to by affected parties. Any changes to one side of the interface shall be accepted and accommodated by the opposing interface. DB Co shall include, in the Interface Control Document, the process by which interfaces are identified and controlled.
- (c) This Article addresses the interfaces between each of the system elements and the system elements with the infrastructure, facilities, services, system information, or other work being provided by DB Co or others. This Article is not a detailed description of all such interfaces; rather, it is a broad description focused on general interface areas and the systems integration needs of the project. DB Co shall inspect the related work, review the drawings and documentation to identify and successfully comply with all interface

and integration requirements in order to perform all of the work required to complete the Project as defined in broad terms throughout the Project Agreement.

- (d) DB Co, as the Systems Integrator shall develop the necessary Systems Engineering Management Plans, produce the SIMP, produce the SIT schedule, manage the interface working groups, identify and coordinate all necessary resources required to successfully execute SIT and commissioning of the upgraded head-end management platform for all of the Confederation Line East Extension and Confederation West Extension's communications systems. DB Co shall provide personnel to coordinate (between operators and field personnel) and witness the test execution from the TOCC, MYCC, BYCC and BCC.

11.2 Systems Engineering and Integration Submittals

- (a) DB Co shall produce a Systems Engineering Management Plan, a Requirements Management Plan, a Verification and Validation Plan, a SIMP, and a preliminary Systems Interface Matrix and submit each within 60 calendar days following Commercial Close in accordance with Schedule 10 – Review Procedure.
- (b) The SIMP shall address the interface of the system with itself, the right-of-way and any infrastructure contained therein; any adjoining facilities; electric, telephone, gas and other Utilities; the water and sewer systems; Fire and Police Departments; and any facility which is used by or for the SI. The SIMP shall provide the procedure by which each interface will be defined, agreed upon and controlled. The SIMP shall contain a responsibility matrix identifying what entity is responsible for controlling the specific elements of the project. Updates to the SIMP shall be provided by DB Co when significant schedule or Project changes are made.
- (c) DB Co shall manage requirements throughout the Project using an object orientated requirements tool (e.g. DOORS), to ensure traceability of requirements from the source through to closure. DB Co shall make available to the City the output of the Requirements Management tool at design reviews and throughout the Project upon request.
- (d) DB Co shall coordinate and integrate all System interfaces so that the system is properly integrated with itself and into the Project area, including the right-of-way, the surrounding communities, and all facilities, equipment, and systems provided by others. This integration effort is critical to allow public and commerce activities to continue with minimal interruption throughout the construction, installation, testing, and commissioning phase of the Project.
- (e) The SIMP shall list all major System elements and define which elements have a direct or indirect interface or interaction. The SIMP shall, as a minimum, define:
 - (i) The entity within DB Co's organization responsible for managing and engineering the integration or interface

- (ii) The agreed integration or interface arrangement (physical installation, power supply, signal levels, transfer characteristics, and other factors)
- (iii) The functional, performance, Reliability, Maintainability, and Safety requirements of the individual elements forming the integration or interface
- (iv) The proposed method and schedule for verifying the interface integrity, the individual element performance, and the combined integration or system performance, with appropriate pass/fail criteria for each.
- (v) The main elements that will be demonstrated through integrated testing.

11.3 Interface Control Document

- (a) ICDs shall be developed and managed by DB Co. Contents in these ICDs will expand as interfaces are identified but it shall be maintained current throughout the Project Agreement period and included as design data at all design reviews. ICDs shall be subject to Configuration Management. DB Co shall be responsible for coordinating all aspects of the system design and the integration of the SI with all other Confederation Line systems and Subsystems as required including vehicles. The civil infrastructure shall be inclusive of the design of the stations, stops, Guideway (elevated, at grade exclusive & semi exclusive ROW), Tunnels, Bridges, viaducts, overpasses, underpasses, MSF and the TOCC.
- (b) A systems interface register shall be used to track each interface identified within the interface matrix and their relationships, bringing forth the issues that are critical to proper systems integration. The interface register shall be updated throughout the Project. Periodic reports shall be processed from the systems interface matrix and distributed for information.
- (c) DB Co shall be responsible for identifying and resolving all system interfaces which contribute to successful achievement of the overall system performance requirements or other Project Agreement requirements. A preliminary list of interfaces to be addressed includes:
 - (i) Track/Vehicle; Wheel/Rail;
 - (ii) Vehicle/Facilities;
 - (iii) Vehicle/Station Platform;
 - (iv) Vehicle/Train Control/Signaling;
 - (v) Vehicle/Wayside Communications;
 - (vi) Vehicle/Traction Power Supply;
 - (vii) Stations/Traction Power;

- (viii) Stations/Signaling;
 - (ix) Stations/Power;
 - (x) Stations/SCADA;
 - (xi) Stations/Track;
 - (xii) Stations/Fire detection and suppression;
 - (xiii) Stations/Communications;
 - (xiv) TOCC/BCC/Traction Power;
 - (xv) TOCC/BCC/Signaling & Train Control;
 - (xvi) TOCC/BCC/Power;
 - (xvii) TOCC/BCC/SCADA;
 - (xviii) TOCC/BCC/Fire detection and suppression;
 - (xix) TOCC/BCC/Communications;
 - (xx) MYCC/LMSF/BYCC Traction Power
 - (xxi) MYCC/LMSF/BYCC Signaling & Train Control
 - (xxii) MYCC/LMSF/BYCC SCADA
 - (xxiii) MYCC/LMSF/BYCC Fire Detection & Suppression
 - (xxiv) MYCC/LMSF/BYCC Communications
 - (xxv) Existing Systems/New Systems;
 - (xxvi) Corrosion Control/Wheel/Rail;
 - (xxvii) Train Control/Tunnel systems; and,
 - (xxviii) Train Control/Tunnel systems.
- (d) DB Co shall add other integration or interfaces as the design and system integration advances.
- (e) The following provide additional requirements for the Systems Integration Program:
- (i) DB Co shall be responsible for all facility and equipment redesign and rework, whether the impacted facility and equipment are the responsibility of DB Co or

others, or for modifying its Work or any DB Co provided Subsystem to match the facility, or for modifying any facility, systems, or Subsystems to match systems or Subsystems provided by DB Co. DB Co shall also be responsible for any delay to others caused by delaying the furnishing of information, by furnishing incorrect information, or by subsequently changing information for which DB Co is responsible. DB Co shall notify the City and any affected parties as soon as any interface information changes or is found to be incorrect.

- (f) DB Co and its representatives shall develop and finalize all interfaces as required. Updates of the SIMP shall be provided whenever significant changes are made to the Work or the Project Schedule.
- (g) This article provides a listing of the systems elements, the coordination required between these elements and the SI elements.
- (h) Design of all elements of the various system designs shall be developed to operate reliably in the environment in which they are installed. DB Co shall design all systems elements to integrate with the environmental conditions for Ottawa including ambient temperature range, humidity, precipitation and other environmental factors that will impact operation.
- (i) Failure to list interfaces between systems does not absolve DB Co of their responsibility for integration of the system.

11.4 Design and Coordination Elements

- (a) Preliminary listing of design elements and required coordination are provided below
 - (i) Revenue Vehicles
 - A. Typical coordination elements between the SI and the Vehicle are:
 - i. Vehicle dimensions shall be coordinated with the Guideway design;
 - ii. Vehicle weight shall be coordinated with the Guideway design and selected Vehicle;
 - iii. Guideway and alignment design shall be developed to meet the requirements of the braking and propulsion system;
 - iv. The City, or City Party, shall coordinate with the Vehicle manufacturer to ensure that any limitations (thermal or other) are consistent with Vehicle needs;
 - v. the system Track infrastructure design shall be coordinated with the Vehicle wheel/rail interface criteria;

- vi. pantograph/contact wire interface criteria shall be coordinated with the Guideway design, the OCS design and selected Vehicle;
- vii. Vehicle dynamic and static envelopes for Guideway clearances shall be coordinated with the Guideway design, SI design and selected Vehicle;
- viii. Vehicle to Platform interface including;
 - 1 Vehicle door threshold height above top of rail to Platform edge; and
 - 2 Platform lateral gap to Vehicle door threshold shall be provided for accessibility as well as to maximize station pass through speed;
- ix. coordination and integration of Vehicle borne elements of the communications and signals systems with the Vehicle supplier;
- x. The City designed onboard elements including S&TCS hardware and communication systems shall be EMC/EMI compliant with the Vehicle; and
- xi. Track Design shall coordinate with the Vehicle to ensure that noise and vibration requirements are in conformance with the existing Vehicles;

(ii) Traction Power Supply System

- A. DB Co shall coordinate the cable routing from the TPSS to the Tunnels and other Guideway segments, and provide pullboxes, switches and SCADA monitoring and control as follows:
 - i. positive cable routing;
 - ii. negative cable routing;
 - iii. communication cable routing; and,
 - iv. suitable electromagnetic segregation of cables in the duct bank and conduits.
- B. DB Co shall coordinate the following Traction Power System elements:
 - i. Traction Power requirements shall be coordinated with the Vehicle;

- ii. TPSS shall be designed to integrate within the right-of-way and surroundings including minimizing visual impacts along the alignment;
 - iii. coordinate with the local utilities to provide the necessary power feeds to the TPSS; and,
 - iv. DB Co shall ensure that the location of Traction Power disconnects and sectionalizing requirements are developed to support operational needs of the system;
 - C. The City shall integrate new equipment into the existing head-end to accommodate the new Traction Power SCADA System equipment.
- (iii) OCS
 - A. DB Co shall coordinate the OCS wire support system hardware, messenger wire, contact wire, feeder wire termination points and appropriate switchboxes including:
 - i. OCS foundation integration along the ROW;
 - ii. OCS electrical clearance requirements according to regulatory and industry standards;
 - iii. OCS mounting and support integration into the right-of-way to minimize visual impact and with necessary restrictions for Tunnel installation;
 - iv. messenger wire installation arrangements;
 - v. contact wire installation arrangements;
 - vi. disconnect/ bypass or isolation switches;
 - vii. OCS to Vehicle interface to include contact wire stagger and sweep to achieve uniform pantograph wear;
 - viii. OCS to Vehicle interface to conform to Vehicle wire height requirements, rate of OCS height change to ensure good contact and current collection; and,
 - ix. protection device coordination to minimize service disruption whilst optimizing life and equipment protection.
- (iv) Signals and Train Control System

- A. The City shall coordinate between the Systems elements and the Vehicle supplier for the on-board Vehicle interface design, spacing, mounting and functioning of system elements within the Vehicle.
 - B. The City shall coordinate the system elements and the Vehicle supplier for installation and commissioning of on- board equipment.
 - C. DB Co shall coordinate the integrated testing of equipped Vehicles in all types of ROW throughout the system.
 - D. DB Co shall coordinate the complete design, installation and integrated testing of the S&TCS for all interfaces associated with S&TCS, except as noted in Clauses 11.4 (a)(iv)A and 11.4 (a)(iv)B above.
- (v) Communications Systems
- A. DB Co shall coordinate the location and mounting of elements noted below, routing of cabling to each element, termination of cabling to each element, and routing to the main communications equipment either in an equipment room or cabinet including:
 - i. locations of communication duct bank and conduit interfaces to communication rooms/cabinets throughout Confederation Line;
 - ii. quantity and sizing of ducts within communications duct banks and conduits;
 - iii. location and quantity of pull boxes, manholes, and hand holes;
 - iv. CTS;
 - v. SCADA system elements;
 - vi. Fare Collection equipment;
 - vii. PA/PIDS;
 - viii. CCTV elements;
 - ix. Telephone system;
 - x. all communication systems control equipment;
 - xi. IAC System elements;
 - xii. Fire system elements;
 - xiii. GIDS elements;

- xiv. Radio repeater system equipment
 - xv. Cell coverage system equipment
 - xvi. Wi-Fi system equipment, and
 - xvii. Blue light station equipment
 - xviii. Locations, equipment connectivity, conduit routing and power provisions for fare collection equipment and cables provided by others.
- (vi) Trackwork
- A. The City shall coordinate the integration of the Track to meet the needs of the Confederation Line with the existing and new interface as well as with other elements including:
- i. Track form shall be developed to adhere to the requirements of the Vehicles;
 - ii. Track form shall be developed to comply with the noise and vibration requirements set out in Schedule 17 – Environmental Obligations;
 - iii. Track form shall be developed to integrate along the right of way and to maintain required clearances along the right of way considering;
 - 1 use of ballasted, direct fixation, embedded and other Track forms shall ensure that no unsafe condition exists due to physical interferences with required Vehicle clearances and surrounding infrastructure; and
 - 2 Track form shall be integrated with the provisions for Structures and Underground Structures;
 - iv. Civil and Infrastructure system elements to provide corrosion control and stray current mitigation along the corridor;
 - v. OCS pole spacing and positioning shall be dependent on Track alignment, Special Trackwork layout, Track construction type, intersection and Emergency Services access locations;
 - vi. bonding, insulated joint requirements, and associated cables, conduit, and duct banks shall be identified in conjunction with the S&TCS as well as the communication systems;

- vii. electrical design related to the location of powered wayside Track equipment and electrical outlets along the ROW to support Track maintenance activities;
- viii. wayside Track equipment includes switch machines, switch element heaters, switch blowers, rail lubricators, and associated cables, wires, conduit, and duct banks;
- ix. operational requirements to identify Special Trackwork locations and configuration, high rail wear locations and superelevation;
- x. civil, structural and geotechnical disciplines to determine Track drainage interface with municipal sewers, Track, roadway requirements, rail expansion accommodation and Emergency guard rail requirements on elevated structures, reinforcing steel requirements, Track foundation type and characteristics; and,
- xi. provisions for protection where required in areas of Special Trackwork to allow for Operators of short-turn or stored Trains, to disembark and walk to opposite end of Train, without facing Hazards of adjacent traffic and Train flow in opposite direction.

(vii) Corrosion Control System

- A. DB Co shall be responsible for development of an overall approach to corrosion control. DB Co shall coordinate corrosion control designs with the following:
 - i. Traction Power and Track systems to identify the location and typical arrangement for any corrosion control mitigation equipment;
 - ii. Utility Companies to identify sensitive utilities that may require relocation and/or protection;
 - iii. locations of monitoring and measuring points; and,
 - iv. stray current monitoring plan and system.

(viii) Non-Revenue Vehicles

- A. The City shall coordinate all Non-Revenue Vehicles with the following:
 - i. Non-Revenue Vehicle dimensions shall be coordinated with the Guideway design and selected Non-Revenue Vehicle type;
 - ii. Non-Revenue Vehicle weight shall be coordinated with the Guideway design and selected Non-Revenue Vehicle type;

- iii. the wheel/rail interface criteria shall be coordinated with the Guideway design and selected Non-Revenue Vehicle type;
 - iv. the pantograph/contact wire interface criteria shall be coordinated with the Guideway design, the OCS Design and selected Non-Revenue Vehicles;
 - v. Non-Revenue Vehicle dynamic and static envelopes for Guideway clearances shall be coordinated with the Guideway Design; and,
 - vi. Tunnel ventilation to accommodate requirements related to Non-Revenue Vehicle exhaust emissions.
- B. DB Co shall ensure that any trackside element placed within the trackway is designed to withstand the worst case loading of an Emergency vehicle;
- (ix) Tunnel Ventilation System
- A. DB Co shall coordinate the designs of the S&TCS, Traction Power System, and Tunnel ventilation system to support the Tunnel ventilation vent zone requirements in accordance with NFPA 130.

11.5 Systems Integration Manager

- (a) DB Co shall appoint a Systems Integration Manager to perform the systems integration obligations of DB Co. The Systems Integration Manager shall have the qualifications as set out in Schedule 9 – Key Individuals.

ARTICLE 12 ARTWORK

12.1 General Requirements

- (a) This article describes artwork that shall become part of the SI and outlines the process for the implementation of the Art Program.
- (b) The primary objective of the Art Program is to make the transit experience user-friendly, aesthetically pleasing and reflective of the communities serviced while fostering opportunities for creative collaboration between the artists, designers and community groups, creating a sense of local ownership.
- (c) The mandate of the Art Program shall comply with the City of Ottawa's Public Art Policy. The City of Ottawa's Public Art Policy is overseen and administered by the City of Ottawa Public Art Program Office.
- (d) The Art Program budget for Confederation Line shall be administered as the Art Cash Allowance in accordance with Project Agreement Section 11.30.
- (e) The scope of the Art Program generally includes but is not limited to the following types of artwork:
 - (i) Permanent integrated public art projects that form part of a Structure or landscape that is part of the transit system and permanent, non-integrated projects that do not form a physical part of a Structure or landscape and includes stand-alone art projects which can be fabricated independently. DB Co shall provide appropriate means of fabricating (optional) affixing and/or supporting stand-alone, non-integrated projects to allow the projects to be periodically rotated or changed; and,;
 - (ii) Temporary public art projects are original artworks by an artist created for a specific occasion, timeframe or event situated at a particular site on a temporary basis and may be periodically rotated or changed.
- (f) DB Co shall consult with the Federal Department of Canadian Heritage for artwork proposed to be located on Federal Lands.
- (g) DB Co shall fully install all art projects prior to Final Completion for Confederation Line East Extension and Confederation Line West Extension.
- (h) DB Co shall protect existing artwork located along the Transitway west of Tunney's Pasture Station in conformance with Good Industry Practice for art handling and conservation, such as practices published by Canadian Conservation Institute.
- (i) Artwork shall not interfere with Passenger flow and shall be planned and implemented in accordance with CPTED principles. DB Co shall include artwork in all Schedule 10 – Review Procedure submissions for Stations and Ancillary Facilities including drawings and reports.

- (j) Artwork installations shall meet property and Station maintenance demands, and reasonably anticipated exposure to weather conditions including but not limited to use of de-icing materials in winter.
- (i) Requirements for Maintenance and access of the Artwork as prescribed by the Artist shall be taken into consideration when determining the Artwork installation location during the design phase of the Project

12.2 Art Program Responsibilities

- (a) City responsibilities;
 - (i) Provide an Art Consultant to provide guidance to DB Co to ensure the City Public Art Policy is adhered to.
 - A. Develop a Public Art Plan and consult with DB Co on the implementation of the Public Art Plan. The Public Art Plan will include proposed transit sites (including Stations) to receive artwork, potential opportunities for public art, scope management and resources, general scope of work, preliminary budget allocations and implementation timelines. The Public Art Plan will be used to develop a City procurement process including a Request for Qualifications and Request for Proposals and guide the selection and evaluation of artist teams in accordance with the City Public Art Policy.
 - B. As appropriate, consult with the Federal Department of Canadian Heritage on artwork that is proposed to be located on federally owned lands.
 - C. Within four months of Commercial Close, and based on an RFQ process, shortlist artists/artist teams and lead a juried selection of three artists/artist teams that will enter into contract with DB Co.
 - D. Lead a community art social engagement process for the Byron Linear Park and Richmond Rd Complete Streets Initiative and coordinate artwork locations and technical review with DB Co.
 - (ii) In co-ordination with DB Co, manage the competition and selection process for artist teams for the artwork.
 - A. Public Art related community consultation, outreach and communications.
 - B. At the end of Project transition, including transfer of the ownership of artwork to the City Art Collection.
- (b) DB Co responsibilities;
 - (i) Retain an Art Manager with a minimum of 5 years' experience managing complex urban development projects that included an artwork program. The Art

Manager shall be a member of DB Co's design team and shall liaise with the Art Consultant throughout the Project.

- (ii) recognize and champion the importance of artistic excellence consistent with the standards and guidelines outlined in the Public Art Plan.
- (iii) work collaboratively with the artist/artist teams and ensure that they are recognized as equal members of the DB Co design team.
- (iv) adhere to the responsibilities as detailed in the Public Art Plan that include but are not limited to:
 - A. Ensure compliance with the City of Ottawa's Public Art Policy and the Public Art Plan;
 - B. Co-ordinate all aspects of DB Co's participation and deliverables of the Project artwork;
 - C. Act as the single point of contact with the City of Ottawa Public Art Program Office and liaise with stakeholders;
 - D. Ensure fair and equitable involvement of the Project artist teams, consistence with Good Industry Practice and artwork copyright and artist moral rights and provide support to and coordination of artists teams at all stages including concept design, pre-final design, final design, tender and construction, fabrication and installation as detailed in the Public Art Plan;
 - E. Co-ordinate review process at each stage for the Project public art, including but not limited to concept design, pre-final design, final design, and tender design packages for artwork and,
 - F. Meet regularly with, and provide project managements reports and documents in a timely manner, including financial reports as required, to the City Public Art Program Office.
- (v) Identification of locations suitable for the artwork installations in consultation with the City and the City's Art Consultant. Placement of artwork installations shall provide an integrated approach with the placement of landscape architecture, Station architecture, signage and wayfinding, advertising and fare media that provides functionality for each element and promotes a positive customer experience.
 - A. Identification of locations suitable for artwork to be provided by the City within Byron Linear Park and Richmond Road Complete Streets. Provide technical review of the proposed installation.
- (vi) Develop integrated art strategies for each of the three Station groupings including one on the Confederation Line East Extension and two on the Confederation West

Extension, including a project management plan, with construction schedule at a WSB 4 level of detail consistent with the approved budget available and the City's recommendations. DB Co shall provide appropriate means of affixing and/or supporting, and lighting any temporary artwork. At least three sites for temporary artwork shall be identified for temporary art projects (two on Confederation West Extension and one on Confederation East Extension. DB Co shall consider their Final Design Development submission of each artwork package as a binding submission and shall work with the City to incorporate the cost and scope of the artwork project fully into the Project Agreement.

- (vii) Provide input to the City with respect to the development of the terms of reference and the preparation of the RFP documents including but not limited to;
 - A. Provision of general commercial terms and conditions in the form of a template contract to be included in artist team selection Request for Proposal;
 - B. Deliverable requirements required by DB Co to implement the Artwork Program;
 - C. Schedule dates for artwork deliverables that co-ordinate with the DB Co. design and construction schedules;
 - D. Work collaboratively with the City with respect to the process to select and assign artist teams to specific locations with the transit system;
 - E. Provision of technical information, drawings and Design Criteria; and,
 - F. Other support for the artist team selection.
- (viii) Participate in the final artist selection jury and provide general support to the City in the final artist selection process including the assignment of artist teams to specific locations.
- (ix) Support the City in outreach and consultation as it relates to the Artwork Program.
- (x) Execution of agreements to retain the individual selected artist teams under standard terms and conditions.
- (xi) Once individual artist contracts have been executed, in collaboration with the artist, develop integrated art concepts for each Station consistent with the budget available for the incremental cost of each integrated project.
- (xii) Co-ordinate, integrate, deliver and install the Confederation Line artwork into the Project through the Art Cash Allowance outlined in Clause 12.3 below.
- (xiii) Work collaboratively with the City, the Art Consultant and the Artist to resolve any contractual issues.

- (xiv) Prepare the site and provide utilities to receive the artwork.
- (xv) As required, provide safe and efficient access by the artist teams (or the artist's sub-contractor) to the site of the artwork for the installation of any artwork.
- (xvi) Develop and execute a review process at each step as outlined in the Public Art Plan that includes review of the Artist's concepts and provide comments on constructability, suitability of materials, Safety, security, Maintainability, compliance with specified material standards, and design and construction costs of the artwork concepts.
- (xvii) Address any implications of the Artwork Projects across all design disciplines during the design, construction and implementation of the Project.
- (xviii) Confirm, at time of submission, in accordance with Schedule 10 – Review Procedure, the scope, budget and cost breakdown of each art concept to be implemented as part of the Art Program.
- (xix) Co-ordinate and attend meetings for artists and DB Co during design and implementation phases.
- (xx) Facilitate the resolution of aesthetic issues between the Artists, DB Co, and the City.
- (xxi) The substitution of standard architectural finishes in Stations in favour of the specified art projects designed by the artist.
- (xxii) Coordinate the integration of the art projects into the overall Station architectural finishes to ensure complete integration from a design, specification, tendering, material selection and construction perspective.
- (xxiii) Collaborate with the City, with respect to any sustainability/maintenance issues related to the fabrication, construction or integration of the artwork.
- (xxiv) Install stand-alone (non-integrated) public artwork and temporary public artwork including but not limited to the necessary base support structures to install artwork.
- (xxv) Install lighting to properly illuminate integrated, stand-alone (non-integrated) and temporary artwork, working in collaboration with the artist.
- (xxvi) Co-ordinate and integrate artwork provided by the City for the Byron Linear Park and Richmond Road Complete Streets.
- (xxvii) Materials purchased by DB Co shall, in respect of the cost, installation and/or fabrication of integrated artwork be of the quality identified and agreed upon by the City and the artist, both acting reasonably.

(c) Artist team responsibilities

- (i) Once the artists' teams have been selected, they shall join the DB Co teams as an integral member of the design team in all phases in the implementation of the public art project for the artist teams.
- (ii) Artist teams shall adhere to the responsibilities as set out in the Public Art Plan that include but are not limited to the following:
 - A. Participate in meetings with DB Co design staff, community stakeholders and committees as required.
 - B. Develop integrated art concepts such as drawings, 3-D models/maquettes and cost estimates for the transit Station and/or landscape public artwork for approval by the City in coordination with DB Co.
 - C. Meet and present preliminary art concept(s) for review at the Pre-Final Design Submission as outlined in Schedule 10 – Review Procedure.
 - D. Participate in preparation of, and present preliminary designs for review including preliminary cost estimates, material samples, fabrication and installation plan, and maintenance plan that demonstrates that each individual artwork concept is compliant with architectural finish materials specified by the City, in particular for integrated artwork, and is maintainable over the life of the art installation.
 - E. Work with the DB Co design team to refine and finalize the approved preliminary design including approved cost estimates, materials, and fabrication, installation and maintenance plans and schedule. Prepare any final drawings depicting both the fabrication and installation of public artworks for each site/Station area identified. The design shall fully depict the attachment/integration details to any site/Station component as jointly developed with DB Co. Artist teams shall be responsible for obtaining all required information for the preparation of the design including site measurements.
 - F. Provide any technical expertise required to deliver the final concept package.
 - G. Provide plaque text to accompany the artwork including translation in up to three languages.
 - H. Provide artwork documentation (both written and photographic).
 - I. Provide artwork maintenance manual.
 - J. Inspect and oversee the fabrication. If DB Co or the City request to inspect the public artworks, the artist shall coordinate such inspections.

- K. Supervise the integration and/or installation of the work by DB Co and support DB Co in a review of artwork installation.

12.3 Implementation of Art Cash Allowance

- (a) The Art Cash Allowance is intended to cover the cost to implement the Artwork over and above any credits for architectural and landscape treatments that would otherwise have been required. DB Co, and not the artist, shall be responsible for the production, review, signing and sealing of any and all engineering drawings required to implement artwork.
- (i) The substitution of standard architectural finishes at the site in favour of the specified art projects designed by the artist and the resulting delta or cost credit shall be applied to the Project to augment the art budget, supported by appropriate documentation as detailed in the Public Art Plan.
- (b) DB Co shall be responsible for certain aspects of the Art Program that are not eligible to be funded out of the Art Cash Allowance as outlined above. For clarity, this includes participation in technical review of artworks during the competition for artists prior to the selection jury, the provision of lighting, communications and the support structures to install the artwork, as well as engineering drawing production, review and sealing of engineering drawings, inspection and oversight.
- (c) Budget for all aspects of the procurement processes for the Artists and selected artwork associated with the Art Program including the supply and installation of the finished pieces shall not exceed the Art Cash Allowance as outlined in the Project Agreement.
- (d) This Art Cash Allowance is comprised of the following incremental costs to implement art over and above credits for standard Station finishes:
- (i) The artists' fees including the necessary design and production work to understand, develop and implement the art concept, consistent with the Public Art Plan;
- (ii) Fabrication of the Artwork;
- (iii) Provision of plaques and/or didactic signage with artist team statements for each Artwork;
- (iv) The cost to implement and install the specified integrated and non-integrated permanent, art projects, above and beyond any required support structures for the artwork;
- (v) The cost for the artist teams to prepare artwork submittals, develop drawings/specifications and input to tender packages in cooperation with DB Co to implement the art projects;
- (vi) The cost for the artist teams (or a subcontractor agreed to by the artist teams) to produce any artwork as part of the Construction Documents or as part of the

fabrication/installation of the artwork including the production of any prototypes that may be required to demonstrate the art concept;

- (vii) Except for the cost to affix/support and light temporary artwork, the City is responsible for the costs associated with the procurement process and fabrication of temporary artwork.
- (e) The Art Cash Allowance excludes and may not be used toward:
 - (i) Legal, accounting, professional or administrative time that may be required in administering contracts with the artists or integrating the art projects into the design of the Works;
 - (ii) Preparation of reports for Art Cash Allowance submissions;
 - (iii) Increased artist design fees due to re-work requested by DB Co;
 - (iv) Station renderings that incorporate artwork; and,
 - (v) Cost to design and construct supporting structures that are part of Station design and construction.

ARTICLE 13 CITY BRANDING INTEGRATION

13.1 General

- (a) DB Co shall be responsible for the integration of the City branding requirements with their design solutions for the Project not limited to but in accordance with the 2016 edition of the OC Transpo Visual Design Standards.

ARTICLE 14 DEMOLITION, REMOVALS AND DISPOSAL

14.1 General

- (a) DB Co shall demolish any buildings or other Structures on the Lands as required for construction and obtain all Permits, Licenses and Approvals required for demolition. All Demolition refuse and materials shall be the property of DB Co and DB Co shall dispose of all such refuse and materials in accordance with Applicable Law and leave the Lands in a clean and tidy condition upon completion of the Work.
- (b) Performance Criteria
 - (i) DB Co shall remove obstructions encountered in the construction of the Project elements that hinder the installation of said elements. Obstructions may include but are not limited to – pipes, conduits, ductbanks, foundations, debris, poles and any other object.
 - (ii) DB Co shall remove existing roadway and sidewalk pavements obstructing the construction of the Project. Use equipment and methods of removal and hauling which protect underlying Pavement or existing Pavement not designated for removal.
 - (iii) DB Co shall remove or relocate existing Utilities connected to buildings or other Structures being demolished including but not limited to – pipes, conduits, ductbanks, and overhead wires as per City standards.
 - (iv) DB Co shall submit a Demolition Plan covering all Works required by this Article in accordance with Schedule 10 – Review Procedure.
- (c) Specific Requirements
 - (i) Existing Transitway
 - A. Demolition of Transitway facilities and Transitway shall be coordinated such that no interruption to service is incurred until temporary facilities and detours are functional.
 - B. The existing Queensway Transitway Station shall be removed as per the following:
 - i. Removal of all existing features currently located at the Highway 417 WB level and at the existing Transitway level including reinstatement of area to match surrounding areas. Removal shall not affect the structural integrity of surrounding structures. Removal shall not affect the existing MUP.
 - ii. Removal shall not affect the use of the 417 EB Station Platform as an Emergency access point. Including preserving and protecting

- the elevator, stairs, electric room and electric service, plumbing and drainage.
- iii. Removal of footings/foundations to below frost level.
 - iv. Remove all utility services on site. Utilities shall be removed to the point of connection to the utility service in the ROW and capped in accordance with Utility requirements.
 - v. Remove existing ramps used to access the Transitway from the Highway 417 level. The Pavement structure and bedding shall be removed, subgrade scarified and regraded to maintain one drainage swale on the interior of the Transitway ramp. A minimum of 600 mm earth material, that shall sustain plant materials as described in Schedule 15-2, Part 6, Article 2 – Design Criteria, shall be installed.
 - vi. Reinstatement of area to match surrounding areas.
- C. The following Transitway Stations shall be completely removed or demolished:
- i. Dominion Station;
 - ii. Lincoln Fields Station;
 - iii. Iris Station;
 - iv. Pinecrest Station;
 - v. Jeanne D’Arc Station; and,
 - vi. Trim Station.
- D. The following Stations shall be selectively demolished and rehabilitated or renovated:
- i. Tunney’s Pasture Station;
 - ii. Westboro Station;
 - iii. Baseline Station;
- 1 Two lanes of the existing Transitway shall remain and the rest shall be removed between College Avenue and Navaho, and the existing bus staging area. The Pavement structure and bedding shall be removed, subgrade scarified and regraded to maintain one drainage swale on the interior

of the Transitway ramp. A minimum of 600mm earth material, that shall sustain plant materials as described in Schedule 15-2, Part 6, Article 2 – Design Criteria, shall be installed.

- iv. Bayshore Station; and,
 - v. Blair Station.
 - E. The demolition, selective demolition and or removals shall be coordinated with City for any salvageable materials that City may want to reuse elsewhere.
 - F. To the fullest extent possible, materials shall be recycled.
 - G. The reuse and re-cycle of material will be reflected in the goals and objectives of the Project Sustainability Plan and reported in the Sustainability Annual Report Card as detailed in Schedule 17, Part 3 – Environmental Management and Sustainability.
- (ii) Other specific Project Lands:
- A. Private properties being used for development that contain existing structures include:
 - i. [REDACTED];
 - ii. [REDACTED];
 - iii. [REDACTED];
 - iv. [REDACTED]; and,
 - v. [REDACTED].
 - B. DB Co shall perform removals and demolition as follows:
 - i. Completely remove all existing internal roadway, parking lots sidewalks and Pavement;
 - ii. Completely remove all Structures located on the site;
 - iii. Removal of structures shall include complete removal of all building foundations;
 - iv. Remove all utility services on site. Utilities shall be removed to the point of connection to the utility service in the ROW and capped in accordance with Utility requirements; and

- v. All materials shall be recycled to the fullest extent possible.
 - C. Prior to the Commencement Date, as defined in Schedule 20 – Lands, for [REDACTED], the City will demolish the existing building, will decommission the existing gasoline service station and will remediate soil and groundwater to MOECC Table 3 standards. Specifically, the City will excavate all soil with contaminant concentrations above standards for Residential / Parkland / Institutional Land Use on Parcel 1 of 18689-PRP_018. To the extent possible without disturbing existing Utilities, the City will excavate contaminated soils on Parcel 2, and will delineate the south end of the excavation with polyethylene sheeting. DB Co shall extend the excavation for the Guideway Tunnel north to the polyethylene sheeting, thereby removing and disposing of all remaining contaminated soil on Parcel 2. References to the PRP shall be the latest version as provided in Schedule 20 – Lands.
 - D. DB Co shall develop and implement a Remedial Action Plan for [REDACTED], as noted in Schedule 17, Article 4.5 (d) and Schedule 20 - Lands. DB Co shall perform all removals of contaminated soil and groundwater at [REDACTED] to achieve compliance for the entire property with the Table 3 Soil Standards for Coarse Textured Soils and Residential/Parkland/Institutional Property Use and the Table 3 Ground Water Standards for Coarse Textured Soils and All Types of Property Use provided in “Soil, Ground Water and Sediment Standards for Use under Part XV.1 of the Environmental Protection Act” dated April 15, 2011. Where remedial excavations approach private property boundaries, shoring and other means shall be taken to maximize removals for the purpose of achieving these standards. DB Co shall be prepared to excavate vertical side slopes to 11m depth, if necessary. Where remedial excavations approach City of Ottawa Right-of-Way, DB Co shall consult with City staff to coordinate removals, also for the purpose of achieving these standards. Verification sampling of excavation walls and floor shall conform to the requirements of O. Reg. 153/04 (Record of Site Condition – Part XV.1 of the Act), and where concentrations of contaminants of concern in the verification samples exceed the Table 3 standards, DB Co shall construct measures to prevent re-contamination of the property.
- (iii) Existing East Transitway Bridge (SN224880)
- A. The existing Transitway bridge over OR174 shall be removed as per the following:
 - i. The entire Structure shall be removed to frost depth.
 - ii. Regrade surrounding area. A minimum of 600mm earth material, that shall sustain plant materials as described in Schedule 15-2, Part 6, Article 2 – Design Criteria, shall be installed.

- (iv) [REDACTED] Pedestrian Bridge (SN018380)
 - A. The entire Structure shall be removed to frost depth.
- (v) SJAM Parkway Improvements
 - A. There are existing utilities within the limits of the SJAM Parkway Improvements limits of construction that shall be addressed as follows:
 - i. DB Co shall remove and not just cap all utilities that once facilitated the Transitway;
 - ii. DB Co shall cap all connections to the ORPP that are no longer required with the removal of the Transitway within the Project limits of construction at the ORPP and shall completely remove the remaining segments of each connections from the Transitway to the ORPP;
 - iii. DB Co shall examine all existing utilities that once facilitated the Transitway and also facilitate an area to remain to determine if rehabilitation is required and if rehabilitation is required outside the Project limits of construction notify the NCC of the existing utility that requires rehabilitation. DB Co shall not be responsible for any rehabilitation that may be required.
 - B. DB Co shall manage excavated materials in accordance with Schedule 17, Part 4. Soil quality information for some parts of SJAM Parkway is provided in [REDACTED].
- (vi) OR174 Concrete Slab
 - A. There is an existing composite Pavement structure on OR174 between Blair Road and Green's Creek. DB Co shall remove the existing composite Pavement structure and replace with an appropriate flexible Pavement as per Schedule 15-2, Part 2, Clause 6.11.
- (vii) Transitway pavement removal
 - A. DB Co shall remove the roads and parking lots associated with the existing Transitway that are no longer being used and are within the Lands but not within the proposed Guideway limits. The Pavement structure and bedding shall be removed and replaced with fill material that shall sustain plant materials as described in Schedule 15-2, Part 6, Article 2 – Design Criteria.
 - B. The removal of the existing Transitway shall not be completed until Revenue Service is completed and the Transitway is no longer required to be utilized by bus traffic.

- (d) All demolition shall be completed in accordance with City of Ottawa Design Standards.
- (e) The demolition, selective demolition and or removals shall be coordinated with applicable Governmental Authorities and/or the City for any salvageable materials that they may want to reuse elsewhere.
- (f) Materials
 - (i) DB Co shall dispose of all materials removed in accordance with City of Ottawa Standards, OPSS and applicable regulations.
 - (ii) DB Co shall manage hazardous materials in accordance with City of Ottawa Standards, OPSS and applicable regulations. DB Co shall not store materials on site without precautions to prevent adverse effects of adjacent watercourses, groundwater, the migration of materials offsite, nor allowing the development of a nuisance condition.
 - (iii) DB Co shall properly stockpile the materials resulting from removals and/or demolition by using separate stockpiles for waste materials and reusable or recyclable materials.
 - (iv) DB Co shall manage excavated materials in accordance with Schedule 17 – Environmental Obligations.
 - (v) DSS reports have been prepared for structures/facilities/properties that have been identified for removal. Refer to Schedule 17 – Environmental Obligations.

ARTICLE 15 NEW MUNICIPAL INFRASTRUCTURE

15.1 Responsibility for New Municipal Infrastructure

- (a) DB Co is responsible for the design and construction, including completion, Commissioning and testing, of any NMI.
- (b) NMI includes new City of Ottawa Infrastructure.
- (c) All design and construction in connection with the NMI to be constructed by DB Co shall incorporate the applicable design and construction standards, of the City.
- (d) All design and construction in connection with the NMI to be constructed by DB Co shall be subject to the Review Procedure as outlined in Schedule 10 – Review Procedure of the Project Agreement.
- (e) NMI shall be turned over to the City after the completion of the construction and Commissioning of NMI. NMI shall be subject to the warranty provision of the City of Ottawa Standard Tender Documents for Unit Price Contracts, Volume 1 and 2, including inspection requirements.

15.2 Design Standard

- (a) In addition to the City Standards identified in Schedule 15-1 – Technical Terms and Reference Documents, NMI shall be designed in accordance with the City of Ottawa Standard Tender Documents for Unit Price Contracts, Volume 1 and 2.
- (b) Where the design and construction of NMI includes material types and product types that are covered by the material specifications included in Volume 2 of the City of Ottawa Standard Tender Documents for Unit Price Contracts, only specific materials and products that are listed therein as approved shall be utilized in the Works.
- (c) Pavement Design for NMI shall be in accordance with Schedule 15-2, Part 2, Article 6 - Roadways, Bus Terminals and Lay-bys.

15.3 Record Drawings and As-built Drawings

- (a) Record Drawings and As-built Drawings for NMI or Third Party Infrastructure shall be completed and submitted in accordance with Article 16 – Record Drawings, of this Part 1.

15.4 Scope of Work

- (a) In general, the following types of assets shall be considered NMI.
 - (i) New retaining walls required for road construction and grading, and not associated with the Guideway.

- (ii) New watermains.
 - (iii) New street lights and illumination.
 - (iv) New storm and sanitary sewers.
 - (v) New traffic signals.
 - (vi) New Utilities.
 - (vii) New Culverts.
 - (viii) New roadways (Local, Provincial, Federal).
 - (ix) New bus terminals and connections, operator facilities, and PPUDO areas.
 - (x) New pedestrian connections (bridges) to Stations that don't exclusively provide access to a Fare-Paid Zone of the Station.
- (b) Any proposed Culverts, storm or sanitary sewers that exclusively serve the system and falls entirely within the Lands shall be considered SI.
- (c) The specific items that shall be included in the Work as NMI are included in Table 1-15.1 below.

Table 1-15.1 – NMI/Third Party Infrastructure

| Asset Name / Structure Number (if applicable) |
|--|
| New Woodroffe (Pinecrest Creek) Stormwater Management Pond (SWP) |
| West Transitway South Rock Wall (SN019991) W of Tunney's Pasture Station |
| West Transitway North Rock Wall (SN019992) W of Tunney's Pasture Station |
| West Nepean Collector |
| Ottawa River Parkway Pipe (ORPP) |
| Signalized pedestrian crossing at Rochester Field, including concrete approach slabs and unit paving |
| SJAM Parkway modifications and new traffic control signals at Kitchissippi Lookout and street lighting system |
| Modifications to SJAM Parkway westbound overpass structure at Westboro Beach, including electrical ducts for street lighting |
| Construction of new access to the existing parking area north/west of SJAM Parkway and Kitchissippi Lookout intersection |
| Construction of a new 4-lane SJAM Parkway between north of 30 Cleary Avenue to Dominion |
| |
| |
| Goldenrod Bridge Structure at Tunney's Pasture (SN016255) |

| Asset Name / Structure Number (if applicable) |
|---|
| W Twy - Ross Av O/P Transitway (SN016260) |
| W Twy - Northwestern Av O/P (SN016270) |
| W Twy - Carleton Av O/P (SN016330) |
| W Twy - Island Park Dr O/P (SN016280) |
| W Twy - Lanark AV O/P Transitway (SN016290) |
| Utility Hydro Bridge @ McRae over W Transitway (SN019890) |
| W Twy - Tweedsmuir Av O/P Transitway (SN016300) |
| W Twy - Athlone Av O/P Transitway (SN016310) |
| W Twy - Churchill Av O/P (SN016320) |
| W Twy - Roosevelt Av Ped Bridge O/P W Tway (SN018220) |
| SJAM Parkway at Carleton Avenue Pedestrian Overpass (North/South bridges) (SN018620 / 018621)(349969) |
| SJAM Parkway at Lanark Avenue Pedestrian Overpass (North/South bridges) (SN018610 / 018611)(349972) |
| SJAM Parkway at Churchill Avenue Pedestrian Overpass (SN018920) |
| SJAM Parkway at Cleary Avenue Pedestrian Overpass (SN018910) |
| Carling Avenue Bridge at Lincoln Fields Station (SN016070) |
| Pedestrian Bridge at [REDACTED] (SN018470) |
| Highway 417 Westbound Off-Ramp at Pinecrest Road (SN015160) |
| Highway 417 Westbound On-Ramp at Pinecrest Road (SN015170) |
| Pinecrest Road Bridge (SN015180) |
| W Twy - Bayshore Dr 417 WB Off Ramp O/P (SN116410) |
| W Twy (Ext) - Richmond Rd (West Section) O/P (SN116420) |
| Richmond Road O/P Bayshore Drive (SN116110) |
| W Twy (Ext) - Richmond Rd On Ramp O/P (SN116430) |
| Graham Creek Culvert (SN117440) |
| Highway 417 E-N/S Ramp at Moodie Drive (SN116390) |
| Highway 417 S-W On Ramp at Moodie Drive (SN116370) |
| Moodie Drive Bridge (SN116350) |
| Highway 417 Moodie Drive Underpass (SN114030) |
| Highway 417 N-W On-Ramp at Moodie Drive (SN116330) |
| SW Transitway U/P Queensway (SN014490) |
| Iris Street Bridge (SN015210) |
| Pinecrest Creek Culvert under Iris (SN018350) |
| SW Twy - Baseline Rd O/P Transitway (SN016080) |
| |

| Asset Name / Structure Number (if applicable) |
|---|
| E Twy - Blair Rd O/P Transitway (SN226780) |
| E Transitway - Hwy 174 WB Blair Rd Off-Ramp O/P Tway (SN226790) |
| Eastbound OR174 Bridge over Montreal Road (SN224851) |
| Westbound OR174 Bridge over Montreal Road (SN224850) |
| Green's Creek Culvert under OR174 (SN227110) |
| Green's Creek Pedestrian Bridge (SN221250) |
| Sir George-Etienne Cartier Parkway O/P Hwy 174 (SN224860) |
| Jeanne d'Arc Blvd O/P Hwy 174 (SN224870) |
| Orleans Blvd O/P Hwy 174 (SN224240) |
| Bilberry Creek Culvert under OR174 (SN224510) |
| Place d'Orléans Pedestrian Bridge over OR174 (SN228030) |
| Champlain St O/P Hwy 174 (SN224890) |
| Tenth Line Rd O/P Hwy 174 (SN894010) |
| Hwy 174 BCulvert OS Con 1 Lot 33 (SN894040) |
| Hwy 174 Taylor Creek BCulvert (SN894050) |
| Miscellaneous Culverts and Sewers: |
| - Transitway Culvert (T224630) |
| - Hwy 174 Culvert (A224700) |
| - Hwy 174 Culvert (A224720) |
| - OR174 Culvert (A220420) |
| - OR174 Culvert (A224810) |
| - OR174 Culvert (A224840) |
| - OR174 Culvert (A224820) |
| - OR174 Culvert (A224860) |
| - OR174 Culvert (A224880) |
| - OR174 Culvert (A224900) |
| - OR174 Culvert (A224902) |
| - OR174 Culvert (A224908) |
| - OR174 culvert (220660) |
| - OR174 Culvert (220670-1) |
| - OR174 Culvert (220670-2) |
| - OR174 Culvert (A224940) |
| - OR174 Culvert (A224950) |
| - Storm Sewer Outlet (STM79592) |

| Asset Name / Structure Number (if applicable) |
|---|
| - OR174 Culvert (A224960) |
| - OR174 Culvert (A224980) |
| - OR174 Culvert (A224985) |
| - OR174 Culvert (220690-1 and 220690-2) |
| - Storm Sewer Outlet (STM67980) |
| - OR174 Culvert (898510) |
| - OR174 Culvert (A894640) |
| - OR174 Culvert (A894680) |
| - OR174 Culvert (A898560) |
| - OR174 Median outlet (new) |

ARTICLE 16 RECORD DRAWINGS

16.1 General

- (a) The Design Team shall track and document all changes from the IFC drawings up to, and including, the preparation of the Record Drawings which shall be in accordance with Schedule 10 – Review Procedure. Record Drawings shall be prepared for all aspects of the Work, including SI, NMI and New MTO Infrastructure.
- (b) DB Co shall keep a record of the As-Built condition and the reasons for any changes from the IFC documents, including any necessary authorizations. Where the As-Built condition deviates from the IFC documents, but continues to meet the requirements of the Output Specifications, such that any changes fall within the design and specification tolerances and do not require engineering sign-off by the responsible engineer, DB Co shall ensure that the drawings are marked up with the relevant information required to represent the As-Built condition, highlighting the difference from the IFC documents. DB Co shall sign and seal the Record Drawings as required in Schedule 14 – Testing and Commissioning, and provide them as soon as possible and in any event no later than 60 calendar days after each applicable Substantial Completion.
- (c) Where changes in the As-Built condition mean that the constructed Works would no longer meet the specifications outlined in the Output Specifications or would require Design Data to demonstrate compliance with the Output Specifications, then the responsible engineer shall revise the IFC documents and submit the Design Data as a Construction Document Submittal in accordance with Schedule 10 – Review Procedure, and shall be subject to the requirements outlined in this Article 16.
- (d) DB Co shall provide Record Drawings for any NMI in accordance with the requirements of any third party owner of such New Municipal Infrastructure.
 - (i) In addition, for City water and sewer NMI, full scale copies of As-built Drawings shall be provided to the City at each New Municipal Infrastructure Component Acceptance Date.
- (e) Record Drawings for NMI shall be produced in accordance with the requirements of the CADD Standards Manual, prepared by the City.
- (f) Temporary Detour Routes/Work
 - (i) As constructed engineering design drawings prepared in accordance with City design standards for each closure, detour route, lane shift, and diversion, or modification thereof, carrying public traffic or transit vehicles and intended to be in service for longer than six months shall be submitted in accordance with Schedule 10 – Review Procedure prior to requesting authorization from the roadway authority for the closure and/or to utilize the detour route, lane shift or diversion or modified version thereof.

- (ii) As constructed engineering design drawings prepared in accordance with City design standards for each intersection with a new temporary or permanent traffic control signal, or modification to an existing temporary or permanent traffic control signal, shall be submitted in accordance with Schedule 10 – Review Procedure within 30 calendar days of the activation of the traffic control signal, or within 30 days of the modification being made.
- (g) DB Co shall provide Record Drawings for any SI in accordance with the requirements of this Part 1 and Schedule 14 – Testing and Commissioning. Record Drawings for SI shall be produced in accordance with the requirements of the [REDACTED] Confederation Line Drawing Standards.

ARTICLE 17 OPERATIONS TRAINING

17.1 Operations Training Curriculum and Materials

- (a) At the City's request, DB Co shall support the City in their review and update of operations training programs, including training curriculum and materials to ensure compatibility with any new SI. The review of the training curriculum and materials apply to programs currently in use by the City for the Existing Confederation Line or under development for the Confederation Line system. DB Co's support to updating the operations training programs shall be timely and in accordance with the City's schedule.
- (b) DB Co shall be responsible for submitting suggested modifications to the training programs to the City for review and approval a minimum 12 months prior to East Substantial Completion or West Substantial Completion, whichever is earliest. Any new technical systems which require training material shall be developed by DB Co, and be subject to the review provisions of this article.
- (c) During the 12 month interval between the submission of suggested modifications to existing training programs and East Substantial Completion or West Substantial Completion, whichever is earliest, the City shall review and incorporate accepted modifications into the respective training programs. In addition, DB Co shall abide by the provisions of Clause 1.5(d) of Schedule 14 – Testing and Commissioning. The review of the training curriculum and materials apply to programs provided by DB Co, in addition to those programs provided by OC Transpo Trainers.

17.2 Track Availability For Operator Training

- (a) Track access to the full Confederation Line Extension for Operator training and certification will be required in advance of Trial Running to ensure the requisite number of Operators are trained and certified on the System Infrastructure to support Trial Running and revenue service operation, as identified by the City. At a minimum:
 - (i) Confederation Line East Extension: Beginning 84 days prior to Substantial Completion, DB Co shall provide the City with a minimum of eight consecutive hours per day of full system access for Operator training and certification between 0600 and 2400 hrs (Monday – Saturday);
 - (ii) Confederation Line East Extension: Beginning 56 days prior to Substantial Completion, DB Co shall provide the City with a minimum 16 consecutive hours per day of full system access for Operator training and certification between 0700 and 2300 hrs (Monday – Saturday);
 - (iii) Confederation Line West Extension: Beginning 84 days prior to Substantial Completion, DB Co shall provide the City with a minimum of 10 consecutive hours per day of full system access for Operator training and certification between 0600 and 2400 hrs (Monday – Saturday);

- (iv) Confederation Line West Extension: Beginning 56 days prior to Substantial Completion, DB Co shall provide the City with a minimum 16 consecutive hours per day of full system access for operator training and certification between 0700 and 2300 hrs (Monday – Saturday);
 - (v) Operator training and certification shall be conducted utilizing a fully functional CBTC system on the Confederation Line Extension and fully upgraded and functional CBTC headend system in the TOCC/BCC, reflective of the new line segments for use by City Controllers; and,
 - (vi) The City shall require the use of up to eight Vehicles for Operator training and certification on both the Confederation Line East Extension and Confederation Line West Extension. Vehicles for Operator training and certification will be provided by the City/[REDACTED].
- (b) DB Co shall provide a minimum of three months' advance notice of when Track access will be available for commencement of Operator Training and certification on the Confederation Line Extension.
 - (c) DB Co shall develop a Track access permit process that allows the City access to the full Confederation Line Extension during referenced periods for Operator training and certification. DB Co shall work cooperatively with the City in the approval of Track access requests and issuance of Track access permits for Operator training and certification.

17.3 Operator Training Simulator

- (a) OC Transpo maintains an Operator training simulator for the Existing Confederation Line.
- (b) DB Co shall support the City in the update of the simulator for the Confederation Line East and West Extensions by collaboratively providing information requested by the City.
- (c) Requested Information may include, but is not limited to the following:
 - (i) Infrastructure-Related:
 - A. Tracks and ROW: drawings, Track charts, designs, maps;
 - B. Stations:
 - i. Design documents (2d/3d CAD maps / mass and sections);
 - ii. Accurate location of Platforms along the Tracks;
 - iii. Ground marks accurate location (if applicable);
 - iv. Furniture: design documentation; and,

- v. PID signs: accurate location along the Platforms.
 - (ii) Systems – Related:
 - A. Signals:
 - i. Accurate locations (along Tracks): signals, signs, other signaling elements.
 - B. TPSS:
 - i. Accurate locations.
- (d) For clarity, the City shall be responsible for updating the simulator. DB Co shall only responsible for providing the required information, working collaboratively and in good faith.
- (e) The requested information shall be provided nine months prior to the start of OC Transpo Operator Training.
- (f) DB Co shall be responsible for all costs associated with any translation from other Project documents, assembly, transfer of information, or any other efforts associated with supporting the City with the simulator update.

17.4 [REDACTED] Operational Training and Support Requirements

- (a) DB Co shall provide the following [REDACTED] operational training and support requirements:
 - (i) Update and provision of all [REDACTED] training material to support a rail controller train-the trainer model including: instructor notes, interim quizzes and tests; classroom presentation materials; key exercises for standard and degraded modes of operation; student reading materials and theory; and pool of final examination materials and questions;
 - (ii) One standard 80-hour [REDACTED] controller training course for pool of new rail controllers / superintendents;
 - (iii) One 40 hour [REDACTED] controller Train-the-trainer course to qualify the City's instructors with the ability to deliver the training;
 - (iv) [REDACTED] oversight of the City's instructor's first 80-hour training class of new rail controllers;
 - (v) Two weeks of on-site [REDACTED] control room support during launch of Confederation Line East: Monday – Friday, 04:00 – 12:00 (AM peak), and,

- (vi) Four weeks of on-site **[REDACTED]** control room support during launch of Confederation Line West: Monday – Friday, 04:00 – 12:00 (AM peak).

ARTICLE 18 REMAINING WORKS

- (a) The following items, detailed elsewhere in this Schedule 15-2 – Design and Construction Requirements, shall be considered Remaining Works and the completion date of these items shall be permitted to follow Substantial Completion of the Confederation Line East Extension and Confederation Line West Extension, as applicable.
 - (i) The full completion of the Richmond Road Complete Streets work as outlined in Schedule 15-2, Part 2 – Civil and Guideway and Part 6 - Urban Design, Landscape Architecture and Connectivity Requirements.
 - (ii) Landscaping work at Dominion Station, Iris Station and the reinstatement of the existing Transitway in the vicinity of Lincoln Field Station, as outlined Article 14 – Demolition, Removals and Disposal, of this Part 1 and in Schedule 15-2, Part 6 - Urban Design, Landscape Architecture and Connectivity Requirements.
 - (iii) Work required for the implementation of the Tunney’s Pasture Station design solution as outlined in Schedule 15-2, Part 4, Clause 3.1 (a).
 - (iv) The reinstatement/removal of the infrastructure required for the implementation of the Transitway detours as outlined in Schedule 15-2, Part 7, Clauses 3.6 through 3.15.
 - (v) The reconfiguration of the traffic lanes on OR174 after the removal of buses from the bus only lanes and the layout of the planned traffic lanes as outlined in Schedule 15-2, Part 2, Clause 6.19 (a).

**ARTICLE 19 DESCRIPTION OF CONFEDERATION LINE WEST, CONFEDERATION
LINE EAST AND HIGHWAY WORKS**

19.1 Description of Confederation Line West Extension (West Works)

- (a) The West Works shall involve completion of all components and systems necessary to independently run Revenue Vehicles between Tunney's Pasture Station to Baseline Station and Moodie Station, excluding Train Control and final Systems Integration. These works shall include, but not be limited to, all Guideway, Track, grading, drainage, Structures, landscaping, SWM, Utilities, geotechnical works, electrical works, environmental works, facilities, Traction Power, communications, corrosion control, OCS, signaling, LMSF, Tunnels, Tunnel ventilation, retaining walls and roadworks.
- (b) As a minimum, West Works shall include all Works in respect of:
 - (i) Stations at the following locations:
 - A. Westboro Station;
 - B. Dominion Station;
 - C. Cleary Station;
 - D. New Orchard Station;
 - E. Lincoln Fields Station;
 - F. Queensview Station;
 - G. Pinecrest Station;
 - H. Bayshore Station;
 - I. Moodie Station;
 - J. Iris Station; and,
 - K. Baseline Station.
 - (ii) Structures at the following locations:
 - A. Goldenrod Bridge Structure at Tunney's Pasture;
 - B. U Approach – Depressed Guideway Parkway East Portal;
 - C. U Approach – Depressed Guideway Parkway West Portal;
 - D. SJAM Parkway at Churchill Avenue Pedestrian Overpass;

- E. SJAM Parkway at Cleary Avenue Pedestrian Overpass;
- F. U Approach - Depressed Guideway Connaught East Portal;
- G. U Approach - Depressed Guideway Connaught West Portal;
- H. Carling Avenue Bridge;
- I. Pedestrian Bridge at [REDACTED];
- J. Lincoln Fields Split Structure;
- K. Pedestrian Bridge at Queensview Station;
- L. Holly Acres Bridge;
- M. Iris Street Bridge;
- N. Pinecrest Creek Culvert under Iris;
- O. Pinecrest Creek Culvert under Alignment;
- P. Roosevelt Pedestrian Bridge; and,
- Q. Baseline Station Pedestrian Bridge.

(iii) Cut and cover tunnel elements at the following locations:

- A. SJAM Parkway & Richmond Tunnel – New LRT tunnel that commences at east portal adjacent to Rochester Field and emerges at west portal located between Richmond Road and Lincoln Fields Station. The tunnel traverses underneath the SJAM, Richmond Road and Byron Linear Park with direct connection to two underground stations; Cleary and New Orchard Station. Approximate length 2,900m
- B. Connaught Tunnel – New LRT tunnel that traverses under Connaught Avenue Approximate length 380m
- C. HWY 417 E-NS Pinecrest Road Ramp Tunnel – New LRT tunnel that traverses under HWY 417 E-NS Pinecrest Road Ramp. Approximate length 100m

(iv) Roadwork:

- A. Richmond Road – reconstruction of Richmond Road between Redwood Avenue and Edgeworth Avenue.

- B. Realignment of the SJAM Parkway between Dominion Station and Cleary Avenue.
- C. Reconfiguration of the Hwy 417/Pinecrest Road Interchange ramps including N-W, S-W and E-N/S.
- (v) Storm Water Management:
 - A. Pinecrest Stormwater Management Facility
- (vi) LMSF:
 - A. An LMSF for approximately 34 vehicles in 2023 on a site to be determined by the Moodie LRT EA currently underway.

19.2 Description of Confederation Line East Extension (East Works)

- (a) The East Works shall involve completion of all components and systems necessary to independently run Revenue Vehicles between Blair Station and Trim Station, excluding Train Control and final Systems Integration. These works shall include, but not be limited to, all Guideway, Track, grading, drainage, Structures, landscaping, SWM, Utilities, geotechnical works, electrical works, environmental works, facilities, Traction Power, communications, corrosion control, OCS, signaling, retaining walls and roadworks.
- (b) As a minimum, East Works shall include all Works in respect of:
 - (i) Stations at the following locations:
 - A. Montreal Road Station;
 - B. Jeanne d'Arc Station;
 - C. Orleans Boulevard Station;
 - D. Place d'Orléans Station;
 - E. Trim Road Station; and,
 - F. Protection for future stations Gloucester High School, Orléans Town Centre and Tenth Line Road.
 - (ii) Structures at the following locations:
 - A. Montreal Road Flyover;
 - B. Westbound OR174 Bridge over Montreal Road;
 - C. Montreal Road Station Bridge;

- D. Eastbound OR174 Bridge over Montreal Road;
 - E. Greens Creek structure under OR 174; and,
 - F. Pedestrian Bridge at Trim Station.
- (iii) Roadwork:
- A. Widening of OR174 at Montreal Road to accommodate new Montreal Road Station structure in median;
 - B. Reconfiguration of OR 174/Montreal Road interchange ramps to accommodate widening;
 - C. Reconfiguration of westbound ramps at Jeanne d'Arc Boulevard to accommodate station entrance requirements;
 - D. Widening of the OR174 median from east of Blair Road to east of Montreal Road to accommodate median LRT as well as some localized median widening at some station locations;
 - E. Construction of new Trim Road/OR174 interchange including localized road reconfigurations to accommodate; and,
 - F. Culvert replacements/rehabilitations along OR174 and ramps.

19.3 Description of Highway Works

- (a) Highway Works shall involve completion of the prescribed Highway Works at the prescribed locations below. Within the prescribed locations, these works shall include, but not be limited to, grading, drainage, Structures, landscaping, Utilities, geotechnical works, electrical works, environmental works, retaining walls, roadworks and signage.
- (b) As a minimum, Highway Works shall all include:
 - (i) Construct retaining walls within the limits of the Highway 417 ROW where deemed necessary, and to facilitate the reconfigured ramps N-W, S-W and E-N/S at Pinecrest Road and the reconfigured Holly Acres N/S-W ramp.
 - (ii) Replace and/or install new Drainage features, as required along the reconfigured ramps N-W, S-W, and E-N/S at Pinecrest Road and the reconfigured Holly Acres N/S-W ramp.
 - (iii) Replacement of existing or new overhead sign structures, signage and required appurtenances, deemed necessary for the reconfigured ramp E-N/S at Pinecrest Road, the reconfigured Holly Acres N/S-W ramp, and any that are in conflict with the new Pedestrian Bridge at Queensview Station.

- (iv) Replacement/and/or relocation of ramp light and illumination features and appurtenances, as required at the reconfigured ramps N-W, S-W and E-N/S at Pinecrest Road and the reconfigured Holly Acres N/S-W ramp.
- (v) Replacement of required highway signage and roadside Safety equipment, as required.
- (vi) Install new sidewalk and parapet wall on the west side of Moodie Drive including the sidewalk connections along the north and south approaches to the ramp terminals.
- (vii) Structures at the following locations:
 - A. Highway 417 Westbound Off-Ramp at Pinecrest Road;
 - B. Highway 417 Westbound On-Ramp at Pinecrest Road;
 - C. Pinecrest Road Bridge;
 - D. Graham Creek south extension to facilitate Temporary Transitway detour if warranted by Transitway operation performance specifications;
 - E. Highway 417 S-W On-Ramp at Moodie Drive;
 - F. Moodie Drive Bridge over Highway 417;
 - G. Highway 417 N-W On-Ramp at Moodie Drive; and,
 - H. Overhead Sign Supports where required.

APPENDIX A

Proposed Design Criteria for the Roadway Improvements in OLRT - Stage 2

| Table 1 - Confederation Line West Design Criteria | | | | | |
|--|--|--|--|--|---|
| Criteria Description | Richmond Road (McEwen Ave. to Cleary Ave.) | SJAM Parkway (West of Cleary Ave. to east of Dominion Ave.) | SJAM Parkway (Profile modification at Churchill Ave.) | SJAM Parkway (At Kitchissippi Lookout Intersection) | Goldenrod Driveway (Yarrow Drwy. to Scott St.) |
| Road Classification ¹ | UAU | UAD | UAD | UAD | ULU |
| Posted Speed (km/hr) ² | 50 | 50 | 50 | 50 | 40 |
| Design Speed (km/hr) | 60 | 60 | 60 | 60 | 50 |
| Basic Lanes | 2 | 4 | 4 | 4 | 2 |
| Minimum Radius (m) ³ | 530 | As Per Appendix C | As Per Appendix C ⁴ | 130 | 90 |
| Min. K Factor Sag ⁵ | 9 | As Per Appendix C | As Per Appendix C | 9 | 6 |
| Min. K Factor Crest | 13 | As Per Appendix C | As Per Appendix C | 13 | 7 |
| Max. Grade (%) ⁶ | 5% | 3% ⁷ | 3% ⁷ | 3% ⁷ | 5% |
| Max. Superelevation (%) ⁸ | 4% | 4% | 4% | 4% | NC |
| Minimum S.S.D. (m) ⁹ | As Per TAC | As Per TAC | As Per TAC | As Per TAC | As Per TAC |
| Minimum D.S.D. (m) ¹⁰ | As Per TAC | As Per TAC | As Per TAC | As Per TAC | As Per TAC |
| Lane Width (m) ¹¹ | 3.5 | 3.5 | 3.5 | 3.5 - 3.7 | 3.5 – 3.75 |
| Aux. Lane Width (m) ¹² | 3.3 | N/A | N/A | 3.5 | 3.5 |
| Sidewalk Width (m) | 2.0 - 3.0 ^{13, 14} | N/A | N/A | N/A | 2.0 |
| Boulevard Width (m) | 0.6 – 1.2 ¹⁵ | N/A | N/A | N/A | N/A |
| Shoulder (m) ¹⁶ | N/A | N/A | N/A | N/A | N/A |
| Bike Lane(m) ¹⁷ | 2.0 - 3.0 ^{18, 19} | N/A | N/A | N/A | 1.8 |
| Median Width (m) | 1.0 | Varies (Min. 5.0) ²⁰ | Varies (Min. 7.5) ²¹ | Varies (Min. 1.5) | N/A |
| Side Slope / Back Slope | As Per TAC | 6:1 | 2:1 (Min.) ²² | 6:1 | As Per TAC |
| Design Vehicle(s) ²³ | WB-20, A-Bus and Emergency Vehicles | MSU, A-Bus and Emergency Vehicles | MSU, A-Bus and Emergency Vehicles | MSU, Maintenance and Emergency Vehicles | A-Bus and Emergency Vehicles |
| Two-Way AADT (vehicles/day) ²⁴ | E. of Woodroffe = 15,300 W. of Woodroffe = 19,200 (1-Dec-2016) | 40,600 (8-Dec-2015) | 20,450 (3-Jul-2015) | 20,450 (3-Jul-2015) | |
| 8 Hour Heavy Vehicle % ^{24, 25} | E. of Woodroffe = 6.1% W. of Woodroffe = 5.7% | 14.4% ²⁶ | 0.2% ²⁶ | 0.2% ²⁶ | |
| Traffic Growth Rate Assumption ^{27, 28, 29} | 0% | 0% | 0% | 0% | |

Table 1 - Confederation Line West Design Criteria Cont'd

| Criteria Description | Carling Avenue (SJAMP ramp terminals to Edgeworth Ave.) | Iris Street (Parkway Dr. to Adirondack Dr.) | Scott Street (Ross Ave. to Caroline Ave.) | Corkstown Road (Moodie Dr. to Abbott Point of Care Access) | |
|--|--|--|--|---|--|
| Road Classification ¹ | UAD | UCU | UAU | UCU | |
| Posted Speed (km/hr) ² | 60 | 50 | 50 | 40 | |
| Design Speed (km/hr) | 80 | 60 | 60 | 50 | |
| Basic Lanes | 5 | 2 | 3 ³⁰ | 1 | |
| Minimum Radius (m) ³ | Tangent | 1290 | 150 | As Per TAC | |
| Min. K Factor Sag ⁵ | 16 | 9 | 9 | As Per TAC | |
| Min. K Factor Crest | 36 | 11 | 13 | As Per TAC | |
| Max. Grade (%) ⁶ | 5% | 5% ³¹ | 5% | 5% ³² | |
| Max. Superelevation (%) ⁸ | NC | NC | 4% | RC ³³ | |
| Minimum S.S.D. (m) ⁹ | As Per TAC | As Per TAC | As Per TAC | As Per TAC | |
| Minimum D.S.D. (m) ¹⁰ | As Per TAC | As Per TAC | As Per TAC | As Per TAC | |
| Lane Width (m) ¹¹ | 3.3 – 4.0 | 5.5 ³⁴ | 3.5 | 3.5 – 4.8 ³⁵ | |
| Aux. Lane Width (m) ¹² | 3.5 | 2.6 ³⁶ | 3.5 | N/A | |
| Sidewalk Width (m) | 2.0 ³⁷ | 2.0 - 3.0 ³⁸ | 1.8 | 3.0 ³⁹ | |
| Boulevard Width (m) | N/A | N/A | N/A | N/A | |
| Shoulder (m) ¹⁶ | N/A | N/A | N/A | As Per TAC | |
| Bike Lane(m) ¹⁷ | 1.8 ³⁷ | N/A | 1.8 ⁴⁰ | N/A | |
| Median Width (m) | Varies | N/A | N/A | N/A | |
| Side Slope / Back Slope | As Per TAC | As Per TAC | As Per TAC | As Per TAC | |
| Design Vehicle(s) ²³ | WB-20, A-Bus and Emergency Vehicles | WB-20, A-Bus and Emergency Vehicles | WB-20, A-Bus and Emergency Vehicles | A-Bus and Emergency Vehicles | |
| Two-Way AADT (vehicles/day) ²⁴ | 31,150 (17-June-2015) | 4,600 (2-July-2015) | 12,250 (22-Sept-2015) | 2900 (4-July-2016) | |
| 8 Hour Heavy Vehicle % ^{24, 25} | 2.3% | 0.7% | 4.4% | 2% | |
| Traffic Growth Rate Assumption ^{27, 28, 29} | 0% | 0% | 0% | 0 | |

Table 1 - Confederation Line East Design Criteria

| Criteria Description | OR174 (Blair Rd to Trim Rd.) | Blair Road (B/w OR174 off ramp terminals) ⁴¹ | Trim Road (Trim Park and Ride West Access/ Egress to south of Dairy Dr.) (Existing) | Trim Road (B/w to Jeanne d'Arc Blvd N. (Realigned) | |
|--|--|---|--|--|--|
| Road Classification ¹ | RFD | UAU | UAU | UAU | |
| Posted Speed (km/hr) ² | 100 | 70 | 50 | 50 | |
| Design Speed (km/hr) | 120 | 80 | 60 | 60 | |
| Basic Lanes | Refer to Table 3 | 4 | 4 | 2/3 ⁴² | |
| Minimum Radius (m) ³ | 650 ⁴³ | As per TAC | Existing | As per TAC | |
| Min. K Factor Sag ⁵ | 62 | As per TAC | As per TAC | As per TAC | |
| Min. K Factor Crest | 66.5 | As per TAC | As per TAC | As per TAC | |
| Max. Grade (%) ⁶ | 3.0% ⁴⁴ | As per TAC | 5% | 5% | |
| Max. Superelevation (%) ⁸ | 6% | As per TAC | Existing | 4% | |
| Minimum S.S.D. (m) ⁹ | As Per MTO | As Per TAC | As Per TAC | As per TAC | |
| Minimum D.S.D. (m) ¹⁰ | As Per MTO ⁴⁵ | As Per TAC | As Per TAC | As per TAC | |
| Lane Width (m) ¹¹ | 3.75 - 4.75 ⁴⁶ | 3.5 | 3.5 | 3.5 | |
| Aux. Lane Width (m) ¹² | 3.5 | 3.5 | 3.5 | 3.5 | |
| Sidewalk Width (m) | N/A | N/A | 2.0 ⁴⁷ | 3.0 ⁴⁸ | |
| Boulevard Width (m) | N/A | N/A | 0.6 | N/A | |
| Shoulder (m) ¹⁶ | 3.0 LT / 3.0 RT ⁴⁹ | N/A | N/A | N/A | |
| Bike Lane(m) ¹⁷ | N/A | 1.5 | 1.8 ⁵⁰ | N/A | |
| Median Width (m) | Varies | N/A | Existing | 1.5 ⁵¹ | |
| Side Slope / Back Slope | As Per TAC | As Per TAC | As Per TAC | As Per TAC | |
| Design Vehicle(s) ²³ | WB-20 | WB-20, A-Bus and Emergency Vehicles | WB-20, A-Bus and Emergency Vehicles | WB-20, A-Bus and Emergency Vehicles | |
| Two-Way AADT (vehicles/day) ²⁴ | Montreal to Champlain = 71,400 (June-2016) Champlain to Trim = 26,200 (June-2012) | 37,550 (Dec-2014) | S. of OR174 = 13,300 (Jun-2012) N. of Dairy Rd. = 15,250 (Jun-2012) | Same as Trim Road (Existing). | |
| 8 Hour Heavy Vehicle % ^{24, 25} | Montreal to Champlain = 12% Champlain to Trim = 6% | 2.6% | 7.6% (Jun-2012) 4.6% (Jun-2012) | Same as Trim Road (Existing). | |
| Traffic Growth Rate Assumption ^{27, 28, 29} | 1% | 2% | 2% ⁵² | Same as Trim Road (Existing). | |

Table 1 - Confederation Line East Design Criteria

| Criteria Description | Montreal Road (B/w Shefford Rd. to OR174 WB Off Ramp Signal) | Montreal Road (B/w OR174 EB Off Ramp Signal to Tie-In Point) | Montreal Road (B/w OR174 on ramp terminals) | | |
|--|---|---|--|--|--|
| Road Classification ¹ | UAD | UAU | UAD | | |
| Posted Speed (km/hr) ² | 60 | 60 | 60 | | |
| Design Speed (km/hr) | 80 | 80 | 80 | | |
| Basic Lanes | 4 | 4 | 6 (including bus lanes) | | |
| Minimum Radius (m) ³ | N/A | N/A | N/A | | |
| Min. K Factor Sag ⁵ | 22 | 22 | 22 | | |
| Min. K Factor Crest | 35 | 35 | 35 | | |
| Max. Grade (%) ⁶ | 5% | 5% | 5% | | |
| Max. Superelevation (%) ⁸ | NC | NC | NC | | |
| Minimum S.S.D. (m) ⁹ | As Per TAC | As Per TAC | As Per TAC | | |
| Minimum D.S.D. (m) ¹⁰ | As Per TAC | As Per TAC | As Per TAC | | |
| Lane Width (m) ¹¹ | 3.5 – 3.75 ⁵³ | 3.5 – 3.75 ⁵³ | 3.5 – 3.75 ⁵⁴ | | |
| Aux. Lane Width (m) ¹² | N/A | N/A | N/A | | |
| Sidewalk Width (m) | 2.5 | 2.5 | 2.0 ⁵⁵ | | |
| Boulevard Width (m) | N/A | N/A | 0.5 | | |
| Shoulder (m) ¹⁶ | N/A | N/A | N/A | | |
| Bike Lane(m) ¹⁷ | 1.5 | 1.5 | 1.5 ⁵⁶ | | |
| Median Width (m) | Varies | Varies | 1.5 | | |
| Side Slope / Back Slope | As Per TAC | As Per TAC | As Per TAC | | |
| Design Vehicle(s) ²³ | WB-20, A-Bus and Emergency Vehicles | WB-20, A-Bus and Emergency Vehicles | WB-20, A-Bus and Emergency Vehicles | | |
| Two-Way AADT (vehicles/day) ²⁴ | 26,500 (Jan-2015) | 26,500 (Jan-2015) | 26,500 (Jan-2015) | | |
| 8 Hour Heavy Vehicle % ^{24, 25} | 3.8% | 3.8% | 3.8% | | |
| Traffic Growth Rate Assumption ^{27, 28, 29} | 1% | 1% | 1% | | |

- ¹ Roadway classifications are identified in the City of Ottawa Official Plan – Schedule E. DB Co shall confirm all roadway classifications with the City of Ottawa.
- ² All posted speed limits and advisory speed signs shall be maintained for all design elements.
- ³ Minimum radius corresponds to maximum superelevation values for road classification and design speed.
- ⁴ The minimum radius and K factors (sag and crest) for the eastbound lanes shall be per the requirements of Schedule 15-2, Part 2, Appendix C. For the westbound lanes, the minimum radius shall be 220m, including associated spiral parameters as necessary, to feasibly tie into existing conditions at the limits of construction. The minimum K factors (sag and crest) for the westbound lane shall meet the requirements of the TAC GDGCR.
- ⁵ The minimum K factor for sag vertical curves shall meet the minimum comfort controls based on the presence of illumination.
- ⁶ Maximum longitudinal grade assumes a rolling terrain, unless otherwise specified.
- ⁷ NCC requirements for longitudinal grades shall not exceed 3%.
- ⁸ Maximum roadway superelevation corresponds to road classification (L – Local, C – Collector, A – Arterial, F – Freeway). NC denotes normal crown. RC denotes reverse crown.
- ⁹ The stopping sight distance parameters referenced as per TAC GDGCR, or MTO GDSOH, are minimum typical values. Additional sight distance may be required under certain constrained conditions. In all cases, DB Co's design shall meet the requirements of Schedule 15-2, Part 2, Clause 6.5.
- ¹⁰ Minimum decision sight distances shall be based on Avoidance Manoeuvre E, unless otherwise specified.
- ¹¹ General lane width requirements shall meet the minimum lane widths as prescribed in the Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads based on the corresponding road classification. For Roadways with a design speed less than 60km/h or less, the median lane width shall be a minimum of 3.25m wide.
- ¹² Auxiliary lanes with high transit volumes shall be a minimum of 3.5m.
- ¹³ DB Co shall design and construct pedestrian facilities to have a standard width of 3.0m. Only under constrained conditions, where the available right-of-way limits the width of the pedestrian facilities (i.e. bus stop locations), may DB Co reduce the pedestrian facilities to a minimum width of 2.0m. DB Co's geometric design shall satisfy the minimum design criteria requirements for Richmond Road and maximize the space available for the Byron Linear Park improvements of Schedule 15-2, Part 6 – Urban Design, Landscape Architecture and Connectivity Requirements, such that the cross sectional elements, including but not limited to 3.0m sidewalk on the north side of Richmond Road, are not compromised for the inclusion of street furniture and other streetscaping features (trees, municipal infrastructure (i.e. hydrants)). Side streets sidewalk connections shall be between 1.8m – 2.0m wide.
- ¹⁴ DB Co shall provide a typical 300mm wide delineator strip to segregate adjacent pedestrian and cycling facilities. A 200mm wide delineator strip will be accepted only under constrained conditions, where the available right-of-way is limited.
- ¹⁵ The boulevard on the north and south side of Richmond Road shall be 0.75m and 0.60m wide, respectively. These represent the absolute minimum design values in constrained conditions. Typical boulevard widths shall be minimum 1.2m, where applicable.
- ¹⁶ All shoulders shall be paved to meet the City's Standard Tender Package Standard Detail Drawings and Specifications.
- ¹⁷ Cycling facilities shall be a minimum of 1.5m. The type of bike lane facility (on-road, shared, raised cycle track, paved shoulder) are to be confirmed by DB Co with the City of Ottawa.
- ¹⁸ Cycling facility for this roadway segment has been considered as a raised cycle track.
- ¹⁹ 3.0m wide cycling facilities shall accommodate bi-directional cycling lanes.
- ²⁰ The minimum 5.0m wide median was developed to accommodate a median bioswale.

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- ²¹ The minimum 7.5m wide median width has been measured between opposing edge of inside (median) lanes.
- ²² For side slope/ back slopes steeper than 3:1, the warrant for roadside safety measures shall be assessed per the MTO Roadside Safety Manual.
- ²³ All A-Bus and B-12 design transit vehicles shall meet the dimensions and specifications per OC Transpo's transit vehicle fleet as per the requirements of Schedule 15-2, Part 2, Clause 6.9(c)(vi).
- ²⁴ Traffic information (AADT and Heavy Truck %) based on 8-hour turning movement counts provided by the City of Ottawa.
- ²⁵ For the purpose of pavement design of all Roadways, DB Co shall assume 2% as the minimum percentage of heavy vehicles to be applied on all non-truck routes even though a lower percentage is specified in the Design Criteria Table.
- ²⁶ The proposed SJAM corridors will not need to accommodate the bus rapid transit service ultimately, in the post construction or post commissioning stage. Buses only need to be accommodated on the SJAM corridor during the temporary conditions, or staged construction.
- ²⁷ Traffic growth rates are based on 'EMME' model outputs comparing 2011 and 2031 volumes provided by the City of Ottawa.
- ²⁸ Traffic projection horizon shall be year 2031 for all transportation impact assessments and traffic and transit analysis studies, unless otherwise noted.
- ²⁹ For the purpose of determining projected traffic volumes in traffic and transit analysis, DB Co shall reference the traffic growth rates specified in the design criteria, accordingly. Where the growth rates are used for the purpose of calculating pavement design requirements, DB Co shall use a minimum of 1.0% or the traffic growth rates specified in the design criteria, whichever is greater.
- ³⁰ Proposed Improvements on Scott Street involves widening the existing pavement to the north side so that Scott Street will have 3 basic lanes (2 travel lanes in the westbound and one a single lane in the eastbound direction of traffic) through the Goldenrod intersection, which transitions to 2 basic lanes (one travel lane in each direction of traffic) approaching Ross Avenue (Sir Frederick Banting Driveway) intersection.
- ³¹ DB Co's profile design shall meet the requirements of Schedule 15-2, Part 2, Article 6, Clause 6.19 (j).
- ³² DB Co shall design the vertical profile for Corkstown Road above the floodplain elevation of a 1:100 year flood event.
- ³³ DB Co shall design the realigned section of Corkstown Road to have a consistent reverse crown slope (2%).
- ³⁴ Lane widths shall match existing conditions.
- ³⁵ The westbound one-way general traffic lane on Corkstown Road shall be 4.8m wide, with the exception of where the lane is adjacent to another travel lane or bus lane, in which case the lane width can be reduced to 3.5m.
- ³⁶ The width of curbside pick-up and drop-off parking spaces on Iris Street shall be a minimum of 2.6m.
- ³⁷ A 0.3m wide buffer separates the cycle track from the roadway and the sidewalk from the cycle track.
- ³⁸ DB Co shall provide a 2.0m wide sidewalk on both sides of Iris Street. In addition to the sidewalk on the south side of Iris Street, DB Co shall provide a 3.0m wide multi-use pathway adjacent to the sidewalk separated by a 0.3m wide buffer.
- ³⁹ DB Co shall construct a 3.0m wide MUP on the north side of Corkstown Road to maintain the connection between Moodie Drive and the Watts Creek pathway.
- ⁴⁰ DB Co shall provide a 1.8m wide raised cycle track in the eastbound direction and a 1.8m wide bike lane in the westbound direction.
- ⁴¹ DB Co shall preserve a 4m space on the shoulder of the southbound lanes along Blair Road for a future cycling and pedestrian facility as per the requirements of Schedule 15-2, Part 7.
- ⁴² Along the section of realigned Trim Road south of the OR174, the roadway cross section shall have 2 northbound lanes and 1 southbound lane. Approaching the intersection of the realigned Trim Road and OR174 intersection, one of the northbound lanes shall transition into the northbound left turn auxiliary lanes, as required. For the section of realigned Trim Road north of the OR174, Trim Road shall have a single northbound and southbound travel lane.

- ⁴³ The minimum radius of 650m is for the tie-in of the Roadway Works associated with the OR174 to existing conditions, east of Trim Road where the design speed shall be 110 km/h with a posted speed of 90km/h. DB Co shall reference the requirements from the TAC GDGCR for the minimum radius for the Roadway Works west of Trim Road.
- ⁴⁴ Any deviations from the maximum grades on the OR174 profile shall meet the requirements of the MTO GDSOH Clause C4.2.1.
- ⁴⁵ Minimum decision sight distance for rural roadways shall be based on Manoeuvre C.
- ⁴⁶ Where there are only 2 general purpose lanes required along OR174 (+ speed change lanes, where applicable), the lane width of general purpose Lane No. 1 (next to the median) and Lane No. 2 (the outside general purpose lane) both shall be 3.75m typical. The width of speed change lane shall be 3.5m typical. The width of interchange ramps shall be 4.75m. Where provisions for the future High Occupancy Vehicle (HOV) lanes are to be considered in the Design and Construction of Stage 2 Works on OR174 from Blair Road to Montreal Road and under Trim Road new bridge structure, DB Co shall follow the following lane widths criteria:
- Median (left) shoulder shall be 3.0m wide typical.
 - Lane No. 1, next to the median shoulder, shall be 3.75m wide. Lane No. 1 will become the future HOV lane.
 - Lane No. 2, right of Lane No. 1, shall be 4.75m wide. The width of Lane No. 2 is sized to provide a 1.25m buffer between Lane No. 1 and Lane No. 2 and a 3.5m wide general purpose lane as future lane No. 2 upon conversion of Lane No. 1 to an HOV lane.
 - Lane No. 3, the outside general purpose lane, to be 3.75m wide.
 - Outside (right) shoulder to be 3.0m wide typical, except in the presence of 3.5m wide speed change lanes where the outside shoulder shall be 2.5m wide typical.
- ⁴⁷ The proposed sidewalk on Trim Road shall be raised by no more than 50mm in comparison to the adjacent cycle track in order to provide a physical separation. DB Co shall coordinate and develop the design for the raised treatment to the satisfaction of the City of Ottawa.
- ⁴⁸ A 3.0m wide asphalt MUP shall be provided adjacent to the outside northbound lane.
- ⁴⁹ The minimum median (left) and outside (right) shoulder width is 3.0m typical but may be reduced to an absolute minimum of 1.0m to accommodate Physical Constraints. Where physical constraints are less than 160m apart, DB Co is permitted to continue the minimum 1.0m shoulder between the physical constraints. Where physical constraints are more than 160m apart and less than 200m apart, the City may consider relaxing the requirement to restore a 3.0m shoulder between the physical constraints.
- ⁵⁰ The bike lanes on the existing Trim Road shall be raised cycle tracks adjacent to outside (curbside) lane on either side of the roadway, separated by a 0.6m wide boulevard, so that that total raised cycle track section including the boulevard is 2.4m wide. The proposed cycle track shall be raised by 150mm in comparison to the adjacent roadway.
- ⁵¹ DB Co shall design and construct raised concrete medians adjacent to auxiliary lanes.
- ⁵² Traffic projection horizon shall be year 2036 for all transportation impact assessments and traffic and transit analysis studies related to Trim Road/ OR174 Interchange, including Trim Park and Ride facility.
- ⁵³ The median lane shall be 3.75m wide and the curbside lane shall be 3.5m wide along Montreal Road.
- ⁵⁴ The median lane shall be 3.75m wide and the curbside lane shall be 3.5m wide along Montreal Road. Bus lanes shall be a minimum of 3.5m wide.
- ⁵⁵ The full width between abutment face to curb shall be 8.0m, consisting of a 2.0m sidewalk, 2.0m wide bus shelter (where applicable), 2m width for bus staging/access, 1.5m width for cycle track and 0.5m width for cycle track buffer. Cycle track shall be discontinued from the bus shelters to the station entrance.
- ⁵⁶ The bike lanes on Montreal Road shall be unidirectional raised cycle tracks adjacent to outside (curbside) lane one either side of the roadway, separated by a 0.5m wide hard surface boulevard, so that the total raised cycle track section including the boulevard is 2.0m wide.

| Table 2 – Confederation Line Left Turn Storage Length Requirements at Signalized Intersections | | | |
|--|----------------------|-----------------------|-----------------------|
| Primary Roadway | Intersecting Roadway | Intersection Approach | Storage Length (Min.) |
| Richmond Road | McEwen Avenue | Eastbound | 35m |
| | | All | N/A |
| | Woodroffe Avenue | Eastbound | 30m |
| | | Westbound | 70m |
| | | Northbound | 50m |
| | | Southbound | 30m |
| | Cleary Avenue | Southbound | 15m |
| Scott Street | Goldenrod Driveway | Eastbound | 20m |
| | | Westbound | 15m |
| | | Southbound | 60m |

| Table 3 – Confederation Line East: OR174 Lane Configuration | | |
|---|--|--|
| Roadway Segment | Westbound | Eastbound |
| From east of Blair Road to west of Montreal Road interchange | 3 general purpose lanes (+ speed change lanes, where applicable) ^A | 3 general purpose lanes (+ speed change lanes, where applicable) ^B |
| From west of Montreal Road interchange to west of Green's Creek | 3 general purpose lanes (+ speed change lanes, where applicable) ^B | 3 general purpose lanes (+ speed change lanes, where applicable) ^{B, C} |
| From west of Green's Creek to west of realigned Trim Road | 2 General Purpose Lanes (+ speed change lanes, where applicable) ^D | 2 General Purpose Lanes (+ speed change lanes, where applicable) ^D |
| From west of realigned Trim Road to east of realigned Trim Road | 1 General Purpose Lanes (+ speed change lanes, where applicable) ^{E, F} | 2 General Purpose Lanes (+ speed change lanes, where applicable) ^{E, G} |

- ^A Along the section from east of Blair Road through to west of Montreal Road interchange, DB Co shall maintain the existing lane configuration, which includes 3 general purpose lanes (and speed change lanes, where applicable). The width of general purpose Lane 1 (next to the median shoulder) is 3.75m, Lane 2 (right of Lane 1) is 3.75m, and Lane 3 (outside general purpose lane) is 3.5m.
- ^B DB Co shall construct the proposed pavement wide enough in this section so that it will accommodate the provision for a (High Occupancy Vehicle) HOV lane including a buffer and 2 general purpose lanes (and speed change lanes, where applicable) without a need for additional widening in the future when the HOV lane is implemented along OR174 corridor. For the width of general purpose Lane 1 (next to the median shoulder), Lane 2 (right of Lane 1), and Lane 3 (outside general purpose lane), see the endnote associated with OR174 lane width in this Design Criteria.
- ^C Lane 3 (outside general purpose lane) shall be constructed in the ultimate location but not open to traffic until HOV is implemented for the OR174. Related interchange on-ramps (i.e. N-E and S-E ramps) shall be constructed to their ultimate location considering future HOV widening requirements without the need to reconstruct the S-E ramp. In order to accommodate the improvements, it is acceptable to terminate the 3rd lane with appropriate line painting to tie-in with Lane 2 between the bullnose for the N-E ramp through to the bullnose of the S-E ramp.

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- ^D For the width of general purpose lanes 1 and 2, see the endnote associated with OR174 lane width in this Design Criteria.
- ^E DB Co shall accommodate for the provision of a (High Occupancy Vehicle) HOV lane including a buffer and 1 general purpose lane (and speed change lanes, where applicable) and appropriate shoulder widths in the future when the HOV lane is implemented along the OR174 corridor. For the width of the HOV lane and general purpose lanes, see the endnote associated with OR174 lane widths in this Design Criteria.
- ^F The general purpose lane will be the continuation of the existing OR174 westbound general purpose lane that extends from the east to west of the realigned Trim Road and OR174 signalized intersection and constitutes one of the 2 continuous general purpose lanes in the section west of the intersection. On the westbound approach and departure of the proposed realigned Trim Road and OR174 signalized intersection, DB Co shall accommodate three westbound through lanes per Schedule 15-2, Part 2, Appendix B. DB Co shall design and construct appropriate diverging and merging transitions for the westbound through lanes from the east to west of the realigned Trim Road and OR174 signalized intersection as per the requirements of Schedule 15-2, Part 2, Article 6.19.
- ^G The general purpose Lane 1 (next to the median shoulder) will continue further east and tie into the existing general purpose lane east of the realigned Trim Road and OR174 signalized intersection and the Lane 2 (right of Lane 1 or outside lane) will terminate with an appropriate transition east of the realigned Trim Road and OR174 signalized intersection. For added clarity, when the HOV lane is implemented along OR174 corridor in the future, the pavement in this section will be widened by others to accommodate the provision for a (High Occupancy Vehicle) HOV lane including a buffer and 1 general purpose lane (and speed change lanes, where applicable).

APPENDIX B

[REDACTED]

APPENDIX C

[REDACTED]

Appendix D – Richmond Road Complete Streets Intersection Designs

ELEMENTS OF A PROTECTED INTERSECTION

- ① RAISED INTERSECTION *
- ② CROSSING SETBACK
- ③ CYCLIST CROSSING
- ④ CYCLIST QUEUING AREA/ SAFETY REFUGE
- ⑤ PEDESTRIAN CROSSWALK
- ⑥ PEDESTRIAN QUEUING AREA/ SAFETY REFUGE
- ⑦ PEDESTRIAN CROSSING OF BIKE LANE
- ⑧ ADVANCED STOP BAR
- ⑨ YIELD LINES
- ⑩ CORNER SAFETY ISLAND
- ⑪ MINIMUM CURB RADIUS
- ⑫ LATERAL APPROACH/ DEPARTURE TAPER

* SITE SPECIFIC REQUIREMENT

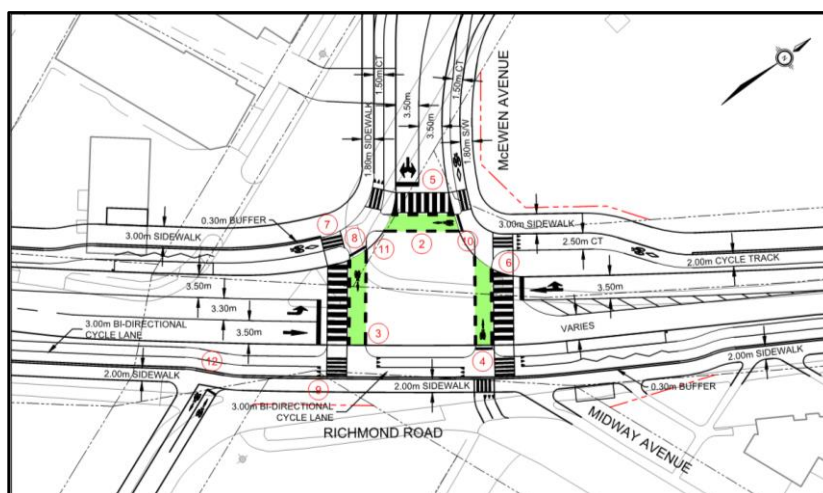


Figure 1: Richmond Road Complete Streets - McEwen Avenue Intersection

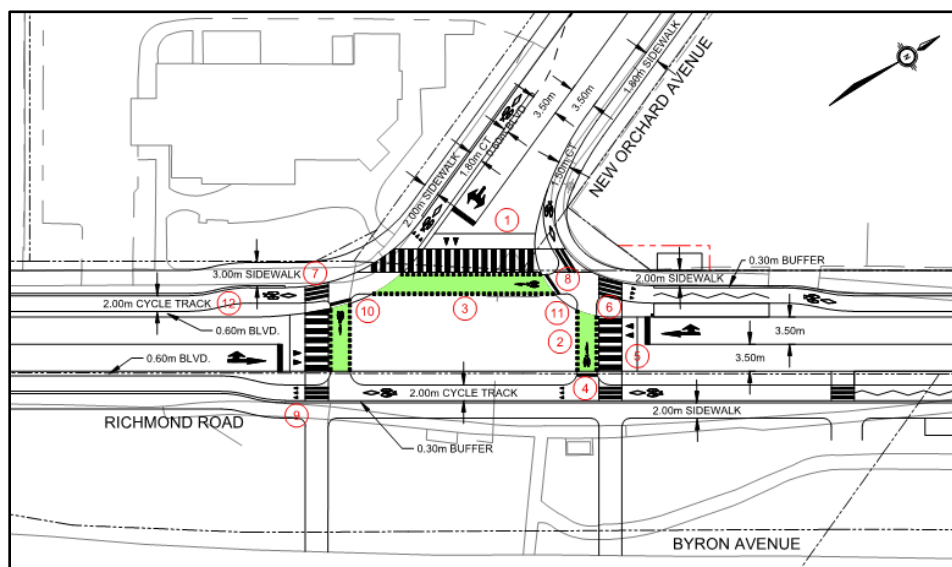


Figure 2: Richmond Road Complete Streets - New Orchard Avenue Intersection

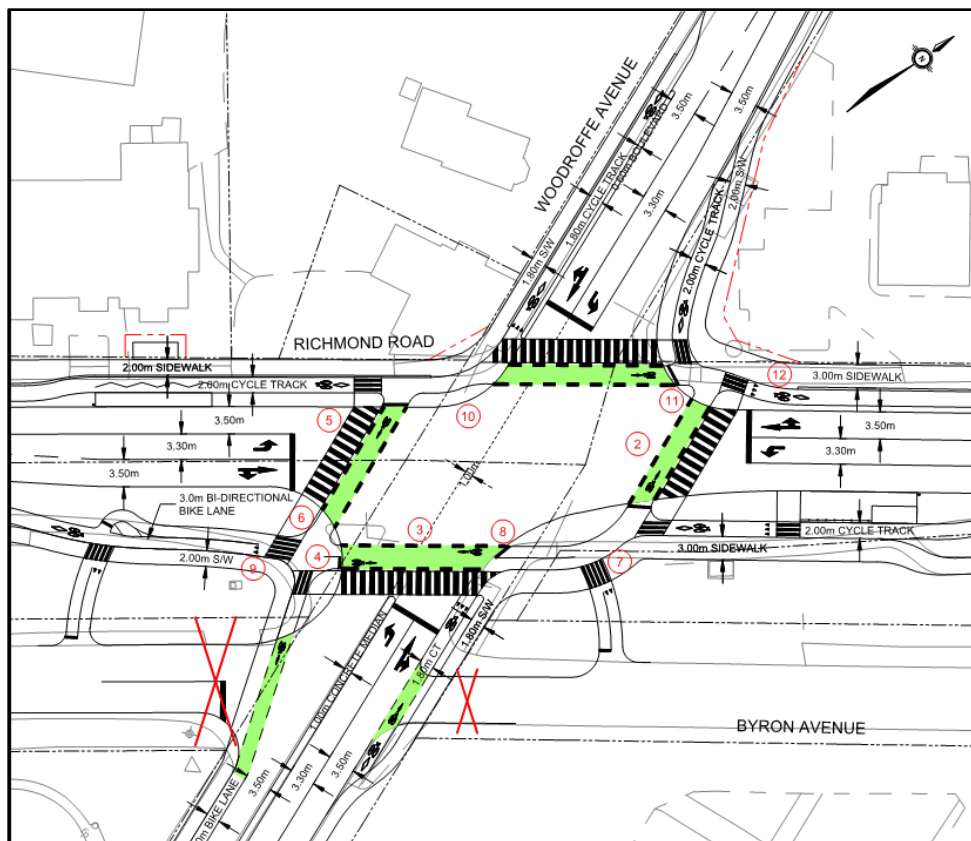


Figure 3: Richmond Road Complete Streets - Woodroffe Avenue

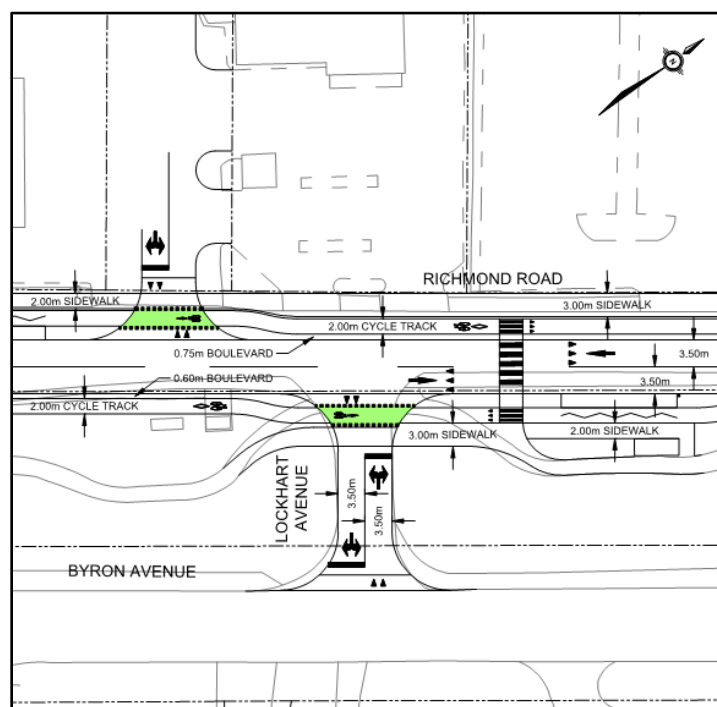


Figure 4: Richmond Road Complete Streets - Lockhart Avenue

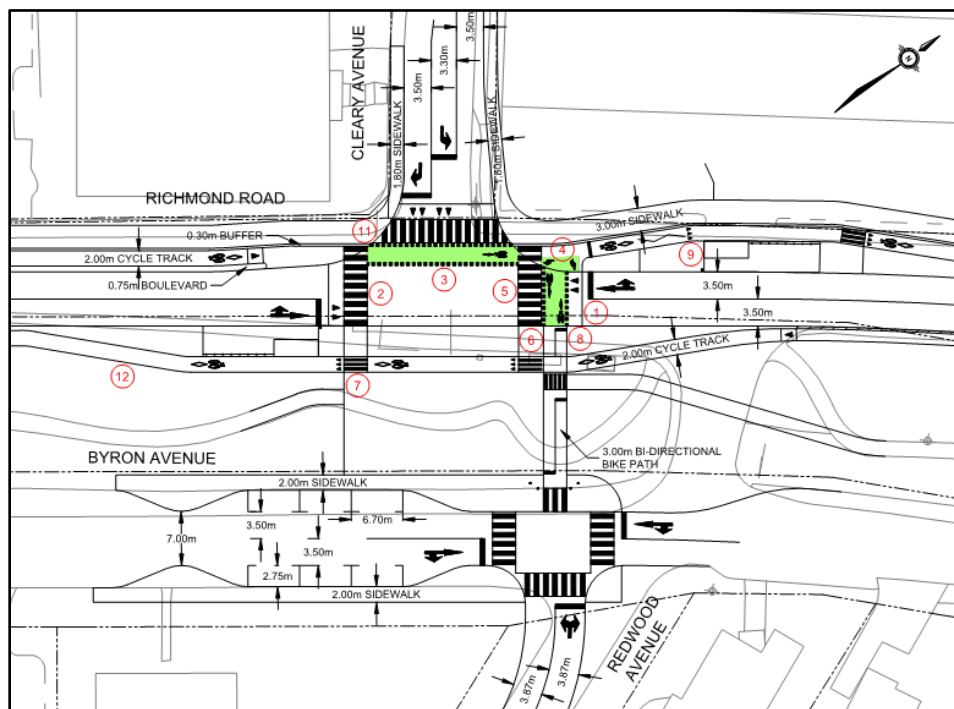


Figure 5: Richmond Road Complete Streets - Cleary Avenue Intersection

Confederation Line Structures

| Structure Number | Structure Name | NMI or SI | Relevant Authority | Structure Type | Structure Conveyance | Minimum Vertical Clearance Exceptions ^{1,2} | Bridge Aesthetic Level and Classification | Geometric Structural Requirements | | Scope of Work | | | | | | | | | | | | | | Additional Comments/Requirements |
|------------------------------------|---|-----------|--------------------|--|------------------------------------|--|---|--|---|---------------------------|---------|---------|-----------------|-----------------------|------------------------------|-------------------------------------|--|-----------------------------|------------------------|------------------|--|--|--|--|
| | | | | | | | | Cross Section to Accommodate | Structure to Span Over | New Design & Construction | Removal | Replace | Accommodate OCS | Structural Evaluation | Install Crash Walls at Piers | Install Security Fence ⁴ | Requires Architectural Concrete ⁵ | Rehabilitation ³ | | | | | | |
| | | | | | | | | | | | | | | | | | | Concrete Patch Repairs | Concrete Crack Repairs | Replace Bearings | | | | |
| Confederation Line East Structures | | | | | | | | | | | | | | | | | | | | | | | | |
| SN226780 | Blair Road Bridge over Transitway | NMI | City of Ottawa | Concrete Rigid Frame | Roadway | No Exceptions | - | • Existing Blair Road configuration | • EB & WB Track Alignment • Emergency walkways • Future Cumberland Transitway | | | | X | | | X | | X | X | | | | | • Replace longitudinal seal in median. |
| SN226790 | Blair Road E-NS Ramp | NMI | City of Ottawa | Post-tensioned Voided Concrete Slab | Roadway | No Exceptions | - | • Existing Ramp configuration | • EB & WB Track Alignment • Emergency walkways | | | | X | | X | | | X | X | X | | | | |
| SN224880 | Transitway Bridge over OR174 | - | City of Ottawa | Post-tensioned Voided Concrete Slab | Transitway | - | - | - | - | | X | | | | | | | | | | | | | Includes the removal of culverts A224636 and A224635 |
| SN224980 | Montreal Road Flyover | SI | City of Ottawa | New Elevated Guideway | Railway | No Exceptions | 1 - High | • EB & WB track Alignment • Emergency walkways | • Future widening of OR174 WB lanes | X | | | | | | | | | | | | | | |
| SN224850 | Westbound OR174 Bridge over Montreal Rd | NMI | City of Ottawa | New Overpass Bridge | Roadway | No Exceptions | 1 - High | • Future widening of OR174 WB lanes | • Future widening of Montreal Road | | | X | | | | | | | | | | | | |
| SN224855 | Montreal Road Station Bridge | SI | City of Ottawa | New Elevated Guideway | Railway | No Exceptions | 1 - High | • EB & WB track Alignment • Train platform | • Future widening of Montreal Road • Montreal Station | X | | | | | | X | | | | | | | | • Shall be Designed in conjunction with Montreal Road Station |
| SN224851 | Eastbound OR174 Bridge over Montreal Rd | NMI | City of Ottawa | New Overpass Bridge | Roadway | No Exceptions | 3 - Low | • Future widening of OR174 EB lanes | • Future widening of Montreal Road | | | X | | | | | | | | | | | | |
| SN227110 | Greens Creek Culvert under OR174 | NMI | City of Ottawa | New Culvert | Roadway/ Railway | - | 3 - Low | • EB & WB track Alignment • Emergency walkways • Future Widening of OR174 • North MUP | • Greens Creek Culvert | X | | | | | | | | | | | | | | • Design and construct a new culvert section to carry the alignment over the existing Green's Creek Culvert |
| SN221250 | Green's Creek Pedestrian Bridge | NMI | City of Ottawa | New Pedestrian Bridge | Pedestrian/ Maintenance Vehicle | - | - | • MUP | • Greens Creek | X | | | | | | | | | | | | | | |
| SN224860 | Sir George-Etienne Cartier Parkway Bridge over OR174 | NMI | NCC/City of Ottawa | Post-tensioned Voided Concrete Slab | Roadway | No Exceptions | - | • Existing Parkway configuration | • EB & WB track Alignment • Emergency walkways • Future widening of OR174 | | | | X | | X | X | | | X | | | | | |
| SN224870 | Jeanne d'Arc Blvd Bridge over OR174 | NMI | City of Ottawa | Pre-stressed Concrete Voided Slab | Roadway | No Exceptions | - | • Existing Jeanne d'Arc Blvd configuration | • EB & WB track Alignment • Train platform • Future widening of OR174 | | | | X | X | X | X | | X | X | X | | | | • Modify existing structure to accommodate new opening for station access |
| SN224240 | Orleans Boulevard Bridge over OR174 | NMI | City of Ottawa | Pre-stressed Concrete I-Girder and Slab | Roadway | No Exceptions | - | • Existing Orleans Boulevard configuration | • EB & WB track Alignment • Train platform • Future widening of OR174 | | | | X | X | X | X | | | | | | | | • Modify existing structure to accommodate new opening for station access |
| SN224510 | Billberry Creek Culvert under OR174 | NMI | City of Ottawa | Concrete Box Culvert with CSP extension | Roadway/ Railway | - | - | • Future Widening of OR174 | • Billberry Creek | | | | | X | | | | | | | | | | |
| SN228030 | Place d'Orléans Pedestrian Bridge over OR174 | NMI | City of Ottawa | Post Tensioned Voided Slab | Pedestrian | No Exceptions | - | • Existing configuration | • EB & WB track Alignment • Train platform • Future widening of OR174 | | | | X | X | X | | | X | X | | | | | • Concrete repairs to the exposed pier foundations. • Modify existing structure to accommodate new opening for station access |
| SN228025 | Place d'Orléans Station Pedestrian Bridge over EB OR174 | SI | City of Ottawa | New Enclosed Pedestrian Bridge | Pedestrian | - | 1 - High | • Pedestrian Traffic • Maintenance Vehicle | • Future widening of OR174 EB lanes | X | | | | | | X | | | | | | | | • Shall be Designed in conjunction with the Place d'Orléans Station |
| SN224890 | Champlain Street Bridge over OR174 | NMI | City of Ottawa | Post-tensioned Voided Concrete Slab | Roadway | No Exceptions | - | • Existing Champlain Street configuration | • EB & WB Track Alignment • Emergency walkways • Future widening of OR174 | | | | X | | X | X | | | | X | | | | |
| SN894010 | Tenth Line Road Bridge over OR174 | NMI | City of Ottawa | Pre-stressed Concrete I-Girder and Slab Bridge | Roadway | No Exceptions | - | • Existing Tenth Line Road configuration | • EB & WB Track Alignment • Emergency walkways • Future Widening of OR174 | | | | X | | X | X | | | | X | | | | |
| SN894040 | Box Culvert under OR174 | NMI | City of Ottawa | Concrete Box Culvert | Roadway/ Railway | - | - | • EB & WB track Alignment • Emergency walkways • Future Widening of OR174 | • Existing Creek | | | | | X | | | | | | | | | | |
| SN894050 | Taylor Creek Culvert under OR174 | NMI | City of Ottawa | Concrete Box Culvert | Roadway/ Railway | - | - | • EB & WB track Alignment • Emergency walkways • Future Widening of OR174 | • Taylor Creek | | | | | X | | | | | | | | | | |

¹Exceptions to the minimum clearance requirements per Schedule 15-2 Part 2, Article 4 - Structural Design Criteria and Requirements, Clause 4.4

²OCS placement under the Structure shall be as indicated in Schedule 15-2, Part 3, Article 14.

³Substructure and Soffit repairs Based on the requirements of the most recent OSIM Inspection Report

⁴Install Security fence in accordance with Schedule 15-2, Part 6, Article 2 - Landscape Design Criteria, Clause 2.7

⁵Architectural concrete shall be in accordance with the requirements in Schedule 15-2. Part 4, Article 2 - Architectural Design Criteria

NTD: Bundled Project, details to follow

Confederation Line Structures

| Structure Number | Structure Name | NMI or SI | Relevant Authority | Structure Type | Structure Conveyance | Minimum Vertical Clearance Exceptions ^{1,2} | Bridge Aesthetic Level and Classification | Geometric Structural Requirements | | Scope of Work | | | | | | | | | | | | | Additional Comments/Requirements | |
|------------------------------------|---|-----------|--------------------|---|------------------------------------|--|---|---|--|---------------------------|---------|---------|-----------------|-----------------------|------------------------------|-------------------------------------|--|-----------------------------|---|---|--|--|----------------------------------|---|
| | | | | | | | | Cross Section to Accommodate | Structure to Span Over | New Design & Construction | Removal | Replace | Accommodate OCS | Structural Evaluation | Install Crash Walls at Piers | Install Security Fence ⁴ | Requires Architectural Concrete ⁵ | Rehabilitation ³ | | | | | | |
| Confederation Line West Structures | | | | | | | | | | | | | | | | | | | | | | | | |
| SN018231 and SN018232 | Box Culvert under West Transitway | SI | City of Ottawa | Concrete Box Culvert | Railway | - | - | - | - | | | | | | X | | | | | | | | | |
| SN019991 | West Transitway South Rock Wall | NMI | City of Ottawa | Rock Face/Concrete Wall | - | - | - | - | - | | | | | | | | | | X | X | | | | |
| SN019992 | West Transitway North Rock Wall | NMI | City of Ottawa | Rock Face/Concrete Wall | - | - | - | - | - | | | | | | | | | | X | X | | | | |
| SN016255 | Goldenrod Bridge at Tunney's Pasture | NMI | City of Ottawa | New Overhead Bridge | Roadway | 4.3m | 1 - High | • Future Goldenrod Driveway configuration | • EB & WB track Alignment • Emergency walkways | X | | | | | | X | | | | | | | | |
| SN016260 | Ross Avenue Bridge | NMI | City of Ottawa | Overhead Concrete Rigid Frame Bridge | Roadway | No Exception | - | • Existing Ross Avenue configuration | • EB & WB track Alignment • Emergency walkways | | | | X | | | X | | X | X | | | | | |
| SN016270 | Northwestern Avenue Bridge | NMI | City of Ottawa | Overhead Concrete Rigid Frame Bridge | Roadway | No Exception | - | • Existing Northwestern Avenue configuration | • EB & WB track Alignment • Emergency walkways | | | | X | | | X | | X | X | | | | | • Mitigate and repair undermining of wingwall |
| SN016330 | Carleton Avenue Bridge | NMI | City of Ottawa | Overhead Concrete Rigid Frame Bridge | Roadway | No Exception | - | • Existing Carleton Avenue configuration | • EB & WB track Alignment • Emergency walkways | | | | X | | | X | | X | X | | | | | |
| SN016280 | Island Park Drive Bridge | NMI | City of Ottawa | Overhead Concrete Rigid Frame Bridge | Roadway | 4.4m | - | • Existing Island Park Drive configuration | • EB & WB track Alignment • Emergency walkways | | | | X | | | X | | X | X | | | | | |
| SN016290 | Lanark Avenue Bridge | NMI | City of Ottawa | Overhead Concrete Rigid Frame Bridge | Roadway | No Exception | - | • Existing Lanark Avenue configuration | • EB & WB track Alignment • Emergency walkways | | | | X | | | X | | X | X | | | | | |
| SN019890 | Hydro Utility Bridge | NMI | City of Ottawa | Overhead Steel Truss Utility Bridge | Utility | 4.2m | - | • Existing configuration | • EB & WB track Alignment • Emergency walkways | | | | X | | | | | | | | | | | |
| SN016300 | Tweedsmuir Avenue Bridge | NMI | City of Ottawa | Overhead Concrete Rigid Frame Bridge | Roadway | 4.2m | - | • Existing Tweedsmuir Avenue configuration | • EB & WB track Alignment • Emergency walkways | | | | X | X | | X | | | X | | | | | • Modify existing structure to accommodate new station entrance |
| SN018240 | Westboro Station Pedestrian Bridge | NMI | City of Ottawa | Enclosed Concrete Pedestrian Underpass | Pedestrian | Approximate 4.1m | - | • Existing configuration | • EB & WB track Alignment • Station elements | | X | | X | | | | | X | X | | | | | • Modify existing structure to accommodate new station or remove structure |
| SN016310 | Athlone Avenue Bridge | NMI | City of Ottawa | Overhead Concrete Rigid Frame Bridge | Roadway | 4.075m | - | • Existing Athlone Avenue configuration | • EB & WB track Alignment • Emergency walkways | | | | X | X | | X | | X | X | | | | | • Modify existing structure to accommodate new station entrance |
| SN016320 | Churchill Avenue Bridge | NMI | City of Ottawa | Overhead Concrete Rigid Frame Bridge | Roadway | 4.075m | - | • Existing Churchill Avenue configuration | • EB & WB track Alignment • Emergency walkways | | | | X | | | X | | | | | | | | |
| SN018220 | Roosevelt Avenue Bridge | NMI | City of Ottawa | Overhead Concrete Rigid Frame Pedestrian Bridge | Pedestrian/ Maintenance Vehicle | No Exception | 1 - High | • Existing configuration | • EB & WB track Alignment • Emergency walkways | | | X | | | | X | | | | | | | | • Design and install a temporary Structure as part of the Scott Street detour |
| SN018620 & SN018621 | SJAM Parkway at Carleton Avenue Pedestrian Overpass | NMI | NCC | Concrete Rigid Frame Pedestrian Overpass | Roadway | - | - | • Existing SJAM Parkway configuration | • MUP | | | | | | | | | X | X | | | | | • Replace barrier |
| SN018610 & SN018611 | SJAM Parkway at Lanark Avenue Pedestrian Overpass | NMI | NCC | Concrete Rigid Frame Pedestrian Overpass | Roadway | - | - | • Existing SJAM Parkway configuration | • MUP | | | | | X | | | | X | X | | | | | • Replace barrier • If maintained, evaluate WB structure to ensure capacity is not exceeded following MUP and lane reconfiguration |
| SN019212 | U Approach - Depressed Guideway Parkway East Portal | SI | City of Ottawa | Portal/Retaining Structure | Railway | - | - | • NB & SB track Alignment • East & west Emergency walkway | - | X | | | | | | | | X | | | | | | • Structure shall be Designed in conjunction with the Parkway Tunnel |
| SN019213 | U Approach - Depressed Guideway Parkway West Portal | SI | City of Ottawa | Portal/Retaining Structure | Railway | - | - | • NB & SB track Alignment • East & west Emergency walkway | - | X | | | | | | | | X | | | | | | • Structure shall be Designed in conjunction with the Parkway Tunnel |
| SN018920 | SJAM Parkway at Churchill Avenue Pedestrian Overpass | NMI | NCC | New Pedestrian Overpass | Roadway | 3.0m | 1 - High | • Proposed SJAM Parkway configuration | • MUP | X | | | | | | | | | | | | | | |
| SN018910 | SJAM Parkway at Cleary Avenue Pedestrian Overpass | NMI | NCC | New Pedestrian Overpass | Roadway | 3.0m | 1 - High | • Proposed SJAM Parkway configuration | • MUP | X | | | | | | | | | | | | | | |
| SN018400 | Lincoln Fields Station Pedestrian Bridge | - | City of Ottawa | Enclosed Concrete Pedestrian Overpass | Pedestrian | - | - | - | - | | X | | | | | | | | | | | | | |
| SN016070 | Carling Avenue Bridge at Lincoln Fields Station | NMI | City of Ottawa | New Overhead Bridge | Roadway | No Exception | 3 - Low | • Proposed Carling Avenue configuration | • EB & WB track Alignment • Emergency walkways | X | | | | | X | X | | | | | | | | |
| SN018470 | Pedestrian Bridge at [REDACTED] | NMI | City of Ottawa | New Pedestrian Overhead | Pedestrian/ Maintenance Vehicle | No Exception | 1 - High | • MUP | • 100 year flood plain • WB, EB & SB track Alignment • Emergency walkways • Existing Transitway configuration | X | X | | | | X | X | | | | | | | | Includes the removal of existing pedestrian bridge (SN018380) |
| SN015050 | Lincoln Fields Split Structure | SI | City of Ottawa | New Elevated Guideway | Railway | No Exception | 1 - High | • WB & EB Track Alignment • Emergency walkways | • SB track Alignment • Emergency walkways • Existing Transitway configuration • Pinecrest Creek • MUP | X | | | | | X | | | | | | | | | |
| SN015130 | U Approach - Depressed Guideway Connaught East Portal | SI | City of Ottawa | Portal/Retaining Structure | Railway | - | - | • EB & WB track Alignment • Emergency walkways | - | X | | | | | | | | X | | | | | | |
| SN015140 | U Approach - Depressed Guideway Connaught West Portal | SI | City of Ottawa | Portal/Retaining Structure | Railway | - | - | • EB & WB track Alignment • Emergency walkways | - | X | | | | | | | | X | | | | | | |
| SN018460 | Pedestrian Bridge at Queensview Station | SI | City of Ottawa/MTO | New Enclosed Pedestrian Underpass | Pedestrian | No Exception | 1 - High | • Pedestrian Traffic • Maintenance Vehicle | • Proposed Highway 417 configuration and Baxter Road | X | | | | | | | | X | | | | | | • Structure shall be designed to span over Highway 417 in one span |
| SN116410 | Highway 417 Westbound Off-Ramp at Richmond Road | NMI | City of Ottawa/MTO | Overhead Concrete Rigid Frame Bridge | Roadway | No Exception | - | • Existing Off-Ramp configuration | • EB & WB track Alignment • Emergency walkways | | | | X | | | | | X | X | | | | | |
| SN116420 | Richmond Road Bridge | NMI | City of Ottawa/MTO | Overhead Concrete Rigid Frame Bridge | Roadway | No Exception | - | • Reconfigured Richmond Road cross section | • EB & WB track Alignment • Emergency walkways | | | | X | X | | X | | X | X | | | | | • Undertake structural evaluation for the reconfigured Richmond Road cross section |
| SN116110 | Richmond Road O/P Bayshore Drive | NMI | City of Ottawa | Concrete Overpass | Roadway | - | - | • Reconfigured Richmond Road cross section | • Bayshore Drive | | | | | X | | | | | | | | | | • Undertake structural evaluation for the reconfigured Richmond Road cross section |
| SN116430 | Highway 417 Westbound On-Ramp at Richmond Road | NMI | City of Ottawa/MTO | Overhead Concrete Rigid Frame Bridge | Roadway | No Exception | - | • Existing On-Ramp configuration | • EB & WB track Alignment • Emergency walkways | | | | X | | | | | X | X | | | | | • Stabilize southeast retaining wall |
| SN117020 | Graham Creek Culvert | NMI | City of Ottawa/MTO | Concrete Box Culvert | Roadway/ Railway | - | - | • Existing Highway 417 EB and WB configuration • EB & WB track Alignment • Emergency walkways | • Graham Creek | | | | | | | | | | | | | | | • Verify the capacity of the Structure |

Confederation Line Structures

| Structure Number | Structure Name | NMI or SI | Relevant Authority | Structure Type | Structure Conveyance | Minimum Vertical Clearance Exceptions ^{1,2} | Bridge Aesthetic Level and Classification | Geometric Structural Requirements | | Scope of Work | | | | | | | | | | | | | | Additional Comments/Requirements |
|------------------|--|-----------|--------------------|--|----------------------|--|---|---|---|---------------------------|---------|---------|-----------------|-----------------------|------------------------------|-------------------------------------|--|-----------------------------|------------------------|------------------|--|--|--|--|
| | | | | | | | | Cross Section to Accommodate | Structure to Span Over | New Design & Construction | Removal | Replace | Accommodate OCS | Structural Evaluation | Install Crash Walls at Piers | Install Security Fence ⁴ | Requires Architectural Concrete ⁵ | Rehabilitation ³ | | | | | | |
| | | | | | | | | | | | | | | | | | | Concrete Patch Repairs | Concrete Crack Repairs | Replace Bearings | | | | |
| SN117440 | Stillwater Creek Culvert 1 | SI | City of Ottawa/MTO | Concrete Box Culvert | Roadway/ Railway | - | - | • Existing Highway 417 EB and WB configuration • EB & WB track Alignment • Emergency walkways | • Stillwater Creek | | | | | | | | | | | | | | | • Verify the capacity of the Structure |
| SN117450 | Stillwater Creek Culvert 2 | SI | City of Ottawa/MTO | Concrete Box Culvert | Roadway/ Railway | - | - | • Existing Highway 417 EB and WB configuration • EB & WB track Alignment • Emergency walkways | • Stillwater Creek | | | | | | | | | | | | | | | • Verify the capacity of the Structure |
| SN116390 | Highway 417 E-N/S Ramp at Moodie Drive | NMI | City of Ottawa/MTO | 3 Span Post-Tensioned Concrete Overhead Bridge | Roadway | - | - | • Existing E-N/S Off-Ramp configuration | • EB & WB track Alignment • Emergency walkways • Bus access to Moodie Station | | | | X | | | | | | | | | | | |
| SN014490 | Queensway (Hwy 417) Bridge | NMI | City of Ottawa/MTO | 2 Span Precast Concrete Box Girder Overhead Bridge | Roadway | No Exception | - | • Proposed Highway 417 configuration | • EB & WB track Alignment • Emergency walkways | | X | | X | | X | | | | | | | | | • Remove Station Platforms |
| SN015210 | Iris Street Bridge | NMI | City of Ottawa | New Overhead Bridge | Roadway | No Exception | 3 - Low | • Proposed Iris Road Configuration | • NB & SB track Alignment • East & west train platforms • West MUP | X | | | | | X | X | X | | | | | | | • Structure shall be Designed in conjunction with the Iris Station. |
| SN018350 | Pinecrest Creek Iris Street Culvert | - | City of Ottawa | Twin Cell Concrete Box Culvert | Roadway | - | - | - | - | | X | | | | | | | | | | | | | |
| SN017710 | Pinecrest Creek Culvert under Iris | NMI | City of Ottawa | New Concrete Culvert | Roadway | - | 3 - Low | • Proposed Iris Road Configuration | • Pinecrest Creek | X | | | | | | | | | | | | | | |
| SN017720 | Pinecrest Creek Culvert under Alignment | SI | City of Ottawa | New Concrete Culvert | Railway | - | 3 - Low | • NB & SB track Alignment • Emergency walkways • MUP • Embankment Slopes | • Pinecrest Creek | X | | | | | | | | | | | | | | |
| SN018360 | Pinecrest Creek Kenson Park Culvert | SI | City of Ottawa | Twin Cell Concrete Box Culvert | Railway | - | - | • NB & SB track Alignment • Emergency walkways • MUP • Embankment Slopes | • Pinecrest Creek | | | | | X | | | | | X | X | | | | • Ensure Structure has adequate length to accommodate any grade raises over culvert |
| SN018370 | Pinecrest Creek Baseline Road Culvert | SI | City of Ottawa | Twin Cell Concrete Box Culvert | Railway | - | - | • NB & SB track Alignment • Emergency walkways • MUP • Embankment Slopes | • Pinecrest Creek | | | | | X | | | | | | | | | | • Ensure Structure has adequate length to accommodate any grade raises over culvert |
| SN016080 | Baseline Road Bridge | NMI | City of Ottawa | 3 Span Steel Girder Overhead Bridge | Roadway | No Exception | - | • Existing Baseline Road configuration | • NB & SB track Alignment • Emergency walkways | | | | X | | X | X | | X | X | X | | | | • The need for crash walls shall be dependent on the proximity of the Alignment to the piers and shall follow the requirements in [Schedule 15-2, Part 2, Article 4 - Structural Design Criteria and Requirements, Clause 4.4] |
| New | Pinecrest Stormwater Management Facility Inlet Chamber | NMI | City of Ottawa | New Inlet Chamber | Pedestrian | - | 3-Low | • MUP | • Baseline Storm Sewer Outfall Flow to Pond • Bypass weir | X | | | | | | | | | | | | | | |
| New | Pinecrest Stormwater Management Facility Inlet Culvert | NMI | City of Ottawa | New Culvert | Roadway | - | 3 - Low | • Maintenance Road • MUP | • Baseline Storm Sewer Outfall Flow to Pond | X | | | | | | | | | | | | | | • Culvert shall be design to carry CHBDC Truck loading |

¹Exceptions to the minimum clearance requirements per Schedule 15-2 Part 2, Article 4 - Structural Design Criteria and Requirements, Clause 4.4

²OCS placement under the Structure shall be as indicated in Schedule 15-2, Part 3, Article 14.

³Substructure and Soffit repairs Based on the requirements of the most recent OSIM Inspection Report

⁴Install Security fence in accordance with Schedule 15-2, Part 6, Article 2 - Landscape Design Criteria, Clause 2.7

⁵Architectural concrete shall be in accordance with the requirements in Schedule 15-2. Part 4, Article 2 - Architectural Design Criteria

APPENDIX F

NCC SJAM Parkway Kitchissippi Lookout Proposed Modifications

APPENDIX F

[REDACTED]

APPENDIX G

NCC SJAM Parkway Rochester Field and Kitchissippi Lookout Site Servicing

APPENDIX G

[REDACTED]

Appendix H – Form of Road Safety Audit Certificates

1. Road Safety Audit Certificate (Stage 1)
2. Road Safety Audit Certificate (Stage 2)
3. Road Safety Audit Certificate (Stage 4)

Certificate Ref No. []

ROAD SAFETY AUDIT CERTIFICATE (STAGE 1)

This Certificate is being delivered pursuant to the agreement between the City of Ottawa and [DB Co] dated • (“the Project Agreement”) relating to the Project. Defined terms and expressions used in this Certificate have the same meanings as ascribed thereto in the Project Agreement.

Form of Certificate to be used by the designer for certifying that a Stage 1 Road Safety Audit has been carried out in accordance with [Schedule 15-2, Part 2, Article 6] of the Design and Construction Specifications.

1. We certify that the Pre-Final Design Development of [.....] has been the subject of a Stage 1 Road Safety Audit in accordance with [Schedule 15-2, Part 2, Article 6] of the Design and Construction Specifications, the Design Quality Management Plan and all other relevant provisions of the Project Agreement.
2. The Road Safety Audit Team’s report and statement certifying the audit has been carried out are attached.

Signed:

Road Safety Audit Team (Principal)

Name:

Title:

Date:

Professional Registration Number:

Affix Professional Seal

3. We certify that the preliminary design of [.....] has been the subject of a Stage 1 Road Safety Audit in accordance with [Schedule 15-2, Part 2, Article 6] of the Design and Construction Specifications, the Design Quality Management Plan and all other relevant provisions of the Project Agreement and that all observations and recommendations in the Road Safety Audit Team’s report have been satisfactorily addressed and resolved.

Signed:

Designer (Principal)

Name:

Title:

Date:

Professional Registration Number:

Affix Professional Seal

Signed:

Construction Contractor (Principal)

Name:

Title:

Date:

Professional Registration Number:

Affix Professional Seal

Signed:

DB Co Representative

Name:

Date:

4. Receipt of this Certificate is acknowledged.

Signed.....

City of Ottawa Representative

Name.....

Date.....

Certificate Ref. No. []

ROAD SAFETY AUDIT CERTIFICATE (STAGE 2)

This Certificate is being delivered pursuant to the agreement between the City of Ottawa and [DB Co] dated • (“the Project Agreement”) relating to the Project. Defined terms and expressions used in this Certificate have the same meanings as ascribed thereto in the Project Agreement.

Form of Certificate to be used by the designer for certifying that a Stage 2 Road Safety Audit has been carried out in accordance with [Schedule 15-2, Part 2, Article 6] of the Design and Construction Specifications.

1. We certify that the Final Design Development of [.....] has been the subject of a Stage 2 Road Safety Audit in accordance with [Schedule 15-2, Part 2, Article 6] of the Design and Construction Specifications, the Design Quality Management Plan and all other relevant provisions of the Project Agreement.
2. The Road Safety Audit Team’s report and statement certifying the audit has been carried out are attached.

Signed:

Road Safety Audit Team (Principal)

Name:

Title:

Date:

Professional Registration Number:

Affix Professional Seal

3. We certify that the final design of [.....] has been the subject of a Stage 2 Road Safety Audit in accordance with [Schedule 15-2, Part 2, Article 6] of the Design and Construction Specifications, the Design Quality Management Plan and all other relevant provisions of the Project Agreement and that all observations and recommendations in the Road Safety Audit Team’s report have been satisfactorily addressed and resolved.

Signed:

Designer (Principal)

Name:

Title:

Date:

Professional Registration Number:

Affix Professional Seal

Signed:

Construction Contractor (Principal)

Name:

Title:

Date:

Professional Registration Number:

Affix Professional Seal

Signed:

DB Co Representative

Name:

Date:

4. Receipt of this Certificate is acknowledged.

Signed.....

City of Ottawa Representative

Name.....

Date.....

Certificate Ref. No. []

ROAD SAFETY AUDIT CERTIFICATE (STAGE 4)

This Certificate is being delivered pursuant to the agreement between the City of Ottawa and [DB Co] dated • (“the Project Agreement”) relating to the Project. Defined terms and expressions used in this Certificate have the same meanings as ascribed thereto in the Project Agreement.

Form of Certificate to be used by the designer for certifying that a Stage 4 Road Safety Audit has been carried out in accordance with [Schedule 15-2, Part 2, Article 6] of the Design and Construction Specifications.

1. We certify that the **[reference relevant works]** as constructed, tested and commissioned has been the subject of a Stage 4 Road Safety Audit in accordance with [Schedule 15-2, Part 2, Article 6] of the Design and Construction Specifications, the Design Quality Management Plan and all other relevant provisions of the Project Agreement.
2. The Road Safety Audit Team’s report and statement certifying the audit has been carried out are attached.

Signed:

Road Safety Audit Team (Principal)

Name:

Title:

Date:

Professional Registration Number:

Affix Professional Seal

3. We certify that the **[reference relevant works]** as constructed, tested and commissioned has been the subject of a Stage 4 Road Safety Audit in accordance with [Schedule 15-2, Part 2, Article 6] of the Design and Construction Specifications, the Design Quality Management Plan and all other relevant provisions of the Agreement and that all observations and recommendations in the Road Safety Audit Team’s report have been satisfactorily addressed and resolved.

Signed:

Designer (Principal)

Name:

Title:

Date:

Professional Registration Number:

Affix Professional Seal

Signed:

Construction Contractor (Principal)

Name:

Title:

Date:

Professional Registration Number:

Affix Professional Seal

Signed:

DB Co Representative

Name:

Date:

4. Receipt of this Certificate is acknowledged.

Signed.....

City of Ottawa Representative

Name.....

Date.....

APPENDIX I

[REDACTED] Information

**[REDACTED] Information to Support the City of Ottawa's
Proposed Light Rail System – Stage 2 Confederation Line**

Table 1-1 – [REDACTED] West Confederation Line Proposed System Expansion

| LRT Station | TPSS | Passenger Station | Supply Circuit | Supply Voltage | Supply Station | Construction Required | Primary Circuit | Supply % O/H | System Expansion Build-out Timeline (months) | Supply Point Location (X; Y) | LRT Peak Elect Demand (MVA) | [REDACTED] Max Circuit Available (MVA) | Supply Point Connection Config |
|-----------------------|------|-------------------|-------------------------|----------------|------------------------------|--|-----------------|--------------|--|--------------------------------------|---|--|--------------------------------|
| Moodie TPSS and LMSF | X | X | 22M28 and A9M2 | 44kV | Nepean DS and South March DS | Extend pole line. | Dual Radial | >75% | 18 | (356228.52, 5022267.30) ¹ | 12 | 12 | Dual Radial |
| Bayshore TPSSW1 | X | X | 2 x new circuits | 13.2 | Lincoln Heights TD | 2 x New Circuits from Lincoln | Looped | 0% | 36 | (358936.31, 5023137.77) | 3.5 | 8 | Looped |
| Pinecrest | | X | 5407 and 5408 | 13.2 | Lincoln Heights TD | Extension of 5407/5408 | Looped | 75% | 12 | (360376.13, 5023652.46) | 1+0.6 back-up | 1.6 | Dual Radial |
| Queensview TPSSW2 | X | X | TD1TW | 13.2 | Woodroffe TW | Extension of circuit TD1TW | Looped | 0% | 36 | (361008.70, 5024195.83) | 4.1 | 6 | Looped |
| Lincoln Fields TPSSW3 | X | X | TD2TW | 13.2 | Lincoln Heights TD | No expansion required. | Looped | 0% | N/A | (361114.94, 5025324.36) | 3.5 | 8 | Looped |
| New Orchard | | X | TD1TW | 13.2 | Woodroffe TW | No expansion required. | Looped | 0% | N/A | (361383.29, 5026368.30) | 1.6 + 1 back-up | 6 | Looped |
| Cleary TPSSW3A | X | X | 2 x new circuits | 13.2 | Woodroffe TW/Lincoln TD | 1 x new circuits from Woodroffe TW, 1 x new circuits from Lincoln TD | Looped | 0% | 36 | (361938.46, 5027161.60) | 4.5 + 0.6 back-up + 2 for future building | 8 | Looped |
| Dominion TPSSW4 | X | X | TM1AH | 13.2 | Carling TM | Minor expansion required | Looped | >50% | 12 | (362759.10, 5028308.34) | 3.5 | 4 | Looped |
| Westboro | | X | TH2UL and UL1AH (TM3UC) | 13.2 | Carling TM | No Expansion required. | Dual Radial | >75% | N/A | (363342.05, 5028747.37) | 1 | 3 | Looped |
| Iris | | X | TW1UV | 13.2 | Woodroffe TW | No expansion required. | Dual Radial | >75% | N/A | (362033.95, 5024240.12) | 1 | 7.6 | Looped |
| Baseline TPSSB1 | X | X | 2 x New Circuit | 13.2 | Woodroffe TW | 2 x New circuit from Woodroffe | Dual Radial | 0% | 24 | (362762.70, 5023246.39) | 7.1 | 16 | Looped |

Table 1-2 – [REDACTED] East Confederation Line Proposed System Expansion

| LRT Station | TPSS | Passenger Station | Supply Circuit | Supply Voltage | Supply Station | Construction Required | Primary Circuit | Supply % O/H | System Expansion Build-out Timeline (months) | Supply Point Location (X; Y) | LRT Peak Elect Demand (MVA) | [REDACTED] Max Circuit Available (MVA) | Supply Point Connection Config |
|-------------------------------------|------|-------------------|----------------|----------------|----------------|--|-----------------|--------------|--|--------------------------------|-----------------------------|--|--------------------------------|
| Track Heaters East of Blair Station | n/a | n/a | CYRF1 | 27.6 | Cyrville TS | Extension of existing circuit. | Looped Radial | >75% | 4 | (375158.87, 5033188.62) | 0.5 | 4 | Radial |
| Montreal TPSSE1 | X | X | 8F1 | 27.6 | Moulton MS | No Expansion required. Overhead switchgear relocation required | Looped Radial | >75% | N/A | (376356.23, 5034941.28) | 4 | 5 | Radial or Dual Radial |
| Jeanne D'Arc TPSSE2 | X | X | 77M5 | 27.6 | Bilberry TS | Extension of existing circuit | Looped Radial | >75% | 12 | (379465.97, 5036961.73) | 4 | 5 | Radial or Dual Radial |
| Orleans Blvd Option A | X | X | 77M1 | 27.6 | Bilberry TS | No Expansion required. | Looped Radial | >75% | N/A | (380323.45, 5037586.09) | 4 | 5 | Radial or Dual Radial |
| Orleans Blvd Option B | | | CYRF4 | 27.6 | Cyrville TS | Extension of existing circuit | Looped Radial | >75% | 18 | (380323.45, 5037586.09) | 4 | 5 | Radial or Dual Radial |
| Place D'Orleans TPSSE3 | X | X | 77M6 | 27.6 | Bilberry TS | No Expansion required. | Looped Radial | >75% | N/A | (381365.46, 5038185.20) | 4 | 5 | Radial or Dual Radial |
| Trim Road ² TPSSE4 | X | X | M1 | 27.6 | Orleans TS | No Expansion Required | Looped | >75% | N/A | (N 45.494989°, E - 75.483315°) | 4 | 5 | Radial |

[REDACTED] does not guarantee the accuracy of the information for the existing services

Notes:

1 DBCo shall be permitted to customize the overhead Supply Point location for the Moodie LMSF and TPSS to any location along the south side of the Corkstown Road ROW, west of Moodie Drive.

2 [REDACTED] supplied station.

Appendix J – Pinecrest Creek Stormwater Management Pond

1. Pinecrest Creek Stormwater Management Pond Stage-Area Curve
2. Pinecrest Creek Stormwater Management Pond Drawings

1. Table 2-J.1 – Pinecrest Creek SWM Pond Stage-Area Curve

| Elevation | Area (m ²) | | |
|--------------|------------------------|-----------------|-----------------|
| (m) | Forebay | Cell2 | Cell1 |
| 76.00 | 2016.65 | 0.00 | 0.00 |
| 76.25 | 2246.72 | 0.00 | 0.00 |
| 76.50 | 2481.12 | 2555.98 | 0.00 |
| 76.75 | 2719.64 | 2860.64 | 0.00 |
| 77.00 | 2962.01 | 3167.36 | 5367.29 |
| 77.25 | 3208.49 | 3475.09 | 5772.16 |
| 77.50 | 3459.27 | 3783.21 | 6181.86 |
| 77.75 | 3714.32 | 4091.64 | 6596.40 |
| 78.00 | 3973.44 | 4400.60 | 7015.77 |
| 78.25 | 4237.18 | 4710.11 | 7446.00 |
| 78.50 | 4505.84 | 5020.20 | 7881.90 |
| 78.75 | 5372.63 | 6062.28 | 9330.66 |
| 78.90 | 5627.98 | 6369.60 | 9747.19 |
| 79.00 | 5797.21 | 6572.68 | 9916.37 |
| 79.25 | 6221.50 | 7084.46 | 10332.29 |
| 79.50 | 6648.09 | 7605.21 | 10748.61 |
| 79.75 | 6833.97 | 7877.66 | 11030.85 |
| 80.00 | 7018.08 | 8150.63 | 11313.49 |
| 80.15 | 7140.90 | 8315.04 | 11483.19 |
| 80.25 | 16214.00 | | 12507.09 |
| 80.50 | 16659.03 | | 12809.62 |
| 80.75 | 17104.29 | | 13108.40 |
| 80.95 | 17452.64 | 13344.92 | |
| 81.00 | 17538.98 | | 13403.79 |
| 81.25 | 18006.19 | | 13696.76 |
| 81.50 | 18446.75 | | 13988.10 |
| 81.75 | 18897.30 | | 14281.52 |
| 82.00 | 19852.68 | | 14580.86 |

APPENDIX J2

[REDACTED]

APPENDIX K

Pedestrian Crossover Infrastructure Requirements

1.0 General

1.1 Scope

- a) This general specification identifies additional construction requirements specific to PXO facilities, including but not limited to, traffic infrastructure, street lighting, traffic signs, and pavement markings.

2.0 Reference Standards

- a) These are the primary references for the design and construction of a pedestrian crossover per Schedule 15-2, Part 2, Clause 6.1(a). DB Co shall reference, but not be limited to, the following reference material for the design and construction of a pedestrian crossover:
- RRFB Specification (Appendix K1 - below)
 - City of Ottawa Pedestrian Crossover (PXO) Program (Appendix K2 – separate document)
 - City of Ottawa Right-of-Way Lighting Policy
 - Ministry of Transportation of Ontario (MTO) Ontario Traffic Manual (OTM) Book 15
 - Ontario Regulation 402/15

3.0 Approval of Source

- a) DB Co shall coordinate and request approval from the City of Ottawa for their pedestrian crossover designs according to the requirements of Schedule 15-2, Part 2, Table 6-1 before proceeding to order, supply and install the pedestrian crossovers. For the permanent installation of pedestrian crossovers, DB Co shall only supply and install materials provided by manufacturers approved by the City of Ottawa or its agent. Only materials evaluated and approved will be accepted. Once the materials are approved, DB Co and the manufacturer shall not change the material type or component parts without prior approval, by the City of Ottawa or its agent, for subsequent orders.

4.0 Characteristics (Physical, Electrical, Environmental, Operational)

4.1 Physical Characteristics

4.1.1 Traffic Poles and Foundations

- a) DB Co shall supply and install the traffic infrastructure referenced from Table 1 below, based on the PXO Type and presence of street lighting, per the City of Ottawa Standard Detail Drawings.

Table 1: Pole Type and Foundation Detail for each PXO Type

| PXO Type | | City of Ottawa Standard Detail Drawing | | |
|----------|--------------------|--|--------|--------------------|
| | | Pole Type | | Foundation Details |
| Type B | w/ street lighting | Joint Use (32') | J-6-16 | As per T23 |
| | w/o street | Mast Pole | J-6-51 | As per T22 |

| | | | | |
|--------|---------------------|-----------------|------------------|--------------------------|
| | lighting | | | |
| Type C | w/ street lighting | Joint Use (32') | J-6-16 (w/o arm) | As per T23 |
| | w/o street lighting | Tubular Pole | J-6-49 (w/o arm) | As per T21 (or LID 002D) |

- a) DB Co shall refer to the attached design references for the placement and spacing of signs, push buttons, RRFB, etc. on the appropriate poles.

4.1.2 RRFB

- a) DB Co shall reference the City of Ottawa RRFB specification included with this Appendix. The City has pre-approved the following RRFB models:
- JSF RRFB Model AB 9207 (Single-sided)
 - JSF RRFB Model AB 9407 (Double-sided)
 - Carmanah SC 315 (Single-sided or double-sided)

4.2 Electrical Characteristics

- a) DB Co is to coordinate and provide sufficient notice to the City of Ottawa prior to making any electrical connections per Schedule 15-2, Part 2, Table 6-1. An authorized City of Ottawa electrical maintenance provider shall complete all final electrical connections.
- b) For the installation of the RRFBs, DB Co shall comply with the requirements of the RRFB specifications.

4.3 Environmental Characteristics

- a) For the installation of the RRFBs, DB Co shall comply with the requirements of the RRFB specifications.

4.4 Operational Characteristics

4.4.1 Illumination

- a) DB Co shall coordinate with the City of Ottawa Street Lighting Group to confirm if the proposed location of the PXO meets the required City of Ottawa lighting level criteria as per City of Ottawa ROW Lighting Policy. If the location does not meet the required lighting level criteria, DB Co shall design, obtain approvals, supply materials and labour, equipment, construct, provide inspection and testing associated with the City's requirements for street lighting standards and best practices, or upgrade the existing fixtures to meet the appropriate lighting levels.
- b) For the installation of new street lights, DB Co shall supply and install all luminaires and the associated traffic fixtures, or an equivalent approved material. The type/model of street light varies for each specific site. As such, DB Co shall confirm

with City of Ottawa Street Lighting Group for the appropriate type/model of each material required for new street lights.

- c) An authorized City of Ottawa Street Light maintenance provider shall complete all final electrical connections.

4.4.2 Traffic Signs

- a) DB Co shall design, supply and install all temporary and permanent traffic signs for a pedestrian crossover per the requirements of OTM Book 5 and Book 15.

4.4.3 Pavement Markings

- a) DB Co shall design, supply and install all temporary and permanent pavement markings for a pedestrian crossover per the requirements of OTM Book 11 and Book 15.
- b) The dimensions of the “shark tooth” pavement markings in the general traffic lanes shall be:
 - Height = 90 cm
 - Width = 60 cm
 - Spacing = 30 cm

Appendix K1 - RRFB Specification

1.0 General Requirements

- a) RRFB's are pedestrian-activated, high-intensity flashing beacons that warn drivers of the presence of a pedestrian in the crosswalk. RRFB's consist of two rectangular yellow indications with two tell-tale end indicators to let pedestrians know that the beacon is flashing. RRFB's must be activated manually by pushbuttons and are to flash in a rapid pattern for a pre-set time.
- b) The Ontario Traffic Manual (OTM) Book 15, outlines the components and installation layouts of RRFB's at pedestrian crossovers. All RRFB's supplied must be compliant with Book 15 applications and requirements and also be compliant with all certifications, as may be required by law.
- c) The RRFB must be widely distributed and have been on the market for more than two (2) years.

2.0 General Design

- a) The unit shall be available in two configurations, double-sided and single-sided. A RRFB unit shall consist of the RRFBs, associated enclosure, and a power supply consisting of a solar panel with rechargeable battery(s) and a push button for activation. The unit may have a separate controller and/or battery cabinet if so required.
- b) The RRFB's must be capable of being mounted on these poles above the Pedestrian Crossing sign and at a height between 3.0m and 4.0m from the base of the pole.

3.0 RRFB Specifications

- a) The enclosure in which the RRFBs are mounted must be yellow. The yellow colour must be similar to that used on warning signs in the Province of Ontario. Refer to the OTM Book 1B. Where a separate controller/battery cabinet is provided, the cabinet shall be grey.
- b) All RRFB enclosures (and controller/battery cabinet if applicable) shall be powder coated aluminum and shall be weather tight, secure and vandal resistant. All enclosures/cabinets shall have a minimum 5 year corrosion damage warranty.
- c) Each single-sided RRFB unit shall provide two (2) LED rectangular-shaped amber indications facing outward toward on-coming traffic. A double-sided unit shall provide an additional two (2) LED indications facing the opposite direction.
- d) Each LED indication shall be a minimum of 125mm wide by 50mm high. The two (2) RRFB indications shall be aligned horizontally, with the longer dimension horizontal and with a minimum space between the two indications of 175 mm, measured from inside edge of one indication to the inside edge of the other indication.

- e) The RRFBs shall provide a minimum of 20 degrees horizontal pivot. When set, the RRFB angle shall remain securely in place.
- f) Each RRFB unit shall provide two (2) yellow LED tell-tale end indicators, one facing inward toward the crossover the other facing outward. Each tell-tale indicator shall be a minimum of 5 sq. cm.

4.0 Power Specifications

- a) Each unit shall be powered by a rechargeable battery(s). The battery(s) shall be recharged by solar panels.
- b) Each unit must be capable of being connected directly to 120 volt AC power or to be capable of being modified to provide a direct AC connection. In the case where the supplied unit does not provide a direct AC connection, an “AC modification package” must be available from the manufacturer that would enable the unit to accept a direct AC connection. The “AC modification package” must be easily field installable. The cost of the “AC modification package” must be available at a cost of [REDACTED].
- c) The power supply must be capable of operating the RRFB unit (from full charge) for a minimum of 20 days without re-charging at an average usage rate of 200 cycles per day at 25 seconds of activation/per cycle.
- d) The solar panel and battery(s) must be of sufficient size and capacity to provide the necessary power as recommended by the manufacturer to achieve the rated usage, where installed in Ottawa, Ontario, Canada.
- e) The battery(s) shall be UL certified and field replaceable.
- f) The solar panel must be capable of being securely installed on the top and on the side of the J-6-49, J-6-51 or J-6-16 (side only) pole that the RRFB is mounted.
- g) All brackets and hardware required to mount the solar panels must be supplied with the unit. All brackets and mounting hardware are to be corrosion resistant. Brackets and mounting hardware must be supplied to enable 12 side-of-pole installations and 20 top-of-pole installations.
- h) All wiring connections for the RRFB unit components must be capable of being easily installed within the poles specified (J-6-49, J-6-51, J-6-16). All wiring and connections shall be weather tight, secure and vandal resistant.
- i) The unit is to be supplied with an accessible push button for pedestrians to activate the RRFB's. The push button is to be yellow and must be capable of being mounted on the same pole that the RRFB is mounted. Brackets and mounting hardware to attach the push button to the poles specified must be supplied.

- j) The pushbutton shall have a two-tone audible confirmation.
- k) The power supply, including battery and solar panel and all other components must be capable of operating at temperatures between -40°C and +40°C. Any upgrades to the power supply or other components recommended by the manufacturer required to ensure the unit operates at its rated usage, within this temperature range are to be included.

5.0 Operational Requirements

- a) The operation of the RRFB shall be as outlined in OTM Book 15.
- b) When activated by push button, the two (2) yellow indications in each RRFB unit (two in each direction for double sided units) shall flash in a rapidly alternating “wig-wag” flashing sequence (left light on, then right light on) with a duty cycle of 800 milliseconds (ms). The left LED flashes two times in a slow volley each time it is energized (125 ms on and 75 ms off per flash). This is followed by the right LED, which flashes four times in a rapid volley when energized (25 ms on and 25 ms off per flash) and then has a longer flash for 200 ms. The effect is known as a “stutter flash effect” and is compliant with the Manual on Uniform Traffic Control Devices (MUTCD) RRFB flash pattern 2/4-1 (2012).
- c) The RRFBs must also be capable of flashing in compliance with MUTCD RRFB flash pattern WW+S (2014) (Wig-Wag plus Simultaneous).
- d) The unit’s flash pattern shall be capable of being easily set in the field through manual means (switch, dial, etc.).
- e) When the RRFB is flashing, the two tell-tale end indicators on the unit shall be on. Otherwise, they are to be off.
- f) The time lapse between the push button activation and start of the RRFB flashing should be less than 1 second and in no case more than 3 seconds.
- g) If a pedestrian pushes the button midway through a flashing cycle, the unit is to reset the RRFB flash duration for another full cycle.
- h) The flash rate of each individual yellow indication, as applied over the full on-off sequence of a flashing period of the indication, shall not be between 5 and 30 flashes per second.
- i) The flash duration cycle of the RRFB must be variable. The flash duration cycle must be capable of being set (in 5 seconds increments) for a minimum of 5 seconds up to 60 seconds.
- j) Generally more than one (1) RRFB unit is installed at a PXO. The operation of these units must be synchronized to enable the activation of one RRFB unit to automatically activate up to four (4) additional RRFBs.

- k) The communication “channel” for the RRFB to synchronize with other RRFB units shall be capable of being easily set in the field through manual means (switch, dial, etc.).
- l) Communication enabling the synchronization of the RRFB units shall be wireless and must operate within a minimum line-of-sight distance of 350m.
- m) Communication between RRFB units to enable synchronized activation must be secure and designed to avoid interference between multiple locations or other electrical devices.
- n) The RRFB units must provide a night time auto brightness feature. This feature must be capable of being turned off.
- o) The RRFB unit shall provide a visual indicator of substandard operating condition.

6.0 Operational Requirements

- a) A five (5) year warranty is to be provided for workmanship and materials.
- b) The RRFB enclosure and controller cabinet (if applicable) shall have a five (5) year corrosion damage warranty.
- c) One (1) written copy of the installation and operating manual must be supplied for each unit supplied. The manual is to contain the information necessary to install, operate, and maintain the RRFB unit and all associated components.
- d) Keys and/or special tools that may be required to access and maintain the unit shall be supplied.
- e) Parts covered by warranty must be available within twenty (20) calendar days. The supplier shall be responsible for all delivery costs, including those for the return of defective components as may be required.

APPENDIX K2

City of Ottawa Pedestrian Crossover (PXO) Program

APPENDIX K2

City of Ottawa Pedestrian Crossover (PXO) Program

Appendix K2 - City of Ottawa Pedestrian Crossover (PXO) Program

OVERVIEW

The City of Ottawa Pedestrian Crossover (PXO) Program provides the basis for PXO implementation in Ottawa. The program's processes for the screening, warranting and implementing the PXOs are extracted directly from those identified in the recently updated and soon to be released Ministry of Transportation of Ontario's (MTO) Ontario Traffic Manual (OTM) Book 15 – Pedestrian Crossing Treatments.

Book 15 includes all of the background information and justification regarding the use of PXOs as safe pedestrian crossing treatments in Ontario. Book 15 must be referred to for clarification on any interpretation of the PXOs outside of the definitions stated further below as defined in Book 15. Book 15 reflects the legal framework in which the program needs to operate; and this includes the following items:

- *Ontario Highway Traffic Act (HTA)*
 - Categories of Pedestrian Crossings
 - Pedestrian Rights and Responsibilities
 - Ontario Regulations
- Accessibility
 - Legislative Requirements - *Accessibility for Ontarians with Disabilities Act (AODA)*
 - Designing for Accessibility
 - Curb Ramps and Depressions

PXOs are one of a few traffic control devices that are available to road authorities throughout Ontario to establish the right-of-way for pedestrians; other control devices include stop and yield signs, adult school crossing guards and traffic control signals. The material extracted from Book 15 for this program addresses, for the most part, the use of PXOs and which type of treatment is the most appropriate device amongst the three new versions of the PXO for facilitating the movement of pedestrians across the road. While other devices also facilitate the control of traffic for all types of travel modes, the PXO focuses solely on pedestrians, including cyclists that need to dismount and cross as pedestrians. Definitions for key terms pertaining to the PXO Program are included below:

- **Crossings** - The *HTA* recognizes two crossing categories.
 - **Controlled:**
 - A crossing that is supported by one of the three control measures; Stop/Yield Signs, Pedestrian Crossovers (PXOs), or one of the Traffic Control Signal variations. **This document focuses on the controlled crossing type.**

- Vehicles are required to stop or yield to pedestrians.
- At a PXO, no pedestrian or person in a wheelchair shall leave the curb or other place of safety at a pedestrian crossover and walk, run or move the wheelchair into the path of a vehicle that is so close that it is impracticable for the driver of the vehicle to yield the right-of-way.
- **Uncontrolled:**
 - All other crossings including unmarked crossings at intersections, marked crossings but unsigned or unsignalized, school crossings when the adult school crossing guard is not present.
 - Pedestrians must yield to traffic and wait for a safe gap sufficient for them to cross the roadway, prior to attempting to enter the roadway. Pedestrians *do not* have the right-of-way at uncontrolled crossings.
- **Pedestrian Responsibility** - Pedestrians must exercise due care even when they are lawfully within a crossing and have right-of-way. It is not an absolute right and they must still exercise care to avoid a collision with a vehicle.
- **Pedestrian**
 - A person who is not in or upon a vehicle, motorized or otherwise propelled
 - A person in a wheelchair driven by muscular or any other kind of power
 - A person pushing a bicycle, or a wheelchair
- **Vehicle** - includes a motor vehicle, trailer, traction engine, farm tractor, road-building machine, bicycle, and any vehicle drawn, propelled or driven by any kind of power, including muscular power. It is pertinent to note that *HTA* considers bicycles as vehicles and are required to yield right-of-way to pedestrians on controlled crossings similar to other vehicles. While using a pedestrian crossing, cyclists must dismount and walk across the pedestrian crossing.

There are three important parts to the Ottawa PXO Program which have been added to the updated Book 15. These include:

- the **screening process** for potential crossing locations,
- the **selection process** for the type of PXO when the location is warranted, and
- the **conditions required** for the installation of the PXO.

SCREENING PROCESS

Book 15 provides a Decision Support Tool (DST) which includes two components: (1) Preliminary Assessment, and (2) Pedestrian Crossing Selection. The preliminary assessment is used to check whether a location is a candidate site for a pedestrian crossing control, whether its warranted or not, and then the pedestrian crossing selection assists practitioners to choose an appropriate pedestrian crossing treatment system for the site in question.

Preliminary Assessment

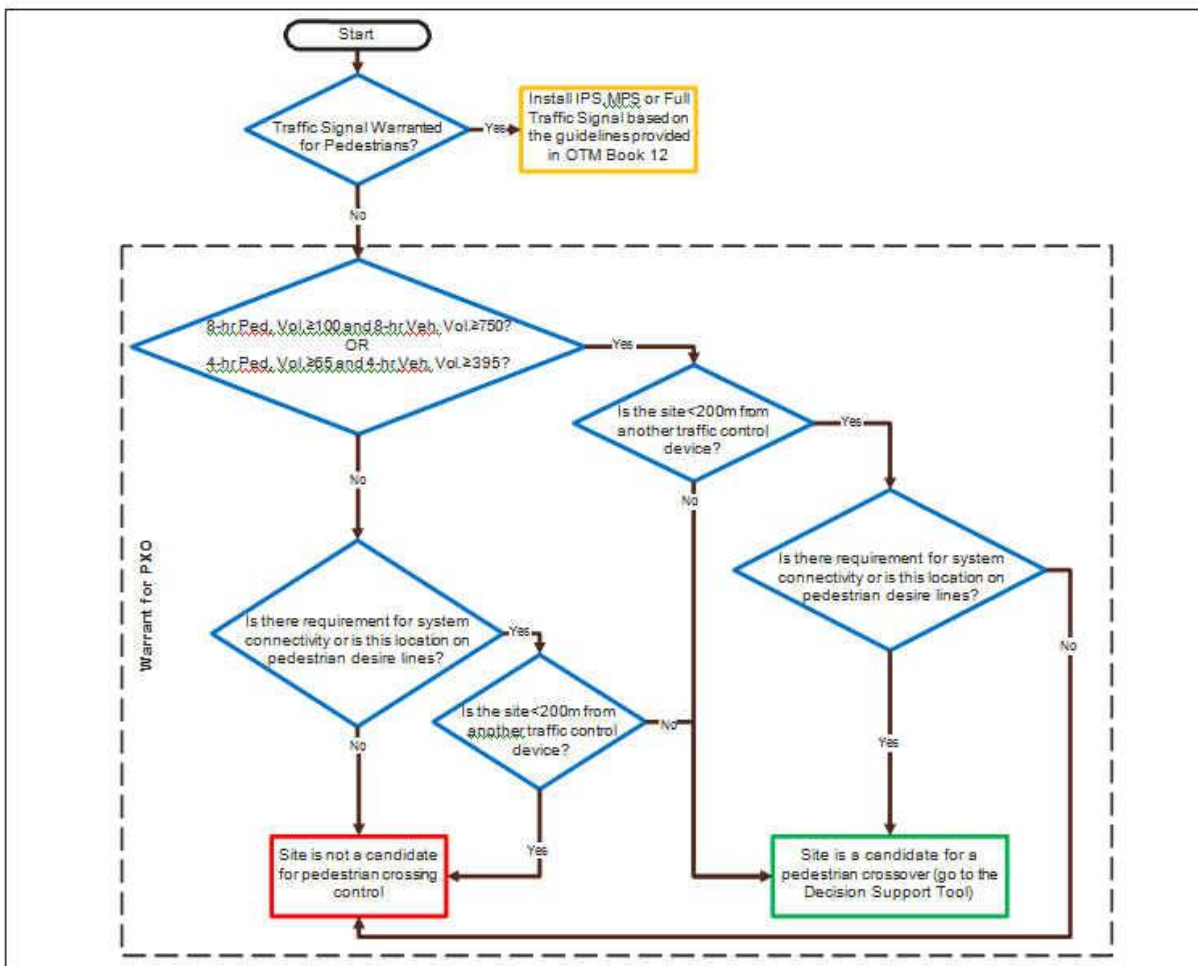
Even before the preliminary assessment is undertaken, it must be confirmed that the identified location has adequate sight distance for both motorists and pedestrians. Motorists must be able to see pedestrians in the waiting area adjacent to the crossing in sufficient time to perceive their intent to cross, react and brake to a stop comfortably. Similarly, pedestrians must be able to see oncoming traffic in both directions of travel so that they do not begin to cross when motorists have insufficient time to stop. To accommodate sight lines, it may be necessary to modify curb side regulations which may include the removal or relocation of on-street parking, bus stops, loading zones, etc.

The preliminary assessment involves the following steps:

- Step 1: Check whether a traffic signal is warranted for pedestrians based on Justification 6 of OTM Book 12.
- Step 2: If a traffic signal is not warranted, the flow chart conditions identified below in Figure 1 must be used to assist in checking whether a PXO is warranted for the site.

The Decision Support Tool (DST) – Preliminary Assessment flow chart identified in Book 15 is used to identify whether a site is a candidate for pedestrian crossing control.

Figure 1 - Decision Support Tool (DST) – Preliminary Assessment Flow Chart



In completing the process identified in Figure 1, the following elements are applied:

- Eight hour volumes will be used for urban areas, and four hour counts will be used for rural areas
- Assisted pedestrians, which include children under 12, seniors and those disabled with or without assistance, will count as two persons.

SELECTION PROCESS - PXO

Pedestrian Crossing Control Selection

The second component of the DST provides guidance for pedestrian crossing treatment selection to assist practitioners to identify which treatment system is applicable to the site based on its traffic and geometric characteristics.

The following table, as provided in Book 15, provides a guideline for the treatment system and the likely application environment.

Table 1 - Pedestrian Crossing Treatment System Selection

| Type of Crossing | Treatment System | Mid-block | Intersection | Roundabout | Right-turn Channel |
|-----------------------|--------------------------------|-----------|--------------|------------|--------------------|
| Traffic Signal | Full Signal | | • | | |
| | Intersection Pedestrian Signal | | • | | |
| | Mid-block Pedestrian Signal | • | | | |
| Pedestrian Crossover | PXO A | • | • | | |
| | PXO B | • | • | • | |
| | PXO C | • | • | • | |
| | PXO D | • | • | • | • |
| Stop or Yield Control | | | • | | • |
| Crossing Guard | | • | • | • | • |

The selection of an appropriate PXO treatment (i.e. Type A, B, C, or D) is determined based on the Pedestrian Crossover Selection Matrix as shown in Table 2. The matrix has been developed based on the following criteria:

- Application of PXOs is limited to road segments with a posted speed limit of 60 km/h or less
- A PXO can be installed on roadways with a maximum of 4 lanes.
- Vehicular traffic volumes are collected during the 8 or 4 hours with the highest pedestrian volumes.
- A PXO must not be used where the road volume exceeds 35,000 AADT (Average Annual Daily Traffic).
- PXOs should not be installed within 200m of other signal-protected pedestrian crossings, although there are some exceptions.

As a result of the criteria used to develop the matrix, four variables are used to select a PXO for a site:

- 8-hour (urban) or 4-hour (rural) two-way vehicular volume of the roadway at the location of the crosswalk
- Posted speed limit of the roadway

- Total number of lanes for the entire roadway cross section
- Presence of raised pedestrian refuge (i.e., refuge island or median)

Note: In the City of Ottawa Pedestrian Crossover (PXO) Program, the Selection Matrix will be used irrespective of the type of environment, such as one-way/two-way roadways, roundabouts, intersections, etc. Also, if the use of a PXO is desired based on the connectivity (i.e. pedestrian and vehicular volume conditions are not fulfilled), then the matrix can still be used based on speed and geometry of the roadway by using the top two rows of the matrix.

Table 2 - Pedestrian Crossover Selection Matrix

| Two-way Vehicular Volume | | | Speed Limit (km/h) | Total Number of Lanes for the Roadway Cross Section ¹ | | | |
|--------------------------|-------------|-------------|--------------------|--|--------------------|-------------------------|---------------------------|
| Time Period | Lower Bound | Upper Bound | | 1 or 2 Lanes | 3 lanes | 4 lanes w/raised refuge | 4 lanes w/o raised refuge |
| 8 Hour | 750 | 2,250 | ≤50 | PXO D | PXO C ² | PXO D ² | PXO B |
| 4 Hour | 395 | 1,185 | | | | | |
| 8 Hour | 750 | 2,250 | 60 | PXO C | PXO B | PXO C ² | PXO B |
| 4 Hour | 395 | 1,185 | | | | | |
| 8 Hour | 2,250 | 4,500 | ≤50 | PXO D | PXO B | PXO D ² | PXO B |
| 4 Hour | 1,185 | 2,370 | | | | | |
| 8 Hour | 2,250 | 4,500 | 60 | PXO C | PXO B | PXO C ² | PXO B |
| 4 Hour | 1,185 | 2,370 | | | | | |
| 8 Hour | 4,500 | 6,000 | ≤50 | PXO C | PXO B | PXO C ² | PXO B |
| 4 Hour | 2,370 | 3,155 | | | | | |
| 8 Hour | 4,500 | 6,000 | 60 | PXO B | PXO B | PXO C ² | PXO B |
| 4 Hour | 2,370 | 3,155 | | | | | |
| 8 Hour | 6,000 | 7,500 | ≤50 | PXO B | PXO B | PXO C ² | PXO A |
| 4 Hour | 3,155 | 3,950 | | | | | |
| 8 Hour | 6,000 | 7,500 | 60 | PXO B | PXO B | | |
| 4 Hour | 3,155 | 3,950 | | | | | |
| 8 Hour | 7,500 | 17,500 | ≤50 | PXO B | PXO B | | |
| 4 Hour | 3,950 | 9,215 | | | | | |
| 8 Hour | 7,500 | 17,500 | 60 | PXO B | | | |
| 4 Hour | 3,950 | 9,215 | | | | | |

¹The total number of lanes is representative of crossing distance. The width of these lanes is assumed to be between 3.0 m and 3.75 m according to MTO Geometric Design Standards for Ontario Highways (Chapter D.2). A cross sectional feature (e.g. bike lane or on-street parking) that extends the average crossing distance beyond this range of lane widths may need to be considered as an additional lane in this table.

²Use of two side mounted signs per direction (one on the right side and on the median).

³Use PXO B for one-way streets.

CONDITIONS REQUIRED

There are a number of conditions required in the pedestrian crossing facility design to implement controlled crossings.

General Considerations

Controlled crossings manage the interaction between pedestrians and vehicles, and present operational benefits to pedestrians by providing priority over vehicles either at all times or for allocated periods of time. This priority may provide a sense of security for pedestrians, encourage pedestrians to cross at the controlled location and limit the number of locations where pedestrian crossings occur.

The OTM guidelines that would automatically limit the distance between pedestrian crossings are as follows:

- According to OTM Book 12, the minimum distance between traffic signals for roads posted at 60 km/h or less is 215 m and for roads posted at 80 km/h is 350 m.
- According to OTM Book 12, PXOs should not be installed within 200 m of other signal-protected pedestrian crossings. Although this is the general rule, OTM Book 15 does make some exceptions for this separation.

Adequate sight distance for all road users must be provided as a fundamental component of all controlled crossing design. Visibility of all signs and signals should be confirmed.

Physical Design Components

The following provides an overview of the geometric requirements of a PXO. Should more detailed information on the design components for PXOs be sought, Book 15 Chapter 6 - Pedestrian Crossing Facility Design: Controlled Crossings should be reviewed.

Crosswalk

According to the *HTA*, a “crosswalk” means,

- a. that part of a highway at an intersection that is included within the connections of the lateral lines of the sidewalks on opposite sides of the highway, measured from the curbs or, in the absence of curbs, from the edges of the roadway, or
- b. any portion of a roadway at an intersection or elsewhere distinctly indicated for pedestrian crossing by signs or by lines or other markings on the surface.

Crosswalks must be marked for all controlled pedestrian crossing treatments.

Curb Ramps and Depressions

Curb ramps provide access for people using wheelchairs or scooters at crossings where there is an elevation change between the sidewalk and the street level crossing.

Curb depressions improve accessibility for crossing activity for all pedestrians. They are typically provided in urban areas where pedestrian activity exists. Curb depressions are not intended to imply right-of-way, but rather to improve accessibility and safety where pedestrian activity has been demonstrated, or is anticipated.

Specific requirements for depressed curbs are provided in Book 15 Section 2.3.3 – Designing for Accessibility.

Signs

The regulatory signs must be provided, wherever conditions are met according to OTM Book 5 – Regulatory Signs and *Ontario Regulation 615* with all amendments. Where right-of-way to pedestrians is being assigned at new locations through the provision of a PXO, an introductory period is required to safely carry out the transition. The complete procedure with required regulatory signs is also included in *Ontario Regulation 615*.

Rapid Rectangular Flashing Beacons with Tell Tale

Rapid Rectangular Flashing Beacons (RRFBs) are pedestrian-activated, high-intensity flashing beacons that warn drivers of the presence of a pedestrian in the crosswalk. RRFBs consist of two rectangular yellow indications with two tell-tale end indicators to let pedestrian know that the beacon is flashing.

RRFBs are required components for PXO Types B and C. Wherever required for an applicable PXO, an RRFB must be used for each direction of travel (see installation layouts of PXO Types B and C).

Markings

The guidelines related to design, installation, and application of pavement markings are provided in OTM Book 11 – Markings and Delineation. Additionally, Ontario Regulation 615 provides information regarding requirements for pavement markings utilized with PXOs.

A yield to pedestrian line is used to indicate the point at which a vehicle approaching a crosswalk must yield to pedestrians in the crosswalk. A yield to pedestrian line is a mandatory component for PXO Types B, C, and D, and is a desirable component for PXO Type A.

Ladder crosswalk markings are a mandatory component for PXO Types B, C, and D. The outer edge of the ladder crosswalks must be minimum 1.5m from the yield to pedestrian line for two-lane roadways and minimum 6.0m from the yield to pedestrian line for multi-lane roadways.

Illumination

The design of all pedestrian crossing treatments (controlled or uncontrolled) must provide adequate lighting to enhance the safety of pedestrians. The guidelines related to planning and design of roadway lighting including lighting of pedestrian crosswalks at intersections, roundabouts and mid-blocks are provided in the TAC Guide for the Design of Roadway Lighting (Roadway Lighting Guide). The Guide also includes the warranting criteria for each application of roadway lighting.

Design Approach

Design, application and operational guidelines and procedures should be used with judicious care and proper consideration of the prevailing circumstances. In some

designs, applications, or operational features, the traffic practitioner's judgement is to meet or exceed a guideline while in others a guideline might not be met for sound reasons, such as space availability, yet still produce a design or operation which may be judged to be safe. Every effort should be made to stay as close to the guidelines as possible in situations like these, and to document reasons for departures from them.

However, no manual can cover all contingencies or all cases encountered in the field. Therefore, field experience, knowledge of application, and engineering judgement are essential in deciding what to do in the absence of specific direction from Book 15 itself and in overriding any recommendations in the manual. Similarly, municipalities may need to adopt policies that reflect local conditions. The traffic practitioner's fundamental responsibility is to exercise engineering judgment on technical matters in the best interests of the public and workers. Guidelines are provided in the Ontario Traffic Manuals to supplement professional experience and assist in making those judgments.

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**SCHEDULE 15-2
DESIGN AND CONSTRUCTION REQUIREMENTS**

**PART 2
CIVIL AND GUIDEWAY**

ARTICLE 1 INTRODUCTION

1.1 General

- (a) The Existing Confederation Line is a dual Track system from Tunney's Pasture Station to Blair Station.
- (b) The Confederation Line shall be extended west from Tunney's Pasture Station to Lincoln Fields Station. From Lincoln Fields Station, separate branches will extend to Moodie Station and to Baseline Station. New Stations will be located at Westboro Station, Dominion Station, Cleary Station, New Orchard Station, Lincoln Fields Station, Queensview Station, Pinecrest Station, Bayshore Station, Iris Station and Baseline Station.
- (c) The Confederation Line shall be extended east from Blair Station to a new Trim Station with Stations also located at Montreal Road Station, Jeanne d'Arc Station, Place d'Orléans Station, and Orléans Boulevard Station.

1.2 General Description of the Guideway and Guideway Requirements

- (a) DB Co shall design the Guideway with two Tracks for operation extending:
 - (i) west from the Existing Confederation Line terminus at Tunney's Pasture to Moodie and Baseline Stations for a total length of approximately 15.3km;
 - (ii) DB Co shall provide the Systems in accordance with the requirements set out in this Project Agreement and any deviations or variances to the application of the selected standards shall be subject to approval by the City; and,
 - (iii) east from the Existing Confederation Line terminus at Blair Station to Trim Station for a length of approximately 12.8km.
- (b) The Guideway alignment characteristics shall be as follows:
 - (i) At grade section, within the existing Transitway trench, from Tunney's Pasture Station to Dominion Station with an approximate length of 2.45 km;
 - (ii) Tunnel section from west of Dominion Station to west of Richmond Road with an approximate length of 3.0 km;
 - A. The Tunnel section that is constructed within NCC property shall be no more than 10.5m wide (for tangent Track, increased on curves for

superelevation and carbody overhang) from exterior face of permanent Tunnel Structure to exterior face of permanent Tunnel Structure and located within the permanent Lands such that there is at least a 3m permanent buffer on each side of the permanent Tunnel Structure to the permanent Lands property parcel limits.

- (iii) At grade section from the West Portal south of Richmond Road through Lincoln Fields Station, where it splits to Baseline Station and to Moodie Station of approximate lengths of 2.7km and 6.1km respectively; includes a 370m tunnel under Connaught Avenue between Lincoln Fields Station and Queensview Station;
- (iv) Lincoln Fields Station shall include a 3rd Track as a Pocket Track between the two Mainline Tracks;
- (v) The Guideway to Moodie Station shall cross over the Guideway to Baseline Station on a continuous elevated structure crossing over the SB Guideway to Baseline Station, over Pinecrest Creek and over a MUP;
- (vi) Baseline Station is a Terminal Station located below ground in the existing Structure and shall include:
 - A. Two storage Tracks located in front of the Station Platform of sufficient length to accommodate two Trains of maximum length plus a safety buffer distance on each end in each Track, coordinated with the CBTC system designer.
 - i. At least one side of each Vehicle parked in the storage Track shall be accessible from a paved surface of adequate width. Space shall be provided for a short Operator platform, to allow the Operator to transfer from one car to the other car, with a safety fence separating the Operator from the mainline.
- (vii) At grade section from Blair Station to the elevated section (Flyover Structure) located just east of the existing Transitway overpass over OR174 of an approximate length of 0.8 km including:
 - A. A Pocket Track of sufficient length to accommodate one Train of maximum length plus a safety buffer distance on each end to allow for uninterrupted movement of a Train into the storage Track (Train shall be able to enter in ATO mode without manual intervention) coordinated with the CBTC system designer. The maximum length Train to be accommodated shall include the future additional 10m long body section in one Vehicle of the trainset.

- i. Space shall be provided for a short (10m long minimum) Operator platform with a safety fence separating the Operator from the mainline.
 - (viii) Elevated Section (Flyover Structure) crossing over the OR174 WB lanes to the OR174 center median of an approximate length of 0.25km; and,
 - (ix) At grade section located in the OR174 center median from the Flyover Structure to Trim Station for an approximate length of 11.6 km including;
 - A. Two Tail Tracks beyond Trim Station as follows:
 - i. The northern Track shall be an approximate length of 130m with OCS terminating 90m beyond the end of the Platform.
 - ii. The southern Track shall extend at least 50m beyond the Train stop location on the Platform and shall meet the requirements of Clause 2.6(d) of Schedule 15-2, Part 1 – General Requirements.
 - iii. Measures to prevent Vehicles from travelling beyond the Tail Track and into the at-grade intersection shall be installed.
 - iv. A secure gated vehicle access to the Tail Track area with a drivable route along one side of the northern Tail Track.
- (c) The Guideway shall include components for safe and efficient operation of the system, including but not limited to:
 - (i) Traction Power;
 - (ii) OCS;
 - (iii) Communications and low voltage power duct banks;
 - (iv) Signal and control Systems;
 - (v) Drainage systems and SWM;
 - (vi) Other appurtenances as required by DB Co's design for the safe and efficient operation of the system;
 - (vii) Track Switch Control.
- (d) Lighting shall be provided to the required safety walkway area as per the requirements of NFPA 130.

1.3 Access of Emergency Services Vehicles to the Guideway

- (a) All sections of the Guideway shall be designed and constructed with a means of Emergency egress in compliance with the requirements of NFPA 130 via an unobstructed clear width.
- (b) DB Co shall provide Emergency egress points along the Guideway that will allow ESP access as per the requirements of NFPA 130. These locations shall be in addition to end of Platform egress points. These points shall be provided with a gated entry through the security fencing of the Guideway where they are located between Stations. A unique identification system shall be developed for the gates in consultation with the City and signage shall be fixed to both sides of each gate for identification purposes.
- (c) Emergency vehicles shall be able to travel by a paved route to within 15m of the gated entry point. The route may be by existing Transitway roadway, nearby public roadway allowance, nearby commercial parking lot or public MUP. If the route is more than 90m in length then a turnaround for the Emergency vehicle shall be provided at the gated entry point. A minimum of one turnaround shall be provided at the end of the route if multiple entry points are being accessed from one route. The turnaround shall be designed for a minimum centreline radius of 12m. The turnaround shall be either a circular cul-de-sac or a hammerhead with minimum dimensions of 14m x 14m.
- (d) DB Co shall provide an identification scheme for the gates on OR174 that includes a reference to the OR174 mileage marker number.
- (e) Access gate locations shall be located to provide Emergency access from both directions of travel on OR174 in alternating fashion along the Guideway.
- (f) The use of the existing Queensway Transitway Station Platforms shall be permitted as an emergency access point on south side only. DB Co shall confirm during the design that such an approach is in conformance with NFPA 130.
- (g) The guideway shall be fenced or otherwise enclosed for security.

ARTICLE 2 GEOMETRIC DESIGN CRITERIA FOR TRACK ALIGNMENT

2.1 Reference Documents

- (a) The design and construction of the alignment work shall comply with the criteria contained within this Article and the Applicable Law, guidelines or practices applicable to the Project, including the following Reference Documents. In the event of a conflict between the criteria, commitments or requirements contained within one document when compared with another, the more stringent shall apply. The Order of Precedence for this portion of the Contract shall be as follows:
 - (i) The criteria in this Article;
 - (ii) Transit Cooperative Research Program TCRP Report 155 – Track Design Handbook for Light Rail Transit, 2nd Edition;
 - (iii) The American Railway Engineering and Maintenance-of-Way Association (AREMA) Manual for Railway Engineering;
 - (iv) European (EN) Standards for Railway Applications
 - (v) OHSA R.S.O. 1990;
 - (vi) Standard Respecting Railway Clearance - Transport Canada - TC E-05 (1992)

2.2 Use of Minimum or Maximum Criterion

- (a) Where specific numbers are given for limitations on alignment elements, such limitations are not targets to be achieved by DB Co, but limits to be avoided. DB Co shall meet or exceed the minimum requirements.
 - (i) Design for maximum Passenger comfort where no physical restrictions or significant construction cost differences are encountered.
 - (ii) Design shall meet the operating objectives, without compromising ride quality or taxing the mechanical limits of the Vehicle, and meet the operational performance requirements.
 - (iii) Minimum and maximum values are determined primarily by the Vehicle design limitations and/or safety considerations, with maximum operating speeds and Passenger comfort as secondary considerations. Minimum and maximum values have potential impacts in terms of maintenance costs, noise, wheel life and Track life. Minimum and maximum values shall only be used where physical restrictions prevent the use of Passenger comfort values. The use of minimum and maximum values shall be justified and documented in a design report, and shall require approval by the City.

2.3 General

- (a) DB Co shall provide the Mainline Track, non-revenue Track, including Connecting Track, storage Track, and Yard Track, for maximum operating speed to satisfy the criteria identified in Schedule 15-2, Part 1, Article 3 – Operational Performance Requirements; as dictated by existing topography, permanent physical features, property, and alignment constraints.
- (b) DB Co shall ensure that the design and construction for the Confederation Line East Extension and Confederation Line West Extension is integrated with the Existing Confederation Line.

2.4 Horizontal Alignment

- (a) DB Co shall design the horizontal Track alignment in accordance with the requirements of Clause 2.2 of this Part 2, and shall be such that all of the SI is contained within the Lands as defined in Schedule 20 – Lands.
- (b) DB Co shall design the Mainline Track for an operating speed of 100km/h unless Physical Constraints do not allow, in which case DB Co shall design the Mainline Track so as to maximize the operating speed.
- (c) DB Co shall design the LMSF Connecting Track for a speed of no less than 30 km/hr and shall also consider the safety of the geometrics.
- (d) DB Co shall provide a tangent horizontal alignment through Station Platform limits for a distance of 25m beyond the end of Platforms. Where a Physical Constraint exists this may be reduced to a minimum of 15m subject to approval from the City, and only if sufficient running clearance between the Revenue Vehicle or Non-Revenue Vehicles, and Platform is achieved. The distance from the end of the Platform to spiral transition curve may be further reduced if site conditions do not provide sufficient length, provided the requirements of Clause 2.7 (a), of this Part 2, at a pass through speed of 30 km/h and clearance requirements for Maintenance Vehicles are considered.
- (e) All non-Track related Construction layout shall be related to or dimensioned from the centreline of the EB Track, unless otherwise noted.

2.5 Track Centres

- (a) Minimum Tunnel Track centre spacing with a center wall shall be 5.3m on tangent Track, increased on curves for superelevation and carbody overhang.
- (b) Ballasted Track centre spacing shall be 4.0m or greater.
- (c) Where Physical Constraints are present, Track centre spacing of less than 4.0m on tangent Track, and increased on curves for superelevation and carbody overhang, may be constructed, subject to approval by the City.

2.6 Horizontal Curves

- (a) DB Co shall define circular curves by the arc definition of curvature and specified by their radius in metres to three decimal places.
- (b) Mainline Track curves shall be designed to maintain the maximum operating speed as dictated by existing topography, permanent physical features, property, and the alignment constraints per Clause 2.7 of this Part 2. The minimum radius used shall be 95m.
- (c) DB Co shall provide the LMSF Track with curves of the following radii:
 - (i) LMSF Connecting Track radii shall be designed to operate with maximum design speed of 30km/h. The minimum radius of curve shall be 55m.
 - (ii) LMSF Yard Track shall be designed to operate with maximum speed of 15km/h. The minimum radius of curve shall be 55m.
- (d) DB Co shall provide a tangent distance between horizontal curves, including reverse curves, for the Mainline Track, Connecting Track and Yard Track as per the following formula where V is speed in km/h and L_T is the length of the tangent:
 - (i) $L_T = 0.57V$;
 - (ii) the minimum tangent length between curves for Mainline Track and Connecting Track shall be 25 m; and,
 - (iii) The minimum tangent length between curves for Yard Track shall be 15m.
- (e) Compound Curves
 - (i) Compound curves shall be permitted on the Mainline Track design.
 - (ii) Circular curves shall be joined by a spiral curve where two or more circular curves will be connected into a compound curve. The superelevation of each circular curve shall be adjusted to ensure that the maximum permissible speeds for all parts of the compound curve are identical, except as indicated below:
 - A. For Confederation Line East Extension, a compound curve shall be provided approximately 1km east of Blair Station on the flyover

2.7 Spirals

- (a) Spiral transition curves shall be used on all mainline and LMSF connection Tracks to connect circular curves to tangents, with the exception that spirals are not required where both actual superelevation is zero and unbalanced superelevation is less than 50mm.

- (b) DB Co shall determine the minimum length of a spiral transition curve (L_s) by selecting the following greatest value, based upon the actual superelevation (E_a , mm), unbalanced superelevation (E_u , mm), and design speed (V , km/h):

(i) $L_s = E_a V/108$; and

(ii) $L_s = E_u V/180$

Where E_a = actual superelevation in mm

E_u = unbalanced superelevation in mm

V = design speed in km/h

L_s = length of spiral in meters

- (iii) The absolute minimum length of spiral shall be 10m.

2.8 Superelevation

- (a) Superelevation shall be linearly attained throughout the full length of the spiral curve by raising the rail farthest from the curve centre, while maintaining the top of the inside rail at profile grade.

- (b) Superelevation shall be determined by DB Co by applying the following equations:

(i) $E_e = 11.83 V^2/R$

(ii) $E_a = (V^2/(12.96 \cdot R \cdot 9.81) - 0.0499) \cdot 1505$

(iii) $E_u = E_e - E_a$

where E_e = equilibrium superelevation in mm

E_a = actual or applied superelevation in mm

E_u = unbalanced superelevation in mm

V = design speed in km/h

R = horizontal curve radius in meters

- (iv) The Track superelevation shall be adjusted as needed to meet or exceed the following criteria for all Track types:

A. Absolute maximum unbalanced superelevation, E_u of 115mm

B. Desired maximum unbalanced superelevation, E_u of 75mm

- C. Absolute maximum actual superelevation, Ea of 150mm
 - D. Desired maximum actual superelevation, Ea of 100mm
 - E. Actual superelevation shall be rounded to the nearest 5mm
 - F. Superelevation, Ea and Eu shall be applied equally or proportionally up to maximum Eu with no Eu until Ea = 13mm.
- (c) For Special Trackwork, zero actual superelevation shall be used by DB Co, with a maximum unbalanced superelevation of 75mm at turnouts.

2.9 Vertical Alignment

(a) General

- (i) All references to profile in the vertical alignment shall represent the top of the low rail for a given Track.
- (ii) DB Co shall provide vertical curves separated by a minimum tangent length of:
 - A. the greater of either: $L_t = 30\text{m}$ or $L_t = 0.57V$;
 - B. minimum: $L_t = 12\text{m}$; and,
 - C. where L_t = minimum vertical tangent length in metres
 - D. V = design speed in km/h.

(b) Grades

- (i) DB Co shall not apply changes in grade or vertical curves within the limits of Station Platforms and future Platforms.
- (ii) DB Co shall provide grades through Stations of a minimum grade of 0.5% and a maximum grade of 1.5%. A minimum grade of 0.0% shall be permitted when additional measures to accommodate positive drainage are provided.
- (iii) DB Co shall provide the Mainline Track with a maximum tangent grade of 4.0%.
 - A. Grades between 4.0% and 5.0% shall only be permitted for a maximum distance of 250m, with the following exception:
 - i. Between the Connaught Tunnel and the Lincoln Fields flyover the maximum distance shall be 350m.
 - B. Grades between 5.0% and 6.0% shall only be permitted for a maximum distance of 250m and are subject to City approval.

- C. Grades of 6% shall only be permitted subject to City approval where physical constraints prohibit lesser grades.
- D. Grades of more than 6% shall not be permitted.
- E. The maximum grades, stated above, are after compensating for any horizontal curvature.

- i. compensation for horizontal curvature:

$$1 \quad G_c = G + 0.04\% \times (5729.6/R \times 3.28)$$

Where

G_c = compensated gradient to account for horizontal curvature, in percent;

G = grade before adjustment in percent;

R = horizontal curve radius in metres

- (iv) Where a continuously ascending or descending profile is composed of a series of vertical tangents of varying grades, DB Co shall provide the alignment such that the weighted average gradient does not exceed 4.0%, with the exception of the Lincoln Fields flyover where the maximum weighted average gradient shall not exceed 4.3%. Calculation of the weighted average gradient shall ignore vertical curves and consider gradients from PVI to PVI.
 - (v) DB Co shall provide the alignment such that the maximum grade for mainline turnouts is 2.0% with the following exceptions:
 - A. Lincoln Fields Split Structure: the maximum grade shall be no more than 3.75%; and,
 - B. Moodie Extension approach to LMSF grade shall be no more than 3%.
 - (vi) DB Co shall provide Mainline Storage Track and Tail Tracks with a maximum grade of 0.3% with Tail Tracks sloped away from the mainline, or provide means of mitigating potential Vehicle rollaway onto Mainline Track in case of brake failure with the following exception:
 - A. Blair Pocket Track shall be no more than 2%.
 - (vii) All Special Trackwork shall be located on constant grades with no vertical curves within the limits of Special Trackwork.
- (c) Vertical Curves

- (i) DB Co shall provide parabolic vertical curves for all grade changes.
- (ii) DB Co shall provide a minimum distance of 15m between Platform limits and any point of vertical curvature.
- (iii) Length of vertical curves shall be as long as practicable, but not less than shown below:
 - A. The minimum length of vertical curve (LVC, m) for mainline and connection tracks shall be determined by the following equations, where A = algebraic difference in grades and V = speed:
 - i. $LVC = 60A$; or where Physical Constraints do not allow
 - 1 $LVC = 0.005AV^2$, for crest curves; and,
 - 2 $LVC = 0.003AV^2$, for sag curves.

2.10 Special Trackwork

- (a) Alignment
 - (i) DB Co shall provide the Special Trackwork on tangent Track and on a constant vertical grade.
 - (ii) DB Co shall provide the alignment such that the minimum horizontal tangent length beyond Special Trackwork located on Mainline Track and Connecting Track shall be 15m.
 - (iii) A minimum tangent length of 20m shall be inserted between the back to back switch points where the turnout arrangement may entail a reverse curve movement through turnouts.
 - (iv) Special Trackwork shall not be located within 15m from the end of the Station Platform and shall not be within a Station Platform.
 - (v) Special Trackwork shall not be located within 50m of the transition between ballasted and direct fixation Track as outlined in the TCRP Light Rail Handbook. DB Co shall provide for special accommodations to mitigate the effects of different Track modulus under various geometric conditions.
 - (vi) Crossover locations shall be integrated with signaling and OCS system designs.
 - (vii) The location of all mainline turnouts and crossovers shall be optimized to meet or exceed the operations performance requirements outlined in Schedule 15-2, Part 1, Article 3 – Operational Performance Requirements.

2.11 Other Alignment Requirements

- (a) Combined horizontal and vertical curvature shall be avoided. Where this situation is unavoidable, DB Co shall provide justification in its Trackwork design report with reference to alignment safety at the design speed.

2.12 Clearances

- (a) Vehicle Clearances
 - (i) Horizontal clearance dimensions shall always be measured perpendicular to the Track centreline accounting for any superelevation and curvature in the Track.
 - (ii) DB Co shall account for structure chord lengths, tilt from superelevation, Track type, and outswing and inswing of a Vehicle that occurs along horizontal curves in their horizontal clearance calculations.
 - (iii) DB Co shall define the Revenue Vehicle clearance envelope as the space occupied by the dynamic envelope, or maximum movement, of the Vehicle as it travels along the Track plus an additional running clearance of 150mm or any other dimension in excess of 150mm deemed pertinent by DB Co's own analysis.
 - (iv) DB Co shall provide the alignment based on the information of the Vehicle dynamic envelope which is defined in Figure 2-2.1 of this Part 2.
 - (v) Where a walkway is present:
 - A. On tangent Track a minimum side clearance of 2500mm from the Track centreline to a curb, railing, fence, wall, OCS Pole or other physical feature shall be maintained on at-grade, elevated, Tunnel and retained cut Guideway Track;
 - B. On curved Track the minimum side clearance from the Track centreline to a curb, railing, fence, wall, OCS Pole or other physical feature shall be the maximum internal or external dimension for each radius which is defined in Figure 2-2.1 of this Part 2, increased by 885mm.
 - (vi) Where no walkway is present:
 - A. On a tangent Track, a minimum side clearance of 1800mm from the Track centreline to a curb, railing, fence, wall, OCS Pole or other physical feature shall be maintained on at-grade, elevated, Tunnel and retained cut Guideway Track.
 - B. On curved Track, the minimum side clearance from the Track centreline to a curb, railing, fence, wall, OCS Pole or other physical feature shall be the maximum internal or external dimension for each radius which is defined in Figure 2-2.1 of this Part 2, increased by 226mm.

- (vii) DB Co shall determine the horizontal clearance distance from the centreline of Track to the finished edge of Station Platform based on the criteria identified in Schedule 15-2, Part 4, Article 2 – Architectural Design Criteria, Revenue Vehicle pass-through speed criteria, and compliance with applicable accessibility standards.
 - (viii) Vertical clearance dimensions shall always be measured in a vertical plane irrespective of any superelevation or profile grade. When superelevation is present, the top of low rail shall be used as the reference elevation when calculating vertical clearance.
- (b) Other Clearance Requirements
 - (i) Signal and Trackwork equipment mounted on Track slab along the alignment shall be kept clear of the under car clearance envelope of the Vehicle.
 - (ii) Temporary clearance requirements for construction shall be assessed on an individual basis.
 - (iii) Vertical clearance to contact wire shall be as described in Figure 2-2.2 of this Part 2.

Figure 2-2.1 – Dynamic Gauge Envelope

[REDACTED]

Figure 2-2.2 –Pantograph Gauge

[REDACTED]

ARTICLE 3 TRACKWORK

3.1 Reference Documents

- (a) DB Co shall provide Trackwork, in accordance with the criteria contained in this Article; and all standards, regulations, policies, Applicable Law, guidelines or practices applicable to the Project, including but not limited to each of the following Reference Documents:
 - (i) APTA Manual of Standards and Recommended Practices for Rail Transit Systems;
 - (ii) European (EN) Standards For Railway Applications
 - (iii) AREMA Manual for Railway Engineering;
 - (iv) International Union of Railways (UIC) ;
 - (v) ASTM Standards;
 - (vi) ISO 2631 Mechanical Vibration and Shock;
 - (vii) NFPA 130 Standard for Fixed Guideway Transit and Passenger Rail Systems;
 - (viii) TCRP Report 155 – Track Design Handbook for Light Rail Transit, Latest Edition;
- (b) In the event of a conflict between the criteria, commitments, or requirements contained within one document when compared with another, the more stringent shall apply.

3.2 Scope of Work

- (a) DB Co shall provide all Works related to the complete Construction of Special Trackwork, including the design, supply, installation and testing of Special Trackwork, including all turnouts, crossover components, adjoining Track, fastening components, Track materials, end-of-track devices, wheel/rail friction control devices, and all other Track materials.
- (b) DB Co shall be responsible for control and any mitigation which may be a result of wheel-rail noise throughout the system in accordance with Schedule 17 - Environmental Obligations.

3.3 Track Classification

- (a) DB Co shall classify Track as follows:

- (i) Mainline Track: used for the operation of Revenue Vehicles carrying Passengers and railbound Maintenance Vehicles;
- (ii) Tail Track: located at Terminal Stations to provide for potential Vehicle storage;
- (iii) Mainline Storage Track/Pocket Track: used to store Revenue Vehicles adjacent to Mainline Track and for potential crossover functionality;
- (iv) Yard Track: includes shop Tracks located in maintenance shops, storage Tracks, spur Tracks, and other Tracks required beyond Connecting Tracks within the LMSF;
- (v) Connecting Track/Lead Track: links Yard Track to Mainline Track.

3.4 General Requirements

- (a) DB Co shall provide Track that is durable for more than or equal to the Design Life identified in Schedule 15-2, Part 1, Article 4 – Design and Construction.
- (b) DB Co shall provide Track that is safe, efficient and allows continuous operation under all operating conditions.
- (c) DB Co shall provide Track that performs safely and efficiently under all local, site-specific climatic and environmental conditions.
- (d) DB Co shall provide Track that allows for expandability and extendibility of the system without major reconstruction.
- (e) DB Co shall provide for the coordination of Track with conduits, cabling, duct banks, raceways, wayside equipment, and Track-mounted equipment for associated TPSS, OCS, S&TCS, communications, electrical, and other systems.
- (f) DB Co shall submit a Track Design and Construction Test Plan in accordance with Schedule 10 – Review procedure.
- (g) Track Gauge and Rail Cant
 - (i) DB Co shall provide 1435mm Track gauge on tangent Track.
 - (ii) DB Co shall provide 1:40 cant Trackwork.
- (h) DB Co shall set the criteria for total and differential post-construction settlements along the Track bed to satisfy the requirements of Clauses 3.10 through 3.12 of this Part 2.
- (i) Track Loading
 - (i) DB Co shall provide Track to accommodate the vertical, horizontal and longitudinal loading from the Revenue Vehicles and Maintenance Vehicles,

without exceeding permissible stress limits of the elements comprising the Track system or Track subgrade.

- (ii) DB Co shall incorporate loading arising from thermal stress within the rail, based on the rail temperature range for local climatic and environmental conditions, into the Track system design, including allowance for heating due to direct sunlight exposure and extreme cold.
- (j) Corrosion Control
 - (i) DB Co shall protect all Track components from corrosion in accordance with the requirements outlined in Schedule 15-2, Part 3, Article 12 - Corrosion Control.
 - (ii) DB Co shall provide reinforcing steel compliant with structural grounding requirements identified in Schedule 15-2, Part 3, Article 12 - Corrosion Control, and compliant with ACI 318M and AREMA Chapter 8 requirements.
 - (iii) DB Co shall provide a Track system that is electrically isolated from ground.
 - (iv) Electrical Continuity of Track
 - A. DB Co shall ensure rail electrical continuity and rail bonding are in accordance with the requirements identified in Schedule 15 – Output Specifications.
 - B. DB Co shall ensure that the rails shall be electrically bonded at locations requiring bolted rail joints. All rail shall be CWR meeting AREMA requirements.
 - C. DB Co shall provide electrical continuity of the Traction Power negative return system at locations requiring insulated joints.
 - D. DB Co shall provide rail bonding compliant with the standards identified in AREMA Chapter 33 Part 7 and Chapter 4 Section 3.7.
 - E. DB Co shall employ means to lower the negative return resistance to the TPSS.
 - F. DB Co shall employ means of protecting rail bonds from ground for rail bonding of embedded Track.

3.5 Track Structure Types

- (a) General
 - (i) DB Co shall provide Track to support and hold the rails in place to the correct alignment, profile, cross level, and Track gauge.

- (ii) DB Co shall provide Track fasteners that have Design Life and maintenance requirements integrated with and similar to the Existing Confederation Line.
- (iii) DB Co shall provide Track compliant with NFPA 130 requirements for trainways.
- (iv) DB Co shall coordinate the placement of Track fastener assemblies and ties with the location of deck or slab steel reinforcement, rail joints, Track-mounted equipment, and wayside equipment.
- (v) DB Co shall provide a direct fixation Track system with Track noise and vibration mitigation measures for Tunnel and underground locations where an invert slab exists, compliant with the noise and vibration criteria defined in Schedule 17 – Environmental Obligations.
- (vi) DB Co shall provide any of the following permitted Track types for at-grade locations or elevated Guideways,:
 - A. direct fixation; or,
 - B. ballasted.
- (b) Direct fixation Track
 - (i) DB Co shall provide direct fixation Track as an open Track form consisting of a resilient, elastic direct fixation Track fastener system anchored into a concrete foundation slab or elevated structure deck.
 - (ii) Direct fixation Track for Tunnel and underground locations where an invert slab exists:
 - A. DB Co shall provide Track directly fixed onto a concrete slab with Track noise and vibration mitigation measures.
 - B. The Track shall be integrated with the Tunnel by DB Co as stated in Schedule 15-2, Part 8, Article 6 - Systems Interface.
 - C. The Tunnel invert shall act as an interface between the Track and Tunnel structure to provide the following minimum functions:
 - i. vertically and laterally support the Track system;
 - ii. provide for Track drainage requirements; and,
 - iii. provide a safety walkway.
 - D. DB Co shall provide Track directly fixed onto the box Culvert under West Transitway (SN018231 and SN018232).

- (c) Ballasted Track
 - (i) DB Co shall provide ballasted Track as an open Track form consisting of a resilient, elastic fastening system and precast concrete ties.
 - (ii) Ballasted Track shall be permitted for use for at-grade locations, provided that:
 - A. Vehicle clearance envelope for ballasted Track is applied;
 - B. Guideway fits within prescribed property limits; and,
 - C. NFPA 130 requirements are satisfied.
 - (iii) Material Requirements
 - A. Crushed stone or other material shall conform to AREMA ballast specifications, with evidence of previous approval on a similar or heavier electrified rail system within the last 5 years provided to the City.
 - B. The particle size requirements shall conform to AREMA requirements in relation to the crushed stone ballast, class number 4A.
 - C. DB Co shall provide ballast gradation that has sufficient voids to permit water to migrate freely and shall not contact the running rails for mitigation of stray current and loss of shunting or calibration with signal systems. Ballast shall be at least 25mm clear of the rail of any fixation so as to mitigate stray current leakage.
 - D. DB Co shall provide sub-ballast that is compliant with the requirements of AREMA Chapter 1 Part 2.
- (d) Track Transition Area
 - (i) DB Co shall provide a gradual, uniform change in Track modulus, by means of a Track transition area of sufficient length, at the interface point where two Track structure types abut one another, in compliance with the principles found in AREMA Chapter 8 and Chapter 30 and TCRP Report 155. Track transition area shall extend from the end of the Structure abutment or the end of slab Track, a minimum of 6.0m into the ballasted Track section

3.6 Guard Rail Configurations

- (a) Restraining Rail
 - (i) All Restraining Rail for Track shall be new and shall conform to the associated AREMA or UIC specifications.
 - (ii) Application:

- A. DB Co shall install Restraining Rails along the gauge side of the low rail for all mainline horizontal curves with a radius of 145m or less.
- B. Restraining Rail shall be electrically isolated from running rail.
- C. Restraining Rail may use bolted joints to avoid differences in thermal stress levels between the restraining rail and adjacent CWR running rail.

(b) Emergency (Steel Inner) Guard Rail

- (i) Emergency Guard Rail shall be provided at locations where it is important to prevent a derailed Train from leaving the Track section. Emergency Guard Rails shall be installed at retained embankments, on approaches to Tunnel portals, near overhead Structure abutments and at locations where a derailed Train would likely impact critical non-transit facilities such as high tension power line poles.
- (ii) DB Co shall provide Emergency Guard Rail at the following direct fixation and ballasted Track locations where structural lateral restraints capable of containing a derailed Train within the Guideway are not present:
 - A. Adjacent (within Train car length) to pier or column
 - B. Track is on embankment near the top of retaining walls where the top of rail is a minimum of 600mm above the surrounding grade, or other value agreed upon by DB Co and the City.
 - C. Track is located on a Bridge or aerial structure;
 - D. At approaches to obstructions or other adjacent Structure.
- (iii) DB Co shall provide Emergency Guard Rail that:
 - A. On Mainline Tracks shall extend 30m ahead of the beginning of the Bridge Structure or area being protected on the approach end, and 15m beyond the end of the protected Structure on the departure end.
- (iv) Emergency Guard Rail shall not be required on Tracks where structural lateral restraints occur and such restraints have been designed to contain a derailed Vehicle.

3.7 Track Materials

(a) General

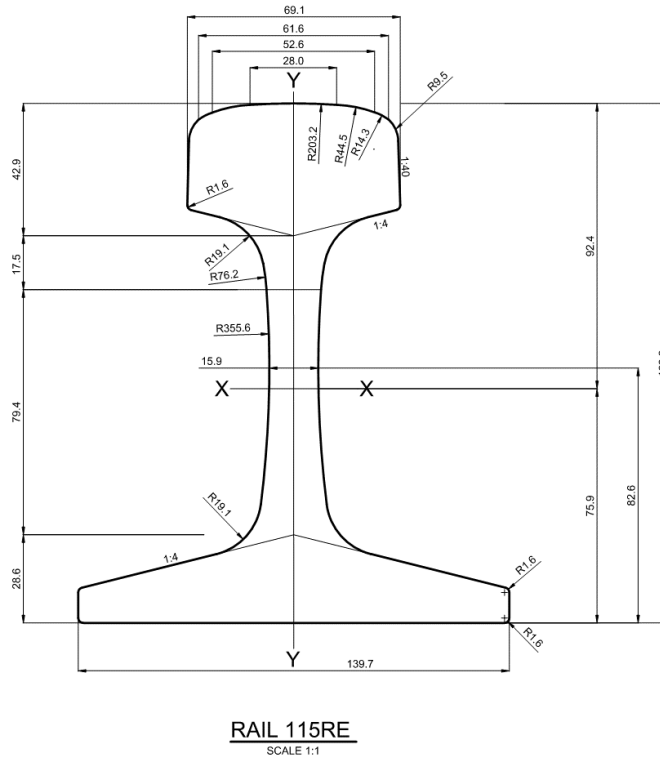
- (i) Track materials provided by DB Co shall be new, with the exception of Emergency Guard Rail.

(b) Rail

(i) General

A. DB Co shall provide new 115 RE running rail that meets:

- i. AREMA Volume 1, Chapter 4, Part 2;
- ii. ASTM A1; and,
- iii. 115RE Rail Profile shown below.



B. DB Co shall provide Standard and Head-hardened rails that meet the following requirements:

- i. Standard Rail—310 minimum BHN.
- ii. High-strength rail—341 to 388 BHN (may be exceeded provided a fully pearlitic microstructure is maintained).

C. Head hardened (high strength) rail shall be used:

- i. on all curves with radius 500m or lower
- ii. on vertical gradients steeper than 4.0%
- iii. On Special Trackwork sections

- D. DB Co shall provide running rail as CWR in accordance with AREMA Chapter 4 Section 3.11, and Chapter 5 Part 4 and Part 5 standards.

(c) Track Fasteners

(i) General

- A. All Track fasteners shall have Design Life as identified in Schedule 15-2, Part 1, Article 4 – Design and Construction.
- B. DB Co shall provide Track fastening systems that:
- i. provides vertical and lateral stability to the rail;
 - ii. Restrain the rail movement during rail break incidents limiting the rail break gap to 55mm;
 - iii. distributes loadings to the Track substructure;
 - iv. resists longitudinal CWR forces due to thermal, acceleration and braking forces;
 - v. prevents rail buckling under all climatic and environmental conditions;
 - vi. resists corrosion and electrically insulate the rail from ground;
 - vii. absorbs vibration energy in order to attenuate noise and vibration and reduce Track Substructure loading;
 - viii. are of a standardized elastic, resilient, self-tensioning type that applies a constant toe load to the rail under all service conditions;
 - ix. permits the removal and re-installation of the rail vertically without loss of fastener function;
 - x. are easily installed and removed by one person with standard hand tools;
 - xi. are capable of being removed and reinstalled without loss in toe load, stiffness, or other performance properties; and,
 - xii. are compatible with the Revenue Vehicle dynamic envelope and clearances.

(ii) Track DFF

- A. DB Co shall provide the DFF:

- i. to be compliant with AREMA Chapter 8 Section 27.7;
- ii. to accommodate structural interface forces;
- iii. to provide means of achieving a minimum of 12mm rail lateral adjustment in 3mm maximum increments utilizing a mechanical interlocking system;
- iv. to provide means of achieving vertical rail adjustment;
- v. to permit Track gauge adjustment without removal of elements below the rail; and,
- vi. to provide a means of preventing not more than 2mm lateral movement of the rail base relative to the Track fastener in the event of failure or loosening of the anchorage devices, or other acceptable value agreed upon by DB Co and the City.

B. DB Co shall implement a DFF qualification test program as part of the Track Design and Construction Test Plan in accordance with Schedule 10 – Review Procedure.

(d) Concrete Ties

- (i) Concrete ties shall be made from monoblock pre-stressed reinforced concrete, conforming to the requirements of Chapter 30, Part 4 of the AREMA Manual for Railway Engineering.
- (ii) Concrete Ties shall be chosen based on having consistent design life and maintenance requirements to the Existing Confederation Line.
- (iii) Concrete ties shall have a minimum Design Life as per Schedule 15-2, Part 1, Article 4 – Design and Construction.
- (iv) Concrete ties may also be furnished with elastomeric pads attached to the underside of the tie to protect the tie from abrasion against the ballast.
- (v) Concrete ties shall be constructed on a minimum 225mm ballast section measured beneath the underside of the tie.
- (vi) Tie spacing shall be determined by DB Co on a system-wide basis, considering factors such as loading, allowable bearing pressure, Vehicle speed, cost, allowable Track deflection, lateral stability, ability to maintain gauge, etc. Tie spacing shall not result in over-stress on ballast, sub-ballast, and sub-grade. Centre-to-centre tie spacing shall never exceed 750mm for concrete crossties.

(e) Timber Ties

- (i) Timber ties shall be made from hardwood and shall conform to the requirements of Chapter 30, Part 3 of the AREMA Manual for Railway Engineering.
 - (ii) Timber ties shall be treated with a wood preservative, and shall be furnished with anti-splitting devices. All wooden ties shall be predrilled to prevent splitting of the ties.
 - (iii) Hardwood ties shall have a minimum Design Life as per Schedule 15-2, Part 1, Article 4 – Design and Construction.
 - (iv) Wood ties within Special Trackwork layouts shall be provided in various lengths to suit the size and layout of the turnout. The Special Trackwork designer or supplier shall determine the appropriate tie layout for the appropriate fastening assembly.
- (f) Rail Joints
 - (i) Insulated Joints
 - A. DB Co shall determine the need for and the positioning of insulated rail joints based on coordination with the S&TC requirements and in compliance with applicable AREMA standards and industry best practice.
 - B. DB Co shall provide factory bonded insulated joints compliant with the requirements of AREMA Chapter 4 Section 3.8 or equivalent where insulated rail joints are required.
 - C. DB Co shall provide field bonded insulated joints where the use of factory bonded insulated joints is not practical.
 - D. DB Co shall provide insulated rail joints to isolate Special Trackwork and to support the broken rail protection maintenance regime developed for the Existing Confederation Line with a maximum spacing of 3000m.
 - (ii) Welded Joints
 - A. General
 - i. DB Co shall provide no holes in the rail located within a minimum of 150mm of the weld location, including for temporary bolted locations.
 - B. Flash-Butt Welds
 - i. All CWR shall be welded by means of electric flash-butt method compliant with the requirements of AREMA Chapter 4 Section 3.10. Electric flash-butt welds shall be used for all running rail

connections consistent with CWR practice. Rail shall be welded into the longer strings practical during Construction.

C. Thermite Welds

- i. DB Co shall perform the thermite welding method compliant with the requirements of AREMA Chapter 4 Section 3.13, where impossible to weld rail joints by means of flash-butt welding.

(iii) Bolted Joints

- A. Standard bolted joints shall not be installed in Mainline Track. Bolted Joints shall be accepted as a temporary condition only.
- B. DB Co shall provide bolted joints with standard diameter holes and standard hole-spacing for the rail type.

(iv) Rail Expansion Joints

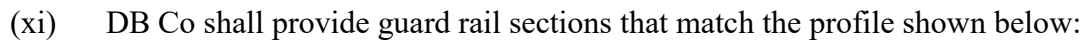
- A. DB Co shall determine the need for rail expansion joints at elevated Structures based on rail-to-structure interface analysis.

3.8 Special Trackwork

(a) General

- (i) DB Co shall provide Special Trackwork that incorporates standard 115RE rail and complies with:
 - A. Union Internationale des Chemins de Fer (International Union of Railway – UIC) Standards.
 - B. European Norm Standards for railway applications.
 - C. AREMA Manual for Railway Engineering
- (ii) DB Co shall provide Special Trackwork that is compatible with the Revenue Vehicle used on the existing system and shall be responsible for obtaining any additional information that may be required to ensure compatibility.
- (iii) DB Co shall provide Special Trackwork designed for concrete slab or ballasted Track on concrete ties for mainline installations and Special Trackwork designed for ballasted Track on timber ties for LMSF installations.
- (iv) All components and the final assembly of components shall be designed such that the specified tolerances can be maintained throughout the operating life of the Special Trackwork with minimal maintenance.

- (v) DB Co shall provide drainage for switch machines and turnouts in accordance with the requirements of Article 5 – Drainage and Stormwater Management Design Criteria, of this Part 2 such that Revenue Service operations can safely continue.
- (b) Design
 - (i) DB Co shall only use No. 12 and No. 8 tangential geometry turnouts and crossovers on Mainline Tracks and No. 6 and No. 4-equilateral turnouts for Yard Tracks and storage Tracks.
 - (ii) DB Co shall provide Special Trackwork with fabrication tolerances that conform with +2mm and -1mm track gauge tolerance and ± 1 mm horizontal, vertical and crosslevel tolerances measured in 2m chords.
 - (iii) The radius of the gauge corner in the wheel contact area for all Special Trackwork components shall be based on the Revenue Vehicle wheel profile. A maximum differential wear of 3mm between new and worn wheel profiles shall be considered in the design of Special Trackwork.
 - (iv) DB Co shall provide Special Trackwork that is electrically isolated from ground. The pads, insulators and other electrical insulation features shall be designed to ensure that there is not electrical continuity between the Special Trackwork and ground. There shall be a minimum air gap of 10mm and a surface electrical tracking distance of not less than 13mm between the Special Trackwork and ground.
 - (v) All rail joints shall be welded or insulated bonded joints.
 - (vi) DB Co shall provide boltless monoblock frogs or moveable-point frogs in turnouts and crossovers.
 - (vii) Frog guard rails shall be adjustable to accommodate rail wear. Guard rail mounting plates shall be integral to running rail plates. Flangeways shall be designed to accommodate the Revenue Vehicle.
 - (viii) DB Co shall provide switch point rails machined from 60E1A1 Rail with a forged transition to 115RE rail. Plant welded rail joints shall not be placed within the limits of the switch point rails supported on slide chairs.
 - (ix) DB Co shall provide point rails of Grade R350HT in accordance with EN13674, or approved equal.
 - (x) DB Co shall provide asymmetric rail profiles for switch points that match the profile shown below:



- (i) DB Co shall provide reusable end-of-Track protection devices at stub-end storage, Pocket Tracks and Tail Tracks and shall be suitable for permanent exterior exposure.
 - (ii) End-of-Track shock-absorbing devices shall meet the following criteria:
 - A. be capable of stopping an unoccupied Train travelling at 25 km/hr;
 - B. engage the Vehicle symmetrically about the coupler at bumper height; and,
 - C. have a cushioned face and not produce any damage to a Vehicle at Vehicle speeds less than 5km/hr. DB Co shall coordinate the design of the stopping device to ensure engagement to the car is adequate to prevent damage.
- (b) Wheel/Rail Friction Control
 - (i) DB Co shall provide wheel/rail friction control measures in locations consistent with the practices identified in AREMA Chapter 5 Section 5.9 and Chapter 4 Section 4.11.
 - (ii) DB Co shall provide lubricant selection and application aimed at minimizing loss of traction and electrical conductivity of the Traction Power negative return rail.
 - (iii) DB Co shall provide lubricators capable of adjusting lubricant application based on site-specific conditions.
 - (iv) DB Co shall provide space within the Guideway for lubricator cabinets, tubing, ancillary equipment, and maintenance access. DB Co shall protect tubing from impact damage.

3.10 Track Commissioning Tests

- (a) DB Co shall complete and submit the following minimum verification tests of Track installation to the City, in accordance with Schedule 10 – Review Procedure prior to Revenue Service:
 - (i) Track geometry measurement;
 - (ii) Track clearances measurement;
 - (iii) Revenue Vehicle clearance to Platform measurement;
 - (iv) rail measurement;
 - (v) rail defects assessment; and,

- (vi) ride quality measurement.

3.11 Track Measurement and Assessment Standards

- (a) DB Co shall implement the following Track measurement and assessment standards:
 - (i) Track parameters as follows:
 - A. Track gauge limits;
 - B. gauge-side rail wear and vertical rail wear;
 - C. cross level and superelevation;
 - D. horizontal lateral misalignment;
 - E. relative horizontal deviation;
 - F. relative vertical deviation;
 - (ii) Track clearances compliant with the criteria in this Part 2;
 - (iii) Revenue Vehicle clearance to Platforms compliant with the criteria defined in Schedule 15-2, Part 4, Article 2 - Architectural Design Criteria; and,
 - (iv) Other measurement and assessment criteria conforming to:
 - A. AREMA;
 - B. APTA Manual of Standards and Recommended Practices for Rail Transit Systems;
 - C. UIC and EN Standards for new Construction.

3.12 Track Measurement and Assessment Methodology

- (a) DB Co shall complete verification of Track geometry by means of a self-propelled Track geometry measuring vehicle in accordance with EN or AREMA Chapter 2 Part 1 practices. The measuring vehicle shall provide measurements at the intervals and tolerances per EN or AREMA for alignment, gauge and superelevation.
- (b) DB Co shall complete verification of Track clearances by means of a Track clearance measuring system in accordance with Good Industry Practice and AREMA Chapter 2 practices.
- (c) DB Co shall complete verification of rail measurement by means of a rail measuring system in accordance with AREMA Chapter 2 Part 2 practices.

- (d) DB Co shall complete verification of rail defect removals by means of an ultrasonic rail flaw detection system in accordance with practices identified in AREMA Chapter 4, Part 4 and Part 5.
- (i) Requirements, applicable to visual Trackwork and CWR inspections; and,
- (ii) For other Track measurement and assessment activities, the more stringent requirements identified in APTA Manual of Standards and Recommended Practices for Rail Transit Systems or Transport Canada Track Safety Rules.
- (iii) Track Construction tolerances shall be as shown in “Trackwork Design Brief Issued for Construction” RES-22-0-0000-DBC-003_0, Section 5.0 Construction Tolerances and Appendix A Construction Tolerances.

ARTICLE 4 STRUCTURAL DESIGN CRITERIA AND REQUIREMENTS

4.1 Scope

- (a) This Article governs the design, modification, rehabilitation and construction of Bridges, Elevated Guideways, at-grade Guideways, portal walls, retaining walls, Culverts, pole bases and other Structures not included elsewhere.
- (b) The design and construction of Underground Structures shall be per the requirements of Schedule 15-2, Part 8 – Underground Structures and Stations and Ancillary Facilities shall be in accordance with Schedule 15-2, Part 4 – Stations.

4.2 Codes, Standards and Manuals

- (a) The codes, standards, and references indicated in this clause shall be utilized for the design and construction of the Structures indicated in this Article, except as explicitly indicated in other articles. The structural design shall conform to the most current edition of the following codes and standards. If the criteria sources conflict, unless otherwise noted, the following shall apply in descending order of precedence:
 - (i) Applicable laws and regulations;
 - (ii) Specific obligations and Design Criteria identified in this Part 2 – Civil and Guideway;
 - (iii) CAN/CSA S6 Canadian Highway Bridge Design Code; and Exceptions to the Canadian Highway Bridge Design Code CAN/CSA S6 for Ontario;
 - (iv) City of Ottawa Standard Tender Documents for Unit Price Contracts;
 - (v) MTO Structural Manual;
 - (vi) OPSS;
 - (vii) OPSD;
 - (viii) CAN/CSA A23.3 Design of Concrete Structures;
 - (ix) CAN/CSA A23.1 Concrete Materials and Methods of Construction;
 - (x) AASHTO Guide Specifications for Design and Construction of Segmental Concrete Bridges;
 - (xi) CAN/CSA S16 Design of Steel Structures;
 - (xii) CAN/CSA G40.20/G40.21 General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel;

- (xiii) AREMA Manual for Railway Engineering, hereinafter referred to as AREMA;
- (xiv) MTO RSS Guidelines;
- (xv) MTO Reports and Guidelines;
- (xvi) MTO Design Supplement for TAC Geometric Design Guide for Canadian Roads;
and,
- (xvii) TAC Geometric Design Guide for Canadian Roads.

4.3 General Requirements

- (a) DB CO shall design all Structures by the Limit States Design method in accordance with CAN/CSA-S6. The design of all Structures shall also consider loads due to system-wide elements such as electrification, signalization and communication equipment.
- (b) DB Co Shall design all Roadway and pedestrian Structures in accordance with the Load Factors and Load Combinations as indicated in CAN/CSA S6.
- (c) DB Co Shall design all Guideway Structures subject to Vehicle loadings in accordance with the Load Factors and Load Combinations indicated in CAN/CSA S6, supplemented as indicated in Clause 4.5 of this Part 2, to recognize the listed permanent, transitory and exceptional loads.
- (d) The loading criteria to which the Structures are designed shall appear on the Structural drawings. Concrete placing sequence shall be indicated on the drawings or in the supplementary conditions, when required by design conditions.

4.4 Design Requirements

- (a) Minimum Clearance Requirements
 - (i) New Overhead Structures and existing Overpass/Underpass Structures being modified to Overhead Structures shall span the alignment and meet the minimum horizontal clearance requirements for the Vehicle, in accordance with Clause 2.12 of this Part 2.
 - (ii) New Guideway Structures and existing Structures being modified to Guideway Structures shall have a minimum structure width to allow for the passage of the alignment and meet the minimum horizontal clearance requirements for the Vehicle, in accordance with Clause 2.12 of this Part 2.
 - (iii) The minimum vertical clearance shall be as specified below unless stated otherwise in Appendix E of this Part 2.

- A. New Overhead Bridge Structures shall be designed to ensure they achieve a minimum vertical clearance of 4.5m from the TOR to the underside of the Structure.
 - B. New Overpass/Underpass Bridge Structures shall be designed to ensure they achieve a minimum vertical clearance in accordance with the MTO Design Supplement for TAC Geometric Design Guide for Canadian Roads.
 - C. Existing Overpass/Underpass Bridge Structures being modified to Overhead structures shall achieve a minimum vertical clearance of 4.5m from the TOR to the underside of the Structure.
- (b) Seismic Design
- (i) Importance Categories
 - A. DB Co shall design new Guideway Bridge Structures to meet major-route importance category.
 - B. Existing Bridge Structures being repurposed to Guideway Structures shall be seismically retrofitted as required and shall be classified as major-route Bridges.
 - C. DB Co shall design new Bridge Structures not subject to Vehicle loads to meet importance category “Other”.
 - (ii) DB Co shall use the PBD approach for all Bridge Structures.
 - (iii) New Bridges shall be analyzed for design earthquake loads for all three return periods and damage states in accordance with CAN/CSA S6.
 - (iv) Existing Bridges shall be analyzed for design earthquake loads for two return periods (975 years and 2475 years) and performance levels as specified in Table 2-4.1. The ASL category shall be determined in accordance with the Report on Study of Return Period Selection for Seismic Evaluation and Retrofit of Bridges in City of Ottawa. The seismic evaluation of existing buried Structures is not required.
 - (v) Table 2-4.2 summarizes the design approach, return period and performance requirements.
 - (vi) Seismic design for buried Structures and retaining walls shall be as per CAN/CSA S6

Table 2-4.1: Return Period and Performance Requirements for Existing Bridges

| Importance Category | Return Period (Years) | ASL 1 0-15 yrs | | ASL 2 16-50 yrs | | ASL 3 >50 yrs | |
|---------------------|-----------------------|-------------------|--------|--------------------|----------------------|------------------|----------------------|
| | | Service | Damage | Service | Damage | Service | Damage |
| Major-Route | 2475 | - | - | Life Safety | Probable Replacement | Disruption | Extensive |
| | 975 | - | - | Disruption | Extensive | Limited | Repairable |
| Other | 2475 | - | - | Life Safety | Probable Replacement | Life Safety | Probable Replacement |
| | 975 | - | - | -* | -* | Disruption | Extensive |

*No need for evaluation/retrofit design since performance objectives will automatically be satisfied after meeting the requirements of longer return periods

Table 2-4.2: Design Approach, Return Period and Performance Requirements

| | New Bridges | Existing Bridges |
|---|---|-----------------------------------|
| Design Approaches | PBD | PBD |
| Seismic ground motion probability of exceedance in 50 years (return period) | 2%, 5% and 10% (2475yrs, 975yrs, and 475yrs) | 2% and 5% (2475yrs and 975yrs) |
| Performance Level and Criteria | As per CAN/CSA S6 | As per Table 2-4.1 |

(c) Collision Protection

- (i) Piers supporting new and existing Bridges over the alignment and with a clear distance of less than 6m from the centerline of a Track shall be of heavy construction or shall be protected by a reinforced concrete crash wall.
 - A. Crash walls shall have a minimum height of 1200mm above the top of rail. The crash wall shall be at least 600mm thick and at least 3.5m long. When two or more columns compose a pier, the crash wall shall connect the columns and extend at least 900mm beyond the outermost columns parallel to the Track. The crash wall shall be anchored to the footings and columns, if applicable, with adequate reinforcing steel and shall extend to at least 1200mm below the lowest surrounding grade.
 - B. Piers shall be considered of heavy construction if they have a cross-sectional area equal to or greater than that required for the crash wall and the larger of its dimensions is parallel to the Track.

(d) Vibration and Deflection Control

- (i) Vibration and deflection control for pedestrian Structures shall be in accordance with CAN/CSA S6 and the MTO Structural Manual.

- (ii) Vibration and deflection control for Guideway Structures shall be in accordance with the following:
 - A. All Structures supporting the Guideway including all elements of retaining walls, infill, retaining, and backfill material, and supporting Guideway fill shall have a proven performance record with respect to detrimental effects of vibration, and other long term factors such as loss of fines and aggregates, and corrosion for the duration of the Design Life.
 - B. Provision for vibration and deflection control shall be incorporated into the design of new Structures. Vibration and deflection shall be reviewed for existing Structures and mitigated to meet the applicable criteria. Proposed variances for vibration and deflection limits for existing structures shall be submitted for approval in accordance with Schedule 10 – Review Procedure. The design for vibration and deflection control shall be based on the characteristics of the vehicle.
 - C. Girders of simple or continuous spans shall be designed so that deflections due to live load plus dynamic load allowance shall not exceed 1/1000 of the span length. The deflection of cantilever arms due to live load plus dynamic load allowance shall not exceed 1/300 of the cantilever arm.
 - D. To limit vibration amplification due to the dynamic interaction between the superstructure and the rail Vehicle, the Guideway spans shall be designed so that the natural frequency of the first mode of vertical vibration is not less than 2.5 Hz.
- (e) DB Co shall design or modify new or existing Guideway Bridges such that major rehabilitation work can be performed while maintaining a minimum of one Vehicle Track. DB Co shall design or modify new or existing Roadway Bridges such that major rehabilitation work can be performed while maintaining a minimum of one vehicle traffic lane in each direction, bicycle lanes and one sidewalk, as applicable.
- (f) The structural capacity and condition of existing Structures being modified to carry Vehicle loading or subject to DB Co construction activities shall be assessed and confirmed in coordination with the applicable Governmental Authorities. DB Co shall perform any repairs or strengthening required to accommodate the Vehicle loading or DB Co construction activities.
- (g) DB Co shall note all Design Criteria, including geotechnical and condition survey information to which the Structures are designed on submissions and/or structural drawings.
- (h) Design of new Structures, which are interfacing with existing Structures, shall be coordinated with the City and shall comply with the design and construction requirements of the applicable Governmental Authorities. Environmental, hydrology and hydraulic studies shall be performed to address all immediate and long-term impacts and issues for

Culverts and all Bridges, including Elevated Guideways, over water in coordination with the applicable Governmental Authorities, and the design shall comply with the requirements of the applicable Governmental Authorities.

- (i) New steel girder Structures over and adjacent to highways or exposed to salt spray shall be steel box girders.
- (j) Access to steel girders for inspection purposes shall be incorporated into the design, including devices/system to enable inspectors to walk along all girders and tie-off safely.
- (k) All new Bridges, Elevated Guideways and at-grade Guideways designed exclusively for Vehicle operation shall meet NFPA 130 requirements. Emergency walkways on Guideway Structures and under Overhead Structures shall be in accordance with NFPA 130.
- (l) Noise and vibration measures and control shall comply with the requirements of Schedule 17 – Environmental Obligations.
- (m) Aesthetic Design
 - (i) All new Structures shall meet the requirements of the MTO Aesthetic Guidelines for Bridges, supplemented by the additional requirements of this Article. All references in the MTO Aesthetics Guideline to Ministry Bridge Aesthetics Evaluation Group or MBAEG shall be replaced with the City. The aesthetic design review process and approval procedures as detailed in Chapter 11 of the MTO Aesthetic Guidelines for Bridges shall not be applicable to this Project. Chapter 11 of the MTO Aesthetic Guidelines for Bridges shall be considered deleted in its entirety.
 - (ii) The Bridge Aesthetic Level and Classification for new Structures is specified in Appendix E of this Part 2.
 - (iii) The aesthetic design of Level One Bridges (High Aesthetic Classification) is subject to City review and approval. DB Co shall prepare and submit an Aesthetic Design Report for all Level One Structures.
 - A. Be signed by the Design Architect.
 - B. Document the consideration of the following aesthetic design principals, as defined in the MTO Aesthetic Guidelines for Bridges, and how each of the aesthetic design principals were successfully addressed in the preliminary bridge design:
 - i. Functional clarity – The size and shape of each primary element shall be appropriate for its respective structural task and the form of the Structure shall truthfully and clearly express the loads that are being carried and transferred to the ground;

- ii. Economy and simplicity – The number of materials, textures, colours and architectural features shall be kept at a minimum without becoming visually monotonous and shall be applied consistently to provide a continuity of appearance;
 - iii. Scale and proportion – The Structure shall be designed to minimize the overall dimensions of elements and shall appear in scale with its surroundings;
 - iv. Harmony and visual balance – The Structure exhibits visual balance amongst its component part as well as with its surroundings;
 - v. Contrast and complexity – The design of the Structure shall introduce complexity as a means of relieving visual monotony without the use of excessive eye-catching elements, colours or superfluous decoration;
 - vi. Enduring visual quality, with a focus on surface finishes – The Structure shall be designed and constructed to ensure the quality and durability of base materials in order to achieve a lasting positive visual effect; and,
 - vii. Integration with context – The Structure shall be designed to make a positive aesthetic contribution to its physical setting.
- C. Include drawings of Bridge alternatives, details of specific aesthetic enhancements and 3D computer renderings of the proposed Structure viewed at perspective angles. Renderings shall be inclusive of the surrounding context.
- (iv) Level Three Bridges (Low Aesthetic Classification) do not require aesthetic design approval by the City. Submission of Aesthetic Design Report is not required for Level Three Bridges (Low Aesthetic Classification).
 - (v) There are no Level Two Bridges (Medium Aesthetic Classification) on this project.
 - (vi) Chain link fencing shall not be used on pedestrian Structures.
 - (vii) DB Co shall detail and protect the structural steel-to-concrete interface in a way that no rust staining of the concrete occurs.
- (n) Durability
- (i) New Structures shall be designed to attain the indicated Design Life as detailed in Schedule 15-2, Part 1, Article 4 – Design and Construction. Time dependent

design calculations, including corrosion, creep and fatigue shall be based on indicated Design Life. Design Life calculations shall be per CAN/CSA-S6.

- (ii) Time dependent design calculations for modified existing Structures, shall take into account the age and condition of the Structure.
- (iii) Guideway Structures shall be designed to protect against salt spray or exposure.
- (iv) Fatigue cycles for Guideway Structures shall be a minimum 15,000,000 cycles for peak period Trains of 120m to 150m length.
- (v) The durability of concrete Structures shall be assured through design and detailing, application of high performance materials, protection of reinforcing steel, and application of concrete sealers.
- (vi) Waterproofing shall be required for all Structure decks. The top of the existing and new concrete Structures shall be waterproofed as per applicable standards. Where direct fixation is utilized, a waterproofing technology compatible with direct fixation shall be applied. In-situ testing and warranties shall be required.
- (vii) Corrosion protection for below grade elements shall be in accordance with AREMA and shall meet the requirements in Schedule 15-2, Part 3, Article 12 – Corrosion Control. Steel piles shall not be used in corrosive ground water. Precast concrete piles may be used under these conditions, if specified with sulphate resisting cement.
- (viii) Where technically feasible, new Bridges shall be designed with integral or semi-integral abutments.
- (o) Stray current corrosion control for all Structures shall be in accordance with Schedule 15-2, Part 3, Article 12 – Corrosion Control.
- (p) A depressed approach slab shall be provided at all transitions between Track slab or Bridge decks with DFF and tie and ballast Track. Approach slabs of Guideway structures shall be waterproofed.
- (q) Approach slabs shall be designed and constructed for all new Structures supporting highway loads. Approach slabs of Roadway structures shall be waterproofed.
- (r) Drainage
 - (i) All Structures shall include provisions for drainage in accordance with Article 5 – Drainage and Stormwater Management Design Criteria, of this Part 2.
 - (ii) Joints shall be detailed to allow longitudinal conveyance of runoff without leaking at the joints.
 - (iii) Drain pipes shall be external to the concrete.

- (iv) Drainage from Structures within RVCA or SNC regulated floodplains shall be in accordance with Article 5 – Drainage and Stormwater Management Design Criteria, of this Part 2 and meet the requirements of applicable Governmental Authorities within whose jurisdiction the Structures are located.
- (v) Drainage pipes shall not reduce the vertical clearance of Structures.
- (vi) Catch basins shall not be located within the approach slab area.
- (s) Ductbanks
 - (i) Ductbanks shall be provided as necessary for Systems and operation conduits, including pull boxes and access to connecting devices.
 - (ii) The design of ductbanks at Structures shall comply with the requirements of the applicable Governmental Authorities.
 - (iii) Services carried through or under Bridges shall be located as per the requirements of the MTO Structural Manual.
- (t) The OCS foundation and structural design shall include, but not be limited to, consideration of wind, ice accretion, wire tensioning forces, upward force to the contact wire or contact rail, and the effect of wire break. The OCS foundation shall be designed in conjunction with the requirements in Schedule 15-2, Part 3, Clause 14.4.
- (u) Design of “U” Approaches and other Retaining Structures
 - (i) A drainage layer shall be provided behind the wall to mitigate the build-up of hydrostatic pressure, where Structures are designed as drained. Both the water pressure and the lateral soil pressure shall be considered in the design. Water from the drainage layer shall be removed with a drainage system acceptable to the local Governmental Authority.
 - (ii) MSE walls and MSE true abutments shall not be utilized as the primary support paths for Bridge beams and girders.
 - (iii) Earth retaining Structures, whether temporary or permanent, greater than 3m in height shall be designed on the basis of specific soils information relating to the backfill material. Such walls shall be analyzed using a recognized numerical design method accounting for the rigidity or flexibility of the soil-structure interaction.
 - (iv) All Tunnel approach retaining walls with exposed faces below the water table shall be waterproofed in accordance with the requirements of Schedule 15-2, Part 8, Clause 3.4.
- (v) Demolition and Restoration

- (i) Demolition and restoration shall be as per Schedule 15-2, Part 1, Article 14 – Demolition, Removals and Disposal, in addition to the provision contained in this clause.
 - (ii) The condition of the existing Structures within the Project ZOI of the demolition shall be surveyed and recorded with the cooperation of the owners of the Structures affected and the Governmental Authorities. The condition of Structures to be demolished is not required to be surveyed and recorded.
 - (iii) The demolition, including protective measures, site maintenance and restoration shall comply with the requirements of the owners and the Governmental Authorities.
- (w) DB Co shall provide a barrier, in accordance with CAN/CSA S6, at the exterior face of all new and existing Structures. The barrier type provided on each Structure shall be based on the following:
- (i) A bicycle barrier shall be provided on all pedestrian/MUP Structures.
 - (ii) A combination (bicycle) barrier shall be provided on all roadway Structures accessible to pedestrians and/or cyclists. In site specific locations, where a traffic barrier is specified between the Roadway lanes and the pedestrians and/or cyclists, a bicycle barrier shall be provided at the exterior face of the Structure.
 - (iii) A traffic barrier shall be provided on all Roadway Structures, not accessible to pedestrians and/or cyclists, and Guideway Structures. The Test Level for barriers used on Guideway Structures shall be Test Level 4 (TL-4).
- (x) Existing Structure foundations may be reused where DB Co has demonstrated them to be structurally adequate and capable of safely supporting the design load for the duration of the Design Life of the Structure.
- (y) Any structural work or upgrades undertaken by DB Co shall not obstruct existing MUP, sidewalk, Roadway or waterway connections on or under the Structure.

4.5 Loads and Forces

- (a) Guideway Structures shall use the following load combinations in addition to those given in CAN/CSA S6. It is imperative that Guideway Structures remain standing after experiencing one of these exceptional events.

$$\text{ULS Combination 10a}^1 = \alpha_D D + \alpha_E E + \alpha_P P + 1.0LR + 1.1L + 1.0K + 1.3LE$$

$$\text{ULS Combination 10b} = \alpha_D D + \alpha_E E + \alpha_P P + 1.0LR + 1.1L + 1.0K + 1.3DR$$

$$\text{ULS Combination 10c} = \alpha_D D + \alpha_E E + \alpha_P P + 1.0LR + 1.0L + 1.3H$$

$$\text{ULS Combination 10d} = \alpha_D D + \alpha_E E + \alpha_P P + 1.0LR + 1.0L + 1.3BR$$

$$\text{ULS Combination 10e} = \alpha_D D + \alpha_E E + \alpha_P P + 1.0LR + 1.0L + 1.3A$$

¹For ULS Combination 10a, do not use LF in L.

Where:

- LR Longitudinal Restraint
- LE - Emergency braking (from LF)
- DR - Derailment load (by LRV)
- H - Collision with pier or column (by other LRV)
- BR - Broken rail
- A - Ice Accretion

(b) Permanent Loads

- (i) Dead Load (D) shall be determined in accordance with CAN/CSA S6 for roadway and pedestrian Structures and in accordance with AREMA for Guideway Structures.
- (ii) Loads due to horizontal earth pressure and hydrostatic pressure (E) shall be determined in accordance with CAN/CSA S6. For lateral earth pressure, a maximum load factor of 1.5 shall be used for proportioning wall sections of “U” approach and other earth retaining Structures.
- (iii) Longitudinal Restraint (LR) for direct fixation Track, the structural design shall make provision for transverse and longitudinal forces due to temperature variations in the rail. These forces shall be applied in a horizontal plane at the top of the low rail. The magnitude of the forces shall be established based on the characteristics of the direct fixation system and the continuity of the Tracks. Longitudinal restraint shall have a load factor of 1.0 and shall be applied to all ULS load combinations.

(c) Transitory Loads

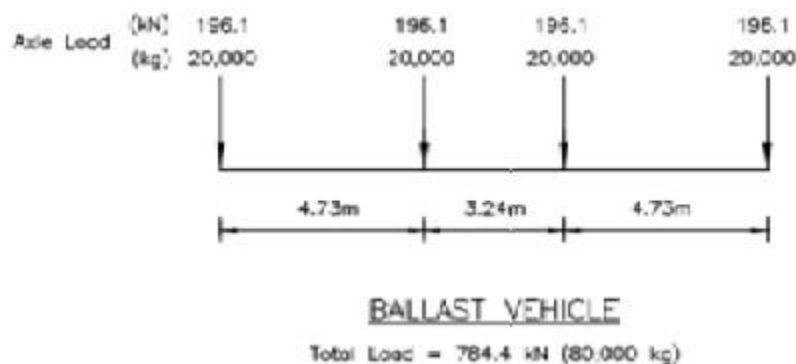
- (i) Live Load (L)
 - A. Live Load for highway and pedestrian loading shall be determined in accordance with CAN/CSA S6.
 - B. Guideway Structures
 - i. The [REDACTED] electrical vehicle shall be used as the Confederation Line Vehicle. The maximum axle load for this Vehicle is 14.9 tonnes (126kN), as shown in Figure 2-4.1.

Figure 2-4.1: [REDACTED]

[REDACTED]

- ii. The ballast vehicle, as shown in Figure 2-4.2 shall be used as the Confederation Line maintenance vehicle. The maximum axle load is 20 tonnes (196.1kN).

Figure 2-4.2: Maintenance Vehicle Loading



- iii. The Live Load (L) indicated in CAN/CSA S6 shall include the following effects:
- 1 L – Vehicle or Maintenance Vehicle live load
 - 2 DLA – dynamic load allowance (impact)
 - 3 LF_1 – Longitudinal traction/breaking force
 - 4 LF_2 – Longitudinal acceleration/deceleration force
 - 5 CF – Centrifugal force
- iv. For Structures carrying more than one Track, any combination of Vehicle axle loading on one or more Tracks which produces the critical design loading shall be the vertical live load used for structural design. It should be noted therefore, that the vehicle live load shall include as many cars as can be accommodated on the span or span(s) under consideration.
- v. Design situations such as Train evacuations, Train breakdown, and Train derailment shall be taken into account. This analysis shall consider the recovery of a disabled Vehicle, which could result in a crush loaded Train in combination with an empty Train.
- vi. All Guideway Structures shall be designed to accommodate highway vehicular loading CL-625-ONT Loading (CL-625-ONT Truck or CL-625-ONT Lane Load), as specified in CAN/CSA S6, in addition to the rail Vehicle loading.
- C. The DLA or impact is an equivalent static load expressed as a percentage of the vehicle vertical live load (L) which is considered to be equivalent to the dynamic and vibratory effects of the interaction of the moving vehicle

and the structure including the vehicle response to irregularity in the riding surface. The DLA or impact shall be determined in accordance with CAN/CSA S6 for highway loading and in accordance with AREMA for Vehicle loading, supplemented by the following:

- i. For direct fixation decks, the DLA shall be 30% for Vehicle loading.
 - ii. Impact shall be applied to the superstructure and generally to those members of the Structure that extend down to the top of footings. The portion above the ground line of concrete or steel piles rigidly connected to the superstructure as in rigid frame or continuous design is included. Impact shall not be considered for abutments, retaining walls, wall-type piers, piles, footings and service walks, except for the portion of piles rigidly connected to the superstructure, underground Structures with 900mm or more of cover and base slabs supported by earth (either at-grade or in subways).
 - iii. The impact force shall be applied at the top of low rail, distributed the same as outlined for the axle loads.
 - iv. In addition to the vertical impact, a horizontal impact or hunting (nosing) force (HF) equal to 10% of the Vehicle load shall be applied. This force shall be equally distributed to the individual axles of the Vehicle and shall be assumed to act in either direction transverse to the Track at the top of the low rail. Hunting force shall be applied to one Track only of any tangent duel-Track Structure. On horizontal curves the more critical of hunting force or centrifugal force shall be applied.
 - v. Rolling (Rocking) Force (RF) is a force equal to 10% of the Vehicle loading per Track shall be applied downwards on one rail and upwards on the other, on one or all Tracks. The rolling or rocking force is an impact load in addition to other vertical impact loads and shall be considered when detrimental to the Structure.
- D. Longitudinal Force (LF) shall be determined in accordance with CAN/CSA S6 for highway loading and as per the requirements below for Vehicle loading.
- i. A longitudinal traction and braking force equal to 25% of the static vertical live load shall be applied on all loaded Tracks at the level of the uppermost rail. The force generated is offset by the resistive clamping force of the rail clip and the number of plinths on the Bridge. The clip clamping force (typically 13.35 kN) shall be

checked and confirmed by DB Co for each individual case prior to being used in the design.

- ii. A longitudinal acceleration/deceleration force equal to 21% of the Vehicle design load, without impact, per Track, shall be applied at the center of gravity of the Vehicle above the top of the rail. Consideration shall be given to combinations of acceleration and deceleration forces where there is more than one Track on the Structure.
 - E. Centrifugal Force (CF) shall be determined in accordance with CAN/CSA S6 for highway loading and as per the requirements of AREMA for Vehicle loading.
- (ii) The effects of strains (K) due to temperature (T), shrinkage (SH), creep (CR) shall be considered in accordance with CAN/CSA S6 unless noted otherwise below:
- A. Provision shall be made for all movements and forces that can occur in the Structure as a result of shrinkage, creep and temperature variations as well as for the presence of thermal gradients through the depth of the superstructure. Load effects that may be induced by a restraint of these movements, including temporary restraints required during construction and restraints imposed by rail fasteners, shall be included in the analysis.
 - B. Thermal forces resulting from the temperature variations in the OCS shall be considered. Loads shall be determined in accordance with AREMA unless otherwise determined by DB Co using other established codes of practice.
- (iii) Wind Load on Structure (W) shall be designed to withstand wind loads in accordance with the CAN/CSA S6. Wind loading on the OCS shall be considered in the design of both superstructure and substructure elements.
- (iv) Wind Load on traffic (V) is wind load acting on the rail Vehicle and/or highway vehicular traffic and shall be in accordance with CAN/CSA S6. The entire length of the vehicle or any part or parts of that length producing critical response multiplied by the actual height of the vehicle above the side wall shall be considered as the frontal area.
- (v) Differential Settlement (S) are loads induced on the Structure and shall be considered.
- (d) Exceptional Loads
- (i) Earthquake (EQ) load shall be in accordance with CAN/CSA S6 and as modified by Clause 4.4 of this Part 2.

- (ii) Loads due to stream pressure and ice flows (F) shall be considered in accordance with CAN/CSA S6.
- (iii) Ice Accretion (A) Load shall be in accordance with CAN/CSA S6 and as modified below:
 - A. During normal operations, ice accretion equivalent to an average thickness of 40mm shall be applied to the roof of the Vehicles. It shall be assumed that there will be no ice build-up on vertical surfaces of the Vehicle.
 - B. During normal operations, ice (9.8 kN/m^3) accretion on the Guideway deck slab to the top of the running rails shall be applied as well as an additional accumulation of compacted snow (4.7 kN/m^3) on catwalks to the top of the barrier wall.
 - C. Snow and ice load during suspended operations is less than that caused by normal operating vehicle live loads; and shall not be included as a design case under load combinations in this Article.
- (iv) Collision Load (H) shall be in accordance with CAN/CSA S6 for roadway and pedestrian Structures and as modified below for Guideway Structures:
 - A. Piers or other Guideway Structure support elements that are situated less than 3m from the edge of an adjacent street or highway shall be designed to withstand a horizontal static force of 1000 kN, unless protected with suitable barriers. This force is to be applied on the support element at an angle of 10 degrees from the direction of the road traffic and at a height of 1200mm above ground level. This condition occurs with the dead load of the Structure but need not be applied concurrently with other loadings. The provisions of this clause shall apply to existing and proposed Guideway Structures.
- (v) Potential Derailment Load (DR) effects shall be considered. In the absence of actual crash test data or the results of a detailed dynamic crash/impact analysis the load effect of a derailment event can be accounted for by applying concurrently vertical and horizontal (transverse) forces to the supporting Structure as follows:
 - A. The vertical derailment load of the Vehicle shall consist of the Vehicle's maximum weight multiplied by an impact factor. A vertical impact factor of 100% of the Vehicle weight shall be used to compute the equivalent static derailment load.
 - B. Horizontal (transverse) load effect – equal to 20% of the Vehicle load, distributed proportionately along the length of the Vehicle in accordance with the axle load distribution along the length of the Train, acting perpendicular (transverse) to the Track alignment at the top surface of the rail.

- C. When checking any component of superstructure to substructure that supports two or more Tracks, only one Vehicle on one Track shall be considered to have derailed, with the other Track being loaded with a stationary work train, including work train, cranes, flats, etc., or another Vehicle, ready to receive Passengers from the derailed Train. The design load used shall be the greatest of these loadings.
 - D. For derailment events that would cause the Vehicle's wheels to bear directly on the Structure slab, the wheel load distribution on the slab shall be established using a rational method. Location of derailed wheel excursion limited by guard rails or curbs shall be that location that achieves maximum loading condition.
 - E. All elements of the Guideway Structure shall be checked assuming simultaneous application of all derailed wheel loads. The reduction of positive moment in continuous slabs due to derailed wheel loads in adjacent spans shall not be permitted.
- (vi) Broken Rail (BR) forces are those which are transferred to the Structure in longitudinal shear by the fasteners when a pull-apart occurs. The rail will slip, on both sides of the pull-apart, until the tensile force in the rail before the break is counteracted by the reversed fastener restraint forces.
- A. The unbalanced force from the broken rail is resisted by both the unbroken rails and the Guideway Structure support system, in proportion to their relative stiffness's. The distribution to the Structure shall be determined by analysis. The probability that more than one rail will break at the same time on a given dual-lane Structure or single-lane Structure is very small and shall not be considered.
 - B. The longitudinal restraint of the fastener shall be such that the calculated gap of a pull-apart will be less than 65mm at the minimum expected rail temperature. Computation of this gap shall include both rail slip in the fasteners and deflection of the Guideway Structure.
- (e) Construction loads shall be determined in accordance with CAN/CSA S6.

4.6 Distribution of Loads

- (a) Distribution of Wheel Loads to Slab for Tie and Ballast Track
 - (i) For tie and ballast Track, wheel loads are transmitted to the deck slab through the ballast. Wheel loads shall be uniformly distributed longitudinally over a length of 900mm, plus the depth of the Track Structure, plus twice the effective depth of slab, except as limited by wheel spacing. Wheel loads shall have uniform lateral distribution over a width equal to the length of the tie plus the depth of ballast

under the tie, except as limited by the proximity of adjacent Tracks or the extent of the Structure.

(b) Distribution of Wheel Loads to Slab for direct fixation Track

- (i) For direct fixation Track, wheel loads are transmitted to the deck slab through the rail fastening system placed directly on the slab. Wheel loads shall be uniformly distributed over a length of 900mm along the rail. This load shall be distributed transversely (normal to the rail and centered on the rail) by the width of the rail fastener plus twice the depth of the deck and Track support Structure except as limited by the proximity of adjacent Tracks or the extent of the Structure.

4.7 Material

- (a) Material used for the modification, repair and rehabilitation of existing Structures shall be compatible with the existing in-situ material.
- (b) Material selection and/or coating of attached elements shall be used to minimize staining to concrete elements.
- (c) All material for the Structures as identified in this Clause shall conform to OPSS.
- (d) Earth Retaining Structures
 - (i) Permanent RSS systems located beyond the salt spray zone, shall meet, as a minimum, medium performance and low appearance requirements in accordance with MTO RSS Design Guidelines. RSS systems within 10m of a salt spray zone or associated with the Bridge Structure shall meet high performance and high appearance requirements in accordance with MTO RSS Design Guidelines.
 - (ii) Where accessible to Passengers within the Fare Paid Zone, including bus Platform areas and adjacent to public areas at Station entrances, gabion stones at the face of gabion walls shall be sized to prevent removal.
- (e) Concrete
 - (i) Concrete shall conform to OPSS 1350 and City Special Provision F-9045 and F-9043.
 - (ii) All concrete mixes shall be in accordance with CAN/CSA A23.1
 - (iii) Concrete strength for Roadway and pedestrian Structures shall be as per MTO Structural Manual, except for Bridge decks and sidewalks which shall be 35 MPa.
 - (iv) Chloride Permeability - Rapid Chloride Permeability as determined by ASTM C1202 and measured at 91 days, shall not exceed 1000 coulombs for the superstructure mix.

- (f) Reinforcing Steel
 - (i) Reinforcing Steel shall meet the material requirements as defined in OPSS 905 and OPSS 1440.
 - (ii) Minimum reinforcement designation shall be 15M.
 - (iii) Welded splices or joints in reinforcing steel shall not be permitted. Welding for purposes of bonding and grounding continuity is permitted.
 - (iv) Couplers shall not be permitted in plastic hinge zones.
 - (v) No splices shall be permitted in plastic hinge zones for substructure components.
 - (vi) Premium reinforcing for Roadway and pedestrian Structures shall be used where required in accordance with the MTO Structural Manual.
 - (vii) Premium reinforcing for Guideway Structures shall be used in:
 - A. Top and bottom of cantilevers;
 - B. Guideway plinths that may be subject to de-icing salts, such as adjacent to Platforms;
 - C. Substructure elements that are located within the splash zone of Roadways treated with de-icing salts;
 - D. Barrier and parapet walls; and,
 - E. Sidewalks.
 - (viii) Where electrical continuity is required for managing stray currents, weldable reinforcement and suitable welding shall be used.
- (g) GFRP Reinforcing bars
 - (i) GFRP reinforcing bar shall only be permitted in barrier and parapet wall applications.
 - (ii) The GFRP reinforcing bars shall conform to the following standards:
 - A. CAN/CSA S806: Design & Construction of Building Structures with Fibre Reinforced Polymer
 - B. CSA S807: Fibre Reinforced Polymers
 - (iii) GFRP shall have a minimum modulus of elasticity of 40 GPa.
 - (iv) GFRP shall have a specified minimum tensile strength of 1000 MPa.

- (v) GFRP shall be type 2 and type 3.
- (h) Prestressing Tendons
 - (i) Internal unbonded post-tensioning tendons shall not be permitted.
 - (ii) External grouted post-tensioning tendons shall be permitted for segmental Construction and shall be corrosion protected.
- (i) Structural Steel
 - (i) Structural steel for Roadway and pedestrian Structures shall conform to the material requirements in the MTO Structural Manual.
 - (ii) Structural steel for Guideway Structures
 - A. Superstructure primary members shall be grade 350AT Category 3 for primary plates, girders and rolled section members.
 - B. Primary members made from pipe sections shall meet the minimum Charpy impact energy specified in Table 9 of CSA G40.21 for the similar yield strength of steel tested at a Category 3 temperature.
 - C. Secondary steel members shall be grade 350W or 350A.
 - D. ASTM A 588 may be substituted for grade 350A or grade 350AT. ASTM A 588 shall only be substituted for grade 350AT steel when the Charpy impact energy requirements are verified by the submission of test documentation.
 - (iii) Steel fabrication companies shall be CWB certified.
- (j) Deck joint assemblies shall comply with City of Ottawa Special Provision F-9201, including the 5 year warranty period for all NMI Structures.
- (k) Bearings shall comply with City of Ottawa Special Provision F-9221, including the 5 year warranty period for all NMI Structures.
- (l) Corrugated steel pipe, regardless of thickness or type, shall not be used for Bridge or Culvert construction.

4.8 Construction

- (a) Concrete Construction shall be in accordance with OPSS 904 and City of Ottawa Special Provision F-9040.
- (b) Precast Prestressed Concrete

- (i) Construction shall be in accordance with OPSS 909.
 - (ii) Precast members shall not be erected until sample cylinders tested per OPSS 1350 achieve a design 28 day compressive strength.
 - (iii) Precast Segmental Concrete Bridges shall be constructed in accordance with the requirements of AASHTO's Guide Specifications for the Design and Construction of Segmental Concrete Bridges except where it conflicts with CAN/CSA S6.
- (c) Structural Steel shall be Constructed in accordance with OPSS 906.
 - (d) Soffits shall be uncovered and without coatings.
 - (e) Bearings shall be uncovered.
 - (f) Bolted connections shall have a minimum diameter of 22mm and A325M designation of weathering steel.
 - (g) Welded connections – critical welds, such as over supports and midspan, shall be treated as tension splices subjected to more stringent tests (Non-Destructive Testing). Testing schemes shall be submitted by DB Co for review in accordance with Schedule 10 – Review Procedure.

4.9 Description of Project Structures

- (a) Provisions contained in this Clause shall be read in conjunction with Appendix E of this Part 2.
- (b) DB Co shall perform the following as part of the work for Confederation Line East Extension:
 - (i) Blair Road Bridge over Transitway (SN226780)
 - A. Repurpose the existing Underpass Bridge to accommodate the OCS in accordance with Schedule 15-2, Part 3, Article 14 – Overhead Contact System.
 - B. Install Bridge Structure fencing in accordance with the requirements in Schedule 15-2, Part 6, Article 2 – Design Criteria.
 - C. Undergo a structural rehabilitation to address all substructure and deck soffit deficiencies. The scope of rehabilitation shall be based on the most recent OSIM inspection report and shall include the following, as a minimum:
 - i. Crack repairs to all medium and wide cracks on the soffit, abutment walls, wingwalls and retaining walls;

- ii. Concrete patch repairs to all delaminated areas on the wingwalls; and,
 - iii. Replace longitudinal joint seal.
- (ii) Blair Road E-N/S Ramp (SN226790)
 - A. Repurpose the existing Underpass Bridge to accommodate the OCS in accordance with Schedule 15-2, Part 3, Article 14 – Overhead Contact System.
 - B. Undergo a structural rehabilitation to address all substructure and deck soffit deficiencies. The scope of rehabilitation shall be based on the most recent OSIM inspection report and shall include the following, as a minimum:
 - i. Crack repairs to all medium and wide cracks on the soffit, abutment walls, ballast walls, wingwalls and retaining walls;
 - ii. Concrete patch repairs to all delaminated areas on the soffit, abutment walls, bearing seat, wingwalls and piers; and,
 - iii. Replace the abutment bearings.
- (iii) Transitway Bridge over OR174 (SN224880)
 - A. Remove existing Bridge in accordance with Schedule 15-2, Part 1, Article 14 – Demolition, Removals and Disposal.
 - B. Remove culverts A224636 and A224635 in accordance with Schedule 15-2, Part 1, Article 14 – Demolition, Removals and Disposal. These culverts located along the shoulder shall be removed and replaced with open ditch.
- (iv) Montreal Road Flyover (SN224980)
 - A. Design and construct a new Elevated Guideway to carry the alignment over OR174 WB lanes. The new Structure shall accommodate:
 - i. The EB and WB alignment, including Emergency walkways on the Structure; and,
 - ii. The proposed OR174 WB roadway cross section in accordance with Clause 6.19 of this Part 2 under the Structure.
- (v) Westbound OR174 Bridge over Montreal Road (SN224850)
 - A. Remove existing Bridge in accordance with Schedule 15-2, Part 1, Article 14 – Demolition, Removals and Disposal.

- B. Design and construct a new Overpass Bridge to carry OR174 WB lanes over Montreal Road. The new Structure shall accommodate:
 - i. The proposed OR174 WB roadway cross section in accordance with Clause 6.19 of this Part 2 on the Structure; and,
 - ii. The proposed Montreal Road cross section in accordance with Clause 6.19 of this Part 2 under the Structure.
 - iii. Scour/erosion protection treatments at the bridge including embankment slopes.
 - C. Bridge shall be an independent structure and designed in conjunction with the Montreal Road Station Bridge and the Eastbound OR174 Bridge over Montreal Road.
 - D. Retaining walls, abutments and Bridge superstructure shall be of concrete construction.
 - E. Bridge abutments shall be semi-integral and designed with deep foundations extending to bedrock.
 - F. Architectural concrete shall be used for all concrete elements exposed to the adjacent Station and/or within the Station limits. Architectural concrete shall be as per ACI 347.3R and shall meet the requirements in Schedule 15-2, Part 4, Article 2 – Architectural Design Criteria.
 - G. Construction of the new structure shall be staged in accordance with Schedule 15-2, Part 7, Article 2 – Existing Municipal Roadways.
- (vi) Montreal Road Station Bridge (SN224855)
- A. Design and construct a new Elevated Guideway to carry the alignment over Montreal Road. The new Structure shall accommodate:
 - i. The EB and WB alignment and the Montreal Road Station Train Platform on the Structure; and,
 - ii. The proposed Montreal Road cross section in accordance with Clause 6.19 of this Part 2 and the east and west Montreal Road Station entry plazas under the Structure.
 - B. Design of the Elevated Guideway shall be coordinated with the design of the Montreal Road Station. Refer to Schedule 15-2, Part 4, Article 3 – Station Specific Architectural Design Criteria.

- C. The Elevated Guideway shall be an independent structure and designed in conjunction with the Westbound OR174 Bridge over Montreal Road and the Eastbound OR174 Bridge over Montreal Road Bridges.
 - D. Architectural concrete shall be used for all concrete elements exposed to the adjacent Station and/or within the Station limits. Architectural concrete shall be as per ACI 347.3R and shall meet the requirements in Schedule 15-2, Part 4, Article 2 – Architectural Design Criteria.
 - E. Retaining walls, abutments and superstructure shall be of concrete construction.
 - F. Bridge abutments shall be designed with deep foundations extending to bedrock.
 - G. Construction of the new Structure shall be staged in accordance with Schedule 15-2, Part 7, Article 2 – Existing Municipal Roadways.
 - H. Design of Station elements, on or below the Structure, shall meet the structural requirements of Schedule 15-2, Part 4, Article 4 – Structural Design Criteria and Requirements in addition to the requirements of this Article.
- (vii) Eastbound OR174 Bridge over Montreal Road (SN224851)
- A. Remove existing Overpass Bridge in accordance with Schedule 15-2, Part 1, Article 14 – Demolition, Removals and Disposal.
 - B. Design and construct a new Overpass Bridge to carry OR174 EB lanes over Montreal Road. The new Bridge shall accommodate:
 - i. The proposed OR174 EB roadway cross section in accordance with Clause 6.19 of this Part 2 on the Structure; and,
 - ii. The proposed Montreal Road cross section in accordance with Clause 6.19 of this Part 2 under the Structure.
 - iii. Scour/erosion protection treatments at the bridge including embankment slopes.
 - C. Bridge shall be an independent structure and designed in conjunction with the Montreal Road Station Bridge and the Westbound OR174 Bridge over Montreal Road.
 - D. Retaining walls, abutments and Bridge superstructure shall be of concrete construction.

- E. Bridge abutments shall be semi-integral and designed with deep foundations extending to bedrock.
 - F. Architectural concrete shall be used for all concrete elements exposed to the adjacent Station and/or within the Station limits. Architectural concrete shall be as per ACI 347.3R and shall meet the requirements in Schedule 15-2, Part 4, Article 2 – Architectural Design Criteria.
 - G. Construction of the new Structure shall be staged in accordance with Schedule 15-2, Part 7, Article 2 – Existing Municipal Roadways.
- (viii) Green’s Creek Culvert under OR174 (SN227110)
- A. Design and construct a section of this culvert to facilitate the future replacement of the existing Green’s Creek culvert without interruption to the rail service. Following the future removal of the existing culvert by the City, it is intended that the new Structure section will serve as part of the new Green’s Creek Culvert. DB Co shall be responsible to provide a design of the complete Culvert to replace the existing Green’s Creek Culverts to demonstrate feasibility.
 - B. Design and construct a new Culvert section over the two easterly cells of the existing Green’s Creek Culvert and under the alignment in accordance with Clause 5.7 of this Part 2. The new Culvert shall accommodate:
 - i. The EB and WB alignment, including Emergency walkways; and,
 - ii. The two easterly cells of the existing Green’s Creek Culvert.
 - C. Design and construct new retaining walls at the south sides of the existing Culvert with concrete traffic barrier to retain the road section.
 - D. Construction of the new Culvert section shall be staged in accordance with Schedule 15-2, Part 7, Article 2 – Existing Municipal Roadways.
 - E. The new Culvert section shall be designed and constructed to allow for future extension to accommodate the ultimate OR174 roadway cross section. Design and construction of the new Culvert section shall:
 - i. Ensure a future Culvert extension to both the north and south sides of the new Culvert section can be constructed without causing disruption to the Confederation Line;
 - ii. Not cause any damage to the existing Green’s Creek Culvert;
 - iii. Ensure the future removal of the existing Green’s Creek Culvert can be performed without causing disruption to the Confederation Line;

- iv. The design of the complete Culvert replacement shall ensure to keep a minimum horizontal clearance of 5m from the existing watermain at north side from the proximate structural components of the future extension of the Culvert.
- (ix) Green's Creek Pedestrian Bridge (SN221250)
 - A. Design and construct a pedestrian Bridge over Green's Creek located north of the Green's Creek Culvert in accordance with Clause 5.7 of this Part 2. The new Structure shall accommodate:
 - i. A MUP on the Structure; and,
 - ii. Green's Creek.
 - B. Bridge shall be an independent Structure and designed in conjunction with the Green's Creek Culvert under OR174.
 - C. Scour/erosion protection treatments shall be provided at the Bridge embankment slopes.
- (x) Sir George-Etienne Cartier Parkway Bridge over OR174 (SN224860)
 - A. Repurpose the existing Underpass Bridge to accommodate the OCS in accordance with Schedule 15-2, Part 3, Article 14 – Overhead Contact System.
 - B. Install Bridge Structure fencing in accordance with the requirements in Schedule 15-2, Part 6, Article 2 – Design Criteria.
 - C. Undergo a structural rehabilitation to address all substructure and deck soffit deficiencies. The scope of rehabilitation shall be based on the most recent inspection report and shall include the following, as a minimum:
 - i. All medium cracks on the soffit.
- (xi) Jeanne d'Arc Boulevard Bridge over OR174 (SN224870)
 - A. Repurpose the existing Underpass Bridge to accommodate the OCS in accordance with Schedule 15-2, Part 3, Article 14 – Overhead Contact System.
 - B. Install Bridge Structure fencing in accordance with the requirements in Schedule 15-2, Part 6, Article 2 – Design Criteria.
 - C. Modify the existing Bridge to provide access to and accommodate the new Jeanne d'Arc Station and provide access to the Station from Jeanne d'Arc Boulevard. Modifications to the existing Bridge shall meet the

requirements in Schedule 15-2, Part 4, Article 3 – Station Specific Architectural Design Criteria.

- i. DB Co shall ensure the existing Structure has adequate structural capacity to accommodate all required modifications. Any required repairs or strengthening shall be performed by DB Co.
- ii. Modifications to the Bridge for the Station shall include the relocation of conflicting Utilities.

D. Undergo a structural rehabilitation of the existing Underpass Bridge to address all substructure and superstructure deficiencies. The scope of rehabilitation shall be based on the most recent conditions reports and shall include the following, as a minimum:

- i. Crack repairs to all medium and wide cracks on the soffit, abutment walls, wingwalls, median island, sidewalk and barrier/parapet walls;
- ii. Concrete patch repairs to all delaminated and spalled areas on the soffit, abutment walls, piers, ballast walls, sidewalk and barrier/parapet walls;
- iii. Provide concrete sealer on the inside face of barriers;
- iv. Replace the abutment bearings;
- v. Mill and pave the asphalt wearing surface on the Bridge and approach slabs;
- vi. Replace concrete end dams and deck joint seals; and,
- vii. Reconstruct adjacent areas affected by construction of the proposed Jeanne d'Arc Station.

(xii) Orléans Boulevard Bridge over OR174 (SN224240)

- A. Repurpose the existing Underpass Bridge to accommodate the OCS in accordance with Schedule 15-2, Part 3, Article 14 – Overhead Contact System.
- B. Install Bridge Structure fencing in accordance with the requirements in Schedule 15-2, Part 6, Article 2 – Design Criteria.
- C. Modify the existing Bridge to provide access to and accommodate the new Orléans Boulevard Station. Modifications to the existing Bridge shall meet the requirements in Schedule 15-2, Part 4, Article 3 – Station Specific Architectural Design Criteria.

- i. DB Co shall ensure the existing Structure has adequate structural capacity to accommodate all required modifications. Any required repairs or strengthening shall be performed by DB Co.
 - ii. Modifications to the Bridge for the Station shall include the relocation of conflicting Utilities.
- (xiii) Bilberry Creek Culvert under OR174 (SN224510)
 - A. Ensure structural capacity of Culvert not be exceeded with passage of the alignment and/or the increase of fill over the Structure. Any required repairs or strengthening shall be performed by DB Co.
- (xiv) Place d'Orléans Pedestrian Bridge over OR174 (SN228030)
 - A. Repurpose the existing Underpass pedestrian Bridge to accommodate the OCS in accordance with Schedule 15-2, Part 3, Article 14 – Overhead Contact System.
 - B. Modify the existing Bridge to provide access to and accommodate the new Place d'Orléans Station. Modifications to the existing Bridge shall meet the requirements in Schedule 15-2, Part 4, Article 3 – Station Specific Architectural Design Criteria.
 - i. DB Co shall ensure the existing Structure has adequate structural capacity to accommodate all required modifications. Any required repairs or strengthening shall be performed by DB Co.
 - ii. Modifications to the Bridge for the Station shall include the relocation of conflicting Utilities.
 - C. Undergo a structural rehabilitation to address all substructure and deck soffit deficiencies. The scope of rehabilitation shall be based on the most recent OSIM inspection report and shall include the following as a minimum:
 - i. Crack repairs to all medium cracks on the soffit;
 - ii. Concrete patch repairs to all spalled areas of the piers; and,
 - iii. Concrete repairs to exposed pier foundations.
- (xv) Place d'Orléans Station Pedestrian Bridge over EB OR174 (SN228025)
 - A. Design and construct a new pedestrian Bridge over OR174 EB lanes in accordance with the requirements in Schedule 15-2, Part 4, Article 3 – Station Specific Architectural Design Criteria. The new Structure shall accommodate:

- i. A fare paid pedestrian connection between the Bus Station to the LRT Station on the Structure; and,
 - ii. The proposed OR174 EB roadway cross section in accordance with Clause 6.19 of this Part 2 under the Structure.
 - B. Architectural concrete shall be used for all concrete elements exposed to the adjacent Station and/or within the Station limits. Architectural concrete shall be as per ACI 347.3R and shall meet the requirements in Schedule 15-2, Part 4, Article 2 – Architectural Design Criteria.
 - C. The new Bridge shall be designed and constructed in conjunction with the Place d’Orléans Station. Refer to Schedule 15-2, Part 4, Article 3 – Station Specific Architectural Design Criteria.
- (xvi) Champlain Street Bridge over OR174 (SN224890)
- A. Repurpose the existing Underpass Bridge to accommodate the OCS in accordance with Schedule 15-2, Part 3, Article 14 – Overhead Contact System.
 - B. Install Bridge Structure fencing in accordance with the requirements in Schedule 15-2, Part 6, Article 2 – Design Criteria.
 - C. Undergo a structural rehabilitation to address all substructure and deck soffit deficiencies. The scope of rehabilitation shall be based on the most recent OSIM inspection report and shall include the following as a minimum:
 - i. Crack repairs to all medium cracks on the abutment walls.
- (xvii) Tenth Line Road Bridge over OR174 (SN894010)
- A. Repurpose the existing Underpass Bridge to accommodate the OCS in accordance with Schedule 15-2, Part 3, Article 14 – Overhead Contact System.
 - B. Install Bridge Structure fencing in accordance with Schedule 15-2, Part 6, Article 2 – Design Criteria.
 - C. Undergo a structural rehabilitation to address all substructure and deck soffit deficiencies. The scope of rehabilitation shall be based on the most recent OSIM inspection report and shall include the following, as a minimum:
 - i. Crack repairs to all medium and wide cracks on the abutment walls, ballast walls, soffit, diaphragms and piers; and,

- ii. Replace south transverse expansion joint seal.
- (xviii) Box Culvert under OR174 (SN894040)
 - A. Complete a structural evaluation to ensure the structural capacity of the Structure is not exceeded with the application of all loads as defined in Clause 4.5 of this Part 2 and/or increase of fill over the Structure. Any required repairs or strengthening shall be performed by DB Co.
- (xix) Taylor Creek Culvert under OR174 (SN894050)
 - A. Complete a structural evaluation to ensure the structural capacity of the Culvert is not exceeded with the application of all loads as defined in Clause 4.5 of this Part 2 and/or increase of fill over the structure. Any required repairs or strengthening shall be performed by DB Co.
- (xx) DB Co shall design and construct retaining walls as dictated by grade and where site conditions do not allow for an embankment with a stable slope to be installed. Retaining wall locations include but shall not be limited to the following:
 - A. Directly adjacent to the wingwalls on the west side of the new Westbound OR174 Bridge (SN224850) over Montreal Road.
 - B. Directly adjacent to the wingwalls on the east side of the new Eastbound OR174 Bridge (SN224851) over Montreal Road.
 - C. Along Ramp S-E OR174 EB between the Montreal Road Interchange and Green's Creek Culvert.
 - D. Along Ramp E-N/S OR174 WB off-ramp to Montreal Road.
- (c) DB Co shall perform the following work as part of the work for Confederation Line West Extension:
 - (i) Box Culvert under West Transitway (SN018231 and SN018232)
 - A. Complete a structural evaluation to ensure the structural capacity of the Culvert is not exceeded with the application of all loads as defined in Clause 4.5 of this Part 2 and/or increase of fill over the Structure. Any required repairs or strengthening shall be performed by DB Co.
 - B. Replacement of Culvert joints includes the replacement of all joint accessories (i.e. dowels). Premium reinforcing shall be used for all reinforcing steel, including dowels, required as part of the replacement of the Culvert joints.
 - (ii) West Transitway South Rock Wall (SN019991)

- A. DB Co shall complete an updated condition assessment including a detailed field survey to verify location and extent of wall defects and locations of increased deterioration on the existing rock wall and concrete retaining wall between SJAM Parkway and Piney Street. DB Co shall perform the updated condition assessment and categorize specific segments of the rock wall based on the following probability of failure:
- i. Low Risk:
 - 1 Rock is currently considered stable (i.e., clean rock face, thickly bedded rock layers with very little loose rock or rock which is slightly overhanging but is situated on a flat lying ledge or the rock is currently keyed into the rock mass) and it is unlikely that the rock will become unstable in the next 30 years.
 - ii. Medium Risk:
 - 1 Rock is stable at present (i.e., rock is overhanging but supported on loose rock or rock that is susceptible to weathering and further deterioration) but could become unstable within the next 30 years if acted upon by external forces including ongoing weathering and groundwater.
 - iii. High Risk:
 - 1 Rock is marginally stable at present (i.e., rock is overhanging and only partially supported on loose rock or rock that is susceptible to weathering or is situated on a potential sliding plane and could slide with increased groundwater pressure) and would very likely become unstable within the next 30 years.
 - iv. Very High Risk:
 - 1 Rock is currently considered unstable and could fail at any time. The rock is situated on a steeply inclined sliding plane possible with an open tension crack at the back of the block or has a very significant overhang. There is also evidence of some past movement (offset across open joints or disturbance of the soil/vegetation).
- B. DB Co shall implement rock face stabilization for all medium, high and very high risk zones. Acceptable stabilization strategies shall include, at a minimum:
- i. Acceptable stabilization strategies shall include, at a minimum::

- 1 Concrete re-facing with drainage system for the sections of the rock face that is comprised of siltstone and eroded limestone; and,
 - 2 Installation of a drapery system on the remaining sections.
- ii. Preparatory works for both strategies shall include removal of loose blocks & vegetation, filling weak shelly interbeds (>100mm into the rock) and filling underside of overhangs (>300mm) with shotcrete where bottom ledge exists. The required minimum Design Life shall be 10 years.
- C. DB Co shall complete an updated post construction condition assessment including a detailed field survey to confirm that only low risk failure zones are present following rock wall stabilization.
- (iii) West Transitway North Rock Wall (SN019992)
- A. DB Co shall complete an updated condition assessment including a detailed field survey to verify location and extent of wall defects and locations of increased deterioration on the existing rock wall and concrete retaining wall between SJAM Parkway and Piney Street. DB Co shall perform the updated condition assessment and categorize specific segments of the rock wall based on the following probability of failure:
- i. Low Risk:
 - 1 Rock is currently considered stable (i.e., clean rock face, thickly bedded rock layers with very little loose rock or rock which is slightly overhanging but is situated on a flat lying ledge or the rock is currently keyed into the rock mass) and it is unlikely that the rock will become unstable in the next 30 years.
 - ii. Medium Risk:
 - 1 Rock is stable at present (i.e., rock is overhanging but supported on loose rock or rock that is susceptible to weathering and further deterioration) but could become unstable within the next 30 years if acted upon by external forces including ongoing weathering and groundwater.
 - iii. High Risk:
 - 1 Rock is marginally stable at present (i.e., rock is overhanging and only partially supported on loose rock or rock that is susceptible to weathering or is situated on a

potential sliding plane and could slide with increased groundwater pressure) and would very likely become unstable within the next 30 years.

iv. Very High Risk:

- 1 Rock is currently considered unstable and could fail at any time. The rock is situated on a steeply inclined sliding plane possible with an open tension crack at the back of the block or has a very significant overhang. There is also evidence of some past movement (offset across open joints or disturbance of the soil/vegetation).

B. DB Co shall implement rock face stabilization for all medium, high and very high risk zones.

i. Acceptable stabilization strategies shall include, at a minimum:

- 1 Concrete re-facing with drainage system for the sections of the rock face that is comprised of siltstone and eroded limestone; and,
- 2 Installation of a drapery system on the remaining sections.

ii. Preparatory works for both strategies shall include removal of loose blocks & vegetation, filling weak shelly interbeds (>100mm into the rock) and filling underside of overhangs (>300mm) with shotcrete where bottom ledge exists. The required minimum Design Life shall be 10 years.

C. DB Co shall complete an updated post construction condition assessment including a detailed field survey to confirm that only low risk failure zones are present following rock wall stabilization.

(iv) Goldenrod Bridge at Tunney's Pasture (SN016255)

A. Design and construct a new Bridge to carry Goldenrod Driveway over the alignment. The new Structure shall accommodate the following:

- i. The proposed Goldenrod Driveway roadway cross section in accordance with Clause 6.19 of this Part 2 on the Structure; and,
- ii. The EB and WB alignment, including Emergency walkways under the Structure.

B. Install Bridge Structure fencing in accordance with the requirements in Schedule 15-2, Part 6, Article 2 – Design Criteria.

- C. Ensure no conflict between the Structure and the box Culvert under the West Transitway.
 - D. Track elevation under Structure to be optimized in order to allow for maximum vertical clearance and shall meet the vertical clearance indicated in Appendix E of this Part 2.
- (v) Ross Avenue Bridge (SN016260)
- A. Repurpose the existing Underpass Structure to accommodate the OCS in accordance with Schedule 15-2 Part 3, Article 14 – Overhead Contact System.
 - B. Ensure the existing Bridge Structure fencing meets the requirements in Schedule 15-2, Part 6, Article 2 – Design Criteria. DB Co shall perform any required fence upgrade, rehabilitation or replacement.
 - C. Undergo a structural rehabilitation to address all substructure and deck soffit deficiencies. The scope of rehabilitation shall be based on the most recent OSIM inspection report and shall include the following, as a minimum:
 - i. Crack repairs to all medium and wide cracks on the soffit;
 - ii. Concrete patch repairs to all delaminated areas on the soffit; and,
 - iii. Concrete patch repairs to all spalled areas on the retaining walls.
- (vi) Northwestern Avenue Bridge (SN016270)
- A. Repurpose the existing Underpass Bridge to accommodate the OCS in accordance with Schedule 15-2, Part 3, Article 14 – Overhead Contact System.
 - B. Install Bridge Structure fencing in accordance with the requirements in Schedule 15-2, Part 6, Article 2 – Design Criteria.
 - C. Undergo a structural rehabilitation to address all substructure and deck soffit deficiencies. The scope of rehabilitation shall be based on the most recent OSIM inspection report and shall include the following, as a minimum:
 - i. Crack repairs to all medium cracks on the soffit;
 - ii. Concrete patch repairs to all delaminated areas on the abutment walls; and,
 - iii. Mitigate and repair undermining of wingwall.

(vii) Carleton Avenue Bridge (SN016330)

- A. Repurpose the existing Underpass Structure to accommodate the OCS in accordance with Schedule 15-2, Part 3, Article 14 – Overhead Contact System.
- B. Ensure the existing Bridge Structure fencing meets the requirements in Schedule 15-2, Part 6, Article 2 – Design Criteria. DB Co shall perform any required upgrade, rehabilitation or replacement
- C. Undergo a structural rehabilitation to address all substructure and deck soffit deficiencies. The scope of rehabilitation shall be based on the most recent OSIM inspection report and shall include the following, as a minimum:
 - i. Crack repairs to all medium cracks on the abutment walls and soffit;
 - ii. Concrete patch repairs to all spalled areas on the abutment walls and soffit; and,
 - iii. Concrete patch repairs to all delaminated areas on the soffit.

(viii) Island Park Drive Bridge (SN016280)

- A. Repurpose the existing Underpass Structure to accommodate the OCS in accordance with Schedule 15-2, Part 3, Article 14 – Overhead Contact System.
- B. Install Bridge Structure fencing in accordance with the requirements in Schedule 15-2, Part 6, Article 2 – Design Criteria.
- C. Undergo a structural rehabilitation to address all substructure and deck soffit deficiencies. The scope of rehabilitation shall be based on the most recent OSIM inspection report and shall include the following, as a minimum:
 - i. Crack repairs to all medium and wide cracks on the soffit, wingwalls, and abutment walls; and,
 - ii. Concrete patch repairs to all delaminated areas on the abutment walls.

(ix) Lanark Avenue Bridge (SN016290)

- A. Repurpose the existing Underpass Structure to accommodate the OCS in accordance with Schedule 15-2, Part 3, Article 14 – Overhead Contact System.

- B. Install Bridge Structure fencing in accordance with the requirements in Schedule 15-2, Part 6, Article 2 – Design Criteria.
 - C. Undergo a structural rehabilitation to address all substructure and deck soffit deficiencies. The scope of rehabilitation shall be based on the most recent OSIM inspection report and shall include the following, as a minimum:
 - i. Crack repairs to all medium and wide cracks on the soffit and abutment walls; and,
 - ii. Concrete patch repairs to all spalled areas on the abutment walls and slope protection.
- (x) Hydro Utility Bridge (SN019890)
- A. Repurpose the existing Structure to accommodate the OCS in accordance with Schedule 15-2, Part 3, Article 14 – Overhead Contact System.
- (xi) Tweedsmuir Avenue Bridge (SN016300)
- A. Repurpose the existing Underpass Structure to accommodate the OCS in accordance with Schedule 15-2, Part 3, Article 14 – Overhead Contact System.
 - B. Install Bridge Structure fencing in accordance with the requirements in Schedule 15-2, Part 6, Article 2 – Design Criteria.
 - C. Modify the existing Bridge to provide access to the new Station in accordance with the requirements in Schedule 15-2, Part 4, Article 3 – Station Specific Architectural Design Criteria.
 - i. DB Co shall ensure the existing Structure has adequate structural capacity to accommodate all required modifications. Any required repairs or strengthening shall be performed by DB Co.
 - ii. Modifications to the Structure for the Station shall include the relocation of conflicting Utilities.
 - D. Undergo a structural rehabilitation to address all substructure and deck soffit deficiencies. The scope of rehabilitation shall be based on the most recent OSIM inspection report and shall include the following, as a minimum:
 - i. Crack repairs to all medium and wide cracks on the soffit and abutment walls; and,
 - ii. Concrete patch repairs to all spalled areas on the abutment walls.

(xii) Westboro Station Pedestrian Bridge (SN018240)

- A. If the Structure is not incorporated into DB Co design solution, DB Co shall decommission the superstructure in accordance with Schedule 15-2, Part 1, Article 14 – Demolition, Removals and Disposal; or
- B. If the Structure is incorporated into DB Co design solution, DB Co shall:
 - i. Repurpose the existing Bridge to accommodate the OCS in accordance with Schedule 15-2, Part 3, Article 14 – Overhead Contact System;
 - ii. Modify the existing Bridge to accommodate DB Co design solution as required. Any required repairs or strengthening required by DB Co's design shall be performed by DB Co; and,
 - iii. Perform structural rehabilitation to address all substructure, deck and soffit deficiencies. The scope of rehabilitation shall be based on the most recent OSIM inspection report and shall include the following, as a minimum:
 - 1 Crack repairs to all medium and wide cracks;
 - 2 Concrete patch repairs to all spalled and delaminated areas; and,
 - 3 Replacement of wearing surfaces.

(xiii) Athlone Avenue Bridge (SN016310)

- A. Repurpose the existing Underpass Bridge to accommodate the OCS in accordance with Schedule 15-2, Part 3, Article 14 – Overhead Contact System.
- B. Install Bridge Structure fencing in accordance with the requirements in Schedule 15-2, Part 6, Article 2 – Design Criteria.
- C. Modify the existing Bridge to provide access to and accommodate the new Station to meet the requirements in Schedule 15-2, Part 4, Article 3 – Station Specific Architectural Design Criteria.
 - i. DB Co shall ensure the existing Structure has adequate structural capacity to accommodate all required modifications. Any required repairs or strengthening shall be performed by DB Co.
 - ii. Modifications to the Structure for the Station shall include the relocation of conflicting utilities.

- D. Undergo a structural rehabilitation to address all substructure and deck soffit deficiencies. The scope of rehabilitation shall be based on the most recent OSIM inspection report and shall include the following, as a minimum:
 - i. Crack repairs to all medium cracks on the abutment walls and soffit; and,
 - ii. Concrete patch repairs to all spalled areas on the wingwalls.
- (xiv) Churchill Avenue Bridge (SN016320)
 - A. Repurpose the existing Underpass Structure to accommodate the OCS in accordance with Schedule 15-2, Part 3, Article 14 – Overhead Contact System.
 - B. Ensure the existing Bridge Structure fencing meets the requirements in Schedule 15-2, Part 6, Article 2 – Design Criteria. DB Co shall perform any required upgrade, rehabilitation or replacement.
- (xv) Roosevelt Avenue Bridge (SN018220)
 - A. Remove existing Bridge in accordance with Schedule 15-2, Part 1, Article 14 – Demolition, Removals and Disposal and replace with a temporary Structure as part of the Transitway detour along Scott Street in accordance with the requirements in Schedule 15-2, Part 7, Article 3 – Existing Transitway System.
 - B. Once the Transitway detour is no longer in service, DB Co shall design and construct a new pedestrian Bridge over the alignment. The new Structure shall be constructed in the location of the existing Bridge and shall accommodate the following:
 - i. A reinstated MUP connection at Roosevelt Avenue providing a minimum clear width of 4.2m on the Structure; and,
 - ii. The EB and WB alignment under the Structure.
 - C. Install Bridge Structure fencing in accordance with the requirements in Schedule 15-2, Part 6, Article 2 – Design Criteria.
 - D. DB Co shall install cyclist/pedestrian counters on the new Roosevelt Avenue Structure in accordance with Schedule 15-2, Part 7, Article 3 – Existing Transitway System.
- (xvi) SJAM Parkway at Carleton Avenue Pedestrian Overpass (SN018620, SN018621)

- A. DB Co shall ensure the structural capacity of EB and WB Structures is not exceeded with the passage of laden and unladen OC Transpo Buses. The design and installation of a temporary support system, if required, shall be performed by DB Co. Uninterrupted pedestrian passage under the Bridges shall be maintained at all times.
- B. Undergo a structural rehabilitation to address all identified Structure deficiencies. The scope of rehabilitation shall be based on the most recent OSIM inspection report and shall include the following, as a minimum:
 - i. Crack repairs to all medium and wide cracks;
 - ii. Concrete patch repairs to all spalled and delaminated areas; and,
 - iii. Replace barrier with owner specified modified Type Wyoming 830WYBRAIL 2-Tube Curb Mounted (PL-2) guiderail. The installation shall include all associated transitions, terminal elements and end treatments as per the details in Appendix F, Drawings F-3 to F-5, of this Part 2 and in accordance with Clause 6.21 of this Part 2.

(xvii) SJAM Parkway at Lanark Avenue Pedestrian Overpass (SN018610, SN018611)

- A. DB Co shall design and construct all necessary modifications to the existing WB pedestrian Overpass Structure as required in order to accommodate a widened MUP. Lane and MUP configuration shall be in accordance with Schedule 15-2, Part 2, Article 6 – Roadways, Bus Terminals and Lay-bys.
 - i. DB Co shall ensure the existing Structure has adequate structural capacity to accommodate all required modifications for the MUP and lane reconfiguration. Any required repairs or strengthening shall be performed by DB Co.
- B. DB Co shall ensure that the structural capacity of the WB and EB Structures is not exceeded with the passage of laden and unladen OC Transpo Buses. The design and installation of a temporary support system, if required, shall be performed by DB Co. Uninterrupted pedestrian passage under the Bridges shall be maintained at all times.
- C. Undergo a structural rehabilitation to address all identified Structure deficiencies. The scope of rehabilitation shall be based on the most recent OSIM inspection report and shall include the following, as a minimum:
 - i. Crack repairs to all medium and wide cracks;
 - ii. Concrete patch repairs to all spalled and delaminated areas; and,

- iii. Replace barrier with owner specified modified Type Wyoming 830WYBRAIL 2-Tube Curb Mounted (PL-2) guiderail. The installation shall include all associated transitions, terminal elements and end treatments as per the details in Appendix F, Drawings F-3 to F-5, of this Part 2 and in accordance with Clause 6.21 of this Part 2.

(xviii) U Approach – Depressed Guideway Parkway East Portal (SN019212)

- A. Design and construct and new tunnel portal at the east end of the Parkway tunnel. The new portal shall accommodate the EB and WB alignment, including Emergency walkways.
- B. Design and construction of the portal shall be completed in conjunction with the design and construction of the Parkway Tunnel.
- C. Architectural concrete shall be used for all exposed concrete elements. Architectural concrete shall be as per ACI 347.3R and shall meet the requirements of Schedule 15-2, Part 4, Article 2 – Architectural Design Criteria.

(xix) U Approach – Depressed Guideway Parkway West Portal (SN019213)

- A. Design and construct and new tunnel portal at the west end of the Parkway tunnel. The new portal shall accommodate the EB and WB alignment, including Emergency walkways.
- B. Design and construction of the portal shall be completed in conjunction with the design and construction of the Parkway Tunnel.
- C. Architectural concrete shall be used for all exposed concrete elements. Architectural concrete shall be as per ACI 347.3R and shall meet the requirements of Schedule 15-2, Part 4, Article 2 – Architectural Design Criteria.

(xx) SJAM Parkway at Churchill Avenue Pedestrian Overpass (SN018920)

- A. Design and construct new twin Bridge Structures to provide MUP connection between the north and south pathway systems along the SJAM Parkway corridor. The new Bridges shall accommodate the following:
 - i. The SJAM Parkway roadway cross section, at Churchill Avenue in accordance with Clause 6.21 of this Part 2 on both the east and west Structure; and,
 - ii. A MUP under the Structures.

- B. Install City specified modified Type Wyoming 830WYBRAIL 2-Tube Curb Mounted (PL-2) guiderail, including all associated transitions, terminal elements and end treatments as per the details in Appendix F, Drawings F-3 to F-5, of this Part 2 and in accordance with Clause 6.21 of this Part 2.
- C. The minimum pathway width under the Structure shall be in accordance with Schedule 15-2, Part 6, Appendix A. A minimum vertical clearance of 3m unencumbered by haunches, shall be achieved over the full width of the pathway.

(xxi) SJAM Parkway at Cleary Avenue Pedestrian Overpass (SN018910)

- A. Design and construct new twin Bridge Structures to provide MUP connection between Cleary Station and NCC's proposed linear pathway system on the north side of the proposed SJAM Parkway corridor. The new Bridges shall accommodate the following:
 - i. The SJAM Parkway roadway cross section at Cleary Station in accordance with Clause 6.21 of this Part 2 on both the east and west Structure; and,
 - ii. A MUP under the Structures.
- B. Install City specified modified Type Wyoming 830WYBRAIL 2-Tube Curb Mounted (PL-2) guiderail, including all associated transitions, terminal elements and end treatments as per the details in Appendix F, Drawings F-3 to F-5, of this Part 2 and in accordance with Clause 6.21 of this Part 2.
- C. The minimum pathway width under the Structure shall be in accordance with Schedule 15-2, Part 6, Appendix A. A minimum vertical clearance of 3m, unencumbered by haunches, shall be achieved over the full width of the pathway.

(xxii) Lincoln Fields Station Pedestrian Bridge (SN018400)

- A. Structure to be decommissioned in accordance with Schedule 15-2, Part 1, Article 14 – Demolition, Removals and Disposal.

(xxiii) Carling Avenue Bridge at Lincoln Fields Station (SN016070)

- A. Design and construct and a new Bridge to carry Carling Avenue over the alignment. The new Bridge shall accommodate the following:
 - i. The proposed Carling Avenue roadway cross section in accordance with Clause 6.19 of this Part 2 on the Structure; and,

ii. The EB and WB alignment under the Structure

B. Install Bridge Structure fencing in accordance with the requirements in Schedule 15-2, Part 6, Article 2 – Design Criteria.

(xxiv) Pedestrian Bridge at [REDACTED]

A. Design and construct a new pedestrian Bridge over the alignment. The new structure shall be constructed north of the existing pedestrian Bridge (SN018380) and meet the requirements in Schedule 15-2, Part 6, Article 5 – Site Specific Temporary Requirements. The new Structure shall accommodate the following:

i. A MUP connection to existing pathway at Sackville Connaught Avenue intersection on the Structure; and,

ii. Existing Transitway; EB, WB and SB alignment, including Emergency walkways, MUP and the 100 year flood plain under the Structure.

B. Remove the existing pedestrian Bridge in accordance with Schedule 15-2, Part 1, Article 14 – Demolition, Removals and Disposal. The new structure shall be Constructed and in service prior to the decommissioning of the existing pedestrian Bridge.

(xxv) Lincoln Fields Split Structure (SN015050)

A. Design and construct a new elevated Guideway to carry the EB and WB alignment to Bayshore over the SB alignment to Baseline. The new elevated Guideway shall be a single, multi-span Structure and shall accommodate the following:

i. EB and WB alignment, including Emergency walkways on the Structure

ii. Southbound alignment, including Emergency walkways, existing Transitway roadway cross section, Pinecrest Creek and a MUP under the Structure.

B. Construction of the new Structure shall be staged in accordance with Schedule 15-2, Part 7, Article 3 – Existing Transitway System.

C. Retaining walls shall not be used between the SB alignment and Pinecrest Creek.

(xxvi) U Approach – Depressed Guideway Connaught East Portal (SN015130)

- A. Design and construct and new Tunnel portal at the east end of the Connaught Tunnel. The new portal shall accommodate the EB and WB alignment, including Emergency walkways.
- B. Design and construction of the portal shall be done in conjunction with the design and construction of the Connaught Tunnel.
- C. Architectural concrete shall be used for all exposed concrete elements. Architectural concrete shall be as per ACI 347.3R and shall meet the requirements of Schedule 15-2, Part 4, Article 2 – Architectural Design Criteria.

(xxvii) U Approach – Depressed Guideway Connaught West Portal (SN015140)

- A. Design and construct and new Tunnel portal at the west end of the Connaught Tunnel. The new portal shall accommodate the EB and WB alignment, including Emergency walkways.
- B. Design and construction of the portal shall be done in conjunction with the design and construction of the Connaught Tunnel.
- C. Architectural concrete shall be used for all exposed concrete elements. Architectural concrete shall be as per ACI 347.3R and shall meet the requirements of Schedule 15-2, Part 4, Article 2 – Architectural Design Criteria.

(xxviii) Pedestrian Bridge at Queensview Station (SN018460)

- A. Design and construct a new pedestrian Bridge over Highway 417 in accordance with the requirements in Schedule 15-2, Part 4, Article 3 – Station Specific Architectural Design Criteria. The new Structure shall accommodate the following:
 - i. A pedestrian connection between the north and south side of Queensview Station on the Structure; and,
 - ii. The proposed Highway 417 roadway configuration in accordance with Schedule 15-2, Part 9 – Highway Works under the Structure.
- B. New structure shall be designed to span over Highway 417 in one span.
- C. Design of the Bridge shall be coordinated with the design of Queensview Station. Refer to Schedule 15-2, Part 4, Article 3 – Station Specific Architectural Design Criteria.
- D. Architectural concrete shall be used for all concrete elements exposed to the adjacent Queensview Station Platforms. Architectural concrete shall be

as per ACI 347.3R and shall meet the requirements of Schedule 15-2, Part 4, Article 2 – Architectural Design Criteria.

(xxix) Highway 417 Westbound Off-Ramp at Richmond Road (SN116410)

- A. Repurpose the existing Underpass Structure to accommodate the OCS in accordance with Schedule 15-2, Part 3, Article 14 – Overhead Contact System.
- B. Undergo a structural rehabilitation to address all substructure and deck soffit deficiencies. The scope of rehabilitation shall be based on the most recent OSIM inspection report and shall include the following, as a minimum:
 - i. Crack repairs to all medium and wide cracks on the soffit, and abutment walls.
 - ii. Concrete patch repairs to all spalled areas on the soffit and retaining walls.

(xxx) Richmond Road Bridge (SN116420)

- A. Repurpose the existing Underpass Structure to accommodate the OCS in accordance with Schedule 15-2, Part 3, Article 14 – Overhead Contact System.
- B. Install Bridge Structure fencing in accordance with Schedule 15-2, Part 6, Article 2 – Design Criteria.
- C. Undergo a structural rehabilitation to address all substructure and deck soffit deficiencies. The scope of rehabilitation shall be based on the most recent OSIM inspection report and shall include the following, as a minimum:
 - i. Crack repairs to all medium and wide cracks on the soffit, wingwalls, abutment walls, and retaining walls.
 - ii. Concrete patch repairs to all spalled areas on the soffit.
- D. Reconfigure Richmond Road cross section in accordance with the requirements of Schedule 15-2, Part 9, Part B, Clause 1.3.
- E. Complete a structural evaluation to ensure the structural capacity of the Bridge is not exceeded following reconfiguration of Richmond Road. Any required repairs or strengthening shall be performed by DB Co.

(xxxix) Richmond Road O/P Bayshore Drive (SN116110)

- A. Reconfigure Richmond Road cross section in accordance with the requirements of Schedule 15-2, Part 9, Part B, Clause 1.3.
- B. Complete a structural evaluation to ensure the structural capacity of the Bridge is not exceeded following reconfiguration of Richmond Road. Any required repairs or strengthening shall be performed by DB Co.

(xxxii) Highway 417 On-Ramp at Richmond Road (SN116430)

- A. Repurpose the existing Underpass structure to accommodate the OCS in accordance with Schedule 15-2, Part 3, Article 14 – Overhead Contact System.
- B. Undergo a structural rehabilitation to address all substructure and deck soffit deficiencies. The scope of rehabilitation shall be based on the most recent OSIM inspection report and shall include the following, as a minimum:
 - i. Crack repairs to all medium and wide cracks on the soffit, wingwalls, abutment walls and retaining walls.
 - ii. Concrete patch repairs to all delaminated areas on the soffit.
 - iii. Stabilize southeast retaining wall.

(xxxiii) Graham Creek Culvert (SN117020)

- A. Ensure the structural capacity of the Culvert is not exceeded with the application of all loads as defined in Clause 4.5 of this Part 2 and/or increase of fill over the Structure. Any required repairs or strengthening shall be performed by DB Co.

(xxxiv) Stillwater Creek Culvert 1 (SN117440)

- A. An extension to this Culvert was constructed as part of the West Transitway construction.
- B. DB Co shall ensure that the structural capacity of the Culvert is not exceeded with the application of all loads as defined in Clause 4.5 of this Part 2 and/or increase of fill over the Structure. Any required repairs or strengthening shall be performed by DB Co.

(xxxv) Stillwater Creek Culvert 2 (SN117450)

- A. An extension to this Culvert was constructed as part of the West Transitway construction.

- B. DB Co shall ensure that the structural capacity of the Culvert is not exceeded with the application of all loads as defined in Clause 4.5 of this Part 2 and/or increase of fill over the Structure. Any required repairs or strengthening shall be performed by DB Co.

(xxxvi) Highway 417 E-N/S Ramp at Moodie Drive (SN116390)

- A. Repurpose the existing ramp Structure to accommodate the OCS in accordance with Schedule 15-2, Part 3, Article 14 – Overhead Contact System.
- B. The existing ramp Structure shall not be modified or removed and shall accommodate the following under the structure:
 - i. The proposed EB and WB alignment, including emergency walkways; and,
 - ii. Bus access ramp to Moodie Station.

(xxxvii) Queensway (Hwy 417) Bridge (SN014490)

- A. Repurpose the existing Overpass Bridge to accommodate the OCS in accordance with Schedule 15-2, Part 3, Article 14 – Overhead Contact System.
- B. The existing Transitway Station shall be decommissioned with no alterations or impacts to the existing substructure and superstructure in accordance with Schedule 15-2, Part 1, Article 14 – Demolition, Removals and Disposal. All components of the existing Queensway Transitway Station shall be removed, including but not limited to the following:
 - i. Lower Station Platforms and shelters;
 - ii. Upper Station Platforms and shelters;
 - iii. Elevator shafts and stairwells on the north side of the Structure; and,
 - iv. One elevator shaft and corresponding stairwell on the south side of the Structure.
- C. DB Co shall have the option to repurpose one of the south elevator shafts and corresponding stairwell as an Emergency access point. One south elevator shaft and stairwell and required components for operation shall only remain to be used as an Emergency access point, otherwise both south elevator shafts and stairwells shall be removed.

(xxxviii) Iris Street Bridge (SN015210)

- A. Design and construct a new Overhead Bridge to carry Iris Street over the alignment. The new Structure shall accommodate the following:
 - i. The proposed Iris Street roadway cross section in accordance with Clause 6.19 of this Part 2 on the Structure; and,
 - ii. The NB and SB alignment, east and west Train Platforms and a MUP under the Structure.
- B. Install Bridge Structure fencing in accordance with Schedule 15-2, Part 6, Article 2 – Design Criteria.
- C. The new Bridge shall be designed and constructed in conjunction with Iris Station. Refer to Schedule 15-2, Part 4, Article 3 – Station Specific Architectural Design Criteria.
- D. Architectural concrete shall be used for all concrete elements exposed to the adjacent Station and/or within the Station limits. Architectural concrete shall be as per ACI 347.3R and shall meet the requirements in Schedule 15-2, Part 4, Article 2 – Architectural Design Criteria.
- E. Piers, if required, shall not be located on or directly adjacent to the Station Platforms.

(xxxix) Pinecrest Creek Iris Street Culvert (SN018350)

- A. Structure shall be decommissioned in accordance with Schedule 15-2, Part 1, Article 14 – Demolition, Removals and Disposal and shall meet the requirements in Clause 5.7 of this Part 2.

(xl) Pinecrest Creek Culvert Under Iris (SN017710)

- A. Design and construct a new Culvert under Iris Street over Pinecrest Creek. The design of the Culvert shall meet the requirements of Clause 5.7 of this Part 2. The new Culvert shall accommodate the following:
 - i. The proposed Iris Street roadway cross section in accordance with Clause 6.19 of this Part 2 and north and south embankment slopes over the Culvert; and,
 - ii. Pinecrest Creek under the Culvert.
- B. The new Culvert shall:
 - i. Be constructed with reinforced concrete;
 - ii. Be open bottom; and,

- iii. Convey a 100-Year Storm event.
- (xli) Pinecrest Creek Culvert Under Alignment (SN017720)
 - A. Design and construct a new Culvert to carry the alignment over Pinecrest Creek. The design of the Culvert shall meet the requirements of Clause 5.7 of this Part 2. The new Culvert shall accommodate the following:
 - i. The NB and SB alignment, including Emergency walkways, a west MUP and embankment slopes over the Culvert; and,
 - ii. Pinecrest Creek under the Culvert.
 - B. The new Culvert shall:
 - i. Be constructed with reinforced concrete;
 - ii. Be open bottom; and,
 - iii. Convey a 100-Year Storm event.
- (xlii) Pinecrest Creek Kenson Park Culvert (SN018360)
 - A. Complete a structural evaluation to ensure the structural capacity of the Culvert is not exceeded with the application of all loads as defined in Clause 4.5 of this Part 2 and/or increase of fill over the structure. All required repairs or strengthening shall be performed by DB Co.
 - B. Ensure Culvert has adequate length to accommodate embankments, alignment and MUP. Any required Culvert lengthening shall be performed by DB Co.
 - C. Undergo a structural rehabilitation to address all Culvert deficiencies. The scope of rehabilitation shall be based on the most recent OSIM inspection report and shall include the following, as a minimum:
 - i. Crack repairs to all medium and wide cracks on the Culvert barrel, and the inlet and outlet components;
 - ii. Concrete patch repairs to all delaminated areas on the Culvert barrel; and,
 - iii. Concrete patch repairs to all spalled areas on the Culvert barrel and inlet component.
- (xliii) Pinecrest Creek Baseline Road Culvert (SN018370)

- A. Complete a structural evaluation to ensure the structural capacity of the Culvert is not exceeded with the application of all loads as defined in Clause 4.5 of this Part 2 and/or increase of fill over the structure. All required repairs or strengthening shall be performed by DB Co.
- B. Ensure Culvert has adequate length to accommodate embankments, alignment and MUP. Any required Culvert lengthening shall be performed by DB Co.

(xlv) Baseline Road Bridge (SN016080)

- A. Repurpose the existing Underpass Structure to accommodate the OCS in accordance with Schedule 15-2, Part 3, Article 14 – Overhead Contact System.
- B. Install Bridge Structure fencing in accordance with Schedule 15-2, Part 6, Article 2 – Design Criteria.
- C. Undergo a structural rehabilitation to address all substructure and deck soffit deficiencies. The scope of rehabilitation shall be based on the most recent OSIM inspection report and shall include the following, as a minimum:
 - i. Crack repairs to all medium and wide cracks on the soffit, wingwalls, ballast walls and abutment walls;
 - ii. Concrete patch repairs to all delaminated areas on the soffit;
 - iii. Concrete patch repairs to all spalled areas on the soffit; and,
 - iv. Replace abutment bearings.

(xlv) Pinecrest Stormwater Management Facility Inlet Chamber and Inlet Culvert

- A. Design and construct a new continuous inlet chamber and inlet Culvert in accordance with the requirements in Clause 5.7 of this Part 2.
- B. The inlet chamber and inlet Culvert shall form a continuous enclosed channel, with a minimum width of 3m, from the existing Baseline Storm Sewer Outfall to the sediment forebay, as shown in Appendix J of this Part 2.
- C. Inlet Chamber
 - i. The new inlet chamber shall accommodate the following:
 - 1 Access for maintenance personnel on the chamber; and,

- 2 Stormwater flow from the Baseline Storm Sewer Outfall and an 8m wide bypass weir to Pinecrest Creek in the chamber.
- ii. The Structure shall be constructed of reinforced concrete walls with a reinforced concrete slab footing and a steel grate top.
- iii. The steel grate top shall include two access hatches and access to stop log gains. The location of the hatch openings and access to the stop log gains shall be in accordance with Clause 5.7 of this Part 2.
- iv. The existing Baseline Storm Sewer Outfall and the inlet chamber shall be structurally connected to prevent differential settlement and separation. The existing sewer and inlet chamber connection shall include the design of a grade beam at the connection interface.
- v. A minimum height of 2.4m shall be provided throughout the chamber, excluding areas over the weir and weir benching.

D. Inlet Culvert

- i. The new inlet Culvert shall accommodate the following:
 - 1 A MUP and maintenance road on the Structure; and,
 - 2 Flow from the inlet chamber to the pond.
- ii. The Culvert shall be designed to support CL-625-ONT live loading in accordance with CHBDC.
- iii. The Structure shall be a rigid frame concrete box Culvert with a minimum opening size of 3m wide by 2.4m high.
- iv. The outlet of the Culvert shall be mitered to match the adjacent slope.
- v. A steel pedestrian railing shall be installed on top of the Structure at the outlet end of the Culvert. The pedestrian railing shall continue down the mitered portion of the outlet.

(xlvi) DB Co shall design and construct retaining walls as dictated by grade and where site conditions do not allow for an embankment with a stable slope to be installed. Retaining wall locations include but are not limited to the following:

- A. Directly adjacent to the abutment walls, on the north and south of the new Carling Avenue Bridge at Lincoln Fields Station.

- B. On the north side of the Queensway, on the south side of Holly Acres Road
- C. Directly adjacent to the wingwalls on the east and west side of the new Iris Street Bridge.

**ARTICLE 5 DRAINAGE AND STORMWATER MANAGEMENT DESIGN
CRITERIA**

5.1 Reference Documents

- (a) Drainage and Stormwater Management shall be provided in accordance with the criteria contained in this Article and the Applicable Law, the Project Agreement, including but not limited to the latest edition of the following Reference Documents:
- (i) City Publications;
 - A. City of Ottawa Sewer Design Guidelines, including Technical bulletins
 - B. Stormwater Management Facility Design Guidelines
 - C. City of Ottawa By-Laws
 - D. “Stormwater Management Guidelines for the Pinecrest Creek/Westboro Area”, JFSA, 2012
 - (ii) Federal and Provincial Codes, Acts and Regulations;
 - A. Fisheries Act (Canada)
 - B. Ontario Water Resources Act
 - C. Drainage Act (Ontario)
 - D. Ontario Regulation 525/98 - Approval Exemption
 - E. Ontario Building Code
 - F. OPSS and OPSD
 - (iii) Conservation Authority Publications
 - A. RVCA: Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses (Ontario Regulation 174/06)
 - B. SNC: Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses (Ontario Regulation 170/06), Conservation Authorities Act, R.S.O. 1990, c. C.27
 - C. RVCA: Solutions for Shoreline Erosion
 - D. TRCA/CVC: Low Impact Development Stormwater Management Planning and Design Guideline
 - E. CVC: Low Impact Development Construction Guide

- F. RVCA: Ottawa River Flood Risk Mapping from Shirley's Bay to Cumberland
- (iv) MOECC Publications;
 - A. Stormwater Management Planning and Design Manual
 - B. Design Guidelines for Sewage Works
 - C. Guideline B-6 – Guidelines for Evaluating Construction Activities Impacting on Water Resources
 - D. Environmental Activity and Sector Registry information
<https://www.ontario.ca/page/environmental-activity-and-sector-registry>
 - E. Permit To Take Water Manual
- (v) Ontario MNR Publications;
 - A. Technical Guide – River & Stream Systems: Flooding Hazard Limit
- (vi) MTO Publications;
 - A. Drainage Management Manual
 - B. Highway Drainage Design Standards
 - C. Gravity Pipe Design Manual
 - D. Environmental Guide for Erosion and Sediment Control during Construction of Highway Projects
- (vii) CHBDC;
- (viii) AREMA Manual for Railway Engineering;
- (ix) Standards Respecting Pipeline Crossings Under Railways (Transport Canada TC E-10);
- (x) NFPA 130; and,
- (xi) Other applicable policies, acts and guidelines by the City, Regulators, and applicable Governmental Authorities.

5.2 General Criteria

- (a) DB Co shall design and construct a drainage and SWM system such that Revenue Service operations can safely continue and such that surface ponding remains below the TOR during the 100-Year Storm event.

- (b) DB Co shall evaluate the performance of the drainage and SWM system under historical storms and 100-Year Storm Plus 20% (stress test condition) and modify the design as needed in accordance with the City of Ottawa Sewer Design Guidelines and Technical Bulletins.
- (c) DB Co shall design and construct Drainage and SWM systems for the Guideway and Stations such that the maximum depth of flow on local and collector streets remains below 0.35 m during the 100-Year Storm event. The depth of flow may extend adjacent to the ROW provided that the water level does not touch any part of building envelopes and shall remain below the lowest Station and building opening during the 100-Year Storm Plus 20% event (stress test condition).
- (d) Runoff from at-grade and below grade segments shall be collected by trackside ditches or storm sewers. All Guideway drainage shall be captured and managed within the Guideway ROW with SWMPs that provide attenuation up to the 100-Year Storm and water quality protection that meets MOECC's 'Enhanced' standard before discharging to outlet locations. Discharge shall be to outlets at the locations identified in Clause 5.7 – Site Specific Criteria, of this Part 2.
- (e) Runoff from raised Guideway, where Guideway is an embankment, may be discharged along the embankment, provided runoff is evenly distributed to prevent erosion, before being collected by SWMPs that provide attenuation up to the 100-Year Storm and water quality protection that meets MOECC's 'Enhanced' standard.
- (f) Runoff from raised Guideway, where Guideway is a Structure, shall be conveyed by gutter systems to inlets. Inlets shall discharge to SWMPs that provide attenuation up to the 100-Year Storm and water quality protection that meets MOECC's 'Enhanced' standard.
- (g) DB Co shall secure all permits and approvals, where necessary for the implementation of the Drainage and SWM systems for the Project, and shall be responsible for preparing and submitting all necessary drawings and supporting documentation associated with obtaining those permits and approvals in accordance with Schedule 10 – Review Procedure.
- (h) DB Co shall be responsible for all costs associated with obtaining the required permits and approvals, and those associated with providing the Drainage and SWM systems.
- (i) DB Co shall obtain sewer discharge permits and approvals in accordance with the City, MOECC and CA (RVCA, SNCA) requirements. Sewer discharge permits and approvals shall be obtained a minimum of two weeks prior to the anticipated discharge date.
- (j) DB Co shall obtain all PTTWs and/or Environmental Activity and Sector Registry registrations, in accordance with current MOECC requirements, for the Works.
- (k) All additions or modifications to existing sewers and related appurtenances will require municipal approval and shall conform to the requirements of the City.

- (l) DB Co shall ensure services to adjoining properties are supported in place and maintained in operation during additions to or modifications of the existing sewers.
- (m) Without limiting any other obligations of DB Co, DB Co shall be in compliance with Ontario Regulation 166/06 (Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses) for Works within RVCA/SNCA regulated areas.
- (n) No sanitary sewer discharge shall be permitted to enter the Drainage and SWM systems supporting SI.
- (o) DB Co shall design and construct Drainage and SWM systems such that existing Drainage systems and overland flow paths are free of Hazard and such that any impact to these is mitigated.
- (p) DB Co shall provide complete design packages for all Drainage and SWM components submitted in accordance with Schedule 10 – Review Procedure. Design packages shall include all Drainage and SWM works including detailed drawings, calculations, reports, and related ECA applications.

5.3 Drainage Criteria

- (a) The Drainage Design Criteria provided herein are considered a minimum standard. The design of drainage facilities belonging to the City or other applicable Governmental Authorities which are to be relocated or modified to accommodate SI shall conform to the Design Criteria and standards of the City or the applicable Governmental Authorities. Required relocation of existing drainage facilities shall be Replacement-In-Kind, unless otherwise instructed.
- (b) Drainage and SWM systems for the Project including the Guideways, Tunnels, Stations, LMSFs, roadways, parking lots, and other SI shall be designed in accordance with City and provincial standards.
- (c) DB Co shall not increase flow rates to existing combined sewers or separated sewers unless the increase is approved by the City. Flow rates shall be limited in accordance with Section 3.2 of the Ottawa Sewer Design Guidelines.
- (d) New storm sewers for the Project to convey minor system flows shall be designed to capture and convey a design storm event in accordance with Section 5.10 of the City of Ottawa Sewer Design Guidelines.
- (e) Where the minor system for the Project is proposed to discharge to an existing municipal storm sewer, Ottawa Sewer Design Guidelines section 8.3.7.3 shall apply.
- (f) In urban areas, DB Co shall design and construct on-site controls for flows from SI runoff in excess of the design capacity of the receiving minor system, for all storms up to the 100-Year Storm. For the stress test storm (100-Year Plus 20% Storm) excess flows shall

- be conveyed via the Guideway, streets, open channels and walkways to a City approved public outlet, in accordance with the City of Ottawa Sewer Design Guidelines flow spread and velocity-depth criteria, without introducing property damage, limiting Emergency vehicle access, or endangering users of the roadway.
- (g) The combination of a minor system and an overland flow system shall be designed for a 100-Year Storm or larger in accordance with the City of Ottawa Sewer Design Guidelines and Technical Bulletin and not create flow depths above the TOR.
 - (h) DB Co shall demonstrate to the City through hydrologic/hydraulic analysis that the flow rates or the hydraulic grade line in the receiving storm sewers does not adversely affect the existing level of service, in terms of flood protection and minor system performance, as a result of the Works.
 - (i) Guideway runoff (up to and including the 100-Year Storm) to Tunnels (or other section of below-grade Guideway), shall be intercepted and diverted by gravity to an outlet as close as possible to each Tunnel portal (or other section of below-grade Guideway). For clarity, possible gravity drainage outlets include new or existing outlets within the Lands, including City Road Allowance Lands. In the below-grade sections of the Guideway, DB Co shall keep Tunnel portals, Tunnels and Stations free from Flooding due to all storms up to and including the 100-Year Plus 20% Storm.
 - (j) DB Co shall design and construct all Drainage and SWM systems required to ensure adequate Drainage during Construction of the Works. Discharges shall comply with Applicable Law and City requirements.
 - (k) DB Co shall comply with the following requirements for Guideway Drainage:
 - (i) The Guideway Drainage system shall be designed and constructed such that ponding levels do not exceed TOR elevation and such that ponding does not contribute to subgrade instability for all storms up to and including the 100-Year Storm, as applicable to East Works, West Works, and Stage 1 Connection Infrastructure;
 - (ii) All Drainage discharges from the Guideway shall be in accordance with Applicable Codes and the requirements of the City and other applicable Governmental Authorities;
 - (iii) DB Co shall provide maintenance holes (access points) outside of the Guideway on all new service connections, between the City's ROW and the Guideway, in accordance with City requirements. The maintenance holes and sewers shall be turned over to the City to enable the City to perform its maintenance responsibility for storm drain/sewer service connections located beyond the limits of the Guideway.

- (l) Groundwater, fireflow discharge, and storm runoff at all underground structures and other areas without a gravity outlet, shall be collected and pumped to a municipal storm sewer in compliance with the City of Ottawa Sewer Use By-Law.
- (m) All new Culverts under the Guideway, regardless of size, shall be of reinforced concrete construction.
- (n) All trackside swales within the Pinecrest Creek and SJAM Parkway corridors shall have side slopes no steeper than 3:1.

5.4 Stormwater Management Criteria

- (a) SWM for the Project shall be provided in accordance with the City's "Sewer Design Guidelines" and "Stormwater Management Facilities Design Guidelines", MOECC's "Stormwater Management Planning and Design Manual", and other applicable sub-watershed studies and guidelines.
- (b) DB Co shall prepare complete SWM plans and design packages in accordance with the City and Provincial requirements for all drainage and SWM aspects of the Works to address at a minimum:
 - (i) Water balance, quantity and quality control requirements imposed by local, provincial and federal government regulations along with the Project environmental impacts and mitigations;
 - (ii) Impact on existing municipal drainage and storm water management systems, and natural drainage systems;
 - (iii) Existing ditches, watercourses, Culvert crossings, and storm sewers that will be affected or are relevant to the Project;
 - (iv) Potential impacts of the Project on the existing drainage system and on any environmentally sensitive areas, in consultation with applicable Governmental Authorities;
 - (v) Existing drainage patterns and how the proposed Drainage System design will extend the existing minor and major drainage systems;
 - (vi) Directions by applicable Governmental Authorities in respect to changes in drainage patterns, upgrades to drainage infrastructure or modifications, and any agreements reached with the City or applicable Governmental Authorities;
 - (vii) Proposed SWMPs to mitigate potential impacts of the Works, including appropriate plans and drawings to illustrate the same; and,
 - (viii) All pertinent background information, calculations and model output to support the proposed designs and Works.

- (c) DB Co shall submit complete SWM plan and design packages to the City as part of the Works Submittals in accordance with Schedule 10 – Review Procedure.
- (d) Drainage and SWM designs of Facilities that require review and approval from applicable Governmental Authorities shall be submitted in accordance with the procedures established by the respective Governmental Authority. DB Co shall comply with the Governmental Authority permit requirements and conditions.
- (e) The design of stormwater detention facilities and control measures proposed as part of the Works shall be submitted to the City and other applicable Governmental Authorities for approval.
 - (i) Where LID measures are required, they shall be designed in accordance with the “Low Impact Development Stormwater Management Planning and Design Guidelines”. Refer to Schedule 15-2, Part 6, Article 2 – Design Criteria for landscaping requirements of LID measures.
- (f) Roof Drainage (above-grade structures) shall be managed in accordance with a site-specific SWMP. Roof Drainage shall not be routed to the underground Track Drainage system.
- (g) Unless otherwise noted, all SWM facilities shall be designed to meet the MOECC’s “Enhanced” standard.
- (h) Project site components that ultimately drain to the Ottawa River or Rideau River, and are considered Infill Development, as defined in section 8.3.7.2 of the City of Ottawa Sewer Design Guidelines, shall control peak flows to the minor system as prescribed in Section 3.2.2 and 8.3.7 of the City of Ottawa Sewer Design Guidelines. Water quality SWMPs for Infill Development are to provide a net improvement over existing conditions.
- (i) Extended detention or “wet-pond” SWM facilities shall be designed and constructed to prevent both losses of permanent pool due to infiltration and losses of active storage due to intrusion of groundwater, if required.
- (j) OGS structures shall be designed and specified with a required performance of removal of fine sediment, oil, floating and sinking debris, and 80% removal efficiency for TSS. OGS structures located outside of the Guideway shall be accessible by rubber tire vehicle.
- (k) All Drainage within the Pinecrest Creek/Westboro watersheds shall be subject to specific quantity and quality criteria as outlined in Table 2-5.1

Table 2-5.1 - SWM Guidelines for the Pinecrest Creek/Westboro

| Soil Infiltration Characteristic | Runoff Volume Reduction | Water Quality | Water Quantity |
|---|------------------------------------|----------------------|-----------------------|
|---|------------------------------------|----------------------|-----------------------|

| | | TSS Removal | Flooding | Erosion |
|---|---------------------------------------|-------------------------|--|--|
| A Draining to Ottawa River (Westboro) | | | | |
| soil infiltration > 1mm/hr | On-site retention of 10mm of rainfall | On-site removal 80% TSS | OSDG Section 8.3.7.3 (Sept 2008) | Does not apply |
| soil infiltration < 1mm/hr | Best effort based on opportunity | | | |
| B Draining to Pinecrest Creek | | | | |
| B1 Discharging upstream of Ottawa River Parkway (ORP) Pipe inlet | | | | |
| soil infiltration > 1mm/hr | On-site retention of 10mm rainfall | On-site 80% TSS removal | More stringent of 33.5 L/s/ha (1:100 yr) or OSDG 8.3.7.3 | Control peak flow (25mm) to 5.8 L/s/ha |
| soil infiltration < 1mm/hr | Best effort based on opportunity | | | |
| B2 Discharging directly to the Ottawa River Parkway (ORP) Pipe | | | | |
| soil infiltration > 1mm/hr | On-site retention of 10mm rainfall | On-site 80% TSS removal | More stringent of 33.5 L/s/ha (1:100 yr) or OSDG 8.3.7.3 | Does not apply |
| soil infiltration < 1mm/hr | Best effort based on opportunity | | | |

5.5 Numerical Computational Procedures and Models

- All numerical computation procedures shall comply with the requirements of the City of Ottawa Sewer Design Guidelines. Computer models used shall comply with the guidelines for model selection provided in the MTO's "Drainage Management Manual."
- DB Co shall confirm the suitability and acceptance of any computer model nominated for use in the design and analysis of Drainage or SWM system for the Project with the City and other approving agencies.
- Peak flows to be used for design purposes for drainage areas greater than 40 hectares shall be verified using a method approved by the City and other applicable Governmental Authorities.

5.6 Erosion and Sediment Control Requirements

- DB Co shall implement stormwater control, mitigation, and ESC measures appropriate for the urban context of the Project to ensure deleterious substances and other pollutants do not leave the Site and enter watercourses or the municipal drainage infrastructure.
- DB Co shall prepare an ESC Plan for the Project, as a component plan of the Environmental Management Plan described in Schedule 17 – Environmental Obligations, to comply with environmental approvals and commitments and with any and all Applicable Codes. In addition, site-specific ESC Plans shall be developed to address local

potential environmentally sensitive site conditions, including watercourse crossings. The ESC Plan for the Project and the site specific ESC Plans shall be submitted to the City in accordance with Schedule 10 – Review Procedure.

- (c) In addition to City and other Governmental Authority requirements, ESC Plans shall be prepared in accordance with the following documents:
 - (i) MNR, et al., 1987, Guidelines on Erosion and Sediment Control for Urban Construction Sites.
 - (ii) MTO's Environmental Guide for Erosion and Sediment Control during Construction of Highway Projects.
- (d) DB Co shall obtain all permits and approvals for all in-water works in accordance with all applicable Governmental Authorities' requirements.
- (e) DB Co shall adhere to all fisheries (timing) window restrictions imposed by the RVCA, SNC, or other applicable Governmental Authorities on activities on or adjacent to watercourses associated with the Works.

5.7 Site-Specific Criteria

- (a) DB Co shall comply with the following site-specific requirements to satisfy the Drainage and Stormwater Management Design Criteria outlined in this Article.
- (b) Confederation Line East Extension Stations:
 - (i) Blair Station (Existing Confederation Line)
 - A. Expansion of the Station is considered Infill Development. As such, it shall comply with the provisions of Sections 3.2.2 and 8.3.7 of the City of Ottawa Sewer Design Guidelines (latest version).
 - (ii) Montreal Station
 - A. The Station shall be considered Greenfield Development. SWM requirements as per this Article.
 - (iii) Jeanne d'Arc Station
 - A. Drainage to existing outlets to the east of the Station. The Station shall be considered Greenfield Development. SWM requirements as per this Article.
 - (iv) Orléans Boulevard Station
 - A. Station drainage shall be to the existing Orléans Boulevard storm sewer, located approximately 230m west of the Station. The Station shall be

considered Greenfield Development. SWM requirements as per this Article.

(v) Place d'Orléans Station

- A. Station drainage shall be to the 900mm -1350mm diameter storm sewer, which is currently located within the OR174 median. This sewer shall be relocated by DB Co as per the requirements in Article 8 – Utility Infrastructure Design Criteria, of this Part 2. The Station shall be considered Greenfield Development. SWM requirements as per this Article.

(vi) Trim Station

- A. The Station and Park and Ride shall be considered Greenfield Development. SWM requirements as per this Clause.

(c) At-Grade Guideway – Blair to Trim

- (i) The Guideway shall be considered Greenfield Development. SWM requirements as per this Article.
- (ii) DB CO shall design and construct a Drainage system for the OR174 in accordance with the MTO GDSOH. For additional requirements of roadway design for OR174, refer to Article 6 – Roadways, Bus Terminals and Lay-bys, of this Part 2.
- (iii) DB Co shall replace all existing centreline and median Culverts underneath the Guideway and OR174 unless specified otherwise in this Clause.
- A. DB Co shall design the replacement of the Green's Creek culverts under the Guideway and OR174, but shall construct only the portion under the Guideway. The hydraulic capacity of the interim condition shall not be less than the existing system. The future replacement of the Culverts under the OR174 (ultimate condition) will be completed by the City.
- (iv) DB Co shall replace all Culverts identified in Table 2-5.2.
- (v) DB Co shall decommission existing Culverts underneath the Guideway and reconstructed OR174 that become redundant or ineffectual as a result of the Works. Culverts to be decommissioned shall be filled with non-shrink grout or concrete. DB Co shall provide access points to allow for confirmation that decommissioned Culverts have been completely filled.
- (vi) Blair to Montreal
- A. Between Blair Station and Gloucester High School, approximately 350m to a high point just east of the OR174 WB off ramp at Blair Road, the

Guideway shall be drained by installing a subdrain system under the Guideway. Drainage of this segment shall be to the relocated 450mm Transitway storm sewer that drains in a westerly direction. The existing 450mm Transitway sewer shall be relocated by DB Co to avoid conflict with the LRT guideway for a distance of approximately 250m as per the requirements in this Article and Article 8 – Utility Infrastructure Design Criteria, of this Part 2. No quantity or quality SWMPs are required.

- B. From the high point just east of the OR174 WB off ramp at Blair Road to the high point at Gloucester High School, a distance of approximately 720m, runoff shall be collected by trackside swales.
- C. From the high point at [REDACTED] to Montreal Station, a distance of approximately 1,960m, runoff shall be drained by installing a subdrain system under the Guideway. SWM requirements as per this Article.
- D. DB Co may retain the following reinforced concrete Culverts, provided DB Co demonstrates that the Culverts comply with all requirements of this Article 5 and Article 4 – Structural Design Criteria and Requirements, of this Part 2.
 - i. Structure A224700 located at the approximate coordinates with an easting of 375,544.0 and a northing of 5,033,412.2.
 - ii. Structure A224710 located at the approximate coordinates with an easting of 375,698.0 and a northing of 5,033,517.0.
 - iii. Structure A224720 located at the approximate coordinates with an easting of 375,835.6 and a northing of 5,033,682.4.
 - iv. Structure STM80696 located at the approximate coordinates with an easting of 376,050.1 and a northing of 5,034,085.3.
 - v. Structure T224630 located at the approximate coordinates with an easting of 374929.4 and northing of 5033030.0.
- E. DB Co may retain the following CIPP lined CSP Culvert, provided DB Co demonstrates that the Culvert complies with all requirements of this Article 5 and Article 4 – Structural Design Criteria and Requirements, of this Part 2.
 - i. Structure T224650 located at the approximate coordinates with an easting of 375,269.8 and northing of 5,033,252.0.

(vii) Montreal to Jeanne d’Arc

- A. From Montreal Station to Jeanne d'Arc Station, a distance of approximately 3,580m, the Guideway shall be drained by installing a subdrain system under the Guideway.
 - B. DB Co may retain the following reinforced concrete Culvert, provided DB Co demonstrates that the Culvert complies with all requirements of this Article 5 and Article 4 – Structural Design Criteria and Requirements, of this Part 2.
 - i. Structure SN220420 located at the approximate coordinates with an easting of 377,161.4 and northing of 5,035,720.0.
- (viii) Jeanne d'Arc to Orléans Boulevard
- A. From Jeanne d'Arc Station to Orléans Boulevard Station, a distance of approximately 1,060m, the Guideway shall be drained by installing a subdrain system under the Guideway.
- (ix) Orléans Boulevard to Place d'Orléans
- A. From Orléans Boulevard Station to Place d'Orléans Station, a distance of approximately 2,380m, the Guideway shall be drained by installing a subdrain system under the Guideway.
- (x) Place d'Orléans to Trim
- A. From Place d'Orléans to Trim Station, a distance of approximately 3,340m, the Guideway shall be drained by installing a subdrain system under the Guideway.
 - B. DB Co may retain the following reinforced concrete Culvert, provided DB Co demonstrates that the Culvert complies with all requirements of this Article 5 and Article 4 – Structural Design Criteria and Requirements, of this Part 2.
 - i. Structure A894640 located at the approximate coordinates with an easting of 382,627.9 and a northing of 5,038,810.8.
 - C. DB Co may retain the following HDPE lined CSP culvert, provided DB Co demonstrates that the Culvert complies with all requirements of this Article 5 and Article 4 – Structural Design Criteria and Requirements, of this Part 2.
 - i. Structure SN898560 located at the approximate coordinates with easting 384,258.8 and a northing of 5,039,908.8.

- (xi) TPSS shall not be located within RVCA or SNC regulated areas to the extent possible. DB Co shall consult and obtain approval from RVCA/SNC for any TPSS that must be located within regulated areas due to Project constraints.

- (xii) **Table 2-5.2** – Confederation East Culvert Replacements

| Culvert ID | Existing Structure | Northing | Easting |
|------------|--------------------|--------------|------------|
| | Size/Material | | |
| A224900 | 300 diam. CSP | 5,036,832.32 | 379,498.87 |
| A224902 | 600 diam. CSP | 5,036,851.41 | 379,332.49 |
| A224908 | 600 diam. CSP | 5,036,970.09 | 379,425.69 |
| A224940 | 850 diam. CSP | 5,037,505.21 | 380,326.39 |
| A224950 | 1000 diam. CSP | 5,037,559.57 | 380,316.18 |

- (d) Confederation Line West Extension Stations:

- (i) Westboro, Dominion, Cleary and New Orchard Stations

- A. The Westboro and Dominion Stations are located on the former Transitway. This shall be considered Infill development. Drainage from the Stations shall comply with the provisions of Sections 3.2.2 and 8.3.7 of the City of Ottawa Sewer Design Guidelines (latest version).
- B. Existing 675mm diameter outfall at Dominion is in conflict with the station and shall be relocated by DB Co in accordance with the City of Ottawa Sewer Design Guidelines.
- C. Cleary and New Orchard Stations are located within the Parkway Tunnel. As such, they shall comply with the quality and attenuation/retention requirements of Table 2-5.1. Pump station(s) shall be provided at low point(s) of the Tunnel to allow discharge to existing sewer(s).

- (ii) Lincoln Fields Station

- A. Lincoln Fields Station and Ancillary Facilities are located within the Pinecrest Creek watershed. Drainage from the Station shall comply with the quality and attenuation/retention requirements of Table 2-5.1.
- B. The quality and attenuation/retention requirements for the Transitway Station shall be achieved by a combination of infiltration trenches in the traffic islands and shallow swales along the edge of the Transitway Station, designed to LID standards. Refer to Schedule 15-2, Part 6, Article 4 – Site Specific Desired Outcomes for landscaping requirements.

- C. Discharge from the Station and Ancillary Facilities shall be via a new storm sewer. DB Co shall construct this sewer between Carling Avenue and its outfall to the ORPP, located approximately 150m north of Richmond Road.
- D. DB Co shall demonstrate to the City through hydrologic/hydraulic modeling that the cumulative impacts of the Works will not increase peak flow rates or the peak hydraulic grade line of the enclosed portion of Pinecrest Creek known as the ORPP for all rain events up to the 100-Year Storm. This analysis shall be submitted in accordance with Schedule 10 – Review Procedure.

(iii) Queensview and Pinecrest Stations

- A. Queensview Station is located within the Pinecrest Creek watershed. Discharge shall meet the quality and attenuation/retention requirements of Table 2-5.1. Discharge shall also meet the requirements of Clauses 5.3(i) and 5.7(e) of this Part 2.
- B. Pinecrest Station is located within the Pinecrest Creek and Graham Creek watersheds. Discharge to Pinecrest Creek shall meet the quality and attenuation/retention requirements of Table 2-5.1. Discharge to Graham Creek shall be controlled to existing (pre-development) peak flow rates. SWM quality requirements as per this Article.
 - i. Discharge from Pinecrest Station shall be to the existing Transitway sewer that outlets to Graham Creek, or to the existing Transitway sewer that outlets to Graham Creek and the existing 1500mm diameter sewer located approximately 160m east of the Station. Discharge shall be in accordance with the requirements of Clauses 5.3(i) and 5.7(e) of this Part 2.

(iv) Bayshore Station

- A. Bayshore Station and Ancillary Facilities are located on the former Transitway alignment. Discharge shall be controlled to existing (pre-development) peak flow rates. SWM quality requirements as per this Article.

(v) Moodie Station

- A. Moodie Station is located on the existing Transitway Station.
- B. DB Co shall design a storm drain inlet and sewer system to convey the runoff to a SWM storage system. Infiltration shall be reviewed and considered in the design of the storage system. Discharge shall be controlled to existing (pre-development) peak flow rates. DB Co shall

consider the temperature of stored runoff prior to discharge to Stillwater Creek in the design of SWM features.

- C. OGS structures shall be designed and specified with a required performance of removal of fine sediment, oil, floating and sinking debris, and 80% removal efficiency for TSS at the outlet from the drainage system to an existing storm sewer that traverses the site and discharges to Stillwater Creek.
- D. DB Co shall design the drainage and sewer system to maintain the existing sewer system at the Transitway Station where practical. No new additional outlets to Stillwater Creek shall be permitted.
- E. DB Co shall permanently plug any existing storm sewers that are not incorporated into the drainage system design.
- F. DB Co shall design and construct drainage requirements for the reconfigured Corkstown Road.
- G. DB Co shall confirm the value of the loss of floodplain storage volume within the 1:100 year floodplain which will result from the placement of fill by June 1, 2020. The City will be responsible to fully compensate for this loss of floodplain storage volume through a balanced cut (or excavation) to be performed in a location selected by the City. The City will be responsible for permits and approvals for this compensation and the work will be complete by the end of 2020.

(vi) Iris Station

- A. Iris Station is located within the Pinecrest Creek watershed. Drainage from the Station shall be conveyed by trackside swales to Pinecrest Creek. Runoff from below grade segments shall be collected by a storm sewer, if required, and discharged to the trackside swales. All drainage infrastructure shall be designed to LID standards. Discharge shall meet the quality and attenuation/retention requirements of Table 2-5.1.

(vii) Baseline Station

- A. Baseline Station and Ancillary Facilities are located on the former Transitway alignment. Runoff shall be conveyed by existing and new storm sewers to existing non-commissioned outlet. SWMPs that are part of the existing Baseline Transitway Station shall be maintained. New SWMPs shall be installed to provide quality control for new impervious areas. Discharge shall meet the water quality requirements prescribed in Table 2-5.1. No on-site quantity control SWMPs shall be required. Quantity control for Baseline Station and Ancillary Facilities shall be provided by the Pinecrest Stormwater Management Facility to be

constructed by DB Co as per Clause 5.7 (i) of this Part 2 in lieu of on-site SWMPs.

- (e) Guideway from Tunney's Pasture to Moodie
 - (i) Tunney's Pasture to the high point east of Dominion (approximately 200m east of the Station).
 - A. Discharge to existing Transitway sewer. DB CO shall limit discharge to the minor system to the 10-year event. Drainage from the Guideway shall comply with the provisions of Sections 3.2.2 and 8.3.7 of the City of Ottawa Sewer Design Guidelines (latest version).
 - B. Overland flow west of Goldenrod shall be collected, attenuated, retained and treated within the Lands. No increase in flow to the Existing Confederation Line drainage collection system shall be permitted.
 - (ii) High point east of Dominion (approximately 200m east of the station) to Parkway Tunnel portal (approximately 400m southwest of Dominion).
 - A. Trackside swales shall be provided where feasible within the Lands, and shall drain to the Workman Avenue outfall sewer. Attenuation/retention and quality control shall be in accordance with Table 2-5.1.
 - (iii) Parkway Tunnel and Portals.
 - A. Tunnel drainage shall be discharged to the storm system. DB Co shall ensure that all runoff is managed in accordance with Clause 5.3(i) of this Part 2. Storage of runoff in the Tunnel shall be below TOR for all events up to the 100-Year Storm. Discharge from Tunnel and portals shall meet the quality and attenuation/retention requirements of Table 2-5.1.
 - (iv) Parkway Tunnel West Portal to East Portal of Connaught Tunnel
 - A. Drainage from below grade Guideway sections shall be discharged to the storm system in accordance with Clause 5.3(i) of this Part 2. Runoff from at-grade and above-grade Guideway sections shall be conveyed and controlled by trackside swales designed to LID standards. Additional LID SWMPs shall be used in combination with the swales in order to meet quality and attenuation/retention requirements. All swales located between the Parkway Tunnel West Portal and the Lincoln Fields Station Pedestrian Bridge (SN018400) shall have side slopes no steeper than 6:1. Discharge from the swales shall meet the quality and attenuation/retention requirements of Table 2-5.1.
 - (v) Connaught Tunnel and east portal

- A. Drainage shall be discharged to the storm system or to a LID SWMP within the Guideway ROW east of the Connaught tunnel in accordance with Clause 5.3(i) of this Part 2. Storage of runoff in the Tunnel shall be below TOR for all events. Discharge from Tunnel and portals shall meet the quality and attenuation/retention requirements of Table 2-5.1.
- (vi) Connaught Tunnel west portal and Guideway from Connaught Tunnel west portal to high point approximately 120m west of Queensview Station.
 - A. This portion of the Guideway drains to the Connaught Tunnel west portal. Tunnel drainage shall be discharged to the storm system or to a LID SWMP within the Guideway ROW east of the Connaught Tunnel. Due to the larger catchment area, runoff up to the 25-year event shall be intercepted and diverted away from the Guideway at the Connaught Tunnel west portal. For clarity, this drainage shall not be conveyed within or parallel to the Tunnel to the same drainage system that serves the Connaught Tunnel low point. Storage of runoff in the Tunnel shall be below TOR for all events. Discharge shall meet the quality and attenuation/retention requirements of Table 2.5.1.
- (vii) Pinecrest Tunnel and portals (Guideway from high point approximately 120m west of Queensview Station to approximately 60m west of Pinecrest Station).
 - A. Tunnel drainage shall be discharged to the storm system. DB Co shall ensure that all runoff is managed in accordance with Clause 5.3(i) of this Part 2. Storage of runoff in the Tunnel shall be below TOR for all events up to the 100-Year Storm. Discharge to Pinecrest Creek shall meet the quality and attenuation/retention requirements of Table 2-5.1. Discharge to Graham Creek shall be controlled to existing (pre-development) peak flow rates. SWM quality requirements as per this Article.
- (viii) From approximately 60m west of Pinecrest Station west for approximately 360m to high point.
 - A. Runoff shall be conveyed by storm sewers to the existing Transitway storm sewer. SWM requirements as per this Article.
- (ix) From high point approximately 420m west of Pinecrest Station to Bayshore Station
 - A. Existing drainage is to the minor system to the 10-year event. Runoff shall be conveyed by trackside swales where feasible within the Lands. SWM requirements as per this Article.
- (x) From Bayshore Station to Moodie Station

- A. Existing drainage is to the minor system to the 10-year event. Runoff shall be conveyed by trackside swales, with no additional outlets to Stillwater Creek. SWM requirements as per this Article.
- (f) From Moodie Station to LMSF
 - (i) Existing drainage is to the minor system to the 10-year event. Runoff shall be conveyed by trackside swales. SWM requirements as per this Article.
 - (ii) DB Co shall design and construct a pumping station to convey drainage from below grade Guideway sections. The pumping station shall be located within the S-W Ramp connecting Moodie Drive to Highway 417. Stormwater shall be conveyed to a SWM storage system, where it shall be allowed to dissipate energy and cool prior to being discharged through the Moodie Station drainage system to Stillwater Creek. DB Co shall determine all parameters of the proposed stormwater storage basin, including the appropriate location, configuration, and type.
- (g) Guideway from split (approximately 300m south of Lincoln Fields Station) to Baseline Station
 - (i) Split to Baseline Road:
 - A. Runoff from at-grade and above-grade Guideway sections shall be conveyed and controlled by trackside swales designed to LID standards. Additional LID SWMPs shall be used in combination with the swales in order to meet quality and attenuation/retention requirements. All drainage infrastructure shall be designed to LID standards. Discharge shall meet the quality and attenuation/retention requirements of Table 2-5.1.
 - (ii) Baseline Road to Baseline Station
 - A. Runoff shall be conveyed by existing and new storm sewers to existing non-commissioned outlet to Pinecrest Creek. SWMPs shall be installed to meet the water quality requirements prescribed in Table 2-5.1. No quantity control SWMPs are required on-site. Quantity control shall be provided by the Pinecrest Stormwater Management Facility as per Clause 5.7 (i) of this Part 2 in lieu of on-site SWMPs.
- (h) Pinecrest Creek Realignment
 - (i) Pinecrest Creek shall be realigned between approximately 110m north and 200m south of the Iris Street crossing of the alignment. The purpose for the realignment is to allow for the combined construction of the Iris Street overpass, the LRT Guideway, Iris Station, and the related removal of the existing 120m long Culvert under Iris Street. As part of the re-alignment, two new single cell Culverts shall be

constructed to allow the realigned Pinecrest Creek to cross the Guideway and Iris Street:

- A. A 10m span x 32m long concrete frame structure that crosses the alignment approximately 200m south of Iris Street. See Article 4 – Structural Design Criteria and Requirements, of this Part 2 for additional information.
 - B. A 12m span x 41.8m long concrete frame structure that crosses Iris Street west of the LRT alignment and approximately 25m east of the private property line that abuts the western border of the NCC land. See Article 4 – Structural Design Criteria and Requirements of this Part 2 for additional information.
- (ii) Iris Street shall be considered an Urban Major Collector road. The LRT Track shall be classified as an Urban Arterial road for the purpose of drainage design. Culverts shall be designed according to section 5.10 of the City of Ottawa Sewer Design Guidelines.
 - (iii) Both Culverts shall be designed as single-cell open bottom Culverts with the spans described above to ensure proper creek functioning through the structures.
 - (iv) Both Culverts shall be designed with a minimum clearance of 1.0m between the design water level and the low chord. Erosion protection and fish passage shall be included in the design.
 - (v) The channel re-alignment shall be designed and constructed in accordance with Natural Channel Design Principles and with the fluvial-geomorphological criteria for Pinecrest Creek provided in Table 2-5.3.

Table 2-5.3 – Fluvial Geomorphological Criteria for Pinecrest Creek Channel Design

| Bankfull Characteristics of the Low Flow Channel | |
|---|-----------|
| Channel slope | 0.4% |
| Left and right side slopes | 1:1 |
| Minimum Bottom width | 4.0m |
| Minimum Top width | 6.0m |
| Manning's <i>n</i> | 0.035 |
| Depth | 1.0m |
| Floodplain Corridor Characteristics | |
| Channel slope | 0.4% |
| Left and right side slopes* | 2:1 – 3:1 |
| Minimum Bottom width | 28.0m |
| Minimum Top width | 40.0m |
| Manning's <i>n</i> | 0.055 |
| Minimum Depth | 2.0m |

*Side slopes steeper than 3:1 shall be avoided where possible and combined with additional bank protection.

- (vi) The channel re-alignment design is constrained by the LRT alignment along its east bank and a 1500mm watermain. The top of rail and the Iris Station shall be protected from a 100-year flood. A minimum 3m separation shall be provided between the outer edge of the 1500mm watermain and the top of the channel embankment and/or the limit of any grading changes as a result of the channel re-alignment.
 - (vii) It shall be demonstrated that the 100-year flow will be contained within the floodplain corridor by the completion of a hydraulic analysis using a HEC-RAS model of Pinecrest Creek. The HEC-RAS hydraulic model of the existing Pinecrest Creek is available in the reference document (Pinecrest Creek Realignment at Iris Station – Functional Channel Design prepared by CTP2, January 31, 2017). The future conditions HEC-RAS model will be available as part of the City of Ottawa Pinecrest Creek Cumulative Impact Study (CIS).
 - (viii) The hydraulic analysis shall demonstrate that the channel design not increase water levels above existing, and that the alignment, private property and roadways are protected from the 100-year flood level.
 - (ix) Design of the realignment of Pinecrest Creek shall follow hydraulic and sedimentological principles of fluvial process in such a manner that risk to infrastructure and property upstream and downstream of the realignment site is avoided.
 - (x) The channel realignment shall be designed by a fluvial geomorphologist who can demonstrate a Master's degree in fluvial processes (or equivalent), and who has at least 10 years of experience designing channels in urban environments.
 - (xi) DB Co shall submit a Preliminary and Final design report of the Pinecrest Creek Realignment in accordance with Schedule 10 – Review Procedure.
 - (xii) The Pinecrest Creek Channel realignment design and construction shall meet environmental and landscaping requirements described in Schedule 17 – Environmental Obligations and in Schedule 15-2, Part 6, Article 4 – Site Specific Desired Outcomes.
 - (xiii) DB Co shall design and construct the channel realignment in compliance with Ontario Regulation 174/06 (Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses).
- (i) Pinecrest Stormwater Management Facility
 - (i) Order of Precedence

- A. For the design and construction of the Pinecrest Creek SWM Pond, in the event of a conflict between the criteria contained in this Article and any other City reference document(s), the following shall apply in descending order of precedence:
 - i. All criteria and requirements specified in this Clause 5.7(i);
 - ii. All criteria and requirements specified in other pertinent parts of this Part 2;
 - iii. Drawings and Stage-Storage Curve in Appendix J of this Part 2.
- (ii) Background Documents
 - A. DB Co shall review and make itself aware of the conclusions and recommendations of studies completed in relation to the planning and design of the SWM pond, which include but may not be limited to:

[REDACTED]
- (iii) General Requirements
 - A. The Pinecrest Creek SWM Pond shall be located on NCC lands to the northeast of the Baseline Road and Woodroffe Avenue intersection.
 - B. The site and pond layout as presented in Appendix J of this Part 2 has been agreed to in principle by the NCC and is subject to a FLUDTA. Any deviations from this layout shall require additional consultation and approval by the NCC.
 - C. DB Co shall complete the design of and construct a SWM pond that, at a minimum, achieves the following criteria:
 - i. Provides a minimum 70% TSS removal for drainage area of 446 ha with full capture of 25 mm Chicago 3h-hour storm.
 - ii. Attenuates the 100-year peak flow to offset the increase in peak flows from a 14.4 ha drainage area with 86% imperviousness. This attenuation covers the quantity control required for the new Baseline station as defined in Clause 5.7(d)(vii), plus an allowance for future City transit projects.
 - iii. Provides additional quantity control for all storms up to the 100-Year event as further described within this Clause 5.7(i) to the greatest extent possible considering site constraints, as specified within this Clause 5.7(i). The main objective of additional quantity control is to reduce the peak overland flow on the SJAM Parkway between Carling Avenue and Richmond Road.

- iv. Maintains the overall geomorphic stability / balance within Pinecrest Creek.
 - v. Mitigates thermal impacts of the pond to Pinecrest Creek using a bottom-draw outlet design and any other measures identified herein.
 - vi. Does not increase the peak hydraulic gradeline under all normal operating conditions for the 2-year Soil Conservation Service 12-hour storm up to and including the 100-year Soil Conservation Service 12-hour storm peak flow at existing storm maintenance hole MHST27014.
 - D. The SWM pond shall incorporate a sediment forebay, wet cell 1, and wet cell 2 configured in accordance with the drawings and stage-storage curve in Appendix J of this Part 2.
 - E. The SWM pond shall incorporate the measures identified herein to discourage geese and gulls from frequenting the pond. Any changes to the measures identified herein would require verification by the City.
 - F. The length of dry channel in Pinecrest Creek resulting from implementation of the pond shall not exceed that shown on the drawings in Appendix J of this Part 2.
- (iv) Permits and Approvals
- A. DB Co shall obtain all PLAA for the pond in accordance with Schedule 17 – Environmental Obligations and Schedule 35 – Permits, Licences, Approvals and Agreements.
- (v) Submittals
- A. Design submittals shall be in accordance with Schedule 10 – Review Procedure and shall comprise all submittals required by Schedule 10 – Review Procedure and other parts of the Project Agreement, including but not limited to:
 - i. SWM Pond Design Brief Addendum.
 - ii. Design Drawings (all applicable disciplines).
 - iii. Construction Specifications (all applicable disciplines).
 - iv. Copies of all submittals to Governmental Authorities.
 - v. Copies of all required permits and approvals.

- vi. Hazardous Bird Deterrence Plan.
 - vii. Operation and Maintenance Manual.
- B. Submittals shall be made as comprehensive packages containing documents from all applicable disciplines, and shall be made at the following stages:
- i. Final design;
 - ii. Permit applications; and,
 - iii. Construction documents.
- (vi) DB Co shall not modify the hydraulic design or performance of facility components specified herein. Any such changes shall require verification by the City.
- (vii) General Layout
- A. The pond layout shall incorporate a sediment forebay, cell 1, and cell 2 configured in accordance with the drawings in Appendix J of this Part 2. The pond volume and design elevations shall be as listed in Table 2-5.4.

Table 2-5.4 – Pinecrest Creek SWM Pond volume and design elevations

| Design elevations, mASL | Sediment forebay | Cell 1 | Cell 2 |
|--|-------------------------|---------------|---------------|
| 100 year water surface elevation | 80.97 | | |
| Extended detention water surface elevation | 80.09 | | |
| Permanent pool water surface elevation | 78.90 | | |
| Invert elevation | 75.90 | 76.90 | 76.40 |
| Water storage volume (total up to specified elevation), m³ | | | |
| 100 year water surface elevation | 24,643 | 37,789 | 26,733 |
| Extended detention water surface elevation | 18,478 | 27,518 | 19,555 |
| Permanent pool water surface elevation | 10,317 | 14,143 | 10,191 |

- B. The grading of the pond shall be in accordance with the the stage-storage table in Appendix J of this Part 2.
- C. The SWM pond site shall be developed with MUP and landscaping as specified in Schedule 15-2, Part 6 – Urban Design, Landscape Architecture and Connectivity Requirements.

(viii) SWM Pond Components

A. Pond Cells

- i. The pond cells shall be curvilinear with variable side slopes, with a maximum slope of 3 horizontal to 1 vertical.
- ii. A 3m-wide submerged aquatic bench shall be provided around the pond, with maximum permanent water depth of 0.3m. The 3m bench shall be 1.5m flat and 1.5m at 5:1 slope.
- iii. The base of the sediment forebay shall be lined with a minimum of 400mm depth Granular ‘B’ type II compacted to 95% SPMDD on woven geotextile class II to OPSS 1860.

B. Inlet Chamber and Culvert

- i. The inlet chamber and Culvert shall be configured as shown in the drawings in Appendix J of this Part 2 and as follows:
 - 1 The inlet Culvert to the pond shall incorporate a bypass weir to the creek within an enclosed inlet chamber.
 - 2 The inlet Culvert shall be a continuous Culvert, 3m in width, from the existing Baseline Storm Sewer Outfall to the sediment forebay. The Culvert shall have a transition from an internal height of 1.8m to a minimum internal clear height of 2.4m immediately downstream of the Baseline Storm Sewer Outfall. The internal clear height shall be a minimum of 2.4m from the transition to the outlet into the sediment forebay.
- ii. The inlet Culvert shall have a continuous slope, a minimum cross-sectional area of 7.2m^2 and minimum clear height of 2.4m maintained throughout the Culvert and inlet chamber, and no obstructions to flow other than bends, each of which shall be no greater than 48 degrees.
- iii. The inlet chamber shall incorporate a concrete weir transverse to the existing Baseline Storm Sewer Outfall with a crest height at 80.20m. The projected length of the weir as measured

- perpendicular to the existing Baseline Storm Sewer Outfall shall be 8m. Up to the height of the weir crest, the inlet Culvert and chamber shall be designed to avoid any expansions or contractions in flow.
- iv. The downstream face of the weir shall be sloped, no steeper than 1 horizontal to 1 vertical.
 - v. Hydraulic modelling reported by [REDACTED] has identified that upstream hydraulic gradeline impacts are sensitive to the configuration of the inlet chamber and Culvert, including but not limited to details of the weir (location, height, alignment, length, downstream slope), Culvert (bend angles, lengths, dimensions, slope), and inlet chamber (size, opening dimensions, benching, safety grille). Any deviation from the information provided in Appendix J of this Part 2 shall therefore be accompanied by a detailed numerical analysis demonstrating that the design remains compliant with Clause 5.7 (i)(iii)C(vi).
 - vi. A 600mm diameter opening covered by a removable stainless steel plate shall be included in the transverse weir for use as a low flow maintenance bypass.
 - vii. The inlet chamber shall extend downstream of the weir for a minimum distance of 2m prior to an opening to the creek. Benching shall be included on the downstream side of the weir with minimum slope 4:1 and maximum slope 1:1. The opening to the creek shall be flanked with concrete wing walls and an apron with baffle blocks to direct the flow into the creek and mitigate the potential for scour and bank erosion. The opening to the creek shall be minimum 6.4m wide by 1.5m high at invert 78.9m.
 - viii. The opening to the creek shall be equipped with a lockable, hinged, outwards opening, safety grate with horizontal bars at 150mm spacing.
 - ix. Openings and ladders shall provide access from the roof of the inlet chamber upstream and downstream of the weir.
 - x. Stop log gains shall be provided to allow isolation of the inlet Culvert at the outlet of the inlet chamber. The stop log gains shall be designed and located to require the stop logs to be no more than 3m in length. Access for stop log operations shall suit equipment currently used by the City. DB Co shall confirm access requirements with the City.

- xi. Steel safety railing shall be installed along all segments of the inlet chamber perimeter where adjacent grading is higher or lower than the top of the structure.
- xii. Refer to Article 4 - Structural Design Criteria and Requirements of this Part 2 for structural requirements.

C. Existing Gabion Basket Retaining Wall

- i. All sections of the existing gabion basket retaining wall at the Baseline Storm Sewer Outfall (and extending along the north bank of Pinecrest Creek for approximately 40m) shall be abandoned in place or removed. Abandonment in place shall be by placement of sufficient compacted fill against the face of the retaining wall, separated by geotextile, to maintain a stable slope assuming complete failure of the gabion baskets.

D. Pinecrest Creek Channel Downstream of Inlet Chamber

- i. The creek channel downstream of the inlet chamber shall be realigned as shown by the drawings included in Appendix J of this Part 2 to form a gentle bend downstream of the inlet chamber. The realigned channel shall have a minimum bottom width of 5m.
- ii. The north bank of the creek downstream of the inlet chamber shall be stabilized to protect from flows that overtop the weir and then travel along the outside bend of the creek as it realigns with the existing creek path. This stabilization shall be provided as shown on Drawing C011 in Appendix J of this Part 2.
- iii. Flow that overtops the weir (i.e. flow in excess of 25mm return storm volumes) shall cascade down to a concrete apron which shall be provided as a component of the inlet chamber to protect from scour. This apron shall be designed based on the bed elevation and the elevation included on Drawing C011 in Appendix J of this Part 2 shall be adjusted to match bed elevations in the creek at the time of construction.
- iv. Scour protection shall be provided on the channel bed downstream of the concrete apron as shown on Drawing C011 in Appendix J of this Part 2.
- v. The design and construction of work within Pinecrest Creek downstream of the inlet chamber shall be under the supervision of the site fluvial geomorphologist (who shall be satisfy the qualifications required by Clause 5.7(h)(x).

E. Mid-pond MUP Crossing

- i. The sediment forebay shall be divided from cell 1 by an embankment carrying a MUP across the pond. The same embankment shall also divide cell 1 from cell 2. The MUP shall be at existing grade and shall be aligned with the existing [REDACTED] buried cables, which shall remain on this alignment following construction.
- ii. A 2.6 m wide by 1.2 m high concrete Culvert (upstream invert 78.40 m and downstream invert 78.30) shall connect the sediment forebay to cell 1. A 1.8 m wide by 1.2 m high Culvert (upstream invert 78.40 m and downstream invert 78.30) shall connect cell 1 to cell 2. Each Culvert shall be no longer than 31 m. These Culverts shall be installed below the existing [REDACTED] cables.
- iii. DB Co shall protect the existing [REDACTED] buried cables during construction in accordance with the requirements of Article 8 – Utility Infrastructure Design Criteria, of this Part 2.
- iv. The crossing shall incorporate an electrical conduit to allow for future pathway lighting.
- v. Between existing grade and elevation 83 m, slopes towards the pond either side of the MUP shall be no steeper than 3 horizontal to 1 vertical. Below this, armourstone retaining walls shall be constructed to minimize the overall width of the embankment.

F. Peninsula

- i. Cell 2 shall be separated from the sediment forebay by a peninsula with a width between 7m of 12m above the permanent pool water level.
- ii. The minimum crest elevation of the peninsula shall be 80.15m, such that the water level does not overtop the peninsula during the 25mm Chicago 3-hour storm.

G. Pond Outlets

- i. The pond outlet, comprising the outlet structure, quantity outlet Culvert, outlet channel, and quality outlet pipe shall be designed in accordance with the layout shown by the drawings in Appendix J of this Part 2.

- ii. The outlet structure shall comprise a single reinforced concrete structure with two compartments; one housing the quantity outlet and one housing the quality outlet.
- iii. The quantity outlet shall incorporate a 1.8m long quantity weir at elevation 80.15m, from which flow shall discharge to Pinecrest Creek via a 26m length 1800mm diameter pipe at upstream invert 78.30m and downstream invert 78.20m.
- iv. The quality outlet shall incorporate a 0.6m by 0.6m bottom-draw opening with invert 76.50m. This opening shall be equipped with a sluice gate. Flow shall discharge to a location within Pinecrest Creek no more than 60m downstream of the inlet chamber via a 600mm diameter quality outlet pipe with upstream invert 78.75m and downstream invert 78.60m. A removable 500mm wide by 300mm high marine grade aluminum orifice plate with invert 78.90m shall be installed within the outlet structure at the upstream end of the quality outlet pipe.
- v. A debris basket shall be incorporated on a rail and cable system fixed to the outside wall of the outlet structure. The debris basket shall have a total surface area no smaller than that shown by the drawings in Appendix J of this Part 2, and shall incorporate sloped bars at 150mm spacing as a safety feature.
- vi. The quality outlet pipe shall be designed in accordance with the Ottawa Sewer Design Guidelines. All maintenance holes required on the pipe shall be located above the 100-year water level, and adjacent to the access road.

H. Pond Outlet Channels

- i. Two proposed outlet pipes will connect to the creek. These are referred to as the quality outlet (releasing flows to approximately 380 l/sec) and the quantity outlet (releasing flows in excess of approximately 380 l/sec).
- ii. The quality outlet shall be angled to join the creek at an angle less than 60 degrees to flow to prevent scour erosion. At the terminus of the pipe, flow shall follow a riverstone-lined channel to join. The channel shall be as shown by Drawing C012 in Appendix J of this Part 2.
- iii. The quantity outlet channel shall join the creek at an angle not exceeding 45 degrees to flow, and shall be as shown by Drawing C012 in Appendix J of this Part 2.

- iv. The design and construction of the outlet channels shall be under the supervision of the site fluvial geomorphologist (who shall be satisfy the qualifications required by Clause 5.7(h)(x).

I. Pond Drains

- i. A 400mm diameter sediment forebay drain shall be provided between the base of the sediment forebay and cell 2. To allow the sediment forebay to be drained by pumping between maintenance holes, two maintenance holes shall be provided on the drain, with a sluice gate installed on the outlet of the upstream maintenance hole.
- ii. The sediment forebay drain shall be designed in accordance with the Ottawa Sewer Design Guidelines. All maintenance holes required on the pipe shall be located above the 100-year water level, and adjacent to the access road.
- iii. Draindown of cell 2 will be via the bottom-draw opening of the quality outlet structure. A 400mm by 400mm opening at invert 78.30m equipped with a sluice gate shall be provided between the quality and quantity compartments of the outlet structure, to allow the draindown flows to outlet to the creek via the quantity outlet Culvert.

J. Access Roads and MUPs

- i. General Requirements
 - 1 All pavements and reinforced grass surfaces shall be designed considering site-specific geotechnical data, and shall incorporate all necessary measures to ensure drainage of the granular sub-base.
 - 2 Pavements and surfaces required to be designed to a 'heavy duty' standard shall be in accordance with Drawing C015 (detail 1) in Appendix J of this Part 2 and shall be suitable for use by SWM pond and [REDACTED] operation and maintenance vehicles, including vehicles necessary for SWM pond sediment removal.
 - 3 All paved access roads and MUPs shall be at longitudinal grades no steeper than 5% and have cross-fall of 2%.
 - 4 CSP cross-Culverts (minimum diameter 400mm) shall be installed where roads and pathways cross overland drainage

paths to prevent flow across the paved surface and/or ponding uphill of the road or pathway.

- 5 Swales shall be constructed on the upslope side of roads and pathways as necessary to capture and direct overland flow to cross-Culverts.
- 6 Erosion protection comprising of rip-rap or geogrid-reinforced grass shall be provided for all swales on slopes 3 horizontal to 1 vertical or greater.

ii. Pond Access Road

- 1 The MUP forming a loop around the sediment forebay and cell 1 of the SWM pond, plus the northernmost connection to Woodroffe Avenue, shall be described as the pond access road.
- 2 The pond access road shall be constructed to a 'heavy duty' standard as defined above.
- 3 The asphalt surface of the pond access road shall be 3m in width. The granular base shall extend 1m beyond both sides of the asphalt surface.
- 4 The existing curb depression at the intersection of the pond access road shall be widened and reconfigured as necessary, complete with tactile walking surface indicators, to provide a permanent vehicle entrance from Woodroffe Avenue to the SWM pond site, suitable for the vehicles identified above. The permanent vehicle entrance shall have a minimum clear width of 3m to the south of the existing traffic signal pole located within the existing MUP. Removeable bollards shall be installed within the permanent vehicle entrance.
- 5 A minimum 80m length of the paved access road between the SWM pond and Pinecrest Creek shall be at a constant elevation of 82m, to serve as an emergency overflow.

iii. MUPs

- 1 DB Co shall design and construct MUPs in accordance with the requirements of Schedule 15-2, Part 6, Article 4 – Site Specific Desired Outcomes.

iv. Access to Structures

- 1 All structure access hatches/covers, maintenance holes and safety or debris grates shall be accessible by asphalt or reinforced grass access roads. Access roads shall be within 1m vertical and 2m horizontal of the top of the item requiring access.

v. Access Ramp to sediment forebay

- 1 A 5m-wide access ramp with a minimum 3m-wide reinforced grass surface at a maximum slope of 5:1 with 2% crossfall shall be provided from the pond access road to the base of the sediment forebay.
- 2 The access ramp shall have a reinforced grass surface, and shall be suitable for use by the SWM pond maintenance and sediment removal traffic described above.

vi. Signage

- 1 Signage shall be installed close to access points and at high visibility locations around the SWM pond to warn the public of the common hazards and prohibitions associated with the facility.
- 2 All signs shall conform to City standards.
- 3 In accordance with commitments made to Transport Canada, signage prohibiting littering and feeding of wildlife shall be installed.

K. Sediment Management Area

- 1 A sediment management area with a minimum area of 2300 m² shall be provided adjacent to the sediment forebay for future use in sediment removal, handling and storage.
- 2 The sediment management area shall be sloped towards the sediment forebay at 1 to 5% slope.
- 3 No structures, pavements, hard landscaping, shrubs or trees shall be located within the sediment management area.

L. Structure Ancillaries

i. Access to Structures

- 1 The Inlet Chamber and Outlet Structure shall be provided with access hatches located to provide maintenance access

to all spaces within the structure, and to facilitate removal and replacement of all sluice gates, stop logs, orifice plates and other installed equipment.

- 2 Access hatches shall be a minimum dimension of 600mm by 600mm.
- 3 All access hatches shall be commercially available.
- 4 All access hatches shall be lockable with locking hasps recessed to avoid trip hazard.
- 5 Access to the floor of spaces within the structure shall be provided by permanent ladders.
- 6 Internal safety platforms shall be provided within all structures deeper than 5m, and within the quality outlet chamber of the outlet structure.

ii. Safety Grates

- 1 Safety grates similar in design to OPSD 804.050 shall be installed on all openings on the inlet chamber, outlet structure and associated Culverts, with the exception of openings which are fully submerged at permanent pool water level other than the bottom draw outlet.
- 2 Safety grates on outlets shall be hinged and shall open in the direction of flow.

iii. Safety Railings

- 1 Safety railings shall be installed on the perimeters of all structures where the top of the structure is higher than adjacent grades.

M. Monitoring Equipment

- i. DB Co shall design, supply, install and commission monitoring equipment in accordance with the following requirements. Final design drawings and instrumentation specifications shall be submitted for City in accordance with Schedule 10 – Review Procedure, prior to construction. To maintain compatibility with existing City equipment, all instrumentation shall be supplied as specified with no substitutions.
- ii. Monitoring Sheds

- 1 A monitoring shed shall be provided adjacent to each of the SWM pond inlet chamber and outlet structure in the locations shown by the drawings in Appendix J of this Part 2.
 - 2 Each shed shall have minimum internal dimensions of 2.4m long by 1.8m wide by 2.1m high, and shall be constructed of precast concrete with a vandal-resistant exposed aggregate finish. Shop drawings for the shed and a sample of the exposed aggregate finish shall be provided for City approval prior to beginning fabrication. Each shed shall have one 914mm-wide metal door. The locking mechanism shall follow the current standard specification of the City.
 - 3 Sheds shall be placed on a compacted granular A base over minimum 50mm rigid high-density Styrofoam insulation, and shall be insulated internally with minimum 19mm high-density Styrofoam and 6.35mm sealed, primed and painted plywood on strapping.
 - 4 DB Co shall coordinate with [REDACTED] to provide electrical services to both monitoring sheds. All new electrical services on the Site shall be buried.
 - 5 Each shed shall be provided with internal lighting (minimum of one 4ft fluorescent strip light), electrical heating, and electrical outlets. A minimum of four spare outlets shall be provided in addition to any required for equipment. The electrical heater shall be sufficient to maintain the internal temperature of the shed above the minimum operating temperatures specified by the manufacturers of all installed equipment, considering the climate data specified in Clause 4.3(b) of Schedule 15-2, Part 1 – General Requirements.
 - 6 Buried rigid PVC electrical conduits shall be installed between each monitoring instrument and the nearest monitoring shed (one conduit per cable/tube).
- iii. The following equipment shall be installed at the pond inlet. Equipment shall be complete with all require ancillaries and accessories, including but not limited to mounting brackets, power cables, and data cables:
- 1 [REDACTED] refrigerated sampler, 2-bottle configuration, with refrigerator battery backup kit. Intake located approximately mid-way along inlet culvert;

- 2 [REDACTED] flow meter system base meter with battery backup, installed in monitoring shed;
 - 3 [REDACTED] ultrasonic level sensor, installed in inlet chamber directly above bypass weir, with stainless steel protective hood;
 - 4 [REDACTED] sensor with surcharge kit and built-in ultrasonic level sensor, installed adjacent to access maintenance hole, approximately mid-way along inlet culvert; and,
 - 5 [REDACTED] sensor for Signature flow meter installed as backup to LaserFlow sensor.
- iv. The following equipment shall be installed at the pond outlet. Equipment shall be complete with all require ancillaries and accessories, including but not limited to mounting brackets, power cables, and data cables:
- 1 [REDACTED] refrigerated sampler, 2-bottle configuration, with refrigerator battery backup kit. Intake located within quality outlet pipe.
 - 2 [REDACTED] flow meter system base meter with battery backup.
 - 3 [REDACTED] ultrasonic level sensor, installed in quality compartment of outlet structure, with stainless steel protective hood.

(ix) Construction

- A. All MUP connectivity across the site shall be maintained throughout construction. The access road along the north-west periphery of the pond between Woodroffe Avenue, the northern extent of construction and Navaho Drive, shall be constructed and placed into service prior to taking the existing MUP out of service.
- B. DB Co shall maintain fencing at all times around the boundaries of the construction site and shall develop hoarding plans as specified in Schedule 15-2, Part 1, Article 4 – Design and Construction.
- C. Construction traffic shall only cross the MUP at defined gates in the site fencing, where appropriate signage and traffic control persons shall be deployed.

- D. Construction traffic shall only enter and exit the site from Woodroffe Avenue. A dedicated temporary access shall be constructed. The presence of existing overhead cables, other utilities, the need to accommodate pedestrians and cyclists, and the location of existing bus stops shall be considered in the design, location and operation of this access.
 - E. DB Co shall prepare and implement an ESC Plan in accordance with Clause 5.6 of this Part 2.
 - F. Deterrence of geese, gulls, and waterfowl during construction
 - i. The location of the proposed SWM pond is within the Ottawa International Airport Bird Hazard Zone. DB Co shall implement measures as necessary to minimize the potential for geese, gulls, and waterfowl (birds considered to pose a hazard and risk to aircraft) frequenting the site at any time during construction.
 - ii. DB Co shall prepare and submit a hazardous bird deterrence plan prior to construction. The plan shall be subject to review by the City and shall detail measures to be implemented during construction to ensure that the site does not become attractive to hazardous birds. The plan shall address each phase of construction, including but not limited to site clearing, excavation, commissioning, and landscaping, through to full establishment of landscaping including deterrent plantings.
 - iii. DB Co shall implement regular monitoring of the site to identify and rectify any situations or areas that could result in hazardous birds frequenting the site, including but not limited to gentle, grass or barren slopes adjacent to waterbodies, emergent vegetation accessible to waterfowl, and inadequate on-site litter management.
 - iv. DB Co shall erect and maintain a silt fence at the top of the aquatic bench immediately after the bench has been planted and before the water level in the pond reaches 78.0m to protect emergent vegetation from geese. The silt fence shall remain in place until emergent vegetation is fully established, for not less than one full growing season. Removal of the fence shall be carried out between November and April to minimize damage to the aquatic bench and plant material.
 - G. DB Co shall maintain a baseflow to the existing creek (downstream of the pond outlet) at all times, including while filling the pond.
- (x) Commissioning and Handover

- A. DB Co shall not redirect flows from the creek into the pond until the following criteria are met:
 - i. All construction complete, with the following exceptions:
 - 1 Landscaping works above 81.0m; and,
 - 2 MUP's and access roads.
 - ii. All sluice gates installed and commissioned;
 - iii. All orifice plates and similar control elements installed;
 - iv. ESC measures in place to prevent silt-laden runoff entry into the pond;
 - v. Operations and Maintenance Manual submitted and reviewed in accordance with Schedule 10 – Review Procedure.
 - vi. Locks installed on all access hatches and safety grates.
 - vii. Pre-commissioning inspection completed by the City and all deficiencies rectified to the satisfaction of the City.
 - B. Acceptance and handover of the SWM pond to the City shall be completed in accordance with the Project Agreement Section 11.27.
- (j) Overland Drainage Swale: Carling Avenue to Richmond Road
- (i) An overland drainage swale shall be constructed as per Schedule 15-2, Part 6, Article 4 – Site Specific Desired Outcomes where the Transitway and existing Lincoln Fields Station are being decommissioned between Carling Avenue and Richmond Road.
 - (ii) The swale shall be designed to convey the flood spill from the ORPP during the 100-year Storm, without Flooding adjacent properties, or endangering or inconveniencing users of the SJAM Parkway.
 - (iii) Discharge from the swale shall be via the existing storm sewer on the SJAM Parkway at the crossing of Richmond Road.
 - (iv) DB Co shall use flows from the modelled future development scenario in Table 4b in the [REDACTED], as the starting point for analysis. The proposed overland swale design and its dynamic interaction with the ORPP may result in a different flow split and associated water depths than those presented in the December 2017 report. The final design shall be validated using appropriate overland flow assessment techniques. The existing conditions 1-D steady-state HEC-RAS model and associated technical memo that is available in the [REDACTED], should

inform the starting point for these analyses. The future (interim and ultimate) conditions HEC-RAS models and associated technical memos are also available in the Background Information, from the City of Ottawa Pinecrest Creek Cumulative Impact Study, for reference and to assist with design.

(k) Green's Creek Culvert Replacement

- (i) DB Co shall complete the design of a full Culvert replacement and install a portion of the new Culvert Structure within the Green's Creek Culvert (SN227110) located beneath the Confederation Line Track portion of OR174. The installation is considered the initial phase of a future replacement of the entire Culvert. DB Co shall complete this initial phase to the limits to enable the complete replacement of the Culvert (by others) without the need to interrupt the Confederation Line operations in the future. The installed Culvert portion shall be a single-span open-bottom Structure with a minimum span of 16.46m. See Article 4 – Structural Design Criteria and Requirements, of this Part 2 for additional information. [REDACTED].
 - A. DB Co DB Co shall be permitted to remove sections of the existing Culverts as needed to construct the permanent Culvert section under the alignment, provided that the Culvert sections are reinstated and that the final installation is hydraulically sufficient and is intended to be permanent until such time that the final installation of the Culverts is performed by others.
- (ii) As part of the initial phase of the Culvert installation, erosion protection shall be provided and fish passage and wildlife passage shall be maintained to meet regulatory requirements.
- (iii) DB Co shall complete the design of the full replacement culvert as per the following parameters:
 - A. A wildlife passage bench shall be designed to be located within the Culvert in the form of a dry ledge with a minimum dry area of 1.5m wide by 1m high (vertical clearance). The wildlife bench shall be extended beyond the Culvert to match the top of the floodplain upstream and downstream of the Culvert, to provide a transition to natural overbanks of creek for access/egress. Refer to the report [REDACTED] for additional design and construction considerations.
 - B. As part of this Culvert installation, mitigation measures for fish and fish habitat as well as freshwater mussels and mussel habitat shall be implemented. For a preliminary assessment of impacts, recommended mitigation measures, as well as design and construction considerations, refer to the following memorandums: [REDACTED]. The assessment of impacts and recommended mitigations related to fish and mussels, as well

as their habitats, shall be revised and updated accordingly by DB Co prior to design completion.

- C. A low flow/bankfull channel shall be designed to be within the Culvert. The channel shall be designed to extend upstream and downstream and shall connect seamlessly to the natural low flow channel of the creek. The channel shall be designed in accordance with Natural Channel Design Principles and with the fluvial-geomorphological criteria provided below in Table 2-5.5. See [REDACTED] technical memorandum for additional design requirements.
- D. Fish passage shall be designed for a maximum velocity of 0.8 m/s within a 0.8m deep migration zone under 2-year flow as per the MTO Drainage Design Guidelines

Table 2-5.5 - Fluvial Geomorphological Criteria for Green's Creek Channel Design

| Bankfull Channel Characteristics - Average Conditions – Green's Creek at Highway 174 | | | |
|---|-------|--------------------------------------|-------|
| Top Width (m) | 15.00 | Area (m²) | 27.09 |
| Depth (Max) (m) | 2.10 | Hydraulic Radius (m) | 1.62 |
| Bottom Width (m) | 10.80 | Wetted Perimeter (m) | 16.74 |
| Side Slopes (L:H) | 1:1 | Average Velocity (m/s) | 0.95 |
| Average Manning 'n' | 0.030 | Estimated Q (m³/s) | 25.81 |

- (iv) The design shall include erosion protection to ensure the stability of the channel banks and channel bed during extreme flow events. Erosion protection shall be designed in accordance with the methodology outlined in the US Army Corps of Engineers (USACE) HEC23 Guidelines (USACE Engineering Manual No. 1110-2-1601 and EM 1601 equation).
 - i. The extreme flow event for erosion protection shall be the 50-year flow. Additionally, a minimum freeboard of 0.5m shall be provided.
 - ii. Erosion protection shall be designed according to the design parameters listed below in Table 2-5.6:

Table 2-5.6 - Green's Creek RipRap Design Parameters

| HEC RAS Station | Location | Average Velocity (50yr) | Channel Width | Water Depth at Toe of | Bank Slope | Radius of Curvature |
|------------------------|-----------------|--------------------------------|----------------------|------------------------------|-------------------|----------------------------|
|------------------------|-----------------|--------------------------------|----------------------|------------------------------|-------------------|----------------------------|

| | | flow) | | Slope | | |
|------|-------------------|--------------|-------|--------------|-----|-----|
| | | (m/s) | (m) | (m) | (°) | |
| 3899 | Upstream | 1.71 | 95.0 | 2.0 | 30 | 65 |
| 3805 | Culvert Outlet | 2.84 | 20.0 | 1.8 | 30 | 200 |
| 3582 | Downstream | 1.86 | 103.0 | 4.7 | 36 | 200 |

- (v) Bank protection shall be designed for a minimum of 110m upstream of the Culvert and 50m downstream of the Culvert. Erosion protection shall be designed to be extended at an elevation of 0.5m above the 50-year water level or to the top-of-bank, whichever is lower.
- (vi) Bed protection shall be designed for the Culvert inlet to ensure channel stability and allow the formation of a natural channel. The top of the bed protection at the inlet shall be located at a minimum of 0.5m below the invert of the low flow channel. Bed protection shall extend a minimum of 5m upstream of the inlet and 2m downstream of the inlet.
- (vii) Bed protection shall be designed for the Culvert outlet to prevent excessive downstream movement of the erodible bed material and to recreate an existing riffle at the outlet. Bed protection at the outlet shall extend 2m inside of the Culvert outlet and 5m downstream. The top of the bed protection shall be flush with the invert of the low flow channel.
- (viii) Additional bed protection shall be designed to extend 5m upstream and 10m downstream of the outlet protection as described in Clause 5.7 (k) (xiv). The top of the bed protection here shall be located at a minimum of 0.5 m below the invert of the low flow channel.
- (ix) Design of any channel realignment shall follow hydraulic and sedimentological principles of fluvial process in such a manner that risk to Infrastructure and property upstream and downstream of the realignment site is avoided.
- (x) Any channel realignment shall be designed by a fluvial geomorphologist who can demonstrate a Master's degree in fluvial processes (or equivalent), and who has at least 10 years of experience designing channels in urban environments.
- (xi) The Culvert replacement and any channel realignment design shall meet environmental and landscaping requirements described in Schedule 17 – Environmental Obligations and in Schedule 15-2, Part 6, Article 4 – Site Specific Desired Outcomes.
- (xii) DB Co shall design any channel realignment in compliance with Ontario Regulation 174/06 (Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses).

- (l) SJAM Parkway – Cleary to Dominion and Churchill MUP Underpass
- (i) For Roadway requirements, refer to Article 6 – Roadways, Bus Terminals and Lay-bys of this Part 2.
 - (ii) DB Co shall design and construct a new storm sewer system to service the SJAM Parkway, sized to convey the 10-year storm flow from the 4-lane arterial roadway, consistent with City of Ottawa Sewer Design Guidelines for arterial roadways.
 - (iii) DB Co shall identify and locate all existing Ottawa River outfalls servicing the reconstructed segment of the SJAM Parkway as described in Clause 6.21 – Federal Roads Improvements of this Part 2. DB Co shall replace these outfalls with concrete storm sewers and headwalls that shall be designed in accordance with Article 4 – Structural Design Criteria and Requirements, of this Part 2. The new storm sewer under SJAM shall outlet to the replacement outfalls. Existing City of Ottawa storm sewers and outfalls shall not be used as outlets from the new storm sewer on SJAM Parkway. Replacement outfalls that are not utilized for the new storm sewer system shall extend from the Ottawa River to the north side of the MUP that is located north of the SJAM Parkway, and shall be terminated with a cap and a clean-out extending to the surface. The minimum size for the replaced outfalls and sewers shall be 300mm diameter.
 - (iv) The SJAM shall include a stormwater treatment system capable of providing 80% removal of TSS. This system shall be provided by means of bio-retention swales to be located within the proposed median of the SJAM Parkway where feasible. Where the median is less than 4m wide, or where superelevation of the Roadway prevents surface drainage to the median, bio-retention swales shall be located as close as possible to the SJAM eastbound or westbound lane. The bio-retention swales shall be designed in accordance with the TRCA/CVC Low Impact Development Stormwater Management Planning and Design Guidelines. The design constraints for the bio-retention swales shall be as follows:
 - A. The roadway design shall include side-inlet catch basins on the roadway to allow capture of runoff directly to the storm sewer during winter conditions and during storm events that exceed the capacity of the bio-retention swales.
 - B. The roadway shall be designed to allow for both lanes of traffic to drain toward opening in the inner (median) and outer curbs of the Roadway to capture all of the runoff in the bio-retention system.
 - C. DB Co shall convey runoff to the bio-retention swales using a combination of the two following methods:
 - i. Provide concrete spillways between the curb openings and bio-retention swales where erosion protection is required. River stone

- riprap shall be placed at the bottom of bio-retention swales where additional erosion protection is required. Angular riprap shall not be used. Concrete spillways shall have a maximum length of 2m.
- ii. Where the length of erosion protection between the Roadway and the bioswale exceeds 2m, runoff shall be captured by a catch basin and conveyed by a sewer to the bioswale.
- D. Bio-retention swales shall have a maximum longitudinal slope of 0.5%. Checkdams constructed of clay with a reinforced grass revetment shall be used as required to meet the maximum longitudinal slope requirement. Checkdams shall not be constructed of riprap.
- E. Bio-retention swales shall be underlain by an infiltration trench, lined with geotextile filter fabric, 50mm stone, and a perforated 200mm diameter storm sewer which connects to the storm sewer system. Raised, beehive-type catch basins within the bio-retention swale will allow direct discharge of runoff to the storm sewer for events that exceed the volume of the swale. The bio-retention swale shall be completed with a 0.5m media filter bed composed of shredded hardwood mulch layer (75mm depth) placed over an engineered mixture of sand, soil, and organic material, the design of which must consist of the following:
- i. Sand (2 to 0.05mm grain size) making up 85 to 88% of the weight;
 - ii. Fines (grain size <.050mm) making up 8 to 12 % of weight; and,
 - iii. Leaf compost making up 3 to 5% of weight.
- F. Media shall be tested to confirm design specifications and approved by the owner prior to installation.
- G. The edges of the raised, beehive type catch basins located in bio-retention swales shall be covered by river stone with minimum diameter of 100mm such that only the cover of the catch basin is visible
- (v) DB Co shall design and construct drainage systems to service the Cleary and Churchill MUP underpasses at the SJAM. The underpasses shall be designed to drain to the Ottawa River. At the Churchill MUP underpass, the MUP surface shall have a minimum elevation of 56.0m to maintain ponding depth on the MUP to 600mm during a 1:2 year flood of the Ottawa River, according to the RVCA Ottawa River Floor Risk Mapping report. Refer to Clause 6.21 of this Part 2.
- (vi) Overland flow spillways shall be provided at low points of the SJAM Parkway to allow for major flows to spill out of the Roadway toward the Ottawa River. Overland flow spillways shall be designed such that the maximum depth of flow on the SJAM Parkway meets the City guidelines for arterial Roadways, and such

that the flow is distributed evenly across the spillway to minimize erosion potential. Reinforced grass slopes shall be provided to prevent erosion of the overland flow spillway. Refer to Schedule 15-2, Part 6, Article 4 – Site Specific Desired Outcomes, for landscaping requirements of spillways from the SJAM.

(m) [REDACTED]

- (i) DB Co shall implement all recommendations of [REDACTED] necessary for the implementation of the Confederation Line, currently being completed by the City.

(n) Richmond Road Complete Streets Improvements

- (i) DB Co shall design and construct localized grading and new Drainage facilities including but not limited to catch basins, maintenance holes, curb and gutters, and storm sewers to ensure positive Drainage along and across the reconstructed Richmond Road and Byron Avenue in accordance with the City of Ottawa Sewer Design Guidelines and with Clause 8.10 of this Part 2.
- (ii) DB Co shall design and construct the site grading of Byron Avenue such that the existing ditches along the south side of Byron Avenue are maintained and continue to capture runoff from catchments external to the Byron Avenue roadway as per existing conditions. The existing ditches shall be re-graded and re-vegetated, along with replacement of driveway entrances within the Byron Avenue ROW, to accommodate a new sidewalk on the south side of Byron Avenue as outlined in Part 6, Article 4 – Site Specific Desired Outcomes. Culverts under driveways shall also be replaced.
- (iii) DB Co shall design and construct a stormwater treatment system capable of providing 80% removal of TSS for a minimum of 1.4ha of the Richmond Road Complete Streets road reconstruction area. This system shall be provided through the design and construction of bioswale and bio-retention LID facilities to be located on the reconstructed segment of Richmond Road. The bioswale and bio-retention facilities shall be designed in accordance with the TRCA/CVC Low Impact Development Stormwater Management Planning and Design Guidelines. The design of the facilities shall be as follows:
 - A. The roadway design shall include side-inlet catch basins on the roadway to allow capture of runoff directly to the storm sewer during winter conditions and during storm events that exceed the capacity of the LID facilities.
 - B. Bioswale and bio-retention facilities shall be located between the cycle track and the roadway, and shall immediately precede all bus stops in the direction of travel of the cycle track.
 - C. Bioswale and bio-retention facilities shall extend to the adjacent curb of private or public access to Richmond Road where the difference in offset

is 20m or less. Refer to Schedule 15-2, Part 6 – Urban Design, Landscape Architecture and Connectivity Requirements, for landscaping requirements.

- D. Bioswale and bio-retention facilities' width shall extend from the back of curb to the cycle track and shall not be less than 1.8m.
- E. DB Co shall construct bio-retention facilities where bedrock is 2.2m or greater below the finished ground surface. The bio-retention facility shall consist of an infiltration trench, lined with geotextile filter fabric, a minimum 300mm layer of clear stone, and a perforated sub-drain which connects to the storm sewer system. The invert of the perforated sub-drain shall be at least 100 mm above the bottom of the clear stone layer to allow infiltration of the 10mm rainfall event. The bio-retention facility shall be completed with a 500mm media filter bed composed of shredded hardwood mulch layer (75mm depth) placed over an engineered mixture of sand, soil, and organic material, the design of which must consist of the following:
 - i. Sand (2 to 0.05mm grain size) making up 85 to 88% of the weight;
 - ii. Fines (grain size <.050mm) making up 8 to 12 % of weight; and,
 - iii. Leaf compost making up 3 to 5% of weight.
- F. DB Co shall construct bioswale facilities where bedrock is less than 2.2m below the finished ground surface. The bioswale shall consist of a trench, lined with geotextile filter fabric, a perforated sub-drain which connects to the storm sewer system, and a clear stone layer with depth equal to or greater than the outside diameter of the perforated sub-drain. The bioswale shall be completed with a 500mm media filter bed composed of shredded hardwood mulch layer (75mm depth) placed over an engineered mixture of sand, soil, and organic material, the design of which must consist of the following:
 - i. Sand (2 to 0.05mm grain size) making up 85 to 88% of the weight;
 - ii. Fines (grain size <.050mm) making up 8 to 12 % of weight; and,
 - iii. Leaf compost making up 3 to 5% of weight.
- G. Raised catch basins within the bioswale and bio-retention facilities will allow direct discharge of runoff to the storm sewer for events that exceed the volume of the facility. The maximum rate of capture to the storm sewer shall not exceed the peak flow from a 2-year event.

- H. Media shall be tested to confirm design specifications and approved by the City prior to installation.
- (iv) DB Co shall design and construct bioswale LID facilities in Byron Linear Park such that runoff from the park is managed in accordance with the Pinecrest Creek SWM criteria. The bioswale facilities shall be designed in accordance with the TRCA/CVC Low Impact Development Stormwater Management Planning and Design Guidelines. The design constraints for the facilities shall be as follows:
 - A. The design shall include catch basins to allow capture of runoff directly to the storm sewer during winter conditions, and during storm events that will exceed the capacity of the LID facilities. The maximum rate of capture to the storm sewer shall not exceed the peak flow from the 2-year storm.
 - B. Where the bioswale facility crosses a pedestrian pathway, DB Co shall design and construct a footbridge for the crossing and shall not use any Culverts.
 - C. DB Co shall design the bioswales with maximum 3:1 side slopes.
- (o) Moodie LMSF
 - (i) DB Co shall design a storm drain inlet and sewer system to convey the runoff to an underground storage system which permits infiltration. Discharge shall be controlled to existing (pre-development) peak flow rates.
 - (ii) OGS structures shall be designed and specified with a required performance of removal of fine sediment, oil, floating and sinking debris, and 80% removal efficiency for TSS at the outlet from the drainage system prior to discharge to Stillwater Creek.
 - (iii) DB Co shall construct any box Culvert extensions as open bottom.
 - (iv) DB Co shall confirm the value of the loss of floodplain storage volume within the 1:100 year floodplain which will result from the placement of fill by June 1, 2020. The City will be responsible to fully compensate for this loss of floodplain storage volume through a balanced cut (or excavation) to be performed in a location selected by the City. The City will be responsible for permits and approvals for this compensation and the work will be complete by the end of 2020.
 - (v) DB Co shall design the site considering future expansion requirements outlined in Schedule 15-2, Part 5 – LMSF and to demonstrate that expansion of the site does not require the removal of underground storage facilities constructed as part of the DB Co site construction. DB Co shall demonstrate how the expansion of drainage facilities can be achieved.

ARTICLE 6 ROADWAYS, BUS TERMINALS AND LAY-BYS

6.1 Reference Documents

- (a) DB Co shall complete the Work in accordance with the criteria contained within this Article, the Applicable Law, all the City of Ottawa's by-laws, regulations, policies, standards, guidelines and practices applicable to the Project, including but not limited to the following Reference Documents:
- (i) The criteria in this Article, as well as Appendices to this Part 2;
 - (ii) AASHTO, Guide for the Design of Pavement Structures;
 - (iii) City of Ottawa, Standard Tender Documents;
 - (iv) City of Ottawa, Transportation Master Plan;
 - (v) City of Ottawa, Official Plan;
 - (vi) City of Ottawa, OC Transpo - Transitway and Station Design Guidelines (June 2013);
 - (vii) City of Ottawa, Municipal Road Activity (By-law No. 2003-445) and Guidelines For Completing the Application for Road Cut Permit;
 - (viii) City of Ottawa, Municipal Traffic and Parking (By-law No. 2003-530) - City of Ottawa Regulating Traffic and Parking on Highways;
 - (ix) City of Ottawa, Municipal Zoning (By-law No. 2008-250) Consolidation;
 - (x) City of Ottawa, Transit-Oriented Development Guidelines;
 - (xi) City of Ottawa, Pedestrian Crossover Program and Examples Documents 1 and 2;
 - (xii) City of Ottawa, CADD Standards;
 - (xiii) City of Ottawa, Urban and Rural Truck Routes Maps;
 - (xiv) City of Ottawa, Road Corridor Planning & Design Guidelines - Urban and Village Collectors / Rural Arterials and Collectors;
 - (xv) City of Ottawa, Right-of-Way Lighting Policy;
 - (xvi) City of Ottawa, Accessibility Design Standards;
 - (xvii) City of Ottawa, Transportation Impact Assessment Guidelines;
 - (xviii) Region of Ottawa-Carleton, Regional Road Corridor Design Guidelines;

- (xix) MTO, Ontario Pavement and Rehabilitation Manual;
 - (xx) MTO, Ontario Provincial Standard Drawings;
 - (xxi) MTO, Ontario Provincial Standard Specifications;
 - (xxii) MTO, Materials Information Report MI-183 “Adaptation and Verification of AASHTO Pavement Design Parameters for Ontario Conditions”;
 - (xxiii) MTO, Ontario Traffic Manual Books 1 through 18;
 - (xxiv) MTO, Roadside Safety Manual;
 - (xxv) MTO, Sign Sheeting Memorandum, February 21, 2008;
 - (xxvi) MTO, King’s Highway Guide Signing Policy Manual;
 - (xxvii) TAC, Geometric Design Guide for Canadian Roads;
 - (xxviii) TAC, The Canadian Road Safety Audit Guide;
 - (xxix) TAC, Guide to Bridge Traffic and Combination Barriers;
 - (xxx) US Department of Transportation, Roundabouts: An Informational Guide (FHWA-RD-00-067);
 - (xxxi) MTO Design Supplement to TAC Geometric Design Guide for Canadian Roads, June 2017;
 - (xxxii) Other relevant City of Ottawa Operation Policy, Procedures and Guidelines.
- (b) DB Co shall design and construct all Roadways under the scope of Works in accordance with the geometric Design Criteria contained in this Article and applicable appendices, and standards and manuals included in Clause 6.1(a) of this Part 2, and if there is any conflict between the criteria contained in this Part 2 and standards and manuals included in Reference Documents, the following shall apply in descending order of precedence:
- (i) The criteria contained in Schedule 15-2, Part 2, Appendices A, B, C and D;
 - (ii) The criteria contained in this Article;
 - (iii) The applicable City of Ottawa Standard Tender Documents and applicable standards and guidelines;
 - (iv) TAC, Geometric Design Guide for Canadian Roads;

- A. In all cases for OR174 and Hwy 417, including all associated interchanges, DB Co shall also reference the MTO Design Supplement to TAC Geometric Design Guide for Canadian Roads.
- (v) TAC, The Canadian Road Safety Audit Guide;
- (vi) MTO, Roadside Safety Manual.

6.2 General Requirements

- (a) DB Co shall provide the design, including obtaining all necessary approvals, and supply the materials, labour, equipment, inspection and testing in order to fulfill the requirements for the execution and commissioning of the Works.
- (b) The overall engineering design and construction requirements of the Works, including typical cross-sections and geometric Design Criteria, are primarily based on the contents of this Part 2, and the Reference Documents from the City of Ottawa, TAC and MTO.
 - (i) DB Co shall design the proposed improvements on all Works according to the Design Criteria included in Appendix A of this Part 2. In all cases where a specific Design Criteria is not provided for a Roadway and/ or interchange in Appendix A of this Part 2, DB Co shall undertake a detailed survey and review of the existing conditions, confirm the Roadway and/or interchange ramps geometric Design Criteria by referencing the existing, appropriate standard and proposed design parameters, in order to address the necessary improvements.
 - A. Under the circumstances whereby an existing interchange ramp, impacted by the Works, does not meet current standards, DB Co shall design and construct the necessary ramp improvements to maximize the radius used so that the impacted ramp will be upgraded to meet the standards. Under circumstances where upgrading the ramps to current standards is not feasible within the available Lands, DB Co shall design the improvements so that current ramp geometry will be maintained.
 - B. DB Co shall also undertake a detailed intersection operations and level of service analysis associated with the necessary improvements on all impacted signalized intersections and interchange ramps. DB Co shall demonstrate that the traffic operations and levels of service are acceptable and feasible using projected traffic volumes, expected transit operations for 2031 horizon year per the requirements of the City of Ottawa Transportation Impact Assessment guideline, including pedestrian and cyclist movements.
 - i. For all permanent Roadway improvements within MTO's jurisdiction, DB Co shall demonstrate that the traffic operations and LOS are acceptable and feasible considering three scenarios

forecasting traffic volumes and expected transit operations for 5, 10 and 20 year horizons beyond the Substantial Completion.

- C. DB Co shall submit to the City the results of above-noted investigations by submitting an existing conditions report, a preliminary design report including the proposed Design Criteria and design synopsis, and a separate traffic analyses report and seek approval from the City at least 20 calendar days prior to initiating the development of geometric design.
- (ii) DB Co shall undertake all necessary traffic and transit assessments, modelling and analysis including vehicular and non-vehicular road user needs, using projected traffic volumes as specified in Appendix A of this Part 2 for a horizon year of 2031 to determine the necessary Roadways and traffic improvements and provide the requisite design and construction of such works, as per the requirements of the City of Ottawa's TIA guidelines and other applicable standards.
- A. All traffic data used for analysis for traffic management purposes shall be based on the most current data and shall be no older than two years. The information to be collected shall include, but not be limited to, all of the hourly traffic volumes and AADTs for all modes of travel on all Roadways, bus Facilities, bike facilities and pedestrian facilities, which will be affected by the Project and as a part of the permanent Works. DB Co shall be responsible for obtaining or collecting all traffic data necessary for its traffic analysis if traffic data less than two years old is not relevant to the traffic analysis due to temporary conditions that existed at the time the data was collected. DB Co shall confirm with the City that the data is appropriate prior to conducting an analysis using said data.
 - B. DB Co shall undertake a traffic management study to determine the traffic impacts on other intersections and local road networks that are impacted as the result of the Project permanent Works and to determine appropriate mitigation measures, if road capacity and level of service is reduced. The traffic management study shall involve area wide traffic modeling to determine impacts to all modes of transportation, including adjacent corridors impacted by the permanent Works. The study shall include DB Co's forecast for, but not limited to, changed traffic volumes, speeds, and travel times for all modes of travel on all routes subject to the study. The traffic management study shall be submitted as a part of the DB Co's traffic report document in accordance with Schedule 10 – Review Procedure.
 - C. All vehicle, transit customer, pedestrian, and cycling data used for analysis for traffic management purposes shall be based on the most current data, and no older than two years with growth factors acceptable to the City. DB Co shall be responsible for obtaining any vehicle, pedestrian, and cycling data necessary for its traffic management analysis.

- (iii) Appendix B of this Part 2 demonstrates only the minimum lane requirements and lane configurations at certain intersections that DB Co is responsible for in their design and construction. Shall DB Co's traffic and transit assessment, modelling and analysis determine that additional traffic lanes and improvements are required in addition to the information shown in Appendix B of this Part 2, DB Co shall be responsible for the design and construction of all such improvements.
- (c) Basic ROW widths and protection requirements shall reference the City of Ottawa's Transportation Master Plan and Official Plan (Annex 1).
- (d) Design Criteria, Road Classifications and Design Speed Considerations
 - (i) Design Criteria parameters, based on the Roadway classifications, shall reference:
 - A. City of Ottawa Transportation Master Plan – Annex B Maps
 - B. City of Ottawa Official Plan – Schedule B and Annex 1
 - C. City of Ottawa Road Design Guidelines:
 - i. Region of Ottawa-Carleton, Regional Road Corridor Design Guidelines;
 - ii. City of Ottawa Road Corridor Planning & Design Guidelines - Urban and Village Collectors / Rural Arterials and Collectors; and,
 - D. Appendix B of this Part 2.
 - (ii) In general, the designation of design speeds shall be based on the speed limits currently posted for the respective Roadways, unless specified otherwise in this Article. DB Co shall design the modifications intended on the existing urban collectors or arterials that have design speed of 60 km/hr or lower as per the TAC GDGCR guidelines applicable to low-speed roads subject to retrofit conditions. The design of new or existing arterial roads and highways with design speeds greater than 60 km/hr shall meet the requirements of high-speed roads as per TAC GDGCR requirements accordingly.
 - (iii) In the absence of City of Ottawa adopted standards, Design Criteria parameters shall reference the TAC GDGCR.
- (e) DB Co shall obtain the approval of the City for all Works, including construction Works that involve the modification of existing City infrastructure, contained within the scope of Works.
- (f) DB Co shall determine the road cross-slope based on the road classification using the City standards and TAC requirements and to match the existing cross-slope of the undisturbed section.

- (g) Superelevations shall satisfy the pertinent requirements as per the road classification, and City of Ottawa's Design guidelines and standards and TAC GDGCR requirements.
- (h) DB Co shall design and construct all necessary requirements for landscape, road furniture and streetscape elements required in all Works as per the requirements of Schedule 15-2, Part 6 – Urban Design, Landscape Architecture and Connectivity Requirements.
- (i) DB Co shall design and construct the necessary utilities and associated underground and aboveground infrastructures for the Works per the requirements of Article 8 – Utility Infrastructure Design Criteria, of this Part 2.
- (j) DB Co shall design and construct all necessary temporary improvements, traffic staging detours, and all associated improvements necessary to support the construction of permanent Works as per the requirements of Schedule 15-2, Part 7 – Traffic and Transit Management and Construction Access.
- (k) DB Co shall design and construct all Roadway improvements to meet the applicable accessibility requirements, including but not limited to COADS or AODA.
- (l) DB Co shall refer to Article 4 – Structural Design Criteria and Requirements, of this Part 2, for any structural requirements associated with the Roadway improvements specified in this Article 6.
- (m) DB Co shall set the criteria for total and differential post-construction settlements of the Pavement to satisfy the requirements of Clauses 6.10 through 6.13 of this Part 2 including Embankment Settlement Criteria for Design, July 2010, MTO.

6.3 Horizontal Alignment

- (a) The geometric characteristics of the horizontal alignment shall meet the requirements of the TAC GDGCR, unless otherwise specified in this Article. In particular, the following requirements shall apply:
 - (i) Minimum radius and maximum superelevation rate requirements shall correspond to the existing road characteristics as per the road classifications in Clause 6.2 of this Part 2. For urban collectors, the maximum superelevation rate (e_{\max}) shall be limited to 2% and no superelevation is required on urban local roads. For new construction road improvements, the maximum superelevation rate (e_{\max}) shall be 0.04 m/m for low-speed urban arterial roads with design speed of 60 km/hr or lower. For new rural roads and new high speed urban arterial applications (i.e. urban roads with design speeds greater than 60 km/hr) the maximum superelevation rate shall be 0.06 m/m. DB Co shall follow the criteria specified in TAC GDGCR (Clause 2.1.2.2) for all other retrofit conditions.
 - (ii) For urban conditions, the minimum length of curve shall be between 30m to 60m.

- (iii) For high-speed urban roads (i.e. Urban roads with design speeds greater than 60 km/hr) and all rural roads, DB Co shall apply spiral curves to the design of the horizontal alignment.
- (iv) DB Co shall provide a shy line offset from edge of road lane to Station walls, portal walls, bridge railings, barriers, stop structures, retaining walls and any other obstruction located within the road clear zone for the safe operation of vehicular traffic in the road ROW. The shy line offset values shall be to TAC standards and treatment within the shy line distance and shall be to the guidelines specified in TAC Guide to Bridge Traffic and Combination Barriers and MTO Road Side Safety Manual.

6.4 Vertical Alignment

- (a) Vertical alignment shall meet the requirements of the TAC GDGCR, unless specified otherwise in this Article. The following main geometric parameters pertinent to the vertical alignment shall apply:
 - (i) Minimum gradient: Minimum grades shall satisfy the requirements of TAC GDGCR Section 2.1.3 under Minimum Grades: Design Domain Application Heuristics - Urban Areas.
 - (ii) Equivalent minimum “K” Values: The vertical curve geometry shall reference the requirements of the TAC GDGCR Section 2.1.3.3 – Item 2:
 - A. “K” value for crest curves shall satisfy the upper limits of the SSD requirements. In all cases, DB Co shall confirm appropriate SSDs by calculating the distance travelled during deceleration and perception and reaction time, considering the effect of grades on deceleration and verified against available sight lines according to TAC GDGCR;
 - B. “K” value for sag curves shall satisfy the upper limit of the requirements of headlight control and comfort control.

6.5 Sight Distance Requirements

- (a) DB Co shall satisfy the upper limit of the required sight distances beyond the minimum sight distance requirements at all intersections and in particular in situations where there are increased interactions between vehicular traffic and non-vehicular modes of traffic, such as areas within 150 m of Stations entrances.
 - (i) DB Co shall determine visibility sight triangles and SSD for road horizontal and vertical geometry. DB Co shall ensure that the sight distances provided in the design meet or exceed the minimum sight distance requirements of the TAC GDGCR based on calculations considering the corresponding Design Criteria parameters.

- (ii) DB Co shall design DSD in accordance with requirements of the TAC GDGCR.
- (b) DB Co shall determine all ISD design requirements, including approach, departure, and crossing ISDs, and visibility triangles using the appropriate design vehicle(s) at all intersections according to the criteria specified in the TAC GDGCR.

6.6 Access and Intersection Layout

- (a) DB Co shall design and construct Pavement markings, traffic signs, traffic control signals and underground traffic plants in accordance with the requirements of the applicable Reference Documents.
- (b) DB Co shall design all intersection layouts and lane configurations to address all system user's requirements, including pedestrian, cyclist, transit and vehicular traffic. DB Co shall give precedence to intersection design characteristics which preserve and enhance public Safety, minimize the area impacts, and respond to traffic demands.
- (c) DB Co shall design and construct street lighting in accordance with Clause 6.16 – Street Lighting of this Part 2.
- (d) DB Co shall design and construct all intersection layouts, lane widths, ramp throats, and Pavement widths using the appropriate design vehicle as defined in Clauses 6.8 and 6.9 of this Part 2, and Appendix A of this Part 2.
 - (i) DB Co shall design intersection geometry such that the turning radius of the selected design vehicles is applied from traffic lane to traffic lane.
 - (ii) DB Co shall design intersection layouts so that turning movements will not encroach on cycling lanes.
- (e) DB Co shall design specific intersection improvements to include typical characteristics and requirements of Protected Intersections, according to site-specific application of these elements, such as the following:
 - (i) Crossing setback;
 - (ii) Cyclist crossing;
 - (iii) Cyclist queuing area/ safety refuge;
 - (iv) Pedestrian crosswalk;
 - (v) Pedestrian queuing area/ safety refuge;
 - (vi) Pedestrian crossing of bike lane;
 - (vii) Advanced stop bar;

- (viii) Yield lines;
 - (ix) Corner safety island;
 - (x) Minimum curb radius (considering the appropriate design vehicle); and,
 - (xi) Lateral approach/ departure taper.
- (f) All pedestrian and cycling crossing facilities shall meet City requirements and reference OTM Book 15 and OTM Book 18.
- (g) DB Co shall not design raised intersections, except at locations where they are specifically prescribed in this Part 2, or Schedule 15-2, Part 6 – Urban Design, Landscape Architecture and Connectivity Requirements.

6.7 Cross-Section Elements

- (a) DB Co's design of typical cross-sections for Roadways shall be in accordance to the requirements of City of Ottawa Design standards and TAC GDGCR, unless specified otherwise in the Roadways corresponding Design Criteria (Refer to Clause 6.19 – Municipal Roads of this Part 2);
- (i) Auxiliary lane width, where applicable, shall satisfy the requirements of Special Purpose Lanes as specified under Clause 2.2.3 of TAC GDGCR; and,
 - (ii) DB shall provide a cross-slope of 2% toward the curbs or shoulders in order to provide improved surface drainage runoff on paved tangent Roadways, unless specifically noted otherwise in the specific municipal Roadway improvements in Clause 6.19 – Municipal Roads of this Part 2.

6.8 Design Vehicles

- (a) DB Co shall use the appropriate design vehicles to design the intersection layout geometry, and to accommodate the applicable sight distances and horizontal and vertical Roadway clearance requirements. For additional requirements pertinent to horizontal and vertical clearances under Overhead structures, refer to Article 4 – Structural Design Criteria and Requirements, of this Part 2. Selection of the largest design vehicle for each Roadway, bus facility, ramp, etc. shall follow the subsequent criteria:
- (i) Commercial Trucks, including WB-20 shall govern the design for all intersections, roads, and streets that are designated as a truck route in the City of Ottawa's Urban and Rural Truck Route Maps.
 - (ii) Commercial Heavy Single Unit Trucks, and the largest emergency vehicles, including fire and paramedic vehicles shall govern the design for all other intersections, roads, and streets that are listed as non-truck routes.

- (iii) All roads and streets that are a designated transit bus routes shall accommodate the turning movement requirements of the City's B-12 standard bus, articulated bus, double decker bus, and Para Transpo vehicles.
- (iv) Where applicable, Inter-City bus and school bus shall govern the design of roads, streets, and intersections.
- (v) Where applicable, maintenance vehicles including snow removal vehicles and garbage trucks shall govern the design of roads, streets, and intersections.
- (vi) Clearance requirements for opposing left-turn design: in design of intersections with multiple left-turn lanes, especially where simultaneous opposing left turns exist, DB Co shall ensure that design vehicle is appropriately selected. In the design of intersection layouts with double turn left lanes, the design shall accommodate the simultaneously turning manoeuvres of the largest design vehicle with a second Light Single Unit truck. Under extremely constrained conditions, as a minimum, a simultaneous double left-turn design shall accommodate the largest design vehicle turn with a passenger car.
- (vii) DB Co shall design and construct all improvements on intersection layouts, and Roadways geometry using turning simulation software (Transoft AutoTURN) with the appropriate design vehicle turning templates to allow for simple turning movements using the generate corner path method.
 - A. Minimum turning speed of a design vehicle shall not be assumed less than 15 km/hr. Only in extremely constrained conditions, where DB Co can demonstrate that no feasible design solution can be developed considering a 15 km/hr turning speed, a minimum 10 km/hr turning speed may be acceptable.
 - B. The design of OC Transpo bus turning paths shall satisfy the requirements of the OC Transpo - Transitway and Station Design Guidelines. Bus design turning speeds at intersection corners and curb returns shall not be less than 15 km/hr. Also refer to Clause 6.9 of this Part 2.
- (b) DB Co shall have regard to the Official Plan and Policy designations for the affected areas and Roadways, including the City of Ottawa Multi-Modal LOS targets which are affected by curb radii. Pedestrian and cycling LOS targets are especially high in the central area, near schools and rapid transit stations and every effort shall be made to achieve these targets within the context of the City of Ottawa Complete Streets Implementation Framework.

6.9 Facilities Operated by OC Transpo

- (a) DB Co shall design and construct all OC Transpo Roadways and Facilities to meet the interim and ultimate operational requirements of the City during all construction stages

and following Revenue Service. DB Co shall obtain the City's approval prior to advancing the design of all Roadways and Facilities operated by OC Transpo.

- (b) DB Co's design and construction of all temporary or permanent bus stop Facilities, station amenities, infrastructure and shelters shall meet the requirements of Schedule 15-2, Part 7, Appendix E and Schedule 15-2, Part 4, Appendix E and shall comply with City of Ottawa accessibility design standards and features, including but not limited to COADS requirements.
- (c) Unless specified otherwise, DB Co shall accommodate the following requirements:
 - (i) The primary reference for the design, construction and operational requirements of all roads, accesses, bus Platforms, PPUDO and Park and Ride facilities operated by OC Transpo is OC Transpo's Transitway and Station Design Guidelines.
 - (ii) The primary reference for the design of all Roadways and bus transit facilities operated by OC Transpo including but not limited to the design speeds, geometric Design Criteria, horizontal and vertical alignments, auxiliary lanes, intersection geometry, cross-section components, drainage requirements, ramp design, pedestrian and cyclists connectivity, safety and security, accessibility, bus station Platform layouts and turnaround circulation geometry and other Roadways, facilities, and structural details shall meet the requirements of OC Transpo's Transitway and Station Design Guidelines. For specific Station site design layout requirements with respect to pedestrian and cyclists' connectivity refer to Schedule 15-2, Part 4 – Stations, and Schedule 15-2, Part 6 - Urban Design, Landscape Architecture and Connectivity Requirements.
 - (iii) For the design and construction of Park and Ride Facilities, in the event of a conflict between the criteria contained in this Article and any other City or OC Transpo's reference document(s), the following shall apply in descending order of precedence:
 - A. All criteria and requirements specified in this Article and in other pertinent parts and clauses of this Part 2;
 - B. City of Ottawa, OC Transpo - Transitway and Station Design Guidelines (June 2013);
 - C. COADS;
 - D. City of Ottawa, Municipal Traffic and Parking (By-law No. 2003-530) - City of Ottawa Regulating Traffic and Parking on Highways;
 - E. City of Ottawa, Municipal Zoning (By-law No. 2008-250) Consolidation;
 - F. City of Ottawa, Transit-Oriented Development Guidelines.

- (iv) Sidewalks associated with bus stops and Station Platform areas shall accommodate positive drainage and have a minimum grade of 0.5% towards the curb.
- (v) Bus shelters, bus stop pad, shelters with sidewalk and boulevard shall satisfy the requirements of both the City's Standard Tender Documents and the OC Transpo's Transitway and Station Design Guidelines, unless specifically noted otherwise in Schedule 15-2, Part 4 – Stations, and/or in Schedule 15-2, Part 6 - Urban Design, Landscape Architecture and Connectivity Requirements. In particular, for additional landscape site design provisions such as bus shelters, lighting, and shade tree requirements refer to Schedule 15-2 Part 4 – Stations, and Schedule 15-2 Part 6 - Urban Design, Landscape Architecture and Connectivity Requirements.
- (vi) Design of bus loops, bus driveway accesses, bus stops, bus Platforms, and bus lay-bys in bus Station Facilities shall meet the following requirements:
 - A. DB Co shall design and construct the bus Facilities, Station amenities and infrastructure that will be used for the operation of buses as per the standard established in this Part 2. DB Co shall submit the design of all bus Station Facilities for review in accordance with Schedule 10 - Review Procedure. The bus Station Facility submission shall include sufficient detail to allow the City to understand the full operation of the bus Facility, including interface with any other activities on the site, all station amenities and infrastructure.
 - B. DB Co shall run AutoTURN analysis to confirm the suitability of the design. DB Co shall obtain the dimensions and characteristics of a typical OC Transpo bus vehicle prior to performing the AutoTURN analysis for the appropriate bus design vehicles. DB Co shall submit the turning movement results for review and approval in accordance with Schedule 10 – Review Procedure and shall consider the following requirements:
 - i. Buses shall line up parallel to the bus Platforms with a distance of no more than 150mm (preferred)/ 300mm (absolute maximum) from Platform curbs.
 - ii. All bus turning manoeuvres in the swept path analysis shall ensure a smooth, continuous movement, without instantaneous steering movements. The swept path analysis shall not include 0m radius turns, with the exception of the first turn away from a parking spot under constrained conditions.
 - iii. DB Co shall perform field tests for compliance and functionality of bus movement clearance through the means of a bus test on mock-up facilities (demarcating curbs and other features using traffic

- cones and or paint lines) with dimensions identical to the proposed bus Facilities.
- iv. DB Co shall design bus loops and driveways for one way circulation at bus terminals. Exceptions to the above requirement may be acceptable where a two-way circulation offers better transit operations, for which DB Co shall consult with and seek approval from the City prior to proceeding with such alternative design.
 - v. All bus loops and driveway accesses shall allow buses to safely pass stalled or parked buses.
 - vi. DB Co shall ensure a bus can maneuver parallel to the Platform curbs and depart independently of parked busses with the assistance of vehicle turning movement simulation software or the appropriate turning movement templates. DB Co shall submit the turning analysis to the City for review and approval in accordance with Schedule 10 – Review Procedure.
 - vii. DB Co shall provide a clearance of 0.5m between bus movements and all obstructions, including the worst case stopping positions of buses in bus bays and lay-by areas.
 - viii. DB Co shall simulate the appropriate bus turning movements considering the minimum outside turning radius (wall to wall radius) to allow for simple turning movements using the “Generate Corner Path” function (Transoft AutoTURN) at the appropriate turning speeds referenced in Clause 6.8 of this Part 2 for operating efficiency.
- C. DB Co shall design and construct bus Platforms, Station amenities, and associated infrastructure located on the Platforms so that these elements are unobstructed and appropriately sized to accommodate the volume of Passengers boarding and exiting the buses. DB Co’s design shall provide for additional area to accommodate peak load volumes, not less than the minimum stated as per the OC Transpo’s Transitway and Station Design Guidelines.
- D. DB Co shall design and orient bus stops to allow Passengers to load and unload from the right side of a bus, providing Passengers with direct access to pedestrian pathways and / or into the bus terminals or Station entrance, without having to cross the front or rear of a bus. DB Co shall not provide pedestrian crossings within bus Facilities without written consent and approval from the City. The design shall preclude such behaviour in addition to placing appropriate and accessible TCDs. Under exceptional circumstances, where the above requirements cannot be met due to constrained conditions and a crossing facility is required, DB Co

shall confirm the appropriate traffic control requirements and demonstrate that the pedestrian crossing facility is safe and meets bus operational requirements. DB Co shall present a risk analysis developed by a certified traffic Safety auditor prior to design and implementation and seek approval from the City.

- E. DB Co shall locate bus stops, designated as drop-off Platforms, as close as possible to the driveway entrances and Station entries.
- F. DB Co shall consult with and seek approval from the City and OC Transpo with respect to the dimensions, layout, and location of all bus stops and bus lay-by areas and the preferred bus stop grouping and arrangements at Platform locations (i.e. single, double, or triple stops).
- G. Bus Platforms shall not be located on curved laneways.
- H. DB Co shall design and construct all permanent and temporary bus stops during staged construction to include safe and secure pedestrian access from / to bus stops and all bus stop shelters as per the requirements specified in COADS and Schedule 15-2, Part 7 - Traffic and Transit Management and Construction Access. DB Co shall reference Schedule 15-2, Part 4, Appendix E and Schedule 15-2, Part 7, Appendix E for the requirements of both permanent and temporary bus terminal requirements, respectively.

6.10 Pavement - Municipal Roads

(a) Order of Precedence

- (i) DB Co shall provide the Pavements in compliance with the criteria contained in this Article, the Applicable Law, standards, guidelines or practices applicable to the Project and including but not limited to each of the following Reference Documents.
- (ii) In the event of a conflict between the criteria contained in this Article and any Reference Document(s), the following shall apply in descending order of precedence for design and construction of Pavements:
 - A. The criteria contained within this Article;
 - B. OPSS;
 - C. OPSD;
 - D. The City's Current Version of Design Guidelines, Standard Tender Documents and Specifications

- E. Ontario Provincial Standards for MTO Designated Source of Materials (DSM);
 - F. Procedures for Estimating Traffic Loads for Pavement Design, 1995, MTO;
 - G. MTO Materials Information Report MI-183 “Adaptation and Verification of AASHTO Pavement Design Parameters for Ontario Conditions”;
 - H. MTO Ontario’s Default Parameters for AASHTOWare Pavement ME Design Interim Report, 2014;
 - I. AASHTO Guide for the Design of Pavement Structures;
 - J. Canadian Portland Cement Association – Thickness Design for Streets and Highways;
 - K. MTO Directive PHM-C-001 The Use of Surface Course Types on Provincial Highways;
 - L. MTO Pavement Design and Rehabilitation Manual (Second Edition);
 - M. The criteria contained within Schedule 15-2, Part 2, Article 7 – Geotechnical Design Criteria and Requirements;
 - N. Embankment Settlement Criteria for Design, July 2010, MTO;
 - O. ASTM Standards; and,
 - P. MTO Laboratory Standards.
- (iii) For the design of rigid concrete Pavements, DB Co shall use both MTO’s Routine Method as described in the Pavement Design and Rehabilitation Manual and the Canadian Portland Cement Association’s Simplified Design Procedure in addition to the foregoing AASHTO guide for Design of Pavement Structures.
- (b) General Requirements
- (i) In general, the design of Pavement structure(s) shall be the responsibility of DB Co’s and be based on the City’s current Pavement design practices.
 - A. DB Co shall follow the requirements of the OC Transpo’s Transitway and Station Design Guidelines for Pavement design of paved areas subject to bus traffic, Park and Ride lots, and facilities operated by OC Transpo vehicles.

- B. Pavement structure shall be of a flexible (asphalt) Pavement design outside bus Station Platform areas, where paved areas are subject to bus traffic, unless otherwise approved by the City.
 - C. DB Co shall incorporate a rigid (concrete) Pavement structure within, at a minimum, the limits of the concrete Platforms. OC Transpo's Transitway and Station Design Guidelines shall be utilized for the approximate limits for concrete Pavement for a typical side loading Station. DB Co shall review the concrete Pavement limits for Stations with center loading Platforms, based on the Station layout, bus access and operational requirements, recommend an appropriate Pavement design and seek approval from the City prior to advancing the design. DB Co shall provide an extension of concrete Pavement 30m exceeding the Platform. A proper transition treatment shall be provided from one Pavement type to another.
- (ii) DB Co shall be responsible for design of all new Pavements and all existing paved areas that are subject to upgrade or reinstatement as a part or result of the Work both during temporary staged construction and in post construction. DB Co shall reinstate the Pavement to match the standards of either the existing adjacent Pavement structure or the current City and OC Transpo's standards and requirements specified in this Article, whichever is more stringent. In all cases, the Pavement reconstruction shall be in accordance with the following requirements:
- A. Where the existing Pavement structure adjacent to a localized widening is greater than current City standards and requirements specified in this Article, the new Pavement structure shall match the existing Pavement structure; and,
 - B. Where the existing Pavement structure adjacent to a localized widening is the same or less than the current City Standards, the new Pavement structure shall match the current City standards and requirements specified in this Article.
- (iii) DB Co shall design and build all Pavement structures in compliance with City standards in areas where Pavement structures will be built as NMI, in City ROW. DB Co shall be responsible to obtain the acceptance from the City of all works within the City ROW prior to construction. In areas where the Pavement structures will be built as NMI on Federal lands, DB Co shall complete Pavement designs following City standards for review and approval from applicable Governmental Authorities in accordance with the procedures established by the respective Governmental Authority. DB Co shall comply with the Governmental Authority permits requirements and conditions.
- (iv) DB Co shall ensure that any roads or sections of roads with unfinished Pavement including, but not limited to, milled Pavement or Pavement without a surface course opened to traffic, including but not limited to public or construction traffic,

are designed to carry the expected traffic and to prevent water penetration. DB Co shall maintain and ensure all unfinished pavement opened to traffic are in compliance with the City standards prior to final paving. For milled pavement surfaces, DB Co shall follow the requirement of Schedule 15-2, Part 7 – Traffic and Transit Management and Construction Access.

- (v) DB Co shall ensure that design and construction of flexible and rigid Pavement structures for all paved Roadways and paved bus Facilities such as lanes, ramps, lay-bys, and Park and Ride Facilities, and paved storage areas, as per the following:
 - A. For the bus terminals and loops, DB Co shall design and construct the Pavement of the bus Facilities for uninterrupted operation of the OC Transpo's buses in light of the expected bus volumes. DB Co shall submit a Pavement Design Report in accordance with Schedule 10 – Review Procedure for all paved facilities stating their consideration of the bus volumes and assumptions of private vehicles. DB Co's report shall also include a site-specific recommendation for the periodical maintenance and rehabilitation of the paved facility considering the facilities Design Life.
 - B. DB Co shall consider factors such as traffic volumes, subgrade conditions, environmental effects, construction traffic, availability and suitability of construction materials and performance of similarly loaded Pavements in the area, and economics when determining a suitable Pavement Design.
 - C. DB Co shall provide site-specific Pavement design reports for the Project in accordance with Schedule 10 – Review Procedure.
 - D. DB Co shall consider the influence of heavy equipment and delivery vehicles during construction during the design process, particularly with respect to the thickness of sub-base material and the native subgrade conditions.
 - E. DB Co's Pavement design report shall provide localized Pavement designs that shall mitigate potential Pavement sliding or rutting in areas along bus Platforms, within access ramps, bus stops, and bus lay-by locations, which are subject to repeated bus turning movements.
- (vi) Byron Avenue Pavement improvement requirements:
 - A. DB Co shall design and construct an appropriate Pavement improvement treatment for the full width of the existing Byron Avenue in the sections between west of Richardson Avenue and east of Redwood Avenue, so that the Pavement shall meet the requirements of Schedule 15-2, Part 2, Clause 6.10 and associated requirements outlined in Schedule 15-2, Part 1, Table 1-4.1. DB Co shall design and construct all improvements required to reinstate the existing Pavement sections that are impacted due to above

ground and underground Works on Byron Avenue. DB Co shall design and rehabilitate an appropriate thickness of milling and resurfacing treatment to improve the Byron Avenue's existing Pavement structure. For the purpose of Pavement design and analysis of Byron Avenue:

- i. DB Co shall consider the section of Byron Avenue west of Woodroffe Avenue as a 2-lane local road and use 1% annual traffic growth rate to calculate the projected traffic volumes for the intended traffic horizon assuming the 2017 AADT is 500.
- ii. DB Co shall consider the section of Byron Avenue east of Woodroffe Avenue as a 2-lane collector road and use 1% annual traffic growth rate to calculate the projected traffic volumes for the intended traffic horizon assuming the 2016 AADT is 3,170.

(c) Design and Performance Requirements

- (i) DB Co shall ensure that the Roadway Pavement structure conform to the latest standards of the applicable Governmental Authorities.
- (ii) DB Co shall ensure that designed Pavement structure have a Pavement life cycle as specified in Schedule 15-2, Part 1, Article 4 – Design and Construction. In the absence of City standards, DB Co shall comply with the following specific OPSS requirements related to the Pavement works, where applicable:
 - A. OPSS 510 for Removals;
 - B. OPSS 206, and 514 for Excavation;
 - C. OPSS 212 for Filling;
 - D. OPSS 501, 1010 for Granular Material. Thickness shall be suitable for the Roadway's intended use;
 - E. OPSS 310, 311, 312 for Hot Mix Asphalt paving. Thicknesses shall be suitable for the Roadway's intended use;
 - F. OPSS 350 for concrete Pavement and Concrete base. Thickness shall be suitable for its intended use;
 - G. OPSS 353 and 312 for Concrete/Asphalt, curb and gutter, and medians, where applicable;
 - H. OPSS 405 for Pipe Subdrains; and,
 - I. OPSS 355 for Interlocking concrete pavers suitable for its intended use.

- (iii) DB Co shall ensure that all the Pavement surfaces in areas drivable by vehicles shall have paved surfaces and comply with all expected performance characteristics for safe use by the public.
 - (iv) DB Co shall design and construct appropriate drainage systems that meet the City's standard when Pavement type is transitioned from interlocking pavers to flexible Pavement.
 - (v) DB Co shall ensure that the grading conform to the requirements of OPSS 206 (Construction Specification for Grading) for work within municipal jurisdictions. The Compaction shall conform to the requirements of OPSS 501 (Construction Specification for Compacting) for work within municipal jurisdictions. Granular Base and Sub-base shall be according to OPSS 314.
- (d) Smoothness and Other Ride Quality
- (i) Following Substantial Completion, the completed Pavements shall meet the smoothness criteria provided in SP 103F31 for hot mix asphalt Pavements.

6.11 Pavement – OR174

- (a) DB Co shall ensure that the design and construction of Pavements be in accordance with the criteria contained in this Article and the following Reference Documents, and if there is any conflict between the criteria contained in this Article and any Reference Document(s), the following shall apply in descending order of precedence for design and construction of Pavements:
 - (i) The criteria contained in this Article;
 - (ii) MTO Special Provisions as identified in this Article;
 - (iii) OPSS;
 - (iv) OPSD;
 - (v) DSM;
 - (vi) Procedures for Estimating Traffic Loads for Pavement Design, 1995, MTO;
 - (vii) MTO Materials Information Report MI-183 "Adaptation and Verification of AASHTO Pavement Design Parameters for Ontario Conditions";
 - (viii) MTO Ontario's Default Parameters for AASHTOware Pavement ME Design Interim Report, 2014;
 - (ix) 1993 AASHTO Guide for the Design of Pavement Structures;

- (x) Canadian Portland Cement Association – Thickness Design for Streets and Highways;
 - (xi) Pavement Design and Rehabilitation Manual – Second Edition (MTO);
 - (xii) Embankment Settlement Criteria for Design, July 2010, MTO;
 - (xiii) MTO Directive PHM-C-001 The Use of Surface Course Types on Provincial Highways;
 - (xiv) Manual for Condition Assessment of Flexible Pavements – Pavement Performance Monitoring using Automated Pavement Distress Data (Nov 2015) (MTO);
 - (xv) The Formulations to Calculate Pavement Condition Indices, September 2009, MTO;
 - (xvi) American Society for Testing and Materials (ASTM) Standards;
 - (xvii) MTO Laboratory Standards; and,
 - (xviii) AASHTO Materials Specifications and Standards.
 - (xix) For the design of rigid concrete or composite Pavements, both MTO's Routine Method as described in the Pavement Design and Rehabilitation Manual and the Canadian Portland Cement Association's Simplified Design Procedure shall be used in addition to the foregoing AASHTO guide for Design of Pavement Structures.
- (b) General Requirements
- (i) DB Co shall ensure that all products used on the Pavement construction meet applicable Project Agreement requirements and, where specified in Schedule 15-2 – Design and Construction Requirements, be in accordance with the MTO Designated Sources of Materials List. The use of products that are not on the MTO Designated Sources of Materials List shall require the prior written approval of the City, in its sole discretion, and acceptance shall be subject to DB Co demonstrating in its submission sufficient experience with the proposed product and acceptable performance for the proposed product under conditions and applications similar to those existing for this Project.
 - (ii) DB Co shall be responsible for the investigation and subsequent design and construction of all Pavements.
 - (iii) The soil boreholes advanced by DB Co shall be in accordance with the requirements of the *Ontario Water Resources Act* (Ontario).

- (iv) DB Co shall be responsible for the design of all proposed slopes in cut and fill areas, including slope geometry, drainage treatments and erosion control measures for embankments and ditches.
- (v) DB Co shall be responsible for effective subsurface drainage and frost protection, including the provision of subdrains or any other drainage treatments.
- (vi) DB Co shall ensure that design of new Pavement structures be in accordance with the “1993 AASHTO Guide for the design of Pavement Structures” and AASHTOWare Pavement ME Design software. The AASHTO 93 method will provide structural Pavement thickness design based on traffic volumes. DB Co shall use the ME Design method to assess the suitability of the chosen AASHTO Design for meeting Pavement performance parameters described elsewhere in this Part 2. DB Co shall select AASHTO Pavement Design parameters as described in the MTO Materials Information Report MI-183 “Adaptation and Verification of AASHTO Pavement Design Parameters for Ontario Conditions”. DB Co shall implement calibrated models for the AASHTOWARE Pavement ME design software or default parameters for any non-calibrated models as described in MTO Ontario’s Default Parameters for AASHTOWare Pavement ME Design Interim Report, 2014. DB Co shall submit the use of alternate design methods and parameters in accordance with Schedule 10 - Review Procedure.
- (vii) Within a segment of OR174, a composite Pavement structure is found. DB Co shall remove the entire width and length of the existing concrete Pavements under all OR174 lanes in the EB and WB lanes, including auxiliary lanes along the following sections and where they are impacted as the result of the Works. DB Co shall not leave any intermediate section of the existing concrete slabs in place, where adjacent sections of concrete slab are removed as the result of the Works.
 - A. In the EB direction, the entire section from 450 m east of Blair Road, through the Montreal Interchange, to the most easterly limits of the existing concrete slabs where it ends in the EB direction.
 - B. In the WB direction, the entire section from a location west of the Montreal Road interchange, where the existing concrete Pavement would become in conflict with the proposed median barrier and / or with any and all Works associated with the Montreal Road Interchange reconstruction all the way to its east end limit, so that:
 - i. Upon the completion of Works, no sections of the existing concrete Pavement shall remain within 1m of the face of the proposed median barrier in any sections.
 - ii. DB Co shall demonstrate that the removal of the remaining sections of composite Pavement within the limits of Works, can be accomplished in the future without any impacts to the concrete median barrier constructed by DB Co.

- (viii) DB Co shall incorporate these changes in the design reports with detailed information about lateral and longitudinal limits, transition treatments, drainage considerations as a minimum and seek approval from the City prior to advancing the design.
 - (ix) If any roads will be opened to traffic prior to completing the surface course paving, DB Co shall ensure that the Pavement design of the unfinished Pavement including, but not limited to, milled Pavement or Pavement without a surface course is designed to carry public and construction traffic and to prevent water penetration until the surface course is placed. For milled pavement surfaces, DB Co shall follow the requirement of Schedule 15-2, Part 7 – Traffic and Transit Management and Construction Access.
 - (x) DB Co shall ensure that the Pavement surface course is in accordance with MTO's Directive PHM-C-001. This shall be applicable to all flexible Pavements
- (c) Pavement Structures
- (i) DB Co shall not discharge materials containing contaminants and that could have an adverse effect on the natural environment (including air, land or water, and human plant or animal life) into the environment. DB Co shall ensure that granular materials conform to the requirements of Ontario Provincial Standards Specifications OPSS.PROV 1010 and Special Provision SP110S13.
 - (ii) DB Co shall ensure that all Flexible Pavements on the highway through lanes and interchanges incorporate a minimum compacted thickness of 100 mm OGD L layer immediately under the hot mix. This requirement shall be applicable to the widening portion of OR174 where the existing Pavement includes an OGD L layer.
 - (iii) DB Co shall ensure that Asphaltic concrete conform to the requirements of OPSS.PROV 1151 – Material Specification for Superpave and Stone Mastic Asphalt Mixtures.
 - (iv) DB Co shall ensure that Grading and compaction conform to the requirements of OPSS.PROV 206 – Construction Specification for Grading, and OPSS 501 – Construction Specification for Compacting. Granular base and subbase shall be according to OPSS 314.
 - (v) DB Co shall design and construct drainage of the Pavement structure in accordance with the OPSD 300 series.
 - (vi) DB Co shall use subdrains whenever an OGD L is used. DB Co shall ensure that subdrains are provided in accordance with OPSS 405
- (d) Smoothness and Other Ride Quality

- (i) Following Substantial Completion, DB Co shall ensure that the completed Pavements meet the smoothness criteria provided in SP 103F31 for hot mix asphalt Pavements.
- (e) Traffic Volume for Pavement Design
 - (i) DB Co shall design all Pavements based on traffic data provided by the City. DB Co shall be responsible for developing forecasted traffic volumes for Pavement design. DB Co shall submit all forecasted data and supporting methodology to the City for Review in accordance with Schedule 10 - Review Procedure.

6.12 Grading

- (a) DB Co shall design and construct all earthworks and grading requirements so that all such work conforms to the relevant City Standards and Specifications, or in absence of such standards to the following:
 - (i) OPSS 206 - Earth and Rock Excavation;
 - (ii) OPSS 212 – Borrow;
 - (iii) OPSS 501 - Compacting;
 - (iv) OPSS 511 - Rip-Rap, Rock Protection and Gravel Sheeting;
 - (v) OPSS 570 – Topsoil;
 - (vi) OPSS 572 - Seeding and Mulching;
 - (vii) OPSS 803 – Sodding.
- (b) DB Co shall meet the requirements of Schedule 15-2, Part 1, Article 5 – Implementation Constraints, in the design and construction of all earthworks and rock excavations.
- (c) Grading includes excavation of native material and fill of approved materials as required for construction in accordance with the recommendations resulting from Pavement design reports.
- (d) DB Co shall manage all excess and imported material per the requirements described in Schedule 17, Part 4 – Contaminated and Excavated Material Management.
- (e) DB Co shall maintain positive drainage during construction on all areas subject to grading at all times. DB Co shall treat any cut or fill slopes, left unattended for 30 calendar days or more, with temporary hydraulic mulch, erosion control blankets or vegetative cover.
- (f) DB Co shall minimize and control the amount of dust generated by construction operations at all times within and outside the construction zone. DB Co shall remove any

mud, debris and dust deposited outside of the construction zone, on Roadways and in boulevards, resulting from the Works.

- (g) DB Co shall provide the design, approvals, and supply of materials, labour, equipment, inspection and testing associated with application of dust suppressants in accordance with the City of Ottawa Standards and Specifications and OPSS 506.
- (h) Rip Rap Protection and Gravel Sheeting
 - (i) DB Co shall provide the design, approvals, and supply of materials, labour, equipment, inspection and testing associated with rip-rap and rock protection in accordance with the City of Ottawa Standards and Specifications and OPSS 511.
- (i) Dewatering
 - (i) DB Co shall provide the design, approvals (permits to take water, where required), supply of materials, labour, equipment, inspection and testing associated with all the dewatering Works.
- (j) Temporary Measures
 - (i) DB Co shall adjust all roadway infrastructure, including but not limited to catch basins, maintenance holes, valve chambers, and any other structures in the Roadway, flush with the base asphalt lift in order to provide snowplow protection in areas where the final lift of asphalt is not paved in advance of winter shutdown. DB Co shall design and construct temporary asphalt curbs to contain Roadway drainage at the proposed curb line of catch basins and maintenance holes. DB Co shall remove and make final adjustments immediately before the placement of surface course asphalt.
 - (ii) DB Co shall restore all trenches to match the existing original conditions or the new construction cross-section within 24 hours of the completion of the trench. In situations where the trench is Constructed in consecutive stages with a delay in between, DB Co shall restore the trench in stages within 24 hours after the completion of each stage.
 - (iii) DB Co shall provide temporary conditions design drawings to specify all temporary measures and are responsible for all costs associated with the above noted work.

6.13 Drainage

- (a) DB Co shall provide the drainage in accordance with the criteria contained in this Article and in Article 5 – Drainage and Stormwater Management Design Criteria of this Part 2, and the applicable Reference Documents.

6.14 Traffic and Transit Signals

(a) General

- (i) DB Co shall liaise and coordinate with the City and the City's designated traffic control signal contact person, with regards to all modifications that may be required at municipal traffic signals during the design and construction period. DB Co shall support all proposed modifications with traffic engineering analysis to meet the City's traffic signal requirements and standards.
- (ii) DB Co shall define the coordination scheme, and coordinate all work with the City for municipal traffic signals that are included in the traffic signal coordination scheme.
- (iii) DB Co shall reference the information provided in Schedule 15-2, Part 7, Clause 1.11, and coordinate with the City of Ottawa to identify and confirm the location of all existing and new traffic cameras, ITS devices, and all associated infrastructure 60 calendar days in advance of the design stage. DB Co shall require the approval of the City of Ottawa's traffic service group for all relocations, design and construction requirements, and types and specifications of such facilities that are impacted or required as the result of Works.

(b) Design and Performance Requirements

- (i) DB Co shall coordinate the design, approvals and construction requirements for temporary and permanent traffic signals with the City.
- (ii) For temporary and permanent traffic signals that are within MTO's jurisdiction, DB Co shall prepare PHM-125 drawings, and shall coordinate review and approval by MTO prior to commencing construction.
- (iii) For permanent new traffic and transit signal facilities, or new permanent configurations at existing signalized intersections, with the exception of PXOs, the City shall supply and install all above ground traffic signal equipment as required by the governing road authority including but not limited to controller, poles, pedestrian and traffic signal heads with push buttons, audible displays, etc. The City shall supply, install and make all required terminations for the traffic signal wiring. The City shall provide all equipment and labour associated with the installation of permanent above-ground traffic signal infrastructure. DB Co shall coordinate with the City the design of electrical power feeds for all alterations to existing traffic signals, and new traffic signals; the cost of obtaining new electrical power feeds shall be a City responsibility.
 - A. For all permanent signalized intersections, the City shall design the vehicle detection system and specify the type of detection equipment to be used. DB Co shall only be responsible for the cost and coordination of the

- installation of inductive loop detectors; any other detection equipment specified by the City's design shall be supplied and installed by the City
- B. DB Co shall construct all permanent underground traffic infrastructure, including the supply and construction of concrete encased ducts, direct buried ducts, pole foundations, maintenance holes, maintenance hole frames & covers, vehicle loop detection and concrete pads.
 - C. Where the location selected for a traffic signal pole is not suitable for a standard pole foundation, as per City of Ottawa Standard Detail Drawings (e.g., where the pole is designed to go on top of pre-existing utilities), DB Co shall be responsible for the design of the non-standard foundation, in addition to the construction requirement in B above.
- (iv) For all temporary traffic and transit signals, or temporary modifications to existing signalized intersections, the City shall supply and install all above ground traffic signal equipment as required by the governing road authority including but not limited to controller, poles (with the exception of wood poles), pedestrian and traffic signal heads with push buttons, audible signals, etc. The City shall also supply and install and make all required terminations for the traffic signal wiring. The City shall provide all equipment and labour associated with the installation of temporary above-ground traffic signal infrastructure. DB Co shall coordinate with the City the design of electrical power feeds for all temporary traffic signals or temporary modifications to existing signalized intersections; the cost of obtaining new electrical power feeds shall be a City responsibility.
- A. For all temporary signalized intersections, the City shall design the vehicle detection system and specify the type of detection equipment to be used. DB Co shall only be responsible for the cost and coordination of the installation of inductive loop detectors; any other detection equipment specified by the City's design shall be supplied and installed by the City.
 - B. Where temporary signal infrastructure requires the use of wood poles and/or span wire, the City shall be responsible for the design of signal head placement only. DB Co shall design the location of the wood poles, guy wires, and span wires based on the City's signal head placement.
 - C. DB Co shall construct all temporary underground traffic infrastructure, including the supply and construction of concrete encase ducts, direct buried ducts, pole foundations, maintenance holes, maintenance hole frames & covers, vehicle loop detection and concrete pads. DB Co shall construct all above ground infrastructure Work, including but not limited to installation, removals and reinstatement of wood poles, all aerial strand support and suspension cables, guys, anchors, ground rods and plates, along with any required underground Civil Work including conduit, foundations, maintenance holes/hand holes, frames & covers etc., as required to accommodate the staged construction of Work, with the

exception of traffic signal equipment as described above, which shall remain the responsibility of the City.

- (v) For all PXOs, DB Co shall supply and install all above ground equipment, including but not limited to poles, hardware, arms, RRFBs, etc. DB Co shall provide the labour associated with the installation of the PXOs.

A. The design and installation of PXOs shall be in accordance with OTM Book 15, City of Ottawa Pedestrian Crossover Program and Examples Documents 1 and 2, and Appendix K – Pedestrian Crossover Infrastructure Requirements of this Part 2.

- (vi) For all temporary and permanent traffic signals, DB Co shall provide interconnection ensuring that all signals can communicate with the City's Traffic Operations Center. Interconnection duct shall be designed by the City and installed by DB Co. The City will consider City-owned system-connectivity infrastructure prior to private-owned infrastructure to establish this connectivity.

(c) Notification Requirements and Timelines

Table 6-1: Permanent/temporary new traffic signals or permanent/temporary modification to existing traffic signals

| Item | Description | Notification (Calendar Days) | Prior to | Information to be supplied to City | Information to be supplied to DB Co |
|------|--|------------------------------------|---|--|---|
| 1 | Design | 30 | Desired receipt of signal design | 1:250 CADD for the intersection, including pavement markings on all approaches | City provides traffic signal design, including traffic signal displays, traffic signal plant design, detection system design, etc., within 30 calendar days |
| 2 | Commencement of civil works (prerequisite – signal design | 30 | construction of civil works | Date when works are to begin, schedule of work | None |

| | | | | | |
|---|--|----|------------------------------------|---|--|
| | completed) | | | | |
| 3 | Electrical work involving the City (prerequisite – signal design completed) | 30 | construction of civil works | Meeting date regarding electrical works, schedule of work | Contact names and telephone numbers of relevant staff |
| 4 | Scheduling of installation date by City forces (prerequisite – signal design completed) | 30 | Desired signal installation date | Desired installation date by City forces | Scheduled date for installation to be provided to DB Co within eight calendar days of the notification. Scheduled date shall be within 10 calendar days of DB Co's request |
| 5 | City Inspection of civil work completed by DB Co (pre-requisite – signal installation date scheduled) | 14 | Scheduled signal installation date | Confirmation of work being completed | Confirmation that the work was completed to City satisfaction, within 7 calendar days of DB Co's notification that work was completed |

- (i) DB Co shall provide 30 calendar days' notice to the City where modification of an approach to a signalized intersection beyond OTM Book 7 applications is being proposed. DB Co shall submit 1:250 scale CADD drawings for all such modifications, as required.

- (ii) DB Co shall prepare and submit TCPs, which show the signal design for the installation of, or modification of a traffic control signal, in accordance with Schedule 10 – Review Procedure. DB Co shall submit these particular TCP at least 45 calendar days before the start of any construction Work related to the installation or modification. Note however, that in the case of multiple simultaneous traffic control signal installations or modifications, the City may require more than 45 calendar days for submission review. DB Co shall meet with the City at least 60 calendar days in advance of these types of scheduled Works in order to discuss the submission schedule, and DB Co shall adjust the submission lead time to a timeframe acceptable to the City.
- (iii) DB Co shall address the City’s comments and changes on signs and Pavement marking plans developed as a part of DB Co’s TCPs and incorporate the revised plans as applicable. DB Co shall submit the revised drawings to the City at least 30 calendar days prior to the scheduled placement of said signs and Pavement markings, all in accordance with Clause 6.15 of this Part 2 and Schedule 10 – Review Procedure.
- (iv) Per Item 2 from Table 6-1, DB Co shall provide a minimum of 30 calendar days advanced notice to the City prior to commencing the following works:
 - A. Permanent Traffic Signals: Underground construction of the permanent traffic signals including concrete encased ducts, direct buried ducts, pole foundations, maintenance holes, vehicle loop detection and concrete pads;
 - B. Temporary Traffic Signals: Installation of the temporary traffic signal controller cabinet onto the wood pole; wood poles, double span and anchors along with any required Civil Works including conduit, foundations, maintenance holes/hand holes, etc.
- (v) Per item 3 from Table 6-1, a minimum of 30 calendar days prior to construction, DB Co shall arrange a meeting with the City to coordinate the requirements of the electrical work involving the City. DB Co shall provide a schedule of the work to the City.
- (vi) In accordance with the scheduled installation date established per Item 4 from Table 6-1, City forces shall perform all traffic signal activations and deactivations in accordance with OPSS 106.
- (vii) Per Item 5 from Table 6-1, at least 14 calendar days prior to the date scheduled for the City to install the traffic signal equipment, DB Co shall have completed their portion of the Work for permanent and/ or temporary traffic signals modification/installation, and have provided the City with notice that the DB Co Work is complete.

6.15 Pavement Marking and Signing

(a) General

- (i) DB Co shall provide the design drawings and obtain approvals from the City for all permanent and temporary Pavement marking and Roadway signs.
- (ii) DB Co shall provide the design drawings and obtain approvals from the City for all permanent and temporary Pavement marking and signage at the locations of bus Transitway and facilities operated by OC Transpo.
- (iii) Unless specified otherwise in this Article, DB Co shall provide all signing and Pavement markings in accordance with the criteria contained in this Article, the requirements of OPSS, and the applicable Reference Documents.
- (iv) DB Co shall refer to Schedule 15-2, Part 9, Part B, Article 8 for all Pavement marking and signage requirements within MTO jurisdictions.

(b) Design and Performance Requirements

- (i) DB Co shall design, obtain approvals, and comply with construction requirements for permanent Pavement markings as per the City of Ottawa's standards and specifications and applicable OPSS.
- (ii) DB Co shall provide for the supply of materials, labour, equipment, inspection and testing associated with the requirements for all temporary Pavement markings during construction.
- (iii) The City shall supply all labour, equipment and materials for the supply and installation of all permanent Pavement markings between April 16 and November 14. DB Co shall supply all labour, equipment and materials for the supply and installation of permanent Pavement markings between November 15 and April 15.
- (iv) DB Co shall supply all labour, equipment, materials, inspection and testing associated with the requirements for all temporary and permanent non-regulatory signing.
- (v) The City shall supply all labour, equipment and materials for the supply and installation of all temporary and permanent regulatory signing requirements.
- (vi) DB Co shall ensure the Pavement surface is prepared, clean and free of debris.
- (vii) DB Co shall complete final grading prior to installation of all permanent and temporary signs. DB Co shall also be responsible for the reinstatement of all areas disturbed during the installation of new or relocated signs.

- (viii) DB Co shall provide a minimum of 10 Business Days advanced notice to the City for the installation of the permanent Pavement markings and regulatory signing to be completed by the City as illustrated on DB Co's construction documents.
- (ix) DB Co shall make all submissions in relation to the requirements of this section in accordance with Schedule 10 – Review Procedure.
 - A. DB Co shall submit Pavement markings and signage CADD drawings formatted in Microstation V.8i at a scale of 1:500.
- (x) DB Co shall obtain the library of symbols from the City prior to commencing any work.
- (xi) DB Co shall contact the appropriate municipal and/ or provincial road authorities to confirm, in writing, the official municipal road names as well as Civic Address Signs (911 Identification Numbers and signing) requirements and incorporate such signs in the permanent and temporary Pavement and signing design drawings. DB Co shall indicate the location, size and type of each sign on the TCPs. DB Co shall ensure that the above noted signs are in place and visible at all times. If the placement of the signs conflict with DB Co's construction, DB Co may temporarily relocate the signs, provided the sign will remain unobstructed and within the affected property limits for the duration of the Project. DB Co shall replace any damaged signs immediately.
- (xii) DB Co shall prepare and submit a permanent signing plan and a permanent signing table a minimum of 30 calendar days prior to the implementation of the plan. The permanent signing table shall include, but not be limited to information detailing sign location (station of final location, removal location and on which side of the road to be installed in relation to the direction of travel), height to bottom of sign, lateral offset to post, support type with dimensions, alpha-numeric sign code with dimensions and the message/description, etc.
- (xiii) DB Co shall prepare sign details for the following types of ground-mounted guide Signs: Roadway identification, direction & destination, and location identification. DB Co shall design and provide all overhead sign structures, ground-mounted sign break-away steel supports and associated sign footings.

6.16 Street Lighting

- (a) General
 - (i) For all the temporary and permanent street lighting, DB Co shall design, obtain approvals, and supply of materials, labour, equipment, build, provide inspection and testing associated with the City's requirements for Street lighting standards and best practices.
- (b) Design and Performance Requirements

- (i) DB Co shall design and construct all permanent and temporary street lighting including power feeds. Street lighting shall meet the requirements of the City of Ottawa Right of Way Lighting Policy. DB Co shall prepare and submit the lighting design together with the lighting calculation summary in accordance with Schedule 10 – Review Procedure.
 - A. For the design and construction of luminaires, DB Co shall supply and install the appropriate [REDACTED] dimming and monitoring nodes. All other equipment, including but not limited to software, programming, configuration and licensing, required to make the supplied luminaires fully operational and integrated into the existing street lighting system shall be the responsibility of the City. DB Co shall be responsible for the supply and installation of all new utility poles.
- (ii) DB Co shall illuminate cycle lanes based on the required Roadway lighting levels stipulated in the City of Ottawa Right of Way Lighting Policy. Any illumination requirements are governed by the strategy for Roadway lighting.
- (iii) All activities related to Roadway lighting systems (i.e. design, construction) shall meet the Conditions of Service set out by the local Electrical Supply Authorities, the ESA, and any other entity having jurisdiction.
- (iv) The installation of luminaires shall utilize existing above ground utility poles located within public ROW where appropriate. DB Co shall coordinate the use of these joint use [REDACTED]/street light poles with the local Electrical Supply Authority and shall satisfy the requirements of Ontario Regulation 22/04 Electrical Distribution Safety (Electricity Act 1998) for third party equipment mounted on [REDACTED] utility poles. DB Co shall be responsible to cover any costs associated with the use of existing above ground utility poles.
- (v) DB Co shall coordinate with the City the design of electrical power feeds for all alterations to existing street lighting, temporary lighting and new street lighting; the cost of obtaining new electrical power feeds shall be a City responsibility.
- (vi) The City shall perform all work impacting existing City owned street lighting within the contract limits, including pole removal (concrete foundations to be removed by the DB Co), wiring, luminaire replacement and aerial cables. DB Co shall coordinate its work with the City.
- (vii) DB Co shall provide a minimum of 15 Business Days advanced notice to the City for the installation of temporary Roadway illumination and removal of existing Roadway illumination.
- (viii) DB Co shall arrange a meeting with the City, a minimum of 10 Business Days prior to construction, to coordinate the requirements of the electrical work involving the City. DB Co shall provide a schedule of its proposed work to the City in this meeting.

- (ix) Lighting shall not contain an upward component and minimize light trespass and disability glare for drivers.
 - (x) DB Co shall design and construct all Roadway luminaries to be LED and meet the full cut-off type and specifications.
 - (xi) All permanent Roadway lighting levels shall meet the appropriate standard for the Roadway classification.
- (c) Refer to Article 10 – OR174 Street Lighting, of this Part 2 for requirements for street lighting on OR174.

6.17 Passenger Pick Up and Drop Off Facilities

- (a) DB Co shall design and construct PPUDO facilities for the location and number of PPUDO spaces specified in Schedule 15-2, Part 4, Appendix A. DB Co shall obtain approval from the City for the location of all PPUDO locations prior to advancing any Roadway designs.
- (b) DB Co shall satisfy the requirements of OC Transpo's Transitway and Station Design Guidelines, including City of Ottawa By-laws and reference material included in Clause 6.1 of this Part 2.
- (c) The following general requirements shall apply to all PPUDO facilities:
 - (i) DB Co shall limit the location of curbside PPUDO facilities to tangent Roadway segments, offset from adjacent intersections and accesses as per the City of Ottawa By-law 2003-530.
 - (ii) DB Co shall satisfy the upper limit of all geometric dimensions for the design of PPUDO facilities including, but not limited to, parking space dimensions and aisle widths as per the City of Ottawa By-law 2008-250.
 - (iii) DB Co shall ensure the locations and design of PPUDO facilities will avoid conflicts with cycling facilities, bike racks, bus access and egress and operations, and Station operations.
 - (iv) PPUDO facilities shall include a fully accessible, direct, and barrier-free pedestrian access from / to all bus stops and Station access and egress. Each PPUDO facility shall include provisions for boarding and alighting from an accessible parking space as per the accessibility requirements and best practices specified under sections 3.1 and 3.2 of COADS.
 - (v) DB Co shall design and construct PPUDO facilities physically separated from fare paid zones.
 - (vi) DB Co shall ensure all curbside recessed PPUDO stalls can accommodate the safe entry and exit manoeuvres with the use of curb transitions as per the City of

Ottawa Standard Detail Drawing R8 – Typical Intersection Narrowing (Single)
and/or R9 – Typical Mid-Block Narrowing.

6.18 Road Safety Audits and Road Design Safety Reviews

(a) Order of Precedence

- (i) DB Co shall have independent Road Safety Audits and Road Design Safety Reviews completed in accordance with the criteria set out in this Article and the following reference documents. If there is any conflict between the criteria contained in this Article and any of the reference documents, the following shall apply, in descending order of precedence:
 - A. The criteria contained in this Article;
 - B. TAC, Geometric Design Guide for Canadian Roads;
 - C. TAC, The Canadian Road Safety Audit Guide;
 - D. MTO, Roadside Safety Manual;
 - E. MTO, Ontario Traffic Manual Books 1 through 18;
 - F. AASHTO, Roadside Design Guide.
- (ii) DB Co shall perform the necessary Road Safety Audits and Road Design Safety Reviews in the context of the traditional Road Safety Audit processes but shall expand the processes in order to include human factors, the review of drawings and plans (Reviews).

(b) General Requirements

- (i) Road Safety Audits shall include the Road Safety Audit processes as identified in The Canadian Road Safety Audit Guide, and shall for clarity, include human factors considerations.
- (ii) DB Co shall provide to the City of Ottawa with the Road Safety (Review and) Audit team's individuals' qualifications, experience, and knowledge, and letters of reference from the relevant governmental authorities where prior audits were performed, 60 calendar days in advance of any safety review or audit work. DB Co shall receive the City's approval for the proposed Safety Audit team in accordance with the requirements of the Review Procedure specified in Clause 6.18 of this Part 2 and prior to any safety review or audit work being initiated.
- (iii) The Road Safety Audits and Road Design Safety Reviews team's individuals shall not be an employee of any of the companies on DB Co's design and construction team, other than being paid for services rendered to DB Co in their capacity as Road Safety Auditor. The auditing team shall remain fully

independent and at arm's length from any company participating on DB Co's team.

- (iv) All DB Co's Road Safety Audits and Road Design Safety Reviews shall include a human factors expert experienced in road and highway design and construction, who shall provide input and review of the safety and operation of the work from a human factors perspective.
 - (v) DB Co shall immediately correct any "as constructed" element that does not conform to the design, does not meet the required safety standards, or deemed not to meet a reasonable level of safety by the Road Safety Auditor. DB Co shall prepare the corrective measures and rectification recommendations noted above and shall ensure a licensed Professional Engineer stamps and seals the appropriate recommendations for the review and acceptance by the Road Safety Audits and Road Design Safety Reviews team and to the City of Ottawa.
 - (vi) DB Co shall assume responsibility for any existing or proposed site conditions found not to meet a reasonable level of safety, and shall rectify the condition immediately, or otherwise construct temporary works to address the safety concern until repairs are made.
- (c) Road Safety Audits and Road Design Safety Reviews Team
- (i) The Road Safety Audits and Road Design Safety Reviews individual and supporting team is more generally referred in this context as the Road Safety Auditor.
 - (ii) DB Co's Road Safety Audits and Road Design Safety Reviews team shall consist of a team of auditors, with a minimum of three qualified personnel, who are independent of the DB Co's design and construction team, and shall meet the following minimum criteria:
 - A. Be Professional Engineers trained in the area of road and public safety, with over 20 years of engineering experience and demonstrated experience or resume working in the area of public safety and undertaking formal Road Safety (Review and) Audits, with references from government agency;
 - B. Demonstrated experience in undertaking formal safety reviews and experience with The Canadian Road Safety Audit Guide, and Canadian and Ontario roadside safety standards;
 - C. Demonstrated experience in road safety analysis, traffic engineering, geometric design, and demonstrated expertise with human factors in design and safety reviews and audits;

- D. Participated in at least two recent formal road safety audits with criteria similar to the Road Safety Reviews and Audits in this Work, where such previous participation was on projects delivered using design build or public private partnership project delivery methods; and,
 - E. Demonstrated professional independence in undertaking Road Safety Reviews and Audits in this Work.
- (d) DB Co's Responsibility:
- (i) DB Co shall undertake Road Safety Audit and Road Design Safety Review as per the requirements of Clause 6.18 of this Part 2 on all temporary and permanent roadway improvements listed below.
 - A. All facilities operated by OC Transpo including, but not limited to, all bus loops and associated accesses, lay-bys, bus stops, PPUDOs, Park and Ride facilities, as specified in Clause 6.9 of this Part 2;
 - B. All Roadway improvements listed under Clause 6.19 of this Part 2 and Clause 6.21 of this Part 2. For Road Safety Audit and Road Design Safety Review requirements for provincial road improvements, including Hwy 417, DB Co shall refer Schedule 15-2, Part 9, Part B, Article 10 – Road Safety Review and Audits.
 - C. All staging detour routes, Lane Shifts, lane closures, and temporary conditions designed and constructed by DB Co as part of the Works per the requirements specified in the Schedule 15-2, Part 7 - Traffic and Transit Management and Construction Access.
 - (ii) DB Co shall assume responsibility for the following items:
 - A. Scheduling, initiating, allowing access to the applicable site and managing the Road Safety Audits and Road Design Safety Reviews process at the appropriate times during the course of the Works;
 - B. Providing all necessary design drawings and supporting documentation for the Road Safety Audit team to conduct the Road Safety Audit and Design Safety Review;
 - C. Ensuring that the Design Safety Review and Road Safety Audit is conducted in accordance with good industry practice;
 - D. Receiving and reviewing the Road Safety Audit team's report with the City of Ottawa representative;
 - E. Responding to the Road Safety Audit team's report, including presenting rectification alternatives to address deficiencies;

- F. Implementing required re-design as a result of the corrective suggestions as described in the sub clause noted above in an expeditious and timely manner;
 - G. Updating changes on the required design drawings; and,
 - H. Providing all draft and final documentation related to the Road Safety Audits and Road Design Safety Reviews to the City of Ottawa's representative.
 - (iii) DB Co shall accept responsibility for and account for all costs associated with Road Safety Audits and Road Design Safety Reviews, including any re-design and increased costs to the Works that result from the Road Safety Audits and Road Design Safety Reviews.
 - (iv) After each Road Safety Audit and Road Design Safety Review, except as otherwise expressly agreed in writing by the City of Ottawa's representative, DB Co shall address all recommendations made by the Road Safety Audit team.
- (e) Road Design Safety Review
- (i) DB Co shall undertake an initial Road Design Safety Review at the outset of the Works and no later than 60 calendar days after Commercial Close of the Works in order to assess DB Co's proposed design elements including both temporary and permanent improvements that may have any bearing on public, maintenance or operational safety from the point of view of any user within the Lands.
 - (ii) In each Road Design Safety Review, DB Co shall review, identify and resolve any safety concerns prior to advancing the design of both temporary and permanent improvements such that the design can be modified in a timely fashion to address the safety concerns within the Works. DB Co shall plan, schedule and execute the review, together with providing a report that addresses any safety concerns and the recommendation or resolution of the initial Road Design Safety Review. The initial Design Safety Review shall precede the design activity and the subsequent design stages shall accommodate any required recommendation or resolution of this initial Road Design Safety Review.
 - (iii) DB Co shall undertake Road Design Safety Reviews on an ongoing basis through the different stages and duration of all designs and all to be Constructed elements, both temporary and permanent improvements that may have any bearing on public, maintenance or operational safety from the point of view of any users within the Lands.
- (f) Road Safety Audit Process
- (i) DB Co shall complete the Road Safety Audit process in accordance with The Canadian Road Safety Audit Guide. References to "review" or "response" from

the owner agency, or other qualifying phrase with similar connotation in the process, shall be construed as the responsibility of DB Co in accordance with the requirements in Clause 6.18 of this Part 2.

- (ii) DB Co's Road Safety Audit team shall prepare a report to document the audit findings and submit the Road Safety Audit reports to the Design Team for the stages identified in the clause that follows. The Road Safety Audit reports shall clearly identify safety hazards that need to be addressed by DB Co along with recommendations for remediation. DB Co shall respond to the identified hazards and recommendations with remediation counter-measures or provide appropriate reasons why the safety issue may not be addressed as recommended in the reports. Under any circumstances, DB Co's response and remediation countermeasures shall address the safety issue to the satisfaction of the Road Safety Audit team.
- (iii) For all temporary conditions and temporary roadway improvements to accommodate staged construction under long duration Works as specified under clause 2.5.4 Long Duration (LD) in the MTO's OTM Book 7, DB Co shall perform Stage 3a and Stage 3b audits for all temporary roadway improvement according to the requirements outlined in Clause 6.18 (f) of this Part 2.
- (iv) DB Co shall perform Stage 3b audits for all Station construction Sites according to the requirements outlined in Clause 6.18(f)(v) of this Part 2.
- (v) DB Co shall submit the Road Safety Audit reports to the City of Ottawa's representative in accordance with the review procedures specified in Schedule 10 – Review Procedure for review at all the stages identified below:

A. Stage 1: Pre-Final Design Road Safety Audit

- i. DB Co shall conduct a Stage 1 Road Safety Audit immediately before submission of the Pre-Final Design Development Submittals in accordance with the requirements of Schedule 10 – Review Procedure of the Project Agreement. DB Co shall undertake a detailed review of the pre-final design development submittals to identify any potential safety-related enhancements that might have an impact on the design and construction of Works. Issues considered shall include, but not be limited to, the following:
 - 1 Design consistency;
 - 2 Site conditions and visibility;
 - 3 Drivers' work load and perceived road information;
 - 4 Vehicular traffic speed management and associated safety risk factors;

- 5 Traffic control devices;
- 6 Human factors;
- 7 Horizontal and vertical alignment;
- 8 Cross section design;
- 9 Interchange/intersection design and configuration;
- 10 Access location;
- 11 Sight distance including, but not limited, to stopping sight distance and turning sight distance, sight distances to traffic control devices, Bullnoses, etc.;
- 12 Operation of public transit;
- 13 Operational and maintenance safety;
- 14 Traffic operations;
- 15 Environmental factors;
- 16 Clearances to roadside objects;
- 17 Safety barriers; and,
- 18 Provision for vulnerable road and all multi-modal road ROW users.

B. Stage 2: Final Design Road Safety Audit

- i. DB Co shall conduct a Stage 2 Road Safety Audit immediately before submission of the final design development submittals in accordance with Schedule 10 – Review Procedure of the Project Agreement. The audit shall undertake a detailed review of the completed final design development submittals to identify any potential safety-related enhancements that might have an impact on the operational safety of the Works. DB Co shall consider in the audit and address issues such as the items included, but not be limited to the following items:

- 1 Signing and Pavement markings;
- 2 All interface with adjacent design disciplines (rail track corridors and LRT facilities; tunnel, civil, facilities

- including stations and landscaping, utilities and bridges, etc.)
- 3 Traffic signal configuration;
 - 4 Intersection details;
 - 5 Municipal services;
 - 6 Drainage and SWM elements;
 - 7 Lighting;
 - 8 Fencing;
 - 9 Clearances to roadside objects;
 - 10 Safety barriers;
 - 11 Surface standards including treatments and structures;
 - 12 Traffic control devices;
 - 13 Streetscape and road furniture;
 - 14 Provision for vulnerable road and all multi-modal road ROW users;
 - 15 Accommodation of design vehicles;
 - 16 Emergency responses requirements;
 - 17 Road maintenance
 - 18 Traffic staging plan; and,
 - 19 Any other Stage 1 Road Safety Audit results affected by the final design.

C. Stage 3a: Temporary Traffic Control On-site Road Safety Audit

- i. DB Co shall conduct Stage 3a Road Safety Audits on the applicable sites within Lands before implementation of temporary traffic and transit control set-ups that meet one or more of the following criteria:
 - 1 Two or more individual temporary work zones in close proximity to each other such that one would influence the traffic and transit operation of the other. The spacing

between the termination area of one work zone and the advance warning area of the next work zone for which one temporary traffic control set-up influences the traffic operations of the next temporary traffic control set-up is 2.0 km or less.

- 2 Temporary staging are required within the existing Roadways and the duration of temporary traffic control set-ups is five calendar days or more. The set-up does not necessarily have to be in place for the entire time but can be one of a number of repeating set-ups that are active at different times.
- 3 The duration of temporary traffic control set-ups is ten calendar days or more on roads other than those identified (2) above. The set-up does not necessarily have to be in place for the entire time but can be one of a number of repeating set-ups that are active at different times.

D. Stage 3b: Construction Road Safety Audit

- i. DB Co shall conduct Stage 3b Road Safety Audits on the applicable sites within Lands during construction of Works. These audits shall examine the field conditions of the Work under construction and assess any circumstances that may have a bearing on public safety from the point of view of any user and public areas that are within the Lands, or are modified and Constructed as a part of the Works. The audits shall meet the following criteria:
 - 1 DB Co shall undertake two of the Stage 3b Road Safety Audits annually within the high construction season, between June and September (i.e. two audits to be performed annually between June and September) and one in the winter season, annually between December and February. DB Co shall preplan for only one of the audits, while DB Co shall perform the other audits unannounced.

E. Stage 4: Post-Construction Road Safety Audit

- i. DB Co shall carry out a Stage 4 Road Safety Audit prior to opening any portions of the Roadway Works for traffic operation. DB Co's audit shall investigate and identify potential safety enhancements that may reduce the frequency and/or the severity of collisions. The Road Safety Auditor shall also check for safety deficiencies that result from using particular combinations of design elements not previously detected or any synergistic effects

of using minimum Design Criteria for multiple design elements that may compromise users' safety.

- ii. DB Co shall plan for and conduct Stage 4 Road Safety Audits prior to and as a condition of the issuance of the substantial completion certificate.
- iii. Pursuant to the requirements of the two clause (i) and (ii) of the intended Stage 4 Road Safety Audit noted-above, the Road Safety Audit team shall fully examine the Works by:
 - 1 Meeting with DB Co to review any issues relating to the Works, in particular design changes that may affect the safety of Roadway Works included in this Article;
 - 2 Checking to ensure that safety issues identified in the Stage 2 Road Safety Audit are addressed and the resulting design changes do not create further safety issues;
 - 3 Reviewing any design changes that occurred during the relevant Works to ensure they do not create safety issues; and,
 - 4 Conducting field reviews of such Works, under both daytime and night time conditions.

(g) City-requested Safety Audit

- (i) The City of Ottawa reserves the right to request site-specific Road Safety Audits at any time in addition to the audits required in all other Road Design Safety Reviews and Road Safety Audits specified in Clause 6.18 of this Part 2. Such request may be for any site conditions, design element, design concern or Constructed element of Works that is of concern to the City of Ottawa. The City's written request will outline the safety concern and the issues required to be investigated and addressed by DB Co.
- (ii) DB Co shall demonstrate that the design and proposed Constructed Works meet a reasonable level of safety for all affected users. DB Co shall provide supporting research or engineering rationale and analyses for the design decisions, and for the support of the proposed design and Constructed Works that are subject to investigation.
- (iii) DB Co shall address the concerns and/or modify the proposed design and Constructed Works accordingly and provide all available technical information to the Road Safety Audit team for consideration.

- (iv) The Road Safety Audit team will render an opinion with the safety issue, and DB Co shall address the safety issue to the satisfaction of the Road Safety Audit team and the City of Ottawa. The disposition and rectification of the safety concern is DB Co's full responsibility and obligation based on full and due consideration of input from the City of Ottawa and the Safety Audit team.
- (h) Road Safety Audit Certificates
 - (i) DB Co shall submit to the City of Ottawa's representative a Road Audit Safety Certificate called in the form attached as Appendix H - Form of Road Safety Audit Certificates to Schedule 15-2 – Design and Construction Requirements in respect of the Stage 1, Stage 2, and Stage 4 Road Safety Audits respectively. Each Road Safety Audit Certificate shall be signed by DB Co's Design Manager, DB Co's construction contractor representative, DB Co's Project Manager representative, and the Road Safety Audit team.
 - (ii) DB Co shall provide the Independent Certifier with the Stage 4 Road Safety Audit Certificate. The Substantial Completion Certificate shall not be issued unless a Stage 4 Road Safety Audit Certificate has been submitted and signed by the DB Co's Design Manager, DB Co's construction contractor representative, DB Co's Project Manager representative, and the Road Safety Audit team.
- (i) Random Audits
 - (i) The City of Ottawa retains the right to perform additional independent audits on any part of design and construction Works at any time.

6.19 Municipal Roads Improvements

- (a) OR174
 - (i) General Requirements
 - A. DB Co shall design and construct all OR174 improvements and new Roadway construction, including all impacted interchanges and associated ramp intersections at cross roads. All associated construction activities with the OR174 shall include the completion and Commissioning of the Works, carried out in strict accordance with Schedule 15-2 – Design and Construction Requirements, and in such a manner as to comply with all applicable Project Agreement requirements.
 - B. DB Co shall design and construct OR174 travel lanes, impacted interchange ramps, and crossing road intersections and permanent improvements to satisfy the requirements of the TAC GDGCR.
 - C. Unless specifically noted otherwise in this Article, DB Co shall design the necessary improvements of OR174 and interchange ramps based on the

OR174 basic Design Criteria parameters noted in Table 1 and Table 3 included in Appendix A of this Part 2.

- (ii) OR174 improvements include the design and construction of all and any modifications necessary on the existing OR174 and associated infrastructures in order to support the construction.
- (iii) OR174 improvements include but are not limited to all permanent improvements, realignment and/ or reconstruction of OR174 travel lanes and shoulders and all necessary earthworks, Pavements, traffic signs, traffic signals, barriers and Pavement marking, and all associated infrastructure modifications on OR174 interchange ramps and cross roads.
 - A. DB Co shall maintain existing lane configuration including number of through travel lanes and speed change lanes as a minimum for all permanent improvements required on OR174 throughout unless specifically noted otherwise in this Article or in Appendix A of this Part 2.
 - B. DB Co shall provide standard Pavement widths for all travel lanes, ramps, and shoulders throughout as per the requirements of Appendix A of this Part 2, unless specifically noted otherwise in this Article.
 - C. DB Co shall repurpose the existing Bus Only Lanes back to outside paved shoulders as Remaining Works. DB Co shall assume responsibility for the design, approvals and construction associated with updating the existing Pavement markings in accordance with OTM requirements. DB Co shall also assume responsibility for removing all bus-only signing. DB Co will be responsible for making any arrangements with the City of Ottawa to ensure the schedule and process for decommissioning the shoulder buses meets OC Transpo service and operational requirements.
 - D. DB Co shall design and construct a TL-5 barrier between the LRT and OR174 median shoulders that meets the applicable structural and safety requirements for the intended use as per the requirements of Article 4 - Structural Design Criteria and Requirements of this Part 2. The design and construction of the TL-5 barrier and median shoulders shall accommodate a future HOV lane in each direction.
 - E. DB Co shall design traffic staging plans in accordance with the requirements of OTM Book 7 and Schedule 15-2, Part 7 – Traffic and Transit Management and Construction Access.
 - F. DB Co shall investigate, design and construct all Pavements. DB Co shall design and construct flexible Pavements that meets or exceeds the requirements of Clause 6.11 of this Part 2.

- G. DB Co's design of the section of the OR174 west of the Montreal Road interchange improvements shall maintain the existing horizontal alignment of the WB lanes and provide for a 3.0 m median shoulder.
 - H. DB Co's design of OR174 west of Montreal Road interchange improvements shall realign the EB lanes as required to accommodate the LRT infrastructure and the TL-5 barriers. DB Co's design shall provide for a 3m median shoulder.
 - I. DB Co's design shall include the full depth removal of the existing concrete road base in some sections of the OR174 travel lanes within the area of the Works as specified under Clause 6.11 of this Article 6.
 - J. DB Co shall design and construct a new signalized intersection to the east of the existing OR174 and Trim Road intersection, such that the intersection is beyond the east terminus of the Tail Tracks, including associated Track bumper stop and other Trackwork appurtenances.
 - K. DB Co shall design and construct localized grading adjacent to existing ditches and new drainage facilities including but not limited to catch basins, maintenance holes, oil and grit separators, curb and gutters, storm sewers, and correction of road cross falls to ensure positive drainage along and across OR174 so that OR174 drainage requirements are satisfied according to the criteria specified in the City of Ottawa Sewer Design Guidelines. For overall drainage requirements criteria refer to Article 5 - Drainage and Stormwater Management Design Criteria, of this Part 2.
 - L. DB Co shall design and construct all impacted Roadway elements at tie-in locations and use appropriate transitions to match existing conditions. DB Co shall also design and construct all necessary road realignments, widenings, and relocation of any interchange exit and entrance ramp sections, loops, and ramp junctions that may be impacted as a result of OR174 improvements or in order to support the construction staging of the Works.
- (iv) DB Co shall design and construct all and any modifications, relocation, and reconstruction of the aboveground and underground utilities, lighting, and traffic signal improvements necessary to support the OR174 road improvements and construction of Works. All such utility works shall satisfy the City's utility circulation and permit approval requirements as required under Article 8 - Utility Infrastructure Design Criteria of this Part 2.
 - (v) DB Co shall ensure that any improvement on OR174 will not compromise the vertical clearance under the existing and new Overhead structures over OR174. For minimum clearance criteria acceptable for Overhead structures refer to Article 4 – Structural Design Criteria and Requirements of this Part 2.

- (vi) Requirements for new MUP in OR174 corridor are referenced in Schedule 15-2, Part 6, Article 3 – Connectivity Requirements. At locations along OR174 corridor, where DB Co shall construct a new MUP, or realign existing MUPs, the location and design of the intended MUP shall not compromise OR174 improvements including its grading and drainage requirements noted in this Part 2. DB Co shall also take into consideration the future ultimate OR174 HOV widening grading and drainage requirements in determining the appropriate location and design of the intended MUPs. DB Co shall demonstrate that a feasible and economical design solution can be achieved without requiring the intended MUPs to be reconstructed or drainage and grading requirements compromised when OR174 is widened to accommodate HOV lanes in the future.
- (vii) DB Co shall undertake a detailed field survey and investigate the existing conditions along the entire OR174 corridor within the Project limits. This review shall include but not be limited to the location and type of the existing concrete barriers, guiderails, structures, traffic signs, poles, creek crossings Culverts, bridge Culverts, ditches, steep slopes, areas of deep excavation and steep grades, all underground and above-ground utilities, and all and any other road side safety Hazard items and issues associated with the existing conditions along and across the road corridor. DB Co shall record the results and findings of the existing conditions survey in a comprehensive existing conditions report and submit a copy of the report to the City, in accordance with Schedule 10 – Review Procedure prior to advancing the design.
- (viii) DB Co shall review all roadside hazard conditions on OR174 and provide adequate mitigation in conformity with current MTO standards including the MTO's Roadside Safety Manual. DB Co shall identify the roadside safety hazards, and substandard conditions due to the widening and realignment of OR174 and interchange ramp modifications. The reduction in length of barriers and guide rails required throughout the OR174 corridor shall consider slope flattening as the preferred method of disposing of excess material. DB Co shall evaluate the design along with the Design Criteria, property constraints, and all roadside safety hazard conditions in the early stages of design development and develop maximum roadside safety design. Where current design guidelines cannot be achieved, DB Co shall identify and provide proposed countermeasures. After receiving endorsement from the City, DB Co shall incorporate the proposed improvements into the design. DB Co shall present and provide documentation of the existing conditions and proposed improvements decisions throughout the length of the Works with respect to roadside safety design in the form of roadside safety review reports stamped by a licensed professional engineer with over 15 years freeway safety review experience and seek approval from the City 30 calendar days prior to completing the preliminary design.
- (ix) There is a +/-150m section of OR174 located approximately +/-680m west of the existing OR174 / Trim Road intersection (at the approximate location of Taylor Creek Culvert crossing) on which a Pavement surface distress is observed on the

existing OR174 travel lanes in both the EB and WB directions of traffic. DB Co shall undertake necessary geotechnical investigations and determine the cause of this pavement distress and design and construct appropriate pavement rehabilitation solutions and necessary improvement countermeasures in order to rectify this Pavement surface distress so that the OR174 pavement and road profile will be improved and meet the appropriate pavement performance requirements, service life, and Design Criteria required under both Clause 6.11 and Article 7 - Geotechnical Design Criteria and Requirements of this Part 2.

- (x) DB Co shall design and construct highway shoulder rumble strips on both outside shoulders and median shoulders of OR174 and all necessary transitions and treatments at the location of exit and entrance ramp terminals as per the requirements of the MTO's directive PLNG-B-004 "Highway shoulder rumble strip application and installation policy, issued by policy and planning branch on 2000-10-23" and its associated appendices.
 - (xi) DB Co shall design and construct the OR174 alignment and cross section at the location of Green's Creek Culvert such that the edge of pavement for the ultimate WB outside lane (Lane 3 as defined in Table 3 of Appendix A of this Part 2) will match the existing edge of pavement of the existing WB outside lane. All the necessary roadway widening to accommodate the Green's Creek Culvert replacement shall be constructed to the south of the above noted WB outside lane and contained within the Lands.
 - (xii) DB Co shall design and construct the OR174 / Montreal Road interchange Bridge Structure and associated road cross-section elements and speed change ramps to their ultimate requirements to accommodate the ultimate widening and improvements required for HOV lane improvements and as specified under Appendix A, Table 3, of this Part 2. For added clarity, DB Co shall demonstrate in the preliminary design stage how DB Co's proposed OR174 design can accommodate the future HOV lanes widening and improvements without any modifications or alterations to DB Co's proposed OR174 / Montreal Road interchange Bridge Structure when the HOV lanes are implemented along OR174 corridor. For additional information, DB Co shall refer to requirements of Clause 6.19(c) and Article 4 – Structural Design Criteria and Requirements, of this Part 2.
- (b) Blair Road
- (i) DB Co shall design and construct all improvements and modifications for Blair Road, including the existing intersections, and interchange ramps that are necessary in order to support the construction of Works. Refer to Schedule 15-2, Part 7 – Traffic and Transit Management and Construction Access, for the description of necessary site-specific improvements on affected Roadways, intersections and interchange ramps, in order to accommodate the appropriate traffic and transit operations under staged conditions, including conditions for final reinstatement requirements.

(c) Montreal Rd / OR174 Interchange

- (i) DB Co shall design and construct the Montreal Road/ OR174 interchange, including all associated ramp terminals, to meet the Design Criteria requirements and corresponding minimum lane configuration diagrams shown in Appendix A and Appendix B of this Part 2, respectively. Refer to Schedule 15-2, Part 7 – Traffic and Transit Management and Construction Access, for the description of necessary site specific improvements on affected Roadways, ramps, and intersections in order to accommodate the appropriate traffic and transit operations under staged conditions.

A. DB Co shall coordinate the design of traffic signals with the City for the interchange, in accordance with Clause 6.14 of this Part 2 as well as undertake a detailed intersection multi-modal operation and level of service analysis.

- i. DB Co shall demonstrate the traffic operations impacts associated with the necessary improvements on the existing signalized intersections and interchange ramps do not cause traffic queues that reach the mainline of OR174 and are acceptable and feasible considering projected traffic volumes, expected transit operations, and pedestrian and cyclist movements.
- ii. DB Co shall develop a Synchro model based on existing conditions that includes the two ramp intersections and the intersection of Montreal Road and Shefford Road at the interchange. DB Co shall use the City supplied existing signal timing, phasing, and volumes for the existing Synchro model.
- iii. DB Co shall perform peak hour field observations and calibrate the Synchro/Sim Traffic model to reflect observed conditions. DB Co shall develop models for all phases of construction and the ultimate condition, using the calibrated existing Synchro model.
- iv. DB Co shall prepare a traffic signal analysis report documenting the existing conditions to compare to the proposed construction phasing and ultimate conditions.
- v. The results of the intersection operations analysis shall include, intersection layout configuration, traffic control types, and auxiliary storage lane requirements as per the requirements of the City of Ottawa TIA guidelines.
- vi. DB Co shall submit to the City of Ottawa the results of above-noted investigations by submitting a traffic analyses report and seek approval from the City of Ottawa at least 20 calendar days prior to initiating the development of geometric design.

- vii. DB Co shall include the existing channelized right turn lane between the WB OR174 off ramp and the WB direction of Montreal Road in the above noted investigations. DB Co shall use the results of the investigations to determine if this channelized right turn lane is necessary to achieve required LOS. If the results of the investigation determine that the existing channelized right turn lane is necessary to achieve required LOS, then DB Co shall include the existing channelized right turn lane in the lane configuration diagrams shown in Appendix A of this Part 2.
- (ii) DB Co shall design and construct Utility Infrastructure and Utility relocations and conflicts in accordance with the requirements of Article 5 – Drainage and Stormwater Management Design Criteria, and Article 8 – Utility Infrastructure Design Criteria, of this Part 2.
- (iii) DB Co shall upgrade the Montreal Road cross-section as per the requirements of the corresponding Design Criteria and lane configuration diagrams specified in Appendices A and B of this Part 2, respectively.
- (iv) DB Co shall design and construct appropriate crossing treatments for pedestrian and cyclists across all Montreal Road/OR174 interchange ramps and Montreal Road intersections.
 - A. The improved Montreal Road cross-section shall accommodate new unidirectional raised cycle tracks within the limits of construction.
 - B. In the WB direction, the raised cycle track shall begin east of the EB on/off ramp intersection, and terminate west of the WB off ramp (connecting back into the existing on road cycling lane).
 - C. In the EB direction, the cycle track shall begin just west of the WB on/off ramp intersection, and terminate just east of the EB intersection, connecting back into the existing on road cycling lane.
 - D. DB Co shall segregate the proposed raised cycle tracks from the outside (curbside) lane on either side of the Roadway by a 0.6m wide hard surface boulevard.
 - E. For additional requirements related to pedestrian and cyclist connectivity treatments and Station facilities used by pedestrians refer to Schedule 15-2, Part 4 – Stations, and Schedule 15-2, Part 6 – Urban Design, Landscape Architecture and Connectivity Requirements.
- (v) DB Co's design shall accommodate and reconstruct to current standards all accesses from / to the adjacent properties including [REDACTED] that are impacted as the result of Works on Montreal Road.

- (d) Jeanne d’Arc Boulevard/OR174 Interchange
- (i) DB Co shall design and construct the necessary improvements on the above-noted interchange ramps intersecting Jeanne d’Arc Boulevard as follows:
- A. DB Co shall remove the northern portion of the existing free flow N-W ramp, and direct traffic through the existing signalized intersection. DB Co shall design and construct a modification to the existing bus ramp to receive and redirect the N-W ramp traffic back to OR174 speed change lane in the WB direction.
- i. DB Co shall repurpose a portion of the land vacated by the removal of the free-flow portion of the N-W ramp to extend the SB right turn lane northerly towards the existing diverge point of the existing free-flow N-W ramp, including pavement markings and signage, as required, to allow the northern portion of this auxiliary lane to function as a bus lay-by area to accommodate transit vehicles during the afternoon peak period, including relocating the west sidewalk and associated utilities as necessary to maintain connectivity. The total length of the SB auxiliary lane shall be a minimum of 40m in length for transit vehicle lay-by storage, in addition to the length required for the SB right turn lane based on the results of the traffic analysis as noted below. The 40m storage noted above should be provided on the northern portion of the above noted SB right turn auxiliary lane.
- B. DB Co shall remove the southern portion of the Jeanne d’Arc Boulevard NB free flow off-ramp that currently leads the traffic to the existing free flow S-W loop ramp, and direct traffic through the existing signalized intersection. DB Co shall replace the above-noted free flow off-ramp with an urbanized ramp intersection that involves a tighter yet feasible curb turning radii and loop ramp geometry considering the governing geometric Design Criteria.
- C. For additional improvements required to enhance pedestrian and cyclist connectivity on both intersections at Jeanne d’Arc Boulevard interchange location refer to Schedule 15-2, Part 6 – Urban Design, Landscape Architecture and Connectivity Requirements.
- D. In order to address the above-noted improvements, DB Co shall also undertake a detailed traffic/ transit analysis and demonstrate the traffic impacts associated with the necessary improvements on the existing signalized intersections and interchange ramps are feasible and acceptable considering projected traffic volumes considering a 2031 traffic horizon, expected transit operations, and pedestrian and cyclist movements. DB Co shall submit to the City of Ottawa the results of the above-noted investigations by submitting a traffic analysis report and seek approval

from the City of Ottawa at least 20 days prior to initiating the development of preliminary design.

- (e) Champlain St / OR174 Interchange
 - (i) DB Co shall design and construct all interchange ramp modifications necessary to accommodate the OR174 widening or realignment as required for the Work.
- (f) Tenth Line / OR174 Interchange
 - (i) DB Co shall design and construct all interchange ramp modifications necessary to accommodate the OR174 widening or realignment as required for the Work.
- (g) Trim Road / OR174 Intersection and Trim Park and Ride
 - (i) DB Co shall design and construct a realigned Trim Road that extends from the eastern leg of the roundabout at the existing Trim Road and Taylor Creek Drive/ Dairy Drive, runs along the south and east sides of the proposed Trim Park and Ride facility, intersects at-grade with the OR174 at a new location east of the existing Trim Road / OR174 intersection, and terminates at an intersection with Jeanne d'Arc Boulevard North, north of OR174. For added clarity, all references to Jeanne d'Arc Boulevard North, hereinafter, in this Article 6 and Part 2 Appendices shall include the Roadway sections of Jeanne d'Arc Boulevard North extended from the west of Trim Road towards Inlet Private. All Roadway Works shall be contained within the Lands as defined in Schedule 20 – Lands.
 - (ii) DB Co shall design and construct a new signalized intersection for the proposed realigned Trim Road / OR 174 at-grade crossing, which shall be located at a feasible location beyond the east terminus of the Tail Tracks and east of the Trim Park and Ride to replace the existing signalized intersection for Trim Road and OR174. The design and construction of the proposed signalized intersection shall meet the applicable reference documents and design requirements specified in this Part 2, applicable Design Criteria specified in Appendix A and shall accommodate the requirements of the proposed minimum lane configurations specified in Appendix B.
 - A. DB Co shall design and construct all the necessary Pavement widening and new improvements to accommodate the appropriate merging and diverging transitions for the westbound through lanes on either side of the realigned Trim Road/ OR174 signalized intersection per the requirements of the TAC GDGCR.
 - i. DB Co shall perform additional traffic analysis in order to determine the optimal length for the development and termination of the outer WB through lanes on either side of the realigned Trim Road/ OR174 signalized intersection in order to maximize the

operational performance of both the northbound triple left turn and westbound through movements.

- B. DB Co shall provide pedestrian crosswalks and bi-directional cycling crossride facilities on both the east and south legs of the intersection of realigned Trim Road / OR174;
 - C. DB Co shall design and construct appropriate channelized concrete islands as per the City's standards to accommodate the right turning traffic and pedestrian and cyclists' movements, as a minimum, at the northeast and southeast quadrants of the intersection; and,
 - D. DB Co shall design and construct the necessary improvements of the proposed realigned Trim Road and OR174 intersection so that all the EB right-turning traffic will be prohibited at the signalized intersection and instead shall be accommodated through the proposed OR174 W-S ramp junction at the existing Trim Road located west of the proposed Park and Ride Facility.
 - i. DB Co shall accommodate the EB right turn movements via a new proposed W-S ramp from the OR174 to the existing Trim Road, intersecting with the west general traffic access to the Trim Park and Ride facility. The design of the proposed OR174 W-S ramp shall provide for a "free-flow" southbound movement into a dedicated southbound lane on the existing Trim Road.
- (iii) DB Co shall design and construct the intersection of the realigned Trim Road and Jeanne d'Arc Boulevard North to accommodate the Design Criteria specified in Appendix A of this Part 2 and, as a minimum, the proposed minimum lane configurations specified in Appendix B of this Part 2.
- (iv) DB Co shall decommission the existing free flow W-S ramp that is located in the SW quadrant of the existing OR174 / existing Trim Rd intersection and design and construct a new W-S free flow ramp as per the appropriate standards referenced in this Article 6 that shall be located south of the existing SWM pond in that same quadrant. DB Co shall also design and construct a controlled intersection at the location where the proposed OR174 W-S ramp intersects with the existing Trim Road and west general traffic access to the Trim Park and Ride to accommodate, as a minimum, the configuration illustrated in Appendix B of this Part 2.
- (v) DB Co shall decommission the section of the existing Trim Road located between the existing access to 1125 Trim Road, through the existing Trim Road and OR174 intersection.
- A. DB Co shall maintain and provide for a 2-way access to and from the existing City yard property located at 1125 Trim Road at all times both

during construction and ultimately post commissioning to the satisfaction of the City.

- B. DB Co shall design and construct all necessary improvements on the adjacent local networks including but not limited to the upgrades required on the intersections of Jeanne d'Arc Boulevard with existing Trim Road and realigned Trim Road to accommodate the [REDACTED] facility's yard operation and traffic access to / from OR174.
- (vi) DB Co shall undertake necessary traffic and transit analysis including but not limited to level of service, capacity and delay analysis using the projected vehicular traffic for 2031 horizon, and movements of pedestrians and cyclists for the existing roundabout at the intersection of Trim Road and Taylor Creek Drive/ Dairy Drive. DB Co shall submit to the City and seek City's approval at least 20 days prior to PFDD submission regarding the findings and recommendations of the above-noted traffic analysis including all improvements necessary to ensure the roundabout will operate in an acceptable level of service. Upon the City's approval of the proposed improvements, DB Co shall design and construct all necessary improvements and modifications on the existing roundabouts including but not limited to additional widening and reconstruction required on the roundabout and on the approach and exit lanes, and upstream and downstream tapers and transitions as required.
- (vii) DB Co shall design and construct all necessary improvements on the existing and proposed roads and intersections to accommodate the termination of the Dairy Drive in the form of a cul-de-sac facility at an appropriate location in the close proximity of the existing Dairy Drive / South Frontage T-intersection within Lands as defined in Schedule 20 – Lands
- (viii) The proposed intersections and road network design for the existing and realigned Trim Road and all other new or impacted intersections and accesses shall accommodate all traffic movements accessing OR174 and the local road network including, but not limited to, Trim Road, Jeanne d'Arc Boulevard North, Inlet Private, Trim Park and Ride, South Frontage, Dairy Drive, Taylor Creek Drive and associated property accesses that are affected as the result of Works. DB Co shall undertake necessary traffic analysis and confirm the geometry, lane configuration, and traffic control types for all new and impacted Roadways, accesses, intersections, and roundabouts within the local road network can feasibly accommodate the existing, staged construction and future traffic demand considering projected traffic and transit volumes for a 2031 horizon year, including pedestrian and cyclist movements.
- A. The analysis shall include, but not be limited to, a network analysis and intersection operation analysis, including traffic operations for the existing Trim Road and OR174 intersection, new proposed signalized intersection for Trim Road and OR174, Trim Park and Ride and existing roundabouts, including area Roadways (including, but not limited to, Jeanne d'Arc

Boulevard North, Inlet Private, Trim Park and Ride, South Frontage, Dairy Drive and associated property accesses).

- B. DB Co's traffic and transit analysis shall address all vehicular access, traffic and transit requirements associated with the existing and realigned Trim Road / OR174 intersection improvements as a whole. The analysis shall also consider existing and potential developments in the area, and connectivity for pedestrians and cyclists.
 - i. DB Co shall also consider any transit priority measures required along both the existing and realigned Trim Road and the associated intersections that are impacted as the result of the Works in order to optimize transit operations in/out of Trim station and in/out of Trim Park and Ride facility. DB Co shall seek the approval of the City and OC Transpo prior to proceeding with the implementation of any proposed transit signal priority measures.
 - C. The results of the intersection operations analysis shall include, but not be limited to intersection layout configuration, traffic control types, and auxiliary storage lane requirements as per the requirements of the City of Ottawa TIA guidelines.
 - D. DB Co shall summarize and submit the findings/ recommendations from the analysis in a detailed report to the City of Ottawa for approval in the early stages of the preliminary design, a minimum of 20 Business Days prior to initiating the detailed design.
- (ix) The design and construction of the Trim Road and OR174 intersection modifications shall account for and include all modifications necessary to accommodate the requirements for the OR174 widening or realignment and Trim Park and Ride Facility improvements, as required to construct the Works.
 - (x) DB Co shall confirm through the traffic analysis noted above that the existing intersections at Trim Road and Jeanne d'Arc Boulevard North / Inlet Private and at Trim Road and Dairy Drive have sufficient traffic capacity for the projected traffic volumes. Based on the results of the traffic analysis, DB Co shall design and construct the required modifications, including intersection control type, to the intersections to provide for the additional capacity required..
 - (xi) DB Co shall design and construct all pedestrian and cycling facilities per the requirements of Schedule 15-2, Part 6 - Urban Design, Landscape Architecture and Connectivity Requirements.
 - (xii) Trim Park and Ride Facility:
 - A. DB Co shall design and construct the Trim Park and Ride Facility to include a bus station Facility with dedicated space for public parking. The

bus station Facility shall include a bus loop, bus bays, bus lay-bys, and bus station Platforms, ensuring all necessary bus movements are accommodated per OC Transpo's Transitway and Station Design Guidelines.

- i. The proposed improvements, and the specific functional and performance requirements, such as number of parking spaces, bus Platforms, and bus lay-bys and bus bays required for the Trim Park and Ride Facility shall meet the requirements of Schedule 15-2, Part 4, Article 3 – Station Specific Architectural Design Criteria and Schedule 15-2, Part 4, Appendix A.
- B. DB Co shall design and construct all the proposed improvements at the Trim Park and Ride as per the standards and requirements specified in Clause 6.9 of this Part 2, unless specified otherwise in Clause 6.19 of this Part 2.
- C. DB Co's design and construction of the Roadway improvements for Trim Park and Ride shall meet the requirements of Clause 6.18 of this Part 2.
- D. Refer to Schedule 15-2, Part 6, Article 2 – Design Criteria for the connectivity, landscape, and streetscape requirements for the Trim Park and Ride Facility.
- E. DB Co shall design and construct all temporary bus detours, temporary transit operations, traffic staging and access management strategies to ensure access and current functionality of the existing Park and Ride Facility is maintained during staged construction and temporary conditions. Refer to Schedule 15-2, Part 7 – Traffic and Transit Management and Construction Access, for the specific improvements noted above.
- F. DB Co shall design and construct all internal access road layouts to accommodate all mixed traffic access from the existing and realigned Trim Road. The layout of the Park and Ride Facility shall accommodate the turning movements of the appropriate design vehicle according to Clauses 6.8 and 6.9 of this Part 2.
- G. DB Co shall design and construct an access/egress to the mid-block of the proposed realigned Trim Road on the east side of the Trim Park and Ride facility in the form of a signalized T-intersection. The lane configuration for the T-intersection with the realigned Trim Road shall meet the requirements of Appendix A and Appendix B of this Part 2.
 - i. In addition to the lane diagrams shown in Appendix B of this Part 2, DB Co's design and construction of this intersection shall

prohibit the NB left turn movements from the realigned Trim Road in the Trim Park and Ride through this T-intersection

- H. DB Co shall design and construct the Trim Park and Ride Facility to include an exclusive bi-directional bus-only connection including designated single bus lanes, one in each NB and SB directions to accommodate OC Transpo's transit vehicle access/egress to the proposed Trim Park and Ride bus loop facility. The above-noted exclusive bus-only connection shall be located within the existing Trim Road corridor south of OR174 and connect the proposed controlled intersection of OR174 W-S ramp and west general access to the west side of the Trim Park and Ride bus loop in such a way that transit delays resulting from operating in mixed traffic (including pedestrian and cyclist traffic) are minimized. DB Co shall also design and construct a secondary bus access / egress to the bus loop internally through Trim Park and Ride. The secondary bus access / egress to the bus loop shall connect to the proposed signalized T-intersection at realigned Trim Rd located east side of the Trim Park and Ride and include appropriate lane configurations and traffic control improvements to accommodate the necessary Transit operations, at a minimum.
- I. DB Co shall evaluate the existing conditions and provide any widening or Pavement improvements requirement of the existing roads to accommodate safe bi-directional operation of transit vehicles. DB Co shall design and construct the widening within the existing ROW and within the Lands identified in Schedule 20 - Lands.
- J. DB Co shall design and construct all intersections to accommodate transit bus access and operations between the local road networks and the proposed bus station at Trim Park and Ride facility.
 - i. With the exception of the proposed Trim Road / OR174 intersection and the proposed T-intersection to the mid-block of the proposed realigned Trim Road on the east side of the Trim Park and Ride facility for which DB Co shall design and construct signalized intersections, for all other accesses from / to the Trim Park and Ride new intersections, and intersections that are impacted as the result of Works, DB Co shall determine the appropriate traffic control type and necessary intersection improvements required at all existing and proposed intersections and, where warranted, install new transit priority measures to provide precedence to transit operations.
 - ii. DB Co shall develop and confirm type of transit priority measures for each intersection, and shall seek approval from the City and OC Transpo prior to proceeding with the implementation of the proposed transit priority measures.

- K. DB Co shall design and construct the Trim Park and Ride Facility so the development meets the intersection capacity requirements based on the City of Ottawa's TIA guidelines.
- L. DB Co's design and construction of the Trim Park and Ride Facility shall not reuse the existing Pavement structure either partially or totally in the new improvements unless DB Co can satisfy the following conditions:
 - i. DB Co shall undertake a traffic assessment, detailed field survey, geotechnical investigation to evaluate the existing ground conditions, Pavement structure, and associated drainage conditions of the existing parking site.
 - ii. DB Co shall identify any risks associated with the substandard drainage and underlying ground conditions, evaluate the existing Pavement failure patterns and report on the adequacy of the existing subgrade and Pavement structure, and calculate the remaining service life of the existing Pavement structure using appropriate lab and field tests and design methods. DB Co shall develop site specific improvements and Pavement rehabilitation strategies in the proposed design and construction of Trim Park and Ride Facility to demonstrate that an acceptable design service life of the Pavement can be achieved that can meet or exceed the requirements of Clauses 6.10, 6.12, and 6.13 of this Part 2, and Clause 4.3 - Table 1-4.1 of Schedule 15-2, Part 1 – General Requirements.
 - iii. DB Co shall submit the findings, results, and recommendations of the above-noted investigations in the form of a comprehensive report and receive approval from the City of Ottawa prior to advancing the design that would make use of the existing Pavement in the proposed design and construction of the Trim Park and Ride Facility.
- M. DB Co shall design and construct the SWM requirements associated with the improvements to the Trim Park and Ride per Article 5 – Drainage and Stormwater Management Design Criteria, and Article 8 – Utility Infrastructure Design Criteria, of this Part 2.

(h) Richmond Road Complete Streets Improvements

- (i) The Works cover a section of Richmond Road, approximately 1,925m long, between a point 225m west of the existing McEwen Avenue / Richmond Road intersection and a point 140m east of the existing Cleary Avenue / Richmond Road intersection. The construction shall include the full reconstruction of all existing intersections impacted by the Richmond Road Complete Streets improvements.

- A. DB Co shall coordinate and make necessary arrangements with the City to ensure a feasible transition at the extents of the Works, integrating the proposed Richmond Road Complete Streets improvements with the existing lane configurations.
- (ii) DB Co shall design and construct the proposed improvements on Richmond Road according to the Design Criteria and minimum auxiliary storage length requirements included in Appendix A of this Part 2.
- (iii) DB Co shall limit the impacts to existing properties as a result of the design and construction of the vertical alignment in accordance with Clause 6.4 of this Part 2 and grading requirements in accordance with Clause 6.12 of this Part 2.
- (iv) DB Co shall ensure all grading along Richmond Road will contain all overland stormwater flows originating from within the City's ROW, maintaining positive drainage towards the appropriate municipal stormwater infrastructure, avoiding overflow onto adjacent private properties.
- (v) DB Co shall design and construct municipal infrastructure and utility relocations and conflicts in accordance with the requirements of Article 5 – Drainage and Stormwater Management Design Criteria, and Article 8 – Utility Infrastructure Design Criteria, of this Part 2.
- (vi) DB Co shall design and construct the intersections along Richmond Road impacted by the Works to meet the corresponding minimum lane configuration diagrams shown in Appendix B of this Part 2. DB Co shall design and construct the Richmond Road corridor and all intersections, including the improvements required on all impacted cross-roads, to meet the requirements of Complete Street standards. DB Co's design shall accommodate the following specific intersection improvements:
 - A. DB Co shall realign McEwen Avenue with Richmond Road to eliminate the skew angle at the existing intersection location, as per the TAC GDGCR.
 - B. DB Co's design shall accommodate feasible traffic operations, including fully protected left-turn signal phases, in both the EB and WB directions at the intersection of Richmond Road / Woodroffe Avenue. DB Co shall design and construct all the necessary Roadway and intersection improvements to avoid conflicting with opposing traffic movements and the bi-directional cycling facility specified on the southern (NB) approach to the intersection.
 - C. DB Co shall design and construct Ancaster Avenue between Richmond Road and Byron Avenue to prohibit the northbound left turn movement from Ancaster Avenue onto Richmond Road, including traffic signs.

- D. As per Schedule 15-2, Part 6 - Urban Design, Landscape Architecture and Connectivity Requirements, Redwood Avenue shall be closed at Richmond Road. In addition, DB Co shall realign Redwood Avenue to form a T-intersection with Byron Avenue at a right angle, eliminating the existing direct vehicular access between Richmond Road and Byron Avenue using Redwood Avenue. DB Co shall realign the new intersection at Redwood Avenue in-line with the proposed bi-directional cycling crossing on the northern (SB) approach to Cleary Avenue as per Clause 6.19(h)(vii)(C) of this Part 2.
- E. DB Co shall formally close vehicular access from Edgeworth Avenue to Richmond Road. DB Co shall design and construct a 3.0m paved bi-directional bike lane and sidewalk connecting Edgeworth Avenue with Richmond Road.
- F. For additional related road closures as a result of the Byron Linear Park improvements, DB Co shall refer to Schedule 15-2, Part 6 – Urban Design, Landscape Architecture and Connectivity Requirements.
- (vii) Cycling facilities on Richmond Road shall be in the form of unidirectional raised cycle tracks on the north and south side of Richmond Road, unless otherwise specified in the segments along Richmond Road noted below:
 - A. DB Co shall design and construct bi-directional raised cycle tracks on the south side in the section of Richmond Road between NCC's Pinecrest Creek Pathway connection to Richmond Road immediately west of [REDACTED] to the existing western dead-end limit of Byron Avenue, west of where Byron Avenue turns to Richardson Avenue.
 - B. DB Co shall design and construct bi-directional raised cycle tracks on the south side in the section of Richmond Road between the SW and SE quadrants at the intersection of Richmond Road and Woodroffe Avenue.
 - C. DB Co shall design and construct a bi-directional cycling pathway between the proposed cross-ride on Richmond Road, east of Cleary Avenue and the realigned Redwood Avenue intersection at Byron Avenue as per Clause 6.19(h)(vi)(D) of this Part 2, forming a north-south cycling facility connection between Richmond Road and Byron Avenue / Redwood Avenue.
- (viii) Refer to Schedule 15-2, Part 6 – Urban Design, Landscape Architecture and Connectivity Requirements, for additional design and construction requirements, including but not limited to, access modifications, landscaping, road furniture, and streetscapes elements along the Richmond Road and Byron Avenue.
- (ix) DB Co shall design and construct the signalized intersections along Richmond Road to include the improvements illustrated in Appendix D of this Part 2, but not

limited to, intersection widenings and realignments, travel lanes and auxiliary lanes, Pavement markings, intersection crossing treatments, and provisions for all pedestrian and cycling facilities and connections. The signalized intersections along Richmond Road include McEwen Avenue, New Orchard Avenue, Woodroffe Avenue, and Cleary Avenue.

- A. DB Co shall design and construct the above-noted intersection improvements to include the typical characteristics and elements for Protected Intersections as per Clause 6.6 (e) and Appendix D of this Part 2.
 - B. DB Co shall design and construct raised intersections at the intersections of New Orchard Avenue and Cleary Avenue on Richmond Road per the requirements of Schedule 15-2, Part 6 – Urban Design, Landscape Architecture and Connectivity Requirements.
- (x) DB Co shall design and construct signalized mid-block pedestrian crossing facilities in the form of City’s typical “Type B – PXO” as per the City of Ottawa’s Document 1 - Examples for PXO Types and Document 2 - City of Ottawa PXO Program at the following locations on Richmond Road:
- A. Approximate mid-lock location between Hartleigh Avenue and Richardson Avenue;
 - B. Immediately across from the Allison Avenue / Byron Avenue intersection;
 - C. Approximately 20m east of the existing Lockhart Avenue / Richmond Road intersection; and,
 - D. Approximately 166m east of the existing Lockhart Avenue / Richmond Road intersection.
- (xi) DB Co shall design and construct raised pedestrian and cycling crossings across all private approaches and crossroads listed below:
- A. Ancaster Avenue, and,
 - B. Lockhart Avenue.
- (xii) DB Co shall design and construct the necessary temporary improvements on Richmond Road as required to support unobstructed pedestrian access and uninterrupted traffic and transit operations during staged construction and temporary conditions. For the details of such temporary improvements, refer to Schedule 15-2, Part 7 - Traffic and Transit Management and Construction Access.
- (xiii) In extremely constrained conditions, such as the EB right turning movement at the intersection of Richmond Road and Woodroffe Avenue, where accommodations for the controlling design vehicle turning movements may not be feasible within

available ROW and/or without compromising planning, and design requirements specified in this Part 2 and Schedule 15-2, Part 6 – Urban Design, Landscape Architecture and Connectivity Requirements, DB Co shall identify and closely coordinate with the City to develop a feasible alternative design solution.

- A. The development of the design solution shall include the evaluation of other feasible design solutions to consider the advantages and disadvantages of each alternative.
 - B. DB Co shall demonstrate to the City, early in the preliminary design stage, how the necessary turning movements can be accommodated by compromising some design elements without compromising public safety or putting vulnerable users at risk. DB Co's proposed design solution shall be subject to the requirements of Schedule 15-2, Part 2, Article 6.18 – Road Safety Audits and Road Safety Design Reviews.
 - C. For any alternative design solutions, DB Co shall receive approval from the City 60 calendar days prior to issuing their Pre-Final Design Development submission per the requirements of Schedule 10 – Review Procedure for any such design compromises required in order to accommodate the controlling design vehicle turning movement.
- (xiv) DB Co's design and construction of Richmond Road shall reference Schedule 15-2, Part 4, Appendix E for permanent bus stop locations and meet the requirements of Article 6.9 of this Part 2.
- (i) Carling Avenue
- (i) DB Co shall design and construct the necessary temporary improvements on Carling Avenue as required in the section between the west of Edgeworth Avenue and the east of Connaught Avenue to support the pedestrians' accesses and uninterrupted traffic and transit operations during staged construction and temporary conditions. For the details of such temporary improvements refer to Schedule 15-2, Part 7- Traffic and Transit Management and Construction Access.
 - (ii) DB Co shall design and construct the necessary permanent improvements on Carling Avenue cross-section and on all accesses, ramps and intersections between the west of Edgeworth Avenue and the east of Connaught Avenue that are impacted as the result of Works as follows:
 - A. DB Co's design shall accommodate and improve all accesses from / to the adjacent properties including [REDACTED] that are impacted as the result of Works on Carling Avenue.
 - B. DB Co shall upgrade the Carling cross-section as per the requirements of the corresponding Design Criteria and lane configuration diagrams specified in Appendices A and B of this Part 2, respectively. The

improved Carling Avenue cross-section shall accommodate new raised cycle tracks for both the EB and WB directions of traffic. DB Co shall segregate the proposed raised cycle tracks from both the adjacent sidewalks and the adjacent curb lane by at least minimum 0.3m hard surface buffer. For additional requirements related to pedestrian connectivity treatments and LRT and bus station facilities used by pedestrians refer to Schedule 15-2, Part 4 – Stations, and Schedule 15-2, Part 6 – Urban Design, Landscape Architecture and Connectivity Requirements.

- C. DB Co's design shall improve the proposed Lincoln Fields bus station and PPUDO access from / to Carling Avenue so that the existing signalized intersection layout and geometry will be improved as required in order to feasibly accommodate necessary bus and general traffic operations as well as non-vehicular movement and access including appropriate travel lanes, auxiliary lanes, sidewalk, median improvements, crosswalks and cross-rides and necessary transitions to tie-in to the existing conditions. For the proposed Lincoln Fields Bus station and PPUDO functional requirements refer to Schedule 15-2, Part 4 – Stations.
- D. DB Co shall design and construct a new signalized mid-block pedestrian crossing facility with associated cross-rides, crosswalk and a mid-block refuge treatment to allow for a 2-stage pedestrian crossing operation. DB Co shall locate the proposed pedestrian crossing facility at an approximate mid-block location between Lincoln Fields bus station access and the existing SJAM Parkway ramps, across the existing pathway ([REDACTED]) connection to the Carling Avenue southern sidewalk. The proposed pedestrian crossing signal shall accommodate the necessary signal heads and push buttons at all necessary locations and shall meet the requirements of the OTM (OTM Book 15, OTM Book 18, and OTM Book 12) guidelines.
- E. In all cases noted above, the intersections geometry layout shall accommodate the appropriate design vehicle and the intersection Pavement marking design shall provide for cross-ride facilities as per the requirements of the OTM Book 18 guidelines.

(j) Iris Street

- (i) DB Co shall design and construct the necessary temporary improvements on Iris Street and its impacted intersections, and bus transit facilities between north of Carling through to Baseline that are impacted as the result of Works as required to support the pedestrians' accesses and uninterrupted traffic and transit operations during staged construction and temporary conditions. For the details of such temporary improvements refer to Schedule 15-2, Part 7- Traffic and Transit Management and Construction Access.

- (ii) DB Co shall design and construct the necessary permanent improvements on Iris Street geometry and layout and on all Iris Street intersections and private property driveways that are impacted as the result of Works.
 - A. DB Co shall design and construct a road / rail grade separated facility including approach embankments under Iris Street at the mid-block location between Iris Street intersections with Adirondack Drive and Parkway Drive, where the proposed Iris Street crosses over the proposed LRT corridor. For the details of the proposed bridge structure requirements refer to Article 4 – Structural Design Criteria and Requirements of this Part 2.
 - B. DB Co's design shall accommodate the necessary permanent road cross-section improvements proposed for the Iris Street as per the requirements of the corresponding Design Criteria and lane configuration diagrams specified in Appendices A and B of this Part 2, respectively.
 - i. DB Co's design shall accommodate a new mid-block controlled pedestrian crossing on Iris Street in order to connect the proposed MUPs on the south side and north side of Iris Street. The design of the proposed pedestrian crossing facility shall meet the requirements of the OTM (OTM Book 15, and OTM Book 12) guidelines. DB Co shall select the optimum location of the proposed pedestrian crossing facility on Iris Street to enhance vehicular and non-vehicular traffic safety, operations and connectivity at this location considering the Iris Street vertical profile geometry, the PPUDO locations, the MUP realignments and grades, the bus stop locations, and the necessary stopping sight distance requirements as per the Iris Street corresponding Design Criteria. In particular, the location of the proposed pedestrian crossing facility shall maintain the grades of the proposed MUPs not to exceed 5%. For additional requirements for the proposed MUPs, PPUDOs and pedestrian connectivity refer to Schedule 15-2, Part 4 – Stations, and Schedule 15-2, Part 6 – Urban Design, Landscape Architecture and Connectivity Requirements.
 - C. DB Co shall design the Iris Street/LRT grade separated facility so that the Iris Street grade raise profile would be constructed on an embankment and the Track profile would be partially constructed in a cut section. The recommended profile for Iris Street grades shall be limited to a range between 3.5% and 5%. Only under constrained conditions and in short length sections less than 15m, maximum grades greater than 5% up to an absolute maximum of 6% may be acceptable. In all cases, DB Co's proposed profile design shall meet all the requirements of vertical curve geometry as per this Appendix A and applicable vertical curve and profile geometries and sight distance requirements as per this Article 6 as well as

the vertical clearance required underneath the bridge deck as per Article 4- Structural Design Criteria and Requirements of this Part 2.

- D. DB Co shall design and construct the necessary grading, SWM and drainage facilities, and vertical support systems for the proposed Iris Street in order to minimize the area impacts associated with the road embankment footprint and consistent with the requirements of the proposed Pinecrest Creek realignment including its associated grading and the proposed Pinecrest bridge Culvert. For additional requirements for the proposed Pinecrest Creek realignment and its associated grading refer to Article 5 – Stormwater Management and Drainage of this Part 2. For additional requirements for the proposed Pinecrest Creek bridge Culvert structure under Iris Street refer to Article 4 – Structural Design Criteria and Requirements of this Part 2. For the specific landscaping requirements of Pinecrest Creek realignment refer to Schedule 15-2, Part 6, Article 4 – Site Specific Desired Outcomes.

(k) Scott Street

- (i) In addition to all the necessary temporary improvements including traffic staging detours intersections, and bus transit facilities required on Scott Street as specified in Schedule 15-2, Part 7- Traffic and Transit Management and Construction Access, DB Co shall also design and construct the following final improvements and reinstatements as a part of the Scott Street reinstatement Works at the western leg of the Churchill Ave. / Scott Street, in order to meet the requirements of the existing [REDACTED] business property located at [REDACTED]:

- A. DB Co shall design and construct all the reinstatements and improvements as required for the section of Scott Street west of Churchill Avenue as described below:
- i. DB Co shall design and construct Scott Street west of Churchill Avenue to a minimum 6.0m wide urban cross section approaching the existing cul-de-sac. The cross section shall include a new 1.8m wide sidewalk along the south side and maintain all existing connections to existing pathways and sidewalks. This section of Scott Street shall be signed as a fire route.
 - ii. DB Co shall reinstate and improve the existing or reconstruct a new paved cul-du-sac that meet the requirements of the above-noted restaurant facility's general traffic and emergency and maintenance vehicular access using the appropriate design vehicles as specified in Appendix A of this Part 2.
 - iii. DB Co shall design and construct five perpendicular parking spaces on the north side of Scott Street and two perpendicular parking spaces on the south side of Scott Street, between Churchill

Avenue and the Scott Street cul-de-sac, per the requirements of the City of Ottawa's Parking By-Law No. 2003-530. DB Co's design shall include paved parking spaces.

- iv. DB Co shall design and construct all necessary improvements required at Scott Street / Churchill Avenue intersection associated with the above noted reinstatement and new construction.
- (ii) In addition to all the necessary temporary improvements including traffic and transit staging detours, and bus transit facilities required on Goldenrod Driveway and Scott Street / Goldenrod Driveway intersection as specified in Schedule 15-2, Part 7- Traffic and Transit Management and Construction Access, DB Co shall also design and construct the following final improvements and reinstatements as a part of the Scott Street and Goldenrod Driveway improvement Works:
- A. DB Co shall design and construct all necessary improvements required on an approximately +/-140m section of Goldenrod Driveway between north of Goldenrod Driveway / Yarrow Driveway intersection and south of Scott Street / Smirle Avenue intersection.
 - i. DB Co's design of horizontal alignment and vertical profile geometry of the proposed Goldenrod Driveway shall accommodate the location and vertical clearance requirements of the new Goldenrod Bridge as per Schedule 15-2, Part 2, Article 4 – Structural Design Criteria and Requirements.
 - ii. DB Co's design shall include and accommodate all necessary vehicular and pedestrians and cyclist accesses and sidewalk and pathway connections along and across Goldenrod Driveway and from / to the proposed bus terminal at Tunneys Pasture Station in accordance with Schedule 15-2, Part 4 – Stations.
 - B. DB Co shall design and construct Scott Street between Ross Avenue and Caroline Avenue to meet the requirements of Appendices A and B of this Part 2. DB Co shall design and construct the widening on Scott Street to the north, which shall include all necessary intersection improvements, sidewalk, cycling facilities and pathway connections, to accommodate the movement of all road users, including vehicular traffic, pedestrians and cyclists, within the Scott Street corridor.
 - C. DB Co shall design and construct a new signalized intersection at the location of the Scott Street / Goldenrod Driveway intersection to accommodate all the necessary vehicular, pedestrian, and cyclists movements. DB Co shall design and construct Scott Street / Goldenrod Driveway/ Smirle Avenue to meet the requirements of a typical Protected Intersection as per Clause 6.6(e) of this Part 2.

- i. DB Co shall design and construct a 1.8m raised EB cycle track on the approach and departure from the above-mentioned intersection. On the approaches to the above-mentioned intersection in the WB direction, DB Co shall construct a 1.8m wide WB bike lane. For additional connectivity requirements, refer to Schedule 15-2, Part 7 – Traffic and Transit Management and Construction Access.
 - (iii) In extremely constrained conditions where accommodations for the controlling design vehicle turning movements may not be feasible within available ROW and/or without compromising planning, and design requirements specified in this Part 2 and Schedule 15-2, Part 6 – Urban Design, Landscape Architecture and Connectivity Requirements, DB Co shall identify and closely coordinate with the City to develop a feasible alternative design solution.
 - A. The development of the design solution shall include the evaluation of other feasible design solutions to consider the advantages and disadvantages of each alternative.
 - B. DB Co shall demonstrate to the City, early in the preliminary design stage, how the necessary turning movements can be accommodated by compromising some design elements without compromising public safety or putting vulnerable users at risk. DB Co's proposed design solution shall be subject to the requirements of Schedule 15-2, Part 2, Article 6.18 – Road Safety Audits and Road Safety Design Reviews.
 - C. For any alternative design solutions, DB Co shall receive approval from the City 60 calendar days prior to issuing their Pre-Final Design Development submission per the requirements of Schedule 10 – Review Procedure for any such design compromises required in order to accommodate the controlling design vehicle turning movement.
 - (l) Woodroffe Avenue
 - (i) DB Co shall design and construct all temporary improvements and modifications to Woodroffe Avenue from Baseline Road to north of Iris Street, including all affected driveway accesses and intersections in order to support the construction of Works. Refer to Schedule 15-2, Part 7 – Traffic and Transit Management and Construction Access, for the description of necessary site-specific improvements on affected Roadways, ramps, and intersections in order to accommodate the appropriate traffic and transit operations under staged conditions.
 - (ii) DB Co shall design and construct all permanent improvements and modifications to Woodroffe Avenue from Baseline Road to north of Iris Street, including all affected driveway accesses, intersections, boulevards, sidewalks and cycle tracks, in order to support the construction of Works as follows:

- A. DB Co shall maintain the existing lane configuration, including number of through lanes and auxiliary lanes, at all the affected intersections along Woodroffe Avenue from Baseline Road to north of Iris Street. DB Co shall maintain the existing storage lengths along Woodroffe Avenue and intersecting roadways.
- B. Where opportunities exist, DB Co shall maximize the width of ultimate urban cross sectional elements on Woodroffe Avenue and provide for the following width requirements:
 - i. The minimum width of the inside lane shall be 3.25m and the minimum width of outside lane shall be 3.5m.
 - ii. The minimum width of auxiliary left turning lanes shall be 3.4m.
 - iii. The desirable minimum width of the boulevard shall be 1.5m between the cycle track and travelled lanes.
 - 1 Where physical constraints exist at the intersection of Iris Street and Woodroffe Avenue, the minimum width of the boulevard shall be 0.5m.
 - iv. The desirable minimum width of the raised cycle track shall be 1.8m.
 - 1 Where physical constraints exist at the intersection of Iris Street and Woodroffe Avenue, the minimum width of the cycle track shall be 1.5m.
 - v. The desirable minimum width of the adjacent sidewalk shall be 2.0m, delineated from the adjacent cycle track by a minimum 0.3m wide hard surfaced buffer.
 - 1 Where physical constraints exist at the intersection of Iris Street and Woodroffe Avenue, the minimum width of the sidewalk shall be 1.5m. Under constrained conditions, the width of the buffer may be incorporated into the width of the sidewalk.
- C. DB Co shall design and construct a new pedestrian crosswalk and crossride facility at the location of the existing midblock crossing between Baseline Road and Adirondack Drive as per OTM Book 15 and Book 18.
 - i. The new midblock crossing facility shall be signalized and include 2 separate sets of pedestrian crosswalk and crossride facilities that are offset from each other on opposite sides (north and south) of

the driveway at the fire station, located at 1300 Woodroffe Avenue.

- ii. The above-noted midblock crossing facility shall be designed and constructed to operate under one coordinated crossing signal operation as per the requirements of Article 6.14 – Traffic and Transit Signals to the satisfaction of the City.

- D. The pedestrian and cycling facilities constructed on Woodroffe Avenue as part of the staged construction improvements specified in Schedule 15-2, Part 7 – Traffic and Transit Management and Construction Access shall remain following the construction of Works.
- E. DB Co shall design and construct appropriate transition to tie the new improvements into existing conditions between Baseline Road to north of Iris Street.
- F. DB Co shall ensure all required turning movements are accommodated as per the requirements of Article 6.8 – Design Vehicles to the satisfaction of the City.

(m) Corkstown Road

- (i) DB Co shall design and construct all the necessary temporary improvements on Corkstown Road, associated accesses and intersections, and adjacent Transitway and bus station facilities as required to accommodate pedestrian accesses and uninterrupted traffic and transit operations during staged construction and temporary conditions. For the details of such temporary improvements, refer to Schedule 15-2, Part 7 - Traffic and Transit Management and Construction Access.
- (ii) DB Co shall undertake a TIA study, including a detailed intersection operations and level of service analysis considering vehicular and non-vehicular road users needs on all new and existing intersections on Corkstown Road that are impacted as the result of Works. DB Co shall demonstrate that the traffic and transit operations and associated levels of service are acceptable and feasible using projected traffic volumes and expected transit operations for 2031 horizon year, including pedestrian and cyclist movements.
 - A. The results of the intersection operations analysis shall include, but not be limited to intersection layout configuration, traffic control types, and auxiliary storage lane requirements as per the requirements of the City of Ottawa TIA guidelines.
 - B. DB Co shall submit to the City the results of above-noted traffic analysis report and seek approval from the City at least 20 calendar days prior to initiating the development of the geometric design.

- (iii) DB Co shall design and construct all the permanent improvements for the Corkstown Road corridor, including existing and new intersections and accesses, the adjacent Transitway, bus station facilities and associated bus accesses that are impacted or required as a result of the Works, according to the requirements of this Article 6 and Appendix A and Appendix B of this Part 2.
 - A. DB Co shall be responsible for the design and construction of all such improvements if DB Co's traffic and transit assessment, modelling and analysis determine that additional traffic lanes and improvements are required at any of the new or existing intersection(s) on Corkstown Road corridor in addition to the information shown in Appendix B of this Part 2.
- (iv) DB Co shall design all Transitway bus access requirements from / to Moodie Station to meet the requirements of the City and seek approval from the City as a part of the above-noted traffic analysis report.
- (v) DB Co shall design and construct two PPUDOs on Corkstown Road, one on either side of Moodie Station, per the requirements of Schedule 15-2, Part 4 – Stations.
 - A. If the walking distance between the proposed location of the PPUDO west of Moodie Station and the entrance to Moodie Station is greater than 200m, DB Co shall design and construct an eastbound and westbound bus stop in accordance with the requirements of Schedule 15-2, Part 4, Appendix E, a controlled intersection and PXO across Corkstown Road.
 - i. As a minimum, DB Co shall design and construct a PXO – Type C across Corkstown Road as per OTM Book 15 and the City of Ottawa, Pedestrian Crossover Program and Examples Documents 1 and 2, and Appendix K of this Part 2, to accommodate safe and direct pedestrian access from / to the proposed Transitway bus access at Moodie Station and the surrounding community. DB Co shall complete a traffic study to finalize the traffic control type and lane configuration and review with the City with respect to the type of controlled crossing device to be implemented (pedestrian signal, full traffic signal, or PXO Type B, or C). DB Co shall implement the type of controlled crossing device selected by the City.
 - B. For improvements required on the existing PXO across Corkstown Road east of Moodie Station, DB Co shall refer to Schedule 15-2, Part 6 – Urban Design, Landscape Architecture and Connectivity Requirements. In the design and construction of the above-noted controlled crossings.
 - C. DB Co shall ensure the crossing facilities meet the appropriate sight distance requirements as per the TAC GDGCR and the safety audit requirements as Clause 6.18 of this Part 2.

- D. DB Co shall coordinate with the City to determine the appropriate traffic control type traffic control devices location and bus stop locations at least 20 calendar days prior to the submission of the PFDD and design and construct the controlled intersection to meet the OC Transpo's service and operational requirements accordingly.
- (vi) For additional requirements related to pedestrian connectivity treatments and Station facilities used by pedestrians from to Moodie Station and from / to the PPUDO, refer to Schedule 15-2, Part 4 – Stations, Appendix A of Schedule 15-2, Part 4, and Schedule 15-2, Part 6 – Urban Design, Landscape Architecture and Connectivity Requirements.
- (vii) DB Co shall design and construct Corkstown Road to permit one-way general traffic in the westbound direction, with general traffic in the eastbound direction limited to between Moodie Drive and the west PPUDO.
 - A. DB Co's design shall accommodate full inbound and outbound bus access at the east bus turnaround for Moodie Station to/ from existing Corkstown Road. At the west end of Moodie Station, bus access shall be provided from the intersection of Moodie Drive and Corkstown Road.
- (n) Moodie Extension Improvements
 - (i) All temporary and permanent improvements associated with the Confederation Line between Bayshore Station and the Moodie LMSF, including Holly Acres Road, Moodie Drive, interchange ramps and intersections, which interfaces between Highway 417 and municipal roadways, shall satisfy the requirements of Schedule 15-2, Part 9, Part B.

6.20 Provincial Roads Improvements

- (a) Highway 417
 - (i) DB Co shall refer to Schedule 15-2, Part 9 – Highway Works for all the design and construction requirements interfacing with MTO's Hwy 417.

6.21 Federal Roads Improvements

- (a) SJAM Parkway – north of [REDACTED] to Dominion
 - (i) DB Co shall design and reconstruct approximately +/- 1,650m of the SJAM Parkway corridor from a section north of [REDACTED], across SJAM Parkway to a section east of the proposed Dominion Station.
 - (ii) DB Co shall design and construct the temporary improvements on the SJAM Parkway eastbound and westbound travel lanes in the form of traffic detours and lane realignments in order to accommodate the construction of the proposed SJAM Parkway improvements specified in Clause 6.21(a) of this Part 2. For the

details of such temporary improvements refer to Schedule 15-2, Part 7 - Traffic and Transit Management and Construction Access.

- (iii) DB Co's design and construction of the Roadway improvements for the proposed SJAM Parkway in this section shall meet the requirements of Clause 6.18 of this Part 2.
- (iv) DB Co shall reference the design information noted in this Clause 6.21(a) and develop a consistent and compliant Roadway corridor design meeting the following specific requirements:
 - A. DB Co shall design and construct the proposed SJAM Parkway within the limits of construction with the objective of enforcing a lower operating speed such that the intended design speed and posted speed limit of the SJAM Parkway shall meet the requirements of Appendix A of this Part 2.
 - i. DB Co shall demonstrate, in the design submittals as per Schedule 10 – Review Procedure, how their proposed detailed design meets the requirements of Clause 6.21(a) of this Part 2 and all other improvements required for SJAM Parkway corridor under this PA within Lands. DB Co shall undertake additional design coordination and provide early documentation as specified in the Basis of Design reports submittals requirements for Federal Roadways as per Schedule 10 – Review Procedure to ensure a compliant design can be achieved that meets the City's requirements at an early stage of the preliminary design.
 - B. DB Co shall design the horizontal alignment, vertical profile, and cross section of the proposed SJAM Parkway corridor according to the Design Criteria specified in Appendix A and Appendix C of this Part 2.
 - i. Appendix C of this Part 2 includes the horizontal and vertical geometry and curve data for the proposed control line of the proposed SJAM Parkway.
 - ii. Appendix A and Appendix C of this Part 2 includes the basic elements of the SJAM Parkway's typical cross-section.
 - iii. DB Co shall design and construct appropriate cross falls and superelevations for the proposed SJAM Parkway as per the TAC GDGCR with consideration for the requirements of the applicable clauses of Article 5 - Drainage and Stormwater Management Design Criteria of this Part 2.
 - iv. DB Co shall determine the appropriate superelevation parameters for the proposed SJAM Parkway and demonstrate in the PFDD submission that DB Co's design satisfies the requirements of

Clause 3.2.4 - Development of Superelevation in the TAC GDGCR

- v. DB Co shall design and construct the SJAM Parkway so that the depth of earth cover under the SJAM Parkway compared to the top of Tunnel concrete slab shall be greater than 2.5m at any location where Roadway crosses over the LRT Tunnel, in order to accommodate the design and construction of the Roadway and stormwater management requirements of this Part 2
 - vi. DB Co shall design and construct the appropriate grading to allow (minimum) 6:1 side slopes at all locations where it is physically possible to do so and design and construct all surface drainage elements such as curb and gutters, outlets, bio swales, catch basins, maintenance holes, sewer pipes, ditches, and Culverts for the proposed SJAM Parkway improvements and MUP Overpass facility and consistent with the requirements of Article 5 – Drainage and Stormwater Management Design Criteria, of this Part 2. For additional grading requirements, DB Co shall meet Schedule 15-2, Part 6 - Urban Design, Landscape Architecture and Connectivity Requirements.
- C. For all road hazards that may be located in the vicinity of the proposed SJAM Parkway corridor within the limits of construction, DB Co shall undertake a roadside design analysis according to the design criteria specified in Chapter 7 – Roadside Design of the TAC GDGCR and develop appropriate improvement measures that meet the requirements of this Article 6 and also seek the City’s approval prior to submitting the PFDD submittal.
- (v) DB Co shall design and construct a pedestrian Overpass bridge including approach embankments under the proposed SJAM Parkway corridor that can accommodate direct pedestrian access via a MUP connection between the proposed MUP network located south of the SJAM Parkway and the NCC’s proposed linear park MUP(s) network located north of the proposed SJAM Parkway corridor. For the site-specific requirements for the proposed MUP connection, refer to Article 4 – Structural Design Criteria and Requirements, of this Part 2 and Schedule 15-2, Part 6 – Urban Design, Landscape Architecture and Connectivity Requirements.
- A. Appendix C of this Part 2 provides the approximate location of the proposed Cleary pedestrian Overpass.
- (vi) DB Co shall accommodate all the requirements of Clause 6.14 of this Part 2 for the design and construction of the following two at-grade signalized pedestrian crossing facilities located:

- A. The Rochester Field pathway crossing that is located between the NCC's Rochester Field MUP network, south of the proposed SJAM Parkway corridor and the NCC's proposed linear park MUP(s) network located north of SJAM Parkway corridor as shown in Appendix C of this Part 2; and,
 - B. The Dominion pathway crossing that is located between the proposed Dominion Station MUP network, south of the proposed SJAM Parkway corridor and the NCC's proposed linear park MUP(s) network located north of proposed SJAM Parkway corridor as shown in Appendix C of this Part 2.
- (vii) The City will supply and install all temporary and permanent aboveground traffic signal infrastructure at both of the Rochester Field and Dominion at-grade pedestrian crossing facilities as required by the NCC, per the requirements of Clause 6.14 of this Part 2.
 - A. The City shall supply all traffic signal posts, arms and accessories/hardware painted glossy black.
 - B. The City shall supply traffic signal heads and back boards with yellow fronts and black backs.
- (viii) The at-grade pedestrian crossings shall not be located where the Roadway crossfall or superelevation exceeds +2% or -2%. For additional information regarding the location and site-specific requirements of the above-noted at-grade pedestrian crossing facilities refer to Schedule 15-2, Part 6 - Urban Design, Landscape Architecture and Connectivity Requirements and all associated NCC's proposed landscape plans that are included in the pertinent Part 6 appendices.
 - A. All Pavement markings, Roadway signs and traffic signals shall accommodate separate pedestrian crosswalk and cycling Crossrides, pedestrian and cyclists signal head push buttons, and loop detectors, including full actuation and accessible pedestrian signal design that is fully compliant with AODA requirements and as per the requirements of the City of Ottawa's Standard Tender Documents and MTO's OTM books.
 - B. DB Co shall provide automatic detection facilities, as required, for all the proposed signalized intersections in the SJAM Parkway corridor within the limits of Works. The acceptable detection facility types and specifications shall meet the requirements of the appropriate inductive loop detectors, or radar detectors facilities approved by the City.
- (ix) In addition to the specific lighting requirements specified for the SJAM Parkway pedestrian crossing intersections in Clause 6.21 of this Part 2, DB Co shall also undertake a corridor-long lighting design study on SJAM Parkway corridor in the section between the west of the Rochester Field pedestrian crossing facility

through to the east of Kitchissippi lookout intersection in order to determine the adequacy of the lighting transitions between each two lit intersections and to ensure intermediate unlit gap sections on SJAM Parkway will not cause any safety concern, will not impact driver's work load or visibility due to variable or inconsistent lighting conditions. This study shall include specific countermeasures, warrant analysis, and recommendations for new construction, where applicable, and shall meet the requirements of the City of Ottawa's Right of Way Lighting Policy guideline. DB Co shall complete this study and receive the City of Ottawa's approval prior to the initiation of the design stage.

- (x) DB Co shall design and construct both the Rochester Field and Dominion pedestrian crossing facilities to be lit using LED-type luminaire NXT 48M 2ES 7 (Type 2 Distribution, 48W LED, 700mA Consumption, 4000k Colour Temperature) elements and consistent with the requirements of the NCC design drawings, standards and specifications per Appendix F of this Part 2. DB Co shall design and construct the infrastructure to accommodate the proposed illumination light levels specified below:
 - A. The proposed illumination light level on the SJAM Parkway in approach to pedestrian crossing facilities in the section between Cleary and Dominion section shall conform to 9 lux, 3:1 average/min uniformity.
 - i. For added clarity, other than transition sections in approach to pedestrian crossings on SJAM Parkway noted above, the remaining mid-block sections of SJAM Parkway in the sections between pedestrian crossings shall not be illuminated.
 - B. DB Co shall provide a proposed illumination light level of 15 lux, 3:1 average/min uniformity, at the Rochester Field pedestrian crossing facility.
 - C. DB Co shall provide a proposed illumination light level of 15 lux, 3:1 average/min uniformity, on the SJAM Parkway at Dominion pedestrian Crossing facility.
 - D. All street light posts located at the signalized intersections shall follow Street Lighting Standard Detail Drawings from the City of Ottawa's Standard Tender Documents for Material Specifications and Standard Detail Drawings complete with a glossy black powder coat finish.
 - E. Street light posts located at the approaches to intersections shall have a concrete aggregate base and follow approved NCC drawings found in Appendix F of this Part 2.
- (xi) DB Co shall submit a design report including the detailed Design Criteria and seek approval from the City a minimum of 20 Business Days prior to initiating the design.

- (xii) DB Co shall install modified Type Wyoming 830WYBRAIL 2-Tube Curb Mounted (PL-2) guiderail as per details provided in Appendix F of this Part 2.
 - A. DB Co shall install the above noted guiderails and all transitions, terminal elements and end treatments on curbs for the lengths of need in both approach and leaving sections.
 - B. DB Co shall design and construct all terminal elements and end treatments to fall outside of the SJAM Parkway clear zones and be no closer than 3m to the edge of adjacent travel lane, whichever is greater. Paved shoulders shall separate end treatments installed on concrete curbs from the travel lanes.
- (xiii) DB Co shall install vehicle/cyclist steel railing to be attached on top of the modified Wyoming guiderail at the SJAM Parkway WB and EB pedestrian underpass structures as per detail provided in Appendix F of this Part 2.
- (xiv) DB Co shall reference Appendix G of this Part 2 for the site specific utility servicing requirements of the Rochester Field Pathway.
- (xv) DB Co shall reference Schedule 15-2, Part 6 - Urban Design, Landscape Architecture and Connectivity Requirements, including associated appendices, for the urban design and landscape requirements of the Rochester Field Pathway.
- (b) SJAM Parkway at Churchill Avenue MUP Overpass
 - (i) DB Co shall design and reconstruct approximately +/- 450m of the SJAM Parkway corridor at an approximate location where the Churchill Avenue ROW extends further north and intersects with SJAM Parkway corridor.
 - (ii) DB Co shall design and construct the temporary improvements on SJAM Parkway EB and WB travel lanes in the form of traffic detours and lane realignments in order to accommodate the construction of the proposed Churchill Avenue MUP Overpass and associated MUP realignments. For the details of such temporary improvements refer to Schedule 15-2, Part 7- Traffic and Transit Management and Construction Access.
 - (iii) DB Co's design and construction of the Roadway improvements for the proposed SJAM Parkway in this section shall meet the requirements of Clause 6.18 of this Part 2.
 - (iv) DB Co shall reference the design information noted in this Clause 6.21(b) and develop a consistent and compliant Roadway corridor design, meeting the following specific requirements:
 - A. DB Co shall design and construct the proposed SJAM Parkway within the limits of construction with the objective of enforcing a lower operating

speed such that the intended design speed and posted speed limit of the SJAM Parkway shall meet the requirements of Appendix A of this Part 2.

- i. DB Co shall demonstrate, in the design submittals as per Schedule 10 – Review Procedure, how their proposed detailed design meets the requirements of Clause 6.21(b) of this Part 2 and all other improvements required for SJAM Parkway corridor within Lands. DB Co shall undertake additional design coordination and provide early documentation, as specified in the Basis of Design reports submittals requirements for Federal Roadways as per Schedule 10 – Review Procedure, to ensure a compliant design can be achieved that meets the City’s requirements at an early stage of the preliminary design.
- B. DB Co shall design the horizontal alignment, vertical profile, and cross section of the proposed SJAM Parkway corridor according to the Design Criteria specified in Appendix A and Appendix C of this Part 2.
 - i. Appendix C of this Part 2 includes the horizontal and vertical geometry and curve data for the proposed control line of the proposed SJAM Parkway.
 - ii. Appendix A of this Part 2 specifies the basic elements of the SJAM Parkway’s typical cross-section.
 - 1 DB Co shall design and construct the basic cross-section elements of SJAM Parkway at Churchill Avenue MUP Overpass consistent with those of the section of SJAM Parkway – north of [REDACTED] to Dominion as specified in Appendix C of this Part 2.
 - iii. DB Co shall design and construct appropriate cross falls and superelevations for the proposed SJAM Parkway as per the TAC GDGCR with consideration for the requirements of the applicable clauses of Article 5 - Drainage and Stormwater Management Design Criteria of this Part 2.
 - iv. DB Co shall determine the appropriate superelevation parameters for the proposed SJAM Parkway and demonstrate in the Pre-Final Design Development submission that DB Co’s design satisfies the requirements of Clause 3.2.4 - Development of Superelevation in the TAC GDGCR.
- (v) For all road hazards that may be located in the vicinity of the proposed SJAM Parkway corridor within the limits of construction, DB Co shall undertake a roadside design analysis according to the design criteria specified in Chapter 7 – Roadside Design of the TAC GDGCR and develop appropriate improvement

measures that meet the requirements of this Article 6 and also seek the City's approval prior to submitting the Pre-Final Design Development submittal.

- (vi) For the construction of the proposed Churchill Avenue MUP Overpass, DB Co shall design and construct the vertical profile geometry of the SJAM Parkway to include a grade raise to accommodate the clearance requirements of Article 4 – Structural Design Criteria and Requirements, of this Part 2. DB Co's design shall not change the existing horizontal alignment for the SJAM Parkway at this location.
- A. The proposed SJAM Parkway shall meet the requirements of the SJAM Parkway Design Criteria in Appendix A of this Part 2.
 - B. DB Co's design and construction of the roadway improvements for SJAM Parkway shall meet the requirements of Clause 6.18 of this Part 2.
 - C. DB Co shall design and construct a pedestrian Overpass including approach embankments under SJAM Parkway at an approximate location where the Churchill Avenue right of way extends further north and intersects with SJAM Parkway corridor. The proposed MUP Overpass location shall not impact the existing underground utilities including but not limited to the existing 600mm sanitary sewer and 1500mm storm sewer pipes that are currently located along the northerly extension of the Churchill Avenue right of way corridor across SJAM Parkway. For the details of the proposed Overpass Structure requirements refer to Article 4 – Structural Design Criteria and Requirements, of this Part 2.
 - D. DB Co shall design and construct the proposed Roadway improvements according to the requirements of Appendix A of this Part 2. DB Co shall design and construct the horizontal and vertical geometry of SJAM Parkway as per Appendix C of this Part 2.
 - i. For additional pedestrian connectivity requirements for the proposed MUP Overpass and for the realignment of the adjacent MUP network that are impacted as the result of Works refer to Schedule 15-2, Part 6 - Urban Design, Landscape Architecture and Connectivity Requirements.
 - ii. DB Co shall design and construct the appropriate grading to allow (minimum) 6:1 side slopes at all locations where it is physically possible to do so and design and construct all surface drainage elements such as catch basins, maintenance holes, sewer pipes, ditches, and Culverts for the proposed SJAM Parkway improvements and MUP Overpass facility and consistent with the requirements of Article 5 – Drainage and Stormwater Management Design Criteria, of this Part 2. For additional grading requirements

DB Co shall meet Schedule 15-2, Part 6 - Urban Design, Landscape Architecture and Connectivity Requirements

- (vii) DB Co shall install modified Type Wyoming 830WYBRAIL 2-Tube Curb Mounted (PL-2) guiderail as per details provided in Appendix F of this Part 2.
 - A. DB Co shall install the above noted guiderails and all transitions, terminal elements and end treatments on curbs for the lengths of need in both approach and leaving sections.
 - B. DB Co shall design and construct the all terminal elements and end treatments to fall outside of the SJAM Parkway clear zones and be no closer than 3m to the edge of adjacent travel lane, whichever is greater. Paved shoulders shall separate end treatments installed on concrete curbs from the travel.
 - (viii) DB Co shall install vehicle/cyclist steel railing to be attached on top of the modified Wyoming guiderail at the SJAM Parkway WB and EB pedestrian Overpass Structures as per detail provided in Appendix F of this Part 2.
 - (ix) DB Co shall design and construct the MUP pathway underneath the SJAM Parkway to have a minimum elevation of 56.0m. DB Co shall reference Article 4 – Structural Design Criteria and Requirements, of this Part 2, for the Structure, including the minimum clearance requirements.
- (c) SJAM Parkway at Kitchissippi Lookout Intersection
- (i) DB Co shall design and construct a new signalized intersection to provide access to the future parking areas that will be located north and south of the SJAM Parkway. Refer to Clause 6.21 of this Part 2, for the Kitchissippi Lookout signalized intersection. For the proposed MUP and pathway connections, refer to Schedule 15-2, Part 6 - Urban Design, Landscape Architecture and Connectivity Requirements.
 - A. DB Co shall design and construct the final lane configuration, including auxiliary lanes, Pavement markings and location of the proposed signalized intersection and receive approval from the City of Ottawa. Layout drawing F-1 in Appendix F of this Part 2, is for demonstration purposes only and is non-reliant. DB Co shall undertake a TIA study and determine the auxiliary lanes storage requirements at this signalized intersection. DB Co shall determine the appropriate location and layout of the proposed intersection and SJAM Parkway realignment considering the recommendations of the above-noted TIA study, so that efficient and safe accesses can be provided from / to the proposed parking sites with appropriate sight lines, and the proposed utility improvements can be feasibly designed and constructed as per the requirements of Article 8 – Utility Infrastructure Design Criteria, of this Part 2. The design shall not

involve any additional bridge widening work, with the exception of the 3.0m MUP requirement for the WB SJAM Parkway pedestrian underpass structure in Clause (iv) below. Refer to Article 4 – Structural Design Criteria and Requirements, of this Part 2 for the modifications to the SJAM Parkway WB pedestrian underpass structure.

- B. DB Co shall demonstrate, in the design submittals as per Schedule 10 – Review Procedure, how their proposed detailed design meets the requirements of Clause 6.21(c) of this Part 2 and all other improvements required for SJAM Parkway corridor within Lands. DB Co shall undertake additional design coordination and provide early documentation as specified in the Basis of Design reports submittals requirements for Federal Roadways as per Schedule 10 – Review Procedure, to ensure a compliant design can be achieved that meets the City’s requirements at an early stage of the preliminary design.
- (ii) DB Co’s design of SJAM Parkway shall meet the requirements of a 4-lane urban arterial divided cross-section (4L-UAD) as per TAC GDGCR. SJAM Parkway Design Criteria and geometry shall correspond to the following:
- A. For the proposed Design Criteria specific to SJAM Parkway at Kitchissippi Lookout Intersection refer to Appendix A of this Part 2.
 - B. For the proposed intersection lane configuration of the SJAM Parkway at Kitchissippi Lookout Intersection refer to Appendix B of this Part 2.
 - i. DB Co shall design and construct the eastern leg of the Kitchissippi Lookout intersection, including the curb return radii, to provide for a future roadway access. In the interim, DB Co shall install temporary precast concrete barriers, per OPSD 911.140, to prohibit vehicular access to this leg of the intersection to the satisfaction of the City.
 - ii. DB Co shall design and construct the western leg of the Kitchissippi Lookout Intersection to provide a realigned connection/ access road to the existing western parking lot as shown in Appendix F of this Part 2.
 - iii. In the design and construction of temporary and ultimate improvements intended on Kitchissippi Intersection and SJAM Parkway, DB Co shall maintain and provide for access to the abandoned site located east of the SJAM parkway at its current location.
 - iv. DB Co shall design and construct one marked pedestrian cross-walk, including sidewalk and TWSIs, per City of Ottawa Standard Tender Documents for Material Specifications and Standard Detail

Drawings, located at the southern limit of the Kitchissippi Lookout intersection as per drawing F-1 in Appendix F of this Part 2

- (iii) DB Co shall design the new SJAM Parkway horizontal and vertical alignment as per the proposed Design Criteria. DB Co shall design and construct the vertical profile of the SJAM Parkway in this section so that the new grades and Pavement elevations will remain as close as practically possible to the existing Pavement elevations and shall ensure positive Drainage is maintained within the limits of construction of Works. The proposed alignment of the EB SJAM Parkway lanes shall remain as close as practically possible to their current location while the proposed WB lanes will shift east, closer to the EB lanes, while maintaining a minimum 1.5m wide median separation at the proposed Kitchissippi Lookout signalized intersection.
- (iv) DB Co's design shall accommodate all the improvements required to ensure a safe and efficient traffic operations considering the intended reduction in the posted speed limit (from the existing speed limits of 60 km/hr to the proposed speed limit of 50 km/hr) in the sections of SJAM Parkway that are affected as the result of Works. DB Co shall ensure that appropriate speed transition zones are established as required and all pertinent improvements are included in the design of the realignment with appropriate traffic signage and pavement marking as per the requirements of MTO's OTM Books.
- (v) DB Co shall design and construct all modifications to the existing SJAM Parkway WB pedestrian underpass structure as required in order to accommodate a 3.0m MUP with 0.5m boulevard between the MUP and outside WB lane. Refer to Article 4 – Structural Design Criteria and Requirements, of this Part 2.
- (vi) DB Co shall install modified Type Wyoming 830WYBRAIL 2-Tube Curb Mounted (PL-2) guiderail as per details provided in Appendix F of this Part 2.
 - A. DB Co shall install the above noted guiderails and all transitions, terminal elements and end treatments on curbs for the lengths of need in both approach and leaving sections.
 - B. DB Co shall design and construct the all terminal elements and end treatments to fall outside of the SJAM Parkway clear zones and be no closer than 3m to the edge of adjacent travel lane, whichever is greater. Paved shoulders shall separate end treatments installed on concrete curbs from the travel lanes.
- (vii) DB Co shall install vehicle/cyclist steel railing to be attached on top of the modified Wyoming guiderail at the SJAM Parkway WB and EB pedestrian underpass structures as per detail provided in Appendix F of this Part 2.
- (viii) DB Co shall design and construct the surface Drainage system in the form of storm sewer network including storm sewer pipes, catch basins, maintenance

holes and all other SWM elements in order to maintain positive Drainage for the Kitchissippi Lookout signalized intersection and the realignment of SJAM Parkway, as per Article 5 – Drainage and Stormwater Management Design Criteria and Article 8 – Utility Infrastructure Design Criteria, of this Part 2.

- A. DB Co shall undertake a detailed site survey and confirm the location and conditions of all existing SWM elements within the limits of construction. DB Co shall clean and undertake CCTV inspections on existing storm sewer pipes, outlets and structures prior to altering the existing Drainage system, per City of Ottawa inspection standards. DB Co shall prepare a detailed existing conditions report, provide recommendations for the substandard conditions observed in the assessment and receive the City's approval 30 Business Days prior to advancing the design stage.
- (ix) Grading requirements shall conform to the SJAM Parkway Design Criteria as outlined in Appendix A of this Part 2 and relevant City Standards and Specifications as per Clause 6.12 of this Part 2.
- (x) DB Co shall undertake a TIA study and determine the level of service at the proposed signalized intersection considering projected traffic volumes, and pedestrian and cyclist movements. DB Co shall prepare and submit a traffic report to and receive the City's approval 20 Business Days prior to initiating the design. DB Co's design and construction shall provide for all intersection improvements including but not limited to left turn lane queue storage and taper length requirements to accommodate projected traffic volumes for year 2031.
- (xi) DB Co shall accommodate all the requirements of Clause 6.14 of this Part 2 for the design and construction of the Kitchissippi Lookout Intersection.
 - A. For added Clarity, the City shall supply and install all above ground traffic signal equipment including controller, poles, pedestrian and traffic heads, video detectors, push buttons, and audible displays for the Kitchissippi Lookout Intersection to meet the following specifications:
 - i. The City shall supply all traffic signal posts, arms and accessories/hardware painted glossy black.
 - ii. The City shall supply traffic signal heads and back boards with yellow fronts and black backs.
- (xii) DB Co shall provide automatic detection facilities, as required, for all the proposed signalized intersections in the SJAM Parkway corridor within the limits of Works. The acceptable detection facility types and specifications shall meet the requirements of the appropriate inductive loop detectors, or radar detectors facilities approved by the City.

- (xiii) DB Co shall design and construct all above and underground utilities and municipal services (water, sanitary and electrical), including underground ducts, maintenance holes, street lighting, and joint use poles as required and shall coordinate utility layout designs for hydro, gas and communications with all relevant utility companies as per the requirements of Article 8 – Utility Infrastructure Design Criteria, of this Part 2.
 - A. DB Co shall reference Appendix G of this Part 2, for the site specific utility servicing requirements for the NCC’s Kitchissippi Lookout intersection.
 - B. DB Co shall provide all necessary underground traffic plant to accommodate for possible future crossing movements by the City and shall meet the requirements of Clause 6.14 of this Part 2.
- (xiv) Pavement markings for the SJAM Parkway and Kitchissippi Lookout Intersection shall conform to Clause 6.15 of this Part 2 and the proposed Signage for the SJAM Parkway realignment and Kitchissippi Lookout Intersection shall conform to City standards and specifications.
- (xv) DB Co shall design and construct SJAM Parkway at Kitchissippi Lookout Intersection to be lit using LED-type luminaire NXT 48M 2ES 7 (Type 2 Distribution, 48W LED, 700mA Consumption, 4000k Colour Temperature) elements and consistent with the requirements of the NCC design drawings, standards and specifications per Appendix F of this Part 2. In particular, DB Co shall design and construct the infrastructure to accommodate the proposed illumination light levels specified below:
 - A. The proposed illumination light level on the SJAM Parkway in approach to the Kitchissippi Lookout Intersection shall conform to 9 lux; 3:1 average/min uniformity.
 - i. For added clarity, other than transition sections in approach to pedestrian crossings on SJAM Parkway noted above, the remaining mid-block sections of SJAM Parkway in the sections between pedestrian crossings shall not be illuminated.
 - B. The proposed illumination light level at the SJAM Parkway Kitchissippi Lookout Intersection shall conform to 15 lux; 3:1 average/min uniformity.
 - C. All street light posts at the signalized intersection shall follow Street Lighting Standard Detail Drawings from the City of Ottawa’s Standard Tender Documents for Material Specifications and Standard Detail Drawings complete with a glossy black powder coat finish.

- D. Street light posts located at the approaches to the intersection shall have a concrete aggregate base and follow approved NCC drawings found in Appendix F of this Part 2.
- (xvi) DB Co shall design and construct detailed traffic staging drawings and traffic control plans as per the requirements of OTM (OTM Book 7) and ensure travel lanes are maintained during staged construction at all time. For the minimum number of travel lane required during construction refer to Schedule 15-2, to Part 7 – Traffic and Transit Management and Construction Access.
- (xvii) DB Co shall undertake geotechnical investigations for the SJAM Parkway and Kitchissippi Lookout Intersection site in order to verify existing site conditions, soil contamination, ground water levels and provide asphalt Pavement designs. The geotechnical investigation and asphalt Pavement designs shall meet the requirements of Article 7 – Geotechnical Design Criteria and Requirements, of this Part 2. The proposed Pavement design shall meet the requirements of Clause 6.10 of this Part 2.
- (xviii) DB Co shall follow landscape drawings and Schedule 15-2, Part 6 – Urban Design, Landscape Architecture and Connectivity Requirements, for landscape, road furniture and streetscape elements, and pathway connections required along the SJAM Parkway corridor and Kitchissippi Lookout Intersection.
- (xix) DB Co's design and construction of the roadway improvements for SJAM Parkway shall meet the requirements of Clause 6.18 of this Part 2.

ARTICLE 7 GEOTECHNICAL DESIGN CRITERIA AND REQUIREMENTS

7.1 Reference Documents

- (a) Design and construction of all geotechnical and foundation Work shall comply with the criteria contained in this Article, and the Applicable Law, guidelines or practices applicable to the Project, including but not limited to the following Reference Documents. In the event of a conflict between the criteria, commitments or requirements contained within one document when compared with another, the more stringent shall apply:
- (i) Criteria contained in this Article;
 - (ii) Article 9 – Protection of Existing Adjacent Structures, of this Part 2;
 - (iii) Article 4 – Structural Design Criteria and Requirements, of this Part 2;
 - (iv) Schedule 15-2, Part 8 –Underground Structures;
 - (v) Schedule 17 – Environmental Obligations;
 - (vi) Municipal Standards according to Master Agreement including Schedule B, Appendix 2, Standard and Guidelines
 - (vii) OBC;
 - (viii) NBCC;
 - (ix) CHBDC;
 - (x) MTO, OPSS/OPSD;
 - (xi) CSA;
 - (xii) ASTM;
 - (xiii) CFEM;
 - (xiv) MOECC Regulations;
 - (xv) PEO, Guideline for Professional Engineers Providing Geotechnical Engineering Services
 - (xvi) AREMA
 - (xvii) OHSA and Applicable Law.

- (b) DB Co shall comply with the Applicable Law, design manuals or practices applicable to the Project, issued by all relevant third parties including MTO and the City. DB Co shall submit design and construction plan for all geotechnical and foundation works including excavation, backfilling, underpinning, modifications, monitoring and mitigation plans for review and acceptance by all relevant third parties including City, MTO, Utility Companies, other third party owners. DB Co shall comply with the following documents and requirements:
 - (i) Schedule 10 – Review Procedure.
 - (ii) To prevent impact to third parties' structures in the alignment, all construction activities such as groundwater control, excavation, underpinning, modification, and support of excavation systems shall meet third party stakeholders' requirements. In particular, for construction within or in the vicinity of the NCC land, specific design approaches shall be considered to avoid adverse impacts of construction dewatering operations on NCC land and other existing Structures.

7.2 General Requirements

- (a) Geotechnical and foundations design shall be performed in accordance with design concepts used in the reference documents listed in Clause 7.1 of this Part 2 such as the principles of LSD based on Load-and-Resistance Factor Design and WSD based on ARMEA. The factors of safety and allowable stress for the Track supports shall be based on the functional requirements of the Structure.
- (b) DB Co shall perform a geotechnical subsurface soil and groundwater conditions assessment using available data for the entire Guideway and shall provide a detailed and complete set of geo-engineering design reports including geo-engineering Design Criteria with a tabulated list of geotechnical and hydrogeological design parameters. The basis for selection of the Design Criteria shall be provided for all components of any Underground Structures, all components of any retaining and support of excavation structures, and at grade and elevated Structures. In addition, DB Co shall prepare stratigraphic profiles along the Guideway with proper cross-sections particularly for the underground sections along the alignment that shall be constructed by DB Co. The stratigraphic profiles shall include anticipated distribution of the various ground types and hydrogeological regimes and conditions, and Reports shall be submitted in accordance with Schedule 10 – Review Procedure.
- (c) DB Co shall consider the following in the design of all Structures during the Service Life specified in Table 1-4.1 in Schedule 15-2, Part 1 – General Requirements.
 - (i) Groundwater recharge or rebound that may occur after temporary groundwater control, unwatering, dewatering, and depressurization.
 - (ii) Groundwater condition changes including those caused by extreme weather events.

- (d) DB Co shall review all existing geo-environmental data and information and develop an Excess Materials Management Plan. Further details on environmental compliance and management requirements are provided in Schedule 17 – Environmental Obligations.
- (e) DB Co shall retain the services of qualified consultants who hold a Professional Engineers of Ontario Certificate of Authorization and practice as a geotechnical consultant. Geotechnical laboratories shall be certified by CCIL and shall have participated and met the MTO correlation program for soil testing. Environmental laboratories shall be accredited by the CALA for analytical tests.
- (f) DB Co shall retain the services of qualified consultants who hold an Association of Professional Geoscientists of Ontario Certificate of Authorization and practice as a hydrogeological consultant.
- (g) DB Co shall submit details of any proprietary geo-engineering systems, for review by the City in accordance with Schedule 10 – Review Procedure.
- (h) The frost penetration depth for Ottawa is 1.8 m. DB Co shall consider this and ensure sufficient frost protection is provided for all Structures.
- (i) DB Co shall demonstrate project experience designing and constructing Structures founded on the sensitive marine clays in the Ottawa area, locally known as Leda Clays, and shall retain personnel who have verifiable local design and construction experience with Leda Clay.

7.3 Foundations

- (a) Foundations for Structures shall be designed such that their displacements (Serviceability Limit States, as defined in the Relevant Codes and standards) are compatible with the structural design, function and performance requirements, and clearance envelope requirements over their Design Life. When a WSD is used, the allowable stress shall be checked under the various loading combinations defined in the relevant Codes and Standards.
- (b) DB Co shall assess and mitigate short-term and long-term adverse impacts to all Foundations for Structures including Tracks due to the swelling and degradation of shale rock that may occur during the Service Life specified in Table 1-4.1 in Schedule 15-2, Part 1 – General Requirements.

7.4 Permanent Cut and Fill Slopes

- (a) Permanent cut and fill slopes and geo-structures shall be designed according to applicable Standards and with adequate safety margin (such as factor of safety), as described in the relevant Codes and Standards.
- (b) Total and differential post-construction settlements along the Track bed or Pavement including those that may result from frost heave shall meet the requirements of Article 3

- Trackwork, and Article 6 – Roadways, Bus Terminals and Lay-Bys, of this Part 2. DB Co shall ensure that the smoothness and cross-slope requirements are met, ponding and sheeting of water is prevented, Pavement drainage is maintained, and the function of constructions and ditches is preserved.
- (c) No vertical offset at longitudinal joints in Pavement surfaces shall be permitted after construction.
- (d) No vertical offset at longitudinal or transverse joints along Station Platforms, interior walkways or at building connections shall be permitted after construction.

7.5 Permanent Retaining Structures and Cut-and-Cover Structures

- (a) The following requirements apply to new Cut-and-Cover structures, new retaining systems, and existing retaining walls and Cut-and-Cover structures:
 - (i) Permanent water-tight underground structures on the alignment shall be designed to resist groundwater pressures and shall account for the Project flood level requirements provided in Article 5 – Drainage and Stormwater Management Design Criteria, of this Part 2.
 - (ii) The lateral earth pressure coefficient corresponding to the characteristic at-rest (K_o) conditions and appropriate to the adjacent native ground or backfill soils shall be applied to determine the magnitude of the characteristic earth pressure distribution. The K_o conditions shall be determined and then reduced according to the proposed structure's characteristics (stiffness, deformability, etc.). DB Co shall estimate, or measure K_o by conducting testing using the appropriate standard methods in the field and in the laboratory.
 - (iii) Consideration of friction piles, micropiles and anchored systems for resisting uplift forces shall be incorporated into the Cut-and-Cover foundations design, provided redundancy is built in the design. For micropiles, the required redundancy shall be achieved by using adequate resistance factor provided that a testing program as indicated in OPSS 903 is followed. For frictional piles, adequate resistance factors with or without a load test shall be used in accordance with relevant design Codes and Standards. For anchored systems, the requirements as indicated in OPSS 942 shall be followed. The design reduction factor to be applied to the uplift resistance capacity of the friction piles and micropiles shall be based on the type of Structure, loading, allowable displacements, and soil and groundwater conditions.
 - (iv) DB Co shall not utilize side friction between the soil and Underground Structure walls to resist uplift, unless DB Co can demonstrate that side friction can be relied upon and will not induce detrimental effects to the Underground Structure. DB Co shall not utilize side friction between the soil and structure walls that have an exterior waterproofing system, to resist uplift.

- (v) All temporary excavation support systems for permanent Cut-and-Cover structures shall be performed in accordance with Clause 7.7 of this Part 2.
- (vi) The upper 1.8m, as measured from lowest adjacent grade, shall be discounted in any axial and lateral load analyses to account for possible future excavations around the pile group.
- (b) If DB Co engage in blasting as part of the Works within the Lands, DB Co shall provide the following:
 - (i) A BAR: This risk assessment report shall include but not be limited to the following details:
 - A. Work plan showing details of the proposed blasting operations;
 - B. Types of explosive and detonation to be adopted;
 - C. Protection against damage to the adjacent Structures in accordance with Article 9 – Protection of Existing Adjacent Structures, of this Part 2, underground and above-ground Utilities, and protection of the public safety including a blast damage mitigation plan and procedures including the proposed methods of remedial measures for damages caused by blasting;
 - D. Determination of the ZOI due to blasting, and assessment of the blasting effects to all Structures and Utilities within the ZOI;
 - E. Document all measures proposed to minimize blast waves regardless of when blasting will take place
 - F. Details of vibration monitoring;
 - G. Emergency responses to blasting damage; and,
 - H. Qualifications and experience of the individuals and specialists who are responsible for the blasting design and operations.
 - (ii) A production rate comparison showing the benefits for blasting over conventional rock excavation methods in terms of cost and schedule.
- (c) DB Co shall ensure that all blasting activities will conform to the City Special Provisions F-1201 and OPSS 120 entitled Use of Explosives, as amended. Prior to any blasting activities, a pre-blast survey shall be prepared as per City Special Provisions F-1201 for all existing and proposed Structures and underground structures including, but not limited to, buildings, Utilities, water wells, and facilities likely to be affected by the blast, in particular, those within 75m of the location where explosives are to be used. The standard inspection procedure shall include the provision of an explanatory letter to the owner or occupant and owner with a formal request for permission to carry out an inspection. DB

Co shall submit blasting limits to the City for review and approval. The City may require changes to ensure the integrity of adjacent Structures. DB Co shall submit the pre-blast survey and full blasting strategy to the City for review and approval at least ninety days prior to any blasting.

- (d) DB Co shall account for additional loads such as increase in lateral earth pressure due to fractured rock or weakened rock or soil zones resulting from blasting operations for the Works or for local developments outside the Works.

7.6 Services

- (a) All services, including installation and reconstruction of water and sewer lines, engineering fill application, pipe bedding, cover and trench backfill material, shall conform to the City requirements, including but not limited to requirements of Article 8 – Utility Infrastructure Design Criteria, of this Part 2.

7.7 Temporary Slopes and Retaining Structures

- (a) The performance of each temporary works shall be sufficient for its service life. All temporary Work shall comply with the OHSA, relevant design Codes and Standards and the Project requirements applicable at the time of excavation and the additional criteria:
 - (i) Temporary retaining structures shall meet the requirements of limiting Ground Movements, such as surface settlement, as stipulated under this Article.
 - (ii) Protection of Existing Adjacent Structures in accordance with Article 9 – Protection of Existing Adjacent Structures, of this Part 2.
 - (iii) Design, installation, and testing of tie backs shall follow OPSS 942;
 - (iv) DB Co shall comply with third party requirements for tie-back de-stressing as stated in this Article. Removal of temporary support system shall follow OPSS 539.
 - (v) All elements of temporary retaining structures within the upper 2m of the ground surface shall be removed and properly disposed of upon completion of backfilling.

7.8 Earthwork and GeoEnvironmental

- (a) Backfilling and reuse of excavated material on City property and ROW shall follow City Standards, Schedule 17 – Environmental Obligations and Third Party standards.
- (b) Buoyancy corresponding to inundation of the fill to the flood level shall be considered in the design of using lightweight fills. Permanent flood protection shall be provided for the area in which the fill is to be used. Fuel spills, salt, wheel loading, penetration from landscaping, and penetration from sign foundations shall also be considered.

- (c) Geo-Environmental requirements are specified in Schedule 17, Part 4 – Contamination and Excavated Material Management.
- (d) DB Co shall assess and mitigate adverse impacts to Structures including drainage components arising from the deformation of ground caused by swelling and degradation of the shale rock leading to drainage-related maintenance issues.

7.9 Geotechnical Instrumentation

- (a) DB Co shall determine and install geotechnical instrumentation in the key and critical areas described as follows where special attention or continued monitoring is required. As a minimum, DB Co shall determine instrumentation requirements, frequency and duration of monitoring for construction-induced noise and vibration, displacement and strains for fill embankments, groundwater elevation and pressure, Ground Movements adjacent to deep excavations, temporary retaining structures (including piles, struts and tiebacks), Tunnel and Tunnel portals, permanent retaining structures, Utilities Infrastructure, hydro towers, existing rail tracks, highways, Roadways and pathways, existing buildings, Bridges or other Structures along the alignment that shall remain in service.
- (b) Design of the geotechnical instrumentation and monitoring program shall be under the direct supervision of a Professional Engineer licensed in Ontario.
- (c) Staff for the design and implementation of the geotechnical instrumentation and monitoring program shall include personnel who have verifiable design and construction experience with similar programs.
- (d) In accordance with all applicable laws, regulations, and by-laws (as amended), DB Co shall decommission and dispose of all geotechnical, hydrogeological, and/or geo-environmental instrumentation installed by DB Co or the City for the purposes of this Project, at the end of construction or after the instrumentation is no longer required for Project activities. DB Co shall decommission and dispose of any existing geotechnical, hydrogeological, and/or geo-environmental instrumentation, that is documented in the Background Information or that may not be documented and otherwise encountered by DB Co during construction, used for monitoring/not used for monitoring, on, in, or under the Lands. DB Co shall obtain acceptance from the City prior to decommissioning and disposal of any existing geotechnical, hydrogeological, and/or geo-environmental instrumentation, that is documented in the Background Information or that may not be documented and otherwise encountered by DB Co during construction, used for monitoring/not used for monitoring, on, in, or under the temporary Lands as defined in Schedule 20 - Lands. DB Co shall provide decommissioning records to the City.
- (e) GIMP: DB Co shall prepare a comprehensive GIMP and submit to the City for review in accordance with Schedule 10 - Review Procedure. The GIMP shall be applicable for the duration of construction, testing, and Commissioning. As a minimum, the GIMP shall include the following:

- (i) A DMP which shall be a GIS-based system using a secure internet connection capable of receiving and visualizing near real time monitoring data. The DMP shall be used to create and send alarm reports/notifications and create monitoring reports including batch reports if Response Levels defined by DB Co and indicated in Article 9 – Protection of Existing Adjacent Structures, of this Part 2 are exceeded. DB Co shall provide access credentials to the City for simultaneous users for the DMP. DB Co shall set up the DMP such that the City is immediately notified of exceedances.
- (ii) Appropriate geotechnical instrumentation for Stations, Structures and Tracks. The instruments shall be capable of collecting and transmitting continuous real time monitoring data to be incorporated and visualized in the DMP. Collecting and transmitting real time monitoring data shall not be required when monitoring Structures that will not experience adverse impacts due to dewatering induced settlement as a result of construction excavation, such as Structures founded directly on intact bedrock or deep foundations extended to bedrock.
- (iii) All instruments including existing instruments turned over to DB Co by the City and instruments to be installed by DB Co.
- (iv) Typical installation details and location of additional instruments.
- (v) Schedule for installation, taking baseline readings, frequency and duration of monitoring for each phase of construction.
- (vi) Construction-induced noise and vibration control and monitoring plan.
- (vii) The plan and schedule for decommissioning and disposing of all additional instruments installed by DB Co as well as all existing instruments turned over to DB Co. DB Co shall notify the City of the intention to decommission instruments.
- (viii) All Response Levels (refer to Article 9 – Protection of Existing Adjacent Structures, of this Part 2), as specified and defined by DB Co.
- (ix) A Response Action Plan, which shall consist of methods and means to respond to various Review and Alert Level scenarios as outlined in Article 9 – Protection of Existing Adjacent Structures, of this Part 2 based on types of geotechnical instruments that indicate Review and Alert Levels. DB Co shall inform the City of subsequent response actions in accordance with the Response Action Plan. At a minimum, a Response Action Plan shall include the following:
 - A. Names, telephone numbers, and locations of persons responsible for implementation of contingency plans.
 - B. Materials and equipment required to implement contingency plans.

- C. Location on Site of all required materials and equipment to implement contingency plans.
 - D. Step-by-step procedure for performing works involved in implementation of the contingency plans.
 - E. Specific actions related to the Alert Level values for all instruments, including means of reducing or eliminating movements and rates of movements.
 - F. Inspection of affected facilities, structures and utilities and performance of acceptable corrective and restorative measures.
 - G. Clear identification of objectives of contingency plans and methods to measure plan success.
- (x) All measures and specific instrumentation and monitoring requirements to protect Existing Adjacent Structures in accordance with Article 9 – Protection of Existing Adjacent Structures, of this Part 2.
- (xi) All measures and specific instrumentation and monitoring requirements for protecting heritage buildings identified in the Project Assessment Study Environmental Project Report and relevant updated revisions which are within the Project ZOI as defined in Article 9 – Protection of Existing Adjacent Structures, of this Part 2.
- (xii) For all Underground Structures, DB Co shall provide, install, maintain, and monitor for the duration of construction, testing, and Commissioning a system of instruments that will indicate the pressures and deformations imparted to the permanent Structures. The instrumentation shall include:
- A. Two arrays of pressure cells with one array on each long side of the Station. Each array shall consist of three cells installed at three different elevations (top, middle and bottom levels along the vertical side walls and away from end walls). Pressure cells shall be installed behind the water proofing system on the overburden side, including soil and rock, prior to start of concrete pouring for the walls.
 - B. An instrument on both sides of the longest side of the Station to measure the deformations. This instrument shall consist of an array of either MEMS gravity sensors separated by special joints to measure tilt along three axes, or IPI, or equivalent.
 - C. Install a minimum of three equally spaced surface settlement monitoring points on both sides of the excavation along a line perpendicular to the excavation, with the first monitoring point located at the edge of the excavation, the second monitoring point located at the farthest point no

further away than the limits of the Project ZOI outlined in Article 9 – Protection of Existing Adjacent Structures, of this Part 2, and the third monitoring point located equally between the first and second monitoring points. These lines of monitoring points shall be spaced a maximum of every 30m running parallel to the excavation.

- D. Install In-Place-Inclinometers on both sides of the excavation spaced a maximum of 50m running parallel to the alignment. Inclinometers to be placed a maximum allowable distance of 1m from the edge of excavation.
 - E. Install piezometers on both sides of the excavation spaced a maximum of every 50m. DB Co to locate and monitor piezometers to ensure the groundwater drawdown restrictions of Clause 7.11 of this Part 2 are followed.
 - F. Install utility monitoring points, spaced a maximum of every 30m, for the 1500mm diameter West Nepean Collector.
 - G. At locations where the 1500mm diameter WNC is exposed, install structure monitoring points spaced every 3m, crack gauges at existing crack locations and strain gauges spaced every 3m. The limiting strain for the WNC shall be determined by DB Co and accepted by the City.
 - H. All the above instruments shall be connected directly or indirectly to permanent data loggers. Connecting instruments to permanent data loggers shall not be required when monitoring Structures that will not experience adverse impacts due to dewatering induced settlement as a result of construction excavation, such as Structures founded directly on intact bedrock or deep foundations extending to bedrock.
 - I. All of the above instruments shall have a minimum daily reading frequency when located less than or equal to 30m from the edge of excavation and a weekly reading frequency (a minimum of once per week) when located greater than 30m from the edge of excavation.
 - J. DB Co shall submit an updated monitoring report in electronic format, in accordance with requirements of Schedule 10 – Review Procedure every week.
- (f) DB Co shall establish permanent reference monuments and deep surveying benchmarks as required along the alignment, in accordance with the requirements of this Article 7.
 - (g) Provide a demonstration of the features of the instrumentation DMP to the City prior to the start of construction and afterwards as modifications are made to the website.
 - (h) Meet with the City as needed to discuss instrumentation levels and necessary actions to protect EAS.

- (i) Replace damaged or malfunctioning instrumentation. The City may order a temporary work stoppage in areas where there is insufficient working instruments to ensure the protection of EAS.
- (j) Accommodate the City in inspecting the installation of geotechnical instrumentation, related hardware, and in verifying the proper functioning of the instrumentation monitoring system including, but not limited to the collection, transmission, storage, backup, and reduction of data.

7.10 Monitoring Requirements

- (a) DB Co shall integrate the following monitoring requirements, in addition to other monitoring requirements outlined in Clause 7.9 of this Part 2.
- (b) DB Co shall incorporate into the monitoring program, data from existing condition surveys, including data provided by the City.
- (c) The monitoring reports prepared and submitted by DB Co shall be in accordance with Schedule 10 – Review Procedure.
- (d) Monitoring shall include logs and survey notes which contain the following information:
 - (i) Record of measurements of in-Tunnel or other deformations;
 - (ii) Construction staging, loading or other construction activities associated with the works in the vicinity of instruments; and,
 - (iii) Record of any cracks in, or damage to any Structures.
- (e) DB Co shall indicate locations where, due to contractual interfaces or changes in the extent of the Project ZOI outlined in Article 9 – Protection of Existing Adjacent Structures, of this Part 2, re-baselining of instrumentation readings shall be conducted.

7.11 Groundwater Control – Dewatering/Unwatering and Depressurization

- (a) For the purposes of this Clause, unwatering is defined as the removal of water that has accumulated in an excavation or Tunnel and is an element of groundwater control. Groundwater control is defined as dewatering/unwatering and/or aquifer depressurization.
- (b) DB Co shall develop and submit plans and procedures for groundwater control (including effluent discharge), in accordance with Schedule 10 – Review Procedure. The plans and procedure shall include, but not be limited to the following items:
 - (i) detailed shop drawings of the entire dewatering system(s) that bear the seal and signature of a professional engineer licensed in Ontario, and include, but not be limited to, details, and calculations of proposed type of dewatering system(s), showing arrangement, location, and depths of components of system including

details of screens and filter media, complete description of equipment and materials to be used, procedure to be followed, standby equipment, standby power supply, and proposed location(s) of points of discharge of water and abandonment of dewatering system(s), a description of any permits and approvals that pertain to the groundwater control activities;

- (ii) a discharge plan that includes: discharge location(s) including methods; procedures and equipment to convey water to discharge locations; location and dimensions of treatment equipment; procedures for water testing; water quality laboratory analyses procedures, test results or analyses, and water treatment methods; location and construction details of monitoring observation wells, and a description of any permits and approvals that pertain to the discharge activities.
- (c) DB Co shall apply for Permits, Licences and Approvals, including PTTW and/or Environmental Activity and Sector Registry, and discharge permits (e.g., Municipal, conservation authority and/or ECA).
- (d) Design, construction, and operation of groundwater control measures shall not induce detrimental short- and/or long-term movements of surrounding Structures, infrastructure and ground surface. Evaluation of detrimental movements shall follow provisions included in Article 9 – Protection of Existing Adjacent Structures, of this Part 2.
- (i) DB Co shall develop plans and procedures for groundwater control (including effluent discharge), establish monitoring requirements, and perform a hydrogeological impact assessment and associated risk assessment and submit to the City. This process shall consider all required project Permits and Approvals. DB Co shall ensure that any groundwater control, effluent discharge, and subsequent effects during construction or during the Design Life shall have no adverse impact on the following features within the Project ZOI: properties, adjacent Structures, infrastructure, active groundwater supply wells, and environmental features. Specifically, the following potential impacts shall be managed/mitigated such that they are not/do not become adverse:
 - A. Groundwater drawdown effects including impacts on the quantity and quality of groundwater available for groundwater dependent ecosystems and existing groundwater users;
 - B. Groundwater drawdown effects which may cause settlement of existing Structures or Utilities within the Project ZOI as required in Article 9 – Protection of Existing Adjacent Structures, of this Part 2; and,
 - C. Appropriate quantity and quality of dewatering effluent with respect to the receiver (e.g., municipal sewer, natural environment, off-site receiver, etc.), in accordance with all applicable Project permits and approvals.
- (e) Water level drawdown resulting from construction dewatering between the approximate coordinates with an easting of 362384.080 and a northing of 5027868.080 and an easting

of 362076.750 and a northing of 5027452.320 using MTM Zone 9 horizontal datum referenced to WGS84 (NAD 83), shall be limited to a maximum of 1m at an outward distance of 30m from the edge of excavation in this area.

- (f) Water level drawdown outside of the excavation footprint between the approximate coordinates with an easting of 362076.750 and a northing of 5027452.320 and an easting of 361947.010 and a northing of 5027195.440 using MTM Zone 9 horizontal datum referenced to WGS84 (NAD 83) shall not be permitted.
- (g) Water level drawdown resulting from construction dewatering between the approximate coordinates with an easting of 360996.150 and a northing of 5025700.750 and an easting of 361048.440 and a northing of 5025253.660 using MTM Zone 9 horizontal datum referenced to WGS84 (NAD 83), shall be limited to a maximum of 3m at the outward edge of excavation in this area.
- (h) Water level drawdown resulting from construction dewatering between the approximate coordinates with an easting of 361140.890 and a northing of 5024428.420 and an easting of 360821.350 and a northing of 5023869.960 using MTM Zone 9 horizontal datum referenced to WGS84 (NAD 83), shall be limited to a maximum of 3m at the outward edge of excavation in this area.
- (i) Any activity within RVCA or SNCA regulated area shall be performed in agreement with the applicable requirements and regulations and will require RVCA or SNCA review and approval.
- (j) DB Co shall design, install, operate, monitor, maintain, and decommission (as required) the project-specific groundwater control systems, as necessary to meet Project requirements and shall continue proper discharging of effluent according to the relevant City's Sewers Use By-law, as well as any other applicable regulatory (e.g., conservation authority and MOECC) approvals without any interruption or negative impact on existing Structures. It shall be the sole responsibility of DB Co to verify the condition of the groundwater control systems and operate them as required.
- (k) DB Co shall submit, on a quarterly basis, the data obtained from all instrumentation utilized for monitoring including hydrogeological and geotechnical instrumentation to the City for review in accordance with Schedule 10 – Review Procedure.
- (l) DB Co shall conduct all monitoring required by the obtained permits and approvals (including daily pumping volumes).
- (m) DB Co shall submit the monitoring results to the applicable agencies as stated in the obtained permits and approvals.
- (n) DB Co shall respond to/address any complaints received that are potentially related to groundwater control activities.

7.12 Seismic Design

- (a) DB Co shall design all Structures in compliance with this Schedule 15 including Underground Structures, partially buried, at grade, and elevated Structures.
- (b) DB Co shall perform an assessment of lateral displacement, liquefaction susceptibility, and cyclic softening and cyclic mobility of the soils for all the Lands.
 - (i) DB Co shall perform a detailed site-specific seismic Hazard Analysis for sites where soils have been identified as susceptible to liquefaction and lateral displacement in accordance with the CHBDC and AREMA. DB Co shall consider liquefaction and lateral displacement in the design of all Structures on these sites and shall provide mitigation measures as required.
 - (ii) DB Co shall consider cyclic softening and cyclic mobility and provide mitigation measures as required in the design of all Structures and slopes, for the sites for which soils will experience cyclic softening and cyclic mobility. DB Co shall utilize local experience and a case-history review combined with in-situ testing and analyses for this assessment.
- (c) Seismic Site classification
 - (i) DB Co shall complete a site classification and seismic response study and provide a report to the City. Site classification and seismic response shall follow NBCC and OBC as applicable.
- (d) Seismic Load
 - (i) The design of the Underground Structures shall use a dual-level seismic design criterion with an upper level design earthquake to provide a life safety performance objective and a lower level design earthquake for operational performance objective. The design shall conform to Clause 3.3 of Schedule 15-2, Part 8 – Underground Structures and the following:
 - A. The upper level design earthquake is an MDE where the probability of exceedance is approximately 4% in the 100-year Design Life, which corresponds to the 2% probability of exceedance in 50 years that is specified in the NBCC. The Underground Structures shall be designed with adequate strength and ductility to resist loads and deformations imposed on the structures during the MDE, thereby preventing Structure collapse and maintaining life safety; and,
 - B. The lower level design earthquake shall be the ODE where the probability of exceedance is approximately 20% in the 100-year Design Life, which corresponds to the 10% probability of exceedance in 50 years that is defined by the GSC using the NBCC seismic Hazard maps. When subjected to ODE, the Underground Structures shall be designed to

respond essentially in elastic manner. There shall be no collapse, and no damage to primary structural elements. The Structure shall remain fully operational immediately after the earthquake, at a full operational status.

- (ii) For partially buried Structures (Structures partially above ground and partially below ground surface), the design shall account for the effect of the above-ground portion.
- (iii) The design shall use ground deformation methods that account for soil-structure interaction in assessing the seismic effect on Underground Structures. DB Co shall perform rigorous numerical modeling methods such as dynamic finite element and finite difference methods (as required). Interior Structure not rigidly connected to the exterior Tunnel Structure shall be analysed using the response spectra method. Restrained Structures that oscillate in phase with or are rigidly attached to the Tunnel shall be analysed using ground deformation methods.

7.13 Subsurface Investigations and Testing Prior to Construction

- (a) DB Co shall review all provided geo-engineering data and shall be responsible to undertake additional subsurface investigations to enable the design and construction of the Project. Results of investigations shall be provided to the City. The actual design basis shall conform to the available and additional geo-engineering data. Copies of any reports and interpretations provided by DB Co for design shall be submitted to the City to review for design consistency purposes;
- (b) All field and laboratory testing shall be performed in accordance with Applicable Law including but not limited to CSA, MTO or ASTM standards. The locations and elevations of all boreholes, test pits, cone penetration tests, and other field testing or sounding locations shall be surveyed in accordance with the requirements of Schedule 15-2, Part 1, Article 4 – Design and Construction.

ARTICLE 8 UTILITY INFRASTRUCTURE DESIGN CRITERIA

8.1 DB Co General Responsibility

- (a) The timing of Utility Work including relocations shall be subject to operational constraints. DB Co shall coordinate the scheduling of all Utility Work including relocation work with the relevant Utility Companies.
- (b) DB Co shall be solely responsible for identifying the actual locations and condition of all existing Utility Infrastructure to complete the Utility Work, identifying all Utility Infrastructure relocation requirements, developing and preparing a Utility Infrastructure Relocation Plan, and performing all required work to protect, safeguard, remove, and relocate Utility Infrastructure as required and obtaining requisite consents from and with all Utility Companies with respect to the design, construction, installation, servicing, operation, repair, preservation, relocation, and or Commissioning of Utility Infrastructure in, on, under, over, or adjacent to the Lands. The Utility Infrastructure Relocation Plan shall include:
 - (i) identification of existing Utilities;
 - (ii) recommended Utilities Work;
 - (iii) assumptions and considerations;
 - (iv) approach to, and documentation of, communication and coordination with Utility Companies including articulating an understanding of Utility Companies' operational constraints;
 - (v) approach to communication and coordination with other Stakeholders including businesses and property owners;
 - (vi) approach to managing service interruption to Utilities customers including property owners;
 - (vii) providing early identification and approach to mitigation of impacts to critical Utility Work;
 - (viii) identification of, and applications for, Permits, Licences, and Approvals required for Utility Work;
 - (ix) evidence of coordination with all other Utility Infrastructure relocations in the same area; and,
 - (x) approach to supplying Utility services to the Project.
- (c) DB Co shall prepare and submit a Utility Infrastructure Relocation Plan to each Utility Company and a fully coordinated overall Utility Infrastructure Relocation Plan to the City, in accordance with Schedule 10 – Review Procedure.

- (i) DB Co shall submit at a minimum submit Utility Relocation Plans, without limitation for the following areas:
 - A. Utilities on Richmond Rd and Byron Ave in conflict with the Guideway;
 - B. Utilities on Carling Ave. and in proximity to Lincoln Fields Station;
 - C. Utilities located on the existing BRT, and between the BRT and Bayshore Shopping Centre;
 - D. Utilities impacted by the Connaught Tunnel; and,
 - E. Utility Work otherwise identified under Clause 8.10 of this Part 2.
- (d) DB Co shall provide to the City, copies of transmittals only, for all submittals provided to and from Utilities Companies within two Business Days of the date of each transmittal. For clarity, transmittals shall be provided to the City for information purposes only.
- (e) DB Co shall provide within two Business Days all documentation to and from Utilities Companies upon the City's request.
- (f) DB Co shall prepare and submit a written workplan and schedule that addresses the Utility Infrastructure Relocation Plan including:
 - (i) durations and timelines for each Utility relocation and or other strategies, by location; and,
 - (ii) identifying dependencies and conflicts with overall Works Schedule.
- (g) DB Co shall be solely responsible for identifying the requirements for and obtaining all consents and approvals, including without limitation, crossing and other agreements in favour of the City from Utility Companies and others having rights over and an interest in the Lands, whether below, at, or above grade.
- (h) All Utility Work shall conform with all relevant codes and standards, of each Utility Company and with the requirements of all federal, provincial, municipal, and safety approving authorities/organizations, and with the requirements of this Project Agreement.
- (i) The Utility Work shall preserve the existing Utility Company network performance and existing capacity subject to relevant codes and standards, of each Utility Company and with the requirements of all federal, provincial, municipal, and safety approving authorities/organizations, where DB Co has identified that Utility Infrastructure shall be relocated or removed and replaced.
- (j) DB Co shall provide access within two hours of request from all Utility Companies to their respective Utilities. DB Co shall provide the City uninterrupted access to watermain valves.

- (k) DB Co shall coordinate Utility Work with the overall system design such that any operations, maintenance, repair and/or replacement activities undertaken by the Utility Company shall not interrupt the operation of the system.
- (l) DB Co shall not construct, install or permit the construction or installation of any Utility Infrastructure on, in, under or over the Lands or any part thereof without the prior written consent of Utility Companies, the City, and any other entity whose consent is required and without obtaining all required permits and approvals.
- (m) Without limiting the generality of the foregoing, at no time shall DB Co use or permit the use of the Lands or any other Project infrastructure for the purpose of protecting, safeguarding, removing and/or relocating Utility Infrastructure (other than Utility Infrastructure, if any, located within the Lands at Commercial Close) without the prior written consent of the City (which may be given or withheld at the discretion of the City).
- (n) DB Co shall replace all surface and subsurface features and Utility Infrastructure disturbed, damaged or temporarily removed during the activities related to Utility Work and reinstate in accordance with the requirements of this Part 2.
- (o) All lane closures, detour routes, Lane Shifts and diversions required to undertake Utility Work shall be in accordance with the requirements of Schedule 15-2, Part 7 – Traffic and Transit Management and Construction Access.

8.2 General Provisions for Utility Work

- (a) DB Co shall coordinate and perform Utility Work so as to minimize impact to continuity of service and disruption to property owners and customers of the Utility Companies to the satisfaction of the Utility Companies, private Utility owner and the City.
- (b) Utility Infrastructure shall be relocated such as to provide access, acceptable to the Utility Company, for maintenance and repairs. Sufficient width shall be provided to accommodate all required Utilities and provide the necessary clearances as determined by the Utility Companies and any applicable City standards;
- (c) The demarcation point between any Utility service and the system shall be defined as the point where the responsibility of ownership transitions from the Utility Company to the owner. The location and configuration of demarcation points between any Utility service and the system shall comply with relevant Utility Company standards and industry practices between the Utility Company and its customers. Where no such appropriate Utility Company standards and industry practices exists, the location and configuration of demarcation points shall be mutually agreed upon between the Utility Company and DB Co.
 - (i) For [REDACTED], the civil demarcation point shall be defined as the point where the ownership of the civil infrastructure associated with electrical services transitions from [REDACTED] to the City. The location and configuration of the civil demarcation shall comply with [REDACTED] Conditions of Service. The

electrical ownership demarcation point may not be the same as the electrical demarcation.

- (ii) For [REDACTED], the electrical demarcation point shall be defined as the point where the ownership of electrical infrastructure transitions from [REDACTED] to the City. The location and configuration of the electrical demarcation shall comply with [REDACTED] Conditions of Service.
 - (iii) For [REDACTED] at the LMSF facility, the demarcation point shall be at the secondary side of the gang operated load break overhead switches. All equipment beyond the demarcation point shall be purchased and installed by DB Co and owned by the City.
 - (iv) Trim Road Station is within the [REDACTED] distribution boundaries. The proposed Supply Point is at the overhead pole line located at N45.494989°, E - 75.483315°. For [REDACTED] the demarcation point shall be at the designated overhead Supply Point disconnect.
- (d) DB Co shall not construct new maintenance holes, water valve box assemblies or locate valve chamber frame(s) and cover(s) on OR174 paved surfaces, shoulders, median or interchange ramps, except:
- (i) Catch basin maintenance holes dedicated to highway drainage shall be permitted on the shoulder of the Highway.
- (e) DB Co shall relocate existing maintenance holes, water valve box assemblies, valve chamber frame(s) and cover(s) where located in the OR174 median, median shoulders, paved surfaces, or interchange ramps to outside of the median, median shoulder and paved surfaces of the Roadway. Existing maintenance holes, water valve box assemblies, valve chamber frame(s) and cover(s) in the outside shoulder shall be permitted to remain.
- (f) DB Co shall use trenchless methods where constructing new or relocating utilities beneath the paved surfaces, shoulders, median or interchange ramps of OR174 that are otherwise only to be resurfaced.
- (g) DB Co shall provide or maintain access to maintenance holes and watermain valves, located outside the Guideway by rubber tire vehicle.
- (h) DB Co shall not attach, construct or relocate any fluid carrying Utilities to new, reconstructed or existing City owned Bridge Structures.
- (i) DB Co shall be permitted to reinstate non-fluid carrying Utilities into existing conduit on existing City owned Bridge Structures that are otherwise not reconstructed.
- (j) DB Co may attach new non-fluid carrying Utilities to new, existing or reconstructed City owned Bridge Structures. Utilities shall not be permitted under sidewalks, in parapet walls or directly suspended from thin deck slabs.

8.3 Protection of Utilities

- (a) DB Co shall be responsible for protection and all repairs as a result of any damages caused by any actions, or neglect of any actions, by DB Co or any DB Co Party to Utility Infrastructure. DB CO shall further be responsible for ancillary costs related to maintaining normal levels of service or incurred by the Utility Company as a result of these damages. Refer to Article 9 – Protection of Existing Adjacent Structures, of this Part 2, for the minimum CIAR requirements for existing Utility Infrastructure within the ZOI and the baseline performance criteria for Utility Infrastructure impact mitigation to be used in the development of the GIMP Response Action Plan.
- (b) All Utility Infrastructure located at Commercial Close or thereafter on, in, under, over, or adjacent to the Lands (including Utility Infrastructure within any excavation) shall remain in service and be protected and preserved by DB Co throughout the construction unless otherwise agreed upon by the Utility Company.
- (c) DB Co shall be responsible for any damage done by DB Co or any DB Co Party to Utility Infrastructure throughout the construction.
- (d) For all existing and new Utilities crossing the Lands, utilize and adhere to all requirements of the Transport Canada document titled Standard Respecting Pipeline Crossings Under Railways TC E10. This document shall be utilized for all Utilities regardless of the age of the Utility.
- (e) DB Co shall maintain the existing OC Transpo optical fibre feed to the Transitway Stations during construction Any temporary communications arrangements to maintain the OC Transpo communications network during construction shall not disrupt OC Transpo operations or degrade existing OC Transpo network performance.

8.4 Project Utilities Services

- (a) DB Co shall be responsible for all Utility Work for all temporary and permanent Utilities services for the Project necessary to comply with the requirements of relevant standards, codes and approvals, as described in this Project Agreement.

8.5 Location and Condition of Utility Infrastructure

- (a) DB Co shall be responsible for identifying and ascertaining the locations and conditions of all Utility Infrastructure, located on, in, under, over or adjacent to the Lands and ensuring compliance at all times with the provisions of this Project Agreement. DB Co shall not rely solely on previous engineering work, location plans, as-built or record drawings supplied by Utility Companies or other similar documents for confirming locations of Utility Infrastructure.

8.6 DB Co Responsibilities for Utility Work

- (a) All Utility Work shall be performed by, or under the supervision of, and at the risk and expense of DB Co subject to the rights of Utility Companies to specify who will perform the Utility Work. Without limiting the generality of the foregoing, DB Co shall be responsible for:
- (i) obtaining all rights of entry or access to the relevant Utility Infrastructure in connection with the Utility Work and providing access to the relevant Lands if such Utility Work is to be performed by the Utility Company;
 - (ii) identifying all requirements in respect of the Utility Work, including determining the most effective strategies for undertaking the Utility Work;
 - (iii) liaising, arranging, coordinating, and entering into all necessary agreements with relevant Utility Companies in connection with the Utility Work, including obtaining any necessary consents or approvals in connection therewith, providing access for inspections and providing information and plans during and following completion of the Utility Work;
 - (iv) obtaining all Permits, Licences, and Approvals for the Utility Work;
 - (v) observing and complying with any instructions or directions relating to the Utility Work that may be issued by the City on its own behalf or on behalf of a relevant Utility Company;
 - (vi) securing or causing to be secured the entry into or execution of all relevant design, construction, crossing, and maintenance agreements, service contracts, and other agreements in connection with the Utility Work;
 - (vii) DB Co shall complete any Utility Infrastructure abandonment as per the standards of relevant Utility Company and City standards, guidelines and specifications. Abandoned underground utility infrastructure which results from the relocation of utility plant, shall be removed up to the first utility structural chamber beyond the abandoned sections;
 - (viii) For telecommunication Utility Companies, DB Co shall design and install all necessary temporary and/or permanent Civil Works associated with the relocation of the Utility Infrastructure, which may include duct banks, maintenance holes, handwells, vaults, pads, etc. for the purpose of the installation of the relevant telecommunication utility company's plant. The Civil Works shall be installed as per the standards and specifications of the corresponding Utility Company;
 - A. General requirements for telecommunication Utility Company duct banks shall be as follows:

- i. Duct banks under Roadway, sidewalk, MUPs and boulevards, or where a duct bank requires three ducts or more, the duct bank shall be concrete encased;
 - ii. Duct conduit shall be permitted to be direct buried under parkland; and,
 - iii. Ducts shall be permitted to be direct buried for any lateral duct bank, (max two ducts) going to a pole, pedestal or building.
- (ix) For [REDACTED], DB Co shall install all necessary temporary and/or permanent Civil Works associated with the relocation or protection of the Utility Infrastructure, which may include duct banks, maintenance holes, handwells, vaults, pads, groundling grids, etc. for the purpose of the installation of the [REDACTED]'s plant.
- (x) For [REDACTED], DB Co shall install all necessary temporary and/or permanent Civil Works associated with the supply of power to stations and/or Traction Power Systems beyond the [REDACTED] Supply Point and [REDACTED] civil demarcation point.
- (xi) For [REDACTED] and [REDACTED], Civil Works design for specialty structures inclusive of Bridges, vaults, viaducts, buildings, pipe chases, utility protective structures and vent shafts shall be DB Co's responsibility and shall be coordinated with other [REDACTED] or [REDACTED] Civil Works design.
- (xii) The new installation, modification, relocation, and/or upgrade all Utility services and related assets for Stations and other systems as necessary to meet Project requirements; and,
- (xiii) The provision of new Utility services for Track switches and switch heaters where required.
- (xiv) The provision of new or alteration of existing low voltage electrical services for streetlighting and traffic signals as coordinated by City signals and streetlighting departments.
- (b) The Utility Companies shall be individually responsible for the following work which will be covered in the Utility Company Works Cash Allowance as noted in Project Agreement Section 11.29. For clarity, only Utility Work up to the Utility demarcation point and where explicitly described here shall be subject to Utility Company Works Cash Allowance. Work by the Utilities beyond the Utility ownership demarcation point shall not attributable to Utility Company Works Cash Allowance:
 - (i) Telecommunication Utility Companies shall be responsible for the design and installation of any temporary and/or permanent plant works including wiring, cables, fibres, equipment, etc., installed or placed in, on, over, under or through

the Civil Works including connections to existing Utility Infrastructure that is associated with Utility relocation. Utility Works performed associated with new telecommunication services is not attributable to Utility Company Works Cash Allowance;

- (ii) [REDACTED] shall be responsible for the design of all necessary temporary and/or permanent Civil Works, excluding specialty structures as per Clause 8.6 of this Part 2, associated with the relocation of the Utility Infrastructure, which may include duct banks, maintenance holes, handwells, pads, etc. for the purpose of the installation of the [REDACTED]'s plant.
- (iii) [REDACTED] shall be responsible for the design and construction of all temporary and/or permanent plant works required including wiring, cables, equipment, etc., installed or placed in, on, over, under or through the Civil Works including connections to existing Utility Infrastructure for their plant;
- (iv) [REDACTED] in coordination with DB Co shall be responsible for the design, supply and installation of all wiring and connection assets including primary switchgear, [REDACTED] metering and Station transformers which are before the [REDACTED]/customer demarcation point. Refer to Schedule 15-2, Part 4, Article 6 – Electrical Design Criteria, for further clarity on [REDACTED]/customer demarcation points.
- (v) [REDACTED] shall be responsible for design and construction of all necessary temporary and/or permanent Utility poles, line cover-ups and associated wiring with the relocation of Utility Infrastructure;
- (vi) [REDACTED] shall be responsible for the design and construction of all necessary temporary and/or permanent Civil Works, excluding specialty structures as per Clause 8.6 of this Part 2, associated with the relocation of the Utility Infrastructure, which may include duct banks, maintenance holes, handwells, vaults, pads, etc. for the purpose of the installation of the [REDACTED]'s plant.
- (vii) [REDACTED] shall be responsible for the design and construction of all temporary and/or permanent plant works required including wiring, cables, equipment, etc., installed or placed in, on, over, under or through the Civil Works including connections to existing Utility Infrastructure for their plant;
- (viii) [REDACTED] shall be responsible for design and construction of all necessary temporary and/or permanent Utility poles, line cover-ups and associated wiring with the relocation of Utility Infrastructure.
- (ix) [REDACTED] shall be responsible for all design and construction of all temporary and/or permanent works associated with required relocation for their plant. Works associated with new natural gas services is not attributable to Utility Company Works Cash Allowance.

- (x) The City shall be responsible for final connections for watermain equal or less than 406 mm in diameter. The City shall also be responsible for installation of new water services and water meters, and disinfection of new water infrastructure where required.
- (c) Within the limits of excavation at Underground Stations, DB Co shall be responsible for:
 - (i) removal of City Utility Infrastructure that is abandoned as a result of Utility Work;
 - (ii) removal and disposal of existing abandoned City Utility Infrastructure that is exposed by DB Co or any DB Co Party;
 - (iii) DB Co shall complete any abandonment of City Utility Infrastructure in accordance with City standards and guidelines; and,
 - (iv) DB Co shall not be responsible for removal and disposal of existing abandoned City Utility Infrastructure outside of the limits of excavation.

8.7 Watermain Requirements

- (a) All watermain design and construction shall conform to all relevant codes, standards and City of Ottawa Design Guidelines – Water Distribution 2010 and Technical Bulletins.
- (b) DB Co shall coordinate the scheduling of all watermain relocation work with the City.
- (c) DB Co shall be responsible for City of Ottawa drinking water permits related costs for final connections, testing, chlorination and commissioning of all water related works.
- (d) All watermain designs are subject to review and final approval by the City.
- (e) Timing for the temporary removal of watermain from service for relocation, protection, or facilitating other construction shall be subject to operational constraints. The City will review requests for isolations on a case by case basis with consideration to :
 - (i) Hydraulic modelling performed by the City to verify that adequate supply of water can be maintained;
 - (ii) Seasonal demand variations, where typically Maximum Daily Demands are realized May 15th to Oct 15th of any calendar year, and Basic Day Demands are realized elsewhere. Exact dates are dependent on recent climatic conditions and vary from year to year;
 - (iii) Other capital works or maintenance activities which may impact the water distribution network;
 - (iv) Available redundancy in water distribution system to ensure acceptable levels of risk to normal service delivery are maintained;

- (v) Unforeseeable conditions due to system failures or maintenance which may impact water service delivery.
 - (vi) Winter potable water treatment and production operation capacities which may be reduced with colder water temperatures.
 - (vii) For large diameter watermain (greater than 406mm) , isolation requests shall be made a minimum of 60 days in advance of the date required, specifying the extents and duration of the isolation.
 - (viii) Known constraints on watermain isolations and the removal of watermain from service. Refer to the “Confederation Line Extension Project Drinking Water Operational Constraints Matrix” for specific references in this Article and other background information.
- (f) Construction of, or near large diameter watermain (greater than 406mm), in a pressurized or non-pressurized state shall be subject to requirements of CIAR submittals. The City retains the right to reject construction means and methods where in the City's opinion there is unacceptable potential for impacting feedermain integrity and or threatening normal service levels in ongoing water service delivery. Requirements for construction monitoring including but not limited to settlement and vibration monitoring may be imposed by the City as deemed necessary and shall be accommodated by DB Co.
- (g) DB Co shall provide full time qualified inspection services where constructing or altering large diameter watermain (greater than 406mm) and related infrastructure (valves, chambers. etc.) to witness and ensure quality control activities are completed at prescribed intervals, materials, material handling and construction are as per design specifications and is completed in accordance with industry standards, manufacturer and City standard specifications, report and take corrective action to remedy deficiencies where required.
- (h) DB Co shall engage a company that can demonstrate a minimum of 10 years of experience in large diameter watermain installation, three references where large diameter watermain installation has been provided within the last five years, and describe the experience of said company, as well as the individuals who shall be responsible for the management and services delivery and their relevant experience and qualifications, to the City in accordance with the requirements of Schedule 10 – Review Procedure.
- (i) For pre-stressed concrete pressure pipe watermain with diameter greater than or equal to 610mm, the following coating, lining and mortar special provisions shall apply:
- (i) The concrete mortar exterior coating mix shall have properties that limit the potential for chloride-induced corrosion by reducing the permeability of the concrete coating. The exterior pipe mortar shall be type 10HSF cement with high quality 9% silica fume additive in accordance with AWWA C205. The high quality silica fume shall comply with C.S.A A23.5-M98. The exterior mortar shall have a thickness of 25mm measured from the outer edge of the prestressed wires.

The cement coating shall be able to withstand occasional freezing/thawing cycles during the lifetime of the pipe.

- (ii) The pipe exterior surface shall be completely coated in the factory with a polyurethane coating 40 mils DFT Corrotec, as manufactured by [REDACTED] or an equivalent approved by the City. The coating shall pass an A.C. Holiday Detector Test set at a voltage of 4000 Volts. The adhesion of the Corrotec onto the concrete shall exceed 700 psi (4830 kPa).
 - (iii) All piping with coatings and linings delivered to the site shall be inspected for defects and cracks. Any repairs to coatings and linings shall comply with the applicable AWWA and ASTM standards. Any damages to the pipe exterior surface shall be repaired by cleaning the area affected and completely coating with a polyurethane coating 40 mils DFT Corrotec, as manufactured by SICO Inc. or an equivalent approved by the City. A pipe shall be deemed as extensively damaged and the pipe will be rejected, if defects or damages in any section of a pipe are numerous or severe enough that, in the City's judgement, it would be unsatisfactory to make separate repairs to the coating or linings.
 - (iv) The exterior pipe joints shall be made using a pre-packaged grout consisting of one part type 10HSF cement with high quality 9% silica fume additive, in accordance with AWWA C205, to two parts of chloride free sand. The high quality silica fume shall comply with C.S.A A23.5-M98. The installation of the field grout shall follow the manufacturer's recommendations. The joint shall be poured using a "Stretch Coat" bitumous diaper that will remain in place after pouring the grout. The addition of excessive water to the grout mix will reduce strength and shall not be tolerated. In order to seal the joints, the diaper shall overlap the pre-stressed concrete pressure pipe Corrotec coating by a minimum of 50mm. The exterior polyurethane coating shall be cut back (not applied) 60mm from both pipe ends to ensure that the poured diaper grout be in contact with the pipe exterior mortar cover for optimal adhesion.
 - (v) Pipe interior joints shall be mortar lined to completely fill the gap with an NSF 61 compliant mortar. All interior exposed steel shall also be similarly mortar lined with an NSF 61 compliant mix. An NSF 61 compliant epoxy coating shall be factory applied to the exposed steel of the bell interior and spigot exterior at the pipe joint (around the gasket area), where interior joints cannot be mortar lined due to size restrictions. The epoxy shall have a minimum thickness of 20 mils.
 - (vi) At the tie-in connection closure piece, the welded split sleeve and any exposed steel shall be grouted. The joint shall be mortar covered with grout using a "Stretch Coat" bitumous diaper or shall be concrete encased with the encasement covered with a Bituthene 3000 waterproof membrane which shall be formed in place.
- (j) DB Co shall not construct Foundations above or within 3m horizontally of watermains or valve chambers.

- (k) DB Co shall not construct or relocate watermains or valve chambers to underneath or within 3m of any Station, Platform or Foundation. DB Co shall not construct valve chambers within 3m of Bridges.
- (l) DB Co shall relocate all water valves and valve chambers out of the Guideway.
- (m) DB Co shall not construct Bridges within 3m horizontally of valve chambers.
- (n) DB Co shall not construct Platforms above or within 3m horizontally of watermains or valve chambers.
- (o) DB Co shall sleeve new and relocated watermains located beneath the Highway 174 paved surfaces, shoulders and median. DB Co shall sleeve new and relocated watermains beneath the Highway 174 a minimum of 5m horizontally past the edge of paved surfaces.

8.8 Storm and Sanitary Sewerage System Requirements

- (a) All storm and sanitary sewer design and construction shall conform to all Applicable Codes, standards and City of Ottawa Sewer Design Guidelines 2012 and Technical Bulletins.
 - (i) DB Co shall relocate all sanitary sewer maintenance holes out of the Guideway.
 - (ii) DB Co shall conduct a precondition survey by way of CCTV on all storm and sanitary sewers within the ZOI as per the City of Ottawa Standard Tender Documents for Unit Price Contracts, Volume 1 and 2.
 - (iii) DB Co shall conduct post construction condition survey by way of CCTV within 90 calendar days on all storm and sanitary sewers within the ZOI as per the City of Ottawa Standard Tender Documents for Unit Price Contracts, Volume 1 and 2.
 - (iv) DB Co shall conduct post construction condition survey by way of CCTV at a minimum of one year following completion of construction on all storm and sanitary sewers within the ZOI as per the City of Ottawa Standard Tender Documents for Unit Price Contracts, Volume 1 and 2.
 - (v) DB Co shall conduct post construction condition survey by way of CCTV within 90 days for all newly constructed or modified storm and sanitary sewers as per the City of Ottawa Standard Tender Documents for Unit Price Contracts, Volume 1 and 2.
 - (vi) All CCTV condition surveys shall include sonar sensing technology, for sanitary or combined sewers greater than 1500 mm diameter.
 - (vii) DB Co, at the City's request, shall conduct additional CCTV surveys or other condition assessments where in the City's opinion may be impacted by construction activities.

- (viii) Where CCTV reports are received and, in the opinion of the City, pipe sections are not of satisfactory cleanliness to adequately assess the condition of the pipe, DB Co, at the City's request, shall be required to clean the respective pipe sections and re-inspect.
- (ix) DB Co shall not construct Foundations over or within 3m horizontally of sewers.
- (x) DB Co shall not construct or relocate sewers beneath or within 3m of any Platform or Foundation.
- (xi) DB Co shall relocate all storm sewer maintenance holes out of the Guideway unless the maintenance hole is part of a storm sewer system dedicated to Guideway drainage.
- (xii) DB Co shall not construct Platforms over or within 3m horizontally of sewers.
- (xiii) DB Co shall not construct Bridges within 3m horizontally of sewer maintenance holes.
- (xiv) DB Co shall not construct sewer maintenance holes within 3m horizontally of Bridges.
- (b) All sewer designs shall be subject to review and final approval by the City.
- (c) The employment of inverted siphons shall be prohibited other than where specified below:
 - (i) There is a conflict of the proposed Tunnel through the SJAM Parkway with the existing 600mm storm water outfall at Mansfield Avenue and Skead Street. An acceptable resolution shall be the construction of a 600mm inverted siphon beneath the existing 1220mm watermain, at an elevation allowing an open channel gravity outfall above the Tunnel to the Ottawa River.
 - (ii) The existing 675mm storm sewer inverted siphon crossing the Transitway corridor from Dominion Street to Workman Avenue, may be lowered and or extended as an acceptable means to deal with further conflicts to the LRT alignment.
- (d) Construction of, or near large diameter sanitary or combined sewers (greater than 750mm), shall be subject to the requirements of CIAR submittals. The City retains the right to reject means and methods where in the City's opinion there is potential for impacting sewer integrity and or threatening normal service levels. Requirements for construction monitoring including but not limited to settlement and vibration monitoring may be imposed by the City as deemed necessary.
- (e) DB Co shall develop a CIAR for construction over, under or near the WNC, in accordance with Schedule 10 - Review Procedure.

- (f) DB Co, in conjunction with the City shall develop an ERP for constructive works over, under or near the WNC, as readiness to mitigate any environmental or service delivery impacts as a result of any damage to the sewer.

8.9 [REDACTED]

- (a) Refer to the “[REDACTED] Information to Support the City of Ottawa’s Proposed light Rail System – Stage 2 Confederation Line” for specific references in this Article and other background information.
- (b) [REDACTED] shall designate the Supply Point locations for the project’s electrical connections and the ownership, control, & maintenance demarcation points between [REDACTED]’s distribution system and the Ottawa Light Rail Transit system. The proposed Supply Points and available capacities are listed in Tables 1-1 and 1-2 of Appendix I. [REDACTED] will designate the final Supply Point.
- (c) [REDACTED] will operate up to the electrical ownership demarcation point and may operate the customer’s first protective device in from [REDACTED]’s distribution system. [REDACTED] clarifies the customer’s interface responsibilities with the connection agreement. [REDACTED] defines three areas of responsibility between itself and the customer’s interface: ownership demarcation (‘O’), electrical control authority (‘C’), and maintenance authority (‘M’). All electrical devices and support structures on [REDACTED]’s distribution system receive unique identifying nomenclature with the required ‘OCM’ suffix indicating the defined roles.
- (d) In the [REDACTED]’s Offer to Connect, Installation & Service agreement and operation & maintenance agreement associated with each project electrical connection, the on-going roles, responsibilities, and ownership shall be defined between the Utility Company, the City, and DB Co. These agreements shall be executed between the three parties within 30 Business Days after the electrical detail design is approved for each Project electrical connection and before construction starts for each Project electrical connection.
- (e) [REDACTED] shall purchase, install and own Supply Point connection assets including primary switchgear, metering equipment, and Station transformers, where there are no TPSS or ventilation loads connected to the Station electrical service.
- (f) For Stations with a TPSS, revenue class [REDACTED] metering shall be provided downstream of the customer owned main breaker in the TPSS.
- (g) DB Co shall file detailed maximum Supply Point loading schedule and its assumptions with [REDACTED] at least two years before energization of the Confederation Line facility is required.
- (h) DB Co shall ensure that [REDACTED]’s control authority and staff has 24/7 access to its primary circuits to control the distribution system, ensure public safety, and replace failed components, and a maximum field emergency response time of 60 minutes not

withstanding a force majeure. Typical circuit restoration times are outlined in the “[REDACTED]” report. DB Co shall ensure it has only one control authority over the Project’s electrical system.

- (i) Other than the Utility Work identified to be paid by the City, DB Co shall pay for any Utility Works for additional Supply Points over those identified in Tables 1-1 and 1-2 of Appendix I.
- (j) Other than the Utility Works identified in this Project Agreement to be paid by the City, DB Co shall pay for the Utility Works that may occur where DB Co requests a change in the Utility Owner’s Supply Point location.
- (k) Automatic load transfer schemes may be deployed by DB Co where redundant electrical servicing is required. Such schemes are subject to [REDACTED] approval and any such scheme will be required to be break before make (open transition of greater than 100 milliseconds) configuration. Automatic transfer schemes shall have provisions for remote monitoring and blocking to the [REDACTED] control centre. Procedures related [REDACTED] ATS blocking shall be developed with consultation to [REDACTED] and included in the [REDACTED] Operations and Maintenance Agreement
- (l) DB Co shall ensure rubber tire vehicle access suitable for [REDACTED] maintenance vehicles outside the Guideway is maintained to existing [REDACTED] underground plant along the north side of the BRT between Holly Acres Road and Woodridge Crescent for the final design and constructed Works.
- (m) DB Co shall be responsible for the costs associated with any temporary electrical services and associated energy accounts.

8.10 Utility Works Special Provisions

- (a) Shefford Road OR174 Watermain
 - (i) DB Co shall undertake Utility Work to replace the existing 406mm watermain that crosses the OR174 from Shefford Road to the 406mm branch valve on the south side of OR174 with a 610mm watermain. Construct a 406mm to 610mm increaser on the existing 406mm branch valve on the south side of the OR174. Construct a new 610mm valve on the new 610mm watermain north of the OR174. Construct a 610mm to 406mm reducer after the new 610mm valve and connect to the existing 406mm watermain on Shefford Road.
- (b) Richmond Road Complete Streets Utility Upgrades
 - (i) DB Co shall undertake Utility Work to design and reconstruct the existing drinking water, sanitary sewer and storm sewer Utility Infrastructure on Richmond Road, Byron Avenue, and their respective connecting cross streets.

A. General design and construction requirements are as follows:

- i. Refer to “Cleary and New Orchard Planning Study Area Future Buildout – Building Population” for specific references in this Article and other background information.
 - 1 DB Co shall perform design calculations and modelling to determine the required size of reconstructed and new drinking water and sanitary sewer Utility Infrastructure on Richmond Road, Byron Avenue, and their respective connecting cross streets. Calculations shall include the 20-year building population forecasts, the design of Richmond Road Complete Streets, and the design of the Confederation Line West Extension. This investigation shall be submitted in accordance with Schedule 10 – Review Procedure.
 - 2 DB Co shall perform design calculations to determine the required size for replacement and new storm sewer infrastructure on Richmond Rd, Byron Ave, and their respective cross streets. Storm sewers shall be sized with capacity for the 5-year storm. The capacity of the catch basin inlets shall be restricted to the 2-year storm. This investigation shall be submitted in accordance with Schedule 10 – Review Procedure.
 - ii. DB Co shall reconstruct all water, sanitary, and storm services within the City ROW to the property line.
- B. Refer to “Richmond Road Complete Streets – Prescribed Water, Sanitary and Storm Replacements” for specific references in this Article. Specific drinking water requirements shall be as follows:
- i. Hydrant spacing shall be reviewed and hydrants added or removed as required to provide coverage in accordance with the Drinking Water Guidelines.
 - ii. DB Co shall design and reconstruct drinking water system Utility Infrastructure as follows:
 - 1 Richmond Road from the Sir John A. McDonald Parkway (360025V247) through to Midway Avenue (360025V084);
 - 2 McEwen Avenue / Edgeworth Avenue from McEwen Avenue (360025V064) through to Edgeworth Avenue (360025V069);

- 3 Richmond Road / Byron Avenue from Hartleigh Avenue (360025V080) through to Redwood Avenue (360026V095);
- 4 Richardson Avenue from Richardson Avenue (360025V094) through to Byron Avenue;
- 5 Ambleside Drive from Ambleside Drive (360026V003) through to New Orchard Avenue;
- 6 New Orchard Avenue from New Orchard Avenue (360026V002) through to Richmond Road (360026V007);
- 7 Richmond Road from Richmond Road (360026V007) through to Redwood Avenue (360027V001);
- 8 Woodland Avenue from Woodland Avenue (360026V015) through to Byron Avenue;
- 9 Harcourt Avenue from Harcourt Avenue (360026V013) through to Byron Avenue;
- 10 Allison Avenue from Allison Avenue (360026V043) through to Byron Avenue;
- 11 Ancaster Avenue from Ancaster Avenue (360026V040) through to Byron Avenue;
- 12 Compton Avenue from Compton Avenue (360026V036) through to Byron Avenue;
- 13 Woodroffe Avenue from Woodroffe Avenue (360026V033) through to Woodroffe Avenue (360026V026);
- 14 Woodroffe Avenue from Woodroffe Avenue (360026V26) through to Woodroffe Avenue (360026V025);
- 15 Lockhart Avenue from Lockhart Avenue (360026V070) through to Byron Avenue;
- 16 Lockhart Avenue from Lockhart Avenue (360026V065) through to Byron Avenue;
- 17 Sherbourne Avenue from Sherbourne Avenue (360026V088) through to Byron Avenue;

- 18 Cleary Avenue from Cleary Avenue (360026V142) through to Richmond Road; and
 - 19 Redwood Avenue from Redwood Avenue (360026V098) through to Richmond Road (360027V001).
- C. Refer to “Richmond Road Complete Streets – Prescribed Water, Sanitary and Storm Replacements” for specific references in this Article. Specific sanitary sewer requirements shall be as follows:
- i. DB Co shall replace the sewer laterals for [REDACTED] to the building foundation;
 - ii. DB Co shall construct a new additional maintenance hole structure outside of the Byron Avenue ROW on New Orchard Avenue, Woodland Avenue, Harcourt Avenue, Allison Avenue, Compton Avenue, and Sherbourne Avenue. New maintenance hole structures shall be located less than 10m from the Byron Avenue ROW. Connect to existing Utility Infrastructure.
 - iii. DB Co shall design and reconstruct sanitary sewer system Utility Infrastructure as follows:
 - 1 Richmond Road from the Sir John A. McDonald Parkway (MHSA01248) through to Midway Avenue (MHSA26107);
 - 2 McEwen Avenue / Edgeworth Avenue from McEwen Avenue (MHSA25339) through to Edgeworth Avenue (MHSA25343);
 - 3 Byron Avenue from Richardson Avenue (MHSA25389) through to Ancaster Avenue (MHSA25395);
 - 4 Richmond Road from Richmond Road (MHSA25381) through to New Orchard Avenue (MHSA26049);
 - 5 New Orchard Avenue from the new maintenance hole structure on New Orchard Avenue through to Byron Avenue (MHSA25390);
 - 6 New Orchard Avenue from New Orchard Avenue (MHSA25391) through to New Orchard Avenue (MHSA25380);
 - 7 Richmond Road from New Orchard Avenue (MHSA25382) through to Woodroffe Avenue (MHSA26110);

- 8 Woodland Avenue from the new maintenance hole structure on Woodland Avenue through to Byron Avenue (MHSA25392);
- 9 Harcourt Avenue from the new maintenance hole structure on Harcourt Avenue through to Byron Avenue (MHSA25393);
- 10 Allison Avenue from the new maintenance hole structure on Allison Avenue through to Byron Avenue (MHSA25394);
- 11 Ancaster Avenue from Ancaster Avenue (MHSA25428) through to Byron Avenue (MHSA25395);
- 12 Compton Avenue from the new maintenance hole structure on Compton Avenue through to Byron Avenue (MHSA26191);
- 13 Byron Avenue from Compton Avenue (MHSA26191) through to Redwood Avenue (MHSA26311);
- 14 Woodroffe Avenue from Woodroffe Avenue (MHSA26200) through to Byron Avenue (MHSA26193);
- 15 Woodroffe Avenue from Woodroffe Avenue (MHSA26162) through to Richmond Ave (MHSA26160);
- 16 Richmond Avenue from Woodroffe Avenue (MHSA26160) through to Richmond Avenue (MHSA01725);
- 17 Lockhart Avenue from Lockhart Avenue (MHSA26157) through to Richmond Avenue (MHSA26163);
- 18 Sherbourne Avenue from the new maintenance hole structure on Sherbourne Avenue through to Richmond Avenue (MHSA01725);
- 19 Richmond Road from Richmond Road (MHSA61485) through to Richmond Road (MHSA01725);
- 20 Cleary Avenue from Cleary Avenue (MHSA26169) through to Richmond Avenue (MHSA01724); and
- 21 Richmond Avenue from Richmond Avenue (MHSA26171) through to Cleary Avenue (MHSA26170).

- D. Refer to “Richmond Road Complete Streets – Prescribed Water, Sanitary and Storm Replacements” for specific references in this Article. Specific storm sewer requirements shall be as follows:
- i. DB Co shall utilize CCTV, smoke/fog testing, and/or dye testing to determine all storm sewers connected and contributing to the sanitary sewer system. The investigation shall include all flat roofs, depressed laneways, parking garages, parking lots, and private catch basins to determine connection points. Known flat roofs include but are not limited to [REDACTED]. This investigation shall be submitted in accordance with Schedule 10 – Review Procedure. Where storm sewers are connected to sanitary sewer systems, DB Co shall:
 - 1 Construct new storm lateral sewers to separate sanitary and storm services. All new storm laterals shall include backwater valves. Connect to storm sewers to City storm sewer Infrastructure; or
 - 2 Where extraneous flow is quantified and is unable to be directed to a new or existing storm sewer due to private property constraints, DB Co shall account for the additional flow in the design and construction of the new sanitary sewer as per the City of Ottawa Sewer Design Guidelines.
 - ii. DB Co shall design and reconstruct storm sewer system Utility Infrastructure at the intersections of Richmond Road, Byron Avenue, and Woodroffe Avenue. DB Co shall construct additional catch basins to eliminate the current ponding and drainage issues at this intersection. List of reconstructed storm sewers are as follows:
 - 1 Richmond Road from Richmond Road (MHST53979) through to Woodroffe Avenue (MHST53982); and
 - 2 Woodroffe Avenue from Woodroffe Avenue (MHST78275) through to Woodroffe Avenue (MHST26040).
 - iii. DB Co shall design and construct new storm sewers on Byron Avenue and Richmond Road with capacity for the 5-year storm. Flows to the minor system shall be restricted to the 2-year peak flow rate. Major system flows shall be designed to pond on the street consistent with requirements in this Article and the City of Ottawa Sewer Design Guidelines. Design and construction shall conform to Article 5 – Drainage and Stormwater Management Design Criteria, and Article 6 – Roadway, Bus Terminals and Lay-Bys of this Part 2. List of new storm sewers is as follows:

- 1 Byron Avenue from Richardson Road to Woodroffe Avenue, to provide minor system drainage of the roadway, and to accept minor system flows from the tributary areas to the south;
 - 2 Byron Avenue from Lockhart Avenue to Woodroffe Avenue, with drainage connections to properties on the south side of Byron, to provide minor system drainage of the roadway and to accept minor system flows from tributary areas to the south; and
 - 3 Richmond Road from Cleary Avenue to Woodroffe Avenue to provide drainage for the arterial roadway, the Byron linear park, tributary areas to the south, and properties on the north side of Richmond Road.
- iv. As part of Richmond Road Complete Streets and Byron Avenue reconstruction, DB Co shall design and construct SWMPs as outlined in Clause 5.7 of this Part 2.

(c) NCC Specific Utility Servicing Requirements

- (i) DB Co shall undertake Utility Work to provide drinking water, sanitary and storm services to the Rochester Fields site ([REDACTED]) and Kitchissippi Lookout for future development and use by the NCC. Elements of the Utility Works shown on the drawings provided by the NCC in Appendix G of this Part 2, shall form part of the requirements as described below.
- A. General construction requirements shall be as follows:
- i. All construction on NCC lands shall follow the City of Ottawa Drinking Water Guidelines and City of Ottawa Sewer Design Guideline;
 - ii. DB Co shall provide sufficient appurtenances to flush stagnant water from constructed watermains. DB Co shall be responsible for water flushing during construction until the site is transferred back to the land owner as per City of Ottawa Standard Specification F-4491. The land owner shall be responsible for flushing post-construction.
 - iii. Sanitary sewer grading shall allow for gravity drainage of buildings.
- B. Prescriptive requirements of the Utility Works shown on the provided drawings shall be as follows:

- i. The routing of all Utility Works.
- ii. Minimum clearances prescribed between Utility Works and existing infrastructure.
- iii. All connections points into municipally or privately owned Infrastructure. All termination points capped for future use;
- iv. All drinking water pipe sizes and type. All sanitary and storm sewer sizes and type;
- v. The location and features of all maintenance holes, valve chambers, tees, reducers, subdrains, catch basins, infiltration based LID, inlet control devices, curb stops, hydrants;
- vi. The features and routing of all joint utility crossing ducts and joint utility crossing duct banks. For the location and additional requirements of the proposed Kitchissippi Lookout Intersection, refer to Clause 6.21 of this Part 2.
- vii. The water and sanitary services at Westboro Beach/Atlantis shall cross the SJAM Parkway in the Kitchissippi Lookout Intersection. For the location and additional requirements of the proposed Kitchissippi Lookout Intersection refer to Clause 6.21 of this Part 2.

(d) Lawn Avenue Parkette & Community Garden Servicing Requirements

- (i) DB Co shall undertake Utility Work to improve the storm water services at the intersection of Edgeworth Avenue and Lawn Avenue and to provide drinking water services to the proposed Lawn Avenue parkette community garden.

A. General requirements shall be as follows:

- i. All Utilities constructed beneath the Lawn Avenue parkette shall be located no greater than 4.5m from the centreline of the park.
- ii. DB Co shall demonstrate to the City through hydrologic/hydraulic modeling that the cumulative impacts of the Works will not increase peak flow rates or the peak hydraulic grade line of the enclosed portion of Pinecrest Creek known as the ORPP for all rain events up to the 100-Year Storm. This analysis shall be submitted in accordance with Schedule 10 – Review Procedure.

B. Specific drinking water requirements shall be as follows:

- i. Provide a 50mm drinking water service on municipal lands at the NCC property line south of the proposed park pathway. construction shall follow the City of Ottawa Standard Design

Drawing W31.1 to provide water to the proposed community garden. The curb stop shall be located at the intersection of Edgeworth Avenue and Lawn Avenue.

C. Specific storm water requirements are as follows:

- i. Clean, repair and re-grade ditches and storm water Culverts along Edgeworth Avenue from [REDACTED] (300m) and along Lawn Avenue from Hartleigh Avenue to Edgeworth Avenue (160m). Grading shall flow towards the intersection of Edgeworth Avenue and Lawn Avenue;
- ii. Upsize the storm Culverts at the intersection of Edgeworth Avenue and Lawn Avenue to 500mm diameter;
- iii. Re-grade the intersection of Edgeworth Avenue and Lawn Avenue towards the catch basin and inlets at the intersection of Edgeworth Avenue and Lawn Avenue. Reinstall road features affected by the work of replacing and upsizing the Culverts. Install the frost tapers;
- iv. Provide a below-grade storm sewer beneath the Lawn Avenue parkette. Connect the storm water Culvert catch basin at the intersection of Edgeworth Avenue and Lawn Avenue to the Lawn Avenue parkette storm water sewer. No overland flow shall be permitted through the Lawn Avenue parkette up to the 5-Year storm event;
- v. Connect the Lawn Avenue parkette storm sewer to the ORPP.

(e) Southwest Transitway Storm Culvert replacements

- (i) DB Co shall undertake Utility Works to reconstruct the storm sewers (STM64602, STM64606, STM64613 and STM64599) between Baseline Road and Iris Street. Existing headwalls and wingwalls shall remain.

(f) Moodie LMSF

- (i) DB Co shall be permitted to construct the LMSF Vehicle storage Tracks and roof Structure above the existing 900mm West Nepean trunk sanitary sewer. Where the West Nepean trunk is located beneath the LMSF Vehicle storage Tracks and roof Structure:

- A. DB Co shall demonstrate the proposed LMSF design, construction and operation does not impose unacceptable operational, life-cycle or access risk to the trunk sewer to the satisfaction of the City in the pre-final design submission.

- B. DB Co shall maintain a 3m horizontal clearance to maintenance hole structures from the storage Tracks and roof Structure.
 - (ii) DB Co shall designate a natural gas supply point location on Corkstown Road. DB Co shall file forecasted demands and required gas service date for the LMSF facility. The City shall cover the costs of [REDACTED] system expansion up to the designated supply point.
- (g) Moodie Station Watts Creek Relief Sewer
 - (i) DB Co shall not construct a pedestrian Bridge overpass crossing the alignment of the 1950mm Watts Creek Relief Sewer sanitary sewer at Moodie Station.
 - (ii) DB Co shall not construct or maintain maintenance holes for the Watts Creek Relief Sewer within the Moodie BRT loop or travelled lanes.
- (h) Iris Grade-Separation Bridge Sanitary Sewer
 - (i) DB Co shall abandon the 300mm sanitary sewer on Iris Street from Parkway Drive to Adirondack Drive.
- (i) [REDACTED]
 - (i) No permanent utility easements shall be permitted on the property parcel at [REDACTED] except:
 - A. A storm sewer easement within 9m of the property parcel at [REDACTED] shall be permitted.
- (j) McRae Avenue Bridge [REDACTED] Transmission Cables
 - (i) [REDACTED] maintains high voltage transmission cables over the existing BRT supported by a steel structure. DB Co shall design OCS elements and an insulating barrier to protect against arching and grounding of the OCS to the steel structures. The design shall be approved by [REDACTED]. Refer to [REDACTED] located in the Background Information.

8.11 Enabling Utility Works

- (a) The City, in conjunction with [REDACTED], has initiated and will complete the following [REDACTED] relocations. Further information can be found in the [REDACTED] planning report:
 - (i) Montreal Road and OR174 Interchange: The [REDACTED] pole line on the north side of Montreal Road will be relocated over the extents from Shefford Road to approximately 300m east of Montreal Road. Relocation is complete.

- (ii) LMSF: [REDACTED] overhead lines crossing Highway 417 at the LMSF facility will be relocated underground immediately east of their current overhead location. Civil works are expected to commence in spring 2020.
- (b) The City, in conjunction with [REDACTED], will complete the relocation of the [REDACTED] direct buried ducts approximately located at station 303+110 of Confederation East. The ducts and fibers be will relocated south and away from the proposed Hwy 174/Montreal Bridge abutments as shown in the Reference Concept.
- (c) The City, in conjunction with [REDACTED], has initiated and will complete the following [REDACTED] relocations. Further information can be found in the [REDACTED]:
 - (i) Lincoln Fields: The [REDACTED] underground transmission line, which crosses the SJAM Parkway immediately south of Carling Avenue is anticipated to be relocated by August 2020. Schedule and relocation requirements will be finalized with DB Co.
 - (ii) Trim Rd: The [REDACTED] overhead transmission cables, which cross Trim Rd. parallel to Hwy 174 are to be elevated to meet clearance requirements for the proposed pedestrian Bridge. Schedule and relocation requirements will be finalized with DB Co.

ARTICLE 9 PROTECTION OF EXISTING ADJACENT STRUCTURES

9.1 Scope

- (a) This Article provides requirements for the following:
 - (i) Determination of the Project ZOI, as defined below, to assess the potential impacts to EAS due to the construction activities associated with the Works;
 - (ii) Criteria for evaluating impacts on EAS;
 - (iii) Development of mitigation measures as necessary to ensure safety and continued operation of the EAS; and,
 - (iv) Pre- and post-construction condition surveys.
- (b) Project ZOI shall refer to the area within and adjacent to the Works, including EAS, that potentially may be impacted by construction activities associated with the Works including dewatering.

9.2 General Requirements

- (a) DB Co shall:
 - (i) Assess the effects of construction related Ground Movements including dewatering on EAS. Prepare and submit for the City review a report in accordance with Schedule 10 – Review Procedure documenting anticipated impacts. Integrate the pertinent requirements of this Article into the report.
 - (ii) Based upon the report conclusions, design and implement mitigation measures as necessary to ensure that the structural integrity of EAS is maintained and that the appearance, functionality, operability, and durability of EAS are unimpaired.
 - (iii) Receive condition survey reports conducted by other parties where available and perform pre and post-construction condition surveys to document the condition of the EAS. Surveys shall be submitted in accordance with Schedule 10 - Review Procedure.
 - (iv) Remedy all damage caused by construction activities associated with the Works, including demolition, to pre-existing conditions. A complete report, that includes all temporary and permanent corrective measures, shall be submitted after completion of construction confirming all damages had been remedied.
 - (v) DB Co shall obtain necessary Permits, Licences, Approvals and Agreements from third party owners of the EAS to perform necessary works. For communication protocols, DB Co shall follow Schedule 18 - Communications and Stakeholder Engagement Obligations. DB Co shall not use any existing permits to enter to the EAS that had been granted for other projects or other purposes.

- (vi) Ensure that utility isolation or relocations do not affect the electrical safety grounding of EAS.

9.3 Qualifications

- (a) Determination of the ZOI, evaluation of impacts on EAS and the design and implementation of mitigation measures shall be undertaken by staff who have verifiable design and construction experience with similar programs and be directly supervised by a Professional Engineer.
- (b) The individual responsible for the surveyors shall be a registered land surveyor in the Province of Ontario with experience in measurements of the types of accuracies that shall be required for geotechnical instrumentation monitoring.

9.4 Design Requirements

- (a) DB Co shall:
 - (i) Obtain pertinent information of EAS and utilities.
 - (ii) Obtain all specific design, protection and monitoring requirements from third party owners including but not limited to City requirements for excavations adjacent to the structures including bridge components and other structures, Utility Companies, and other third party owners.
 - (iii) More specifically, prior to undertaking any excavations, DB Co shall provide the predicted movements (vertical, horizontal, rotational, tilt, relative movement) for review by the City. For such excavations, a detailed real time (24/7) monitoring plan to monitor settlements, Ground Movements and tilting/movement of adjacent bridge components shall be implemented in the GIMP and made available on DMP. If blasting is considered as a means of rock excavation in accordance with the restrictions of Schedule 15-2, Part 1, Clause 5.2, the anticipated ground vibrations shall be determined based on DB Co's blasting design and blasting plan to ensure compliance with the blasting limitations of Article 7 of this Part 2. City structures staff shall be notified, according to the communication protocols stipulated in Schedule 18 - Communications and Stakeholder Engagement Obligations, if any Alert Levels are exceeded. For further negotiations with City, DB Co shall provide modelling and assessment of the anticipated settlement in a CIAR-2 level report as well as a sensitivity analysis of the impact of varying settlement levels on the City bridges to be undertaken in 5mm increments.
 - (iv) Complete EAS verification study to include confirming information related to EAS locations, dimensions, elevations, foundations, structural details, materials, and other information necessary to complete a deformation analysis of the structures. Perform field surveys, utility locates, and foundation test pits as needed
 - (v) Deformation Analysis

- A. DB Co shall consider the available Site specific geotechnical reports and reference documents to identify the Project ZOI. The Project ZOI shall be determined by DB Co using engineering analyses and shall include all sources of Ground Movements that may be caused by construction activities associated with the Works including dewatering for temporary and permanent structures. At a minimum the Project ZOI shall be as follows:
- i. A horizontal distance from the edge of any supported excavation or temporary slope equal to twice the excavation depth as measured from the existing ground surface.
- B. Design Reports:
- i. Prepare and submit CIAR-1 and CIAR-2 in accordance with the requirements of Schedule 10 – Review Procedure. CIAR-1 and CIAR-2 shall include magnitude and distribution of Ground Movements as well as potential impacts on EAS. CIAR-1 is applicable to:
- 1 First level of assessment and screening for all EAS.
 - 2 EAS such as low rise commercial buildings and single family residences that are assumed to be flexible small frame buildings.
 - 3 EAS which are absent of any large rigid grade beam elements, which may have the potential to attenuate ground settlements.
 - 4 Small, low-rise non-critical EAS where the predicted impact poses no risk to public safety or loss of functionality.
 - 5 Utilities within the Project ZOI.
- ii. To assess the magnitude of impact to EAS and facilities, CIAR-1 analysis shall include the following tasks as a minimum:
- 1 Review of literature on impact assessment methodologies.
 - 2 Conduct building, bridge and utility inventory by identifying buildings, bridges and utilities within the settlement trough using building type and use survey.
 - 3 Overall evaluation of EAS and facilities potentially at risk.
 - 4 Detailed definition of damage levels.

- 5 Determine strain, settlement, and angular distortion limits for each building.
 - 6 Determine joint rotation, joint pull-apart, and tensile strain limits for each utility.
 - 7 Determine EAS or locations requiring a further CIAR-2 analysis.
- iii. CIAR-2 analysis is generally appropriate for EAS that meet any of the following criteria:
- 1 EAS recommended by the findings of CIAR-1.
 - 2 Exterior cladding systems that generally consist of non-load bearing masonry, precast concrete or glass.
 - 3 EAS that generally include deep, multi-storey basements which could possibly alter the slope of the ground settlement profile
 - 4 Mid-rise and high-rise EAS.
 - 5 Critical EAS that are considered to be of historical or cultural significance, heritage buildings or essential services buildings and utilities that exceed a CIAR-1 predicted impact levels.
- iv. The representative EAS for CIAR-2 analysis, as a minimum, shall be selected based on the following criteria:
- 1 Results of CIAR-1.
 - 2 Proximity to the cut-and-cover excavation zone or dewatering zone.
 - 3 Potential to sustain cut-and-cover excavation or dewatering induced settlement impacts.
 - 4 Type and sensitivity of superstructure and cladding.
- v. As a result of this selection process, the CIAR-2 analyses are expected to provide an estimate of the potential structural impacts due to cut-and-cover excavations. The results of these CIAR-2 analyses shall be used to predict excavation induced settlement impact to other similar EAS within the Project limits.

- vi. DB Co shall use established numerical simulation methods such as finite element method or finite difference method. Simplified numerical methods and empirical methods may be used only for CIAR-1 for screening purposes.

(b) Impact Mitigation Design

- (i) Design Structure-specific mitigation measures needed to prevent a loss in appearance, structural integrity, functionality, operability and durability of potentially impacted EAS and ensure safety and continued operation of the EAS. Demonstrate the effectiveness of the proposed mitigation measures by engineering analysis. Confirm and document that the proposed mitigation is acceptable to all potentially affected EAS owners which shall also include but will not be limited to City structures and Utility Companies. Determine instrumentation monitoring requirements, include Review and Alert Levels in the GIMP (refer to Article 7 – Geotechnical Design Criteria and Requirements, of this Part 2) for evaluating the effectiveness of the mitigation measures during construction that is consistent with the means and methods for construction. The DMP, as stated in this Article, shall be used to create and send alarm reports/notifications if Alert Levels are exceeded. DB Co shall inform the City of subsequent response actions taken by DB Co.
- (ii) DB Co shall prepare a Response Action Plan, as stated in Article 7 – Geotechnical Design Criteria and Requirements, of this Part 2, which shall consist of preliminary methods and means to respond to various Review and Alert Level scenarios based on types of geotechnical instruments that indicate Review and Alert Levels. Review and Alert Levels shall be determined based on the predicted Ground Movements and the results of the CIAR and shall also comply with the following criteria,
 - A. The Review Level is a geotechnical instrument reading that triggers a set of review and mitigation actions to ensure that the Alert Level is not exceeded. Review Level shall not exceed 10mm movement.
 - B. The Alert Levels is maximum permissible geotechnical instrument reading that triggers consideration of temporary work stoppage to prevent damage to EAS. Alert Levels shall not exceed 25mm movement.
 - C. DB Co shall adhere to the allowable joint pull-apart, joint rotation and tensile strain in table below for utilities within the Project ZOI.

| Material | Joint Pull-Apart (mm) | Joint Rotation (rad) | Tensile Strain ($\mu\epsilon$) |
|------------------|-----------------------|-----------------------------|----------------------------------|
| Cast Iron | 15 ⁽¹⁾ | 0.0075 ⁽²⁾ | 150 ⁽¹⁾ |
| Steel | 25 ⁽²⁾ | 0.0075 ⁽²⁾ | 550 ⁽²⁾ |
| Ductile Iron | 25 ⁽²⁾ | 0.0075 ⁽²⁾ | 500 ⁽¹⁾ |
| RCP | 25 ⁽²⁾ | 12.5mm/diam. ⁽²⁾ | 300 ⁽³⁾ |
| Brick & Concrete | NA | NA | 150 ⁽³⁾ |
| Precast Concrete | 25 ⁽²⁾ | 12.5mm/diam. ⁽²⁾ | 300 ⁽³⁾ |

1 Bracegirdle et al. (1996)

2 CIRIA No. 30 (1992)

3 North American Tunneling Proceedings (2014)

- i. DB Co shall develop limits for Concrete Pressure Pipe joint pull-apart, joint rotation and tensile strain in accordance with the pipe manufacturer's recommendations and industry standards, whichever is the more stringent.
 - ii. If blasting is used for rock excavation in accordance with the restrictions of Schedule 15-2, Part 1, Clause 5.2 and the requirements of Article 7 of this Part 2, the CIAR shall demonstrate that the tensile strain limits of brick and concrete Utilities listed above are not exceeded for the WNC based on DB Co's blasting design and plans. The minimum stand-off distance for rock blasting between the WNC and Parkway Tunnel shall not be reduced from that specified in Schedule 15-2, Part 1, Clause 5.2 but may be increased based on the results of this CIAR and as determined by the City.
- (iii) DB Co shall include in the GIMP all measures and specific instrumentation and monitoring requirements for protecting EAS within the Project ZOI as defined by DB Co.
- (c) Pre, during- and post-construction condition surveys
 - (i) DB Co shall be solely responsible to perform required condition surveys for the purpose of inspecting and documenting the existing condition of EAS prior to, during and after construction. Record information about EAS damage or repairs, defects, unusual aspects of construction, presence of sensitive equipment, and similar pertinent information. Perform this work in accordance with Applicable Law, relevant standards, regulations and by-laws including but not limited to the City municipal code. Survey information shall be submitted according to Schedule 10 – Review Procedure.

- (ii) Where pre-construction condition surveys for EAS are performed by DB Co, survey reports shall be prepared and submitted for review in accordance with the requirements of Schedule 10 – Review Procedure. The survey reports shall consist, at a minimum, of the completed standard form, photographs with photo description log sheet, and DVD of digital video and digital photographs. The report shall be stamped by the Professional Engineer licensed in Ontario responsible for performing the survey.
- (iii) Perform during- or post-construction condition surveys for EAS where the Response Levels of structure movements or deformation have been exceeded, or a damage claim has been received.

9.5 Existing Adjacent Structures Owner Interactions

- (a) DB Co shall:
 - (i) Follow communication protocols established in Schedule 18 - Communications and Stakeholder Engagement Obligations, for interactions with EAS owners and other impacted or potentially impacted parties.
 - (ii) Work with owners of EAS to perform required inspections. Develop and implement, where required, acceptable mitigation measures and geotechnical instrumentation monitoring requirements and perform pre- and post-construction condition surveys.
 - (iii) The process of identifying impacts to EAS and developing monitoring and mitigation requirements shall generally be as follows:
 - A. Step 1: Owners of potentially affected EAS, as identified in the CIAR-1, shall be briefed of the CIAR-1 findings by DB Co.
 - B. Step 2: CIAR-2 shall be prepared and provided to potentially affected EAS owners and the City.
 - i. DB Co shall consider each of the above steps as iterative depending on specific requirements of individual EAS owners including but not limited to the City, Utility Companies and other third party owners. DB Co shall be proactive and thorough in their approach.
 - ii. Develop and maintain a schedule of the EAS and other stakeholders that rely on EAS. This document shall be updated as required and shall be used to track the completion of the impact assessments and obtaining acceptances of the monitoring and mitigation plans including review and approval by all relevant third parties including but not limited to the City, Utility Companies and other third party owners. Submit the updated

document to the City on a quarterly basis in accordance with Schedule 10 – Review Procedure requirements.

9.6 Future Adjacent Construction Requirements and Protection of Project Infrastructure

- (a) At the City's request DB Co shall be required to review the existing Developer's Guide prepared by the City as it relates to proximity of proposed Third Party development in relation to the Confederation Line East Extension and Confederation Line West Extension alignment, Lands and Facilities, and provide comments regarding the defined Development ZOI compared with the Project ZOI.
- (b) Assist the City with the review of submitted documentation for proposed development throughout the construction. DB Co review comments will be used by the City for approval of DB construction and implementation procedures required prior to construction of future adjacent projects to ensure that no adverse impacts will be caused to the system. DB Co shall coordinate and cooperate with the City with respect to the established development review process recognizing that:
 - (i) The City will be responsible for performing development reviews in accordance with the process;
 - (ii) The City will retain an independent consultant and/or utilize internal staff resources to undertake the development reviews;
 - (iii) The City will be responsible for screening development applications that require a development review;
 - (iv) DB Co shall be responsible for reviewing and commenting on the draft development review findings; and,
 - (v) DB Co's contributions to the review process will be formalized in a City by-law to be enacted by the City.

ARTICLE 10 OR174 STREET LIGHTING

10.1 Introduction

- (a) This Article presents the roadway lighting Design Criteria and lighting performance requirements for transition highway lighting at the Stations. Transition lighting shall be provided at Station locations and shall be compatible with anticipated future lighting requirements for the full highway. Full lighting shall be provided at the Montreal Road interchange and the new Trim Road intersection.

10.2 Reference Documents

- (a) The road lighting design and construction shall comply with the criteria contained in this Article, and all standards, regulations, policies, Applicable Law, guidelines or practices applicable to the Project, including but not limited to each of the following Reference Documents. In the event of a conflict between criteria, commitments or requirements contained within one document when compared with another, the more stringent shall apply:
 - (i) The criteria contained in this Article;
 - (ii) Ontario Electrical Safety Code, Electrical Safety Authority – Last Edition;
 - (iii) MTO – Electrical Engineering Manual;
 - (iv) Road interchanges Lighting Policy;
 - (v) Right-of-way lighting policy;
 - (vi) Roadway lighting ANSI/IES RP-8-14;
 - (vii) Illumination Warrant Policies PLNG-B-05 & PLNG-B-06;
 - (viii) Ontario MTO Provincial Highway Directives, MTO;
 - (ix) MTO accepted luminaire Photometric list;
 - (x) Policy for spill light beyond MTO Right-of-away and for Light Trespass onto the MTO Right-of-way;
 - (xi) MTO Drawings (MTOD);
 - (xii) OPS;
 - (xiii) DSM;
 - (xiv) TAC – Guide for design of roadway lighting

- (xv) Highway Element Investment Review Guidelines (HEIR);
- (xvi) Roadside Safety Manual, MTO;
- (xvii) Geometric Design Standards for Ontario Highways, MTO;
- (xviii) City of Ottawa standards;
- (xix) Other relevant municipal standards;
- (xx) NEMA;
- (xxi) CSA;
- (xxii) IESNA Lighting Handbook;
- (xxiii) IEEE;
- (xxiv) IEC;
- (xxv) [REDACTED] Specifications;
- (xxvi) [REDACTED] Specification.

10.3 Basis for Design

- (a) All lighting within the ROW of OR174 including on and off ramps to the OR174 shall conform to MTO Standards, specifications and drawings. Lighting design for all other City ROWs shall conform to the requirements in Article 6 - Roadways, Bus Terminals and Lay-Bys of this Part 2.
- (b) Calculations
 - (i) Lighting level calculations around the Stations shall be completed in conjunction with the final retained concept. DB Co shall use one of the following modeling software programs to develop and verify the design of all the photometric aspects.
 - A. AGI 32 version 2.36
 - B. Autolux version 8.05
 - (ii) Calculations shall include luminaire locations, mounting heights, manufacture's catalog data sheet with product selections and options indicated, lamp data sheet, wattage lumens, color rendering index, light loss factors, and photometric file used.
 - (iii) DB Co shall provide modeling simulations for each Station. The calculations shall show the calculated lighting levels.

- (iv) Voltage drop calculations shall be completed for maximum loads, long run circuits and feeders. Voltage drop shall not exceed 5 %.
- (v) DB Co shall submit the lighting calculation results to the City of Ottawa for review in accordance with Schedule 10 – Review Procedure.
- (c) General requirements
 - (i) All lighting poles shall be base mounted with underground ducts and wiring.
 - (ii) All Roadway lighting Design Criteria shall meet the TAC and MTO requirements.
 - (iii) DB Co shall design a roadway illumination concept for the following locations :
 - A. Montreal Road Station
 - B. Jeanne d’Arc Boulevard Station
 - C. Orléans Boulevard Station
 - D. Place d’Orléans Station
 - E. Trim Road Station
 - (iv) DB Co shall determine the need for any additional illumination within the Lands, interchanges, crossing roads and adjacent highways if applicable.
 - (v) DB Co shall design and construct full interchange lighting for the Montreal Road/OR174 and lighting as appropriate for the Trim Road/OR174 intersection, including interchange ramps. The lighting identified above for Montreal Road Station and Trim Road Station and Park and Ride shall be designed in conjunction with the interchange/intersection lighting.
 - (vi) The products or materials used for the illumination on OR174 shall be as per the MTO standards and shall be LED fixtures.
 - (vii) Lighting system shall be designed so that the failure of any single luminaire or lighting circuit in areas accessible to the public does not leave an area in total darkness.
 - (viii) Lighting system shall be energy-efficient using high-efficiency light sources and auxiliary equipment and shall be LED equipment.
 - (ix) Lighting equipment shall be vandal-resistant where accessible to the general public.
 - (x) The design of the illumination systems shall provide safety, reliability, and continuous operation.

- (xi) Lighting design and construction shall be coordinated with other building elements so as not to affect the expected works.
- (d) Design Criteria
 - (i) The DB Co design shall meet the minimum illumination levels listed below:
 - A. Luminance
 - i. Minimum average maintained 0.6 cd/m²
 - ii. Average to Minimum Uniformity ratio ≤ 3.5
 - iii. Maximum to Minimum Uniformity ratio ≤ 6
 - B. Illuminance
 - i. Minimum average maintained 9 lux
 - ii. Average to Minimum Uniformity ratio ≤ 3.0
 - C. Veiling luminance
 - i. Recommended ≤ 0.3
 - (ii) DB Co shall perform a detailed illumination analysis for the Station locations.
 - (iii) The lighting design shall meet the illumination levels and uniformity requirements for both day and night time operations.

10.4 Functional requirements

- (a) Luminaires
 - (i) All roadway lighting fixtures shall be LED type III, cut-off or full cut-off.
 - (ii) Luminaire housing/refractor assembly shall be designed and fabricated to prevent the ingress of moisture, dirt and other foreign materials.
 - (iii) Luminaire shall have a minimum of 10 years warranty.
- (b) Poles
 - (i) DB Co shall provide poles in accordance with the City of Ottawa or MTO requirements and the requirements of Clause 10.1 (a) of this Part 2.
 - (ii) Poles shall be direct buried.
 - (iii) Poles shall be base mounted.

- (iv) Poles shall be installed in Earth. When rock is encountered, the method of installation shall be chosen from those specified in the contract documents. Each method of installation in rock shall be approved by the Engineer prior to construction.
 - (v) All poles shall be inspected for any obvious flaws, prior to erection.
- (c) Cables and wiring
 - (i) Cables and wiring shall be installed in accordance with the City or MTO Standards.
- (d) Grounding
 - (i) The roadway lighting electrical distribution system shall be solidly grounded, designed to meet the City or MTO Standards.
 - (ii) The system ground wire and the service ground wire shall be connected to the same neutral bus.
- (e) Electrical ducts and fittings
 - (i) Two different types of ducts shall be permitted. All of them shall meet the City requirements.
 - A. Rigid PVC ducts using a rigid PVC coupling sleeve;
 - B. Flexible Polyethylene ducts joined by cutting a sleeve from the next larger size
 - (ii) Rigid PVC electrical ducts shall be direct buried and installed in trench.
 - (iii) The materials shall meet the requirements of the City and MTO.
- (f) Power distribution
 - (i) The power distribution system shall provide enough power for the illumination components that require electrical power.
 - (ii) DB Co shall undertake all coordination with Utility Companies for all required servicing and shall provide a list of all electrical loads to the power Utility Companies.
 - (iii) DB Co shall provide power installations and connections to all illumination components that require electrical power.
- (g) Power supply

- (i) Power supply equipment shall comply with the City and MTO Standards.
 - (ii) Supply control cabinets shall be mounted securely on poles using stainless steel strapping.
 - (iii) DB Co shall inspect the power supply equipment to ensure that it meets the requirements of the contract. A visual inspection of all the power supply equipment is preferable prior to its delivery.
- (h) Coordination with local utilities
 - (i) DB Co shall coordinate along the DB construction staging with all the involved local utilities.
 - (ii) DB Co shall plan measures to protect existing underground utilities.

Appendix A

[Intentionally deleted]

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**SCHEDULE 15-2
DESIGN AND CONSTRUCTION REQUIREMENTS**

**PART 3
SYSTEMS**

ARTICLE 1 INTRODUCTION

1.1 General Overview

- (a) This Part 3 is written using design standards typical of North America unless otherwise specified.
- (b) DB Co shall declare and apply the selected standards consistently throughout the full range of the Systems designs.
 - (i) DB Co shall provide the Systems in accordance with the requirements set out in this Project Agreement and any deviations or variances to the application of the selected standards shall be subject to approval by the City.
- (c) DB Co shall ensure that each system design includes the ability to support the extension and system expandability.
- (d) DB Co shall ensure that equipment from selected vendors is implemented consistently from the same vendors throughout the Confederation Line Extension.
- (e) This section provides a description of the elements contained within the general heading of systems. Systems include the following functional elements:
 - (i) Traction Power System;
 - (ii) OCS;
 - (iii) Revenue Vehicles; the City to procure all Revenue Vehicles required for the extension;
 - (iv) Maintenance Vehicles; the City to procure all Maintenance Vehicles required for the extension ;
 - (v) Communications
- (f) DB Co shall develop the performance specifications, produce the design, supply and test the Signalling and Train Control System.
- (g) DB Co shall design, procure, install, test and commission the S&TC infrastructure items required to support the overall S&TCS implementation. The S&TC system will be an

extension of the Existing Confederation Line system and as such shall be consistent with the existing system in design approach, architecture and technology. The S&TC shall, as far as possible, deploy the identical functions, features and equipment. Changes to the existing design shall be limited to those specifically required for the extensions to the guideway and associated facilities, including any new hazards or requirements

- (h) DB Co shall produce the specifications, develop the interfaces and manage the integration testing and Commissioning of the communications Systems listed below.
 - (i) CTS;
 - (ii) PA/PIDS system ;
 - (iii) CCTV System
 - (iv) IAC System
 - (v) Telephone and Intercom System
 - (vi) SCADA System
 - (vii) Voice Radio Communications (including BTS hotel, conduits along the alignment, fibre along the alignment, conduits at Stations, fibre & coax cable at Stations, leaky coaxial cable in Tunnel and equipment in communications equipment rooms)

1.2 Systems Element Summary

- (a) TPSS – detailed in Article 13 – Traction Power System, of this Part 3.
 - (i) DB Co shall design the Traction Power System that supplies a dual end fed DC voltage into the OCS.
 - (ii) DB Co shall ensure that the TPSS be placed alongside the Guideway at locations dictated by the Train performance criteria, maintenance consideration, available property and availability of utility power connection. Refer to Schedule 15-2, Part 4, Article 2 – Architectural Design Criteria, for TPSS location restrictions.
 - (iii) DB Co shall ensure that the TPSS be modular in design. Equipment within the TPSS shall be easily accessible for performing maintenance.
 - (iv) DB Co shall ensure that the design and positioning of the TPSS take into account any environmental and aesthetic constraints resulting from their chosen locations.
 - (v) DB Co shall ensure that The TPSS conform to EMI & EMC requirements set forth in Article 11 – EMI/EMC of this Part 3.

- (vi) DB Co shall minimize stray current through compliance with the corrosion requirements set forth in Article 12 – Corrosion Control, of this Part 3.
 - (vii) DB Co shall ensure that the Utility feed to TPSS be obtained at the utility transmission voltage level.
 - (viii) DB Co shall ensure that the System include built-in redundancy to maintain normal revenue Train operations with a single point of failure, sub-transmission systems shall be designed with two cable circuits, each capable of carrying the full-load current.
 - (ix) DB Co shall ensure that a computerized analysis be performed to develop an optimum Traction Power System configuration defining TPSS locations, equipment ratings and cable sizes. DB Co shall ensure that the design meet specified systems performance under normal and degraded operation conditions. DB Co shall produce and submit the report to the City for review and comment.
 - (x) DB Co shall ensure that the System design take into consideration personnel and equipment safety requirements, proper clearances, and required lockout functions, controls, warning alarms, and other equipment operating functions.
- (b) OCS – detailed in Article 14 – Overhead Contact System, of this Part 3.
- (i) DB Co shall provide an OCS to supply Traction Power to Revenue Vehicles and Maintenance Vehicles throughout the Confederation Line.
 - A. The OCS shall consist of the messenger and contact wires which are supported from poles, portals, cross-spans, bridge supports and tunnel supports as required. The contact wire shall be installed at constant height with respect to the Track and shall be suspended from the messenger wire by means of hangers.
 - B. The OCS design shall include the selection of support structure spacing along tangent and curved Track, and the messenger and contact conductor tensions. The design shall optimise the selection of these parameters to achieve the most complete and functional design while the pantograph does not leave the contact wire under the most onerous conditions of operation.
 - C. The OCS shall be designed to have a low visual impact, high reliability, provide safe operation and maintenance and operate within the environment installed.
- (c) Signalling and Train Control System – detailed in Article 10 – Signalling and Train Control System, of this Part 3.

- (i) DB Co shall ensure that the S&TCS be based on a proven ATC architecture supporting a wide range of operating environments.
 - (ii) DB Co shall ensure that the S&TCS be designed to maximize the safety, reliability, operational flexibility and fault tolerance.
 - (iii) DB Co shall ensure that the S&TCS support operational performance and service plan as described in Schedule 15-2, Part 1, Article 3 – Operational Performance Requirements.
- (d) DB Co shall provide all field cables. DB Co shall provide all civil infrastructure (conduits duct banks, inserts, etc.) and installation required to support the S&TCS design. DB Co shall terminate and test all cabling.
- (e) EMC/EMI – detailed in Article 11 – EMI/EMC, of this Part 3.
 - (i) All supplied equipment and systems within the DB Co System Infrastructure shall meet the EMC/EMI requirements set out in Article 11 – EMI/EMC, of this Part 3.
- (f) DB Co shall ensure that all systems elements be designed, implemented and configured as required to support the future implementation of PEDs at all Underground Stations.
- (g) DB Co shall produce and provide a register to the City with all Confederation Line Extension Project asset data for incorporation into the CMMS developed as part of the Existing Confederation Line. DB Co shall provide the CMMS data for the East Extension and the West Extension six months prior to Substantial Completion.
- (h) The City will provide the prescribed format to DB Co for development and incorporation of the asset data.
- (i) Radio Systems
 - (i) In Article 2 – Communications Transmission Systems, of this Part 3, the term “train to wayside wireless” includes all three of the train to wayside radio systems being constructed as part of the Confederation Line West Extension and Confederation Line East Extension and described below.
 - (ii) A Voice Data Radio (P25) system is being provided for Project wide communications and ESP use. The scope of work with regards to the locations of DB Co responsible items has been included in Article 5 – Voice/Data Radio System, of this Part 3.
 - (iii) In Clause 8.8 (a) (vi.), of this Part 3, the term “train to wayside” is being used to include the Voice/Data (P25) Radio System and the HSDR system.

- (iv) A wireless radio system is being included as part of the CBTC system, as outlined in Article 10 – Signalling and Train Control System. The location of all radio system components included as part of this system is included as part of the CBTC system design and installation.
- (v) A High Speed Data Radio System is being provided for data communications between the vehicles and the wayside infrastructure, as outlined in Article 17 – high Speed Data Radio System, of this Part 3. The actual locations of the wayside devices shall be determined during the design phase.

1.3 Systems Engineering Principles

- (a) All the Systems described in this Part 3 shall be designed and implemented following the Systems Engineering principles (as set out in ISO/IEC 15288 and as described in Schedule 15-2, Part 1 – General Requirements) and the S&TCS will be consistent with [REDACTED] as described in the [REDACTED]. The Systems Engineering and Systems Integration Management processes shall ensure that systems expanded, or provided, by DB Co will interface with Existing Confederation Line systems to create a fully integrated expanded system.
- (b) This systems engineering approach shall be applicable for all levels in the system hierarchy and for all disciplines.
- (c) Submittal requirements are outlined in Schedule 10 – Review Procedure.
- (d) DB Co shall:
 - (i) Implement a SEMP that outlines the engineering organization, the facilities needed and where they will be located; the interaction between each of the engineering phases and what criteria is necessary to be completed prior to moving on to the next phase; each of design phases and the requirements, processes and steps taken to successfully complete each; how technical issues will be resolved; description of how external interfaces will be developed and managed; implementation planning including training of users; and a description of how production will be managed; the SEMP shall include the plan & process for requirements review and approval as well as how issues will be resolved between the City and DB Co.
 - (ii) DB Co shall develop and implement a comprehensive Grounding and Bonding Plan that outlines how all elements (above ground and underground Stations, Track, TPSS, OCS, bridges and overhead structures, etc.) of the System are grounded and bonded. The plan shall describe how the elements of the Confederation Line shall be grounded and bonded to ensure an electrically safe design and to prevent adverse stray current conditions that could impact the overall operational state of the System and surrounding non-system elements. The plan shall be submitted to the City for review and comment.

1.4 RAM Targets

- (a) DB Co shall provide equipment/subsystem equipment to meet the following RAM targets:
- (i) General
- A. For the requirements pertaining to this Clause 1.4, a re-use of equipment from the Existing Confederation Line will be deemed compliant. DB Co shall provide the respective information for reliability and MTTR for the intended re-use equipment from the Existing Confederation Line. DB Co shall demonstrate to the City that the equipment to be re-used from the Existing Confederation Line for the Confederation Line East Extension and Confederation Line West Extension is from the same supplier, with the same model number, and has been accepted for use on the Existing Confederation Line. In the case that equipment cannot be re-used from the Existing Confederation Line due to actual or planned obsolescence, DB Co shall be entitled to use a more recent and equivalent model recommended by the equipment supplier, provided it meets or exceeds the specifications of the original equipment and is compatible with the existing interface.
- B. MTTR – For the purpose of the prescribed requirements in this Clause 1.4, the design MTTR shall be used for analysis and demonstrated at the First Article Inspection or at a site demonstration, if a First Article Inspection is not required.
- C. All workstations (excluding keyboard, monitor, mouse) shall have a minimum MTBF of 50,000 hours.
- i. MTTR < 0.5 hours.
- D. All servers shall have a minimum MTBF of 50,000 hours.
- i. MTTR < 0.5 hours.
- E. Network switches shall have an MTBF of 500,000 hours.
- i. MTTR < 0.5 hours.
- F. Station Controllers for emergency sound system/CCTV/PIDS (as applicable) shall have a minimum MTBF of 120,000 hours.
- i. MTTR < 1.0 hours.
- G. Elevators shall have an Availability of > 97%.

- i. Availability is calculated as total operational time (in hours) divided by the total number of downtime (in hours) plus total operational time (in hours).
 - ii. $A\% = \text{total operational time} / (\text{total operational time} + \text{total downtime})$.
 - iii. $MTTR < 4 \text{ hours}$.
 - H. Escalators shall have an Availability of $> 97\%$.
 - i. Availability is calculated as total operational time (in hours) divided by the total number of downtime (in hours) plus total operational time (in hours).
 - ii. $A\% = \text{total operational time} / (\text{total operational time} + \text{total downtime})$.
 - iii. $MTTR < 4 \text{ hours}$.
 - I. Switch Heater (gas for yard and electric for mainline):
 - i. Each switch heater shall have an MTBF of 2000 operational hours with an MTTR of 1 hour.
- (ii) Communications Equipment
 - A. CCTV:
 - i. Each camera shall have a minimum MTBF of 120,000 hours.
 - ii. $MTTR < 0.5 \text{ hours}$.
 - B. NVR shall have a minimum MTBF of 50,000 hours.
 - i. $MTTR < 0.5 \text{ hours}$.
 - C. PA / PIDS:
 - i. Each speaker shall have a minimum MTBF of 120,000 hours.
 - ii. Each display shall have a minimum MTBF of 50,000 hours.
 - iii. $MTTR < 0.5 \text{ hours}$.
 - D. ETEs and FTEs:

- i. Each outdoor phone shall have a minimum MTBF of 50,000 hours.
 - ii. Each indoor phone shall have a minimum MTBF of 130,000 hours.
 - iii. Each intercom shall have a minimum MTBF of 130,000 hours
 - iv. MTTR < 0.5 hours
 - (iii) S&TCS:
 - A. Wayside Radio Unit Assembly:
 - i. Includes radio, antenna and peripherals and shall have an MTBF greater than 50,000 hours.
 - ii. MTTR < 0.5 hours.
 - B. Zone Controllers:
 - i. Each single checked redundant (2oo2) zone controller shall achieve an MTBF greater than 16,000 hours.
 - ii. MTBSAF of 50,000 hours.
 - iii. MTTR < 0.5 hours.
 - C. Switch Machine:
 - i. Each switch machine shall achieve an MTBF of 200,000 hours.
 - ii. MTTR < 2 hours.
 - D. Transponder Tags:
 - i. Each tag shall achieve an MTBF of 3,000,000 hours.
 - ii. MTTR < 0.5 hours.
 - (iv) Traction Power:
 - A. TPSS:
 - i. Switchgear shall have an MTBF of 20,000 hours, MTBSAF of 50,000 hours and an MTTR of < 4 hours.

- ii. Transformer/Rectifier Unit MTBF of 20,000 hours, MTBSAF of more than 250,000 hours and an MTTR of < 4 hours.
- B. UPS Equipment provided for applicable system power supply back-up:
 - i. UPS assembly shall have an MTBF of 25,000 hours, MTBSAF of 250,000 hours and an MTTR of 0.5 hours.
- C. OCS:
 - i. DB Co shall provide an MTBF and MTBSAF analysis for the Overhead Contact System (inclusive of poles, mounts, messenger and contact wire, tensioners, mounts, etc.) to demonstrate that the design meets or exceeds the performance of the Existing Confederation Line.
 - ii. MTTR < 8 hours.

ARTICLE 2 COMMUNICATIONS TRANSMISSION SYSTEM

2.1 General Requirements

- (a) The CTS shall serve as communications backbone to provide data, voice and video communications between the TOCC, BCC, Moodie LMSF, Belfast MSF, the Stations and wayside facilities.
- (b) DB Co shall ensure that the CTS design provide hi-speed fibre optic communications transmission for the various Confederation East/West communications subsystems, including, CCTV, PA, PIDS, telephone & intercom, IAC, fare collection, FLS, radio, Train to wayside wireless and SCADA systems. Train Control data for the Confederation Line communication shall be on a separate wireless network, see Article 10 – Signaling and Train Control System, of this Part 3, for details. The CTS design shall also include any fibre required for the voice radio system and the cellular network in the Tunnels and for any parts of the Works.
- (c) DB Co shall ensure that the CTS design for Confederation Line shall include integration of the proposed CTS with the existing CTS.
- (d) DB Co shall ensure that the CTS design be capable of providing automatic protection switching for link recovery in case of failure.
- (e) DB Co shall ensure that if a complete fibre optic cable break should occur, the system shall perform a loop back operation, isolating the fault, and maintaining communications with all equipment that remains connected to the network. Should a major node failure occur, the network shall automatically create and startup a new configuration without the node.
- (f) DB Co shall ensure that all restoration times shall be limited to a maximum of 50 milliseconds.
- (g) DB Co shall provide the system of ductwork, conduits, pull boxes, man holes and fibre optic splice enclosures required for the CTS extension. DB Co shall ensure that manholes can be secured and allow access only to authorized persons.
- (h) DB Co shall ensure the system of ductwork, conduits, pull boxes and manholes to be provided along the mainline to transport the CTS cables is physically separated by providing a system along both sides of the alignment that connects with the Existing Confederation Line infrastructure.
- (i) DB Co shall design, manage the interfaces, supply and install, the CTS civil infrastructure both outside and inside the Stations including conduits, pits, foundations, buildings and cabinets.
- (j) DB Co shall provide rack space at underground Stations for cellular service equipment.

- (k) The mainline CTS system of ductwork and conduits shall include manholes strategically located throughout the alignment to facilitate connection of fibre cables from the Stations to the TPSS.
- (l) DB Co shall design, manage the systems interfaces, procure, install, conduct PICO and SAT of the CTS facility to facility fibre optic cable.
- (m) DB Co shall terminate fibre runs into the fibre entrance cabinets in Station communications rooms and from there to CTS rack patch panels.
- (n) DB Co shall design, manage the systems interfaces, procure, install, conduct PICO and SAT of the CTS stations to wayside fibre cable.
- (o) DB Co shall design, manage the interfaces, supply (including Pre-delivery Test), install, terminate, conduct PICO and SAT on the fibre runs from fibre entrance cabinets in Station communications rooms to any CTS wayside patch panels and from FECs to CTS rack patch panels.
- (p) DB Co shall design, supply (including Pre-delivery Test), install, conduct PICO, SAT and commissioning of all CTS cable terminations.

2.2 Operational Requirements

- (a) The existing TOCC, located at 875 Belfast Road, Ottawa, Ontario (referred to as 875 Belfast herein), includes all of the systems and subsystems necessary to provide the command, control and monitoring necessary for the delivery of the services. The existing communications elements managing these functions are located either in the Belfast MSF communications room or in TOCC.
- (b) The City will purchase all required server licenses, data storage, and any other system expansion equipment required to connect the new CTS field equipment to the equipment located in the Belfast MSF.
- (c) The City will integrate, test, and commission all OLRT Stage 2 communications equipment at the TOCC and BCC head-ends.

2.3 CTS Core Network Switch/Router Requirements

- (a) The core network switches/routers within the Stations shall have a minimum of 4 X 10Gbps ports to connect on the ring to the next Station on the loop and interconnect the core switches/routers.
- (b) The core network switches/routers within the Station shall be interconnected using two 10 Gbps fibre interfaces. The switches shall be sized for the port density required within each Station including network connections on each core network switch/router for local critical equipment such as SCADA, VOIP gateways and CCTV NVRs, and PA network

interfaces. All systems equipment with two network interfaces shall connect to a port on each of the core Station switches or access switches. If the core network switches/routers do not have the port density to support all network equipment in the Stations then additional access switches with high network interface ports shall be supplied to connect to CCTV cameras, and other equipment that only support single network connections. The access switches shall be connected to each of the core switches for redundancy. The core network switches located in each Station shall support at a minimum the following features:

- (i) Standard 19 inch rack mountable.
- (ii) Dual redundant hot swappable power supplies connected to the UPS and a separate electrical panel feed. Field replaceable fans.
- (iii) Local switch management.
- (iv) Minimum switch fabric non-blocking throughput of 40Gbps.
- (v) Provide switch aggregation or switch stacking.
- (vi) Support minimum 4 x 10 Gbps interfaces.
- (vii) Support minimum of 20 additional ports either single mode or multimode fibre or 10/100/1000 TX.
- (viii) Support the following network protocols:
 - A. G 8032 Ethernet Ring Protection and/or MPLS and/or SPB IEEE 802.1aq;
 - B. IEEE 802.1Q VLAN Tagging;
 - C. IEEE 802.3ad Link aggregation;
 - D. IEEE 802.1 Prioritizing;
 - E. IEEE 802.3w Rapid Spanning Tree;
 - F. IGMP V2, V3;
 - G. IEEE SBP Shortest Path Bridging;
 - H. IEEE 802.3af Power over Ethernet; and,
 - I. SNMP MIBs for remote management.
- (ix) Port Security:

- A. All ports shall be disabled unless specifically configured;
 - B. Port security shall be set by MAC address, Sticky mac address, VLAN trunk; and,
 - C. Learned MAC address.
- (x) Switch Security:
 - A. Switch shall require user and password to login; and,
 - B. Remote MIBs to support SNMP V3 for security.
- (c) DB Co shall design the new extension's CTS to include a WAN component and LAN component. The LAN shall provide local network traffic switching and aggregation of the network traffic at each Station, TPSS, and the Moodie LMSF, for transport over the WAN.
- (d) The City shall configure the existing network hardware to accept the expanded CTS. The City shall configure the existing network software to accept the expanded CTS.
- (e) The City shall update the existing head-end management platform and verify the CTS connectivity from the field equipment to the TOCC, BCC, MYCC and BYCC. This is the network equipment (switches, routers, etc.) that make up the active CTS equipment along the main line.

2.4 Performance Requirements

- (a) DB Co shall ensure that the CTS expansion for the Project shall include fibre optic cables, network transmission equipment, and other equipment necessary for a complete communications network.
- (b) DB Co shall provide, as a minimum, cable sizes and quantity of strands that match what has been installed on Stage 1. DB Co shall also provide a minimum of 50% spare fibre/copper cable and port capacity for future expansion of the CTS.
- (c) DB Co shall design the network expansion to be a high bandwidth and fault tolerant system. The system shall be of a compatible design with that of the existing City system and shall have no single point of failure.
- (d) The City shall be responsible for protecting and maintaining the existing optical fibre feeds on the Confederation Line until Substantial Completion. The WAN shall be configured in a path-diverse topology in order to minimize single point failure. WAN network equipment shall support fast (sub-50 milliseconds) automatic network recovery (self-healing) in the event of a network link failure.

- (e) DB Co shall ensure all CTS equipment include redundant power supplies. In the event of a power outage, the equipment shall remain operational for a minimum of 24 hours through the use of uninterruptible power supplies, generators, and/or other backup power equipment.
- (f) DB Co shall ensure that all new equipment be compatible with the existing NMS and shall be managed and monitored by the NMS.
- (g) The City shall be responsible for the integration into the TOCC & BCC. The existing NMS shall automatically discover all new network devices and network connections within the CTS. In the event of a network failure, the NMS shall perform root cause analysis to pin-point location of failure.
- (h) The CTS shall be designed such that these component failures are minimized by redundancy. The availability of the Confederation Line system (i.e. availability of all system hardware, cabling) equipment shall be greater than 99.9%.

2.5 City Traffic Operations Communications Infrastructure

- (a) DB Co shall supply and install a twenty-four strand single-mode fibre optic cable for dedicated use by the City along the whole length of the Confederation Line alignment, including 17 break-out points (with the breakout point at Carling (Lincoln Fields) serving as the junction point for the lines to Moodie and Baseline) and manholes throughout the alignment; seven of these shall be on the East extension, and ten shall be on the West extension.
- (b) DB Co shall supply and install fibre cable rated for the environmental considerations and shall meet all regulatory requirements regarding installation along a transit corridor.
- (c) DB Co shall ensure at each break-out point, a concrete encased 100mm duct shall deviate from the mainline and connect to breakout manholes. The fibre cable shall run from the main duct to the manhole and return to the main duct. The location of manholes will be determined based on consultation with the City, but shall be located outside of the Confederation Line ROW, and shall be as close as practicable to the locations proposed in Table 3-2.1. The manholes shall be designed to meet current City specifications for traffic maintenance holes. The manholes shall be located at street level and provide sufficient clearance from obstacles to allow City staff to access the manhole.

Table 3-2.1: Proposed Breakout Points for Traffic Operations Fibre

| Confederation Line Breakout Points | Lat | Long | Description |
|---|------------|-------------|--------------------|
| Confederation Line East Extension | | | |

| | | | |
|-----------------------------------|-----------|------------|--|
| Blair Rd | 45.433117 | -75.607537 | Southwest corner of the 174 WB Off ramp & Blair Rd |
| Montreal Road | 45.45106 | -75.584471 | Southeast corner of the 174 WB Off ramp & Montreal Rd (North side of the Jersey Barrier) |
| Jeanne D'Arc | 45.468264 | -75.545546 | Northwest Corner of the 174 EB On/Off ramp & Jeanne d'Arc |
| Orleans Blvd | 45.47328 | -75.534117 | Southwest corner of the 174 & Orleans Blvd Overpass |
| Place D'Orleans | 45.479667 | -75.517476 | Southeast corner of the 174 & Champlain Overpass. Northeast corner of the Champlain & Place d'Orleans Drive Intersection |
| Tenth Line | 45.486967 | -75.503442 | Southwest Corner of the Tenth Line & 174 WB Off ramp Intersection |
| Trim Rd | 45.494774 | -75.482003 | Southwest Corner of the 174 & Trim Intersection |
| Confederation Line West Extension | | | |
| Tunny's Pasture | 45.404002 | -75.734266 | Northeast Corner of the Scott & Holland Intersection (Manhole existing as part of Stage 1 LRT) |
| Island Park | 45.399004 | -75.745968 | Southeast corner of the Confederation line and Island Park. Northeast corner of the Island Park & Scott Intersection |
| Scott Street | 45.394975 | -75.755324 | Northeast corner of the Scott & Churchill intersection |
| Woodroffe N | 45.377793 | -75.774967 | North corner of the Richmond & Woodroffe Ave N Intersection |
| Carling Rd | 45.364693 | -75.783757 | Northeast Corner of the SJAM Parkway On Ramp & Carling Ave |

| | | | |
|--------------------|-----------|------------|--|
| Baseline Rd | 45.351552 | -75.763422 | Northwest corner of the Baseline & Woodroffe Intersection. |
| Pinecrest | 45.350655 | -75.790239 | Southeast corner of the Pinecrest & 417 WB Off ramp Intersection |
| Richmond Rd (West) | 45.347805 | -75.803548 | Southwest corner of the Richmond & Bayshore Intersection |
| Holly Acres | 45.344746 | -75.814196 | Southeast corner of Holly Acres & Transitway Intersection |
| Moodie | 45.343011 | -75.842018 | Northeast Corner of Moodie & Corkstown Intersection |

- (d) DB Co shall ensure that the fibre have 10m of slack for each direction of travel coiled within each manhole.
- (e) DB Co shall ensure that the installed fibre not have any splice points within the duct and shall be one unbroken cable from breakout point to breakout point.
- (f) Where the Confederation Line splits (south to Baseline Road and west to Moodie Drive) the fibre shall be installed in both branches, with the breakout point at Carling Road serving as the junction point for both of the branches. The City shall be responsible for any splicing and/or termination work at the junction.

2.6 City Traffic - Intelligent Transportation System Devices

- (a) DB shall provide 120/240 VAC and Traffic Signal Disconnect with Cabinet External Meter (EB99) (DWG NO T31-M date Dec 2010) along with Disconnect Pad Foundation (DWG NO. T26 Rev. date March 2012) at each of the 14 locations (4 for Traffic Engineering; 10 for Traffic Management) identified in Table 3-2.2 below.
- (b) DB Co shall relocate affected devices at current locations if required due to Roadway modifications. Some devices shall be relocated irrespective of Roadway modifications. The City shall have final approval of identified device locations.

Table 3-2.2: Proposed Locations for Power, Disconnect Cabinets and Pads

| Owner | Device | Location | Current Connection | Scope | Extra Scope |
|---------------------|---------------|-------------------------|---------------------------|----------------------|--------------------|
| Traffic Engineering | Camera 234 | NE corner of Hwy 174 EB | Hydro & | Relocate existing if | N/A |

| Owner | Device | Location | Current Connection | Scope | Extra Scope |
|-------|------------|---|--------------------|--|----------------------|
| Group | | on/off ramp & Blair Rd intersection | wireless | required due to Roadway modifications | |
| | Camera 235 | NE corner of Hwy 174 WB off ramp & Blair Rd intersection | Hydro & wireless | Relocate existing if required due to Roadway modifications | N/A |
| | Camera 200 | Hwy 174 Transitway overpass, near SE corner of bridge deck | Solar & wireless | Relocate existing if required due to Roadway modifications | Provide Hydro power. |
| | Camera 199 | Hwy 174 WB (north side), ~505m east of Montreal Rd | Hydro & DSL | Relocate existing if required due to Roadway modifications | N/A |
| | Camera 198 | Hwy 174 EB (south side), ~25m east of Jeanne d'Arc Blvd | Hydro & DSL | Relocate existing if required due to Roadway modifications | N/A |
| | Camera 197 | NW corner of Champlain St & Place d'Orleans Dr intersection | Hydro & DSL | Relocate existing if required due to Roadway modifications | N/A |
| | Camera 72 | Hwy 174 WB (north side), | Hydro & DSL | Relocate existing if required due | N/A |

| Owner | Device | Location | Current Connection | Scope | Extra Scope |
|--------------------------|------------------------------------|---|--------------------|--|--|
| | | ~85m east of Trim Rd | | to Roadway modifications | |
| | Wavetronix B | Hwy 174 EB (south side), ~240m east of Blair Rd | Solar & Cell | Relocate existing if required due to Roadway modifications | Provide Hydro Power. |
| | Wavetronix C | Hwy 174 EB (south side), ~1075m east of Blair Rd | Solar & Cell | Relocate existing if required due to Roadway modifications | Relocate to Hwy 174 EB (south side), ~1185m east of Blair Rd. Provide Hydro power. |
| | Wavetronix D | Hwy 174 EB (south side), ~940 west of Montreal Rd | Solar & Cell | Relocate existing if required due to Roadway modifications | Provide Hydro Power. |
| Traffic Management Group | BlueToad 655 | Hwy 174 EB (south side), ~245m west of Jeanne d'Arc Blvd | Solar & Cell | Relocate existing if required due to Roadway modifications | N/A |
| | Wavetronix 3 | Hwy 174 WB (north side), ~505m east of Montreal Rd | Solar & Cell | Relocate existing if required due to Roadway modifications | N/A |
| | FVMS: 174 EB for Jeanne d'Arc Blvd | Hwy 174 EB (south side), ~1635m west of Jeanne d'Arc Blvd | Solar & Cell | Relocate existing if required due to Roadway modifications | Provide Hydro Power. |

| Owner | Device | Location | Current Connection | Scope | Extra Scope |
|-------|------------------------------------|---|----------------------|--|----------------------|
| | FVMS: 174 WB for Montreal Rd | Hwy 174 WB (north side), ~1635m west of Jeanne d'Arc Blvd | Solar & Cell | Relocate existing if required due to Roadway modifications | Provide Hydro Power. |
| | FVMS: 174 WB for Trim Rd | Hwy 174 WB (north side), ~525m east of Trim Rd | Hydro & Cell | Relocate existing if required due to Roadway modifications | N/A |
| | FVMS: 174 EB for Montreal Rd | Hwy 174 EB (south side), ~1185m east of Blair Rd | N/A (Future Devices) | N/A (Future Devices) | Provide Hydro power. |
| | FVMS: 174 WB for Blair Rd | Hwy 174 WB (north side), near south end of Shefford Rd | N/A (Future Devices) | N/A (Future Devices) | Provide Hydro power. |
| | FVMS: 174 EB for Champlain St | Hwy 174 EB (south side), on west side of embankment for Orleans Blvd overpass | N/A (Future Devices) | N/A (Future Devices) | Provide Hydro power. |
| | FVMS: 174 WB for Jeanne d'Arc Blvd | Hwy 174 WB (north side), on east side of embankment for Orleans | N/A (Future Devices) | N/A (Future Devices) | Provide Hydro power. |

| Owner | Device | Location | Current Connection | Scope | Extra Scope |
|-------|--------------------------------|--|----------------------|----------------------|----------------------|
| | | Bldv overpass | | | |
| | FVMS: 174 EB for Tenth Line Rd | Hwy 174 EB (south side), ~440m east of Champlain St | N/A (Future Devices) | N/A (Future Devices) | Provide Hydro power. |
| | FVMS: 174 WB for Champlain St | Location: Hwy 174 WB (north side), ~520m west of Tenth Line Rd | N/A (Future Devices) | N/A (Future Devices) | Provide Hydro power. |
| | FVMS: 174 EB for Trim Rd | Location: Hwy 174 EB (south side), ~900m east of Tenth Line Rd | N/A (Future Devices) | N/A (Future Devices) | Provide Hydro power. |
| | FVMS: 174 WB for Tenth Line Rd | Hwy 174 WB (north side), somewhere along Parkrose Pvt | N/A (Future Devices) | N/A (Future Devices) | Provide Hydro power. |

ARTICLE 3 TELEPHONE AND INTERCOM SYSTEM

3.1 General Requirements

- (a) DB Co shall design a telephone and intercom system that provides emergency and non-emergency voice grade communications.
- (b) DB Co shall design the telephone and intercom system to ensure that all telephones route through the Confederation Line's existing telephone system. The emergency intercom systems (emergency and elevator help) shall provide a direct connection to the TOCC and BCC.
- (c) DB Co shall ensure that staff telephones be deployed in specific locations in the Stations to support operations.
- (d) DB Co shall supply and install maintenance telephones in the communications equipment rooms, elevator/escalator machine rooms, EERs, TPSS, CIH, and vent plants and shall route through the existing Confederation Line's telephone system.
- (e) DB Co shall coordinate the expansion of the telephone system with the City. The City shall expand the telephone system to support the new telephones with the new licenses and expansion modules.

3.2 Operational Requirements

- (a) DB Co shall design, manage the interfaces supply, install, conduct PICO, SAT, SIT and commissioning of the telephone and intercom system. Refer to Schedule 15-2, Part 4 – Stations for locations including the equipment cabinets and racks. The telephone system shall include the following types of telephones:
 - (i) ETEL;
 - (ii) FTEL
 - (iii) HINT;
 - (iv) ICP Phones
 - (v) ITEL;
 - (vi) STEL;
 - (vii) MTEL;
 - (viii) HFI; and,
 - (ix) Public Telephones (by others).

- (b) DB Co shall perform static subsystem test of the of the telephone systems.

3.3 Performance Requirements

- (a) The City shall perform all addition/modifications to the Existing Confederation Line telephone System head-end equipment at the TOCC and BCC.
- (b) DB Co shall install ETELS a minimum of every 30m on Platforms and a minimum of every 30m in TSA.
- (c) DB Co shall install ETELS at each Station entrance, along the concourse areas and in general passenger circulation areas including concourse areas and corridors.
- (d) DB Co shall ensure that Emergency telephones and staff telephones be VoIP and be routed through the existing PBX.
- (e) DB Co shall ensure that the ETELS be of identical construction and branding as the Existing Confederation Line. ETEL are identified in accordance with Schedule 15-2, Part 4, Appendix D – Signage and Wayfinding Cyrville Station (Segment 5) IFC package.
- (f) DB Co shall ensure that Emergency telephones be rated for outdoor use, with IP66 rated enclosures, and vandal-resistant. Refer to Schedule 15-2, Part 4 – Stations for location information.
- (g) DB Co shall design, supply, and install the telephone systems E&M infrastructure including conduits, mounting brackets, etc.
- (h) Emergency telephones and elevator help telephones shall interface with the CCTV system to automatically provide video of the activated telephone and area to the TOCC, BCC, MYCC and BYCC receiving a call from these phones. A minimum of two fixed cameras shall view the areas so that cameras cannot be purposely panned away from possible incidents.
- (i) ETEL Alarm Monitoring
 - (i) The ETELS located on Platforms shall have an off-hook auxiliary relay installed in the ETEL enclosure. This auxiliary relay shall be hard wired to the Station's SCADA system. This shall enable the SCADA system to send commands to the CCTV system to control CCTV cameras close to the ETELS to capture video and display it on a workstation monitor when the ETEL is being used. The ETELS located in the TSA shall be monitored by a fixed camera at all times. For Emergency situations, when the call button is activated an alarm shall be sent to the SCADA system from the auxiliary relay. This causes the nearby PTZ cameras to pan towards the area providing two views of the area. These functions shall be performed by the SCADA system, cameras shall then be displayed on the video wall in the TOCC and BCC.

- (ii) The ETEs located elsewhere on the Platform or in the concourse area of the Station shall be monitored by either a fixed camera at all times or by a nearby PTZ camera which shall be homed to that area when the push button on that particular ETE is pressed.
- (j) Elevator Help Intercoms
 - (i) The EHFI and faceplate shall be provided by the elevator supplier. An analog EHFI shall be deployed in each elevator cab of all Stations on the Confederation Line connected to a VOIP terminal adapter over CAT 3 cable, provided within the elevator travelling cable. Customers using the elevator shall be able to communicate with the TOCC and BCC by the push of a button when and if they feel threatened.
 - (ii) All EHFIs shall be connected to an interface panel in their designated elevator room connected via the elevator travelling cable. From the terminal adapter in the elevator room they shall be routed back to the nearest communications room by a fibre optic cable or an Ethernet cable depending on the distance between both rooms and the length of the travelling cable. In the communications room, EHFIs shall be terminated in the same patch panels used for ETEs. The EHFI include a LED on the faceplate to indicate “Help is on the way” that can be controlled remotely using a DTMF code to illuminate the LED. The EHFI phones’ DTMF codes shall be configured using the embedded HTTP web configuration tool or through a TFTP file. The EHFI units shall be flush-mounted at an accessible height, and shall be equipped to be accessible to Passengers with hearing and/or visual impairments. The EHFIs shall be rated for outdoor use and are vandalism-proof.
- (k) EHFI Alarm Monitoring
 - (i) Similar to ETEs, EHFIs shall be equipped with an auxiliary relay, which shall be connected to the Station SCADA system for monitoring purposes via the interface panel. The auxiliary relay shall be activated when the red HELP button is pressed.
 - (ii) Each EHFI shall be monitored by a fixed CCTV camera located in the cab. When the help button is pressed, CCTV shall start recording at a higher frame rate and video from this camera shall be fed to the video wall in the control room at the TOCC and BCC.
- (l) Information Telephone
 - (i) ITEs shall be used by the public for assistance with any issues related to tickets, or any other non-Emergency purposes. These ITEs shall be installed on the fare paid side of the fare gates within the utility cabinets. ITEs shall be used by customers for information and to communicate with customer service for issues such as fare information, Ticket Machine errors, and if they need any non-

Emergency assistance. ITELs shall be programmed to connect directly to the customer service personnel. ITELs shall be power over Ethernet VoIP based hands free units. They shall be powered by power over Ethernet and shall be a different color than the Emergency phones to avoid confusion between both types of telephones. ITELs shall function outdoors and be able to withstand the local climate conditions. They shall be provided with the equipment necessary to assist Passengers with visual impairment. ITELs shall be connected using CAT6 to the CTS rack's patch panel in the communications room of the Station. From there, they shall be routed through the CTS back to the City's PABX.

(m) ITEL Alarm Monitoring

- (i) Alarm alerts shall not be necessary when ITELs are used by customers as these phones are expected to be used for non-Emergency purposes; however, the personnel in the TOCC and BCC shall be able to monitor these devices by using existing fixed cameras or nearby PTZ cameras in case these phones are used for an Emergency purpose.

(n) Maintenance Telephones

- (i) MTEs shall be located in all technical rooms (electrical rooms, communications rooms, elevator machine rooms, SER, etc.). In addition to these technical rooms, MTEs shall be installed at the LMSF, and within all TPSS for maintenance staff to communicate with each other and OC Transpo staff as necessary. Similar to the STEs, each MTE shall be supplied with a wall mounting bracket. Staff using these phones shall be able to call any other STE or MTE by dialing the extension of a particular telephone. These phones shall have a dial pad to dial numbers. These phones shall have conference calling and call forwarding capabilities. The MTEs shall be power over Ethernet VoIP based telephones with speed dial programming capabilities that shall allow staff to utilise the short dialing feature of the programmable telephones. They shall be routed to a new PABX located in the Belfast MSF.

(o) MTE Alarm Monitoring

- (i) There is no alarm monitoring for maintenance telephones.

(p) Staff Telephones

- (i) STEs shall to be installed in specific locations such as the TOCC, BCC, MYCC, BYCC and staff multipurpose rooms. STEs help OC Transpo staff communicate via Confederation Line telephones for Confederation Line operations support. Each telephone shall be supplied with a wall mounting bracket. STEs located in the TOCC, BCC, MYCC and BYCC shall sit on the console desktops. Staff using these phones shall be able to call any other STE or MTE by dialing the extension of a particular telephone. These phones shall have a dial pad to dial

numbers. These phones shall have conference calling and call forwarding capabilities. The handset shall be a power over Ethernet VoIP based telephone with speed dial programming capabilities that shall allow staff to utilise the short dialing feature of the programmable telephones. They shall be routed through the City PBX via the CTS.

(q) STEL Alarm Monitoring

- (i) There is no alarms monitoring for STELs.

(r) HFI

- (i) HFIs shall to be installed in the Moodie LMSF yard, the LMSF Building, and at main entrances to the site. HFIs shall be provided for use by maintenance staff for communication with the MYCC. HFIs are power over Ethernet VOIP based telephones and pre-programmed to call a specific number at the MYCC. HFIs shall be rated for outdoor operations and shall be wall mounted at accessible heights.

(s) HFI Alarm Monitoring

- (i) There will not be any active monitoring available for HFIs, but HFIs located beside level crossings and near external doors or entrances shall be visible from PTZ cameras located nearby.

(t) Circuit Wiring

- (i) The telephone wiring between the communications room and telephone devices (ETELs, STELs, ITELs, MTELs, HFIs, etc.) shall use CAT6E cables for power over Ethernet connections. For intercoms requiring fibre (e.g. in the Moodie LMSF where the unit is more than 90m from a network switch), an industrial grade media converter shall be installed in the intercom housing and powered with a 48VDC power supply which requires a 120VAC input. The CAT6E cables (from switch or media converter) shall be connected to telephone wall jacks to accommodate a connection with the RJ-45 plugs of the telephone sets.

(u) IP Connectivity

- (i) Each telephone shall be configured to have a unique IP address and caller ID. The caller ID shall help locate a telephone if it has an error, or in the event of an alarm monitoring event.
- (ii) Telephones shall be assigned an IP address for their location. Circuit wiring for EHFIs in elevators shall be run from the Communications Room to interface with the panel in the elevator room. A two core cable shall be run along the elevator travelling cable for alarm monitoring.

(v) AODA Compliance

- (i) All the telephones which shall be used by patrons to communicate with OC Transpo staff, such as, ETEls, ITELs, EHFIs and HFIs shall be AODA compliant. The telephones shall have an amplifier producing sound at approximately 88db to help hearing impaired customers. To help visually impaired customers, all of the above mentioned public accessible telephones shall have their function written in Braille on the phone. The ETEls, ITELs, EHFIs and HFIs shall be equipped with an LED indicator marked as “Help is on the Way” in English and French. The LED shall be connected to the telephones auxiliary relay that is controlled by a digital phone that supports DTMF codes. The telephone shall be programmed with a selectable code of up to 25 characters that enables the LED. The phone shall be configured for the LED to stay on for a predetermined time, or to stay on permanently until the code is resent.

ARTICLE 4 PA SYSTEM/PASSENGER INFORMATION DISPLAY SYSTEM

4.1 General Requirements

- (a) DB Co shall design all Confederation Line Extension Stations with a PA system to broadcast audio announcements of arrivals, departures, general and emergency/security information from a microphone or headset connected to the PA/PIDS console located in the TOCC, BCC, MYCC and BYCC. DB Co shall design the PA system to provide uniformly distributed audio throughout public areas of the Stations. The PA system shall be synchronized with the Vehicle announcements for the Confederation Line so that announcements on the Vehicle do not occur at the same time as announcements on the Platforms.
- (b) PIDS shall be capable of displaying text in both English and French including accents in upper and lower case letters.
- (c) Each new Station shall be equipped with PIDS signs to provide real time, specific, location-based, visual operational and safety-related messages for customer awareness. The PIDS shall be individually addressable and shall be accessed from the existing PA/PIDS console located in the TOCC and BCC. Under normal operating conditions, information presented on the PIDS shall include, but not be limited to: date, time, arrival time and destination of the next Train (one arrival time per line), safety messages, Train delays, holiday schedules, and other ad-hoc messaging. In an Emergency condition, the PIDS shall display both pre-programmed Emergency announcements and simultaneous visual display of the PA system Emergency announcements.
- (d) DB Co shall design, supply, install and test the PA E&M system infrastructure including conduits, mounting brackets, etc.
- (e) DB Co shall design, manage the interfaces, procure, install, conduct PICO, SAT, SIT, and commissioning of the Station PA system.
- (f) DB Co shall provide the Station speakers/microphone and Station rack with connectivity to the TOCC and BCC via the CTS.
- (g) DB Co shall produce the design, supply (including Pre-delivery Test), install test and coordinate with the City during the Systems integration, testing and Commissioning of the Station PA system.
- (h) DB Co shall provide the relevant technical staff, tools and test equipment to support the City during Systems integration, testing and Commissioning of the PA system.

4.2 Operational Requirements

- (a) DB Co shall ensure that the PA/PIDS System Station equipment interface to the existing PA/PIDS servers at the Belfast MSF.

- (b) The City shall expand the existing head-end equipment including system servers and voice recorder(s) as required to accommodate the new Station equipment.
- (c) DB Co shall provide one new PA/PIDS console at the TOCC.
- (d) The City shall ensure that the PA/PIDS system integrate with the existing GUI which shall serve as the means of interface between the system and the operator.

4.3 Performance Requirements - PA

- (a) DB Co shall ensure that the PA system announcements be addressable to single and multiple zones within individual and/or groups of Stations. Separate zones with separate amplifying channels and speaker systems shall be accessible individually or in combination. Stations shall have up to five zones covering each Platform, mezzanine, and ancillary area.
- (b) DB Co shall ensure that the PA system maintain a uniformly distributed sound level at least 10 dB above ambient Station operating noise level measured at 1.5 m above floor. Stations SPL shall be not less than 60 dB plus or minus 30 degrees off axis, 1.5 meter above the floor, at Vehicle ambient noise level. The PA system in the in the Stations shall also provide a STI of 0.6.
- (c) DB Co shall ensure that the automatic gain adjustment of the PA system be provided based upon ambient noise levels captured by ambient noise sensors. The system shall adjust volume and clarity in proportion to the increase in noise level from a pre-set quiet level.
- (d) DB Co shall ensure that the PA system be capable of playing pre-recorded messages in both English and French.
- (e) DB Co shall ensure that the PA system be designed such that the component failures are minimized by redundancy. The availability of the system (i.e. availability of all system hardware, cabling) shall be greater than 99.9%.
- (f) DB Co shall ensure that the PA system be fully supervised with failure annunciation at the TOCC, BCC, MYCC and BYCC of all major system components such as preamplifiers, power amplifiers, supervision detectors, and power supplies.
- (g) DB Co shall ensure that the PA announcements from TOCC shall be delivered to the Station PA controllers over the CTS using TCP/IP protocol.
- (h) DB Co shall ensure that the in the event of a power outage, the PA system shall remain operational for a minimum of 4 hours through the use of uninterruptible power supplies, generators, and/or other backup power equipment.

- (i) DB Co shall ensure that the PA system be designed to accept several competing inputs with successful transmission designated according to assigned priorities. DB Co shall coordinate with OC Transpo to determine priority levels. The system shall be prioritized for TOCC, BCC, MYCC, and BYCC communications consoles, Station PA microphone in the ICP, and pre- recorded announcement devices.
- (j) The PA system shall be prioritized for TOCC communications consoles, Station microphones, fire alarm panels, and pre-recorded announcement devices.
- (k) DB Co shall ensure that the PA system work in conjunction with the PIDS system to provide synchronous broadcasting of audio and visual pre-recorded announcements and to provide synchronous transmission of live announcements.
- (l) DB Co shall ensure that the PA system be synchronized with in-Vehicle PA systems for the Confederation Line to prevent audible delays between the two systems while a Vehicle is at the Station.
- (m) DB Co shall ensure that the PA system announcements shall be recorded on the existing City voice recorder at 875 Belfast.
- (n) The voice recording system may need to be expanded to accommodate the additional PA system requirements.
- (o) The City shall design the PA system to be capable of expansion to accommodate additional equipment and licenses as required.

4.4 Performance Requirements - PIDS

- (a) DB Co shall design, manage the interfaces, supply, install, conduct PICO, SAT, SIT and commission the PIDS.
- (b) DB Co shall design, supply and install the PIDS E&M infrastructure including conduits, mounting brackets, etc.
- (c) DB Co shall install, conduct PICO and SAT of the PID signs.
- (d) Due to the unique physical characteristics of the signage, DB Co shall procure and install Station racks with connectivity to the TOCC and BCC via the CTS.
- (e) On each Platform, DB Co shall install PIDS displays such that at least one display is visible and legible from any location along the Platform edge. DB Co shall ensure that Two-Platform Stations whether side or centre 90m in length have a minimum of two PIDS spaced no further than 30m apart. Longer Platforms may require additional PIDS. DB C shall install separate displays for each Platform edge on center Platforms. DB Co shall place displays to maximize visibility throughout the Platform area. Refer to Schedule 15-2, Part 4 – Stations for locations.

- (f) The City shall integrate the PA/PIDS system with the existing centralized message generator and dispatch functions at the existing PA/PIDS workstation in the TOCC & BCC to address individual zones, Stations, groups of Stations, or System Infrastructure-wide announcements for PIDS installed on the System.
- (g) DB Co shall ensure that Stations have zones covering each Platform, mezzanine, and ancillary area that correspond with the PA system zones.
- (h) DB Co shall ensure that the PIDS have the capability of displaying messages in both English and French. All pre-programmed messages shall be provided in both languages.
- (i) DB Co shall ensure that the PIDS be designed to accept several competing inputs with successful transmission designated according to assigned priorities. DB Co shall coordinate with OC Transpo to determine priority levels. The system shall be prioritized for TOCC, BCC, MYCC, and BYCC communications consoles, an automatic pre-defined emergency PIDS message triggered from the Station PA microphone in the ICP, and pre-recorded announcement devices.
- (j) The City shall ensure that the PIDS is integrated with the PA system to provide synchronous broadcasting of audio and visual pre-recorded announcements and to enable near-synchronous transmission of live announcements.
- (k) DB Co shall ensure that the PIDS be fully supervised with failure annunciation at the TOCC of all major system components such as PIDS displays, Station controllers, and power supplies.
- (l) DB Co shall ensure that all PIDS announcements be recorded in a database on the existing head end PIDS system servers.
- (m) DB Co shall ensure that all PIDS display Station time, which shall be synchronised with the existing central time server over the CTS.
- (n) DB Co shall ensure that the PIDS be designed that in the event of a power outage, PIDS equipment shall remain operational for a minimum of 4 hours through the use of uninterruptible power supplies, generators, and/or other backup power equipment.
 - (i) PIDS signs shall have a visual message when the sign is not operational.

4.5 PID Signs

- (a) Physical / Functional Attributes
 - (i) The overall size inclusive of housing shall be no larger than 1500mm (W) x 475mm (H) x 300mm (D), to accommodate space constraints along the underground Station Platforms. Refer to Schedule 15-2, Part 4 – Stations for location information.

- (ii) The PID sign shall have a maximum weight of 70 Kg (for double-sided signs).
- (iii) The PID signs shall feature the following characteristics:
 - A. Less than or equal to 8mm resolution pitch.
 - B. High contrast display using a monochromatic amber colour LED full matrix on a black glare-free background (590nm wavelength).
 - C. Ambient light adjustment - automated dimming of LEDs using ambient light sensors. E.g. in a darkened ambient light condition, LEDs would be dimmed to prevent eyestrain.
 - D. All outdoor PID signs (above ground Stations) shall be equipped with sunlight readable LED's (up to 5000 cd/m² (nits) brightness level if required).
 - E. Wide viewing angle (minimum 120 degrees horizontal and vertical).
- (b) Mechanical Attributes
 - (i) The PID sign shall be modular and designed for ease of service taking into consideration the clearances around the PID sign (reviewing adjacent architectural elements and spacing).
 - A. Keyed power switch and internal electronics accessible from the front top hinged doors, and;
 - B. Easily replaceable LED modules.
 - (ii) The PID housing shall be vandal and graffiti resistant with break, shatter proof, and scratch resistant display glass, resilient against dust, discoloration, atmospheric pollutants and salty dust.
 - (iii) PID signs should be able to sustain frequent cleaning using commercially available cleaning products approved by the manufacturer.
 - (iv) The PID housing shall be constructed of aluminum, galvanized steel and/or stainless steel.
 - (v) The PID housing components and fasteners shall be corrosion resistant.
 - (vi) The PID housing colour shall be provided by the City.
 - (vii) The PID signs shall be mounted from two HSS supports within which will run the power and data cables (installation by DB Co).

- (viii) Under a regular scheduled maintenance program, the Design Life of the PID signs shall be 20 years.
- (c) Electrical
 - (i) The main power supply shall be 90-132Vac, 1 phase, 60 Hz (110Vac nominal)
 - (ii) Data connection - the PID sign shall accept either UTP CAT6 or Fibre depending on the distance to the network switch.
 - (iii) The PID shall have CSA approval.
 - (iv) The cable routing and conduit design shall be performed by the DB Co.
- (d) Data Communication
 - (i) Connectivity with the head end systems shall be through the CTS.
 - (ii) The PID signs shall be connected to PID controllers which in turn shall interface with the CTS via dedicated IP switch ports in the Station's communications room
 - (iii) A VLAN shall be created within the CTS that will segregate all PIDS traffic.
 - (iv) The PIDS shall use open standard communication protocol.
 - (v) The Station PIDS shall communicate with a head end server, via a dedicated IEEE 802.3
 - (vi) Ethernet connection at 10/100 Mbps minimum using TCP/IP protocol.
 - (vii) Each PID shall have an addressable unique IP address.
 - (viii) Each PID shall have a unique alphanumeric ID.
 - (ix) Standard messages may be either sent from the head end system, or stored locally in the PID controller's local digital message store and be broadcast in response to instructions sent from the central equipment in the Belfast MSF.
 - (x) The PID shall optionally have wireless WiFi 802.11b/g/n connectivity.
 - (xi) The PIDS network shall be designed to handle an estimated network load of 100 kbps.
- (e) PID Layout Design
 - (i) The PID shall be ADA compliant spacing (in term of character height) as given below:

- A. Character separation: 10%
 - B. Line spacing: 35%
 - C. Stroke thickness: 10% - 30%
 - D. Character width: 55%
- (ii) The PID signs shall be designed to display three lines of text with a minimum character height of 76mm.
 - (iii) The ETA/ETD screen display shall emphasize the top line of text (using a larger font and/or bolded).
 - (iv) The following examples describe an ETA/ETD screen display adhering to the given PID sign and character sizing constraints above:
 - A. 176 x 40 pixel active display; 7.62mm pixel; active area measuring roughly 1341mm x 305mm (~1481mm x 445mm overall area with 70mm border).
 - i. 11 pixels height top line (83.83mm) and bolded,
 - ii. 10 pixels height second and third lines (76.2mm) in height.
 - B. 224 x 48 pixel active display; 6mm pixel; active display measuring roughly 1344mm x 288mm (1484mm x 428mm overall area with 70mm border).
 - i. 14 pixels height top line (84mm) and bolded,
 - ii. 13 pixels height second and third lines (78mm) in height.
- (f) The examples above can accommodate the 3-line ETA or a 3-line general announcement of up to 25 - 76.2mm mono-spaced characters - in practice, proportional characters shall be used which will accommodate more characters per line depending on message content.
 - (g) Failure Monitoring/Diagnostics
 - (i) The PID signs shall have built-in diagnostic capabilities and be monitored periodically by the PIS via a scheduled polling or subscribe/notify software architecture. The PID diagnostics and control shall include, but not limited to the following:
 - A. Power supply unit failure

- B. High temperature warning. Temperature sensor(s) shall monitor the overall temperature in the PID sign case. In the event of a high temperature condition, the PID sign shall automatically shut off and an alarm generated.
 - C. Pixel failure (test). Each PID sign shall have embedded self-cycling pixel test.
 - D. Brightness level test
 - E. Communication failure/Message time out (handled by the head-end PIS)
 - F. Remote power cycle / re-boot function
- (ii) Communications Failures
- A. Each PID sign's network connection shall be monitored.
 - B. The PID shall be capable of displaying a default message such as time and date or a preconfigured message stored locally in the display. The message shall be activated by user-defined scenarios, including but not limited to, loss of communication with the head end system.
 - C. Locally stored default messages shall be displayed in the event that no content has been received from the PIS. If the communications fail (no heart beat message response), the display shall be blanked after a pre-set delay or shall default to a predetermined message stored locally (e.g. "Out of Service").
- (iii) The head end PIDS shall log and timestamp all alarms/events.
- (iv) The PID shall optionally have a local RS232/485/422 serial maintenance port for maintenance and diagnostic capabilities.
- (h) Electrical and Cabling Design
- (i) DB Co shall ensure that design is stamped & sealed by a Professional Engineer.
 - (ii) Racks

DB Co shall supply and install all rack cabling required for connections between equipment. All cabling and wires shall be traceable within the shop drawings of the equipment racks.
 - (iii) PID Sign Circuits

All PID sign network cabling shall be designed to be routed and terminated onto the patch cords in the back of the appropriate network equipment rack located in the Facility's communications room

(i) Cable Rating

- (i) All cables called up in DB Co's installation design shall be CSA approved and meet the requirements of NFPA 130.
- (ii) The insulation for all PIDS cabling installed shall be FT-4-ST1 as a minimum and specified with LSZH jacketing where cables are run through public areas.

ARTICLE 5 VOICE / DATA RADIO SYSTEM

5.1 General Requirements

- (a) The City shall design the Voice/Data Radio system for Confederation Line to include all BTS, back office, portables and handheld equipment required to provide coverage for the Confederation Line East Extension and Confederation Line West Extension including Moodie Station, Moodie LMSF and the Parkway Tunnel, Connaught Tunnel and Baseline Station Tunnel.

| Tunnel Name | Length (meters) |
|-------------------------|-----------------|
| Parkway Tunnel | 2500 |
| Connaught Tunnel | 400m |
| Baseline Station Tunnel | 400m |

- (b) The City shall provide DB Co with design details/drawings and specifications identifying equipment/device placement for all active and passive system electronics to DB Co. The City shall provide final specifications and details on cable sizing.
- (c) The City shall locate the primary head-end (radio shelter) at the West Portal.
- (d) The system shall take the radio signal off-air at the radio shelter and distribute it to the remote amplifier over single mode fibre to each Station where it would be amplified and used to provide coverage enhancement to both the Tunnel and the Station.
- (e) A conduit or duct shall be required from the radio shelter to the West Portal to allow for fibre optical cable and coaxial cable routing.
- (f) A 48-strand fibre optic cable shall be provided from the radio shelter to each communications room along the Parkway Tunnel to feed each of the remote fibre optic amplifiers (BDA).
- (g) The City shall locate the secondary head-end (radio shelter) at Dominion Station.
- (h) The system shall take the radio signal off-air at the radio shelter and distribute it to remote amplifiers over single mode fibre to each Station where it would be amplified and used to provide coverage to both the Tunnel and the Station.
- (i) A conduit or duct shall be required from Dominion Station to the East Portal to allow for fibre optical cable and coaxial cable routing.

- (j) A 48-strand fibre optic cable is required to each telecom room along the Parkway Tunnel to feed each of the remote fibre optic amplifiers (BDA).
- (k) The primary system shall allow for the distribution of radio frequency signals down the Tunnel and throughout the Cleary Station and New Orchard Station and in case of a critical Failure the secondary system would automatically be activated to take over the coverage.
- (l) DB Co shall include/reserve space along the wayside, in Tunnels, rack space in the equipment rooms, Moodie LMSF and other areas for Voice/Data Radio System equipment per the City's placement details/specifications.
- (m) DB Co shall install the conduits and cables required to connect the Voice/Data Radio System equipment in the Underground Stations to equipment in the Tunnels.
- (n) DB Co shall complete installation of the Voice/Data Radio system infrastructure and provide the City with full access to the Site to install their communications rack and active system electronics in communication rooms and/or in Tunnels.
- (o) DB Co shall complete the installation of the Voice/Data Radio System tunnel infrastructure including power, communications, and the redundant radiating cable no later than 90 days prior to initial Train movements in the Tunnel otherwise subject to further schedule coordination with the City.
- (p) DB Co shall complete the final outfitting of the communications rooms where the Voice/Data Radio system is to be located no later than 90 days prior to Train movements in the Tunnel otherwise subject to further schedule coordination with the City.
- (q) Once the Voice/Data Radio System infrastructure is in place and tested by DB Co, the City shall install, configure and test the Voice/Data Radio System equipment.
- (r) DB Co shall design the infrastructure including power and conduit. The City shall specify the cables and the equipment/device locations.
- (s) DB Co shall install the infrastructure including power, conduit and cables (fibre and radiating).
- (t) DB Co shall procure and install the fibre, coax, radiating cables and installation hardware.
- (u) DB Co shall design, manage the interfaces, supply (including Pre-delivery Test) and install the connections of the voice/data radio System civil infrastructure outside of the ROW including conduits, pits, foundations, buildings, cabinets, etc.
- (v) Radio communications system shall be provided. The system shall allow for voice communications between the following:

- (i) Trains and Controllers;
- (ii) Trains and rail staff;
- (iii) Rail staff and Controllers;
- (iv) Non-Revenue Vehicles and Controllers;
- (v) Maintenance personnel and Controllers;
- (vi) Trains and maintenance personnel;
- (vii) Controllers and other Emergency service providers along the ROW;
- (viii) Trains and Emergency service providers; and,
- (ix) Rail supervisors and Emergency service providers.
- (w) DB Co shall utilize the existing City of Ottawa Public Safety radio system. DB Co shall be responsible for purchasing licenses and paying the monthly fees for all new mobiles that are used by DB Co through the construction period.
- (x) DB Co shall provide rack space (2 racks) at each underground station for Voice/Data Radio System Radio equipment.
- (y) The City shall verify Station, Tunnel, and the Moodie LMSF coverage of the Voice/Data Radio System.
- (z) The City shall verify Emergency services coverage of the Voice/Data Radio System.
- (aa) DB Co shall design, supply, and install (design reviews, drawings, system integration) the redundant feeder coaxial cables and redundant radiating cable (and accessories) and ensure that all electrical, mechanical, physical interfaces are reviewed and approved.
- (bb) DB Co shall provide appropriate conduits or pathways to cater for coax cabling from the radiating cable exiting the Tunnel to the remote amplifier within the Stations, Station transition areas, or Tunnels.
- (cc) DB Co shall design antennae mounting locations throughout the Underground Stations to cater for the antennas required for the DAS. Antennas shall be located at the Platform level, concourse level, entrances, any Tunnel transition areas and will ensure that cellular coverage is provided in all public areas or on the Vehicle while entering the Platform or stationary at the Platform. Any interfacing hardware for the antennas are to be provided by the City.
- (dd) DB Co shall provide suitable locations (will need to be accessible by the City) on Platform and or concourse areas to locate City DAS equipment as required. DB Co shall

- provide power to this equipment. The City will provide exact sizing of equipment during design phase of the project. Normally all Voice/Data System equipment is in the communication room.
- (ee) DB Co shall provide appropriate conduits or pathways to cater for coax cabling from the remote amplifiers, switches or patching device to the antennas within the Stations.
 - (ff) DB Co shall provide appropriate space in each Stations' Communication rooms for two 19 inch racks (supplied by the City) of equipment and one fiber entrance panel.
 - (gg) DB Co shall provide appropriate access to the third party supplier to the various project locations, no different than any other supplier on the project.
 - (hh) Immediately west of the Pinecrest rail junction, the Confederation Line alignment crosses over Pinecrest Creek on a Bridge Structure, skirts the Hanlon sports field and starts to descend to enter the Connaught east portal. This Tunnel will be 3 to 4 metres below grade at the Connaught Avenue and will emerge east of the proposed Queensview Station along Highway 417. The Tunnel is estimated to be approximately 400 metres in length.
 - (ii) For redundancy purposes, the City shall supply 2 off-air channelized BDAs, one at the east portal of the tunnel and the second installed at the Queensview station. Each BDA's donor antenna would face a different P25 radio site. Since no structure is available at the east portal the city shall supply a radio shelter within close proximity of the Tunnel.
 - (jj) DB Co shall provide all electrical work including a new protected AC circuit for this new equipment.
 - (kk) The amplified signal from the east portal BDA shall be routed down to the tunnel (½" coaxial cables provided by DB Co) and feed a single DB Co installed radiating cable. For redundancy, the amplified signal from the Queensview BDA shall feed a second DB Co installed radiating cable mounted on the opposite wall. The radiating cables shall serve as the signal source for the coverage enhancement. Conduit from the Queensview station to the Connaught tunnel's west portal shall be provided by DB Co. Due length of the cable, DB CO shall install two 7/8" cable radiating cables.
 - (ll) At Baseline Station, to provide redundancy, the City shall use 2 off-air channelized BDAs. Each BDA's donor antenna would face a different P25 radio site. The preferred location for the donor antennas is on the roof of the [REDACTED]. The two donor antennas shall be at least 15m apart from each other. Each shall feed a channelized 800 MHz BDA located in a telecom room in the building or in a telecom room in the Baseline Station Tunnel.
 - (mm) The amplified signal from each of the BDA shall then be routed down to the Station (two ½" coaxial cables provided by DB Co) and down to the Tunnel where it shall feed the DB Co supplied radiating cable. Again, for the purpose of redundancy, DB Co shall install two independent radiating cables mounted on opposite walls. The radiating cables shall

serve as the signal source for the coverage enhancement. Due to the length of the cable and its loss, DB Co shall install two 7/8" cable radiating cables.

- (nn) DB Co shall provide the electrical work including a new protected AC circuit for this new equipment

5.2 Operational Requirements

- (a) The City shall develop the performance specifications for the Voice/Data Radio System that provides complete coverage of the Confederation Line Extension, including but not limited to the Guideway, City spaces at the Moodie LMSF and all required materials within the tunnels to ensure full radio reception is achieved from portal end to portal end and all areas within the underground Stations
- (b) The City shall integrate the voice/data radio System into the TOCC, BCC, MYCC and BYCC.
- (c) The City shall procure, install and test all materials (radios, control head, antenna, base stations/amplifiers, combiner, microphone, batteries, chargers, base transmission system) required for a fully functional integrated system. The City shall pay all associated access fees and on-going maintenance fees associated with the radios to be used by the City's operations personnel through the construction period.
- (d) The City shall provide all necessary equipment to expand the existing voice recorder at the TOCC.
- (e) The City shall install, integrate, test and commission the one new radio dispatch console at the Moodie LMSF for the MYCC.
- (f) Battery backups shall be provided for all active components for a minimum of four hours.

ARTICLE 6 FARE CONTROL

6.1 General Requirements

- (a) DB Co shall provide power source provisions within the Station electrical service for all fare collection equipment. DB Co shall supply each Ticket Machine and each fare gate with one 15 amp individual circuit for each.
- (b) Data communication channels shall be provided within the Station communications rooms so that fare vending equipment may communicate with the existing fare collection head end equipment and accounting personnel located within the TOCC. The fare collection data shall communicate using its own network and fibre optic cabling that extends from the Existing Confederation Line fare collection network backbone cabling. DB Co shall extend the dark fibre to all new Stations and provide space for the City to install their equipment.
- (c) DB Co shall procure and install an interposing relay at each Station that when a fire alarm is initiated from the FDAS to the interposing relay, it will cut power to the fare gates. By cutting power, the gates shall default open allowing customers to safely exit the facility.
- (d) The City shall procure, install and test all fare control equipment (Ticket Machine, fare gates and servers). Refer to Schedule 15-2, Part 4 – Stations for location and quantity information.

6.2 Operational Requirements

- (a) Ticket Machine, Power and Data requirements:
 - (i) DB Co shall provide slab conduits to bring UPS protected power cabling from the Station power panel to the Ticket Machine. Refer to Schedule 15-2, Part 4 – Stations for electrical details.
 - (ii) DB Co shall provide slab conduits from the Communications room/cabinet to allow for data cabling to the Ticket Machines locations. DB Co shall ensure that no conduits or ducts are exposed.
- (b) Fare Gates, Power and Data requirements:

DB Co shall provide the Power for the fare gates by a single circuit breaker protected line delivered by slab conduits to the base of the fare gate. DB Co shall ensure that no conduits or ducts are exposed.

 - (i) DB Co shall provide slab conduits from the communications room/cabinet to allow for data cabling to the fare gate locations. DB Co shall ensure that no conduits or ducts are exposed.

ARTICLE 7 CCTV SYSTEM

7.1 General Requirements

- (a) DB Co shall provide a CCTV system that serves both operational and security needs of the Confederation Line. The CCTV system shall allow operations, security staff and ESP the ability to monitor elements of the system remotely from the TOCC, BYCC, MYCC, and BCC. DB Co shall ensure that the Confederation Line Extension Project CCTV System integrates with the head end of the existing Confederation Line CCTV system to facilitate seamless interaction.
- (b) All NVR's shall be connected to the CTS and able to transmit all required live and recorded video to the TOCC while multiple users are using the system at one time. All NVR's shall be located at each Station or facility and will locally record all video from the same facility.
- (c) DB Co shall procure and install NVRs that match the Existing Confederation Line units.
- (d) Each Station shall have at least two NVRs to ensure redundancy. Each camera shall be assigned to a recording device via the VMS to balance the load on each NVR. Cameras located within the same area shall be recorded on a different NVR. The video storage capacity varies by Station. The NVR shall be capable of recording up to 200 channels however the system shall be designed to limit 50 cameras per recorder. All NVRs shall be the same model but with different hard drive sizes based on the total storage per NVR storage unit. Storage capacity shall be based on 30fps frame rate and native resolution of the camera being recorded for 31 days.
- (e) The total capacity of the NVR at each Station shall be based on the number of cameras at each Station. Common factors affecting the NVR size shall include video compression, resolution, frame size and frame rate of cameras connected to the NVR.
- (f) DB Co shall undertake a risk and safety assessment of the System and shall install CCTV's and / or any other security devices as an outcome of the assessment.
- (g) The City shall update the CCTV into the existing head-end management platform at the TOCC and BCC to ensure that OC Transpo personnel have supervisory control of the new extension's CCTV system equipment.
- (h) The City shall update the existing head-end management platform at the TOCC and BCC to ensure that operators have access and the ability to view video from the new extension's CCTV system equipment.
- (i) DB Co shall design the CCTV cameras in Facilities to be connected to the system-wide backbone network for transmission of images to the TOCC and BCC.

- (j) DB Co shall ensure that security video that is required for long term storage from any Station or facility be stored in a centralized long term storage server at the Belfast MSF; no security video storage is permitted at any other Facility.
- (k) DB Co shall design the CCTV system with the capability to identify each camera with a unique IP identification number.
- (l) DB Co shall provide commercially available, high quality cameras from reputable and established manufacturers. The cameras shall be fixed cameras and PTZ cameras. The cameras located within the Stations shall be chosen for their ability to meet functional specifications and for their aesthetic appearance. Cameras shall use 6.35mm or 8.5mm CMOS type sensors and be able to operate in all expected light levels down to a level of <2 lux. The cameras shall be able to switch to black and white mode in low light conditions (below 0.1 lux).
 - (i) The cameras shall be:
 - A. High Resolution Fixed Cameras, minimum 1 MP, 3.3-12mm lens – Platforms, concourses, ETEs, escalators, elevator landings, stairs, communications equipment rooms/cabinets, bike racks, Tunnel portals and egress entrance/exits, yard perimeter fences and intrusion monitoring, monitoring of Train movements.
 - B. High Resolution Fixed Cameras, minimum 1 MP, 2.5-6mm lens – elevators.
 - C. High Resolution Fixed WDR cameras, minimum 1 MP, 3-9mm – Platforms, Platform edges/Train doors, TSAs, Ticket Machines, fare gates.
 - D. Super High Resolution Fixed Cameras, 2 MP, 3-9mm – external cameras for exterior of Stations and viewing large areas.
 - E. High Resolution PTZ Cameras, HD, 1.3 MP, 4.3-129mm – Platforms, PPUDO, parking lot and yard, yard perimeter fences and intrusion monitoring, monitoring of Train movements.
 - F. Identification Cameras, 3-6mm – Moodie LMSF Yard vehicle entrance.

7.2 Operational Requirements

- (a) DB Co shall design the CCTV cameras to meet the following requirements:
 - (i) In keeping with CPTED principles, including but not limited to complete CCTV coverage of entrances to washrooms, Park & Rides, bicycles parking areas, all (Bus & Train) Platforms, Train doors, corridors, elevators, escalators, and stairways;

- (ii) Cameras shall cover every door of the Train servicing the Station and general circulation areas, all entrances to Stations/Platforms and fare equipment.
 - (iii) Cameras shall monitor all Station and Tunnel entrance and exit points.
 - (iv) Through the combination of fixed and PTZ cameras, the CCTV system shall provide the TOCC and BCC with complete coverage of all exterior areas of each Station including but not limited to MUPS, Station plazas and general circulation areas, interior and full exterior coverage of all four sides of each TPSS.
- (b) DB Co shall provide the Station/Guideway cameras, accessories and Station rack for data/images to be transferred back to the TOCC and BCC via the CTS.
 - (c) DB Co shall design, manage the interfaces, install, conduct PICO, SAT, SIT and commission the City provided Platform edge cameras for Stations including accessories and Station rack for transferring of data/images back to the TOCC & BCC via the CTS.

7.3 Performance Requirements

- (a) DB Co shall design a CCTV system that is proactive in determining intrusion into the alignment and private areas through interface with the SCADA and IAC Systems.
- (b) DB Co shall ensure that The CCTV system be designed to interface to the ETEs and access control system so that any events are automatically recorded at higher frame rates and resolution.
- (c) DBCO shall design the CCTV system where images can be transmitted from the Station area to the vehicle while the vehicle is located within a Station. DB Co shall design the CCTV system such that recorded video can be downloaded from the on-board Vehicle CCTV system at the Belfast MSF for long term storage for up to 3 years
- (d) DB Co shall design the CCTV system based on a distributed video storage architecture; some data will be captured and stored at Stations, some will be captured and stored on Trains. DB Co shall ensure that data stored in local NVRs at each Station and in Trains for a maximum of 31 calendar days with minimum 1080P and 30 fps at H.264 compression.
- (e) Expansion of the long term storage servers up to three years and system management servers installed in the data room at 875 Belfast shall be required.
- (f) The City shall manage the addition/modification to the Belfast MSF head-end equipment (VMS Server and workstations); to accommodate any expansion.
- (g) DB Co shall provide complete CCTV coverage for the System based on Good Industry Practices, for example as described in the most recent edition APTA Standards Development Program Recommended Practice CCTV (APTA IT-CCTV-RP-001-11).

- (h) DB Co shall design a CCTV system that complies with MFFIPA and the current Surveillance System for Transit Network Access and Privacy Policy dated 2016.
- (i) DB Co shall provide a CCTV System comprised of network based fixed, HD fixed, and HD PTZ digital cameras, along with associated power supplies, cabling, network media converters, video storage devices, viewing stations and control panels, all of which is managed by the IP video system. The CCTV sub-system shall provide records for post event review and analysis. DB Co shall ensure that cameras are rated for the environment installed, including day/night capabilities, heater/blower, appropriate housing, NEMA 4X (IP-66) rated and IEC 62262 IK10 impact resistant enclosure
- (j) DB Co shall locate the cameras to ensure the views are clear, unobstructed, and not impaired by structures, signage, foliage, intense lights, or any other obstacles.
- (k) DB Co shall ensure that Camera views of the fare collection area be arranged to provide images of the customer's frontal interface with the Ticket Machines and Fare Gates.
 - (i) DB Co shall ensure that fixed cameras are installed to monitor the following locations:
 - A. Platform edges including Train doors;
 - B. Emergency telephones located in TSAs;
 - C. Elevator cabs and landings, escalator and stair landings;
 - D. Public and employee washroom entrances;
 - E. Tunnel access/egress points and entrance/exits;
 - F. Fare collection equipment;
 - G. All restricted areas;
 - H. TPSS interiors and exteriors;
 - I. Station entrances and exits;
 - J. Bike racks;
 - K. Concourse level corridors/passenger circulation area;
 - L. Station Platforms (bus and Train); and,
 - M. Tunnel portals.

- (ii) DB Co shall ensure that PTZ cameras are provided to monitor the following locations:
 - A. Concourse level corridors/Passenger circulation areas;
 - B. Station Platforms (bus and Train);
 - C. Coiling grills at some Stations;
 - D. PPUDO; and,
 - E. High rail vehicle access points/gates.
- (iii) DB Co shall ensure that high resolution cameras with low lux capabilities are installed to monitor tunnel entrances.
- (iv) The City shall develop the performance specifications and manage the interfaces for the CCTV equipment.
- (v) DB Co shall design, install, test and perform testing and commissioning of the portal CCTV equipment together with the City.
- (l) DB Co shall supply and install the CCTV system E&M infrastructure (conduits, poles, brackets, etc.).
- (m) The City shall provide all additions/modifications to the TOCC head-end equipment (VMS Server and workstations).
- (n) DB Co shall design the CCTV system to interface to the Emergency telephone systems. Upon activation of Passenger Emergency telephones or elevator help telephones, the CCTV system at the TOCC and BCC shall automatically display the CCTV camera with the best view of the telephone area.
- (o) DB Co shall design the CCTV system to interface to the IAC System. The CCTV system shall be capable of automatically displaying a view of the activated access control device, either via fixed camera or PTZ pre-set, upon activation of an IAC System alarm or use, whether authorized or unauthorized.
- (p) The City shall integrate the new CCTV system into the existing head-end management platform so that it is capable of including or excluding automatic display of video coverage of any device, type of device, specific event, or general event type as needed.
- (q) DB Co shall design the CCTV system such that all alarms can be assessed and if determined that the video/images are required, they will then be saved to the long term storage server. DB Co shall design the CCTV system such that all alarms can be assessed and if determined that the video/images are required, they will then be saved to the long

- term storage server. DB Co shall design the CCTV System such that Recordings be digitally watermarked to detect tampering.
- (r) The City shall integrate the CCTV System into the existing head-end management platform to ensure that access to recordings is restricted to OC Transpo personnel only.
 - (s) DB Co shall design the System such that the resolution and clarity of captured images be maintained under a range of lighting conditions from darkness through bright sunlight while ensuring optimal picture quality.
 - (t) DB Co shall design the CCTV System to provide spare recording capacity to allow for the addition of up to 40% video inputs for future expansion.
 - (u) DB Co shall design the CCTV System to allow an administrator to dynamically specify resolution and frame rate variation at a particular camera location for monitoring that location while not affecting the recording parameters.
 - (v) DB Co shall design the cameras to have de-icing and lens clearance protection. All cameras shall have a unique identity and provide a means of detecting image loss.
 - (w) DB Co shall design the CCTV System to store all recorded images in an accepted industry standard format.
 - (x) DB Co shall design the CCTV System that in the event of a power outage, the equipment shall remain operational for a minimum of 4 hours through the use of uninterruptible power supplies, generators, batteries, and/or other backup power equipment.
 - (y) DB Co shall design the CCTV System to ensure cameras installed in public areas are placed in protective vandal resistant environmental enclosures. Refer to Schedule 15-2, Part 4- Stations for location information.
 - (z) DB Co shall design the CCTV System to ensure that Cameras are located so that they never directly view the sun. The field of view of cameras shall be adequately illuminated either by natural light or by luminaires. Within the field-of-view, particular care shall be taken to avoid extremes of light, shadow and reflection from extreme glare.
 - (aa) DB Co shall design the CCTV System to provide a video feed to the ICP at each Underground Station.

ARTICLE 8 SCADA SYSTEM

8.1 Scope of Work

- (a) The SCADA system shall provide supervisory control of the support systems. The SCADA system(s) provided shall be of the same manufacturer as installed on the Existing Confederation Line. The existing system servers are located at the Belfast MSF and manage all system controls and indications for the System.
- (b) The City shall integrate the new SCADA system with the existing GUI and include the ability to filter out unnecessary indications and alarms according to user preference.
- (c) DB Co shall ensure that all equivalent equipment included on the Existing Confederation Line SCADA points list is included on the Confederation Line Extension Project points list. DB Co shall ensure that the Existing Confederation Line asset ID convention is followed for the Confederation Line Extension Project.
- (d) DB Co shall ensure that all Confederation Line Extension Project systems which interface with SCADA that are expansions of the Existing Confederation Line systems interface using the same architecture as in the Existing Confederation Line.
- (e) There are a total of four SCADA system functions required which include:
 - (i) Traction Power System
 - A. The Traction Power System SCADA shall be an on-line, real-time, interactive system operated by TOCC personnel at the existing maintenance console to monitor and control power distribution and equipment. The SCADA system shall provide remote control capability for TOCC to sectionalize or isolate any section of contact rail or item of equipment in the TPSS or other Traction Power Facilities. Also, discrete input points shall be provided from Traction Power equipment to SCADA for display of status and to alarm abnormal operating conditions.
 - B. DB Co shall design, supply, install test, perform systems integration and testing of the Traction Power System SCADA field wiring; all wiring from substation protection and control devices to Marshalling Panel including IED interface with control PLC.
 - C. The City shall be responsible for integration of the extension's new SCADA system equipment into the existing SCADAs head-end management platform at the TOCC and BCC.
 - D. DB Co shall supply the local field SCADA cabinet/housing
 - (ii) Signaling & Train Control

- A. The Signaling & Train Control system shall have a separate Train Control SCADA monitoring system operating over the CBTC wireless network. Refer to Article 10 – Signalling and Train Control System, of this Part 3 for details;

(iii) BMS

- A. The BMS system shall monitor Station electronics, electrical and mechanical equipment.
- B. DB Co shall design, supply and install the conduits, cabling and mounting hardware to provide connectivity and protection of all cabling required to connect field equipment to communications equipment rooms and other equipment rooms.
- C. DB Co design, manage the interfaces, and install the E&M equipment for the BMS including interfaces with the FADS.
- D. DB Co shall be responsible for all field wiring to marshalling panel; design and install associated conduits and mounting hardware.
- E. The City shall update the existing SCADA head-end platform at the TOCC & BCC to accommodate the extension's new BMS Station equipment.

(iv) BAS

- A. The BAS system shall monitor and control the Tunnel ventilation systems and FLS systems. This system shall be compatible with the Existing Confederation Line systems and be interfaced with the fire annunciator panel in the TOCC.
- B. DB Co shall design the TVS interfaces with the SCADA System to be consistent with the Existing Confederation Line.
- C. DB Co shall design, supply, install, conduct PICO and SAT of the control system, damper control panels, and MCC/VFDs.
- D. DB Co shall design, procure and install the BAS E&M infrastructure (Conduits, mounting hardware, etc.).
- E. The City shall be responsible for head-end SCADA integration; software integration of the tunnel ventilation system control equipment with the head-end SCADA management platform in the TOCC and the BCC at the Belfast MSF via the CTS. Refer to Schedule 15-2, Part 4, Article 6 – Electrical Design Criteria for details.

8.2 General Requirements

- (a) The existing SCADA head-end equipment consists of master terminal equipment, including servers and workstation GUIs, to control, monitor, gather data and communicate with field equipment. The SCADA system shall be a continuous, dynamic scanning type for gathering information and status indication of all points. Each point shall be sequentially scanned point by point under normal conditions and the status of all points shall be continuously transmitted to the existing SCADA head-end.
- (b) DB Co shall design the SCADA system to facilitate the transmission of indications and alarms from the RTUs to the TOCC and the transmission of controls from the TOCC to the RTUs via the CTS.
- (c) DB Co shall design the system such that signals transmitted from RTUs to the processors at the TOCC shall be processed to provide monitoring information to all required subsystems, generate commands to be transmitted back to the RTUs, provide information for displays and alarm processing at the control consoles, and store information and historical data for future processing.
- (d) DB Co shall ensure that for each remote location, the SCADA system shall display the following items on the SCADA monitoring workstations in the TOCC:
 - (i) Current system and subsystem status;
 - (ii) Control panel status;
 - (iii) Remote control RTU functions;
 - (iv) Alarm handling and fault resets; and,
 - (v) Historical event logging.
- (e) Each RTU shall be designed to interface to the CTS.
- (f) The City's Existing Confederation Line SCADA servers and related processing equipment is located at the main communications room in the Belfast MSF and connected to a redundant LAN.
- (g) DB Co shall design the SCADA System to ensure that schematic, one-line, pictorial, and alphanumeric displays of the SCADA system have the capability to be generated, altered, or deleted online by existing GUI.
- (h) DB Co shall design the SCADA system for ease of expansion and alteration in an economical and efficient manner to protect for future System expansion.

8.3 Control and Monitoring Requirements

- (a) DB Co shall ensure that TOCC, BCC and SCADA system shall operate as a homogenous control system. This system provides indications from field equipment to the TOCC & BCC and controls from the TOCC & BCC to field equipment.
- (b) DB Co shall ensure that each remote monitored location shall provide a local HMI for local alarm annunciation and system control.
- (c) DB Co shall ensure that each communications cabinet/ signal case and TPSS report status of intrusion detection, fire alarm, to the TOCC & BCC via the SCADA system.

8.4 SCADA Configuration

- (a) DB Co shall ensure that SCADA RTUs provide the interface between the field equipment and the CTS, which includes the communications backbone network.
- (b) DB Co shall ensure that SCADA RTUs utilize an Ethernet connection via the CTS to communicate with the existing TOCC & BCC head-end equipment.
- (c) DB Co shall ensure that Error correction and detection schemes utilize an industry standard (such as CCITT CRC-16) and, at a minimum shall:
 - (i) Detect all errors of up to 16 continuous bits; and,
 - (ii) Detect at least 99% of all error bursts greater than or equal to 16 bits.
- (d) DB Co shall ensure that The RTU be designed and implemented so that wiring and cabling between the RTU and field devices are uniform in type, routing, and connection locations. The following field interface requirements shall be met:
 - (i) Signals between the RTU and Train Control houses/cases shall terminate at one centralized location;
 - (ii) Signals between RTU and TPSS sites shall terminate at one centralized location;
 - (iii) RTU terminations shall include test points and rapid disconnect; and,
 - (iv) All wires and cables shall be labeled using a logically consistent labeling convention consistent with the existing system labeling.

8.5 Development and Configuration Tools

- (a) The City shall ensure that SCADA RTUs be supplied with hardware and software tools and documentation for reconfigurations and expansion.

- (b) DB Co shall design the SCADA subsystem such that no action or lack of action by the users or any malfunction of the SCADA subsystem equipment can cause an unsafe condition.
- (c) DB Co shall ensure that should the SCADA subsystem become completely inoperative, for any reason, the System shall continue to operate normally and safely.

8.6 Remote Terminal Units

- (a) DB Co shall ensure that the requirements for the SCADA RTUs are provided as follows:
 - (i) Solid-state, microprocessor-based with logic elements and auxiliary components configured on easily replaceable plug-in modules;
 - (ii) Provide interchangeability of modules; all RTUs shall be of a common design;
 - (iii) Operate normally unattended. RTU logic and configuration data shall reside in non-volatile memory;
 - (iv) Perform self-tests upon power up and on command from local test equipment and from the TOCC. Self-tests shall also be performed by input/output subsystems and input/output cards;
 - (v) Provide for maintenance of input/output circuits (including disabling power to output circuits) and safe replacement of input/output cards while power is applied. Possess the capability to continue operation in outdoor weather conditions with 0 to 95% humidity (non-condensing);
 - (vi) Operate within a power supply range of plus or minus 5% of its nominal value and a frequency range of plus or minus 1% of its nominal value;
 - (vii) Support local initialization and troubleshooting with either a local control panel or workstation or portable test equipment; and,
 - (viii) Be modular in design to provide expansion of performance and capacity by adding subsystem modules. This shall include the ability to add a minimum of 20% more input/output subsystem modules.

8.7 Operational Requirements

- (a) DB Co shall ensure that RTUs operate in a full-duplex mode in which each continuously scans and reports the status of indicators and commands.
- (b) DB Co shall design the SCADA RTUs to continue operations with the loss of communication to head-end as a result of either communication equipment failures or head-end equipment failures. Upon return to service of failed equipment, the SCADA

system shall automatically resume normal monitoring and management of that equipment.

- (c) DB Co shall ensure that SCADA RTUs are designed to continue operation in the electromagnetic environment where they shall be located, such as TPSS, Train control cases/houses, traffic cabinet and communications equipment cabinets.

8.8 Interface Requirements and Data Exchange

- (a) The SCADA System RTUs shall support discrete inputs and outputs via relay contact closures (or optically isolated solid-state equivalents such as silicon controlled rectifiers). All discrete inputs to the RTU shall be of the same type. All discrete outputs by the RTU shall be of the same type. The following RTU input and output requirements shall be met:
 - (i) Digital inputs to the RTU shall be from Form C relay contacts. The sensing voltage DC power supply shall be in the RTU domain;
 - (ii) Input and output signals shall be electrically isolated from the RTU;
 - (iii) RTU shall generate outputs via relays. Relays and transient suppression circuits shall be provided. RTU interface relays and relay contacts shall have a MTBF, at rated loads, of 5,000,000 cycles or more;
 - (iv) RTU outputs shall be momentary contact closures with a time duration that is stable and adjustable;
 - (v) RTUs shall prevent unintended action such as energizing output circuits upon power-up and power-restore; and,
 - (vi) A serial digital data interface may be used between the RTU and other processor-based devices, such as Train-to-wayside communications. All serial interfaces to RTUs shall be optically isolated.

8.9 Performance Requirements

- (a) The City shall ensure that the elapsed time from the first possible detection by an RTU or equivalent field device of an alarm or change of state, until display at the TOCC shall not exceed 2.0 seconds, unless otherwise approved.
- (b) DB Co shall ensure that when a user enters a command for any individual device control, the RTU shall generate the associated output signal, in the field, in no more than 2.0 seconds, unless otherwise approved. In the event a device equivalent to an RTU is used, the network shall deliver the command to the equivalent device in no more than 2.0 seconds, unless otherwise approved.

- (c) DB Co shall ensure that the specified SCADA equipment shall have the ability to integrate into the existing system without degrading performance and security of the system.
- (d) DB Co shall ensure that the SCADA HMI hardware shall have TCP/IP with 10/100Mbps connectivity for network communication.
- (e) DB Co shall ensure that the SCADA HMI software shall comply with the Open Process Control standards to assure interoperability of the data servers between different RTU Platforms.

8.10 RTU Configuration Requirements

- (a) DB CO shall design and procure one RTU to be installed in the data room at the Belfast MSF to support the Confederation Line Extensions' additional SCADA system requirements. The new RTUs shall be 19 inch rack mountable; capable of supporting a minimum of 16 I/O modules within the main RTU rack; capable of adding expansion racks; 256 MB of high speed DDR SDRAM and 128 MB of on board flash memory; capable of supporting 2000+ I/O point capacity; supports field and remote update of system programs.
- (b) The initial DB Co provided MSF RTU shall be configured with a minimum I/O of; AI Card (8 I/O), DI Card (160 I/O), DO Card (32 I/O) including 15% spare I/O for future expansion.
- (c) The RTU I/O modules shall meet the ANSI C37.90-1978 standard for surge protection.
- (d) The Belfast MSF RTU shall have a LCD display/keyboard/touch screen console unit that shall be capable of being mounted on the enclosure door and connected by cable to the processor module.
- (e) The City shall install, test and commission the RTU in the computer room at the Belfast MSF.
- (f) DB Co shall design, procure, install, test and commission RTUs in each of the new Station CERs and the Moodie LMSF to support the Confederation Line Extensions' additional SCADA system requirements. The new RTUs shall be 19 inch rack mountable; capable of supporting a minimum of 16 I/O modules within the main RTU rack; capable of adding expansion racks; 256 MB of high speed DDR SDRAM and 128 MB of on board flash memory; supports field and remote update of system programs.
- (g) The initial DB Co provided Station RTUs shall be configured with a minimum I/O of; AI Card (8 I/O), DI Card (132 I/O), DO Card (32 I/O) including 15% spare I/O for future expansion.
- (h) The RTU I/O modules shall meet the ANSI C37.90-1978 standard for surge protection.

- (i) The Station RTUs shall have a LCD display/keyboard/touch screen console unit that shall be capable of being mounted on the enclosure door and connected by cable to the processor module.
- (j) DB Co shall design, procure, install, test and commission RTUs in each of the new TPSS to support the Confederation Line Extensions' additional SCADA system requirements. The new RTUs shall be 19 inch rack mountable; capable of supporting a minimum of 16 I/O modules within the main RTU rack; capable of adding expansion racks; 256 MB of high speed DDR SDRAM and 128 MB of on board Flash memory; supports field and remote update of system programs.
- (k) The initial DB Co provided TPSS RTUs shall be configured with a minimum I/O of; AI Card (8 I/O), DI Card (160 I/O), DO Card (32 I/O) including 15% spare I/O for future expansion.
- (l) The RTU I/O modules shall meet the ANSI C37.90-1978 standard for surge protection.
- (m) The TPSS RTUs shall have a LCD display/keyboard/touch screen console unit that shall be capable of being mounted on the enclosure door and connected by cable to the processor module.
- (n) The Belfast MSF, Station (including Moodie LMSF) and TPSS RTUs shall support all five industry standard IEC 61131-3 PLC programming languages.
- (o) The Belfast MSF, Station and TPSS RTUs shall support the following protocols:
 - (i) Modbus;
 - (ii) DNP3;
 - (iii) SNMP;
 - (iv) BACnet; and,
 - (v) NTP.
- (p) DB Co shall procure and provide the installation, maintenance and Operator manuals that accompanies the supplied RTUs.

ARTICLE 9 INTRUSION ACCESS CONTROL SYSTEM

9.1 General Requirements

- (a) DB Co shall design the IAC system to control access and provide for detection of intrusion into non-public or otherwise restricted areas in Stations including coiling grilles, service entrances and along the alignment.
- (b) DB Co shall design the IAC system such that Intrusion sensors shall sound an audible alarm locally and trigger an automatic alarm notification to the workstation GUI in TOCC, BCC and MYCC for unauthorized entry or tampering to IAC equipment.
- (c) DB Co shall design the IAC system such that major access control equipment in Facilities include smart card readers, request-to-exit detectors, door contacts, electrified lock sets, and ACPs. ACPs shall be connected to the local network switch associated with the CTS. Card readers and ACPs shall be designated matching products or equivalent to ensure system compatibility with the existing IAC System.
- (d) DB Co shall supply, install, and test all Station IAC equipment. DB Co shall also be responsible for Station IAC equipment integration with the Station E&M RTU and the Station CTS. The City shall be responsible for head-end integration; software integration of the IAC with the head-end management platform.
- (e) DB Co shall design the IAC system such that all access-controlled doors in Stations and buildings shall be monitored by the CCTV System.

9.2 Operational Requirements

- (a) DB Co shall design the IAC system to provide controlled access and detect intrusion of the following:
 - (i) Public to non-public doorways;
 - (ii) TPSS;
 - (iii) CIH;
 - (iv) Station communications rooms;
 - (v) Elevator machine rooms;
 - (vi) Escalator machine rooms;
 - (vii) Electrical equipment rooms;
 - (viii) Vent plants;

- (ix) Mechanical rooms;
- (x) Crew/operational Rooms;
- (xi) Platform end gates;
- (xii) Station perimeter doors and coiling grilles (at some Stations);
- (xiii) ICP;
- (xiv) Restricted areas; and,
- (xv) Moodie LMSF; and,
- (xvi) High rail vehicle access points/gates.

9.3 Performance Requirements

- (a) Access Cards – access cards shall be provided as follows:
 - (i) Access cards shall be provided by the City to approved staff for entry into the CIHs, TPSS, and vent plants. The access cards shall be compatible with the existing IAC System.
- (b) DB Co shall design the IAC system such that access authorization be verified based on data submitted from any credential and retained in the system controller database, granting access by releasing electronic door locks once all correspondence is deemed accurate.
- (c) DB Co shall design the IAC system to ensure that all access decisions/credential transactions be processed locally at the card reader interface board as it receives data from the system controller, minimizing network traffic while also providing real-time access determinations.
- (d) DB Co shall design the IAC system to ensure that all cardholders shall have access based on Facility, card reader, time, and day. The system shall allow access levels to be defined and to be applied to any or all cardholders. Access authorization shall be denied by credential holder, time of day, group of staff, shift, and any additional characteristics that are identified by the system controller database.
- (e) DB Co shall design the IAC system to ensure that provisions be made for remote signalling of the door unlocking to an IAC panel.
- (f) DB Co shall design the IAC system to provide a means to bypass zones for facilities/locations where certain alarm zones are not 24 hour zones and be capable of being armed and disarmed from the TOCC and BCC.

- (g) DB Co shall design the IAC system to incorporate an interface to the fire alarm panel to allow override of door locks in an emergency situation. DB Co shall ensure that any door lock that restricts egress is code compliant and includes approved hardware and signage. Refer to Schedule 15-2, Part 4 – Stations for additional information.
- (h) DB Co shall ensure that the IAC System can be interfaced with the CCTV system to allow the display of video upon activation of an IAC alarm or use of an access control device at the TOCC.
- (i) DB Co shall design the IAC system to ensure that in the event of a power outage, IAC equipment shall remain operational for a minimum of 4 hours through the use of uninterruptible power supplies, generators, batteries, and/or other backup power equipment.
- (j) DB Co shall design the IAC system to ensure a fully distributed system architecture, with access control and event processing undertaken by intelligent controllers, and shall be designed with the following capabilities:
 - (i) Support multiple card readers for access control, alarm input devices, and control outputs.
 - (ii) Designed for multi-tasking, capable of maintaining system operations while other applications are being performed in the host computer.
 - (iii) Prepare, process, and display video photo identification badges.
 - (iv) System shall be interlocked with the fire alarm system such that if a zoned fire alarm is activated, all access-controlled doors within that zone are automatically unlocked for free egress.
 - (v) Designed for 24-hour per day, 7 days a week operation.
 - (vi) Generate reports based upon system configuration database as well as historical system activity.

ARTICLE 10 SIGNALLING AND TRAIN CONTROL SYSTEM

10.1 Scope of Work

- (a) DB Co shall provide a complete Signalling and Train Control System (S&TCS) in accordance with these Output Specifications. The S&TCS for the new segments of the Confederation Line shall be an extension of the same CBTC system used on the existing Confederation Line and as described herein.
- (b) DB Co shall provide all necessary infrastructure and installation of the S&TCS equipment/cabling to support the design of the S&TCS in accordance with these Output Specifications.
- (c) DB Co shall be responsible for all modifications to the Existing Confederation Line signal equipment, including signal equipment at the central location and other distributed system elements as necessary (e.g. software updates), to interface the existing signal system with the signal system as described herein. Modifications shall be made in such a manner that operations are fully supported until the new system is ready to be tested and commissioned.
- (d) The City shall provide that all Revenue Vehicles be equipped with S&TCS equipment to meet the requirements set out in the Output Specification.
- (e) DB Co shall design S&TCS for the safe operation of the Trains, Maintenance Vehicles, non-communicating Trains and non-equipped vehicles throughout the Confederation Line at all times.
- (f) DB Co shall provide all necessary wayside signs required for manual operation of Trains and work zones. DB Co shall install the wayside signs.
- (g) DB Co shall provide maintenance planning information for S&TCS to support the asset management planning.
- (h) DB Co shall provide training equipment in order to allow training of maintenance staff, including troubleshooting, fault finding and system updates.
- (i) DB Co shall provide the training equipment, or update the existing equipment, to be consistent with system operating functions and features.
- (j) DB Co shall provide remote diagnostic capability and additional portable test units for S&TCS equipment. The list in the table below defines the minimum equipment to be provided and may be changed during the design process based on obsolescence.
 - (i) DB Co shall provide CBTC Test Equipment for the Project as listed below.

| Test Equipment | Part Number | Quantity |
|-----------------------|--------------------------------|-----------------|
| FLMD Laptop | 3CU10081ADAA | 2 |
| DCS FLMD Laptop | 3CU10081AJAB | 2 |
| TAG Programming Kit | 183000, plus 612835, 612836 | 2 |
| Handheld Tag Reader | HR-2 Handheld Reader | 2 |

- (k) DB Co shall provide the City with all necessary Project data as required to sequentially update the CBTC simulator.
- (l) DB Co shall provide the same level of redundancy built into the S&TCS as the existing Confederation Line.
- (m) DB Co shall develop the performance specifications, produce the design, manage the interfaces and supply (including Pre-delivery Test) the CBTC wayside equipment including wayside terminal boxes, switch machines, transponders, wheel detectors (as required), Wayside Radio Units and Signals.
- (n) DB Co shall install, conduct PICO, SAT and SIT and commissioning of the CBTC wayside equipment including wayside terminal boxes, switch machines, wheel detectors (as required), transponders, Wayside Radio Units and Signals.
- (o) DB Co shall upgrade the head-end management platform in the TOCC and BCC to accommodate the new CBTC equipment installed for the Confederation Line East and West Extensions. DB Co shall be responsible for certifying the head-end management platform based on upgrades required to add the Confederation Line East and West Extensions.
- (p) DB Co shall upgrade the VOBC software to support the various phases of the software integration and the final alignment including Confederation Line East and West Extensions.
- (q) DB Co shall develop the performance specifications, produce the design, manage the interfaces and supply (including Pre-delivery Test) the CBTC Station equipment including Zone Controllers, Relay Racks, FODF, Control CTFs, point Controllers, Isolations Transformers, GIDS and FDAS interfaces.
- (r) DB Co shall install, conduct PICO, SAT and SIT and commissioning of the CBTC Station equipment including Zone Controllers, Relay Racks, FODF, Control CTFs, point Controllers, Isolations Transformers, GIDS and FDAS interfaces.

- (s) DB Co shall be responsible for confirming the S&TC wayside equipment properly communicates with the VOBC.
- (t) DB Co shall develop the performance specifications and produce the design requirements of the CBTC fibre optic civil infrastructure including conduits, trenches, sub-ducts, etc.
- (u) DB Co shall develop the final design, supply, and install the CBTC fibre optic civil infrastructure including conduits, trenches, sub-ducts, etc.
- (v) DB Co shall develop the performance specifications for the CBTC civil infrastructure for the main cable runs both outside and inside the stations including conduits, pits, foundations, buildings and cabinets.
- (w) DB Co shall design, supply (including Pre-delivery Test), install conduct PICO and SAT of the CBTC civil infrastructure for the main cable runs both outside and inside the Stations including conduits, pits, foundations, buildings and cabinets.
- (x) DB Co shall develop the performance specifications and produce the design requirements of the CBTC civil infrastructure within the Ballast, i.e. to and from the switch.
- (y) DB Co shall produce the final design, supply, install and test the CBTC civil infrastructure within the ballast, i.e. to and from the switch.
- (z) DB Co shall develop the performance specifications and produce the design requirements for the CBTC station to station cable and fibre within the Stations to the local junction boxes near the equipment (copper and fibre network).
- (aa) DB Co shall produce the final design, supply, install and test the CBTC Station to Station cable and fibre within the Stations to the local junction boxes near the equipment (copper and fibre network).
- (bb) DB Co shall supply, install, and conduct PICO of the CBTC Station to Station cable and fibre within the Stations to the local junction boxes near the equipment (copper and fibre network).
- (cc) DB Co shall develop the performance specifications and produce the design requirements for the CBTC cable connecting the local equipment (fibre & copper) local cable network from the junction box to the equipment.
- (dd) DB Co shall produce the final design, supply, install, conduct PICO, SAT, and SIT of the CBTC cable connecting the local equipment (fibre & copper) local cable network from the junction box to the equipment.
- (ee) DB Co shall develop the performance specifications for the CBTC fibre and copper terminations

- (ff) DB Co shall produce the design, supply, install, terminate and test the CBTC fibre and copper terminations.
- (gg) DB Co shall coordinate to ensure that enough space is made available within the systems rooms for all DB Co supplied equipment in addition to space required for any equipment delivered by the City.

10.2 General Requirements

- (a) All elements of the S&TCS shall be designed to be fail safe and maximize the safety and security of all personnel, Passengers, and equipment.
- (b) The S&TCS shall be designed for the operation and control of all equipped Revenue Vehicles.
- (c) The S&TCS shall be designed to accommodate the safe operation of the Maintenance Vehicles.
- (d) The S&TCS shall be designed to allow additional equipment for expandability and extendibility without replacement of previously provided equipment. This shall not prevent minor hardware and software upgrades.
- (e) The S&TCS expandability and extendibility criteria shall include as a minimum:
 - (i) additional Tracks;
 - (ii) additional interlockings;
 - (iii) additional vehicles;
 - (iv) additional Station/Stops; and,
 - (v) technology refresh (i.e. hardware and software).
- (f) The S&TCS shall be capable of adapting to the foreseen conditions and constraints such as failures, emergencies, weather conditions, abnormal conditions and interruptions. It shall be DB Co responsibility to identify and mitigate them while ensuring safe and reliable operations at all times.
- (g) The S&TCS shall optimize the Train movements and operational speed in accordance with vertical and horizontal Track alignment.
- (h) The S&TCS shall be capable of reading and reacting to the inputs from supervisory and control systems as required.
- (i) The CBTC system of the existing Confederation Line uses the **[REDACTED]** moving block system capable of operating in manual, restricted manual or ATO Modes, including

STO and UTO, with UTO restricted to yard areas for storage and other yard movements. The moving block system creates a virtual block of protection for each individual Train, dynamically calculated based on the Train's location, speed, and direction. The system shall prevent any Train from entering the virtual block of another Train, while maintaining a variable safe separation distance adjusted according to their actual speeds.

- (j) On the mainline, the Trains shall be capable of operating in restricted manual, manual mode under ATP or STO mode. The Trains are driven in STO mode with Operator assistance by the VOBC based on a MA received from the zone controller over the DCS.
- (k) With the exception of the MOW Shed, the LMSF yard shall be CBTC territory. Train Operators take control of the Trains for Revenue Service operations at a handoff platform. Transfer between yard and mainline control shall occur at the handoff platform. Train Operators handback control of the Train at the handoff platform. Trains shall be routed directly between the handoff platform and the mainline by the signal system.
- (l) Subject to specific hazard analyses, wheel detectors shall be used to detect unauthorized movements of non-communicating Trains on to mainline territory. Trap switch functionality shall be deployed to ensure a route must be set to allow movements onto the Mainline. Once the route has cleared, the switch shall automatically realign to prevent unauthorized movement onto the Mainline.
- (m) In the non-revenue areas, up to the handoff platform, including the carwash, Trains shall be capable of operating in UTO mode, under complete control of the signal system.

10.3 Codes, Standards and Manuals

- (a) The design and construction of the Works shall comply with the criteria contained in this Article 10, and all standards, regulations, policies, and applicable law, applicable to the Project, including but not limited to each of the following Reference Documents. In the event of a conflict between criteria, commitments or requirements contained within one document when compared with another, the more stringent shall apply:
 - (i) AREMA Communications and Signal Manual.
 - (ii) EN 50126 Railway Applications – The Specification and Demonstration of Reliability, Availability, Maintainability and Safety
 - (iii) EN 50128 Railway Applications – Communication, Signalling, and Processing systems – Software for Railway Control and Protection Systems
 - (iv) EN 50121 Railway Applications – Electromagnetic Compatibility
 - (v) EN 50129 Railway Applications – Communication, Signalling and Processing systems – Safety Related Electronics for Signalling

- (vi) EN 50155 Railway Applications – Electronic Equipment Used on Rolling Stock
- (vii) EN 50159-2 Railway applications – Communication, Signalling and Processing Systems -- Part 2: Safety Related Communication in Open Transmission Systems
- (viii) IEEE Std. 1474.1 IEEE Standard for Communications-Based Train Control (CBTC) Performance and Functional Requirements
- (ix) IEEE Std. 1474.2 IEEE Standard for Functioning of and Interfaces Among Propulsion, Friction Brake and Train-borne Master Control on Rail Rapid Transit Vehicles
- (x) IEEE Std. 1474.3 IEEE Recommended Practice for Communications-Based Train Control (CBTC) System Design and Functional Allocations
- (xi) IEEE Std. 1483 IEEE Standard for Verification of Vital Functions in Processor-Based Systems Used in Rail Transit Control

10.4 Existing CBTC System Description

- (a) CBTC of the Existing Confederation Line:
 - (i) Uses the **[REDACTED]** moving block system capable of operating in manual, restricted manual or ATO Modes. The moving block system creates a virtual block of protection for each individual Train, dynamically calculated based on the Train's location, speed, and direction. The moving block system shall support an 80-90 second design headway. The system shall prevent any Train from entering the virtual block of another Train, while maintaining a variable safe separation distance adjusted according to their actual speeds.
 - (ii) Operates in Revenue Service in either a manual mode under ATP (ATPM) or in STO mode. The Trains are driven in STO Mode with Operator assistance by the VOBC based on MA received from the Zone Controller.
 - (iii) Operates in non-revenue areas of the yard in UTO mode, under the complete control of the CBTC system.
 - (iv) Consists of equipment located on the wayside, at the TOCC, BCC, BYCC and onboard each Train. The wayside, TOCC, BCC, MYCC, and BYCC equipment connects to each other through redundant fibre optic networks. The onboard equipment communicates to the wayside and TOCC, BCC, MYCC and BYCC equipment through wireless AP connected into the CBTC network.
 - (v) Utilizes an ATS system management interface between the CBTC system and the operations/maintenance personnel. The ATS does not inherently provide any functionality for safety.

10.5 New CBTC System Description

(a) General

- (i) The CBTC system for the Confederation Line East and West Extensions shall consist of equipment located on the wayside, including the Moodie LMSF and MYCC, with additional equipment or upgrades (e.g. software) at the TOCC, BCC, Belfast MSF and onboard each Train. The wayside, TOCC, BCC, Moodie LMSF, and MYCC equipment shall be connected to each other by redundant fibre optic networks. The onboard equipment shall communicate to the wayside through wireless APs connected into the CBTC Network. Systems providing the same functionality, Safety and level of redundancy as that described below are acceptable regardless of the assignment of functions among hardware or the terminology used.

10.6 System Architecture

(a) TOCC, BCC, Moodie LMSF and Belfast MSF Equipment

- (i) The TOCC and BCC serve as the command and control centers for the Confederation Line. ATS Workstations located in the TOCC, BCC, and the Belfast and MYCCs shall communicate with redundant ATS and ATC servers located in the Belfast MSF. The ATS workstations shall allow the TOCC, BCC, BYCC and MYCC personnel to setup routes through interlockings in their control areas using entrance/exit selection or direct switch control, and to clear, cancel or fleet signals. Using this system, TOCC and BCC personnel shall also be able to stop and release any Train or group of Trains in Revenue Service. The TOCC and BCC personnel shall be able to put the ATS servers in an automatic mode to automatically set up routes through interlockings, send ATS commands to Trains to control Dwell Times, speeds, and acceleration or braking rates to manage headways, and schedules and/or optimize energy usage. In ATO mode, the ATS system shall also route Trains, with Operator support, out of and into the Moodie LMSF to build up and reduce service around the rush hours.
- (ii) The ATC servers shall maintain the most up to date Track Database. The ATC servers shall push the latest version of the Track Database including Track profile, Station locations and civil speed out to the Zone Controllers and to all Trains. Handshaking shall be provided to ensure that all ATC servers, Zone Controllers and vehicles maintain the same up to date version of the Track database. The Zone Controllers shall maintain a registry of all equipped Vehicles in CBTC territory. Authorised TOCC personnel shall be able to use workstations to update, add or remove speed restriction zones and work zones.
- (iii) One additional ATS workstation shall be installed in the TOCC to supplement the existing workstations. The ATS workstations at the TOCC shall have at

minimum, two additional overhead video display screens that allow TOCC personnel to view the entire line and all the Trains, interlockings and switch positions as well as equipment warnings, alarms, temporary speed restriction zones and work zones. General user interface controls shall be provided to allow the TOCC personnel to control interlockings and switches, to clear, cancel and fleet signals, to turn switch point heaters on and off, to stop and release Trains and to transfer interlockings and the entire line between automatic and manual operation.

- (iv) CBTC maintenance database servers shall be provided, or the existing servers upgraded, at the Belfast MSF to record all faults from additional wayside and on board CBTC and network equipment required by the extensions.
 - (v) Fault alerts and easy database access shall be provided for maintenance personnel.
 - (vi) The ATS shall interface to the SCADA. SCADA shall provide the data to the PID systems.
- (b) Zone Controllers
- (i) DB Co shall provide all CBTC Station equipment including Zone Controllers. DB Co shall be responsible for all infrastructure and installation.
 - (ii) Zone Controllers shall be distributed throughout the line to control the Train movements in the various zones. Redundant Zone Controllers shall be provided in each zone. The number of zones shall be determined by the latency requirements to provide the required headways, the availability requirements, the product limitations (e.g. capacity), as well as the requirements of the vital interface with the interlocking controllers provided.
 - (iii) Each Zone Controller shall:
 - A. Receive Train location, length, speed and identification messages from each Train;
 - B. Ensure that the Track database version is compatible with the VOBC and ATS database versions;
 - C. Where applicable read inputs from the smoke detector and intrusion detection systems, GIDS and TVS;
 - D. Interface to Emergency stop buttons and Emergency stop key switches (yard only);
 - E. Request and receive the Track database version from each Train in its zone;

- F. Deny MA to Trains without a valid Track database version until the database is made current;
 - G. Send movement authorities to all Trains within its zone including overlap into adjacent zones;
 - H. Provide Train location to the ATS system;
 - I. Inform adjacent Zone Controllers of all switch, signal positions and Train location information within its own zone; and,
 - J. Read inputs from the intrusion detection system installed at Tunnel Portals and the Guideway intrusion systems at Platform ends.
- (iv) Read inputs from the intrusion detection system installed at Tunnel portals and Guideway Intrusion from Platform ends. Redundant Zone Controllers shall be provided for each zone.
- (c) Local ATS Processor
 - (i) DB Co shall provide, and test all ATS processors. DB Co shall provide all infrastructure and installation required to support the S&TCS design.
 - (ii) Redundant local ATS processors shall provide a non-vital interface between the ATS servers and the VMIS to allow ATS control of interlockings. The local ATS processors shall also allow local control of the interlocking, through a local ATS workstation.
 - (iii) The local ATS function may be combined in various hardware configurations and location provided:
 - A. Local control of the turn backs at terminal locations and of the interlocking controlling entrance to and exit from the Moodie LMSF is not dependent on the health of the line CBTC network.
- (d) Interlocking Control
 - (i) Vital interlocking logic shall include control of traffic direction between interlockings. Traffic direction status shall be vitally maintained through power failures. Vital interlocking control may be integrated into the Zone Controller package provided that:
 - A. Local control of the turn backs at terminal locations is not dependent on the health of the line CBTC network;

- B. Failure of the CBTC portion of the Zone Controller shall not disable local control of terminal location turn backs or the interlocking controlling entrance to and exit from the Moodie LMSF;
 - C. The non-vital interface shall support a local control panel for testing and Emergency operation of the interlocking; and,
 - D. In local automatic operation, Trains shall be routed to the inbound Platform Track first and only if that Track is occupied to the other Platform Track. Provisions shall be made for taking a Platform Track out of service.
- (ii) In case of CBTC system failure, signals will go red.
- (e) Signal Equipment Room
- (i) The S&TCS interior equipment shall be installed within a designated SER location within the Station building such that it is in close proximity to the interlocking as dictated by performance requirements of the signalling system equipment.
 - (ii) DB Co shall provide and test all equipment located within the SER. DB Co shall provide all infrastructure and installation required to support the S&TCS design.
 - (iii) All interlockings shall be controlled from a SER.
 - (iv) The SER shall be secured in accordance with safety and security requirements.
 - (v) The SER shall be provided with doors with locks. The doors shall also have an emergency bar on the inner side of the door which shall bypass the lock and open the door.
 - (vi) The SER shall house all microprocessor systems, relays, electronic switch controllers, etc. necessary to control the interlocking from the central ATS servers.
 - (vii) The SER shall house, as necessary, CBTC equipment such as Zone Controllers, local ATS processors, CBTC networking equipment, etc.
 - (viii) Local Track switch controls, signal controls and switch indications shall be provided through the local ATS. Controls to select local or central ATS control, and local automatic or local manual control shall be provided.
 - (ix) The SER shall be resistant to corrosion and weather damage.

- (x) The SER shall be insulated to a level that minimizes heating and cooling loads for the HVAC and heating systems.
 - (xi) DB Co shall provide a single phase AC feed with appropriate step down transformer(s) and distribution panels for signal power and for power outlets, lighting, HVAC etc.
 - (xii) DB Co shall provide a transfer switch and a connection for a portable emergency generator and pad for placement of that generator
 - (xiii) Power for vital signal systems shall not be grounded.
 - (xiv) HVAC and heating systems shall be provided with sufficient capacity to maintain room temperatures between 15°C and 22°C.
 - (xv) A fire detection and suppression system shall be provided which shall be integrated into the central SCADA system.
 - (xvi) A control head, transceiver and antenna shall be provided for the radio.
 - (xvii) The SER shall be properly grounded. All racks in the SER shall be connected to the earth ground bus.
 - (xviii) Where high density termination blocks are used in signalling equipment located within the SER, the types used shall:
 - A. Allow for circuit isolation without disconnecting wires from the terminal blocks;
 - B. Provide crimped terminations on wires to provide strain relief at the wire insulation;
 - C. Provide cable identification; and,
 - D. Provide evidence of environmental testing to EN50125-3 Environmental conditions for equipment, equipment for Signalling and Telecommunications. Special attention shall be paid to the clearance and creepage requirements and lightning suppression for entrance rack terminations.
 - (xix) The SER shall be monitored for intrusion detection by either the IAC or SCADA.
- (f) S&TCS Backup Power Supply System
- (i) DB Co shall provide a UPS system for the S&TCS that is capable of providing a minimum of four hours of backup power after the primary source of power is not

available. An additional minimum of eight hours of supplementary backup power shall be provided by an external generator.

- (ii) If batteries are used:
 - A. The battery bank system shall be constantly recharged by the primary power source. Therefore when the primary power source is out, the batteries are no longer recharged but will continue to provide power until the batteries are exhausted. An external generator shall provide the second backup source of power.
 - B. UPS filtering shall be sufficient that the ripple requirements of attached processor systems can be met in all conditions.
 - C. Batteries provided shall be selected for the required capacity and minimal degradation of capacity with age and suitable for the environmental conditions outlined in Schedule 15-2, Part 1, Article 4 – Design and Construction.
 - D. Batteries shall not be lead acid.

(g) Switch Machines

- (i) DB Co shall provide all switch machines, switch machine layouts and switch heaters.
- (ii) DB Co shall provide all civil infrastructure (conduits duct banks, inserts, etc.) and installation required to support the S&TCS design.
- (iii) DB Co shall terminate and test all cabling.
- (iv) Power switch machines provided shall:
 - A. Have heaters to prevent internal condensation;
 - B. Have a removable hand crank to perform manual switch moves; and,
 - C. Have a record of reliable operation in heavy traffic transit operation.
- (v) Switch heaters provided shall prevent ice and snow from building up and immobilizing the switch points and switch rods. Switch heaters shall:
 - A. Be equipped with both rail temperature and precipitation sensors allowing for automatic operation.

- B. Be equipped with remote control via SCADA by the TOCC, BCC, BYCC and MYCC with local manual control available for maintenance and troubleshooting;
 - C. Have sufficient thermal rating and capacity with appropriate controls to operate successfully and be effective in the Ottawa climate;
 - D. Report the status of the switch heater (ON/OFF) for each switch to the local control panel and to the TOCC;
 - E. Failure of switch heaters status to correspond to command status shall cause an alarm indication; and,
 - F. Include capability for remote control and indications (control on/off, status on/off, status alarm/normal) to be transmitted via SCADA
 - G. Switch heaters shall operate effectively in the Ottawa climate as described in Schedule 15-2, Part 1, Clause 4.3.
- (vi) Electric switch heaters shall be utilized for all main line switches:
- A. A switch heater case shall be provided at each interlocking or group of interlockings to distribute power to each switch heater;
 - B. A main circuit breaker and disconnect shall be provided at each switch heater case; and,
 - C. The power for the switch heater for each switch shall be separately current protected.
 - D. Electric switch heaters used on the mainline shall be hot air blower type with a minimum of 153,000 BTU/hr.
- (vii) Gas heaters shall be utilized for all yard switches:
- A. Flameout and ignition failure shall be provided; and,
 - B. A safety analysis of gas heaters as well as the gas delivery or storage systems shall be provided.
 - C. Gas switch heaters used in the Moodie LMSF shall have a minimum output of 400,000 BTU/hr.
- (viii) Switch machine controls shall provide overload protection and automatic recycling in case of obstructions.
- (ix) Switch heater feeds that are powered from a TPSS shall be metered.

- (h) Wayside Signals
 - (i) DB Co shall provide and test all wayside signal layouts. DB Co shall provide all civil infrastructure (conduits duct banks, foundations, etc.) and installation required to support the S&TCS design. DB Co shall terminate and test all cabling.
 - (ii) Wayside signals shall be provided only in the Moodie yard and at mainline interlockings.
 - (iii) Wayside signals shall be mounted such that the vertical center of the signal head is approximately 2.6m above top of rail. Lower signals may be provided in the Moodie LMSF yard but the bottom of the signal head shall be at least 1 meter above top of rail.
 - A. Built in ladders shall be provided on high signal masts to permit the changing of aspect lamps.
 - (iv) Signal heads shall be located outside the dynamic envelope of the LRV.
 - (v) Wayside signals shall be mounted on the right hand side of the alignment for normal running.
- (i) Location Norming Transponders
 - (i) Passive transponders with location and Track information shall be supplied and installed by DB Co along each Track in CBTC territory. The transponders shall be located at intervals as required to provide the specified Train location error limits, to provide verification of Track at interlockings and to provide the specified Station stopping precision.
 - (ii) The LRV VOBC shall detect missing or malfunctioning norming transponders and shall report this failure to the CBTC maintenance server.
- (j) CBTC Network
 - (i) DB Co shall provide a CBTC network that supports the requirements of these Output Specifications. DB Co shall provide all civil infrastructure (conduits duct banks, inserts, etc.) and installation required to support the S&TCS design. DB Co shall terminate and test all cabling.
 - (ii) The TOCC, BCC, MYCC workstations, Belfast MSF servers and all wayside CBTC controllers and interfaces, shall be connected to each other and to wayside APs over independent redundant fibre optic networks.
 - (iii) Networks design and equipment shall be based upon an open standard such that replacement equipment may be procured from multiple sources.

- A. Copper Category 6A or higher cables may be used within control rooms.
- B. The fibre optic backbone networks shall be designed such that for each node there are 2 paths to any other node.
- C. Network switches shall be located in SERs, CILs and in Station communications rooms as needed.
 - i. All network switches regardless of location shall have at least 4 hours of battery backed up power.
- (iv) The network shall be designed to reliably meet the latency requirements determined by the Headway requirements outlined in Schedule 15-2, Part 1, Article 3 – Operational Performance Requirements.
- (v) The integrity of vital messages shall not depend on network protocols but upon error checking and time stamp checking methods used by the attached vital systems.
- (vi) The CBTC system fibres shall be run in separate cables from all other communications systems. Each of the two CBTC fibre optic networks shall be run in a separate cable and a separate conduit or trough. The routing of fibre cables shall minimize the possibility of disabling both networks with a single digging accident or lightning strike.
- (k) CBTC Wireless Communication
 - (i) APs provided by DB Co shall be provided along the right of way. DB Co shall install all civil infrastructure (conduits, duct banks, inserts, etc.).
 - (ii) Communications between APs and Trains shall be based upon an open or proprietary standard such that replacement APs may be procured from multiple sources.
 - (iii) Advanced encryption and error checking, time stamping, etc. in accordance with EN 50159-2 and other applicable standards shall be used to prevent deliberate and random message falsification and to guarantee message integrity. Additional measures shall be taken to mitigate the possibility of and damage from non-safety critical interference such as denial of service and man in the middle attacks and to reduce potential interference from external wireless networks.
 - (iv) The CBTC wireless communication system shall not carry data for any other vehicle or wayside system.
 - (v) Nodes on both backbone networks shall be able to talk to all APs.

- (vi) APs shall be spaced along the alignment as needed to provide redundant radio coverage for each Train antenna at all times.
 - (vii) AP electronics shall be protected in sealed enclosures watertight to IP67 or NEMA equivalent. Alternatively, they shall be IP65, and be mounted high enough to prevent them being under water due to any environmental condition.
 - (viii) DB Co shall perform propagation studies and intermodulation studies to determine placement of APs and antennas on the wayside.
 - (ix) Frequency selection and antenna placement for Vehicle voice and non CBTC data radios shall be coordinated to minimize interference with CBTC wireless communication.
 - (x) Power for all APs shall be provided from a source with a minimum of a 4 hour battery backup. Power distribution to the APs shall be redundant. A short in a single AP shall not affect the operation of any others.
- (l) Event Recording
- (i) An event recording system shall be provided by the City and updated by DB Co, to record changes in switch positions, and signal aspects, fixed block occupancy, Train location, and ATS commands to the interlockings and Trains.
 - (ii) All events shall be time stamped.
 - (iii) Sufficient storage shall be provided by DB Co to record all events for a minimum of 60 days.
 - (iv) Onboard CBTC systems shall report all changes in MA, all Onboard Computer Train control commands, all changes in speed limits, etc. to the vehicle event recorder.
- (m) Onboard CBTC Systems
- (i) The City shall install and test the updated onboard CBTC System. Any software or database updates for the onboard CBTC System shall be provided by DB Co.
- (n) Train Initiation
- (i) Before any equipped Train may enter CBTC mainline territory and receive MA it shall register with the wayside CBTC system.
 - (ii) During Train initiation the Onboard Computer shall:

- A. Provide all data required by the wayside CBTC system to Track the Train and the moving or virtual block it is occupying;
 - B. Verify the Track database; and,
 - C. Provide any other information required for ATS scheduling and routing.
- (o) Non-Revenue Vehicles
 - (i) Non-Revenue high rail vehicles provided by the City shall be detected by the SCADA system displayed on ATS and protected by TOCC, BCC, MYCC and BYCC Operators setting a manual reservation for each non-revenue vehicle on the Guideway.
- (p) Emergency Stop Devices
 - (i) Emergency Stop Devices shall be provided by the DB Co in the Moodie yard consisting of ESB and ESS.
 - (ii) ESBs shall be distributed around the yard. If the ESB is activated, the Tracks associated with the ESB shall be closed. If the ESB is released to the non-active state, the CBTC system shall allow the Tracks to be re-opened.
 - (iii) The ESS is a keyed switch located at the entrance to the access points to maintenance platforms and other locations based on based on the Hazard Analysis. Activation of the switch shall close the associated Tracks to protect the maintenance crews' activities. The ESS shall be able to be activated without a key, but shall only be returned to the non-active state using the key.
 - (iv) Locations and quantities of ESB and ESS devices shall be determined based on safety analyses to ensure the safety of maintenance and other personnel that may require yard access.
- (q) External wayside and central S&TCS Interfaces:
 - (i) The ATS interfaces to SCADA and PIDS over an existing network interface.
 - (ii) The SCADA interface to the ATS shall provide Traction Power and UPS equipment status information. This interface allows the ATS to provide Train location information to the TVS, including onboard smoke detection status.
 - (iii) The ATS interface to PIDS shall provide Train prediction and other information required for Passenger information displays and automated Passenger announcements at Stations.

- (iv) The interface to the smoke detectors and intrusion detection shall be via one pair of normally closed dry contacts per detection device for monitoring by the Zone Controller. Each Underground Station has one set of smoke detectors for each side of the Station. Each Tunnel Portal has one set of intrusion detectors. Each Platform has one Guideway intrusion detector at each end.

10.7 Modes of Operation

- (a) Design work for the S&TCS system to be capable of the required modes of operation shall be performed by DB Co and shall mirror operation on the Existing Confederation Line with any specific adaptations required by the additional guideway and Moodie yard.

10.8 Interface with Passenger Information and City of Ottawa Systems

- (a) Design work required for interface with Passenger Information and the City of Ottawa systems shall be performed by DB Co.

10.9 Monitoring and Diagnostics

- (a) The Vehicle borne CBTC systems including fault monitoring and diagnostic capabilities necessary to meet the requirements of the Existing Confederation Line Vehicles, shall be provided by the City.

10.10 Signal Cable, Signal Case and Junction Box Requirements

- (a) Signal Cable
 - (i) DB Co shall provide all civil infrastructure (conduits duct banks, etc) cabling and installation required to support the S&TCS design. DB Co shall terminate and test all cabling.
 - (ii) The design and manufacture of all signal cables shall meet the requirements of AREMA 10.3.17 for armoured cable.
 - (iii) Signal Cable used in Tunnels shall be provided with a low smoke zero halogen jacket.
 - (iv) Signal wires from cables shall be terminated with compression lugs.
- (b) Junction boxes
 - (i) DB Co shall provide install and test all junction boxes associated with the S&TCS design. DB Co shall provide all civil infrastructure (conduits duct banks, foundations, etc.) and installation required to support the S&TCS design. DB Co shall terminate and test all cabling.

- (ii) Junction boxes, and switch heater cases shall be constructed of stainless steel, aluminum or fibreglass with locking doors and neoprene door seals.
- (iii) Junction boxes shall be earth grounded.

10.11 Performance Requirements

- (a) Latency and Response Times
 - (i) Communications latency and CBTC equipment response times shall be optimized to facilitate the operational performance requirements outlined in Schedule 15-2, Part 1, Article 3 – Operational Performance Requirements.
- (b) Maximum Position and Speed Errors
 - (i) Base ATP location error shall not exceed 5 meters for each vehicle with all wayside transponders working and without any slides or spins or significant creepage due to prolonged acceleration or deceleration.
 - (ii) The Train shall stop reliably such that all doors are located on the Platform, with the required door setbacks from the Platform ends.
 - A. The braking profile shall be adjustable to prevent Station over runs during low adhesion conditions.
 - (iii) The S&TCS shall have the capability to support the future addition of Platform screen doors.

10.12 System Safety

- (a) Safe Braking
 - (i) The OBC shall generate penalty brake speed profiles within the limits of the safe braking model described in IEEE STD 1474.1
 - (ii) The penalty brake for CBTC shall be an emergency friction brake without any Track brake application. Propulsion shall be disabled in a fail safe manner. Sanding shall be provided but shall be assumed not to work for purpose of safe braking computation.
 - (iii) The Guaranteed Emergency Brake Rate used by the safe braking model shall be based upon an analysis of plausible combinations of brake failure modes and on brake testing under the full range of adhesion conditions.
- (b) Train Operation During Train/Wayside Communication Failure

- (i) If the OBC fails to receive a MA update from the Zone Controller it shall continue to enforce the speed profiles from the previous MA as well as speed restrictions. If the communications failure continues for longer than 5 seconds the Onboard Computer shall command and enforce a full service brake to stop.
- (c) Response to Intrusion
 - (i) The CBTC System shall respond to intrusion detection by alarming drivers and enforcing stop and proceed orders, speed restrictions or stop and hold orders as warranted by the Safety analysis.
- (d) Fire and Smoke
 - (i) The Zone Controllers shall stop any Trains from entering the Tunnel or approaching an area, either in response to smoke detectors, or in response to TVS operation. Trains shall not be prohibited from moving in the Tunnel beyond and away from the fire zone.
- (e) Speed Restrictions and Work Zones
 - (i) The speed limit of any temporary or civil speed restriction zone shall be enforced while any part of the Train is within the boundaries.
 - (ii) When a Train approaches a work zone, ATO operation shall be suspended. The Train shall operate in ATP Only Mode, and the assigned speed limit or stop shall be enforced.
 - A. Some work zones may require operation at limited speed while others may require a stop before proceeding on permission of the work crew. Both rules shall be enforced by the CBTC system.
- (f) Degraded Modes of Operation
 - (i) The CBTC system design shall account for degraded modes of operation and shall develop a Safety Analysis of degraded mode operation in accordance with the standards outlined in this Article 10.
 - (ii) Solutions and operational policies for degraded modes of operation such as manual operation through interlockings with switch point detection problems, failed fixed block detection units, developed and implemented for the Existing Confederation Line shall be applied for the Confederation Line Extension.
- (g) Safety Design Standards Reference Documents
 - (i) The CBTC system shall meet the safety requirements of IEEE STD 1474.1 and IEEE 1483-2000 and the formal verification methods referenced in EN 50126,

EN50128 and EN 50129. All required safety documentation of the generic products and the specific application and the operation the CBTC/signal system shall be provided.

10.13 Environmental Requirements

- (a) Environmental requirements measures shall be included as part of the overall System design considerations from the start of the design to the final in-service testing. The wayside and onboard systems supplied shall be designed to meet the climate conditions provided in Schedule 15-2, Part 1, Article 4 – Design and Construction.
- (b) At a minimum, all wayside equipment shall meet all of the environmental requirements as delineated in the AREMA Environmental Requirements. DB Co shall test equipment and submit certified test results showing the dates, locations and testing agency that performed the verification, at the City's request, unless the equipment has been proven in service in an equivalent environment and test results are available which can support this.

10.14 Testing

- (a) General
 - (i) DB Co shall be responsible for testing the CBTC onboard software changes necessary to support the new Confederation Line Extension segments and required safety regression tests.
- (b) Interlocking Testing
 - (i) Interlocking tests shall include point to point and vital break down tests of control wiring, insulation resistance testing of cables, and full functional testing of switch locking and signal and switch control.
 - (ii) All non-vital route setup, switch blocking, switch control, signal clearing and cancellation functions shall also be tested from the local control panel and from the ATS work station.
- (c) CBTC System Tests
 - (i) Vital communications between VMIS and zone controllers shall be fully tested for each bit or variable transferred.
 - (ii) CBTC software shall be subjected to the test cycles required during development by the safety verification standards cited in Clause 10.12 (g) (i) of this Part 3.
 - (iii) Before any wayside or vehicle CBTC equipment is installed, functional simulations and load testing of the software shall be conducted for the Confederation Line Extension. During load testing, delays shall be simulated to

verify the cycle times can be met under heavy traffic and less than optimal transmission and reception conditions. Actual load tests shall be conducted on site as part of SAT activities.

- (iv) CBTC equipped Vehicles shall be used to test communications quality along the Confederation Line West Extension and the Confederation Line East Extension.
- (v) Station stopping tests shall be performed under all weather and grade conditions to verify the validity of the speed profile algorithms at the Platforms of the Confederation Line Extension Stations.
- (vi) All CBTC safety and supervisory functions shall be tested including: Train separation, coupling, work zones, automatic and manual interlocking control, headway adjustment, adding and removing Trains from the line, ATS workstation displays, local control panels, etc.
- (vii) All degraded modes of operation shall be tested.
- (viii) The proper functioning of system redundancy including power redundancy shall be tested at all levels.
- (ix) The CBTC fault reporting system shall be tested.

ARTICLE 11 EMI / EMC

11.1 Scope of Work

- (a) DB Co shall develop the specifications, design and manage the interfaces for the EMI/EMC program.
- (b) DB Co shall perform an overall EMI program and develop the requirements to install.
- (c) DB Co shall conduct and document a program in which the system achieves compliance with EMC and EMI as set out in this Article 11, while providing safe and reliable operation in all specified functions and modes.
- (d) DB Co shall apply the EMI/EMC program requirements to all Systems and sub-contractors within DB Co.'s scope of work including Revenue Vehicle EMI immunity which complies with the Existing Confederation Line Vehicles.
- (e) DB Co shall ensure that all equipment provided under this Output Specification and the Performance Specifications provided by the City, taken individually and together, complies with the EMI/EMC requirements set out in this Article 11, in normal, degraded, and emergency operating and maintenance modes.
- (f) DB Co shall demonstrate to the City that the equipment installed shall not interfere with any other systems or equipment.
- (g) In order to identify existing sensitive receptors and emitters, DB Co shall conduct an EMI Site Survey along the alignment early in the design process as well as prior to the completion of system Commissioning;
 - (i) DB Co shall engage affected stakeholders to ensure that mutual EMI/EMC concerns are appropriately addressed and mitigated; and
 - (ii) DB Co shall work with the Authorities (i.e. Industry Canada), or other affected stakeholders to resolve any EMI/EMC problems identified during design, construction, Commissioning and operation and maintenance in accordance with Schedule 15-2, Part 1 – General Requirements and Schedule 17 – Environmental Obligations.
 - (iii) DB Co shall work with the identified locations below, for Confederation West, in addition to other locations identified during their design survey;

| Sensitive Receivers - Confederation West | | | | |
|--|------------|--------------------------------------|-------------|-----------|
| Approx. Distance From Bayview Meters | Track Side | Approx. Distance to Centerline | Description | Rationale |

| (Feet) | | Meters (Feet) | | |
|------------------------------|---------------------------------|------------------|-----------------------------|---|
| 0-1676 (0-5,500) | East | 6.1 (20) | Power lines | Low frequency magnetic and electric fields |
| 1219 (4,000) | Perpendicular to Track | N/A | Power line Crossing | Low frequency magnetic and electric fields |
| 1219 (4,000) | West | 46 (150) | Transformer Station | Low frequency magnetic and electric fields |
| 2286 (7,500) | East | 305 (1000) | [REDACTED] | Medium to high frequency plane waves |
| 3810-4724 (12,500-15,500) | East Side, Parallel to Track | 31 (100) | Power lines | Low frequency magnetic and electric fields |
| 6919 (22,700) | Perpendicular to Track | N/A | Power Line Crossing | Low frequency magnetic and electric fields |
| EOL | East | 610 (2000) | Queensway Carleton Hospital | Multiple Sources of Possible Electromagnetic Interference: Low, medium, and high frequency magnetic and electric fields, medium to high frequency plane waves, conducted low and high frequency phenomena, and Electrostatic Discharge |

- (iv) DB Co shall work with the identified locations below, for Confederation East, in addition to other locations identified during their design survey;

| Sensitive Receivers - Confederation East | | | | |
|--|--|--|--|--|
| | | | | |

| Approx. Distance From Blair Meters (Ft) | Track Side | Approx. Distance to Centerline Meters (Feet) | Description | Rationale |
|---|------------------------------|--|-----------------------------------|--|
| 0 (0) | Perpendicular to Track | N/A | Power line Crossing | Low frequency magnetic and electric fields |
| 0-2560 (0-8,400) | East Side, Parallel to Track | 49 (160) | Power lines | Low frequency magnetic and electric fields |
| 3048 (10,000) | Perpendicular to Track | N/A | Power line Crossing | Low frequency magnetic and electric fields |
| 3962-EOL (13,000-EOL) | East Side, Parallel to Track | 31 (100) | Power lines | Low frequency magnetic and electric fields |
| 6218 (20,400) | East | 62 (200) | Transformer Station | Low frequency magnetic and electric fields |
| 9510 (31,200) | East | 305 (1,000) | CML Healthcare Laboratory Service | Multiple Sources of Possible Electromagnetic Interference: Low, medium, and high frequency magnetic and electric fields, medium to high frequency plane waves, conducted low and high frequency phenomena, and Electrostatic Discharge |
| 10607 (34,800) | East | 305 (1,000) | Ottawa Police Service | Medium to high frequency plane waves |
| 10729 (35,200) | East | 61 (200) | Cell Tower | Medium to high frequency plane waves |
| <0 (<0) | West | 3048 (10,000) | Montfort Hospital | Multiple Sources of Possible |

| | | | | |
|--------------|------|-------------|-------------|--|
| | | | | Electromagnetic Interference: Low, medium, and high frequency magnetic and electric fields, medium to high frequency plane waves, conducted low and high frequency phenomena, and Electrostatic Discharge |
| <0 (<0) | West | 122 (400) | [REDACTED] | Medium to high frequency plane waves |
| 1768 (5,800) | West | 244 (800) | Power lines | Low frequency magnetic and electric fields |
| 2438 (8,000) | West | 366 (1,200) | [REDACTED] | Multiple Sources of Possible Electromagnetic Interference: Low, medium, and high frequency magnetic and electric fields, medium to high frequency plane waves, conducted low and high frequency phenomena, and Electrostatic Discharge |
| 2987 (9,800) | West | 366 (1,200) | [REDACTED] | Multiple Sources of Possible Electromagnetic Interference: |

| | | | | |
|--|--|--|--|---|
| | | | | Low, medium, and high frequency magnetic and electric fields, medium to high frequency plane waves, conducted low and high frequency phenomena, and Electrostatic Discharge |
|--|--|--|--|---|

- (h) DB Co shall ensure that there is no harmful or disturbing electrical interference of the Systems with external systems, (City traffic system, human beings, radio/television receivers, radio/television transmitters, cellular systems, wireless systems, power gridlines, power substations, cars, buses, police, emergency vehicles, and any other equipment belonging to Passengers, pedestrians and neighborhoods).
- (i) DB Co System Infrastructure shall be designed and commissioned to be electromagnetically compatible and not cause any electromagnetic interference to other adjacent railway systems ([REDACTED] and [REDACTED]).
- (j) DB Co shall cooperate with Industry Canada and third party stakeholders in the investigation and resolution of complaints regarding documented or suspected EMI/EMC issues.
- (k) DB Co shall provide an O&M manual detailing all identified sensitive receivers, mitigation measures taken, and required maintenance on any EMI/EMC management systems/equipment. The City will consider any EMI issues arising post Completion as a warranty issue or latent defect.

11.2 Reference Documents

- (a) The works shall comply with the criteria contained in this Article 11, and all standards, regulations, policies, Applicable Law, guidelines or practices applicable to the Project, including but not limited to each of the following Reference Documents:
 - (i) EN 50121, Railway applications – Electromagnetic compatibility Part 1, Part 2, Part 3-1, Part 3-2, Part 4 and Part 5;
 - (ii) Industry Canada ICES:

- A. ICES-001: Industrial, Scientific and Medical Radio Frequency Generator;
 - B. ICES-002: Spark Ignition Systems of Vehicles and Other Devices Equipped with Internal Combustion Engines;
 - C. ICES-003: Information Technology Equipment (including Digital Apparatus - Limits and Methods of Measurement;
 - D. ICES-004: Alternating Current High Voltage Power Systems;
 - E. ICES-005: Radio Frequency Lighting Devices;
 - F. ICES-006: AC Wire Carrier Current Devices (Unintentional Radiators);
- (iii) OESC.

11.3 General Requirements

- (a) DB Co shall meet current Industry Canada EMI/EMC regulations and licensing regulations at all times during the Maintenance Period.
- (b) DB Co shall ensure that all equipment meets emission regulations and that all radio equipment is type certified for use in Canada.
- (c) The equipment shall be designed to be compatible with the surrounding electromagnetic environment.
- (d) Each system, subsystem or component thereof, installed as part of the work, shall comply or be compatible with applicable Canadian EMC standards (ICES).
- (e) The System shall be designed and constructed such that the System does not electrically or magnetically interfere with the safe and proper operation of the Revenue Vehicles, and Maintenance Vehicles, and wayside equipment, including external systems and equipment.
- (f) An EMI/EMC Control Plan for the entire System shall be submitted, based on EN50121 standard series and related Canadian EMI/EMC standards, according to Schedule 10 – Review Procedure.
- (g) The EMI/EMC Control Plan shall define a process for early identification of interference risk areas and development of solutions to mitigate the risk of the electromagnetic interferences and the electromagnetic compatibilities of the System elements in the operating EMC environment. DB Co shall, at minimum, include the following items into the EMI/EMC Control Plan:

- (i) Identification of roles and responsibilities for EMI/EMC management and compliance;
 - (ii) Identification of the applicable standards and equipment characterization tests;
 - (iii) Ensuring that the EMI/EMC requirements are clearly understood by design and construction team;
 - (iv) Providing proper definition and support for analysis and allocation of EMI/EMC requirements in applicable system, subsystem and component specifications, and interface control drawings;
 - (v) Ensuring that the EMI/EMC requirements are met by design and construction teams by reviewing all applicable drawings and specifications prior to their release for proper EMI/EMC control content;
 - (vi) Compliance with statutory regulations and relevant standards via participating in EMI/EMC design reviews, EMI/EMC control board meetings and test result review;
 - (vii) Coordination with the regulatory organizations during the design, construction, operation and maintenance shall be maintained to ensure that the EMC requirements are addressed and that necessary licences and approval are acquired and maintained; and,
 - (viii) Undertaking an EMC risk assessment of the design in order to detail the potential risks for EMC and determine the necessary mitigations to reduce or eliminate those risks.
- (h) DB Co shall ensure that each system configuration complies with the EMI/EMC requirements, in all possible operating modes to ensure that all supplied equipment shall operate, without degradation or failure resulting from the installed environment nor cause any other equipment, existing or new, degradation or failure due to emitted interference.
- (i) Qualification test reports shall clearly identify the pass/fail status of each test.
- (i) Where any test is failed, a clearly defined remedial action report shall be included in the test report identifying the reason for the failure and the proposed remedial action.
- (j) No product, system, subsystem or component shall be installed until it has successfully passed EMI/EMC qualification testing.
- (k) DB Co may use equipment that can demonstrate prior EMI/EMC performance testing and in-service proven ability.

- (i) Use of the service proven equipment shall be assessed on prior records; if this is demonstrable, their inclusion into the design shall be justified using an EMI/EMC risk assessment.
- (l) DB Co shall ensure that the equipment is adequately protected against radio frequency emissions from nearby mobile and handheld radios or cellular telephones.
- (m) The operation and maintenance manual shall describe the equipment protections as well as any restrictions on equipment operation or maintenance necessary to ensure immunity control (e.g. leaving covers on equipment enclosures).
- (n) DB Co shall perform a radio immunity qualification test on equipment to demonstrate its immunity against radio emissions. Radio emissions immunity qualification tests shall demonstrate the following:
 - (i) Demonstrate that the designed susceptibility thresholds are met under normal and failure conditions, and at the limits of permissible field adjustments. Failure conditions shall include failures identified in the safety analysis above, including relevant un-annunciated failures and maladjustments.
 - (ii) Demonstrate that the designed susceptibility thresholds are adequate to permit operation with worst-case conducted and inductive emissions expected from Trains in all possible operating configurations.

ARTICLE 12 CORROSION CONTROL

12.1 Reference Documents

- (a) The design and construction of corrosion control work shall comply with the criteria contained in this Article 12, and all standards, regulations, policies, Applicable Law, guidelines or practices applicable to the Project, including but not limited to each of the following latest revision of the Reference Documents. In the event of a conflict between criteria, commitments or requirements contained within one document when compared with another, the more stringent shall apply:
- (b) American Concrete Institute
 - (i) ACI Publication SP-77 Sulphate Resistance of Concrete;
 - (ii) ACI Publication 201.2R Guide to Durable Concrete;
 - (iii) ACI Publication 222R Protection of Metals in Concrete Against Corrosion; and,
 - (iv) ACI Publication 506.2 Below Grade Shotcrete Used as Permanent Support.
- (c) ASTM International
 - (i) ASTM A536 Standard Specification for Ductile Iron Castings;
 - (ii) ASTM A716 Standard Specification for Ductile Iron Culvert Pipe;
 - (iii) ASTM A746 Standard Specification for Ductile Iron Gravity Sewer Pipe;
 - (iv) ASTM B418 Standard Specification for Cast and Wrought Galvanic Zinc Anodes;
 - (v) ASTM B843 Standard Specification for Magnesium Alloy Anodes for Cathodic Protection;
 - (vi) ASTM C452 Standard Test Method for Potential Expansion of Portland-Cement Mortars Exposed to Sulfate;
 - (vii) ASTM D256 Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics;
 - (viii) ASTM D516 Standard Test Method for Sulfate Ion in Water;
 - (ix) ASTM D570 Standard Test Method for Water Absorption of Plastics;
 - (x) ASTM D638 Standard Test Method for Tensile Properties of Plastics;

- (xi) ASTM D1248 Standard Specification for Polyethylene Plastics Extrusion Materials for Wire and Cable;
 - (xii) ASTM D2216 10 Standard Test Methods for Lab Determination of Water Content of Soil;
 - (xiii) ASTM D4327 Standard Test Method for Anions in Water by Suppressed Ion Chromatography;
 - (xiv) ASTM D4658 Standard Test Method for Sulfide Ion in Water;
 - (xv) ASTM G16 Standard Guide for Applying Statistics to Analysis of Corrosion Data;
 - (xvi) ASTM G51 Standard Test Method for Measuring pH of Soil for Use in Corrosion Testing; and,
 - (xvii) ASTM G57 Standard Test Method for Field Measurement of Soil Resistivity Using the Wenner Four-Electrode Method.
- (d) AWWA
- (i) AWWA C104/A21.4 Cement-Mortar Lining for Ductile-Iron Pipe and Fittings;
 - (ii) AWWA C111/A21.11 Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings;
 - (iii) AWWA C116 Protective Fusion-Bonded Coatings for the Interior and Exterior Surfaces of Ductile-Iron and Gray-Iron Fittings;
 - (iv) AWWA C151/A21.5 Ductile-Iron Pipe, Centrifugally Cast;
 - (v) AWWA C200 Steel Water Pipe 6 Inch (150mm) and Larger;
 - (vi) AWWA C203 Coal-Tar Protective Coatings and Linings for Steel Water Pipelines-Enamel and Tape-Hot Applied;
 - (vii) AWWA C207 Standard for Steel Pipe Flanges for Waterworks Service-Sizes 4 In. Through 144 In. (100mm Through 3,600mm) for Potable Water and Other Liquids;
 - (viii) AWWA C209 Cold-Applied Tape Coatings for the Exterior of Special Sections, Connections, and Fittings for Steel Water Pipelines;
 - (ix) AWWA C210 Liquid Epoxy Coating Systems for the Interior and Exterior of Steel Water Pipelines;

- (x) AWWA C213 Liquid Epoxy Coating Systems for the Interior and Exterior of Steel Water Pipelines;
 - (xi) AWWA C214 Tape Coating Systems for the Exterior of Steel Water Pipelines;
 - (xii) AWWA C215 Extruded Polyolefin Coatings for the Exterior of Steel Water Pipelines;
 - (xiii) AWWA C216 Heat-Shrinkable Cross-Linked Polyolefin Coatings for the Exterior of Special Sections, Connections, and Fittings for Steel Water Pipelines; and,
 - (xiv) AWWA C302 Reinforced Concrete Pressure Pipe, Non-cylinder Type.
- (e) Canadian Electrical Code
- (i) CSA C22.1 Canadian Electrical Code Part I Safety Standard for Electrical Installations;
 - (ii) CSA C22.2 Canadian Electrical Code Part II General Requirements; and,
 - (iii) CSA C22.3 No. 4-1974(R1995) Control of Electromechanical Corrosion of Underground Metallic Structures.
- (f) Electronic Industry Association (EIA)
- (i) EIA RS-169 Thermoplastic Insulated and Jacketed Hook-Up Wire; and,
 - (ii) EIA 214 Method for Calculation of Current Ratings on Hook-Up Wire.
- (g) European Standard
- (i) IEC 62128-1 Part 1: Protective Provisions Relating to Electrical Safety and Earthing.
- (h) International Union of Railways (UIC)
- (i) UIC605OR Protection from Corrosion.
- (i) Institute of Electrical and Electronics, Inc. (IEEE)
- (i) IEEE C2 National Electrical Safety Code (NESC);
 - (ii) IEEE 80 IEEE Guide for Safety in AC Substation Grounding;
 - (iii) IEEE 81 IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System Part 1: Normal Measurements;

- (iv) IEEE 142 IEEE Recommended Practice for Grounding of Industrial and Commercial Power Systems;
 - (v) IEEE 316 Standard Requirements for Direct Current Instrument Shunts; and,
 - (vi) IEEE 837 Qualifying Permanent Connections Used in Substation Grounding.
- (j) ICEA
- (i) ICEA S-61-402 Thermoplastic-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy; and,
 - (ii) ICEA S-66-524 Cross Linked Thermosetting Polyethylene Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.
- (k) NACE International
- (i) Report 10B189 Direct Current Operated Rail Transit Stray Current Mitigation (24255-SG);
 - (ii) NACE RP 0104 Recommended Practice The Use of Coupons for Cathodic Protection Monitoring Applications;
 - (iii) NACE SP 0109 Standard Practice Field Application of Bonded Tape Coatings for External Repair Rehabilitation and Weld Joints on Buried Metallic Pipelines;
 - (iv) NACE SP 0169 Standard Practice Control of External Corrosion on Underground or Submerged Metallic Piping Systems;
 - (v) NACE SP 0177 Mitigation of Alternating Current and Lightning Effects on Metallic Structures and Corrosion Control Systems;
 - (vi) NACE SP0187 Design Considerations for Corrosion Control of Reinforcing Steel in Concrete;
 - (vii) NACE SP 0207 Performing Close-Interval Potential Surveys and DC Surface Potential Gradient Surveys on Buried or Submerged Metallic Pipelines;
 - (viii) NACE SP 0285 Standard Practice Corrosion Control of Underground Storage Tank Systems by Cathodic Protection;
 - (ix) NACE SP0290 Design Considerations for Corrosion Control of Reinforcing Steel in Atmospherically Exposed Concrete Structures;
 - (x) NACE TM 0101 Standard Test Method Measurement Techniques Related to Criteria for Cathodic Protection of Underground Storage Tank Systems; and,

- (xi) NACE TM 0497 Standard Test Method Measurement Techniques Related to Criteria for Cathodic Protection on Underground or Submerged Metallic Piping Systems.
- (l) NEMA:
 - (i) NEMA AB 1 Molded Case Circuit Breakers and Molded Case Switches;
 - (ii) NEMA ICS 6 Industrial Controls and Systems: Enclosures;
 - (iii) NEMA MR 20 Cathodic Protection Units; and,
 - (iv) NEMA ST 1 Specialty Transformers (except General Purpose Type).
- (m) National Sanitation Foundation
 - (i) NSF/ANSI 61 - Drinking Water Standards/Certification.
- (n) OEC
 - (i) Ontario Reg. 164/99 Electrical Safety Code.
- (o) Transit Cooperative Research Program
 - (i) TCRP Report 155 Track Design Handbook for Light Rail Transit Chapter 8 Corrosion Control.
- (p) UL
 - (i) UL 83 UL Standard for Safety Thermoplastic-Insulated Wires and Cables; and,
 - (ii) UL 486A Wire Connectors and Soldering Lugs for Use with Copper Conductors.
- (q) NFPA
 - (i) NFPA 70 National Electric Code; and,
 - (ii) NFPA 130 Standard for Fixed Guideway Transit and passenger Rail Systems.

12.2 Scope of Work

- (a) Introduction
 - (i) This Article 12 describes the Design Criteria for corrosion control. Corrosion control is required to prevent premature corrosion failures on System facilities, on metallic and concrete pipes, and on other underground structures. Such measures shall also minimize stray current levels and their effects on underground and

above-grade structures. Types of corrosion control include mitigation for stray currents and protection against atmospheric and underground corrosion. Corrosion control systems should be economical to install, operate, and maintain.

(b) Objective

- (i)** Corrosion-control Design Criteria encompass all engineering disciplines applied to the Project.
- (ii)** The criteria are separated into three areas: stray current corrosion, soil corrosion, and atmospheric corrosion. The Design Criteria for each of these categories, and their implementation, shall meet the following objectives:
 - A.** Realize the Design Life of System facilities by avoiding premature failure caused by corrosion;
 - B.** Minimize annual operating and maintenance costs associated with material deterioration;
 - C.** Provide continuity of operations by eliminating corrosion-related failures of systems and subsystems;
 - D.** Minimize to a tolerable limit the detrimental effects to facilities belonging to others that may be caused by stray earth currents from transit operation; and,
 - E.** Provide a means for monitoring stray current and corrosion control systems including electrical continuity, cathodic protection, and coating integrity.
- (iii)** DB Co shall ensure all structures be protected against environmental conditions by the use of coatings, insulation, cathodic protection, electrical continuity, or a combination of the preceding, as appropriate.

12.3 General Requirements

- (a)** DB Co shall design the ground of all Structures and equipment meets the requirements for protection of the public as described in IEC 62128-1 and IEEE C2 NESC 2012.
- (b)** DB Co shall retain a NACE certified corrosion specialist or cathodic protection specialist with a certification in cathodic protection and 10 years of experience on transit systems with a similar level of complexity as this Project to serve as the responsible professional and approve and coordinate all elements of the corrosion mitigation measures for the Project.

- (i) DB Co.'s responsible professional shall be approved by the City and shall provide all reference materials regarding similar projects, certifications, and experience with references for the City's approval.
 - (ii) DB Co.'s corrosion control measures shall be coordinated by DB Co with the other relevant disciplines including Track, Traction Power, OCS, signaling and Train control, communications, EMI/EMC, facilities, safety, civil, structural, geotechnical, electrical, and mechanical.
 - (iii) DB Co. shall produce a Project corrosion control and stray current mitigation coordination management plan report to address the corrosion control mitigation technologies to be employed, the coordination with the discipline designers, and the coordination with the adjacent and outside utilities. DB Co shall complete the Corrosion Control and Stray Current Mitigation Coordination Management Plan no later than 120 days after Commercial Close.
- (c) Soil Corrosion Control
 - (i) Soil corrosion control requirements apply to systems or measures installed to mitigate corrosion caused by soil, rock and groundwater.
 - (ii) The designs required to mitigate soil corrosion control shall be implements within 30 calendar days after Commercial Close and completed within the Project design duration for each identified Utility or Structure.
 - (iii) DB Co shall be responsible to obtain adequate soil/rock samples and ground water samples in areas of anticipated extensive below grade construction. The soil/rock samples shall be analyzed for resistivity (or conductivity), moisture content, pH, chloride and sulphate ion concentrations and for the presence of sulphides.
 - (iv) DB Co shall be responsible to obtain in-situ Wenner 4 electrode soil resistivities along the ROW at 150m spacings and at electrode spacings of 1.5, 3.0, 4.5, and 6.0m and at electrode spacings of five times the diagonal distance of the anticipated ground mat diagonal distance. These data shall be used to calculate the Barnes layer resistivity for each layer and both the average and Barnes layer data shall be statistically analyzed to determine the overall corrosivity of the ROW. These data shall also be used in the computer Track-to-earth resistance simulation to calculate the allowable stray current levels and required Track-to-earth resistance to minimize stray current to 0.075 volts earth potential gradient per 300 meter distance perpendicular to the Tracks.
 - (v) DB Co shall coordinate with the geotechnical engineering firm to obtain soil samples at a minimum of 10% of boring locations for chemical analysis testing to include moisture content, pH, concentration of chlorides, concentration of sulfates, presence of sulfides, and saturated resistivity to assess corrosivity.

- (vi) DB Co shall obtain in-situ soil resistivity measurements, in accordance with IEEE81, using the Wenner 4 pin method at all TPSS locations for the design of ground mats. The location of the in-situ tests shall be within the footprint of the substation location and in accordance with IEEE80.
- (d) Stray Current Corrosion Control
 - (i) DB Co shall develop stray current corrosion control designs and reports early in the project and coordinate with the utility designers and adjacent utilities to ensure that the designs can be implemented during construction of the facilities and utilities and cause no impact to the project schedule. DB Co shall initiate the Stray current corrosion control design within 30 calendar days after Commercial Close and completed within the project duration for each identified Utility or Structure.
 - (ii) Stray current corrosion control minimum requirements apply to measures installed with the Traction Power System and Trackwork to assure that stray earth traction currents do not exceed maximum acceptable levels. These levels are based on system characteristics and the characteristics of underground Structures and shall be obtained from the soil resistivity study and the load flow program.
 - (iii) These minimum requirements also apply to measures installed with fixed facilities, and to facilities belonging to others. They are based on anticipated stray earth traction current levels and the characteristics of fixed facilities and other buried Structures.
 - (iv) DB Co shall perform a baseline stray current survey for post-construction and pre-energization to establish the reference levels of stray current existing prior to energization of the System. DB Co shall ensure the baseline stray current survey include transit facilities, adjacent utilities, and Third Party Utilities and structures. DB Co shall provide the report of this testing to the City.
 - (v) A revenue stray current survey shall be performed by DB Co no later than 90 days after the start of Revenue Service to determine the levels of stray current generated by the new system extensions on transit facilities, adjacent utilities and Third Party Utilities and structures. The report of this testing shall be provided to the City.
 - (vi) The DB Co shall provide continuous Track to ground current monitoring to detect any stray current faults.
 - (vii) DB Co shall provide an annual survey that includes stray current monitoring for transit structures and adjacent utility structures at least 90 days prior the end of the construction warranty period and provide the reports to the City

- (viii) DB Co shall provide Track-to-earth resistance testing for all Track during construction including Mainline Track and Yard Track of Track-to-earth resistance unless measures are incorporated to allow for indirect testing of Track-to-earth resistance during revenue serviced provide the reports to the City.
- (e) Atmospheric Corrosion Control
 - (i) Atmospheric corrosion control requirements apply to systems or measures installed to mitigate corrosion caused by local climatological conditions including condensation, temperature cycling, industrial and vehicle emissions, salt spray by motor vehicles and snow and air pollutants.
 - (ii) DB Co shall apply the requirements to all areas where atmospheric corrosion may be anticipated, are selection of materials of proven durability, protective coatings both barrier and sacrificial, sealants to prevent moisture intrusion and prohibiting the use of dissimilar metals.
 - (iii) DB Co shall ensure that the electrical insulation design is not affected by the contamination from adjacent road de-icing or dust suppression, which includes but may not be limited to the following compounds:
 - A. Sodium Chloride (NaCl);
 - B. Calcium chloride (CaCl₂);
 - C. Magnesium chloride (MgCl₂);
 - D. Potassium chloride (KCl);
 - E. Brines used in road de-icing/salting; and
 - F. The salt portion of abrasive mixtures and additives commonly used in road salts (ferrocyanides).
- (f) Coatings
 - (i) Coatings specified for corrosion control of buried metallic or concrete facilities shall satisfy the following requirements:
 - A. Minimum thickness as recommended for the specific system, but not less than 380 microns in accordance with NACE International Standard SP0169 and the manufacturers' recommendations;
 - B. A chemical or mechanical bond to the metal or concrete surface; Pressure-sensitive systems shall not be accepted; non-bonding systems may be used in special instances, after review;

- C. Minimum 15-year performance record for the intended service;
 - D. Mill application wherever possible, with field application of a compatible system; and,
 - E. Mechanical characteristics capable of withstanding installation abuse during handling and earth pressure after installation for the Design Life of the system.
- (g) Electrical Insulation of Piping
- (i) DB Co shall design all devices used for electrical insulators for corrosion control to include non-metallic inserts, insulating flanges, couplings, unions, and/or concentric support spacers.
 - (ii) DB Co shall design all devices to meet the following requirements:
 - A. A minimum resistance of 10 Megaohms prior to installation;
 - B. Sufficient electrical resistance after insertion into the operating piping system such that no more than 2 percent of a test current applied across the device flows through the insulator, including flow through conductive fluids if present;
 - C. Mechanical and temperature ratings equivalent to the Structure in which they are installed;
 - D. Internal coating (except complete non-metallic units) with a polyamide epoxy for a distance on each side of the insulator equal to two times the diameter of the pipe in which they are used. Where conductive fluids with a resistivity of less than 2,000 ohm-centimeters are present, internal coating requirements shall be based on separate evaluation and comply with NSF/ANSI 61 for potable water systems;
 - E. Devices (except non-metallic units) buried in soils shall be encased in a protective coating bonded coating or a petrolatum 4 part coating system;
 - F. Devices (except non-metallic units) installed in chambers or otherwise exposed to partial immersion or high humidity shall have a protective coating applied over the components or a petrolatum 4 part coating system;
 - G. Inaccessible insulating devices, such as buried or elevated insulators, shall be equipped with accessible permanent test facilities; and,

- H. In the event that construction of the System disturbs or affects an existing grounding system, DB Co shall be responsible for the reinstatement or modification of the system equal to the pre-existing conditions.
- (iii) DB Co shall ensure a minimum clearance of 300mm is provided between new and existing metallic structures. When conditions do not allow a 300mm clearance, the design shall include special provisions to prevent electrical contact with existing Structure(s).
- (h) Electrical Continuity of Piping
 - (i) DB Co shall ensure electrical continuity is provided for the non-welded metallic pipe joints and shall meet the following requirements:
 - A. Use of direct burial, insulated, stranded, copper wire with the minimum length necessary to span the joint being bonded;
 - B. Wire size shall be based on the electrical characteristics of the structure and resulting electrical network to minimize attenuation and allow for cathodic protection; and,
 - C. Any coating damage incurred from the installation of pipe joint bonds shall be repaired.
 - (ii) DB Co shall design a minimum of two wires per joint for redundancy.
- (i) Cathodic Protection
 - (i) DB Co shall accomplish cathodic protection by sacrificial galvanic anodes to minimize corrosion interaction with other underground Utilities. DB Co shall use impressed current systems only when the use of sacrificial systems is not technically and/or economically feasible. DB Co shall not use cathodic protection schemes that require connection to the transit System negative return system, in lieu of using a separate isolated anode ground bed.
 - (ii) DB Co shall coordinate all cathodic protection systems with the utility operators including water mains, gas mains, petroleum pipelines, power transmission/distribution pipe type cables, lead sheath cables, underground storage tanks, and any other structure that can be impacted by stray current and/or corrosion control.
 - (iii) DB Co shall base the Cathodic protection system design on theoretical calculations that include the following parameters:
 - A. Estimated percentage of bare surface area (minimum 1 percent);

- B. Cathodic protection current density;
- C. Estimated current output per anode;
- D. Estimated total number of anodes, size, and spacing;
- E. Minimum anode life of 30 years; and,
- F. Estimated anode ground bed resistance.
- G. Impressed current rectifier systems shall be capable of operating in constant voltage, constant current or potential control mode. Rectifiers shall be rated at a minimum of 50 percent above calculated operating levels to overcome a higher-than-anticipated anode ground bed resistance, lower-than-anticipated coating resistance, or presence of interference mitigation bonds. Other conditions which may result in increased voltage and current requirements shall be considered.
- H. Test facilities consisting of a minimum of two structure connections, one coupon reference electrode connection, conduits and termination boxes shall be designed to permit initial and periodic testing of cathodic protection levels, interference currents, and system components (anodes, insulating devices, and continuity bonds). The designer shall specify the locations and types of test facilities for each cathodic protection system.

(j) Structures and Facilities

- (i) The following paragraphs establish the protective measures to be incorporated for specific underground Utilities and buried Structures.

A. Ferrous Pressure Piping

- i. All new buried cast iron, ductile iron, and steel pressure piping shall be cathodically protected. System design shall satisfy the following minimum requirements and in accordance with NACE International SP0169;
- ii. Application of a bonded protective coating to the external surface of the pipe;
- iii. Electrical insulation of pipe from interconnecting pipe, other Structures and segregation into discrete electrically isolated sections depending upon the total length of piping;
- iv. Electrical continuity through the installation of copper wires across the mechanical pipe joints other than intended insulators;

- v. Permanent test/access facilities to allow for verification of electrical continuity, electrical effectiveness of insulators and coating, and evaluation of cathodic protection levels, installed at the insulated connections. Additional test/access facilities shall be installed at intermediate locations, at intervals determined on an individual Structure basis; and,
- vi. Number and location of anodes and size of rectifier (if required) shall be determined on an individual Structure basis.

B. Copper Piping

- i. Buried copper pipe shall be cathodically protected and electrically isolated from non-buried piping, such as that contained in a Station Structure, through use of an accessible insulating union installed where the piping enters through a wall or floor. Pipe penetrations through walls and floors shall be electrically isolated from building structural elements. The insulator shall be located inside the Structure and not buried.

C. Gravity Flow Piping

- i. Corrugated steel piping shall be internally and externally coated with a sacrificial metallic coating and a protective organic coating.
- ii. Cast or ductile iron piping shall be designed and fabricated to include the following provisions:
 - 1 An internal mortar lining with a bituminous coating on ductile iron pipe only (not required for cast iron soil pipe);
 - 2 A bonded protective coating on the external surfaces in contact with soils;
 - 3 An unbounded dielectric encasement shall not be allowed; and,
 - 4 A bituminous mastic coating on the external surfaces of pipe 150mm on each side of a concrete/soil interface.
- iii. Reinforced concrete non-pressure piping shall include the following provisions:
 - 1 Water/cement ratios meeting the minimum provisions of ACI Publication 201.2R ACI Publication 222R; and,

2 Maximum 250 ppm chloride concentration in the total concrete mix.

D. Electrical Conduits

i. Buried metallic conduits shall include the following provisions:

1 Galvanized steel with PVC or other coating acceptable for direct burial, including couplings and fittings. The PVC coating is not required when conduits are installed in concrete; and,

2 Electrical continuity through use of standard threaded joints or bond wires installed across non-threaded joints.

E. Hydraulic Elevator Cylinders

i. Steel hydraulic elevator cylinders shall be designed, fabricated and installed to meet the following requirements:

1 External protective coating resistant to deterioration by petroleum products;

2 Outer concentric FRP casing. Casing thickness, diameter and resistivity shall be designed to prevent moisture intrusion (including the bottom) and to maximize electrical insulation between the cylinder and earth;

3 Sand fill between the cylinder and FRP casing with a minimum resistivity of 100,000 ohm-centimeters, a pH of between 6 and 8 and a maximum chloride content of 250 ppm;

4 Cathodic protection through the use of impressed current with the anodes installed in the sand fill;

5 Permanent test facilities installed on the cylinder, anodes and earth reference to permit evaluation, activation, and periodic retesting of the protection system;

6 Removable moisture-proof sealing lid installed on the top of the casing prior to installation of the cylinder. The top of the casing shall be permanently sealed against moisture intrusion after installation of the cylinder; and,

7 Alternative protective measures in lieu of cathodic protection shall be Union Gard 160 or equal.

(ii) Buried Concrete/Reinforced Concrete Structures

- A. The design of cast-in-place concrete Structures shall be based on the following provisions and the Design Life requirements included in Schedule 15-2, Part 1, Article 4 – Design and Construction:
- i. Use Type I cement. ASTM C452-75 and ACI Publication SP-77 Sulfate Resistance of Concrete shall be used as guidelines for evaluating the sulphate resistance of concrete mixes with non-standard cement types;
 - ii. Water/cement ratio and air entrainment admixture in accordance with the structural requirements to establish a dense, low permeability concrete. Refer to applicable sections of ACI 201.2R Guide to Durable Concrete;
 - iii. Maximum chloride concentration of 250 ppm in the total mix (mixing water, aggregate, cement, and admixtures). The concrete mix shall be such that the water soluble and acid soluble chloride concentrations, at the concrete/ reinforcing steel interface, do not exceed 0.15 and 0.2 percent by weight of cement, respectively, over the life of the Structure. Refer to applicable sections of ACI 222R Corrosion of Metals in Concrete;
 - iv. Concrete cover over reinforcing steel shall comply with appropriate codes and provide a minimum of 50mm of cover on the soil/rock side of reinforcement when pouring within a form and a minimum of 75mm of cover when pouring directly against soil/rock; and,
 - v. The need for additional measures, as a result of localized special conditions, shall be determined on an individual basis.
- B. Precast standardized facilities, such as vaults and maintenance holes, shall be reviewed on an individual basis to determine alternative requirements when they cannot be practically modified to meet some or all of the requirements herein.
- C. Precast segmented concrete ring construction shall meet the requirements of this Article 12 or be reviewed on an individual basis to determine alternative requirements when they cannot be practically modified to meet some or all of the provisions specified.
- D. Support Pilings

- i. The following is applicable only to support piling systems which are to provide permanent support. Pilings used for temporary support do not require corrosion control provisions.
- ii. Designs based on the use of metallic supports exposed to the environment, such as H or soldier piles, shall include the use of a barrier coating. The need for special measures, such as cathodic protection, shall be determined on an individual basis, based on type of Structure, analysis of soil borings for corrosive characteristics and the degree of anticipated structural deterioration caused by corrosion.
- iii. Reinforced concrete piling, including fabrications with prestressed members, shall be designed to meet the following minimum requirements:
 - 1 A Design Life as per the requirements included in Schedule 15-2, Part 1, Article 4 – Design and Construction;
 - 2 Water/cement ratio and cement types in accordance with Applicable Codes;
 - 3 Chloride restrictions for concrete with non-prestressed members shall be in accordance with Applicable Codes;
 - 4 Chloride restrictions for concrete with prestressed members shall be in accordance with Applicable Codes, with exception that the concrete mix shall be such that the water soluble and acid soluble chloride concentrations, at the concrete/prestressed steel interface, do not exceed 0.06 and 0.08 percent by weight of cement, respectively, over the life of the Structure; and,
 - 5 A minimum of 75mm of concrete cover over the outermost reinforcing steel, including prestressing wires, if present.
- iv. Concrete-filled steel cylinder columns, where the steel is an integral part of the load bearing characteristics of the support structure, shall be designed considering the need for special measures, such as increased cylinder wall thickness, external coating system, and/or cathodic protection. The design shall be determined on an individual basis, based on type of Structure, analysis of soil borings for corrosive characteristics and the degree of anticipated structural deterioration caused by corrosion.

(k) Stray Current Corrosion Control

- (i) This section provides requirements for designs to minimize the corrosive effect of stray earth traction currents from transit operations on transit Structures and Adjacent Structures.
- (ii) Stray current control shall reduce or limit the level of stray currents at the source, under normal operating conditions, rather than trying to mitigate the corresponding effects (possibly detrimental) which may otherwise occur on transit facilities and other underground Structures. The basic requirements for stray current control are as follows:
 - A. Maximize the isolation of the electrical systems and prevent inadvertent electrical connections between the positive and negative Traction Power distribution circuits and ground; and,
 - B. Design the Traction Power System and Trackwork to minimize stray earth currents during normal revenue operations.
- (iii) Traction Power System
 - A. Traction Power supply System shall be designed as a dedicated system, providing power to the System. The Traction Power supply System shall be designed electrically isolated.
 - B. TPSS shall be spaced at intervals such that maximum Track-to-earth potentials do not exceed 50 volts during normal operations and 75 volts during contingency operation as defined in Article 14 – Overhead Contact System, of this Part 3.
 - C. Substations shall be provided with access to the dc negative bus and ground mat for stray current monitoring in the same enclosure. Access shall be provided either inside, through use of dedicated space if available, or outside through the use of a weather tight enclosure with an open conduit between the enclosure and the dc negative bus.
 - D. Substations shall be provided with a Utility drainage panel(s) for connection of Utility drain cables if deemed necessary. The drainage panels shall be connected through a raceway system to a drainage pullbox exterior to the substation to facilitate Utility interconnection.
 - E. Provisions shall be included to monitor Track-to-earth potentials on a continuous basis at TPSS.
 - F. TPSS shall include a negative return shunt with test lead access to the current monitoring terminals in the negative bus and ground mat enclosure identified in C above.

(iv) Positive Distribution System

- A. Positive distribution system shall be normally operated as an electrically continuous bus, with no breaks, except during Emergency or fault conditions. Intentional electrical segregation of mainline positive distribution systems is the only type of segregation permitted.
- B. OCS, consisting primarily of support poles, insulators, the contact wire and the messenger wire, shall be designed to meet the following minimum requirements and include the following minimum provisions:
 - i. Discrete grounding of individual at-grade support poles, in lieu of interconnecting poles to each other or to a common ground electrode system. Establish electrical continuity of reinforcing steel in OCS support poles by fillet welding of the reinforcing steel and electrically connect support poles to the foundation reinforcing steel through the use of an embedded plate to protect the copper bond cables from vandalism; and,
 - ii. Common grounding of support poles on aerial structures through electrical connection to either bonded (welded) reinforcing steel in the deck or to each other and a common ground electrode system, when present.

(v) Negative Return System

- A. Running Rails. The mainline, including Special Trackwork, and grade crossings shall be designed to have a minimum, uniformly distributed, in-service resistance to earth per 300 m of Track (two rails) (based on 115# rail resistance) as determined by the following:
 - i. A computerized simulation shall be used to determine the level of stray current to be permitted and the required Track to earth resistances; and,
 - ii. Soil layer resistivity (ASTM G-57) along the entire alignment shall be used in the above simulation to determine anticipated earth potential gradients.
- B. The requirements shall be met through the use of appropriately designed insulating Track fastening devices, such as insulated tie plates, insulated rail clips, direct fixation fasteners, rail boots, or other approved methods.
- C. Ballasted Track construction shall meet the following minimum provisions:

- i. Use of a hard rock, non-porous, well drained ballast material;
 - ii. A minimum 25mm clearance between the ballast material and the metallic surfaces of the rail and metallic Track components in electrical contact with the rail;
 - iii. Mainline Track shall be electrically insulated;
 - iv. Mainline Track shall be electrically insulated from foreign railroad connections (sidings) by use of insulating rail joints. Location of the insulating joints shall be chosen to reduce the possibility of a vehicle bridging the insulator(s) for a time period larger than required moving onto or off mainline;
 - v. Select grade crossing and Track locations shall utilize permanent reference electrode arrays with test stations for monitoring of stray current activity and evaluating the isolation of Track. The requirements for the use of these earth potential gradient test arrays shall be based upon a case by case review of the Track or grade crossing location, type of Track construction, adjacent critical utility Structures and others as deemed appropriate.
- D. Track-to-earth resistance shall be monitored periodically during construction to detect variations or decrease in resistance. Investigations shall be initiated as soon as a low resistance reading is obtained and the cause of the low reading repaired.
- E. Minimum Track-to-earth resistance requirements based on the type of Track shall be based on the computer simulation and not less than the following values:
 - i. Concrete tie-and-ballast Track, yard and mainline, 500 ohms-300-Track meters;
 - ii. Direct fixation Track, 500 ohms-300-Track meters;
 - iii. Embedded Track using girder rail with rail boot system including special Track construction, 250 ohms-300-Track meters;
 - iv. Embedded Track using tee rail with rail boot and snap-on flangeway filler, 200 ohms-300-Track meters; and,
 - v. Embedded Track using tee rail with rail boot and screeded concrete flangeway, 200 ohms-300-Track meters.
- F. Ancillary Systems

- i. Switch machines, signalling devices, Train to wayside Communication Systems, and other devices or systems attached to the rails shall be electrically isolated from the rails. The requirements shall be met through the use of dielectric materials electrically separating the devices/Systems from the rails.

G. Electrical Continuity

- i. The running rails shall be constructed as an electrically continuous Traction Power return circuit through use of rail joint bonds, continuously welded rail, or a combination of these, except for the use of insulated rail joints at specific locations. To allow isolation of each special Trackwork area, the maximum spacing between insulated joints shall be 3000m. The linear resistance of each individual negative rail shall not exceed the resistivity of the steel alloy used for the running rails (18 micro-ohm centimeters), the cross sectional area of the running rail, and the length of the running to calculate the actual resistance.

(vi) Underground Trackway Structures

- A. Reinforcing steel in underground Trackway structure inverts shall be made electrically continuous. Minimum requirements for the reinforcing steel from the top of rail down shall include the following:
 - i. Welding of all longitudinal lap splices in the top layer of first pour reinforcing steel;
 - ii. Welding of all longitudinal members to a transverse (collector) member at intervals not exceeding 150 m and at electrical (physical) breaks in the longitudinal reinforcing steel, such as at expansion joints; and,
 - iii. Electrical interconnection of first pour reinforcing steel to second pour reinforcing steel at all collector bars through use of insulated copper cables or steel straps. Longitudinal steel in the second pour shall be made electrically continuous by tack welding all lap splices.
- B. Test facilities shall be installed at each end of the structure and at every collector bar. Facilities shall consist of insulated copper wires, conduits, and enclosures terminated at an accessible location.
- C. Precast segmented concrete ring tunnel construction shall meet the requirements in Section 3.1 and the following or be reviewed on an

individual basis to determine alternative criteria when they cannot be practically modified to meet the provisions specified below:

- i. Embedded steel reinforcing members should be constructed without special provisions for establishing electrical continuity.
- ii. Connecting hardware between adjacent rings and ring segments should be constructed without provisions for establishing electrical continuity between segments.
- iii. Any metallic components which will be exposed to the soils/groundwaters should be coated with a fluidized bed epoxy resin system or coal tar epoxy system.
- iv. Application of a coal tar epoxy coating system to the external surfaces of each precast panel.

- D. Steel liner tunnel construction must be reviewed on an individual basis to determine the need for special measures, such as increased liner thickness, external coating system, and/or cathodic protection.

(vii) Aerial Trackway Structures

A. Column and Bearing Assemblies, Tie and Ballast

- i. This section applies to aerial structures and Bridges that use a column and bearing assembly, but with tie and ballast Track construction. Welding of reinforcing steel in the deck is not required for this configuration.
- ii. A waterproof, electrically insulating membrane (with protection board on top of the membrane) shall be provided over the entire surface of the deck that shall be in contact with the ballast. The membrane system shall have a minimum volume resistivity of 1×10^{12} ohm-cm.
- iii. Electrical isolation of reinforcing steel shall be provided in deck/girders from columns, abutments, and other grounded elements. Isolation can be established through the use of insulating elastomeric bearing pads, dielectric sleeves and washers for anchor bolts and dielectric coatings on selected components. Use of bearings shall take into account the appropriate electrical grounding to ensure that stray current does not pass through the bearing race.

B. Column and Bearing Assemblies, Direct Fixation.

- i. This section applies to aerial Structures and bridges that use a column and bearing assembly that can be electrically insulated from deck or girder reinforcing steel and shall have insulated Trackwork construction.
- ii. Provide a fusion bonded epoxy coating to all reinforcing steel and provide a wire mesh current collector mat or provide electrical continuity of top layer reinforcing steel in the deck/girder by welding all longitudinal lap splices.
- iii. If the top layer of reinforcing steel is made electrically continuous, electrically interconnect all top layer longitudinal reinforcing steel by welding to transverse collector bars installed at breaks in longitudinal reinforcing steel, such as at expansion joints, hinges, and at abutments. Connect collector bars installed on each side of a break with a minimum of two cables.
- iv. If the top layer of reinforcing steel is made electrically continuous provide additional transverse collector bars at intermediate locations to maintain a maximum spacing of 150 m between collector bars.
- v. Provide a ground electrode system at each end of the Structure and at intermediate locations to maintain a maximum spacing between ground electrode systems of 450 m. The number, location, and earth resistance of the ground electrode system shall be determined on an individual structure basis.
- vi. Provide test facilities at each end of the Structure and at intermediate locations to maintain a maximum spacing of 500 ft between test points. The facilities shall house test wires from the collector bars and ground electrode system, if present.
- vii. Provide electrical isolation of reinforcing steel in deck/girders from columns, abutments, and other grounded elements. Isolation can be established through the use of insulating elastomeric bearing pads, dielectric sleeves and washers for anchor bolts and dielectric coatings on selected components.

C. Bents and Girders, Tie and Ballast

- i. This section applies to aerial Structures that use bent type supports with reinforcing steel extending into the deck/girders, but with tie and ballast Track construction.

- ii. Provide electrical continuity of the column/bent steel by fillet welding appropriate reinforcing to at least two vertical column bars. Make these connections to each of the two vertical bars at the top and bottom of the column/bent. The use of sacrificial reinforcing steel bars shall be considered to eliminate degradation of structural steel bars by welding.
- iii. Provide electrical continuity of the deck longitudinal bars by fillet welding all lap splices or fillet welding sacrificial reinforcing steel bars and wire tying the structural bars together and to the welded reinforcing steel.
- iv. Electrically interconnect column/bent steel to deck/girder steel by fillet welding at least two vertical column bars to collector bars installed at bents or fillet welding sacrificial reinforcing steel bars between column/bent and deck.
- v. Electrically interconnect column/bent steel to footing steel when column/bent steel penetrates the footing. Fillet weld at least two vertical column/bent bars to footing reinforcing steel.
- vi. Electrically interconnect pre or post tensioned cables to continuous longitudinal reinforcing steel by fillet welding a cable between each anchor plate and the longitudinal reinforcing steel.
- vii. Provide test facilities at each hinge and expansion joint and at every other column/bent, starting with the first column/bent from an abutment. Test facilities at hinges and expansion joints shall house bonding cables from adjacent collector bars on each side of the hinge/joint.
- viii. Facilities at columns/bents shall house two wires from vertical column/bent steel and from the collector bar at the top of the bent.
- ix. Provide a waterproof, electrically insulating membrane (with protection board on top of the membrane) over the entire surface of the deck that shall be in contact with the ballast. The membrane system shall have a minimum volume resistivity of 1×10^{12} ohm-cm.

D. Bents and Girders, Direct Fixation.

- i. This section applies to aerial Structures that use bent type supports with reinforcing steel extending into the deck/girders. Girders can

- ii. Provide electrical continuity of top layer reinforcing steel in the deck/girder by welding all longitudinal lap splices.
- iii. Electrically interconnect all top layer longitudinal reinforcing steel by welding to transverse collector bars installed at bents and on each side of breaks in longitudinal reinforcing steel, such as at expansion joints, hinges and at abutments (deck side only). Connect collector bars installed on each side of a break with a minimum of two cables.
- iv. Provide electrical continuity of all column/bent steel by welding appropriate reinforcing to at least two vertical column bars. Make these connections to each of the two vertical bars at the top and bottom of the column/bent.
- v. Electrically interconnect column/bent steel to deck/girder steel by welding at least two vertical column bars to collector bars installed at bents.
- vi. Electrically interconnect column/bent steel to footing steel when column/bent steel penetrates the footing. Weld at least two vertical column/bent bars to footing reinforcing steel.
- vii. Electrically interconnect pre or post tensioned cables to continuous longitudinal reinforcing steel by welding a cable between each anchor plate and the longitudinal reinforcing steel.
- viii. Provide test facilities at each hinge and expansion joint and at every other column/bent, starting with the first column/bent from an abutment. Test facilities at hinges and expansion joints will house bonding cables from adjacent collector bars on each side of the hinge/joint. Facilities at columns/bents will house two wires from vertical column/bent steel and from the collector bar at the top of the bent.
- ix. If electrical continuity of the reinforcing steel is not provided, other methods of stray current control may be employed such as the use of epoxy coated reinforcing steel and stray current collector mats with test facilities.

E. Concrete Deck/Exposed Steel, Tie and Ballast

- i. This section applies to Bridge Structures that use a reinforced concrete deck with exposed steel superstructure and have insulated Trackwork with tie and ballast Track construction. Welding of reinforcing steel in the deck is not required for this configuration.

- ii. Provide a waterproof, electrically insulating membrane (with protection board on top of the membrane) over the entire surface of the deck that shall be in contact with the ballast. The membrane system shall have a minimum volume resistivity of 1×10^{12} ohm-cm.
- iii. Provide electrical isolation of reinforcing steel in the deck and superstructure steel from columns, abutments and other grounded elements. Isolation can be established through the use of insulating elastomeric bearing pads, dielectric sleeves and washers for anchor bolts and dielectric coatings on selected components.
- iv. If electrical isolation of reinforcing steel in the deck and superstructure steel from columns, abutments, and other grounded elements cannot be obtained, then electrical continuity of metallic components within these latter elements shall be established by appropriate welding and bonding procedures.

F. Concrete Deck/Exposed Steel, Direct Fixation.

- i. This section applies to bridge structures that use a reinforced concrete deck with exposed steel superstructure and shall have insulated Trackwork construction. This type of construction precludes the electrical insulation of deck reinforcing steel from superstructure steel.
- ii. Provide electrical continuity of top layer reinforcing steel in the deck/girder by welding all longitudinal lap splices.
- iii. Electrically interconnect all top layer longitudinal reinforcing steel by welding to transverse collector bars installed at breaks in longitudinal reinforcing steel, such as at expansion joints, hinges, and abutments. Connect collector bars installed on each side of a break with a minimum of two cables.
- iv. Provide additional transverse collector bars at intermediate locations to maintain a maximum spacing of 150m between collector bars.
- v. If the total structure length exceeds 3,000m provide a ground electrode system at each end of the structure and at intermediate locations to maintain a maximum spacing between ground electrode systems of 450m. The number, location and earth resistance of the ground electrode system shall be determined on an individual structure basis.

- vi. Provide test facilities at each end of the structure and at intermediate locations to maintain a maximum spacing of 150m between test points. The facilities will house test wires from the collector bars and ground electrode system, if present.
- vii. Provide electrical isolation of reinforcing steel in the deck and superstructure steel from columns, abutments and other grounded elements. Isolation can be established through the use of insulating elastomeric bearing pads, dielectric sleeves and washers for anchor bolts and dielectric coatings on selected components.
- viii. If electrical isolation of reinforcing steel in the deck and superstructure steel from columns, abutments and other grounded elements cannot be obtained, then electrical continuity of metallic components within these later elements must be established by appropriate welding and bonding procedures.
- ix. If electrical continuity of the reinforcing steel is not provided, other methods of stray current control may be employed such as the use of epoxy coated reinforcing steel and stray current collector mats with test facilities.

(viii) Retaining Walls

- A. The longitudinal bar overlaps in both faces of the wall, including the top and bottom bars in the footing, shall be tack welded to insure electrical continuity. Longitudinal bars in the footing shall be made electrically continuous to the longitudinal bars of the walls. Collector bars, bonding cables and test facilities shall be installed.

(l) OCS Pole Foundation Grounding

- (i) All metallic components, inclusive of the pole baseplate, that shall be partially embedded or come in contact with concrete surfaces shall be coated with a sacrificial/barrier coating. The coating shall be applied to the entire component. The coating shall extend a minimum of 152.4mm into the concrete and a minimum of 12.7mm above the surface of the concrete.
- (ii) At-Grade OCS Support Poles
 - A. Electrical continuity of reinforcing steel within support pole foundations shall be established to provide an adequate means for dissipating any leakage current from the contact wire and, where applicable, the messenger wire. The following minimum provisions shall be included with design:

- i. The outermost layer of vertical reinforcing steel within the concrete foundation shall be tack welded at the intermediate vertical lap joints and to reinforcing bar collector rings (two) installed at the top and bottom of the reinforcing bar cage;
- ii. A copper cable shall be connected between the base of the catenary support pole and the foundation reinforcing steel. The cable shall be thermite welded or brazed to the support pole and routed in such a manner that it shall not be susceptible to damage during construction or after installation is complete. The connection to the pole shall be coated with a zinc-rich weather resistant coating material; and,
- iii. The copper cable shall be sized based upon anticipated fault current and fault clearing time.

(iii) OCS Poles on Aerial Structures

- A. OCS poles located on aerial structures shall include either of the following minimum set of provisions, depending on the type of aerial structure.
- B. Where the aerial structure includes welded deck reinforcing steel connected to a ground electrode system, electrically interconnect the OCS support poles on the structure and connect these poles to the ground electrode system.
 - i. Cabling used to interconnect the poles and the ground electrode system shall be sized based upon anticipated fault current and fault clearing time.
 - ii. The cabling shall be routed in conduit and terminated in junction boxes or test cabinets that also house wires from the deck reinforcing steel and the ground electrode system.
 - iii. Cabling shall be designed to allow for connection of interconnected OCS poles along the aerial structure to the ground electrode systems installed with a particular aerial structure.
- C. Where the aerial structure has welded deck reinforcing steel but does not include a ground electrode system, electrically connect the OCS support poles to the welded deck reinforcing steel.
 - i. Provide a copper cable from each OCS support pole to the deck reinforcing steel. The copper cable shall be sized based upon anticipated fault current and fault clearing time.

- ii. Thermite weld or braze the cable to the OCS support pole and to the nearest transverse collector bar installed in the aerial structure deck.
- iii. Where it is not practical to connect an OCS pole directly to a transverse collector bar, because of excessive distance or other factors, connect the pole to a local transverse reinforcing bar using a copper cable and weld the transverse reinforcing bar to at least three upper layer longitudinal reinforcing bars in the deck.

(m) Utility Structures

- (i) Piping and conduit shall be non-metallic, unless metallic facilities are required for specific engineering purposes.

(n) Metallic Facilities (Systemwide)

- (i) Pressure or non-pressure piping exposed in crawl spaces or embedded in concrete inverts shall not require special corrosion prevention provisions.
- (ii) Pressure piping that penetrates foundation, or Station walls shall be electrically insulated from the external piping to which it connects and from watertight wall sleeves. Electrical insulation of interior piping from external piping shall be made on the inside of the foundation or wall.

(o) Facilities Owned by Others

(i) Replacement/Relocated Facilities

- A. Corrosion control facilities provided for protection of buried Utilities and installed by DB Co as part of the System shall become the responsibility of the individual Utility owner/operator following acceptance of the corrosion protection system.
- B. DB Co shall protect the buried Utilities including City water mains so that the maximum anodic potential shift caused by dynamic stray currents on any water main or buried Utility along the alignment shall not exceed 50 mV anodic shift from the average baseline value of the voltage time data logger graphs. Monitoring locations of the dynamic potential shifts and stray currents shall be at the discretion of the Utility operators. DB Co shall obtain copies of the sample baseline monitoring charts and information on some of the possible future monitoring locations from the individual Utilities. Such testing shall be performed by a corrosion/cathodic protection specialist. Where the anodic shift exceeds 50 mV, cathodic protection shall be installed by DB Co at all affected areas to

mitigate any adverse impact of corrosive stray currents that are induced by the System.

- C. Relocated or replaced Utilities installed by DB Co as part of a separate contractual agreement between DB Co and the Utility, shall be installed in accordance with the Utility owner agreed upon specifications and shall include the following minimum provisions. These provisions are applicable to ferrous and reinforced concrete pressure piping. Other materials and Structures shall require individual review.
- i. Electrical continuity through the installation of insulated copper wires across the mechanical joints for which electrical continuity cannot be assured;
 - ii. Electrical access to the Utility Structure via test facilities installed; and,
 - iii. The need for additional measures, such as electrical isolation, application of a protective coating system, installation of cathodic protection, or any combination of the preceding, shall be based on the characteristics of the specific Structure and to not adversely affect the existing performance within the environment.

(ii) Existing Utility Structures

- A. The need for stray current monitoring facilities shall be jointly determined by DB Co and the individual Utility operators. If utilities have no stray current guidelines, DB Co shall provide direction based on the following:
- i. Test facilities at select locations for the purpose of evaluating stray earth current effects during start-up and revenue operations. Guidelines for location of test facilities shall be as follows:
 1. At the utility crossings with the system and on Structures parallel to the Tracks; and,
 2. At locations on specific utility Structures that are near the System TPSS.

(iii) Existing Bridge Structures

- A. Stray current corrosion control for existing Bridge Structures shall be addressed by limiting earth current levels at the source (running rails). Meeting the requirements established shall provide the primary stray current control for these facilities.

- (p) Corrosion control coatings
 - (i) Coatings shall have established performance records for the intended service and be compatible with the base metal to which they are applied.
 - (ii) Coatings shall be able to demonstrate satisfactory gloss retention, color retention, and resistance to chalking over their minimum life expectancies.
 - (iii) Coatings shall have minimum life expectancies, defined as the time prior to major Maintenance or reapplication, as determined by the manufacturer's standard.
 - (iv) Metallic-Sacrificial Coatings
 - A. Acceptable coatings for carbon and alloy steels for use in crawlspaces, vaults, or above grade shall be as follows:
 - i. Zinc (hot-dip galvanizing or flame sprayed);
 - ii. Aluminum (hot-dip galvanizing or flame sprayed);
 - iii. Aluminum-zinc;
 - iv. Cadmium and electroplated zinc (sheltered areas only); and,
 - v. Inorganic zinc (as a primer).
 - (v) Organic Coatings
 - A. Organic coating systems shall consist of a wash primer (for galvanized and aluminum substrates only), a primer, intermediate coat(s), and a finish coat. Acceptable organic coatings, for exposure to the atmosphere, are as follows:
 - i. Aliphatic polyurethanes;
 - ii. Vinyl copolymers;
 - iii. Fusion-bonded epoxy polyesters, polyethylenes, and nylons;
 - iv. Acrylics, where not exposed to direct sunlight;
 - v. Alkyds, where not exposed to direct sunlight; and,
 - vi. Epoxy as a primer where exposed to the atmosphere or as the complete System where sheltered from sunlight.
 - (vi) Conversion Coatings

- A. Conversion coatings, such as phosphate and chromate coatings, shall be used as pre-treatments only for further application of organic coatings.
- (vii) Ceramic-Metallic Coatings (Cermets)
 - A. This hybrid-type coating system shall be acceptable for use on metal panels and fastening hardware.
- (viii) Sealants
 - A. Crevices shall be sealed with a polysulfide, polyurethane or silicone sealant.
- (ix) Barrier Coating System
 - A. One of the following barrier coating systems shall be used where corrosion protection is required but appearance is not a primary concern:
 - i. Near white blast surface according to NACE NO. 2/SSPC-SP 10;
 - ii. Commercial blast surface according to NACE NO. 3/SSPC-SP 6;
 - iii. Near white blast surface according to NACE NO. 3/SSPC-SP 10;
or,
 - iv. Apply the coatings according to manufacturer's specifications.
 - B. Use one of the following barrier coating systems where corrosion protection and good appearance is needed.
 - i. Near white blast surface according to NACE NO. 2/SSPC-SP 10;
 - ii. Near white blast surface according to NACE NO. 2/SSPC-SP 10;
 - iii. Commercial blast surface according to NACE NO. 3/SSPC-SP 6;
 - iv. Commercial blast surface according to NACE NO. 3/SSPC-SP 6;
or,
 - v. Apply the coating according to manufacturer's specifications.
- (q) Grounding Coordination
 - (i) Coordination shall be undertaken to ensure that grounding design and corrosion control measures do not conflict so as to render either the grounding system or the corrosion control system ineffective.

- (r) DB Co shall implement a stray current test program prior to Commissioning. The DB Co test program shall be a pre-operation baseline and serve as the basis for decisions regarding mitigation of System caused stray current impacts.

ARTICLE 13 TRACTION POWER SYSTEM

13.1 Scope of Work

- (a) The Traction Power supply System shall consist of a network of TPSS and all equipment between the interface point with [REDACTED] and/ or [REDACTED] and the interface point with the catenary and the negative return systems and the interface points of the Existing Confederation Line TPS. The TPS shall be designed and constructed to accommodate future expansion. This section provides the performance objectives for the TPS. The TPS shall be designed to be an integrated system for supplying power to the Vehicles, switch heaters, and related equipment in order to meet the Project operational performance requirements provided in Schedule 15-2, Part 1, Article 3 – Operational Performance Requirements. These criteria govern the design, performance, and installation requirements of the TPS. The system shall provide safe, efficient and continuous operation in all operational and environmental conditions. The TPS and associated components shall perform to the environmental characteristics defined in Schedule 15-2, Part 1, Article 4 – Design and Construction. In areas where the Traction Power equipment presents high risk of visual intrusion DB Co shall provide design enhancements to minimise or mitigate visual impact. In all other areas, the equipment shall be of a style and appearance similar to that used by comparable transit systems.
- (b) The equipment includes, but is not limited to the following: AC cables and raceway systems, AC switchgear, transformer-rectifier unit, DC switchgear, positive and negative raceway systems, positive and negative cables, negative drainage panel and cables, rail to ground monitoring equipment, prefabricated substation housing (or dedicated space in or adjacent to a Station facility) and foundation, grounding system, protective device systems, communications interface systems, auxiliary power supply system, climate control, UPS systems, intrusion access control system, interior and exterior CCTV cameras, MV lightning arresters, high voltage protection, alarm control, monitoring health and safety equipment, and SCADA equipment.

13.2 Codes, Standards and Manuals

- (a) The design and construction of the Works shall comply with the criteria contained in this Article 13, and all standards, regulations, policies, Applicable Law, guidelines or practices applicable to the Project, including but not limited to each of the following Reference Documents. In the event of a conflict between criteria, commitments or requirements contained within one document when compared with another, the more stringent shall apply:
 - (i) ANSI;
 - A. ANSI C34.2-1968, Practices and Requirements for Semiconductor Power Rectifiers

- B. ANSI C37.14-2015 - IEEE Standard for DC (3200 V and below) Power Circuit Breakers Used in Enclosures
 - C. ANSI C37.20.2-2015, IEEE Standard for Metal-Clad Switchgear
 - D. ANSI C37.20.6-2015 - IEEE Standard for 4.76 kV to 38 kV Rated Ground and Test Devices Used in Enclosures
 - E. ANSI C57.12.01-2015, Standard Requirements for Dry Power Transformers
 - F. IEEE C57.18.10 Requirements for Semiconductor Power Rectifier Transformers
 - G. IEEE C57.12.91 Requirements for Dry-Type Distribution and Power Transformer
- (ii) NEMA;
- (iii) CSA;
- (iv) City of Ottawa Codes and By-Laws;
- (v) IEEE;
- A. IEEE 80-2013, IEEE Guide for Safety in AC Substation Grounding
 - B. IEEE 519-2014, IEEE Recommended Practice and Requirements for Harmonic Control in Electric Power Systems
 - C. IEEE 1653.2-2009, IEEE Standard for Uncontrolled Traction Power Rectifiers for Substation Applications Up to 1500 V DC Nominal Output
 - D. IEEE C37.14-2015, IEEE Standard for Low Voltage DC Power Circuit Breakers Used in Enclosures
 - E. IEEE C37.20-2015, IEEE Standard for Metal Clad Switchgear
 - F. IEEE 81-2012 Guide for measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of A Grounding
- (vi) IEC;
- A. IEC 61992-1:2006, Railway applications - Fixed installations - DC switchgear - Part 1: General

- B. IEC 61992-2:2006: Railway applications - Fixed installations - DC switchgear - Part 2: DC circuit-breakers
 - C. IEC 62271-1, High-voltage switchgear and control gear—Part 1: Common specifications
 - D. IEC 62271-100, High-voltage switchgear and control gear—Part 100 High voltage alternating current circuit breakers
 - E. IEC 62271-1020, High-voltage switchgear and control gear—Part 102 Alternating current disconnect switches and earthing switches
 - F. IEC 62271-200, High-voltage switchgear and control gear—Part 200: AC metal-enclosed switchgear and control gear for rated voltages above 1 kV and up to and including 52 kV
- (vii) UL and ULC;
 - (viii) IBC;
 - (ix) ICEA;
 - (x) EIA;
 - (xi) ASTM;
 - (xii) NETA;
 - (xiii) NECA;
 - (xiv) OEC;
 - (xv) OESC;
 - (xvi) AREMA;
 - (xvii) APTA; and,
 - (xviii) NFPA:
- A. NFPA 72: National Fire Alarm and Signaling Code.

13.3 Performance Requirements

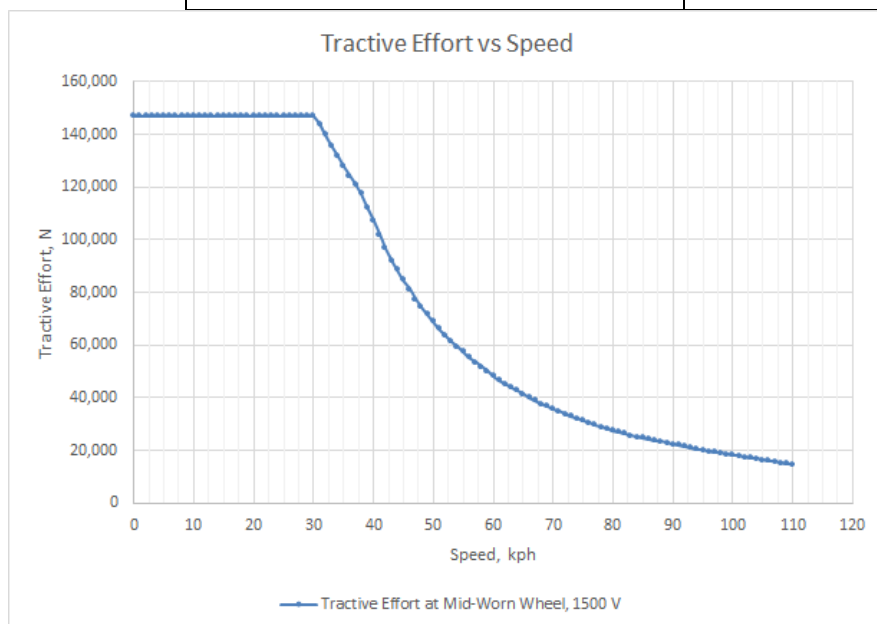
- (a) DB Co shall provide a Traction Power System that is a fully integrated system of TPSS which shall support normal and contingency operations with no degradation of performance. Normal and contingency operation of the TPS shall be defined as:

- (i) Normal: The Traction Power supply System is in full operation with all feeder breakers in closed positions. All scheduled service is running in accordance with the headway and consist with all civil speeds applied; and
 - (ii) Contingency: The Traction Power supply System shall maintain full performance service with any one TPSS completely out of operation. In order to maximize the allowable Train voltage during contingency operations, the DC breakers shall remain closed or the motor operated DC bypass switches and paralleling switches shall be closed at the affected TPSS thereby utilizing the TPSS as a DC tie station. At end of line substations motor operated DC OCS paralleling switch shall be closed when the end of the line TPSS is out of operation.
- (b) DB Co shall design, procure, install, and test the Traction Power System to perform satisfactorily under the environmental conditions identified in Schedule 15-2, Part 1, Article 4 – Design and Construction.
- (c) DB Co shall design, procure, install and test a The Traction Power System that is a high resistance grounded system, meaning the running rails are insulated from ground and there is no intentional connection to ground (earth potential).
- (d) The traction return shall be through both running rails of each Track and cross-bonds shall be installed where necessary. Negative cables shall be appropriately sized between the running rails and the TPSS. As per the Existing Confederation Line, a bolted connection shall be used to connect the negative return cables to the running rails.
- (e) DB Co shall base the design and analysis of the TPSS locations and ratings and voltage shall be confirmed by load flow studies that DB Co performs. The studies shall be real time computer generated simulations of the electrical system utilizing validated traction system software and performance based upon the operational performance requirements. The load flow study shall utilize the following criteria:
 - (i) Final Track alignment:
 - A. Track horizontal alignments, vertical profiles, Station locations, and operating speeds shall be based on the latest Track drawings.
 - (ii) Operating Plan:
 - A. Normal Operations:
 - i. 2 minute headways: Lincoln Fields Station to Trim Station.
 - ii. 4 minute headways: Baseline Station to Lincoln Fields Station.
 - iii. 4 Minute headways Moodie Station to Lincoln Fields Station.

- B. Contingency Operations:
- i. 2 minute headways: Lincoln Fields Station to Blair Station.
 - ii. 2-2-4 minute headways: Blair Station to Trim Station.
 - iii. 4 minute headways: Baseline Station to Lincoln Fields Station.
 - iv. 4 minute headways: Moodie Station to Lincoln Fields Station.
- (iii) Utility Source Short Circuit Availability: 250 MVA.
- (iv) TPRU:
- A. 3 MW Extra heavy traction service per IEEE 1653.2.
 - B. DC voltage regulation is 5.0% up to 200% load, 5.25% between 200% to 300% load, and 5.5% above 300% load.
- (v) Substations:
- A. 14 new 3 MW TPSS's:
 - i. On the Confederation Line East Extension: Montreal Station, Jeanne d'Arc Station, Orleans Blvd Station, Place d'Orléans Station and Trim Station.
 - ii. On the Confederation Line West Extension: Dominion Station, Cleary Station, Lincoln Fields Station, Baseline Station, Queensview Station, Bayshore Station, Moodie Station, Moodie LMSF and one 1 MW TPRU at Moodie LMSF Shop.
- (vi) Light Rail Vehicle:
- A. **[REDACTED]** two car Train with AW2 loading. Vehicle operates at full performance above 1275V. Per the Vehicle manufacturer, between 1275V and 1050V, the current is reduced from 100% to 0%. At 1050V the Vehicle has no tractive effort.

| Parameter | Value |
|-----------------|------------------|
| Nominal Voltage | 1500 V dc |
| Cars per Train | 2 cars per Train |
| Car length | 48.89m per car |

| | |
|--|-----------------------|
| Axels per car | 10 |
| AW2 full weight | 103,548 kg per car |
| AW0 full weight | 80,028 kg per car |
| Rotational mass | 5,332 kg per car |
| Auxiliary power | 62.5 kW per car |
| Frontal area | 8.3 m ² |
| Wheel flange coefficient | 0.045 |
| Air drag coefficient, lead car | 0.0024 |
| Air drag coefficient, trailing car(s) | 0.00034 |
| Average curve resistance (lbs per ton per degree of curvature) | 0.8 |
| Acceleration Limit at AW2 (excluding rolling resistance effort) | 1.35 m/s ² |
| Deceleration for Station stops | 0.89 m/s ² |
| Regenerative braking | Not Used |



- (vii) Running Rails:
 - A. Two 115 lb RE rails per Track at 60 deg C, 10% worn.
- (viii) Leakage Resistance:
 - A. Direct fixation, rail-to-earth resistance 500 ohms*kft for single-Track, two rails.
- (ix) Cross Bonding:
 - A. 2000 V, 3-1/c 500 kcmil, copper conductor, 75 deg C, 30 ft length.
- (x) Positive Feeders:
 - A. 2000 V, 3-1/c 500 kcmil, copper conductor, 75 deg C, 300 ft length.
- (xi) Negative Feeders:
 - A. 2000 V, 3-1/c 500 kcmil, copper conductor, 75 deg C, 200 ft length.
- (xii) OCS:
 - A. 350 kcmil copper contact wire, 30% worn, and 500 kcmil copper messenger wire at 60 deg C
- (xiii) Acceptance Criteria:

| Parameter | Value |
|--|---|
| Maximum allowable equipment voltage | 1800 V dc |
| Nominal system voltage | 1500 V dc |
| Train tractive effort knee voltage (Beginning of performance reduction) | 1275 V dc |
| Minimum allowable train voltage during normal operations | 1275 V dc |
| Minimum allowable train voltage during contingency operations | Between 1275 V and 1050 V for less than 0.5% of complete train trip |
| Absolute minimum allowable train voltage | 1050 V dc |
| Maximum allowable running-rail to ground voltage under contingency operation | 75 V dc |
| Maximum allowable running-rail to ground voltage under normal operation | 50 V dc |

| Rectifier Size | Rating |
|--------------------|--|
| 1000 kW, 1500 V dc | 667 A continuous (100%) 3000 A peak (450%) |
| 3000 kW, 1500 V dc | 2000 A continuous (100%) 9000 A peak (450%) |

- A. Rectifier operation shall not exceed the continuous rating. DB Co shall provide a TPS that is a fully integrated system of TPSS that shall support normal and contingency operations with no degradation of performance, and no time limits are given for contingency operation.
- (f) The TPS shall be fully integrated into the Existing Confederation Line TPS including but not limited to incorporation into the SCADA head end, interface of SCADA functions including DC bypass switch status and transfer trips. TPSS protection and control system must be integrated with SCADA as per the Existing Confederation Line design.
 - (g) DB Co shall furnish, install, and commission DC switchgear in two existing end of line Phase 1 TPSS's to accommodate the expansion of the TPS in Phase 2. The DC switchgear shall include, but is not limited to, two DC feeder breakers including cubicles, bus detail, DC disconnect switches and tie switches, protective relays, duct banks, wires, cables, and appurtenances.
 - (h) The Traction Power system for the Moodie LMSF shall be electrically separate and isolated under normal operations from the remainder of the Traction Power System. This shall apply to both the positive and negative sides of the Traction Power Systems. The Moodie LMSF TPSS shall have a backup feed from a mainline TPSS, and the backup shall also be able to power the DC shop supply.
 - (i) The electrical limits of the Traction Power System (excluding OCS) shall be the System side of the [REDACTED]/[REDACTED] disconnect switch on the Utility side and up to and including the OCS disconnect switches on the OCS distribution side. The installation limits shall include the [REDACTED]/[REDACTED] switch foundation and Infrastructure in compliance with utility standards.
 - (j) All TPSS equipment shall be CSA or UL/ULC approved.
 - (k) The Traction Power System shall meet the requirements set out in IEEE 519 for harmonic disturbance and any requirement outlined by [REDACTED]/[REDACTED].
 - (l) DB Co shall develop a protective device coordination plan and relay settings for the Traction Power System.

- (m) The supply voltage selected by DB Co shall be supported by a complete computer simulation and engineering analysis.
- (n) Significant effort has been made during Preliminary Engineering in working with [REDACTED]/[REDACTED] and in capacity and planning delivery of power feeders to Supply Points (X – Y coordinates) across the alignment. DB Co shall make every effort to utilize these power Supply Points during design. Any changes in [REDACTED]/[REDACTED] Supply Points locations as a result of design shall be borne by DB Co.

13.4 Traction Power Substations

- (a) The TPSS shall be located as close to Passenger Stations and the Guideway as possible.
- (b) Negative rail voltage rise shall be limited to 50V under normal operation and 75V under outage conditions. Rail to ground sensing devices shall be implemented to monitor the negative voltage to ground and “clamp” the rails to ground upon exceeding preset limits.
- (c) Minimum Train voltage shall be coordinated with the Vehicle manufacturer.
- (d) All TPSS equipment with the exception of the medium voltage switchgear, shall be standardized, and allow for interchanging of equipment and spare parts. Medium voltage switchgear equipment and spare parts shall be standardized and interchangeable within their voltage class. Integration of TPSS equipment shall be the sole responsibility of a single manufacturer/supplier.
- (e) Each TPSS shall be furnished internally with emergency trip stations adjacent to each entrance. The emergency trip station shall, upon activation, de-energize the entire TPSS and its associated line sections and the DC sections at adjacent TPSS back feeding into the TPSS.
- (f) Mass trip function shall be provided through TPSS SCADA which shall remove power from the overhead catenary system for the entire alignment. The human machine interface shall be operated from the TOCC and BCC.
- (g) Building Structures and Foundations
 - (i) The TPSS shall be completely factory assembled, pre-wired, pre-tested, and installed in a compact, climate controlled, self-supporting, transportable enclosures or provided in Passenger Station rooms designed for the application. The TPSS shall be ready for connection to the Utility interface and outgoing DC feeders prior to shipment. The TPSS shall include all elements necessary to provide Traction Power including the following: the enclosure shall be flush mounted on the concrete foundation (and insulated) to prevent water leaking. All exterior screws/bolts must be vandal resistant and tamper proof. The TPSS

grounding cable must be completely protected and buried to prevent any tampering or vandalism.

- A. TPSS shall be designed to minimize their impact on the areas where they are installed. Architectural treatment, to provide an acceptable appearance, may be required for TPSS located in sensitive areas such as those located on or adjacent to Federal Lands.
 - B. The TPSS enclosure shall at a minimum consist of a structural steel frame, double sided walls and thermal /acoustic insulation; the TPSS shall have watertight insulation and be tested; the test report shall be provided to the City for review.
 - C. Removal of all large equipment (rectifier transformer, circuit breakers) shall be accommodated without structural modifications; all equipment removal doors shall have a minimum of 4m clearance to any outside obstruction.
 - D. Interior and exterior lighting shall be provided. Emergency backup power shall be provided for at least 2 interior and 2 exterior TPSS lighting fixtures.
 - E. Intrusion access control shall be provided to selectively limit access to the TPSS.
 - F. Fire detection system shall include separate fire alarm control panels and intrusion alarm panels. Activation of the fire alarm system shall trip and lockout the affected TPSS and transmit an alarm to the TOCC, BCC, MYCC and BYCC. Intrusion detection shall provide a remote alarm to the TOCC.
 - G. The TPSS enclosure shall include interior and exterior CCTV system cameras. Exterior CCTV cameras shall provide the TOCC, BCC, MYCC and BYCC views of all four sides of the TPSS.
- (ii) The TPSS enclosure Water Leakage Test: Pre-shipment of the enclosure, perform a water leakage test in the factory by applying a uniform spray of water from hoses for 15 minutes to surfaces to verify the enclosure is completely watertight.
 - (iii) TPSS located in Station facilities shall contain identical manufacturer switchgear to pre-fabricated TPSS. Performance, testing and environmental requirements for TPSS located in Station facilities or other areas shall match those indicated for pre-manufactured TPSS, indicated in Clause 13.4(g)(i) of this Part 3.
 - (iv) Foundations shall be designed and constructed based upon local, national and international standards and codes and the structural loading (live and dead loads)

of the TPSS during installation, normal operation, maintenance and faults. The foundation shall be coordinated with the TPSS and distribution elements.

- (v) TPSS sites shall have road access for both pedestrians and maintenance vehicles, a minimum of two vehicular parking spaces, and adequate space around each substation to permit the use of heavy maintenance vehicles to remove and deliver the largest pieces of Traction Power equipment. Adequate space shall be provided around the TPSS to allow removal of equipment onto an apron which has 6m clear between the TPSS wall and the nearest Track centre.
- (vi) A hard surfaced walkway between the TPSS and the closest Station shall be provided to enable technicians to access the TPSS without having to obtain a Track authority. The walkways shall be separated from the active Train envelope by fencing or other protective barrier.
- (h) DB Co shall conduct soil resistivity test at the TPSSs foundation locations. DB Co shall review the soil resistivity test results to confirm the soil meets the standard requirements. DB Co shall ensure that if the soil does not meet the standard requirements, the soil shall be replaced with the proper soil requirement according to IEEE 80. DB Co shall produce and supply the soil test results to the City once complete.

13.5 Traction Power Transformer

- (a) Design Tests for Rectifier Power Transformers
 - (i) Each Traction Power transformer design shall have design tests performed as per IEEE C57.12.01-1989, C57.12.91-2001 and C57.18.10-1998, and design tests indicated in this Article 13.
 - (ii) Temperature Rise Test: this test is defined as a test to determine the temperature rise above the ambient of one or more transformer windings as measured at the terminals. For conditions under which temperature limits apply, refer to IEEE C57.12.01 for dry type transformers, IEEE C57.12.00 for liquid filled transformers and IEEE 1653.1.

13.6 Traction Power Transformer-Rectifier Units

- (a) DB Co shall ensure that each Traction Power transformer and associated traction rectifier is designed as an integral unit. Each Traction Power transformer/rectifier unit shall be tested in accordance with ANSI Test Codes C57.12 and C34.2 and IEEE 1653.2. A complete design test sequence shall be performed on one transformer/rectifier unit of each design, each voltage class, and each rating. The design tests shall include a rated current test, loss measurement and short circuit test to verify the integrity of the mechanical system. For the rated current, loss measurement and short circuit test, test results on a transformer-rectifier unit of duplicate design and rating, and of recent date, can be submitted for review. Rectifier tests, unless otherwise herein specified, shall be

made in accordance with IEEE1653.2. Complete load-cycle test shall be conducted at the factory. Tests shall be conducted at reduced voltage sufficient to attain the load current ratings specified in IEEE1653.2 7.3.3 for Extra Heavy Traction Service. A surge test shall be made to test the effectiveness of the surge protection equipment. In this test an impulse voltage of 75Kv shall be applied to a simulated system from a source with a surge impedance comparable to that of the actual circuit. Routine production tests for rectifier transformers shall be performed by the manufacturer in accordance with IEEE Std. C57.18.10-1998 and IEEE P1653.1. The rectifier's manufacturer shall perform routine production tests on all rectifiers in accordance with IEEE 1653.2-2009.

- (i) DB Co shall design the transformer-rectifier units to conform to the following requirements:
 - A. Rectifier transformer Insulation Class: 220°C, UL or ULC Listed.
 - B. BIL for static discharge shall be as follows:
 - i. Insulator Class 15.0 Kv 95 BIL (Kv); and,
 - ii. Insulator Class 34,5 Kv 150 BIL(Kv).
 - C. Rectifier transformer maximum temperature rise by resistance of all individual windings at the end of the two hour extra-heavy traction service load cycle: 115°C.
 - D. Both high voltage and low voltage windings shall be copper conductor.
 - E. Diode bridge type 12 pulse double way rectifier.
 - F. Convection cooled with no forced cooling to meet the Extra Heavy Traction Service requirement per IEEE Std. 1653.2.
 - G. Rated full (100%) load of 3MW.
 - H. Rated primary input voltage shall be either 13.2 kV or 27.6kV.
 - I. Rated full (100%) load output voltage: 1500 Vdc.
- (ii) DB Co shall ensure that the TPSS locations have been coordinated with and made available to [REDACTED]/[REDACTED] in determining the power feed requirements based on a 3MW TPRU. DB Co shall evaluate and confirm through a load flow study that 3MW TPRU are suitable for this system expansion. DB Co shall coordinate with [REDACTED]/[REDACTED]. DB Co shall ensure that a displacement power factor of the TPRU shall be 95% or greater has been achieved.

- (iii) DB Co shall ensure that the TPRU is protected from damage due to surges and transients transmitted through the utility network with MV surge protection.
- (iv) DB Co shall ensure that the overall efficiency of the TPRU is greater than 97.5%.
- (v) DB Co shall design the TPRU to comply with ANSI C57.12.01.
- (vi) The noise generated by the TPRU shall not exceed 55dBA at full load inside the substation through the use of rectifier load balance, coupling, or interphase transformer, or other alternative method to reduce audible noise.
- (vii) DB Co shall design the rectifier transformer supplied from 13.2kV and 27.6kV [REDACTED]/[REDACTED] feeders to be dry type, vacuum pressure impregnation or cast coil construction, convection cooled with no forced cooling necessary to meet the IEEE 1653.2 extra-heavy traction operations requirement and two-stage temperature monitoring. DB Co. shall evaluate the need for protective snubber circuits on the TPRU's in substations serviced by 27.6kV feeders. Snubber circuits shall be monitored by TPSS SCADA for health.
- (viii) DB Co shall ensure that the High-voltage windings of each rectifier power transformer be wound for their rated voltage and be equipped with a total of five full capacity taps, at 2-1/2% and 5% below nominal and at 2-1/2% and 5% above nominal. DB Co shall ensure that the taps are connected to the high voltage coils so that unbalanced magnetic forces and short circuits will be reduced to a minimum. The tolerance on voltage difference between any pair of adjacent taps shall not exceed $\pm 1/4\%$.
- (ix) DB Co shall design the TPRU for extra-heavy traction service operation with no damage or degradation of performance. The Extra-heavy traction service is defined in IEEE 1653.2-2009: IEEE Standard for Uncontrolled Traction Power Rectifiers.
- (x) DB Co shall ensure that the imbalance in the rectifier caused by loss of one diode per phase not reduce the overload capability of the TPRU.
- (xi) DB Co shall ensure that the rectifier is furnished with a negative disconnect switch, two-stage temperature monitoring, two-stage diode monitoring, two-stage enclosure monitoring as a minimum.
- (xii) DB Co shall ensure that the each rectifier is furnished with a NGD which shall monitor the potential between the negative bus and the TPSS ground grid. For both above ground and below ground TPSS the NGD shall be connected between the TPSS ground grid and the TPSS negative bus.
- (xiii) DB Co shall ensure that the TPRU shall is furnished with digital metering for:

- A. DC rectifier current;
 - B. DC Voltage; and,
 - C. Winding and rectifier over-temperatures.
- (xiv) DB Co shall ensure that the rectifier enclosure energized/grounded protection be provided which shall detect when the enclosure has a positive to frame fault or when grounded. Upon detection of a positive to frame fault the substation shall be automatically shut down. DB Co shall ensure that there is local audio – visual warning which shall be communicated along the SCADA to the TOCC, BCC, MYCC and BYCC.
- (xv) DB Co shall produce and provide the traction transformer and traction rectifier test results reports according to standard requirements (IEEE C57.12.01 & C57.12.91 & C57.18.10).
- (xvi) DB Co shall provide the performance qualification test result report for each Traction Power transformer-rectifier integrated unit according to IEEE 1653.2. DB Co shall provide testing parameters for the integrated unit under the performance qualification test section in the Project Agreement.
- (b) Routine tests for rectifier power transformers:
- (i) DB Co shall ensure that the each rectifier power transformer l have routine tests performed as per IEEE Std. C57.12.01-1989, IEEE Std. C57.12.91-2001 and IEEE Std. C57.18.10-1998, plus the following additional tests shall be performed as routine tests. DB Co shall ensure that the impulse test precede all low frequency tests as part of the test sequence.
 - A. DB Co shall ensure that the impulse tests consisting of the following, are applied in the following order: one reduced full wave, two chopped waves and one full wave. DB Co shall ensure that the details of impulse wave shapes shall be as per IEEE Std. C57.98-1993 “Guide for Transformer Impulse Tests”;
 - B. Partial discharge test;
 - C. Load tests:
 - i. Rated voltage test;
 - ii. Rated current test; and,
 - iii. Rated load test.

- D. Loss Measurement tests:
 - i. Efficiency; and,
 - ii. Forward Current loss.
 - E. Waveshape tests:
 - i. Oscillographic tests; and,
 - ii. Harmonic tests.
 - F. Excitation loss test; and,
 - G. Load Loss Test.
- (c) DB Co shall ensure that the TPSS AC Switchgear meet the following requirements:
- (i) TPSS supplied from 13.2kV and 27.6kV [REDACTED]/[REDACTED] feeders shall be equipped with Drawout, metal clad (as defined by ANSI C37.20.2) switchgear which prevents the accidental contact of live parts by maintenance personnel;
 - (ii) Circuit interrupting devices which do not have load- break capabilities and doors equipped with interlocks to prevent unsafe operations;
 - (iii) Adequate space for removal and maintenance of both AC and DC circuit breakers;
 - (iv) Multifunction protective devices for phase imbalance, overcurrent, undervoltage, diagnostics, alarming, monitoring, data storage and power metering;
 - (v) Equipment to test the AC and DC breakers in the TPSS after it has been removed from its cubicle;
 - (vi) DB Co shall ensure that the AC switchgear be equipped with Digital metering capable of monitoring and transmitting the following analog functions to SCADA:
 - A. AC voltage;
 - B. AC current;
 - C. Power;
 - D. Power factor; and,

- E. AC Energy metering.
- (vii) DB Co shall ensure that the AC switchgear also contain the auxiliary power transformer supplying “house” power for the TPSS building, with appropriate protection and disconnect devices on the primary and secondary. DB Co shall ensure that the auxiliary transformer supply power to the AC distribution panel.
- (d) DB Co shall ensure that the DC Switchgear meet the following requirements:
 - (i) DC switchgear shall be metal enclosed single pole, draw-out type feeder breakers equipped with load measuring auto-reclosing systems, rated to interrupt maximum available fault current;
 - (ii) The major elements of the TPSS DC switchgear shall consist of a main cathode circuit breaker, high speed DC feeder circuit breakers, and PLC based controller with protection functions;
 - (iii) PLC based protection and data storage devices shall be provided for the DC circuit breakers. These devices shall perform all the functions of overcurrent protection, breaker control, breaker monitoring, data storage, transfer trip, alarm summary storage, event summary storage, ammeter, voltmeter, SCADA interface, HMI interface for establishing and adjusting breaker protective parameters and visual display of metering;
- A. Main cathode circuit breaker shall meet the following requirements:
 - i. Protect against reverse current;
 - ii. Include a DC enclosure device to detect enclosure faults;
 - iii. Provide an interlock to the AC breaker; and,
 - iv. Include a lockout device.
- B. Feeder circuit breakers shall meet the following requirements:
 - i. PLC based circuit breaker protection with instantaneous, long time and rate of rise overcurrent protection;
 - ii. A transfer trip scheme to ensure all feeder circuit breakers supplying power to a faulted section shall trip and de-energize the faulted section; , (including the existing feeder circuit breakers in the Existing Confederation Line substations); and,

- iii. Equipment shall be metal enclosed as defined by the C37 series of ANSI specifications and shall prevent the accidental contact of live parts by maintenance personnel.
 - (iv) Digital metering shall be provided for:
 - A. DC bus voltage; and,
 - B. On each feeder circuit breaker through the PLC based protective device and controller displaying DC feeder voltage, and feeder current.
 - (v) Each TPSS shall be furnished with a negative grounding device which shall monitor the potential between the negative bus and the substation ground grid. The NGD shall provide an open circuit when the potential is at an acceptable level. The NGD shall close if the pre-set potential is exceeded. Once the potential has decreased below the pre-set level the NGD shall automatically open. Status points shall be provided from the NGD to the SCADA system.
 - (vi) DC enclosure energized/grounded protection shall be provided which shall detect when the switchgear has a positive to frame fault or when grounded. Upon detection of a positive to frame fault the substation shall be automatically shut down. There shall be a local audio – visual warning which shall be communicated along the SCADA to the TOCC, BCC, MYCC and BYCC.
 - (vii) Equipment shall be metal clad as defined by the C37 series of ANSI specifications and shall prevent the accidental contact of live parts by maintenance personnel.
 - (viii) The main cathode circuit breaker and the negative disconnect switch shall be interlocked such that the cathode circuit breaker cannot be closed when the negative disconnect switch is open and the negative disconnect switch cannot be opened when the cathode circuit breaker is closed.
- (e) DB Co shall ensure that the Utility Power meet the following requirements:
- (i) [REDACTED]/[REDACTED] have identified Supply Points across the alignment to supply power, both traction and facility in accordance with Article 6 of Schedule 15-2, Part 4 – Stations, and in the Hydro supply strategy document titled “[REDACTED]” provided in the Background Information. [REDACTED]/[REDACTED] shall terminate MV power supply feed at the pad mounted switchgear.
 - (ii) Utility power needs, codes and requirements shall be coordinated with [REDACTED]/[REDACTED].

- (iii) DB Co shall provide a cubicle in the customer owned switchgear lineup for [REDACTED] to install revenue metering. For Trim Station, DB Co shall furnish a pole adjacent to the overhead [REDACTED] supply point where [REDACTED] will supply and install pole mount primary metering. Additional customer owned revenue class metering equipment shall be on the load side of medium voltage TPSS circuit breakers that supply station and or mechanical loads.
- (iv) All Infrastructure and cabling elements (duct banks, foundations, grounding, maintenance holes) to facilitate the [REDACTED]/[REDACTED] Supply Point switchgear, serving the TPSS and/or facilities shall be by DB Co and shall be constructed to meet [REDACTED]/[REDACTED] standards and require [REDACTED]/[REDACTED] approval.
- (v) Utility power from [REDACTED]/[REDACTED] Supply Point switchgear to the TPSS shall be configured such that no two electrically adjacent TPSS are supplied from a feeder sourced from the same bus at a [REDACTED]/[REDACTED] substation.
- (f) DB Co shall ensure that the Control Power meet the following requirements:
 - (i) Control power in the TPSS shall be used for TPSS controls, relaying, SCADA and other functions. The system shall consist of a step down transformer, battery bank, battery charger, DC distribution panels and all necessary equipment to provide a complete control power system.
 - A. The battery shall be capable of supplying TPSS demand to support control power for 8 hours and to support duration as identified in a failure mode analysis.
 - B. The battery shall be sized based upon a load calculation incorporating TPSS switching operations and all static TPSS loads during normal and contingency operation.
 - C. The battery charger shall include a ground detection system and alarm function reporting to the SCADA system.
- (g) DB Co shall ensure that the following control requirements are met:
 - (i) The TPSS shall be designed for unattended operation with remote supervision and control from all control centres through the SCADA system.
 - (ii) Local control shall be provided for all elements of the TPSS through a HMI and computer based TPSS control unit (PLC). Remote control shall be disabled when in local control. Local control shall be enabled by means of a “local/remote” switch. This switch shall enable and disable local control of the entire TPSS

excepting circuit breaker trip functions. All TPSS indication and alarms shall be provided to the HMI.

- (iii) HMI located in each TPSS shall be the local TPSS status screen annunciator. The HMI/PLC shall provide all information to SCADA at the TOCC, BCC, MYCC and BYCC. This includes alarms, equipment status and real-time metering values. The default screen shall be a representation of the TPSS single line indicating the current status.
- (h) DB Co shall ensure that the following SCADA requirements are met:
 - (i) TPSS shall be provided with a TPSS SCADA monitored and controlled reporting directly to TOCC, BCC, MYCC and BYCC.
 - (ii) DB Co shall provide a TPS system where all TPSS metering is monitored and logged by the SCADA system.
 - (iii) The TPSS shall be provided with a TPSS SCADA RTU that shall interface with the SCADA systems specified in Article 8 – SCADA System, of this Part 3 for the purposes of transmitting the information and control to TOCC, BCC, MYCC and BYCC.
 - (iv) The following status and control points, at a minimum, shall be incorporated into the TPSS SCADA system functionality:
 - A. AC switchgear – Status and control:
 - i. Protective devices – Status; and,
 - ii. Lockout device – Status;
 - B. Loss of utility power – Status;
 - C. Rectifier transformer:
 - i. Winding over temperature – Status;
 - D. Rectifier:
 - i. Over temperature – Status;
 - ii. Negative disconnect switch position – Status;
 - iii. Negative overvoltage – Status;
 - iv. Diode failure – Status;

- v. Surge suppressor failure – Status;
 - vi. Reverse current trip – Status;
 - vii. Enclosure energized alarm – Status; and,
 - viii. Enclosure grounded alarm – Status;
- E. DC Switchgear:
 - i. Cathode (main) breaker – Status and control;
 - ii. Feeder breakers – Status and control;
 - iii. Transfer trip trouble/failure – Status;
 - iv. Feeder breaker reclosure failure – Status;
 - v. Feeder breaker protective relay trouble/failure – Status;
 - vi. Lockout relay trip – Status;
 - vii. Enclosure energized alarm – Status;
 - viii. Enclosure grounded alarm – Status; and,
 - ix. OCS section energized – Status;
- F. Negative Grounding Device:
 - i. Closed – Status;
 - ii. High Current – Status; and,
 - iii. Failure – Status;
- G. TPSS Local Control Enabled – Status;
- H. Loss of Station auxiliary power – Status;
- I. Intrusion Detection – Status; and,
- J. Fire alarm:
 - i. Trouble – Status;
 - ii. Power Supply – Status; and,

- iii. Alarm – Status;
 - K. Loss of control power – Status;
 - L. Battery charger trouble/failure – Status;
 - M. Climate Control – Status;
 - N. TPSS air temperature – Status;
 - O. Emergency trip activated – Status; and,
 - P. Mass trip control – Status.
- (v) 25% additional status and control point spare capacity shall be provided at each TPSS.
- (vi) Communication between the local SCADA system, the TOCC, BCC, MYCC and BYCC shall be redundant via the CTS.
- (i) DB Co shall ensure that the following climate control requirement is met:
- (i) All TPSS shall include a climate control system which shall maintain indoor temperature and humidity to allow for PLC and SCADA equipment operational performance to be maintained throughout all expected external temperature variations. The climate control system shall be designed to continuously maintain the temperature within the TPSS and provide status to the TPSS SCADA system.
- (j) DB Co shall ensure that the following communications System requirements are met:
- (i) Connection panel to the CTS for redundant data and telecommunication shall be provided.
 - (ii) Telephone connection to TOCC and BCC shall be provided for local control and emergency functions.
- (k) DB Co shall ensure that the following intrusion detection requirement is met:
- (i) Each substation shall be equipped with an intrusion detection system which shall allow keyed and keyless access and upon unauthorized access provide a local audible and visual alarm as well as remote notification. The IAC System shall be compatible with the IAC System provided for in Article 9 – Intrusion Access Control System, of this Part 3.
- (l) DB Co shall ensure that the following fire/smoke detection System requirement is met

- (i) Each TPSS shall be equipped with a fire alarm system which shall detect and alarm upon detection of a smoke or fire event and report to TOCC, BCC, MYCC and BYCC through SCADA. Activation of the fire alarm system shall trip and lockout the TPSS. The fire/smoke detection System shall be designed in accordance with NEPA 72 Standard.
- (m) DB Co shall ensure that the following TPSS grounding requirements are met:
 - (i) A TPSS grounding system shall be provided for life safety and fault detection purposes. The grounding system shall be designed in accordance with IEEE Standard 80 and 81 or IEC equivalent specification for ground fault detection and touch and step potential for safety. Prior to installation of the grounding system, the grounding system calculation shall be submitted to the City in accordance with Schedule 10 – Review Procedure. All required data such as available short circuit current, available Z and X/R ratio shall be obtained prior to installation and implemented in the grounding system report. The grounding test report shall be submitted to the City in accordance with Schedule 10 – Review Procedure.
 - (ii) Any metallic structures exterior to the TPSS shall be connected to the ground grid.
 - (iii) Traction Power DC ground grid shall not be interconnected with any Passenger Station grounding grid. TPSS's that share a structure with Passenger Stations shall have a common ground grid.
 - (iv) Surge protection shall be provided for all cables entering and exiting the TPSS as follows:
 - A. All non-current carrying parts of 1500 DC TPSS equipment (traction rectifier and DC switchgear) shall be isolated from ground and connected to the ground grid through a ground fault detection system. The ground fault detection system shall, upon detection of a grounded condition, disconnect the substation from sources of power and annunciate an alarm locally and at the TOCC, BCC, MYCC and BYCC; and,
 - B. Security fencing, lamp stanchions shall be connected to the ground grid. This includes any conductive hardware where public can inadvertently come in contact with high voltages.

13.7 DC Feeder System

- (a) DB Co shall ensure that the DC feeder system be provided and consists of all raceways, cabling and switching equipment necessary to connect the TPSS to the OCS and rail returns.

- (b) The DC feeder system shall include positive cable and connections from the TPSS DC switchgear to the OCS and negative cable and connections between the TPSS negative bus and return rails. Where specified, impedance bonds shall be installed between the running rails. Positive cable connections shall include motor operated DC disconnect switches to provide a means to isolate the TPSS from the OCS. Motor operated load break switches shall be installed at TPSS locations to provide a means to bypass OCS insulated overlaps and equalize across Track OCS systems during contingency conditions when TPSS DC switchgear is out of service.
- (c) DB Co shall ensure that the following cable ampacity ratings be based upon the worst case maximum RMS currents indicated in the load flow studies with any necessary de-rating due to duct bank/raceway routing and appropriate temperature rise. DB Co shall ensure that the positive DC feeder system be designed to provide adequate ampacity and to maintain the electrification voltage within acceptable limits.
- (d) DB Co shall design the DC negative feeder system to include any necessary equipment to interface with the running rail traction return so as not to interfere with the Train control system.
- (e) DB Co shall design the negative feeder system to maintain a low rail to ground voltage and provide sufficient ampacity.
- (f) DB Co shall design the negative feeder system to be continuous through the four running rails including interlockings at all locations.
- (g) DB Co shall ensure that the Yard Tracks are supplied from a dedicated yard TPSS.
- (h) DB Co shall ensure that the Yard Tracks have the ability to connect to the mainline Tracks through normally open DC disconnect switches during yard TPSS outages.

13.8 Negative Return Path

- (a) DB Co shall ensure that the negative return current is carried through the running rails, which shall be insulated from the ground. DB Co shall ensure that locations requiring insulated joints, impedance bonds be used to maintain continuity. DB Co shall ensure that insulated joints be installed at the entrance to the yard and to the shop buildings to prevent any connection between the grounded rails in the shop and the ungrounded system in the yard and between the yard and mainline rails.
- (b) DB Co shall develop and submit to the City for review and approval a Stray Current Monitoring Plan.
- (c) Once the Stray Current Monitoring Plan has been approved by the City, DB Co shall implement a Stray Current Monitoring System.
- (d) Drainage Feeder System

- (i) DB Co shall ensure that the provisions be made for the monitoring and control of stray current through the use of drainage panels. DB Co shall design the drainage panels to provide a means of permitting metallic utilities to connect to the substation negative bus. DB Co shall ensure that provisions shall be made to provide a raceway system to a demarcation pull box for utility company drainage cables to be connected to the drainage system.
- (e) DB Co shall ensure that the following AC feeder system requirement is met:
 - (i) The medium voltage AC feeder system shall be provided and consist of all raceways, cabling maintenance holes, foundations, ground rods and switching equipment necessary to connect the TPSS to the [REDACTED]/[REDACTED] utility supply switchgear in accordance with utility requirements.
- (f) DB Co shall ensure that the following duct banks and raceways requirements are met:
 - (i) Duct banks shall be provided from the TPSS exiting point to the intersect point of the distribution system and constructed of non-conductive material encased in concrete.
 - (ii) All underground raceways shall have a utility marking tape (with magnetic tracer) installed 0.33 meters above the raceways.
 - (iii) Positive and negative feeders shall not be installed in the same raceway, pullbox or maintenance hole.
 - (iv) Ten percent (10%) spare duct shall be included in each duct run.
- (g) DB Co shall ensure that the following communication raceway system requirement is met:
 - (i) Duct banks shall be provided from the TPSS exiting point to the intersect point of the communication CTS system and constructed of non-conductive material encased in concrete.
- (h) DB Co shall ensure that the following sectionalization requirement is met:
 - (i) The Traction Power distribution system (OCS) shall be circuited into manageable electric sections. These sections shall be redundantly fed from two adjacent TPSS to maintain reliability, continuity of service, fault discrimination and distribution of loading.
- (i) DB Co shall ensure that the following Cabling Identification System requirement is met:
 - (i) All cable and wire terminations shall be labeled with tags indicating termination points of both ends and function.

13.9 Switch Heaters

- (a) DB Co shall design the TPS to supply power to the location of electric switch heaters, refer to Article 10 - Signalling and Train Control System, of this Part 3.

13.10 LRT Vehicle power requirement

- (a) TPS shall supply power to the Revenue Vehicles, Maintenance Vehicles, non-communicating Trains and non-equipped vehicles throughout the Confederation Line.

13.11 Testing

- (a) DB Co shall be responsible for all factory acceptance testing, field testing, and all testing and commissioning of the Traction Power System. DB Co shall be responsible for all installation tests (power, grounding, cabling, etc.) for all work installed.
- (b) All test reports shall be submitted to the City for review and approval to meet required performance qualifications of the City.

ARTICLE 14 OVERHEAD CONTACT SYSTEM

14.1 General Requirements

- (a) This section provides the criteria for the OCS, also referred to as the catenary system, including technical, operational, maintenance, local climatic and economic considerations.
- (b) The OCS consists of the catenary wires and their physical supporting structures. The OCS distributes DC electric power from TPSS to the Vehicles operating on the Mainline Tracks, yards and within the Moodie LMSF through the pantograph mounted on top of the vehicle.
- (c) On the mainline, a simple catenary system shall be employed, consisting of a single contact wire supported by a messenger wire via hangers (droppers). This configuration shall be auto-tensioned, consisting of balance weight assemblies mounted out of running, one span away from the overlap transition span and supported with standard anchorage assemblies. Spring tension assemblies are also permitted at crossovers and interlockings. The auto-tensioned operating range shall accommodate the designed tension length.
- (d) On the Connecting Track a simple catenary system shall be employed and on the LMSF a single contact wire system shall be employed. These configurations may be auto-tensioned utilizing a balance weight assembly or semi-compensated using a spring tension assembly. The tension compensated operating range shall accommodate the designed tension length.
- (e) For tunnel/ underground areas, an overhead conductor rail support system shall be used. This OCS configuration shall consist of contact wire inserted at the bottom of from an extruded aluminum profile rail section, which in turn shall be mounted to the underside of the Tunnel structure. Double insulation shall be provided between the OCS and Tunnel structure.
- (f) DB Co shall blend the appearance and style of the overhead catenary system into the adjacent communities and at visually sensitive areas including, but not limited to the following elements:
 - (i) Pole size, shape and color;
 - (ii) Location of the pole; and,
 - (iii) Special attention shall be paid to the design of the catenary system and supporting system in visually sensitive areas of the alignment corridor as follows:
 - A. Visually sensitive areas include:

- i. Within all Station Platform areas extending 15m to either side of Platform end;
 - ii. Within the existing BRT trench from Tunny's Pasture Station to Carleton Avenue; and,
 - iii. All SI located on Federal Lands.
 - B. In visually sensitive areas of the alignment corridor, closed or tapered sections shall be used. Multi-sided poles shall have a minimum of 16 sides.
- (iv) Pole base covers shall be provided in areas easily accessible to the public, and other historic or special designated locations identified by the City. The base cover shall match the color of the pole.
- (g) Design shall include components that:
 - (i) Are standard and off-the-shelf, available from multiple suppliers;
 - (ii) Match, or similar to that provided for the Existing Confederation Line;
 - (iii) Have a proven maintenance performance; and,
 - (iv) Maintain functionality even during extreme weather conditions and temperature changes as defined in this Article 14.
- (h) In addition, the design shall take into consideration existing overhead obstructions such as Bridges, overpasses, buildings and aerial Utilities that may impact the final layout.
- (i) As an extension of the existing system, wherever possible, the OCS design shall match or blend, function, and operate seamlessly with the existing OCS system.
- (j) DB Co shall design, supply, and install all components of the OCS, including poles, foundations, cantilevers, conductors, and associated hardware and assemblies.
- (k) In addition, DB Co shall provide all electrical feeding, grounding, and bonding arrangements required for proper system performance.

14.2 Codes, Standards and Manuals

- (a) The design, materials selected and construction of the Works shall comply with the criteria contained in this Article 14, and all standards, regulations, policies, Applicable Law, guidelines or practices applicable to the Project, including but not limited to each of the following Reference Documents. In the event of a conflict between criteria,

commitments or requirements contained within one document when compared with another, the more stringent shall apply:

- (i) ANSI;
- (ii) NEMA;
- (iii) CSA;
 - A. CAN/CSA-C22.3 No. 1, Overhead Systems
 - B. CAN/CSA-C22.3 No.8, Railway Electrification Guidelines
 - C. CSA S6, Canadian Highway Bridge Design Code
- (iv) City of Ottawa Codes and By-Laws;
- (v) IEEE;
- (vi) IEC;
 - A. IEC 60913, Railway applications – Fixed installations – Electric traction overhead contact lines
 - B. IEC 62128-1, Protective provisions relating to electrical safety and earthing
- (vii) UL and ULC;
- (viii) ASTM; and,
- (ix) AREMA;
 - A. AREMA Chapter 33, Electrical Energy Utilization.

14.3 Operational Requirements

- (a) The OCS shall be comprised of the following major items:
 - (i) Catenary Wires: Messenger and Contact/Trolley;
 - (ii) Feeder Cables: Feeders from Substation to Catenary;
 - (iii) Supports: Cantilever, Headspan or Cross-Span, Pull-Off, Overhead Conductor Rail;
 - (iv) In-Span Materials: Hangers, Jumpers, Splices, etc.;

- (v) Midpoint Anchors: Tie Wire and Downguy Assemblies;
 - (vi) Poles: Poles both Center and Wayside;
 - (vii) Foundations: Drilled Shaft and Ground Connections;
 - (viii) Lightning Arresters: Surge Protection;
 - (ix) Structure Guying: Termination, Anchors;
 - (x) Tensioning Systems: Concentric Wheel or Pulley Type with balance weight assemblies and Spring Type tensioning systems;
 - (xi) Insulated Overlaps: Sectionalization;
 - (xii) Section Insulators: Isolation; and,
 - (xiii) Disconnect Switches: Isolation.
- (b) OCS Configuration and Tension Systems
- (i) DB Co shall design the OCS system to meet:
 - A. Line speed;
 - B. Clearance;
 - C. Mandatory national standards;
 - D. Climatic and environmental constraints;
 - E. Vehicle power consumption and ampacity determined by the operational performance requirements; and,
 - F. Traction Power load flow simulation.
 - (ii) Where there is a requirement for the transition between auto-tensioned and fixed termination catenary, it shall be accomplished by a catenary parallel wire overlap. The fixed termination overlap catenary shall be supported by an intermediate cantilever structure on the catenary at mid-span.

14.4 Design Parameters

- (a) The design parameters are outlined in Table 3-14.1.

Table 3-14.1

| | |
|-------------------------------|--|
| Ambient Temperature Range | In accordance with environmental conditions referenced in Schedule 15-2, Part 1, Article 4 – Design and Construction |
| Loading / Climatic Conditions | In accordance with environmental and loading conditions referenced in CAN/CSA 22.3 No.1 & 8 |
| Maximum Design Train Speed | 100km/hr, mainline 30km/hr, Connecting Tracks 15km/hr, Moodie LMSF |
| Elevation Above Sea Level | 60m |
| Durability | Reinforcing steel in substructure concrete within the splash zone of adjacent Roadways treated with de-icing salts shall be stainless steel. Splash zone shall be as defined in MTO Structural Manual. |

14.5 Electrical Clearances

- (a) Clearances shall be maintained between live conductors, including pantographs and any overhead structures, in accordance with Table 3-14.2.

Table 3-14.2

| Clearances | Static (1) | Passing (2) |
|------------------|------------|-------------|
| Normal Minimum | 155mm | 130mm |
| Absolute Minimum | 130mm | 80mm |

Where:

(1) Static clearance is the clearance between the catenary system and any overhead structure when not subject to pantograph pressure.

(2) Passing clearance is the clearance between the catenary system or pantograph and an overhead structure under actual vehicle operating conditions during the time it takes the Train to pass.

- (b) Clearance from the pantograph to any fixed item, excluding the steady arm or registration arm of a cantilever, shall not be less than 130mm. Pantograph clearance to steady arm shall not be less than 38mm.
- (c) For Vehicle related clearance, full allowances shall be included for dynamic displacement of the Vehicle under operating conditions, including tolerances for construction and maintenance of the Track.

- (d) Personnel clearances according to IEC 62128 for public and restricted areas as a minimum shall be incorporated into the DB Co design. Obstacles shall be appropriately designed and located to protect direct contact with live parts

14.6 Height, Depth and Gradient Requirements

- (a) The nominal contact wire height perpendicular to the TOR at super elevated Track centerline shall be in accordance with the requirements outlined in CAN/CSA C22.3 No. 1 & No. 8 as detailed in Table 3-14.3.

Table 3-14.3

| Route Description | Track Type | Type of OCS | Contact Wire Height (mm) |
|-----------------------------|--------------------|---|---|
| Tunnel/ Underground | Direct Fixation | Overhead Conductor Rail | 3940 minimum |
| Open Route Alignments | Ballast | Auto –Tension Simple Catenary | 4900 normal |
| Yard/ Moodie LMSF Tracks | Ballast | Auto-Tension Single Contact Wire | 6500 maximum 5700 minimum |
| Road Crossing | Embedded | Auto-Tension Simple Catenary | 5500 minimum |
| Overhead Bridges | Ballast | Auto-Tension Simple Catenary Overhead Conductor Rail | 4100 desirable minimum 3900 absolute minimum |

- (i) The contact wire height at supports shall take into consideration the effect of wire sag, due either to temperature rise or to ice loading, and construction tolerance, including Track construction and maintenance tolerances.
- (b) The system depth is defined as the height or vertical distance between the messenger and contact wires at the point of support. The nominal system depth is outlined in Table 3-14.4.

Table 3-14.4

| Locations | System Depth, Nominal |
|-----------------------------|-----------------------|
| Open Route Alignments | 1220mm |
| Underneath Overhead Bridges | 152mm |

- (i) These heights may vary at specific locations for the profile transitioning from Tunnel structures or underneath overhead structures.
- (c) The contact wire gradient is defined as the rate of change in elevation of the contact wire with respect to top of rail. Where possible, the contact wire grade shall match the grade of the Track for a contact wire gradient of zero.
 - (i) Table 3-14.5 presents the maximum gradient as per CAN/CSA C22.3 No. 8:

Table 3-14.5

| Train Speed | Maximum Contact Wire Gradient |
|------------------------|---|
| Yard / LMSF (15 km/hr) | 2.0% (1:50), Storage and Maintenance Tracks |
| 50 km/hr | 1.3% (1:77) |
| 75 km/hr | 0.8% (1:125) |
| 100 km/hr | 0.6% (1:167) |

- (ii) Except for Yard / LMSF conditions, the change of grade from one span to the next (between consecutive spans) shall not exceed one half the values shown above.
- (iii) The Moodie LMSF Lead Tracks shall be governed by the 50km/hr requirement.

14.7 Vertical Clearances

- (a) The vertical clearance requirements to Structures are provided in Schedule 15-2, Part 2, Article 4 – Structural Design Criteria and Requirements. The values given in Schedule 15-2, Part 2, Article 4 – Structural Design Criteria and Requirements represent the acceptable minimum for existing Structures, provided that the Track is tangent and a direct fixation type and the catenary can be suspended between poles spacing 18m maximum or supported from the existing Bridges and Structures. Additional clearance is required to account for Track superelevation.
- (b) DB Co shall ensure for those TPSS that are only accessible by rail that the OCS wire in front of the TPSS shall be no less than 5.5m in order to accommodate TPSS equipment removal operations. Additionally, DB Co shall ensure that no OCS poles shall be installed directly in front of the TPSS.
- (c) DB Co shall ensure all structures are clear of the clearance envelopes for the Vehicle and pantograph under all operating conditions. Clearance envelopes shall incorporate all relevant construction and maintenance tolerances.

14.8 Loading and Overload Factors

- (a) Loadings and overload factors shall be based on the most current CAN/CSA 22.3 No.1 & 8 requirements.
- (b) Canadian Highway Bridge Design Code CSA S6 with ice accretion (31mm) for bridge sections shall be employed for radial ice on the wires and associated equipment and treated as an additional loading condition. The 31mm Non-Operating ice loading condition is for the purposes of structural capacity of the OCS on bridge segments. The CSA CHBDC S6 31mm ice loading condition shall apply to all Bridges along the alignment where OCS is present. If any portion of an OCS span between supports runs along a Bridge section, that entire span shall be subject to this loading condition. The CSA CHBDC S6 31mm ice loading condition also shall apply to any OCS span where one of the supports is attached to an Overhead structure.
- (c) The following climatic conditions shall also be taken into consideration for the design of the system:
 - (i) Operating conditions (Vehicles in service and running):
 - A. 90km/hr wind speed at 8°C.
 - B. 65km/hr wind speed with 12.5mm radial ice thickness on messenger wire, 6.25mm thickness on contact wire at -20°C.
 - C. No ice or wind at -27°C.
 - D. No ice or wind at 55°C.
 - (ii) Non-Operating Conditions (Vehicles not in service):
 - A. 90km/hr wind speed with 12.5mm radial ice thickness at -20°C.
 - B. No ice or wind at -32°C.

14.9 Strength Requirements

- (a) DB Co shall design the OCS in accordance with the strength requirements specified in CAN/CSA 22.3 No.1 & 8, latest edition.

14.10 OCS Wires Tensions and Tension Lengths

- (a) The messenger wire shall be 500 kcmil stranded hard-drawn copper
- (b) The contact wire shall be 350 kcmil solid-grooved hard-drawn copper

- (c) The design shall take into account a maximum permissible wear of 30% cross-sectional area loss of contact wire
- (d) The following shall be the base wire tensions for the stated tensioned system with a base temperature of eight (8) degrees Celsius:
 - (i) Mainline/ Surface Alignment (Auto-Tension):
 - A. Messenger: 2700 kg.
 - B. Contact Wire: 1350 kg.
 - (ii) Tunnel/ Underground:
 - A. Overhead Conductor Rail.
 - (iii) Moodie LMSF Tracks (Auto-Tension, Spring Type):
 - A. Contact Wire: 1100 kg.
- (e) DB Co shall locate tension segments in the alignment according to sectionalizing requirements and to minimize the tension loss due to cantilever restraining forces. Tension lengths shall be limited by the allowable along-track movement and limits of the tensioning devices.

14.11 Mid-Point Anchor Assembly

- (a) The mid-point anchor assembly is used to anchor or hold the catenary and allow the catenary to expand and contract from that point. It is typically installed at or in the vicinity of the mid-point of the OCS tension length. The assembly is comprised of turnbuckles, in-line insulators, wire terminations, high strength steel cable, parallel clamps, steel links and pole bands.

14.12 Sectionalizing Requirements

- (a) The OCS shall be electrically sectionalized by means of insulated overlaps or section insulators near each substation. The OCS design shall adopt a combination of both insulated wire overlaps and section insulators (sleds). The OCS shall require sectioning at crossovers, the Moodie LMSF, and other Special Trackwork. Section insulators shall be used at crossovers, Pocket Tracks, turnout, and siding locations. Overlaps shall not be placed on sharp curves.
- (b) Additional sectioning may be required at specific sensitive areas of the alignment where EMI considerations are required to be mitigated.
- (c) Sectioning at Interlocking

- (i) The sectioning of the standard two Track “Universal” crossover arrangement, facing or trailing, shall be the standard arrangement of three (3) switched mainline insulated overlaps or section insulators, and two (2) section insulators in the crossover wires. The positioning of all sectioning assemblies shall be capable of allowing the ultimate (5+4 car consist) Train set to pass the Track switch and signal.
 - (ii) Diamond crossovers shall have switched insulated overlaps or section insulators on both Mainline Tracks, and section insulators in the crossovers wires. Sectioning of this crossover type shall consist of a minimum of four disconnect switches, and a combined total of six section insulators and/or insulated overlaps.
 - (iii) The electrical sectioning and isolation of OCS shall be arranged in a manner that prevents any “dead spots”, or un-energized portions of catenary, from occurring under normal Vehicle operating conditions.
- (d) Sectioning in the Moodie LMSF
 - (i) The Tracks in the Moodie LMSF area shall be divided into working groups of four Tracks or less. Exceptions may be granted for more Tracks of shorter lengths. Each group shall have a manually operated switch and section insulators to accomplish the section isolation. The catenary for the entrance to and exit from the Moodie LMSF shall not be fed from the same DC breaker.
- (e) Sectioning at the Maintenance and Storage Buildings
 - (i) Each Track inside the Moodie LMSF buildings shall have the capability of individual sectioning. A door mechanism shall be installed with insulation, which allows continuous pantograph passage when the door is in the “open” position. A switch shall be installed for de-energizing the contact wire. Manual OCS disconnect switches in Moodie LMSF Yard shall be monitored via the SCADA system. Insulated joints shall be installed at the apron of all Moodie LMSF Tracks.
 - (ii) Isolation Requirements
 - A. On the Mainline, the OCS shall be designed using motor-operated disconnect switches, including for isolating sections of wire at interlockings, and at Lead Tracks for isolating the Moodie LMSF from the mainline. Motorized disconnect switches shall have operating and monitoring capabilities via SCADA. Manual disconnects shall be used throughout the Moodie LMSF for isolating sections of Track, and in the shop for isolating each section of wire.

14.13 Switching and Feeding Assemblies

- (a) Manual or motorized switches shall be used as specified in Section 14.12 (e) (ii) A above. The switch assembly usually comprises of a blade style switch, mounted in a weatherproof box; full feeding jumpers positioned on either side of the switch, and insulated cables from the switch to the individual sets of catenary wires. For motor operated switches, an electrical interlock circuit shall be provided to prevent operation with voltage on either side of the contact. The interlock shall prevent local and remote electrical operation of the switch motor. Emergency manual operation shall not be prohibited.

14.14 Safety Assurance

- (a) As a minimum, the following items shall be provided by DB Co in the design, specification, construction, and functionality of the OCS:
 - (i) Double insulation from any type of grounded pole, structure, building, etc. shall be provided to eliminate the possibility of bridging or spanning from neutral or grounded parts to live wires.
 - (ii) Warning signs shall be attached to OCS or the supporting structures to warn personnel of the proximity of high voltage wires. Signs shall be attached to the OCS to denote the end of the electrified wires over the Tracks. The signs comprise of “High Voltage”, “Danger”, “Danger Live Wire” and “Electric Train Stop” in red and black with white background.

14.15 Pole Deflection

- (a) Pole deflection under all Vehicle operating conditions shall not exceed 50mm at contact wire height. Pole deflection at the top of the pole under CSA C22.3 heavy loading condition shall not exceed 3% of pole length. Overload factors shall not be applied in the calculation of pole deflection. All pole deflection values shall take into account the effects of foundation translation and rotation for the applied loading condition.

14.16 OCS Pole Grounding and Bonding

- (a) Each pole or structure shall be grounded by a 4/0 AWG copper stranded wire by exothermic weld connections to two reinforcing bars in the foundation and to a ground rod adjacent to the foundation if necessary. The use of an appropriately sized copper-weld ground wire shall be permitted at locations with public access or in areas susceptible to vandalism and wire theft. All OCS support structures shall be grounded to a total ground resistance not exceeding 25 ohms.
- (b) Ground connections to disconnect switches shall have a maximum ground resistance of 5 ohms. Ground rods shall be utilized to obtain the required ground resistance.

- (c) Touch potential overvoltage at each pole or structure shall be limited to 50 V under normal operation and 70 V under outage conditions.
- (d) Where the tested resistance exceeds the specified value, additional ground rods shall be driven and interconnected with a suitable conductor and the test repeated.
- (e) All test results shall be provided to the City for review and approval.

14.17 Bridge, Overhead and Roof Structure Attachments

- (a) Attachment to overhead Bridges and overhead structures shall be prohibited unless other methods are not available. In instances with clearance limitations or where Bridge spans are greater than the allowable OCS span, attachments may be required. Underneath roof structures, a soft suspension assembly shall be used to minimize pantograph bounce and loss of contact between the pantograph and contact wire.
 - (i) DB Co shall provide protection against arcing or ground from the OCS lines in other areas such as Stations, at grade Structures, etc.
 - (ii) In addition to OCS lines, where and if DB Co installs other medium voltage lines such as [REDACTED], DB Co shall protect metallic parts and Structures, including protecting [REDACTED] metallic infrastructure against arcing or ground from other medium voltage lines.
 - (iii) Near existing [REDACTED] infrastructure, DB Co shall protect metallic parts and Structures against arcing or ground from [REDACTED] infrastructure medium voltage lines.
 - (iv) When [REDACTED] is installing or maintaining medium voltage lines, [REDACTED] normal safety protocols apply to [REDACTED].
- (b) Overhead Bridge and Tunnel Portal Protection
 - (i) At locations where the catenary passes underneath overhead structures that are equipped with sidewalks or walkways without guard and there is less than 3m of clearance to the nearest wire, fencing shall be provided as specified in Schedule 15-2, Part 6, Article 2 – Design Criteria.
 - (ii) At locations where the OCS underpasses structures are susceptible to corrosive elements, such as salt spray on bridge, an insulated protection board(s) is to be provided directly above the catenary wires, shielding them from potential corrosion risk. Alternate protection measures shall be permitted only after review and approval of the City.
- (c) Overgrade Bridges

- (i) Where the catenary and Track are supported by overgrade Bridges, all metal materials attached to the Bridge shall also be attached to the electrical grounding system. Where poles are to be mounted, the pole ground shall be attached to the electrical grounding system.

14.18 Overhead Conductor Rail Support

- (a) In tunnel, underground areas, or other areas that warrant special consideration due to low clearances and spatial confinement, overhead conductor rail supports may be used. Support spacing shall typically range between 10m to 12m maximum, and shall be bolted together section by section.
- (b) The DB Co conductor rail design shall include provisions for a smooth transition between the flexible OCS and the overhead conductor rail system. The section lengths shall be properly size taking into account tangent and curved Track and shall include the use of mid-points with overlap sections where applicable. Supports shall be either sliding or pivoting type.
- (c) A grounding cable shall be provided the entire length of the Tunnel or underground area to which the conductor rail is attached. The cable shall be suspended near and bonded to the overhead conductor rail supports and bonded to the collector bar to provide a continuous grounding system.

14.19 OCS Span Length and Staggers

- (a) The span lengths (spacing between contact wire registration points) and stagger shall be designed to provide for pantograph security (i.e. no pantograph de-wirement). Pantograph security shall be established by maintaining a minimum contact wire edge distance from the tip of the pantograph of 75mm under worst-case Vehicle operating conditions. Maximum span lengths shall be determined so as to achieve this minimum pantograph security allowance at any point within the span.
- (b) For mainline OCS, the contact and messenger wires shall be staggered on both tangent and curved Tracks, relative to Track centerline. The amount of stagger is based on the various class of Track allowances, vehicle body and pantograph tilt, sway, and other dynamic movements; and construction tolerance.
- (c) For LMSF and yard areas, the OCS wires shall be staggered on curved Tracks, similar to mainline OCS. However, tangent Tracks do not require stagger in these areas.

14.20 OCS Assemblies, Equipment, and Hardware

- (a) All OCS materials and equipment shall be standard products of manufacturers regularly engaged in the production of such materials, shall be designed for use on electric railways, and shall be the manufacturer's latest proven design.

- (b) DB Co shall provide appropriately sized turnbuckles in all wire assemblies for maintenance purpose to adjust the registered messenger or contact wire position. Where applicable, the turnbuckle shall be located on the slack wire, such as headspan or cross-spans.
- (c) Splices shall not be permitted in the system without prior approval of the City.
- (d) DB Co shall provide section insulators suitable for use by new and worn pantograph carbons and shall be designed to remain stable dynamically and structurally under all Vehicle and operating conditions.
- (e) DB Co shall provide automatic tensioning systems that operate freely within the specified temperature range and shall not interfere with clearance envelopes if a breakage in the OCS wires occurs.
- (f) DB CO shall provide jumper clamps with two bolts.

14.21 Cathodic Protection

- (a) Each structure shall be designed with a passive protection system. For specific requirements, refer to Article 12 – Corrosion Control, of this Part 3.

14.22 OCS Structure Numbering and Chainage

- (a) DB Co shall coordinate the OCS pole numbering and system chainage with the Existing Confederation Line to produce a logical sequence between new and existing systems. Pole identification shall use the same numbering scheme implemented in the Existing Confederation Line.
- (b) The numbering system and chainage shall continue in Tunnels at reasonable spacing to support location identification by maintenance staff, EROs, and ESPs.

14.23 Construction Tolerances

- (a) DB Co shall specify allowable construction tolerances for safety and current collection quality related parameters according to standard industry practice, IEC 60913, and AREMA Ch 33 Part 4.
- (b) The following are minimum System-wide allowable construction tolerances:
 - (i) Contact wire height: -13mm to +25mm, open route; 0mm to +13mm, Tunnel
 - (ii) Messenger and contact wire stagger: +/- 25mm (Relative to centerline of pantograph)
 - (iii) System Depth: +/- 50mm, open route; +/- 25mm, Tunnel (if applicable)

14.24 Lightning Protection

- (a) A connection from the OCS to a lightning arrestor/surge arrester and to ground shall be provided at a minimum of each feeder pole. DB Co shall additionally place arresters at a regular spacing that has been determined by assessment of geographical location, environmental conditions, public safety, operational and maintenance risks and ground conditions. The lightning arrestors shall have a minimum energy discharge capability of 2.6 kJ at 1000 kV. The grounding connection from the lightning arrestor will be connected directly to a ground rod(s) or mat, with a total ground resistance of not more than 5 ohms. Lightning/ surge arrester connection may be combined with the pole/ structure ground connection.
- (b) The grounding connection from the arrester shall be connected directly to a ground rod(s) or mat, with a total ground resistance of not more than 5 ohms. Arrester connection may be combined with the pole ground connection.
- (c) For poles on aerial structures having an arrester, an independent ground wire and ground rod shall be utilized.
- (d) The arresters shall be appropriately chosen based on the expected peak system voltage including regenerative braking. The complete discharge voltage shall be sufficiently low enough to prevent damage to connected system elements. Surge arresters shall have a minimum thermal energy rating of 2.6 kJ per rated kV.

14.25 Performance Requirements

- (a) The Vehicles shall be equipped with ice removal device(s) for operations during snow and ice conditions.
- (b) All OCS equipment and installation shall undergo all complete factory and on-site inspections and testing. On-site inspection and testing shall, at a minimum, include the following:
 - (i) Acceptance Measurements: Stagger, Contact Wire Heights at support and mid-span, Pole Horizontal Offset, Mid-Span Offset, Span Lengths, Messenger Wire Heights or System Depths, Wire Stringing Tensions and corresponding installation temperature, Pole Stationing/ Structure Identification, and Contact Wire Gradient;
 - (ii) Visual Inspection: Visual inspection of the OCS equipment and installation shall consist of the following:
 - A. At contact wire level, checks shall be made for fit and tightness of components, ensure split pins, locknuts and other fastening components are secure, contact wire checks for kinks, roll, or other damage, messenger wire checks for damaged strands, correct steady arm fittings and heel

settings, checks that OCS jumpers are correct type, have adequate travel capability, are properly fitted, and well formed to avoid fatigue failure, and installation checks for locations of possible interference with passage of pantographs, including spots where pantographs could tangle with wires or suspension assemblies.

- B. At ground level, check that hangers are plumb and within tolerance of design position, and check cantilevers are in correct along-Track position under given temperature.
- (iii) Clearance Envelope Tests: Pantograph Clearance Envelope and Vehicle Clearance Envelope; and
- (iv) Electrical Tests: The following electrical tests shall be performed on the OCS once installation is complete and all components and related electrical equipment are in final locations:
 - A. OCS Section Proving
 - B. Circuit Continuity (or Loop Resistance) Test,
 - C. Hi-Pot Insulation Test,
 - D. OCS Pole Grounding,
 - E. Ground Resistance Measurement at Lightning Arrestors.
- (v) DB Co shall perform all static, or subsystem tests, involving individual or isolated components of the Overhead Contact System. DB Co shall perform the integration testing and commissioning of the system.

ARTICLE 15 CELLULAR SYSTEMS

15.1 General Requirements

- (a) DB Co shall coordinate with the City for the installation of public cellular and WiFi service at the Stations.
 - (i) At At-Grade Stations, Underground Stations and within the Tunnel, DB Co shall coordinate the installation of cellular service. DB Co shall provide the infrastructure that will support installation of antennas, cabling, amplifiers and associated equipment that will be designed and installed by the City.

15.2 Cellular System

- (a) DB Co shall incorporate into their design (design reviews, drawings, system integration) the radiating cable (and accessories) and ensure that all electrical, mechanical, physical interfaces are reviewed and approved. DB Co shall install and test a minimum 7/8" radiating cable in the Tunnel sections. DB Co shall provide the radiating cable, including mounting hardware.
- (b) DB Co shall provide power to the remote units required along the Tunnel or in any Station areas. A number of remote units shall be installed by the City throughout the Tunnel and/or Stations at various locations to be determined during design. Typical installation requires an RU at approximately every 500m, one RU at each Station entry or exit, and/or in the communications room and one RU at each Tunnel portal. Installation brackets hardware shall be the responsibility of the City.
- (c) DB Co shall provide a minimum 75mm conduit in the Tunnel(s) for installation of cellular required fibre.
- (d) DB Co shall provide all necessary conduits, junction boxes, pull boxes to cater for cellular fibre that will connect the various remote units within any Underground Stations.
- (e) DB Co shall provide appropriate conduits or pathways to cater for coax cabling from the radiating cable exiting the Tunnel to the Remote Units within the Stations or Station transition areas, or Tunnel.
- (f) DB Co shall provide power to RUs, and other telecom equipment as required, located in the Tunnel, and / or at Stations.
- (g) DB Co shall provide appropriate number of conduits (for fibre and coax) from the Tunnel to a location close to the Tunnel but external to the Tunnel, where a BTS site will be located. DB Co shall provide a manhole as the interface point where the conduits will terminate.

- (h) The Telecom provider shall coordinate with the electrical service provider and provide a connection to the BTS site electrical interface panel for the BTS site (the electrical panel shall be designed by the City. The City may require consolidation of Voice/Data Radio System and cellular BTS sites depending on the requirements of each provider – the City wants to minimize the footprint of a BTS hotel. The BTS site shall include fencing, foundation, access road, shelters, conduits, electrical panel, hydro incoming connection, drainage etc. This shall all be part of the City scope.
- (i) DB Co shall design antennae mounting locations throughout the Stations to cater for the antennas required for the cellular system. Antennas shall be located at the Platform level, concourse level, entrances, any Tunnel transition areas and will ensure that cellular coverage is provided in all public areas or on the Vehicle while entering the Platform or stationary at the Platform. Any interfacing hardware for the antennas shall be provided by the City.

ARTICLE 16 GUIDEWAY INTRUSION DETECTION SYSTEM

16.1 General Description

- (a) Confederation Line Trains are attended by Operators on a segregated Guideway that is protected by ROW fencing.
- (b) The system shall be equipped with a GIDS to detect when intruders attempt to enter the Guideway off the end of a Station Platform, at the LMSF access Track or at Tunnel portals.
- (c) The GIDS shall operate using laser based technology with programmable logic to distinguish between Trains, human beings, and other objects.
- (d) When there is a human intrusion detected by the GIDS, alarms shall be raised in the TOCC, BCC, MYCC, BYCC and automated responses shall be triggered by both the CBTC and SCADA systems. TOCC, BCC, MYCC, and BYCC staff shall then initiate procedural responses. For other observed or reported intrusions on the Guideway, investigation and follow-up response shall be strictly by procedure.
- (e) The GIDS shall detect when intruders proceed beyond the end of a Station Platform onto the Guideway.
- (f) The system shall also be installed at all Tunnel portals, including the Parkway Tunnel, Connaught Tunnel, Baseline Station and HWY 417 E-N/S Pinecrest Rd Ramp Tunnel to detect when persons enter the Guideway at a Tunnel portal location.
- (g) The system shall use laser scanners which produce 180 invisible beams with a scan arc of 180 degrees. The scanners shall be equipped with environmental hoods to facilitate all weather operation. The laser scanners shall measure the time it takes for a laser beam to project to an object and reflect back to the scanner. Using this time, the distance from the scanner to the object surface is calculated.
- (h) Laser data shall be transmitted to a PLC which combines the data from the individual lasers to determine the outline of an object. Using pre-defined permissible shapes and sizes the system shall be able to distinguish between various types of objects providing for intelligent object detection. Detected objects such as a Train or a bird shall not generate an alarm while other objects, such as a person, are programmed to meet the criteria of an intrusion. When an object fits the criteria of an intrusion, the PLC shall transmit alarm signals to both the SCADA and the CBTC systems.

16.2 Intrusion Detection Automated Responses

- (a) Upon detection of an intrusion, the following automated responses shall be triggered:

- (i) Upon detection of an intrusion, the CBTC behaviour shall be identical to that of the Existing Confederation Line.
 - (ii) Alarms shall be raised on the ATS workstations in the TOCC and BCC providing notification and warning of the GIDS detected intrusion.
 - (iii) An alarm shall be raised on the SCADA workstations annunciating a GIDS detected intrusion and CCTV video coverage of the intrusion location shall be presented on the monitors. The video presented can be in the form of live images or lagged images (for example 15 seconds prior to the intrusion).
- (b) In addition to these automated responses to an intrusion, the SCADA system shall monitor the ongoing health of the GIDS equipment and annunciate alarms when a malfunction or failure has occurred. Alarms shall also be raised when the system has been tampered with.

16.3 Guideway Intrusion Detection Equipment

- (a) DB Co shall design, procure, install, test and commission the GIDS equipment that includes the laser scanners along with IP 67 rated protective outdoor enclosures and protective shields; all associated mounting hardware and all of the required system cables to connect the laser scanners to the respective junction boxes.
- (b) DB Co shall install a PIU or junction box for each laser scanner to be installed in a NEMA 4X stainless steel enclosure including a tamper alarm door switch within close proximity to the laser scanner. The PIU provides the interface location between the laser scanner and the electrical cabling system. A 24VDC power supply shall be installed for each laser scanner. The PIU shall include a dry contact closure for intrusion detection/tamper alarms per unit. The PIU shall include a Local LED alarm display. The PIU shall include a serial and RJ45 for connections of data cables.
- (c) DB Co shall also install an alarm cabinet, known as a PAU to be located at each Station. The PAU is where the laser scanner output signals are received and processed. The main components of the PAU shall include the power supply, circuit breakers, PLC, Ethernet switch, alarm relays, and terminal blocks. The PAU shall be installed in a NEMA 4X stainless steel enclosure. The PAU enclosure shall include a tamper alarm door switch, a 24 VDC power supply, an Ethernet and a PLC for alarm handling.
- (d) DB Co shall procure and install a detection software package required for each laser scanner.
- (e) DB Co shall design and install the GIDS equipment such that individual laser scanners do not conflict with the location of other equipment such as OCS poles and radio antennas.
- (f) DB Co shall ensure that all installation, operation and maintenance manuals are procured and delivered along with the GIDS equipment.

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ARTICLE 17 HIGH SPEED DATA RADIO SYSTEM

17.1 General Description

- (a) The HSDR is a wireless data network Train-to-Station based system between the Train-based data network and the base station units installed at Stations along the Guideway. The wireless network shall support standard Ethernet interfaces and IP protocols and operate within the 5GHz unlicensed band.
- (b) DB Co shall design and build the Confederation Line Extension wayside HSDR system such that it integrates with and forms a single complete system with the Existing Confederation Line system.

17.2 General Requirements

- (a) The HSDR shall support the following operations:
 - (i) High speed/high volume data transfer of Station Platform edge/Train door CCTV images from wayside to Train cab display;
 - (ii) Transfer of Passenger count information from Train to wayside and on to the Passenger counting server;
 - (iii) Transfer of Vehicle diagnostics information from Train to wayside and on to the Vehicle central maintenance server; and,
 - (iv) Transfer of Passenger information display messages from wayside to Train at the Moodie LMSF and at the Stations.
- (b) Data transfer Platform edge/Train door CCTV images to Train cab display
 - (i) The high speed/high volume radio shall transfer encoded video streams from the Platform edge cameras to\from the wayside to the Operators Train cab display.
 - (ii) The system shall start transmitting the images of four Platform edge cameras to the two displays on each side of the Train Operator display only when the Train is stopped at the Station.
 - (iii) The two sets of four Platform edge cameras shall be provided by DB Co as four independent IP UDP video streams in each Station. The CCTV images shall be streamed as live images using RTSP or approved equal from the wayside modem to the Vehicle modem.
 - (iv) The transmission of images shall continue for 10 seconds after the Train has started to move. Those images shall be shown for the same period of time on the existing cab CCTV display.

- (v) Once the time period is over (10 seconds) the screens in the Operator cab shall go blank.
 - (vi) The system shall display the correct set of CCTV cameras from the Station Platform the Train is stopped at, on the Vehicle. The location and direction of the Train shall be known by the system in order to display the proper camera images.
 - (vii) There shall be two sets of four CCTV cameras per Station. One set per Platform per direction.
 - (viii) The Platform edge/Train door CCTV cameras shall be accessible for viewing at any time from the TOCC, BCC, MYCC and BYCC. The images of those cameras shall be recorded via the same system as the rest of the CCTV cameras of the remaining part of the Station. However the images of those cameras shall be streamed simultaneously to the Vehicle, the storage location and the TOCC, BCC, MYCC and BYCC live on demand.
 - (ix) The HSDR shall be able to transfer a minimum of one live video data stream from the Train CCTV system to the wayside CTS network when the Train is in a Station. The video stream shall support the ONVIF standard and be streamed using RTSP streaming protocol. The minimum resolution and frame rate from the onboard video source being streamed over the HSDR shall be CIF resolution and 12FPS.
- (c) Transfer of Passenger count information
- (i) The system shall provide a high speed connection to transfer at each Station and at the Moodie LMSF the Passenger counting information. The transfer of the Passenger information shall be done two ways:
 - A. Once per day at the LMSF, and at every Station when the Train is stopped. Those transfers shall be done automatically without any command from the TOCC, BCC, MYCC and BYCC.
 - (ii) The data transmitted at the Station shall be “raw” with no post process to be viewed by the TOCC & BCC personnel only.
- (d) Transfer of Vehicle diagnostic information from Train to wayside
- (i) The transfer of Train health data from the Train to the wayside CTS network which passes data to the Vehicle central maintenance server shall be done at every Station. Information such as, but not limited to:
 - A. Low voltage power supply;
 - B. Door control system;

- C. HVAC system;
 - D. CBTC system;
 - E. Brake system;
 - F. Communications and Passenger information sub systems;
 - G. Propulsion system;
 - H. Auxiliary inverters; and,
 - I. Event recorder system.
- (ii) Shall be transferred to the SCADA system and shall be communicated to the Moodie LMSF at the same time. The data shall be transferred from the Train to the wayside wirelessly. Once on the wayside it shall be connected to the Station network to transmit the information to the relevant location.
 - (iii) The transmission of the data at every Station is aimed at identifying faults only. The status of the Train's health shall be used to prioritize the removal of unhealthy Trains to the Moodie LMSF during service reduction.
- (e) Transfer of PID messages from wayside to the Train
- (i) The HSDR system shall be able to transfer data from the PIS located in the Belfast MSF and controlled in TOCC & BCC to the PIDS located on the Train. The data transmitted from the PIS may be directed to a specific train, a group of Trains, or all Trains.
 - (ii) The PIDS determines which messages need to be displayed in the Trains, and when, to provide accurate and reliable information to Passengers.
 - (iii) The pre-recorded messages, both visual and audio shall reside in the PIDS system within the Vehicle. Those messages shall be in both English and French and shall have their individual ID that can be triggered by the PIS through the HSDR at any given time when the Vehicle is stopped at the Station or the Moodie LMSF.
 - (iv) The HSDR shall support the transfer of PIS system configuration data, pre-recorded audio files and visual messages to onboard PIDS wirelessly in the Stations or in the Moodie LMSF
 - (v) The HSDR shall provide data connection to allow new messages to be sent from the PIS system to the vehicle PIDS system to be displayed in a single Vehicle or fleet wide when the Vehicles are stopped at the Station.

- (vi) The transfer of any data messages between the PIS and the Train borne PID equipment over the HSDR should not affect the transmission of Platform edge camera video from a Station to the Train.
- (f) HSDR fault reporting
 - (i) The HSDR shall provide fault alarms and warning to the SCADA system using the SNMP standard protocol.
 - (ii) Alarm messages shall include but not be limited to;
 - A. Failure of HSDR in a station other operating parameters that are supported by the HSDR.
- (g) HSDR Subsystem
 - (i) The HSDR shall operate within the unlicensed 5GHz bands and meet Industry Canada and FCC regulations compliant. It shall transmit in the 5GHz unlicensed bands in order to provide radio frequency separation from any CBTC transmissions in the 2.4GHz ISM band,
 - (ii) There shall be AP or base station at each end of each Platform and it is expected that there shall be APs or subscriber units at the end of each Vehicle to ensure maximum coverage and redundancy for RAMS purposes.
 - (iii) Each AP shall be wired to the local network switch, either on the wayside or within the Vehicle to enable connectivity with other Ethernet devices as appropriate. The City shall procure and free-issue to DB Co, 60 Wi-Fi Access Points (four per Station). The City shall procure and free-issue to DB Co, 60 Transceiver SFPs for access points (four per Station).
 - (iv) All base station units or subscriber units, irrespective of location, shall be approved by Industry Canada for operation within the Ottawa environment.
 - (v) When coupled, the intermediate access points on the two Vehicles shall be disabled.
- (h) Wayside Network Connectivity
 - (i) The wayside (station AP's) shall be wired through an Ethernet switch at each Station. The Ethernet switches shall be connected to the main Confederation Line CTS through a dedicated wireless access. All high speed wireless data traffic traversing the CTS network shall be provided with a dedicated VLAN or similar protocol to segregate network traffic originating from the HSDR access points and route data traffic to the wayside servers.

- (i) Protocols
 - (i) Given the data that shall be passed across them, all base station units shall be able to support more than one multi-protocol session and all shall be able to support the protocols used for the services described above. The HSDR shall support remote management tools, SNMP V3 and NTP protocols.
- (j) Antennae
 - (i) The antenna shall be selected to support the selected radio frequency spectrum, signal strength and gain requirements to meet the system requirements. The antennas shall be selected and mounting locations shall be based on the required radio frequency coverage and minimum signal strength of the selected high speed radios. All base station units shall be connected to their antennae by low loss co-axial cable such as LDF-450 or LMR-400. All antennae ports shall be protected and suitable for the environment in Ottawa. The use of MIL style covers over 'N' style connectors is encouraged to provide weather protection.
 - (ii) The City shall procure and free-issue to DB Co, 240 Station directional antenna (16 per Station).
- (k) Environment
 - (i) All APs shall be rugged and suitable for service within the Ottawa environment, including temperature, condensing humidity, snow and ice accretion and seismic requirements, in which they are deployed. Refer to Schedule 15-2, Part 1, Clause 4.3 for details.
- (l) Latency
 - (i) The latency time of the end of Platform video for display to the driver screen shall be 100 ms or less measured from the data leaving the wayside AP to the data network port of the Vehicle video decoder.
- (m) CCTV Video Interface
 - (i) The Platform edge cameras video shall be provided to the high speed radio as four independent analog video feeds per Platform in the communication rooms in each Station. The CCTV analog feed shall be 1.0 Vp-p, NTSC/PAL composite, 75 ohms, BNC connector. Alternately an IP video feed for each camera can be provided. The IP video shall be H.264 or MJPEG compliant 30 FPS 4cif resolution and comply with ONVIF specification for streaming. The connection shall be through a RJ 1000baseT Ethernet connection supporting UDP streaming. IP addressing and network interface to be arranged with the CTS network manager.

Appendix B

Exemplary Station Drawings – Existing Confederation Line

APPENDIX B

[REDACTED]

APPENDIX C

Material and Equipment Specifications – Existing Confederation Line

DB Co shall Design and Construct the Stations to be consistent with the Existing Confederation Line Stations. The following materials and equipment specifications shall be incorporated by DB Co.

APPENDIX C

[REDACTED]

APPENDIX D

Exemplary Station Signage and Wayfinding Drawings – Existing Confederation Line

APPENDIX D

[REDACTED]

APPENDIX E

Permanent Bus Stop Requirements

| Location | Description | Permanent Bus Terminal Requirements | | | | | | | | | | | | | | | |
|------------------|--|-------------------------------------|-----------------------|-----------------------|----------|-----------------|----------|-----------------------|---|------------|------------|---------|---------------------|--------------|------------------------------------|--------------------------|------------|
| | | Platforms (length) | Shelters ¹ | Sidewalk/curb type | Lighting | Station signage | Bus Flag | Transit Info Panel | Passenger Information Displays ² | Bike Racks | Waste bins | Benches | Emergency phones | CCTV cameras | Operator Washroom Facilities | Supervisor Facilities | Bus Lay-up |
| Richmond Rd | Eastbound bus stop, east of McEwen Ave | 15m | ✓ | SC11.4 | ✓ | x | ✓ | ✓ | Note 5 | ✓ | ✓ | ✓ | x | x | x | x | x |
| | Westbound bus stop, west of McEwen Ave | 15m | ✓ | SC11.3 | ✓ | x | ✓ | ✓ | Note 5 | ✓ | ✓ | ✓ | x | x | x | x | x |
| | Eastbound bus stop, east of Richardson Ave crosswalk | 15m | ✓ | SC11.3/4 | ✓ | x | ✓ | ✓ | Note 5 | ✓ | ✓ | ✓ | x | x | x | x | x |
| | Westbound bus stop, west of Richardson Ave crosswalk | 15m | ✓ | SC11.4 | ✓ | x | ✓ | ✓ | Note 5 | ✓ | ✓ | ✓ | x | x | x | x | x |
| | Eastbound bus stop, east of New Orchard Ave | 35m | ✓ | Note ³ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | x | x | x |
| | Westbound bus stop, east of New Orchard Ave | 35m | ✓ | Note ³ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | x | x | x |
| | Eastbound bus stop, east of Allison Ave crosswalk | 15m | ✓ | SC11.4 | ✓ | x | ✓ | ✓ | Note 5 | ✓ | ✓ | ✓ | x | x | x | x | x |
| | Westbound bus stop, west of Allison Ave crosswalk | 15m | ✓ | SC11.4 | ✓ | x | ✓ | ✓ | Note 5 | ✓ | ✓ | ✓ | x | x | x | x | x |
| | Eastbound bus stop, east of Woodroffe Ave | 15m | ✓ | SC11.3 | ✓ | x | ✓ | ✓ | Note 5 | ✓ | ✓ | ✓ | x | x | x | x | x |
| | Westbound bus stop, west of Woodroffe Ave | 15m | ✓ | SC11.4 | ✓ | x | ✓ | ✓ | Note 5 | ✓ | ✓ | ✓ | x | x | x | x | x |
| | Eastbound bus stop, east of Lockhart Ave crosswalk | 15m | ✓ | SC11.4 | ✓ | x | ✓ | ✓ | Note 5 | ✓ | ✓ | ✓ | x | x | x | x | x |
| | Westbound bus stop, west of Lockhart Ave | 15m | ✓ | SC11.4 | ✓ | x | ✓ | ✓ | Note 5 | ✓ | ✓ | ✓ | x | x | x | x | x |
| | Eastbound bus stop, west of Cleary Ave | 35m | ✓ | Note ³ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | x | x | x |
| | Westbound bus stop, east of Cleary Ave | 35m | ✓ | Note ³ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | x | x | x |
| Scott St | Eastbound bus stop, east of Island Park Dr | x | ✓ | SC11 | ✓ | x | ✓ | ✓ | Note 5 | ✓ | ✓ | ✓ | ✓ | ✓ | x | x | x |
| | Westbound bus stop, east of Goldenrod Dwy | x | Note 6 | | | | | | | | | | | | | | |
| | Westbound bus stop, east of Ross Ave | x | ✓ | Note ³ | ✓ | x | ✓ | ✓ | Note 5 | ✓ | ✓ | ✓ | ✓ | ✓ | x | x | x |
| Iris St | Eastbound bus stop at Iris Station, west of crosswalk | 15m | ✓ | Note ³ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | x | x | x |
| | Westbound bus stop at Iris Station, east of crosswalk | 15m | ✓ | Note ³ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | x | x | x |
| Montreal Rd | Northbound bus Platform, north of intersection with OR174 W-N/S ramp | 18m | ✓ | Note ³ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | x | x | x |
| | Southbound bus Platform, south of intersection with OR174 S-W ramp | 18m | ✓ | Note ³ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | x | x | x |
| Montreal Station | Eastbound OR174 bus ramp, east of St. Joseph Blvd | 35m | ✓ | Note ³ | ✓ | ✓ | ✓ | ✓ | Note 5 | ✓ | ✓ | ✓ | ✓ | ✓ | x | x | x |
| | Westbound OR174 bus ramp, west of Montreal Rd | 35m | ✓ | Note ³ | ✓ | ✓ | ✓ | ✓ | Note 5 | ✓ | ✓ | ✓ | ✓ | ✓ | x | x | x |

| | | | | | | | | | | | | | | | | | |
|-----------------------------|--|-----|---|-------------------|---|---|---|---|--------|---|---|---|---|---|---|---|---|
| Jeanne d'Arc Blvd | Shelters north of Jeanne d’Arc Blvd bridge structure to remain | - | - | Note ⁴ | - | - | - | - | Note 5 | - | - | - | ✓ | ✓ | - | - | - |
| | Shelters south of Jeanne d’Arc Blvd bridge structure to remain | - | - | Note ⁴ | - | - | - | - | Note 5 | - | - | - | ✓ | ✓ | - | - | - |
| Orleans Blvd | Northbound bus stop on Orleans Blvd bridge structure | 35m | x | Note ³ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | x | x | x |
| | Southbound bus stop on Orleans Blvd bridge structure | 35m | x | Note ³ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | x | x | x |
| Corkstown Road ⁸ | Eastbound bus stop at Moodie Station left-in/right-out PPUDO | 15m | ✓ | SC11.4 | ✓ | x | ✓ | ✓ | Note 5 | - | ✓ | ✓ | x | x | x | x | x |
| | Westbound bus stop at Moodie Station left-in/right-out PPUDO | 15m | ✓ | SC11.4 | ✓ | x | ✓ | ✓ | Note 5 | - | ✓ | ✓ | x | x | x | x | x |

Table Notes:

- ¹ On-street bus stops shall be provided with a standard 5’ x 10’ shelter. On arterial corridors, a curved roof shelter is required.
- ² Passenger Information Display infrastructure shall be moved by OC Transpo at no cost to DB Co, however DB Co shall provide the ducts/feeds to the bus stops at cost to DB Co
- ³ As per OC Transpo Transitway and Station Design Guidelines
- ⁴ Weather protection for customers at LRT Stations described in Schedule 15-2 Part 4
- ⁵ Provide power and communications for future PIDS
- ⁶ Existing condition, maintain existing facilities and functions
- ⁷ Note The flag shall be located 20m from the nearest crosswalk, or from the point at which the curb becomes tangent (whichever requires the stop to be further downstream)
- ⁸ These bus stops are only required if the walking distance from the left-in/right-out PPUDO to the entrance of Moodie Station is greater than 200m. In the event that the distance is less than 200m, the bus stop shall not be required.

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**SCHEDULE 15-2
DESIGN AND CONSTRUCTION REQUIREMENTS**

**PART 4
STATIONS**

ARTICLE 1 INTRODUCTION

1.1 Introduction

- (a) The Project Stations shall be efficient, universally accessible, sustainable facilities that provide Passengers with an enjoyable, comfortable and safe transit experience.
- (b) Stations shall act as a catalyst for TOD and shall enhance connectivity to surrounding neighbourhoods while not precluding integration opportunities with future planned developments.
- (c) DB Co shall provide complete Stations and Ancillary Facilities to fully support the operational requirements of the Project while minimizing crowding, travel impedances and physical barriers.

1.2 Overview

- (a) The project consists of the design and construction of a total of seventeen Stations consisting of new Stations, renovated Stations, and/or the conversion of BRT Stations to LRT Stations.
- (b) DB Co shall design and construct the Stations and all Ancillary Facilities, and shall obtain necessary Permits, Licences and Approvals for the same. Station Structures and systems shall be designed and constructed to satisfy the Design Life requirements of Schedule 15-2, Part 1, Article 4 – Design and Construction. DB Co shall provide the Facilities including but not limited to the following:
 - (i) Stations including;
 - A. Types of Stations constructed or modified for the Confederation Line shall include the following (note classifications are not mutually exclusive):
 - i. Line Stations; Westboro, Dominion, Cleary, New Orchard, Lincoln Fields, Iris, Queensview, Pinecrest, Bayshore, Montreal, Jeanne d’Arc, Orléans Boulevard and Place d’Orléans.
 - ii. Terminal Stations; Baseline, Moodie, and Trim
 - iii. Transfer Stations; Tunney’s Pasture, Blair, Bayshore, Lincoln Fields, Moodie, and Place d’Orléans.

- iv. All Terminal Stations are also Transfer Stations. Where requirements are defined by Station types in this Schedule 15-2 – Design and Construction Requirements, the requirements for both Station types shall be applied.

(ii) Ancillary Facilities

- A. Bicycle Facilities
- B. Retail Facilities
- C. Bus Terminals
- D. On-street bus stops
- E. Bus Operator and Maintenance Buildings
- F. Plaza(s)
- G. PPUDO
- H. TPSS
- I. Tunnel Ventilation Shafts
- J. EEBs
- K. Off-street Non-Revenue Vehicle parking
- L. Maintenance Facilities: Refer to Schedule 15-2, Part 5 – LMSF.
- M. Bus supervisor office
- N. Public washrooms
- O. Pedestrian overpass or underpass structures;
- P. Passenger shelter structures;
- Q. Structures containing mechanical, electrical, communications or other service equipment;
- R. SER;
- S. Entrances; and,
- T. Bus lay-by areas.

(c) Emergency Planning:

- (i) DB Co shall be responsible for the preparation, and submission (including revisions as necessary) of fire safety plan(s), for approval by the authority having jurisdiction, pursuant to Ontario Fire Code, Section 2.8 Emergency Planning, where applicable.
- (d) Stations design shall consider pedestrian circulation as a critical element. Station designs shall facilitate the transfer of Passengers from one mode of transportation to another by minimizing transfer effort and to ensure safe exiting under Emergency conditions.
- (e) Station capacity shall be provided to serve the projected operations contained in Schedule 15-2, Part 1, Article 3 – Operational Performance Requirements and the ridership forecast data provided in this Part 4.
- (f) DB Co shall provide calculations and Passenger modeling simulations to demonstrate that generous public spaces have been achieved in Station design and the level of service required by this Article 1 has been provided for Passenger circulation including calculations for entry and exit volumes. Modelling shall include all physical barriers, such as columns and Station furniture, and include surge spaces around Station equipment such as fare equipment and elevators. Station designs shall provide intuitive Passenger flow, minimizing obstacles and pinch-points.
- (g) Calculations and Passenger modeling shall be submitted in accordance with Schedule 10 – Review Procedure.
 - (i) Passenger modeling at Transfer Stations shall include the entire Facility and site, inclusive of bus and Train operations; and,
 - (ii) Passenger modeling for the Baseline Station site shall be expanded to be inclusive of the crossing of the Woodroffe and College Avenue intersection and bus operations.
- (h) Stations Platforms shall be constructed to satisfy the requirements of the operational performance requirements defined in Schedule 15-2, Part 1, Article 3 – Operational Performance Requirements and the ridership forecast data provided in the Part 4 as follows:
 - (i) All At Grade Stations shall be constructed to satisfy the requirements of the operational requirements for design year 2031.
 - (ii) Baseline, New Orchard, and Cleary Stations shall be constructed to satisfy the operational requirements for design year 2048.
- (i) Stations shall be provided with space and utility services provisions for installation of a fare control system to be installed by the City.
 - (i) DB Co shall provide the required supporting infrastructure to allow power and communications connections, including walker ducts and conduits.

- (ii) DB Co shall design and construct the location of equipment as to ensure the year round operation of the fare equipment. DB Co shall ensure that all fare gate equipment is protected from the weather as required by Clause 2.5(b)(iii)Bi.
- (iii) All fare collection, vending, and control equipment shall be located within the Station Structure.
- (iv) DB Co shall provide a study of the building envelope with respect to the micro-climatic and geographical location of each Station to determine the extent of the weather protection required.
- (j) All Stations shall include weather protection including roof Structures and canopies in accordance with this Part 4. Stations shall not be required to be climate controlled, however provisions shall be made for radiant on-demand heating where specified elsewhere in this Part 4.
- (k) The Platform width of the Underground Stations shall be such as to protect for future installation of PEDs. Protection for PEDs shall include an electrical isolation membrane between the structure of the Platform and Platform finish material and the construction of a 3m x 4m dedicated PED equipment room.
- (l) Federally Mandated Stations (Lincoln Fields, Iris and Moodie) and the LMSF (refer to Schedule 15-2, Part 5 – LMSF) are subject to review by the NCC. DB Co shall be responsible for advancing the designs of Stations and the LMSF in accordance with the following:
 - (i) The National Capital Act makes the NCC responsible for coordinating and approving projects related to federally owned lands and buildings in Canada's National Capital Region. The NCC is a Crown Corporation and therefore functions at a distance from the federal government, reporting to Parliament through the Minister of Canadian Heritage.
 - (ii) All individuals and federal organizations need NCC approval before undertaking projects on Federal Lands and buildings in Canada's National Capital Region.
 - (iii) The NCC's mandate to approve federal land uses, transactions and designs is set out in sections 12 and 12.1 of the National Capital Act.
 - (iv) Three Stations (Lincoln Fields, Iris and Moodie) and the LMSF (refer to Schedule 15-2, Part 5 – LMSF) are subject to FLUDTA, and design approval by the NCC under Section 12 of the National Capital Act. DB Co's approach to the Stations are subject to review by the NCC and will be assessed in terms of compliance with the guiding principles contained within this Project Agreement:
 - A. DB Co shall be responsible to develop designs and Design Presentation documentation to support the City in obtaining the FLUDTA approval, including but limited to:

- i. Attending meetings with the City and NCC;
 - ii. Providing design documentation, reports, renderings specifications, etc. to be used in the FLUDTA process; and
 - iii. DB Co shall be responsible for the presentations of the Stations/Project to the Advisory Committee on Planning Design and Realty at the NCC.
- (m) All Stations shall be designed and constructed to permit Emergency vehicle access. If any new Works are required to ensure Emergency vehicle access, then these Works shall be the responsibility of DB Co.
 - (i) At the following Stations, Emergency vehicle access can be via the bus transfer area: Tunney's Pasture, Westboro, Lincoln Fields, Baseline, Moodie, Bayshore, Blair, Place d'Orléans, and Trim;
 - (ii) At the following Stations, Emergency vehicle access can be via the nearest City street: Dominion, Cleary, New Orchard, Iris, Montreal, Jeanne d'Arc, Place d'Orléans, and Orléans;
 - (iii) At Pinecrest Station, Emergency vehicle access can be from the off street bus stopl and,
 - (iv) At Queensview Station, Emergency vehicle access can be from the parking lot and loading dock facilities of 2600 Queensview Drive.

1.3 Design Principles and Guidelines

- (a) Accessibility
 - (i) DB Co shall ensure all Stations and all public spaces are designed for accessibility for persons with disabilities in accordance with Universal Design principles. This shall include satisfying the requirements of relevant federal, provincial and municipal accessibility legislation, standards, guidelines, practices and criteria, including but not limited to Transport Canada, Canadian Transportation Agency Code of Practice - Terminal Accessibility, AODA, OBC, COADS, as well as CSA Standards (including but not limited to CAN/CSA B651). The application of accessible design legislation, standards, guidelines, practices and criteria shall accommodate the needs of persons with different types of disabilities, including those with auditory, intellectual, physical, developmental, visual, learning, and mental health disabilities.
 - A. Adequate clearances shall be provided to accommodate Passengers with mobility devices, luggage, strollers, bicycles, service animals, and support persons, access to benches, and equipment at Stations, public facilities, and all TSA including Station Platforms and bus Platforms.

- (ii) DB Co shall ensure all accessible public spaces and interior routes are connected to accessible entrances and accessible exterior routes.
- (b) Crime Prevention Through Environment Design
 - (i) DB Co shall design all Station-related public accessible areas (Platforms, concourses, entrances and passageways, sidewalks, landscaping, PPUDO's, cycling facilities, MUPs, parking areas, plazas bus Platforms elevators, washrooms and Emergency access) using CPTED principles. An independently contracted CPTED review and report of the Project design shall be provided to the City by DB Co as part of each design submittal, in accordance with Schedule 10 – Review Procedure, and all of the CPTED report requirements shall be incorporated into the Project by DB Co. The independently contracted CPTED review provided by DB Co shall be performed by a qualified CPTED practitioner or practitioners, in good standing with a recognized CPTED national or international organization and who holds current CPTED certification(s).
- (c) DB Co shall implement bird friendly design as follows:
 - (i) All glazing utilized in the Facilities shall be non-reflective type glazing;
 - (ii) Expanses of glazing system in excess of 2 m² shall include pattern to create a visual maker to allow birds to identify the Facilities as solid objects. The pattern density shall be maximum 5cm by 5cm between each element; the pattern elements shall be at least 0.32cm wide; and the visible pattern shall be on the outside of the glass; the glazing shall have a low degree of external reflection (max. 15 %).
- (d) Snow Storage:
 - (i) DB Co shall include the capacity for snow storage in the design of all bus facilities, including bus Platform, bus loop and bus lay-by areas.
 - (ii) DB Co shall provide and install salt-tolerant plants, should landscape areas be used for snow storage.
- (e) DB Co shall design and construct all Stations with provision for maintenance including the following:
 - (i) Access to Station areas without passing through fare gates;
 - (ii) Access into and through Stations for maintenance equipment;
 - (iii) Consideration of roof and ceiling heights above finished floor elevation for maintenance or replacement of ceiling mounted or supported items;
 - (iv) Roof access and fall protection for roof mounted equipment; and,

- (v) Other requirements listed elsewhere in this Part 4.

1.4 Key Individuals

(a) Design Architect

- (i) Project Co shall assign a Design Architect with the qualifications identified in Schedule 9 – Key Individuals, to lead the design of the Project including the following:
 - A. Responsible for development of the overall architectural language and overseeing the design of the Project is executed throughout all phases of design and construction;
 - B. Responsible for overseeing that public art is coordinated with the architectural design;
 - C. Responsible for review and approval of all Level One Structures in accordance with Schedule 15-2 Part 2, Clause 4.4 m (iii);
 - D. Responsible for the presentations of the Stations/Project to the Advisory Committee on Planning Design and Realty at the NCC; and,
 - E. Responsible to ensure all Stations and Facilities submissions for architectural drawing and rendering deliverables (Schedule 10 – Review Procedure) reflect the architectural design intent.

(b) Lead Architect

- (i) Project Co shall assign a Lead Architect with the qualifications identified in Schedule 9 – Key Individuals, to lead all aspects of the Stations and Ancillary Facilities, design planning and execution of the same for the Project including the following:
 - A. Responsible for the ensuring the execution of the architectural design of all facilities is consistent across the Project, including compliance with Federally Mandated Station requirements and compatibility of all other Stations with the Existing Confederation Line Stations;
 - B. Responsible for coordination and integration of all signage and wayfinding, mechanical, structural, electrical, communications, public art and systems, to ensure the integrity of the architectural design;
 - C. Responsible for Stations and Ancillary Facilities interface and coordination with the City and third parties;
 - D. Responsible for the interface with all Governmental Authorities; and,

- E. Responsible for the content and completion of all Stations and Facilities
Schedule 10 – Review Procedures deliverables.

ARTICLE 2 ARCHITECTURAL DESIGN CRITERIA

2.1 Introduction

- (a) This Article 2 presents the specific general criteria that are necessary for DB Co to carry out the design and construction of the components and elements of Stations and other building-type Structures on the system.
- (b) Where Design Criteria related to site specific requirements differs from general requirements, site specific Design Criteria take precedence over general Design Criteria.
- (c) The Confederation Line Stations are an extension of the Existing Confederation Line Stations.
 - (i) For Federally Mandated Stations, DB Co shall design the Stations using the same architectural vocabulary, materials and overall architectural design approach as the existing Confederation Line Stations;
 - (ii) For all Stations not identified as Federally Mandated Stations, DB Co shall develop a single architectural language for the Stations, to be implemented during design and construction. The architectural language shall be aesthetically compatible with the Confederation Line Station designs, and where indicated in Table 4-2.1 Station Elements of Continuity (C)/Variability (V), specific elements of DB Co's design shall be consistent with the Existing Confederation Line Stations utilizing the same materials configuration; and,
 - (iii) Refer to Appendix B of this Part 4 for exemplary drawings and renderings of the Existing Confederation Line Stations.

2.2 Codes and Standards

- (a) DB Co shall design and construct all Facilities in accordance with applicable laws, codes, standards, regulations, guidelines and Governmental Authority.
- (b) Where the requirements stipulated in this document or any referenced sources are in conflict, refer to Schedule 15-2, Part 1, Article 1 – Reference Documents and Submittals for order of precedence.
- (c) The following codes, standards and regulations shall apply to the Works:
 - (i) OBC;
 - (ii) AODA;
 - (iii) COADS;
 - (iv) OFC;

- (v) NFPA 130;
- (vi) OC Transpo Transitway and Station Design Guidelines;
- (vii) The Ontario Heritage Act;
- (viii) CSA including:
 - A. CAN/CSA B44 Safety Code for Elevators and escalators (latest edition including Appendix E);
 - B. CAN/CSA-B651 Accessible Design for the Built Environment;
- (ix) MNECB;
- (x) CPTED as defined on the CPTED website: cptedontario.ca;
- (xi) OHSA;
- (xii) MTO; OPSD, OPSS
- (xiii) NBC, applicable to Federally Mandated Stations;
- (d) Code Analysis
 - (i) DB Co shall perform a code analysis with respect to the OBC and NFPA 130: Standard for Fixed Guideway Transit and Passenger Rail Systems. For Federally Mandated Systems, a code analysis for NBC shall also be performed. The code analysis for each Station shall address the following minimum requirements:
 - A. Building Size, Use and Occupancy;
 - i. Building area and number of storeys;
 - ii. Mezzanines; and
 - iii. Description of Stations as either open or enclosed;
 - B. Structural Design:
 - i. Including where the existing Transitway retaining walls that form part of a Station;
 - C. Occupant load;
 - D. Construction requirements;
 - E. Interconnected floor spaces;

- F. Spatial separation;
- G. Fire department access;
- H. Fire separations and compartmentalization;
- I. Egress and exiting;
- J. Fire protection systems, Emergency power and communication systems;
- K. Emergency Ventilation;
- L. Washrooms;
- M. Barrier free design; and
- N. Alternative Solutions:
 - i. Description of performance; and
 - ii. Proposed method of compliance.

2.3 Elements of Continuity and Variability:

- (a) The design of each Station shall utilize a common vocabulary of elements and features that unifies and identifies the system as a whole maintaining an equal quality of design.
- (b) Station design elements are divided into two classifications: Elements of Continuity and Elements of Variability.
 - (i) Elements of Continuity are standard designs established for the purpose of overall system identity, functional consistency, and a reduction in capital, operations, and maintenance costs. They shall include system-wide components such as signage, elevators, and escalators; systems equipment; handrail and guardrail, and Ancillary Facilities. Where identified as Existing Confederation Line (ECL), DB Co shall utilize same designs as implemented in the Existing Confederation Line Station design and construction.
 - (ii) Elements of Variability shall not be required to be consistent between Stations.

Table 4-2.1

| Station Elements of Continuity (C)/Variability (V) | | |
|--|--------|--------------------|
| Element | C or V | ECL ⁽¹⁾ |
| Information devices, all signs/graphics, including accessibility signs/graphics | | |
| • Station lanterns | C | ECL ⁽²⁾ |

| | | |
|--|---|--------------------|
| • System and Station vicinity/maps | C | ECL ⁽²⁾ |
| • Bus information | C | ECL ⁽²⁾ |
| • Directional signage and graphics | C | ECL ⁽²⁾ |
| • Identification | C | ECL ⁽²⁾ |
| • Regulatory | C | ECL ⁽²⁾ |
| • Variable message signs | C | ECL ⁽²⁾ |
| • Transit Information Panels | C | ECL ⁽²⁾ |
| • Advertising Panels | C | ECL ⁽²⁾ |
| Vertical circulation | | |
| • Stairs with bicycle runnels | C | ECL |
| • Escalators | C | |
| • Escalator cladding, lighting, and detailing | C | ECL ⁽²⁾ |
| • Elevators | C | |
| • Elevator enclosure design and detailing ⁽³⁾ | C | ECL ⁽²⁾ |
| • Elevator cab design and detailing | C | ECL ⁽²⁾ |
| Communications | | |
| • PA speakers | C | |
| • PA systems for hearing impaired | C | |
| • Emergency telephones | C | ECL ⁽²⁾ |
| • Passenger information telephones | C | ECL ⁽²⁾ |
| • PIDS | C | ECL ⁽²⁾ |
| • Maintenance telephones | C | |
| Station control and security | | |
| • Intrusion alarms | C | |
| • CCTV equipment | C | |
| Fare collection equipment (Provide infrastructure and coordination only and Emergency egress gates if required) | | |
| • Ticket Machines | C | ECL ⁽²⁾ |
| • Fare gates | C | ECL ⁽²⁾ |
| • Emergency exit gates, if required | C | ECL |

| | | |
|---|---|--------------------|
| Site development plazas | | |
| • Paving | V | |
| • Streets, curbs, and gutters | C | ECL |
| • Walkways | V | |
| • Retaining walls | V | |
| • Bollards, bumpers | V | |
| • Handrails/railings | V | |
| • Landscaping | V | |
| • Fences | C | |
| • Accessible benches | C | ECL ⁽²⁾ |
| • Bus stop shelters | C | ECL ⁽²⁾ |
| • Four stream trash and recycling receptacles | C | ECL ⁽²⁾ |
| • Planters | V | |
| • Lighting (lamp) | C | ECL ⁽²⁾ |
| • Lighting (fixtures and standards) | V | |
| • Bicycle racks and shelters | C | ECL ⁽²⁾ |
| • Bus Platforms | V | |
| • TWSIs | C | ECL ⁽²⁾ |
| • PPUDOs | C | |
| • After-hours entrance into Fare –Paid Zone bus Platforms | C | |
| Station Elements | | |
| • Roof form (design) and Materials | C | ECL |
| • Platform seating | C | ECL ⁽²⁾ |
| • Trash and recycling receptacles | C | ECL ⁽²⁾ |
| • Utility cabinets | C | ECL ⁽²⁾ |
| • PA speaker housing | C | ECL |
| • Doors, gates, and hardware | C | |
| • Floor material | C | ECL |
| • Wall and ceiling finishes public areas | C | ECL |
| • Hose bibs | C | |

| | | |
|---|---|--------------------|
| • Lighting (lamp) | C | |
| • Lighting (fixture) | C | ECL |
| • Security gates at Station entrances | V | |
| • Acoustical materials and details | V | |
| • Concourse configuration | V | |
| • Smoke and exhaust enclosure | V | |
| • Canopies and windscreens | C | ECL |
| • Screens for Mechanical equipment | C | ECL |
| • Handrails—public areas | C | ECL |
| • Guardrails—public areas | C | ECL |
| • Railings/handrails—Emergency exits | C | |
| • Linear Platform edge detail and material | C | ECL ⁽²⁾ |
| • Stairway details and materials | C | ECL |
| • Electrical outlets | C | |
| • Platform service gates | C | ECL |
| • Fire hose cabinet | C | ECL |
| • Emergency telephone | C | ECL ⁽²⁾ |
| • TWSIs | C | ECL ⁽²⁾ |
| • Heat traced Platforms | C | ECL |
| • TSA waiting Area | C | ECL |
| • Retail Areas | C | ECL ⁽²⁾ |
| Ancillary rooms | | |
| • Incoming power room | C | |
| • SER | C | |
| • Communication room | C | |
| • Substations | C | |
| • Auxiliary electrical rooms | C | |
| • Miscellaneous auxiliary rooms | C | |
| • Toilet room—fixtures, accessories materials | C | |
| • Custodial rooms | C | |

| | | |
|---|---|--|
| • Maintenances Staff room | C | |
| • Fan rooms | C | |
| • Storage rooms | C | |
| • Utility boxes | C | |
| • Doors and hardware | C | |
| • Elevator Machine Room | C | |
| • Mechanical grates, louvers, and grilles | C | |
| • OC Transpo staff multi-purpose room | C | |
| Artwork | V | |
| <i>C = Elements of continuity</i> | | |
| <i>V = Elements of variability</i> | | |
| <i>ECL=Existing Confederation Line detailing required</i> | | |

Table Notes:

- (1) All items listed as ECL are applicable to Federally Mandated Stations.
- (2) Indicates consistency with ECL required at all Stations.
- (3) Enclosure includes the formed perforated metal shroud.

2.4 Station Sizing and Capacity

- (a) DB Co shall provide Stations sized to meet the following general requirements:
 - (i) DB Co shall provide Station designs sized to accommodate the ridership forecast data provided in this Part 4, and the operational performance requirements as outlined Schedule 15-2, Part 1, Article 3 – Operational Performance Requirements utilizing the Passenger demand forecast for 2031AM peak with the exception of the Underground Stations which shall be designed to accommodate the Passenger demand forecast for 2048 AM peak.
 - (ii) DB Co shall provide bus transfer Stations and Platforms to accommodate the peak hour bus transfer operations, including Passenger flows and bus volumes for 2031.
 - (iii) DB Co shall ensure Stations, Platforms and circulation elements, both horizontal and vertical, are sized to meet the following minimum requirements:
 - A. Minimum Emergency egress provision shall satisfy the requirements of the OBC.
 - B. A Platform clearance time of no more than 0.8 times the shortest Headway anticipated under normal operations for the design capacity.

- i. Two Trains arriving at the same time shall be considered as the base case for modeling purposes for centre Station Platforms.
 - ii. Two Trains arriving at the same time shall be considered as the base case for modeling purposes for side Station Platforms with a shared mezzanine level.
 - C. The maximum calculated Train load utilized for code compliance and Station planning and design shall be calculated by DB Co in accordance with the OBC based on the following Train configurations:
 - i. For design years 2023-2031, the crush load, as defined in the OBC shall be calculated for the maximum capacity of a two-car Train;
 - ii. For Design year 2048, and beyond, the crush load shall be calculated for the maximum capacity of a two-car Train plus an additional module added in one car.
- (b) DB Co shall provide Platforms sized to meet the following general requirements:
 - (i) Platform length shall be as follows:
 - A. The minimum finished Platform length at all Stations shall be as follows:
 - i. All Station Platforms, with the exception of Cleary, New Orchard, and Baseline Stations shall be constructed to an initial length of 90m and protected and planned for an ultimate length of 100m. Protection shall involve ensuring that the future extension of the Platforms can be performed without requiring Track realignment, additional property acquisition, and/or demolition or relocation of any SI or public and private utilities services; and
 - ii. Cleary, New Orchard and Baseline Stations shall have an initial Platform length of 100m. The below grade portion of the Station structure shall be constructed to allow for Platform extensions to 120m in the future without disruption to Revenue Service.
 - (ii) Platform width shall be as follows:
 - A. Platform width shall be calculated in accordance with the requirements of the OBC, NFPA, Passenger data and the level of service for the Platform space as required in this Article 2.
 - B. The final width of the Platform shall be the greater of the following: the minimum required by OBC; the minimum required by NFPA 130; or the minimum width to satisfy the LOS requirements

- i. Calculation of Platform width shall be based upon this Part 4 and Schedule 15-2, Part 1, Article 3 – Operational Performance Requirements, and operational Headways described in Schedule 15-2, Part 1, Article 3 – Operational Performance Requirements.
 - ii. Platform width minimums for Stations shall be as follows:
 1. The calculated width of all Station Platforms, with the exception of Cleary, New Orchard, and Baseline Stations shall be for 2031 operations; and,
 2. The calculated width of Cleary, New Orchard and Baseline Stations shall be for 2048 operations.
 - iii. Both Platforms in a side Platform configuration shall be equal in size based upon the greater of the calculated required width per direction.
 - iv. Shelters, equipment and amenities shall be placed in the centre of the Platform, for centre Platform configuration, to maximize the clearance from shelters, equipment and amenities to edge of Platform for circulation.
 - v. Shelters, equipment and amenities are to be placed adjacent to the side walls, for side Platform configurations
- (c) DB Co shall provide Station elements that meet the Levels of Service as follows:
- (i) The LOS indicated below shall be provided in the design of public spaces as referenced in other parts of this Article 2:
- | Location | LOS | Measure |
|------------------------|-----|------------------------------|
| Platforms (Normal)* | C | 0.8m ² per person |
| Platforms (Emergency)* | D | 0.4m ² per person |
| Waiting Areas | C | 0.8m ² per person |
| Passageways – 1 way | D | 50 ppm per metre |
| Passageways – 2 way | C | 40 ppm per metre |
| Stairways – 1 way | E | 55 ppm per metre |
| Stairways – 2 way | D | 35 ppm per metre |
- *Note: Normal Platform refers to the LOS during the daily peak 15 minutes. Emergency Platform refers to the level of service provided during an Emergency in accordance with OBC.*
- (d) DB Co shall utilize Passenger modeling software to develop and verify the design of all aspects of the Station circulation including but not limited to the interior circulation, vertical circulation, site circulation and bus Platform operations based upon the 2031 and 2048 ridership forecast data provided in this Part 4 and the 2031 and 2048 Operational

requirements as outlined in Schedule 15-2, Part 1, Article 3 – Operational Performance Requirements as applicable at each Station.

- (i) The software utilized by DB Co shall be a proven and widely used product in the design and analysis of rapid transit and intermodal transit facilities.
 - (ii) DB Co shall provide modeling simulations for each Underground Station utilizing Passenger data reflecting Passenger carrying capacities for 2048 as outlined in this Part 4.
 - (iii) Passenger modelling shall to include all physical barriers, such as columns and Station furniture, and include surge spaces around Station equipment such as fare equipment and elevators.
 - (iv) The design of the Station Facilities shall be adjusted based upon the results of the simulation.
 - (v) The Passenger simulation analysis shall be submitted in accordance with Schedule 10 – Review Procedure.
 - (vi) Assumptions used in modelling simulations shall be confirmed and agreed upon between DB Co and the City.
 - (vii) Data and assumptions related to bus activities at Transfer Stations required for the modeling of bus terminal shall be reviewed with the City prior to commencement of any modeling.
- (e) Surge spaces, queuing and runoff
- (i) DB Co shall be responsible for determining the amount of queuing space required at each element within the design to meet the LOS required in each area. The calculated requirements shall be equal to or greater than the requirements below for the following items;
 - A. Runoff provided at the top and bottom of escalators shall be a minimum of 5000mm.
 - B. Surge space provided at the top and bottom of public stairs shall be a minimum of 5000mm.
 - C. Runoff provided space in front of an elevator shall be a minimum of 3000mm.
 - D. Queuing distance provided at fare gates, entry and exit sides shall be a minimum of 5000mm measured from the leading and trailing limits of the gate pedestal.

- i. The coiling door shall not be located as such to reduce the required 5m surge space from the fare gates where coiling doors, are provided at a Station entrance.
 - ii. Queuing distances conforming with the above shall be provided at all fare gates including future gates.
 - E. Queuing space provided at a Ticket Machine or automatic teller shall be a minimum 3000mm when facing a wall or obstruction.
 - F. Queuing space provided at a Ticket Machine or automatic teller shall be a minimum 2000mm when adjoining another queue space.
 - G. Queuing space provided at doors for use by the public to and within Stations within the flow path of Passengers to and from entries, Platforms and vertical circulation, exclusive of coiling doors and grills, shall be a minimum of 3000mm.
 - H. Where two or more elements listed above converge, the surge or runoff spaces shall be cumulative.
- (f) Vertical Circulation shall be sized as follows:
- (i) Vertical circulation for all stations shall be sized to meet the Passenger carrying capacity of the 2048 operations.
- (g) Ridership Forecast Data
- (i) DB Co shall be responsible for ensuring that the SI supports the Passenger demand in Table 4-2.2 and Table 4-2.3 below, and in accordance with this Part 4 and Schedule 15-2, Part 1, Article 3.3 – Operational Design and Construction Requirements.
 - (ii) DB Co shall utilize a ratio of 82.5% to convert the AM peak hour ridership forecast to a PM peak hour ridership forecast.

Table 4-2.2: 2031 AM Peak Hour Ridership Forecast

| Stations | 2031 AM Peak Hour Ridership Forecast | | | | | |
|------------|--------------------------------------|---------------|---------|--------------|---------------|---------|
| | EB Boardings | EB Alightings | EB Load | WB Boardings | WB Alightings | WB Load |
| Moodie | 4,226 | 0 | 4,226 | 0 | 688 | 0 |
| Bayshore | 1,305 | 64 | 5,467 | 106 | 180 | 688 |
| Pinecrest | 561 | 36 | 5,992 | 43 | 156 | 762 |
| Queensview | 376 | 77 | 6,291 | 67 | 118 | 875 |

| | | | | | | |
|------------------|-------|-------|---------------|-------|-------|------------------------------------|
| Baseline | 4,881 | 0 | 4,881 | 0 | 2,230 | 0 |
| Iris | 279 | 33 | 5,127 | 13 | 31 | 2,230 |
| Lincoln Fields | 891 | 863 | 11,446 | 734 | 157 | 2,248 to Iris 926 to Queensview |
| New Orchard | 411 | 123 | 11,734 | 112 | 110 | 2,596 |
| Cleary | 565 | 404 | 11,895 | 110 | 163 | 2,594 |
| Dominion | 152 | 39 | 12,008 | 26 | 24 | 2,647 |
| Westboro | 661 | 168 | 12,501 | 163 | 246 | 2,645 |
| Tunney's Pasture | 1,916 | 851 | 13,566 | 304 | 1,131 | 2,728 |
| Bayview | 554 | 960 | 13,160 | 148 | 203 | 3,555 |
| Pimisi | 518 | 458 | 13,220 | 210 | 325 | 3,610 |
| Lyon | 3,852 | 4,089 | 12,983 | 941 | 3,748 | 3,725 |
| Parliament | 274 | 3,876 | 9,381 | 239 | 2,959 | 6,532 |
| Rideau | 545 | 2,566 | 7,360 | 763 | 1,466 | 9,252 |
| uOttawa | 388 | 3,989 | 3,759 | 491 | 2,759 | 9,955 |
| Lees | 211 | 215 | 3,755 | 217 | 206 | 12,223 |
| Hurdman | 626 | 1,535 | 2,846 | 4,444 | 1,059 | 12,212 |
| Tremblay | 52 | 280 | 2,618 | 71 | 162 | 8,827 |
| St. Laurent | 202 | 928 | 1,892 | 948 | 707 | 8,918 |
| Cyrville | 58 | 403 | 1,547 | 340 | 192 | 8,677 |
| Blair | 138 | 886 | 799 | 2,395 | 720 | 8,529 |
| Montreal | 89 | 163 | 725 | 277 | 85 | 6,854 |
| Jeanne d'Arc | 62 | 207 | 580 | 1,474 | 46 | 6,662 |
| Orleans Blvd | 41 | 170 | 451 | 851 | 56 | 5,234 |
| Place d'Orléans | 13 | 402 | 62 | 2,828 | 38 | 4,439 |
| Trim | 0 | 61 | 1 | 1,649 | 0 | 1,649 |

Table 4-2.3: 2048 AM Peak Hour Ridership Forecast

| Stations | 2048 AM Peak Hour Ridership Forecast | | | | | |
|----------|--------------------------------------|---------------|---------|--------------|---------------|---------|
| | EB Boardings | EB Alightings | EB Load | WB Boardings | WB Alightings | WB Load |
| Moodie | 4,758 | 0 | 4,758 | 0 | 775 | 0 |
| Bayshore | 1,469 | 72 | 6,155 | 119 | 203 | 775 |

| | | | | | | |
|------------------|-------|-------|---------------|-------|-------|---------------------|
| Pinecrest | 632 | 41 | 6,746 | 48 | 176 | 858 |
| Queensview | 423 | 87 | 7,083 | 75 | 133 | 985 |
| Baseline | 5,496 | 0 | 5,496 | 0 | 2,511 | 0 |
| Iris | 314 | 37 | 5,773 | 15 | 35 | 2,511 |
| Lincoln Fields | 1,003 | 972 | 12,887 | 826 | 177 | 2,531 to Iris |
| | | | | | | 1,043 to Queensview |
| New Orchard | 463 | 138 | 13,211 | 126 | 124 | 2,923 |
| Cleary | 636 | 455 | 13,393 | 124 | 184 | 2,921 |
| Dominion | 171 | 44 | 13,520 | 29 | 27 | 2,980 |
| Westboro | 744 | 189 | 14,075 | 184 | 277 | 2,978 |
| Tunney's Pasture | 2,157 | 958 | 15,274 | 342 | 1,273 | 3,071 |
| Bayview | 624 | 1,081 | 14,817 | 167 | 229 | 4,003 |
| Pimisi | 583 | 516 | 14,884 | 236 | 366 | 4,065 |
| Lyon | 4,337 | 4,604 | 14,618 | 1,059 | 4,220 | 4,194 |
| Parliament | 308 | 4,364 | 10,562 | 269 | 3,332 | 7,354 |
| Rideau | 614 | 2,889 | 8,287 | 859 | 1,651 | 10,417 |
| uOttawa | 437 | 4,491 | 4,232 | 553 | 3,106 | 11,208 |
| Lees | 238 | 242 | 4,228 | 244 | 232 | 13,762 |
| Hurdman | 705 | 1,728 | 3,204 | 5,004 | 1,192 | 13,750 |
| Tremblay | 59 | 315 | 2,948 | 80 | 182 | 9,938 |
| St. Laurent | 227 | 1,045 | 2,130 | 1,067 | 796 | 10,041 |
| Cyrville | 65 | 454 | 1,742 | 383 | 216 | 9,769 |
| Blair | 155 | 998 | 900 | 2,697 | 811 | 9,603 |
| Montreal | 100 | 184 | 816 | 312 | 96 | 7,717 |
| Jeanne d'Arc | 70 | 233 | 653 | 1,660 | 52 | 7,501 |
| Orleans Blvd | 46 | 191 | 508 | 958 | 63 | 5,893 |
| Place d'Orléans | 15 | 453 | 70 | 3,184 | 43 | 4,998 |
| Trim | 0 | 69 | 1 | 1,857 | 0 | 1,857 |

2.5 Circulation and Egress

- (a) DB Co shall provide vertical circulation in accordance with the following:
 - (i) DB Co Shall provide elevators in accordance with the following:

- A. Where Station design requires elevators, except where noted in this Article 2, each Station Platform, concourse, and entrance shall be serviced by redundant elevators or other alternative route as described in this Part 4.
 - i. The crossing of City or private streets to satisfy the redundancy requirements shall not be permitted.
 - ii. An alternative accessible means of vertical transportation, such as a ramp, shall be permitted, provided the alternative means is within 50m, lit, winter maintained and comply with CAN-CSA B-651,
 - iii. Passengers shall not be required to exit the Fare Paid Zone to access the redundant elevator or alternative route.
- B. Where Station design requires elevators, a minimum of one elevator serving each Platform, and all levels of the Station, shall be sized to allow for an ambulance stretcher in the prone position and customers with bicycles. The other elevator shall provide redundancy for accessibility purposes.
- C. All elevators shall meet the following general requirements:
 - i. Conform to all applicable Acts and codes, including the CAN/CSA B44 Safety Code for Elevators and Escalators (latest edition including Appendix E), OBC, NFPA, NBC, AODA, CSA Accessible Design for the Built Environment CAN/CSA B651, and City of Ottawa Accessibility Design Standards;
 - ii. Be of heavy duty components and construction designed specifically for transportation system usage;
 - iii. All elevator doors including existing refurbished elevators shall be constructed utilizing glass with stainless steel frames to maintain sightlines into the elevator cab.
 - iv. Traction elevators shall be provided where they serve more than 14m of travel; and
 - v. Running time, cycle counters or trip counters that would cause the elevators to shut down or alter their operation in any way, shall not be permitted.
- D. In addition, all new elevators shall have the following:
 - i. The elevator car walls and hoistway walls shall be constructed utilizing glass to maintain sightlines inside and outside of elevator. Both elevator cab and hoistway enclosure shall be constructed of glass.

- ii. Where all glass cab and hoistway is not feasible, a minimum, of 50% of the total elevator cab and hoist way's vertical enclosure surface area shall be constructed of glass;
 - 1 Glass surfaces of the elevator and elevator hoistway shall be aligned.
 - 2 Panels within the elevator shaft required to meet TSSA requirements shall not be opaque.
 - 3 All glass used in the construction of the elevator cab, hoistway, and panels used to meet TSSA requirements where door opening in the hoistway shaft are not present, to reduce gaps between cab and hoistway, etc. shall be transparent vision glass.
 - 4 In lieu of panels located where door openings in the hoistway do not exist, DB Co may substitute, with TSSA approval, a positive door interlock to prevent doors from opening at no door opening locations.
- iii. CCTV camera coverage shall be provided within the cab and at each landing;
- iv. Access locations to elevators shall be weather protected so as to prevent the infiltration of precipitation into the elevator shafts and or cabs;
- v. Elevator cab flooring shall be aluminum, rubber, or other durable, non-absorbent material with a non-slip surface with coefficient of friction of not less than 0.60;
- vi. Elevators shall accommodate a minimum capacity of 1815kg, or the heaviest piece of equipment to be transported between levels for replacement or maintenance of the equipment, whichever is greater;
- vii. The minimum inside cab dimensions shall be 1526mm wide x 2413mm deep with 1200mm wide (clear opening) x 2135mm high doors.
- viii. Minimum car operating speeds shall be 0.5m per second for elevators with a travel distance of less than or equal to 20m and 1m per second for elevators with a travel distance of more than 20m;

- ix. Elevator machine rooms shall be located as near as possible to hoistways with a maximum distance of 20m clear of public walking and landing areas;
- x. Oil heaters shall be installed in the hydraulic elevator storage tank if the elevator is not in a heated area;
- xi. Elevators shall be equipped with a self-recharging battery pack which shall maintain lighting, return the elevator to level of fire department access, open the doors, and render the elevator inoperative in the event of a power failure;
- xii. All elevator keying shall match the keying of the existing elevators within the Existing Confederation Line;
- xiii. Elevators shall be equipped with a hands-free telephone connected with TOCC;
- xiv. Elevators shall contain graffiti-resistant finish material in the cab interior;
- xv. Elevators shall be equipped with a urine detection system;
- xvi. Lighting in elevator cabs shall be LED fixtures. Lighting shall be covered with a protective transparent shield to prevent vandalism;
- xvii. The operating status of the elevator shall be monitored by the BMS system and the TOCC;
- xviii. Elevators shall be controlled at the Station only;
- xix. Elevators intended for use in moving equipment to and from locations within the facility shall be sized to accommodate the intended equipment;
- xx. Elevator pit walls shall be lined with a non-porous material and shall be drained and waterproofed; and
- xxi. Existing elevators within Station Facilities shall be refurbished to meet at a minimum the following:
 - 1 Existing cab and shaft doors shall be replaced with full glass doors;
 - 2 Existing control equipment shall be compatible with the BMS and TOCC monitoring requirements and shall be upgraded, if required;

- 3 DB Co shall ensure existing elevator cabs are provided with CCTV cameras; and,
 - 4 DB Co shall be responsible to make all upgrades to existing elevators in order to obtain certification of the equipment.
 - 5 DB Co shall upgrade the existing elevator, cabs, controls, signage, etc. to meet the current accessibility requirements, excluding any modifications to the cab size.
- (ii) DB Co shall provide escalators in accordance with the following:
- A. Where escalators are required to serve the Train Platform level, DB Co. shall provide a minimum of one escalator serving each Train Platform.
 - B. Escalators shall be provided to serve Baseline Station.
 - i. DB Co shall provide a minimum of one escalator serving each entrance and each level inclusive of the Train Platform, Entrance level and pedestrian Bridge level;
 - C. Escalators shall be provided to serve Lincoln Fields Station.
 - i. DB Co shall provide a minimum of one escalator serving each Train Platform to the Carling Avenue entrance level; and,
 - ii. DB Co shall provide an escalator serving the bus terminal level to the Carling Avenue entrance level.
 - D. Escalators shall be provided to serve Moodie Station.
 - i. DB Co shall provide a minimum of one escalator serving each Train Platform to the pedestrian Bridge level.
 - E. Escalators shall be provided to serve Place d'Orléans Station.
 - i. DB Co shall provide a minimum of one escalator serving the Train Platform to the new pedestrian Bridge level to the bus terminal within the Fare Paid Zone.
 - F. Escalators shall be provided to serve Trim Station.
 - i. DB Co shall provide a minimum of one escalator serving the Train Platform to the pedestrian Bridge level connecting to the Fare Paid entrance adjacent to the bus terminal; and,
 - ii. DB Co shall provide a minimum of one escalator serving the fare paid entrance and bus terminal to the pedestrian Bridge level;

- G. Escalators shall meet the following requirements:
- i. Conform to all Applicable Codes and acts including the CAN/CSA B44 Safety Code for Elevators and Escalators OBC, NFPA, NBC, AODA, CSA Accessible Design for the Built Environment CAN/CSA B651, and City of Ottawa Accessibility Standards;
 - ii. Shall be of components and construction that meet or exceed the requirements for the “Heavy Duty Transportation System Escalator Design Guidelines,” published by the APTA; and
 - iii. Running time, cycle counters or trip counters that would cause the escalators to shut down or alter their operation in any way, shall not be permitted.
- H. In addition, the escalators shall meet the following requirements:
- i. Shall have a minimum step width of 1000mm;
 - ii. Shall have a running headroom of not less than 2200mm;
 - iii. Shall have reversing capabilities. A keying device shall be required to change direction;
 - iv. Shall be capable of operating with a full passenger load at a speed of 0.5m per second in both directions;
 - v. Shall be designed for continuous operation, 24 hours a day, 365 days a year;
 - vi. Shall be capable of operating with full specified performance capability while exposed to the following climatic and environmental conditions:
 - 1 Natural elements of weather and other man made environmental conditions, including sunlight, rain, slush, snow and ice, all conditions of relative humidity while exposed to road salt, airborne dust and debris; and in dry bulb temperature -40°C to 40°C;
 - vii. Step chain rollers shall be mounted outside the chain link;
 - viii. Shall have 3 flat steps at each of the top and bottom landings;
 - ix. Shall have brushes along the skirt panels;
 - x. The sides and bottom of the escalators shall be clad in Type 304 alloy stainless steel conforming to ASTM A167, where exposed;

- xi. Escalators forming part of the required egress route shall be capable of being interlocked with the fire alarm system and shut down in the event of an alarm;
- xii. Shall have a high deck with angled stainless steel balustrades;
- xiii. Status shall be monitored by the BAS in the Station and at the TOCC; and,
- xiv. Shall be able to be controlled at the escalator in the Station.
- xv. Shall have provisions to be controlled remotely at the TOCC.
- xvi. The use of wood, inclusive of fire treated, non-combustible wood shall be prohibited from use in any portion of the escalator or escalator cladding.

(b) DB Co shall provide stairs and ramps in accordance with the following:

(i) Stairs

- A. New stairs shall be constructed of precast or cast in place concrete with precast concrete treads with cast in nosings. Tactile warning strips shall be provided as required by OBC, CAN-CSA B-651, AODA and COADS.
- B. Exterior stairwells within the Station, Emergency egress stairs from the Station, and stairs providing access to the Station shall be fully weather protected or heat-traced to ensure safe usage during the winter;
- C. Sizing shall be per code minimum requirements and per LOS requirements as defined in this Part 4.
- D. DB Co shall design and construct all stairways in compliance with the following criteria.
 - i. Open risers shall not be permitted;
 - ii. Continuous railings shall be provided on both sides of the stairs;
 - iii. Stairs rise and run shall be 30 degrees.
 - iv. Exterior stairway landing levels shall include a grated drainable catchment basin to trap grit, water and snow.
 - v. All public stairs, interior and exterior, shall include a bicycle wheel trough on one side of each flight of stairs.

- 1 For new construction, the bicycle trough shall be integral with the stair construction.
 - 2 For existing stair construction, the trough is permitted to be surface applied, provided the trough, fasteners and accessories to do not reduce the required egress width.
 - 3 All bicycle wheel troughs shall include textured, non-slip surfaces to provide traction for bicycle wheels.
- E. Existing stairs shall be refurbished or replaced to satisfy the Design Life requirements outlined in Schedule 15-2, Part 1, Article 4 – Design and Construction.
- (ii) DB Co shall provide railings in accordance with the following:
- A. Guardrails and handrails shall be provided where required by code and CAN-CSA B-651 as follows:
- i. The design and construction of guardrails for all Stations shall be consistent and an element of Continuity.
 - 1 Guardrails for Federally Mandated Stations shall be consistent with the Existing Confederation Line per drawings contained in Appendix B of this Part 4: STAIR RAILING / GUARD DETAILS; and,
 - 2 For Stations other than Federally Mandated Stations, Guard Materials and detailing shall be of any material and detailing conforming with the requirements of the OBC and satisfying the Design Life requirements per Schedule 15-2, Part 1, Article 4 – Design and Construction.
 - ii. All handrails associated with public stairs and ramps within the Station Fare Paid Zone, on the Station site and providing access to the Station site, shall be stainless steel pipe sections Type 304 alloy conforming to ASTM A167, with smooth brushed finish, supported by cast aluminum or stainless steel bracket supported from wall or guard rail system;
- (iii) DB CO shall provide ramps in accordance with the following:
- A. All interior and exterior ramps shall be universally accessible, including satisfying the requirements of OBC, AODA COADS and applicable CSA Standards, including but not limited to CAN/CSA B651; and,

- B. All interior ramps and exterior ramps providing access to the Station shall be fully weather protected or heat-traced to ensure safe usage during the winter.
 - C. For Station designs that rely only on ramps in lieu of elevators as the accessible route, DB Co shall design the vertical circulation in accordance with the following:
 - i. Each level served by ramps only shall also be served by a stair;
 - ii. The landings of the stairs in the direction of travel from the Station entry to the Platform shall be directly adjacent to each other; and,
 - iii. The landings of the stair and ramp at Platform level shall be separated by a maximum distance of 15.0m.
- (c) DB Co shall provide doors in accordance with the following:
- (i) Power door operators shall be provided for at least one public door into each publicly accessible space and room.
 - (ii) All doors shall have a 980 mm minimum clear width.
 - (iii) Exposed edges of frameless transparent glass public doors and panels shall be framed with a 70% colour contrast material compared to surrounding wall surfaces.
 - (iv) Framed glass public doors shall be finished with a 70% colour contrast material compared to surrounding wall surfaces.
 - (v) Opaque door and frame assemblies shall be finished with a 70% colour contrast compared to surrounding wall surfaces
 - (vi) All doors and gates securing the perimeter of the Station, inclusive of service doors shall be provided with electronic key card access and shall be monitored at the TOCC.
 - (vii) All Emergency egress doors and gates shall be provided with an exterior light that remains on during all hours of darkness and shall be signed for restricted access.
- (d) DB Co shall provide circulation in accordance with the following:
- (i) Public Passageways
 - A. The width of public passageways:
 - i. Shall meet or exceed exiting requirements set forth in the OBC;

- ii. Shall be a minimum of 4000mm; and
 - iii. Shall be sized in order to satisfy the LOS indicated in this Article 2.
 - B. Corridors and passageways shall have a minimum clear height of 3500mm, excluding space required for mechanical and electric services.
 - C. The main accessible path of travel for public passageways in an open area from entrances to the Platform level and all Passenger amenities shall be identified by tactile floor wayfinding.
- (ii) Non public
 - A. The minimal acceptable width of passageways for non-public use shall be the greater of the following: code calculated minimum, 1200mm, as required by accessibility requirements or sized as required to move equipment for maintenance.
- (iii) Public-use pedways within Fare Paid Zone (Overpass / Underpass)
 - A. The minimum clear width shall be 4000mm, unless existing to remain.
 - B. The minimum clear height shall be 3500mm, unless existing to remain.
- (e) DB Co shall provide Emergency egress in accordance with the following:
 - (i) Egress to Track level from the Platform along the length of the Platform for purposes of satisfying code exiting requirements shall be prohibited.
 - (ii) Where required, exiting from the end of the Platform into the Guideway area is acceptable for At Grade Stations in accordance with the following:
 - A. Doors/gates at Platform ends shall be sized appropriately to satisfy code requirements. The door/gate assembly overall height shall be 2450mm;
 - i. For Federally Mandated Stations door/gate design shall be consistent with the Existing Confederation Line per drawings contained in Appendix B of this Part 4: END OF PLATFORM DOOR DETAILS; and,
 - ii. For Station other than Federally Mandated Stations door/gate design shall be similar to the Existing Confederation Line per drawings contained in Appendix B of this Part 4: END OF PLATFORM DOOR DETAILS utilizing a glazing and support system as selected by DB Co.

- B. Doors/gates at Platform ends shall be equipped with panic device hardware;
 - C. The position of doors/gates shall be monitored at the TOCC. Unauthorized opening of the door/gate shall sound an audible signal in the Station and notify the TOCC;
 - D. Beyond the Platform end, the egress path shall be segregated from Track level with a fence or railing system to prevent public access to the Tracks and or crossing the Tracks;
 - i. Railing system shall be designed to meet the OBC requirements for a guardrail including but not limited to structural capacity and balustrade spacing.
 - E. The path of travel shall lead to a public way;
 - F. The path of travel must be designed and constructed to allow winter maintenance; and,
 - G. Crossing of the Tracks to access the public way shall be prohibited.
- (iii) Pathways connecting a Station Platform to a MUP, roadway, or sidewalk, to satisfy Emergency egress requirements from the Stations, shall include the following requirements:
- A. Egress lighting;
 - i. The lighting level shall at a minimum meet the requirements of OBC for Emergency egress lighting; and
 - ii. Lighting shall be interconnected with the fire alarm system and be activated only in the event of an Emergency situation.
- (f) DB Co shall provide Station entrances in accordance with the following::
- (i) Entrances to Stations for use by the public shall be equipped with doors, coiling grilles or ornamental gates or other means to secure the Station buildings during hours of non-operation.
 - A. All doors, inclusive of coiling grills shall be capable of being remotely opened, closed and locked from the TOCC;
 - B. All doors shall be equipped with IAC and card access; and,
 - C. The status of all doors shall be remotely monitored by the TOCC.

- (ii) Each mode of transportation at Transfer Stations shall be capable of being secured separately when hours of operations differ.
 - A. Public access to/from the bus terminal at Transfer Stations shall be maintained 24 hours per day.
 - B. Bus Passengers shall have access to Ticket Machines during bus operating hours.
- (iii) All doors, coiling grills, etc. used to secure the Stations shall be equipped with electric operators, and controlled both locally and remotely from the TOCC.
- (iv) Each Station entrance shall have a maintenance access in accordance with the following:
 - A. Maintenance door shall have a clear width of at least 1200 mm;
 - i. Use of fare gate for maintenance access shall be prohibited; and
 - B. Maintenance door shall be accessible when the Station is closed to public use.
- (v) DB Co shall provide recessed floor grilles at all Station entrances located directly adjacent to the fare gates:
 - A. The floor grills shall extend the full width of the fare gate array, inclusive of the future fare gate allowances, and a minimum distance of 2.5m from the leading and trailing face of the fare gate pedestal.
 - B. Each floor grille shall be equipped with a floor drain.
 - C. Each floor grille drain and drainage pan shall be heat traced.
- (g) DB Co shall provide wayfinding in accordance with the following:
 - (i) Provide tactile floor wayfinding throughout all Stations inclusive of bus Facilities including bus boarding locations within the Fare Paid Zone, and on street bus stops in compliance with OBC, COADS and CAN/CSA B651: Accessible Design for the Built Environment.

2.6 Functional Requirements

- (a) DB Co shall design and construct the Stations to meet the functional requirements as indicated in Appendix A of this Part 4:
- (b) Where bus services are provided, the DB Co shall provide all surface facilities including bus Platforms, drives, slips, etc. to accommodate all buses including articulated and double decker buses and in accordance with the following:

- (i) All OC Transpo facilities, (bus operator rooms, washrooms, multipurpose room, lunchrooms, etc.), shall be designed to be universally accessible.
- (ii) All OC Transpo facilities, (eg: bus operator rooms, washrooms, multipurpose room, lunchrooms, etc.), shall be access controlled by key card.
- (iii) All washrooms for use by OC Transpo shall be designed and constructed to meet the requirements of OBC and COADS.
- (iv) Where required in Appendix A of this Part 4, bus operator Facilities shall be provided as follows:
 - A. All bus operator Facilities at all Stations, with the exception of Place d'Orléans and Bayshore Stations, shall be standalone Facilities.
 - B. All bus operator Facilities, with the exception of Place d'Orléans and Bayshore Stations, shall be located as to separate OC Transpo bus operators from Passenger areas and bus Platforms.
 - C. New Facilities shall be constructed to meet the requirements of the City's standard bus operator building.
 - D. All bus terminals shall be provided with a designated walking area for bus operators to safely walk between the bus lay-up and bus operator facility.
 - E. DB Co shall register each new Facility with the GBC and provide documentation for all credits necessary for "Certified" status.
 - F. Program elements within the facility shall include the following:
 - i. Multiple occupancy male washroom with ceiling mounted embossed stainless steel partitions with the following plumbing fixture count;
 - 1 Two lavatories;
 - 2 Two water closets; and,
 - 3 One urinal.
 - ii. Multiple occupancy female washroom with ceiling mounted embossed stainless steel partitions with the following plumbing fixture count;
 - 1 Two lavatories; and,
 - 2 Two water closets.

- iii. Universal washroom satisfying the requirements of COADS and CAN-CSA B-651;
- iv. Washroom fixtures and accessories shall meet OC Transpo requirements, including but not limited to mirror, toilet tissue dispenser, soap dispenser, paper towel dispenser, and trash receptacle.
- v. Janitor closet with mop sink, accessible from within the Facility;
- vi. Breakroom with kitchenette and casework for concurrent use by four people;
- vii. General power requirements, including dedicated power circuits for each of the following: microwave oven, refrigerator, and toaster oven; and vending machines;
- viii. Space for a refrigerator, vending machine, and microwave;
- ix. Water cooler with bottle filler;
- x. Staff work areas;
- xi. Maintenance room with slop sink, accessed from the exterior and interior from the staff area;
 - 1 Shall be a minimum of 60m², with no side less than 6m in length;
 - 2 Shall be equipped with a personnel door and a 4m wide overhead door to the exterior.
 - 3 Shall be equipped with a personnel door and a 4m wide overhead door to the staff area;
 - 4 Shall have at a minimum of one floor drain.
- xii. Building entry and maintenance room shall have electronic access control;
- xiii. Mechanical and electrical support rooms;
 - 1 DB Co shall provide a building automation system per Article 5 - Mechanical Design Criteria of this Part 4, which is compatible with existing OC Transpo BMS.
- xiv. Communication room to support City equipment;

- xv. New buildings shall be designed and constructed with materials compatible with the adjacent Station; and,
- xvi. New buildings at Federally Mandated Stations shall be consistent with the Existing Confederation Line bus operators' buildings.
- G. Buildings shall provide illumination level of 25fc to be achieved via natural daylighting over 75% of all floor spaces. Windows shall conform to City's standard bus operator building requirements; and
- H. Building shall be equipped with telephone and data services.
 - i. All staff spaces shall be equipped with data and communications outlets.
- I. The flooring in all spaces, excluding building service support spaces and the maintenance space, shall be finished with Stonehard flooring system or other similar resinous flooring system as approved by the City.
- (v) All Transfer Station bus drives, Platforms, and lay-by areas shall have a vertical clearance of no less than 5m.
- (c) DB Co shall design and construct LRT Operator rooms per the following:
 - (i) Shall be provided as indicated in Appendix A of this Part 4;
 - (ii) Shall at a minimum include the following:
 - A. Breakroom with kitchenette and casework designed for concurrent use by four people;
 - B. General power requirements, including dedicated power circuits for each of the following: microwave oven, refrigerator, vending machine, and toaster oven;
 - C. Data/communication outlets;
 - D. Phone line;
 - E. Space for a refrigerator, vending machine, and microwave;
 - F. Two small work stations, one with a computer;
 - G. Water cooler with bottle filler;
 - H. Double tier lockers
 - i. 16 unit, 300mm w x 300mm d x 900mm h each

- I. Universal single occupancy male washroom;
 - J. Universal single occupancy female washroom;
 - K. Stonehard flooring system or other similar resinous flooring system as approved by the City; and,
 - L. DB Co shall provide space for and provide one 900mm wall mounted electronic display with power and data connection.
- (iii) Shall be located at Platform level with direct access to a Platform without using vertical circulation; and,
- (iv) DB Co shall provide one 32" wall mounted electronic display with power and data connection for the HASTUS.
- (d) DB Co shall provide public washrooms within the Fare Paid Zone in accordance with the OBC at Terminal Stations, Moodie, Trim and Baseline.
- (i) In addition to the Terminal Stations, DB Co shall provide public washrooms within the Fare Paid Zone, complying with OBC Terminal Station requirements at Lincoln Fields Station and Place d'Orléans Station.
- (e) Bus supervisor's office
- (i) DB Co shall provide bus supervisor's office at the Transfer Stations as indicated in Appendix A of this Part 4. The bus supervisor's office shall have the following requirements:
- A. Shall be located at bus Platform level, within the Station;
 - B. Shall be located adjacent to the bus transfer Platform and contain a line of site to monitor bus operations;
 - C. Shall be have a minimum area of 12m² with no side less than 3m;
 - D. Shall be conditioned;
 - E. Shall be accessed from the bus Platform area; and
 - F. Shall be equipped with a minimum of two data and two telephone connections.
- (f) Retail spaces
- (i) DB Co shall provide retail spaces as indicated in Appendix A of this Part 4.
- (ii) DB Co shall design and construct Third Party retail spaces as follows:

- A. Shall be a minimum of a 20m² accessible from within the Fare Paid Zone;
 - B. Shall be protected from exposure to precipitation;
 - C. Shall have electrical, mechanical, and communications services roughed in for the protection of future development;
 - D. Shall provide power provisions and sufficient space for a third party distribution panel with 100amp service;
 - E. Shall Provide sufficient power provision for HVAC (min 100 amp service); and,
 - F. Shall have domestic water, fire suppression water, and sanitary services roughed in for the protection of future development.
- (iii) Once developed and occupied by a tenant, control of retail spaces and revenue generated from the retail space shall belong to the City.
- (g) OC Transpo Multi-purpose Rooms
- (i) DB Co shall provide OC Transpo Multi-purpose Rooms as indicated in Appendix A of this Part 4.
 - (ii) DB Co shall design and construct OC Transpo Multi-purpose Rooms as follows:
 - A. Shall be a minimum of 16m²;
 - B. Accessible from within the Fare Paid Zone;
 - C. Provided with one workstation;
 - D. Provided with electrical, City data outlets and communications;
 - E. Table and chairs designed for concurrent use by up to three people;
 - F. Space for storage of printed materials;
 - G. Space for displaying fares and service information/posters; and,
 - H. Shall be secured with electronic access control.
- (h) Automatic teller machines:
- (i) DB Co shall provide all required infrastructure to support the installation of ATM and coordinate their location with the City in the following Stations:
 - A. Lincoln Fields, Baseline, Bayshore, and Place d'Orléans.

- (i) DB Co shall design and construct public parking as follows:
 - (i) Park and Ride Facilities shall be provided at the Stations indicated in Appendix A to this Part 4.
 - (ii) All Park and Ride Facilities shall be designed and constructed as follows:
 - A. Vehicle parking spaces:
 - i. Shall be between 2.6m to 2.75m wide; universal accessible parking spaces shall be compliant to CAN-CSA B-651, COADS and;
 - 1 Surface lot parking spaces shall be 90 degree;
 - 2 A maximum of 5% of parking spaces located in each Park and Ride Facility are permitted to be reduced a width of 2.4m and length of 4.6m provided the spaces are clearly signed for compact cars only; and,
 - 3 The reduction in parking space width permitted in the City of Ottawa Zoning By-law, Parking Space Provisions (Sec. 106) subsection (3) shall not apply to this Project.
 - ii. Shall be 5.2m in length;
 - iii. DB Co shall provide each Park and Ride Facility with charging stations for plug in electric vehicles in accordance with the following:
 - 1 0.5% of the spaces in each Park and Ride shall have charging stations. Each space shall be served by one unit, or two spaces can be shared by a unit with two independently functioning dispensers;
 - 2 Each charging station shall be Level 2 charging stations with credit card payment;
 - 3 Each charging station shall have power conduits, handholes etc. for electric supply;
 - 4 Each charging station shall have conduits, handholes etc. for data and communications;
 - 5 Each charging station shall have foundation and concrete slab per manufacture's requirements; and,
 - 6 Each charging station shall have identification and operating signage for each charging station.

- B. Drive aisles:
 - i. Drive aisles within the parking areas shall be a minimum of 6.7m wide.
- C. Snow Storage
 - i. DB Co shall design and construct the Park and Ride Facilities accommodate snow storage with no reduction to the minimum number of required parking spaces.
 - ii. Vegetation located in areas identified for snow storage or within the drainage area of the snow storage area shall be salt resistant.
- (j) DB CO shall design and construct support spaces required for the operation of Stations and Facilities consistent with the Existing Confederation Line Stations including but not limited to the following:
 - (i) Support spaces shall not be accessible to the public and shall be access controlled by key card system compatible with the Existing Confederation Line access control system.
 - (ii) DB Co shall design and construct access to all areas of the Station that require maintenance with personnel doors. Access hatches to rooms or areas such as TVS rooms and vent shafts, which would be considered confined spaces, shall not be permitted.
 - (iii) DB Co shall design and construct Stations with provisions for the removal and installation of all fixed equipment including:
 - A. Equipment install/removal routes for TVS fans, transformers, rectifiers and all other large equipment including pathway through open space, corridors and openings;
 - B. The Structure within all equipment removal/installation routes shall be designed and constructed to support the live load of the equipment; and,
 - C. DB Co shall provide all fixed equipment to facilitate the installation/removal including lifting beams.
 - (iv) Support spaces and area requirements listed below are minimums only, and may not represent all spaces required to support a fully functioning Station. DB Co shall be responsible to determine the final space requirements to support the system and required sizes to house all equipment and maintain clear working space clearances.
 - A. Maintenance staff washrooms:

- i. Each Station shall have 1 maintenance staff unisex washroom, in addition to OCT washrooms and public washrooms, for the exclusive use by maintenance staff;
 - ii. Maintenance staff washrooms are not required to meet COADS; and
 - iii. Washroom accessories shall include mirror, toilet tissue dispenser, soap dispenser, paper towel dispenser and trash receptacle.
- B. OC Transpo Washrooms
 - i. Westboro and Pinecrest Stations shall have one OC Transpo staff unisex washroom, in addition to maintenance washroom, for the exclusive use by OC Transpo staff;
 - ii. OC Transpo staff washrooms shall meet COADS; and,
 - iii. Washroom fixtures and accessories shall meet OC Transpo specifications, including but not limited to mirror, toilet tissue dispenser, soap dispenser, paper towel dispenser and trash receptacle.
- C. SER
 - i. A dedicated SER shall be located in Baseline, Moodie, Lincoln Fields, Dominion, Montreal, Orleans Blvd, and Trim Stations;
 - ii. Minimum room size shall be 60m².
- D. Communications room:
 - i. A dedicated communications room shall be located in all Stations;
 - ii. Minimum room size shall be 60m².
- E. Electrical room:
 - i. A dedicated electrical room shall be located in all Stations;
 - ii. Minimum room size shall be 45m².
- F. Telephone room:
 - i. A dedicated telephone room shall be located in all Stations;
 - ii. Minimum room size shall be 2m².

- G. Mechanical room:
 - i. A dedicated mechanical room housing equipment to heat and cool support spaces shall be located in all Stations;
 - ii. Minimum room size shall be 40m².
- H. Janitor room:
 - i. A minimum of 1 janitor room shall be located in all Stations;
 - ii. Shall have a mop sink, 48"x12"x75" 5 shelf stainless steel shelving unit;
 - iii. Minimum room size shall be 20m²;
 - i. In addition to the janitor room identified in Clause i above, DB Co. shall provide an additional janitor closet within 5.0m of all public washroom facilities; and,
 - ii. DB Co shall provide at a minimum one janitor room at the LRT Platform location at Trim Station and Place d'Orléans Station.
- I. Snow removal equipment room:
 - i. A minimum of 1 snow equipment removal room shall be located in all Stations;
 - 1 Minimum room size shall be 20m²;
 - 2 DB Co shall design and construct all snow removal equipment rooms to allow the storage of up to 2, 25L containers of gasoline, including ventilation and fire rating as required by all applicable Codes and Standards; and,
 - 3 Snow room shall be shared with Emergency Services.
 - ii. In addition to the above, Westboro, and Baseline Stations shall have one additional snow removal room located adjacent to the bus terminal for use by the City.
- J. Elevator machine room:
 - i. This section applies only to Stations where elevator equipment requires a machine room;
 - ii. Each Station equipped with elevators shall have elevator machine room(s);

- iii. Elevator machine room minimum size shall be as required by equipment manufacturer; and,
 - iv. Elevator machine room shall contain only elevator equipment and equipment to support the same.
- K. TPSS rooms within Stations:
- i. TPSS rooms shall be located within Stations at Lincoln Fields and Cleary Stations;
 - ii. Minimum size of TPSS room shall be 120 m²;
 - iii. Minimum clear height shall be 4m;
 - iv. Room shall be equipped with pair of doors or overhead door with a nominal clear opening of 3.2 m x 3.2 m; and,
 - v. DB Co shall design and construct the Station for the removal and replacement of equipment.
- L. TPSS package units adjacent to Stations:
- i. DB Co shall design and construct all TPSS packaged units located within the Guideway and adjacent to a Station as follows:
 - 1 A hard surface walkway with a minimum width of 1200mm shall be provided for personnel access to the TPSS;
 - 2 Access to the walkway shall be restricted from all public areas of the Station including the Platform by an access controlled gate or door;
 - 3 Access walkway shall be segregated from the guideway by protective fencing with a minimum height of 1.0 m;
 - 4 Access to Track level of the Guideway from the access walkway shall be restricted by an access controlled gate; and,
 - 5 DB Co shall design and construct the Station, and systems for the removal and replacement of equipment.
- M. Fan room:
- i. Fan rooms shall be provided as required in Underground Stations;
 - ii. Fan room shall be sized to house required equipment; and,

- iii. Fan room and pathway shall be sized for the replacement of largest piece of equipment within the room.

N. Mobile generator

- i. Where required in Article 6 – Electrical Design Criteria of this Part 4, DB Co shall provide parking for a vehicle and trailer mounted generator within 6m of the generator connection point to the Station electrical system; and,
- ii. Where dedicated parking area is not available within the vicinity of the Station, DB Co shall request permission from the City to allow vehicle and trailer parking on the public roadway, prior to submission of the Final Design Development submittal.

O. Refuse room:

- i. A minimum of one refuse storage room shall be located in all Stations;
 - 1 Minimum room size shall be 8 m²; and,
 - 2 At Moodie, Trim and Place d'Orléans, DB Co shall locate one refuse room in the LRT Platform area of the site.

P. Rail operations storage room:

- i. DB Co shall provide a storage room for the exclusive use of the City rail operations in each Station;
 - 1 Minimum room size shall be 8 m² with no side less than 2.5m.

(k) Rail supervisor's office

- (i) DB Co shall provide rail supervisor's office at Baseline Station and Trim Station. The rail supervisor's office shall have the following requirements:
 - A. Shall be located at Platform level within the Station;
 - B. Shall be located adjacent to LRT Operator's room;
 - C. Shall be have a minimum area of 12m² with no side less than 3m;
 - D. Shall be conditioned;
 - E. Shall be accessed from the Platform area; and,

- F. Shall be equipped with a minimum of two data and two telephone connections.
- (l) Maintenance crew room
 - (i) DB Co shall provide a maintenance crew room as indicated in Appendix A of this Part 4. The maintenance crew room shall have the following requirements:
 - A. Shall be a minimum of 16m²;
 - B. Accessible from within the Fare Paid Zone;
 - C. Shall be conditioned;
 - D. Provided with one workstation; and,
 - E. Provided with general use electrical, data outlets, and communications.

2.7 Project Elements

- (a) DB Co shall provide Train Platforms in accordance with the following:
 - (i) Platform Vehicle interface
 - A. The finished level of the Platform at Platform edge shall be level with finished floor height of the Revenue Vehicle, 356mm above TOR.
 - B. The finished edge of the Platform shall be located 1440mm from the centerline of Track.
 - (ii) Platform Drainage
 - A. The cross slopes of the Platforms shall not exceed 2% with a minimum of 1% toward the Track or away from the Track.
 - B. The longitudinal slope of the Platform surface shall not exceed 1.5%.
 - C. The path of travel lanes on the Platform shall comply with OBC, NFPA and all accessibility requirements.
 - (iii) Platform floor finish
 - A. The finished floor material shall have an integral non-slip surface with a wet static coefficient of friction of at least 0.60 or higher by ASTM C 1028.

- B. A detectable tactile warning strip, comprised of a non-slip, colour contrasting surface consistent with the Existing Confederation Line Stations shall be placed along the trackside edge of the Platform.
- C. Floor colour and texture shall be different from the flooring in the areas approaching the Platform.
- D. The floor finish in all Stations, except Underground Stations and Federally Mandated Stations, shall be cast in place concrete with consistent colour, pattern, Platform edge tile treatment, etc. applied through all Stations.
- E. The floor finish in Federally Mandated Stations shall be consistent with the Existing Confederation Line Stations, including material, colour, pattern, Platform edge tile treatment, etc.
- F. The floor finish for Underground Station Platforms shall be porcelain tile having a non-slip surface with a coefficient of friction of at least 0.60.
- G. Wall finishes for all Station Platforms shall be as follows:
 - i. Station Platform walls at Cleary, New Orchard and Baseline, inclusive of the existing CMU walls separating the Revenue Service Tracks from the future Storage Tracks, shall be finished with a unique colour accent and/or tiled design or pattern to be selected by the City during the design phase of the Project to provide each Station with a unique, distinctive look and feel to aid with customer navigation, identification, and enjoyment of the system.
 - ii. For Federally Mandated Stations wall finishes shall be consistent with Existing Confederation Line Stations, including but not limited to large format porcelain panel system and glazing.
 - iii. For Stations other than Federally Mandated Stations, wall finishes shall be nonporous, durable materials meeting the Design Life requirements of Schedule 15-2, Part 1, Article 4 – Design and Construction, and shall be impact resistant to a height of 2.5m above the adjacent walking surface. Acceptable materials shall include, glass, precast concrete, porcelain tile, cast in place concrete, and natural stone and composite metal panels. Exposed or paint CMU is prohibited from use in public areas, with the exception of the CMU at Baseline separating the Revenue Service Tracks from the future Storage Tracks, which shall be sealed and painted.

- H. Lighting fixtures shall be installed at the ceiling, signage band or underside of the roof Structure to provide continuous light on the Platform edge warning strip.
- I. Floor hatches and or floor access doors shall not be placed within the Platforms.
- (iv) Clearances from Platform
 - A. Vertical Clearances above Platform Surface
 - i. Any Station element that could be targeted for theft or vandalism (e.g. light fixtures, speakers, CCTV cameras, etc.) shall be located a minimum of 3050mm above the finished Platform surface. DB Co shall consider the possible use of benches, waste receptacles and other items by vandals to stand on to reach these elements; the placement of all items in DB Co's design shall reduce this potential.
- (v) Service Outlets
 - A. Service outlets required for power and water shall be as follows:
 - i. Electrical – provide 15 A/120 V split receptacles at 20m intervals along the Platform area in addition each TSA shall have one 15A/120 V split receptacle.
 - ii. Water Hose Bibs – provide a minimum of 1 tamper proof hose bib on each Platform.
 - 1 Water hose bibs shall be designed, located, and selected as to be protected from freezing.
- (vi) Service/Maintenance Personnel Access Requirements
 - A. DB Co shall provide access from the Platform to Track level at each end of each Station Platform. Access off of the end of the Platform shall be restricted by and end of Platform door. Door shall be signed and alarmed to prevent unauthorized access. Door status shall be monitored by the TOCC. Door design shall be as per Clause 2.5 (e) of this Part 4.
 - B. DB Co shall provide an access path with a minimum clearance of 1200mm throughout all areas of the Station for the movement of maintenance equipment.
- (vii) DB Co shall provide inner-car barrier protection on all Train Platforms as follows:
 - A. Inner-car barrier shall be consistent with the Existing Confederation Line;

- B. Comprised of flexible bollards spaced as required to provide a clear distance between bollards of not greater than 200mm;
 - C. Shall be located on the Platform edge, centered on a coupled Train;
 - D. Minimum length of 6m;
 - E. Located within the detectable Platform edge warning tile;
 - F. No less than 900mm above the Platform finished floor level; and,
 - G. Color shall be safety yellow.
- (viii) Inter-Track barriers:
- A. All side Platform configured Stations shall be provided with a continuous barrier fence between Tracks.
 - i. The barrier shall be 1960mm high from TOR and extend a minimum of 15m beyond the end of the Station Platform at each end of the Station.
 - ii. Inter-Track barrier shall be as per Appendix B of this Part 4.
 - iii. A gap of no more than 100mm between the bottom of the barrier and the surface below, (ballast, concrete, etc) shall be permitted; and,
 - iv. The barrier shall be non-climbable and designed to allow visibility from Platform to Platform.
- (ix) Platform snow melting
- A. All Platforms, with the exception of Underground Stations, shall be provided with in slab electrical heating elements to remove snow and ice;
 - B. Platform heating shall include the area of the Platform edge warning tile; and
 - C. Platform heating electrical supply shall be sub metered.
- (b) DB Co shall provide weather protection for the Stations in accordance with the following:
- (i) DB Co shall provide a micro climate study of the building envelope and its configuration with respect to the micro-climatic and geographical location of each Station to determine the extent of the weather protection required. DB Co shall reflect the requirements of the micro climate in the design of the Stations.

- (ii) The micro climate study shall be submitted in accordance with Schedule 10 – Review Procedure.
- (iii) Roof requirements:
 - A. DB Co shall provide roof structures covering the Platform area at all Stations, with the exception of the Baseline Station, as per the following:
 - i. DB Co shall determine the extent of roof coverage required utilizing the Passenger forecast data and the results of the micro climate study for each Station identified in (i) above;
 - ii. Roof structures shall cover the entire width of the Platform with the exception of “Type C” roof canopy design contained in Appendix B;
 - iii. DB Co shall be responsible to determine the applicability of extending the roof coverage beyond the edge of the Platform based upon the results of the micro-climate study for each Station identified in Clause 2.7(b)(i) of this Part 4 above;
 - iv. DB Co shall determine the appropriate height of the roof structure above the Platform surface based upon the results of the micro-climate study for each Station identified in Clause 2.7(b)(i) of this Part 4 above;
 - v. DB Co shall design all roofs including Station roofs and pedestrian Bridges to prevent snow and ice from falling on to adjacent pedestrian or vehicular areas including roadways, sidewalks, MUPs, and plazas; and,
 - vi. The use of fritted glazing with up to 20% opaque surface shall be permitted in the “Type C” roof canopy design contained in Appendix B. Fritting shall be integral with glazing panel composition. The use of surface applied fritting on exposed surfaces of the glazing system shall not be permitted.
 - B. Roof structures shall cover all vertical circulation elements (stairs and ramps within the Stations, stairs providing access to the Stations outside of the Fare Paid Zone, escalators and elevators) and Fare Control equipment.
 - i. All fare gates shall be weather protected from rain infiltration and snow accumulation at fare gates in accordance with the following:
 - 1 DB Co shall design the Station entries to limit exposure of the fare gates to direct precipitation in the form of rain and wind blown rain to 1.1% (95 hours) of the hours in a year;

- 2 DB Co shall design the Station entries to limit exposure of the fare gates to direct precipitation in the form of snow to 6.1% (265 hours) of the total hours between October 15 to April 15 months; and,
 - 3 DB Co shall validate the values above for each entrance of each Station by computer simulation and shall submit the findings of the micro climate simulation in accordance with Schedule 10 – Review Procedure, as part of the Works Submittal for each Station.
- ii. DB Co shall be responsible to implement any required design changes as a result of the microclimate studies for each required submission.
- 1 In the event that DB Co makes modifications to any entry design following the submission of the final micro climate study, DB Co, at no cost to the City and without schedule impact, shall resubmit the microclimate study for the affected Station to ensure conformance with the requirements of Clause 2.7(b)(iii)B,i of this Part 4. Should the study indicate nonconformance with the requirements, DB Co shall redesign and repeat the process until conformance with Clause 2.7(b)(iii)B,i of this Part 4, is confirmed.
- C. DB Co shall be responsible for all interfaces and implications of the Platform roof structures, where applicable, and all Platform elements, including but not limited to the following:
- i. Interface of roof structure with Train;
 - ii. Protection of OCS from falling ice and debris;
 - iii. Protection/isolation of any roof structure from stray current;
 - iv. Support of OCS;
 - v. Integration of lighting and signage requirements; and
 - vi. Integration of any other Station or systems element.
- D. Any and all roof top equipment shall be completely screened from all public areas, inclusive of views from within the Lands and all surrounding areas.

- E. DB Co shall design all roofs including Station roofs and pedestrian Bridges to prevent snow and ice from falling on to adjacent pedestrian or vehicular areas including roadways, sidewalks, MUPs, and plazas.
- (c) Windscreens:
- (i) DB Co shall provide wind screens for Passenger protection from the elements. Windscreens shall be predominately glass walls.
 - A. The use of wood windscreens shall only be permitted in locations not accessible to the public.
 - B. The design of windscreens for Federally Mandated Stations shall be consistent with the Existing Confederation Line designs: and,
 - C. The design of windscreens for Stations other than Federally Mandated Stations shall be of glazing and support system as selected by DB Co.
 - (ii) At a minimum, windscreens shall be provided at the perimeter edge of the Platform (side Platform) or outside edge of the Guideway (centre Platform).
 - A. Wood windscreens shall not be permitted for use in this application.
 - B. For Stations located within the median of a highway, windscreens shall be constructed of an MTO approved precast concrete sound barrier.
 - (iii) In addition to the above, the micro climatic and geographical location study of each Station shall determine the extent of the windscreen, including: where windscreens are required, extent of windscreen required, and required height of windscreen.
- (d) Fare collection and control:
- (i) DB Co shall plan, design, and construct all Stations with provisions for installation of a fare control system including but not limited to fare control gates and Ticket Machines to be installed by the City.
 - A. Fare control equipment provisions and requirements shall not apply to existing Stations (Blair and Tunney's Pasture) with existing equipment previously installed if not modified by DB Co.
 - B. Each entry shall be provided with a minimum of two standard fare gates, two wide gates, and two Ticket Machines. The designated accessible gate shall always be placed furthest to the left when entering the Fare Paid Zone with the second wide gate at the other end of the array.
 - i. The fare paid entrance serving the pedestrian Bridge at Baseline Station to the [REDACTED] does not require Ticket Machines.

- C. Each fare gate array shall be contiguous and not broken or obstructed by any other elements, including structural supports within the fare array or surge space.
- D. DB Co shall provide the minimum clear working distances from the fare gate pedestals as follows:
- i. When approaching the fare array from the non-fare paid side provide a minimum of 130 mm on the left side of the fare array to a wall, barrier or obstruction of any kind.
 - ii. When approaching the fare array from the non-fare paid side provide a minimum of 475mm on the right side of the fare array to a wall, barrier, or obstruction of any kind.
 - iii. Barriers to delimit the Fare Paid Zone at the gate array shall be located in the center of the length of a gate array and installed perpendicular to the gate arrays.
 - iv. In addition to the clearance requirements above, DB Co shall provide space in the array for the addition of one 1 fare gate in the future to the right of the gate array. This space shall be protected for by providing a 1.5m high glass barrier centred on the fare gate pedestal.
- E. The following Tables indicate the minimum quantities of fare collection and control equipment required at each Station subject to revision based on DB Co's Station designs and Passenger modelling and approved by the City:

| Confederation Line West | | | | | |
|-------------------------|--------------------------|----------------|----------------------------|-----------|------------------|
| Station | No. of Station Entries * | Ticket Machine | Smartcard Enable Fare Gate | | |
| | | | Standard Gate | Wide Gate | Total Fare Gates |
| Westboro | 2 | 4 | 6 | 4 | 10 |
| Dominion | 1 | 2 | 3 | 2 | 5 |
| Cleary | 1 | 2 | 3 | 2 | 5 |
| New Orchard | 1 | 2 | 3 | 2 | 5 |
| Lincoln Fields | 3 | 6 | 6 | 6 | 12 |
| Iris | 2 | 4 | 4 | 4 | 8 |
| Baseline | 3 | 4 | 9 | 7 | 16 |
| Queensview | 1 | 2 | 2 | 2 | 4 |

| | | | | | |
|----------|---|---|---|---|---|
| Pincrest | 1 | 2 | 2 | 2 | 4 |
| Bayshore | 2 | 4 | 4 | 4 | 8 |
| Moodie | 1 | 2 | 2 | 2 | 4 |

* In the event that DB Co's Station design varies the number of entrances from the quantity indicated in the table above, the quantities of fare control equipment shall be modified and approved by the City.

| Confederation Line East | | | | | |
|--------------------------------|--------------------------|----------------|----------------------------|-----------|------------------|
| Station | No. of Station Entries * | Ticket Machine | Smartcard Enable Fare Gate | | |
| | | | Standard Gate | Wide Gate | Total Fare Gates |
| Montreal | 2 | 4 | 4 | 4 | 8 |
| Jeanne d'Arc | 2 | 4 | 4 | 4 | 8 |
| Orléans | 2 | 4 | 4 | 4 | 8 |
| Place d'Orléans | 4 | 8 | 8 | 8 | 16 |
| Trim | 1 | 2 | 4 | 2 | 6 |

* In the event that DB Co's Station design varies the number of entrances from the quantity indicated in the table above, the quantity of fare control equipment shall be modified and approved by the City.

- (ii) DB Co shall ensure that all building services and feeds are sized appropriately to accommodate the fare collection equipment.
- (iii) DB Co shall provide a 1.5m-high minimum glass barrier adjacent to the fare gate equipment and extending to a wall or other building element to provide protection of the Fare Paid Zone.
- (iv) DB Co shall plan and design the location of equipment so as to ensure the year round operation of the fare equipment, by ensuring protection of the fare collection equipment from direct precipitation, including but not limited to wind-driven rain, snow, and sleet, and drifting snow, in accordance with Clause 2.7(b)(iii)B,i Fare vending equipment placement shall mitigate glare from sunlight on the screen.
- (v) DB Co shall ensure the integrity of the Fare Paid Zone at all Transfer Stations.
- (vi) DB Co shall ensure consistent location of fare collection devices at Stations and in keeping with Existing Confederation Line Stations and weather protection requirements.
- (vii) All Ticket Machines located in public spaces shall be recessed, with overhead canopies extending to the required queuing space. Ticket Machine placement shall also mitigate glare from sunlight on the screen.

- (viii) DB Co shall design Stations' fare collection equipment to be flush, fixed, and integrated with Station infrastructure, unless otherwise noted, to avoid removal by unauthorized persons.
 - A. DB Co shall construct all surfaces for design and installation of the fare collection equipment and system elements by the City's fare collection system provider.
 - B. Ticket Machines shall be located and installed to allow Ticket Machine doors to open 180 degrees for servicing. While in the open position the Ticket Machine door shall not preclude customers from using the adjacent machines.
 - C. Free standing equipment shall be permitted provided DB Co provides sufficient queuing and circulation space as well as space required for maintenance and re-stocking activities, without compromising Passenger movement through the Station.
 - D. All conduit and cable ducts shall be concealed within walls, under slabs, within chases, etc., the use of exposed conduit and cable duct shall not be permitted in public spaces.
 - E. Within existing City structures, if the use of exposed conduit is required in public spaces for the installation of fare equipment, DB Co shall conceal conduits, and other surface mounted items by painting, enclosing in chases or otherwise treating the conduits, junction boxes, cable ducts, blend in with the surface to which the item is attached.
- (ix) DB Co shall provide CCTV coverage of the fare control equipment as follows:
 - A. Full CCTV coverage for inbound and outbound Passenger flows at the fare control line.
 - B. Full CCTV coverage of Ticket Machines with view of interaction with machine, without compromising privacy.
- (x) DB Co shall work in coordination with the City to ensure all supporting infrastructure and systems have been accommodated and to ensure schedule coordination for equipment installation, testing and Commissioning.
- (xi) Exposed conduit and cable duct shall be avoided within public spaces.
- (xii) DB Co shall paint or otherwise treat the conduit to blend in with the surface to which the conduit is attached where the use of exposed conduit cannot be avoided in public spaces.
- (xiii) Fare gates and ticket machines post installed anchor system require concrete embedment of 150mm. DB Co shall ensure location and or depth of concrete

reinforcing is coordinated with the mounting requirements of the equipment avoiding the possibility of a conflict between the anchor and reinforcing steel.

- (xiv) DB Co shall provide concrete mounting and walking surface at the fare control line between the floor grille assemblies, level with surrounding floor finish.
- (e) DB Co shall provide Fare Paid Zone of Stations in accordance with the following:
 - (i) DB Co shall plan, design and construct all Stations with segregated Fare Paid Zones and non-Fare Paid Zones.
 - (ii) The Fare Paid Zone of the Station and all fare paid transfer areas shall be segregated from non-Fare Paid Zones by continuous 1.8m fencing or barrier.
 - (iii) Fare Paid Zones at Lincoln Fields, Bayshore, Moodie, Baseline, Place d'Orléans, and Trim Stations shall be planned, designed and constructed to allow Passengers to transfer between bus and Train within the Fare Paid Zone of the Station.
 - A. DB Co shall maintain the integrity of the Fare Paid Zones in the design and construction of bus terminal modifications at existing Tunney's Pasture and Blair Stations.
 - (iv) The following additional requirements shall apply for bus Transfer Stations:
 - A. Fare paid transfer area of Stations shall be designed to prohibit transferring Passengers from crossing bus traffic with the exception of Place d'Orléans.
 - B. All islands provided within a bus transfer area shall contain a combination of barriers including fencing, landscaping, or other physical barrier elements to prevent Passengers from traversing bus traffic to access the Station and bus Platforms or other Passenger destinations.
 - C. Where a dedicated fare controlled entrance to a bus terminal is not required, DB Co shall provide an entrance to allow Passenger access to the bus Station area when the Train Station is secure during non-operational hours, including CCTV and lighting.
 - i. The entrance shall be designed and constructed to be consistent with the architectural design requirements of the adjacent Train Station;
 - ii. DB Co shall provide signage and wayfinding for the entrance within the bus Station and from the public side;
 - iii. The entrance shall be secured with an overhead coiling grill or other means, and monitored outside Train operational hours; and,

- iv. Notwithstanding requirements to secure the Train operations, Passengers shall have access to Ticket Machines outside Train operational hours.
 - D. DB Co shall provide a minimum of three bicycle racks within the Paid Fare Zone of all Transfer Stations. As per Schedule 15-2, Part 6, Clause 2.7(b)(v), there shall be sufficient space to double the quantity of bicycle racks without modification to the built design.
- (f) Weather protection:
 - (i) Roof design features shall include the following:
 - A. The roof and Station design shall allow an illumination level of 25fc to be achieved via natural daylighting to reach over 75% of the entire Platform surface by incorporation of skylights or other design features. This requirement shall not be applicable to Underground Stations.
 - B. Roof accessibility systems such as hatches and retractable ladders, for cleaning and maintenance if required.
 - C. Fall protection measures that form a permanent part of the roof Structure.
 - D. Heat traced gutters and downspouts for roof drainage tied directly into a SWM system.
 - E. Snow guards shall be provided on all roofs where roof design contributes to possibility of falling snow and ice.
 - i. Particular attention shall be paid to the design and placement of snow guards on areas of roof above Station entrances and areas of roof adjacent to spaces of public circulation or gathering such as sidewalks and bus Platforms and adjacent Roadways to ensure the protection of the public from falling snow and ice.
 - A. The underside of all roofs within public spaces shall have soffits to conceal all mechanical, electrical, and communications equipment, conduits, etc. in accordance with the following:
 - i. For Federally Mandated Stations, BD Co shall provide soffit materials consistent with the Existing Confederation Line Stations, including composite metal panels and wood slats; and,
 - ii. For Stations other than Federally Mandated Stations DB Co shall provide soffit materials/systems that provide access to concealed building systems and equipment satisfying the Design Life requirements per Schedule 15-2, Part 1, Article 4 – Design and Construction.

- (g) Transecure Areas:
- (i) DB Co shall provide one TSA at all individual Station Platforms.
 - (ii) On LRT Platforms, the TSA shall be located close to the centre of the Platform length to align with the door of the first car in a two consist Train operation.
 - (iii) DB Co shall provide one TSA per Direction for center Platform configuration.
 - (iv) DB Co shall provide one TSA within in the bus Facility at Transfer Stations.
 - (v) The design of the TSA shall be consistent with the design of the Existing Confederation Line TSA/designated waiting area, including but not limited to:
 - i. Configuration & Material usage;
 - ii. For Stations other than Federally Mandated Stations, glazing and glazing support systems shall be consistent with glazing system for the Station as selected by DB Co in accordance with other requirements of this Part 4.
 - iii. Seating design;
 - iv. Size & Location of features;
 - v. Provide clear sightline of oncoming buses or Trains; and,
 - vi. Design of utility cabinet.
 - (vi) TSA's shall be provided with the following features:
 - A. Signage indicating location of TSAs and indicating the amenities available in the TSA, which shall be consistent at all Stations;
 - B. Fixed CCTV security coverage, PTZ cameras shall not be used for TSA;
 - i. Each TSA shall have a minimum of two CCTV cameras.
 - C. Enhanced lighting level of 220 lux;
 - D. Transit information panels that show scheduled times, maps, and other relevant information shall be included;
 - E. A clock integrated with the TIPs shall be viewable from the TSA;
 - F. Companion seating;
 - G. Emergency phones at accessible height with handles, braille, and user-friendly directions;

- H. Emergency cabinet with fire extinguisher for Train TSA only;
- I. Infrastructure to support a pay phone;
- J. Accessible seating for four including seating with handles and backs;
- K. Tinted glass or anything that compromises Safety or sightlines shall be prohibited from use in the TSAs;
- L. Garbage and recycling receptacles shall be provided adjacent to the TSA;
- M. All TSAs located on Platforms, with the exception of Underground Stations, shall be equipped with timed, Passenger activated heating;
- N. An electrical outlet to provide ability for customers to charge cell phones at Train TSA only;
- O. Timed, Passenger activated heating at TSA on bus Platform all bus Transfer Stations; and,
- P. Indication of location of TSA on the Platform floor surface and directional TWSI. Platform markings for all TSAs shall extend to the Platform edge at Train TSA only.

(h) Advertising:

- (i) DB Co shall provide all Infrastructure to support advertising in the Stations, including power data and communications to support digital advertising;
 - (ii) Each advertising location shall be provided with lighting in accordance with IESNA standards to illuminate static advertising;
 - (iii) Each Station shall have a minimum of three locations for advertising within the Fare Paid Zone, with dedicated wall areas of 1.5m x 2.5m minimum; and
 - (iv) Location and type of advertising shall be coordinated with the City during design;
 - A. For Federally Mandated Stations, advertising shall not be visible from the exterior of the Station.
 - (v) DB Co shall comply with MTO signage and advertisement requirements for all stations adjacent to Highway 417, and obtain MTO approvals.
- (i) Public washroom features shall be provided as follows:
- (i) Fixed CCTV coverage of the exterior of the washroom entrance doorway of each washroom.

- (ii) Infant changing facilities.
 - (iii) Toilet partitioning shall be ceiling hung embossed stainless steel panels.
 - (iv) Toilet stall latch shall be surface mounted dead bolt type.
 - (v) Coat hooks on the stall door above head level.
 - (vi) Graffiti resistant mirrors at each wash basin.
 - (vii) Soap dispensers, toilet tissue dispensers, towel dispensers and disposal units.
 - (viii) Wash basins shall be built into a counter or vanity.
 - (ix) Washrooms shall be heated and ventilated.
 - A. DB Co shall heat and ventilate public washrooms in accordance with Good Industry Practice, without doors or with doors in the open position during operating hours and winter conditions.
 - (x) All fixtures shall be vandal-proof and be equipped with automatic water controls.
 - (xi) Toilet compartment, cubicles door and partition thickness shall be a minimum of 25mm. Pilaster thickness shall be a minimum of 32mm.
 - A. No system shall contain material capable of supporting growth of bacteria, fungi, mould, etc. or encourage the harbourage of insects or mites. No system shall develop or shed electrostatic charges.
 - B. All fasteners shall be concealed or tamper proof.
 - C. Partition shall be ceiling mounted embossed stainless steel.
 - (xii) Entrances to washrooms shall be designed and constructed according to CPTED principles with a labyrinth style access.
- (j) CCTV
- (i) DB Co shall provide 100% CCTV camera coverage for Stations and Facilities as follows:
 - A. As indicated elsewhere in this Part 4;
 - B. All public spaces shall have CCTV coverage, excluding washrooms;
 - C. Entrances to maintenance access areas;
 - D. All stair runs with full coverage from landing to landing;

- E. All Escalators with full coverage from landing to landing;
 - F. Station Plazas and Station sites;
 - G. Bus Facilities at Transfer Stations;
 - H. Park and Rides;
- (k) Emergency phones:
- (i) DB Co shall provide Emergency phones providing direct audio connection to the TOCC as follows.
 - A. One Emergency phone at each entrance on the non-fare paid side, concourses and in general passenger circulation areas;
 - B. Two Emergency phones on each Train Platform spaced no more than 30m apart;
 - C. In addition to the Emergency phones required on Platforms, each TSA shall have an Emergency phone;
 - D. Provide Emergency phones spaced not more than 100m in any direction in surface Park and Ride facilities;
 - E. Provide Emergency phones with no more than 30 m in between at each bus Platform in addition to the Emergency phone at the TSA; and
 - F. Provide Emergency phones at new PPUDO's;
 - (ii) Emergency phones at outdoor locations shall be identified with a blue light.
- (l) Payphones:
- (i) DB Co shall provide provisions for public pay phones (Type TTY) in accordance with the following:
 - A. Provide conduit and space for 1 pay phone at every bus and Train Platform;
 - B. Provide conduit and space for 1 payphone in each TSA.
 - C. Provide conduit and space for pay phones at new PPDUO's;
 - D. All designated space and public pay phones shall be fully accessible; and
 - E. The City will arrange with a Third Party Contractor for payphone installation and maintenance of public payphones.

- (m) Transit Information Panels:
 - (i) DB Co shall provide TIPs as follows:
 - A. Provide 2 TIPs on each Train Platform for side Platform configurations, excluding TIPs located within the TSAs;
 - B. Provide 4 TIPs on each Train Platform for centre Platform configurations, excluding TIPs located within the TSAs;
 - C. Provide 2 TIPs at each Station entry prior to the fare barrier, located outside of the fare paid area;
 - i. TIPs shall be accessible 24/7 when Station is closed.
 - D. Provide a minimum of 1 TIP, located after the fare barrier, inside the Fare Paid Zone, in addition to TIPs located on Platforms and at the TSAs. Where a Station has two or more entrances, and where Passenger traffic does not converge before accessing the Platform Level, provide TIPs inside the Fare Paid Zone at each entry;
 - E. Provide a minimum of 1 TIP in each bus shelter located on bus Platforms within Transfer Stations;
 - F. Provide 1 TIP in each TSA located on bus and Train Platforms;
 - G. TIP panel size (1.2m x 1.3m) shall be confirmed during design phase; and,
 - H. All TIPS shall be backlit.
- (n) DB Co shall provide clocks connected to the NTP server displaying time of day, with a minimum of one clock per Platform, including bus Platforms at Terminal/Transfer Stations.
 - (i) DB Co shall provide clocks meeting the following minimum requirements:
 - A. Including digital LED display;
 - B. Capable of full operation in an outdoor environment, exposed to the elements in a dry bulb temperature range of -40°C to 40°C;
 - C. Capable of displaying both time and date simultaneously as follows:
 - i. Shall be capable of displaying 12:00 or 24:00 hour time in hours minutes and seconds, with the option to configure with or without seconds being displayed;

- ii. Shall be capable of displaying date in varying formats and sizes. Maximum character height shall be no greater than that of the time display;
 - iii. Shall have the ability to display time independently with or without date being displayed;
 - D. Minimum cap character height for time display of 150mm;
 - E. Have amber character colour and background with a minimum colour contrast of 70%. Amber colour shall be consistent with amber colour utilized in the PIDS; and,
 - F. Clock display shall meet or exceed all accessibility requirements referenced in this Part.
- (o) Trash and recycling receptacles:
 - (i) DB Co shall provide trash and recycling receptacles in the following locations and minimum quantities:
 - A. three on each Platform including one located at the TSA;
 - B. one located on each mezzanine or Concourse Level of the Station;
 - C. Receptacles shall be integrated into cabinets with other customer amenities such as TIPS or emergency phones;
 - D. All receptacles provided in public spaces shall be transparent to allow visual identification of their contents;
 - E. All receptacles shall be 4 stream receptacles to separate at source; organics, paper, glass, metal and other refuse; and,
 - F. All receptacles shall have hard containers to support removal bag.
- (p) DB Co shall design and construct Platform seating in accordance with the following:
 - (i) DB Co shall provide three benches that can accommodate three Passengers per bench seating on each Train Platform per direction in addition to seating within the TSA;
 - (ii) DB Co shall provide seating for three on each bus Platform for every two bus bays at Terminal/Transfer Stations. Bench locations to be coordinated with the City, and must not impede snow removal equipment movement/pedestrian flow;
 - (iii) Armrests and backrests shall be provided on all benches in accordance with AODA and COADS;

- (iv) The location of Platform seating shall not interfere with access to overhead lighting and equipment.
- (q) Outdoor shelters:
 - (i) DB Co shall provide one bus shelter for each bus stop located within the Fare Paid Zone at Transfer Stations and each stop located in an off-street non Fare Paid Zone;
 - A. Shelters shall be sized according to accommodate passenger activity and be approved by the City.
 - B. All shelters design and capacity shall be consistent with shelters at Existing Confederation Line Stations;
 - C. DB Co shall provide power and communications to all shelters in accordance with OC Transpo Transitway and Station Design Guidelines;
 - D. Requirements of shelters within the fare Paid Zone of Transfer Stations:
 - i. All shelters located within the bus Fare Paid Zone of Transfer Stations shall be fitted with a minimum of 2 doors with power door actuators;
 - ii. On demand Passenger heating shall be provided in the TSA shelters within the bus Fare Paid Zone of Transfer Stations. Provision for on-demand heating shall be included for all remaining shelters within the Fare Paid Zone;
 - iii. Lighting according the Transitway and Stations Design Manual;
 - iv. AODA compliant benches;
 - v. Transit Information Panel;
 - vi. DB Co shall provide power and Communications for PIDS; and,
 - vii. All shelters shall not be required to have radiant heaters installed but shall be provided with rough in and provisions for future installation of radiant heaters.
 - (ii) DB Co shall provide on street bus Facilities in accordance with Appendix E to this Part 4.
- (r) **[REDACTED]** wayfinding wheel
 - (i) At each Station, directional signage shall be installed at either the entry, concourse, Platform or Station entry Plaza;

- A. The City will be responsible for the production of the wayfinding wheel for each Station;
 - B. DB Co shall incorporate the wayfinding wheel into the design and shall be responsible for the installation and placement of this element in accordance with guidelines and standards provided by the City;
 - C. The location of the wayfinding wheel at each Station shall be co-ordinated with the City through the design review process; and,
 - D. The City will undertake consultation with the appropriate Aboriginal representatives, (including the [REDACTED]) during the design stage to ensure cultural appropriateness of the location of the [REDACTED] wayfinding wheel and provide this input to DB Co for incorporation into DB Co's design.
- (s) DB Co shall provide PIDS in accordance with the following:
- (i) DB Co shall provide Train Platform/Concourse PIDS in accordance with the following:
 - A. DB Co shall design and construct architectural, electrical, mechanical and structural infrastructure to support PID installation.
 - B. Each Station shall be equipped with PIDS signs to provide up-to-date, specific, real time, location-based, visual operational, and Safety-related messages for customer awareness.
 - C. DB Co shall provide PIDS at new Stations consistent with the locations of Existing Confederation Line, including, but not limited to:
 - i. Three PIDS at Underground Station Platforms, and two PIDS at all other Station Platforms;
 - ii. One PID at each fare line. PIDS shall be visible and readable from both paid and unpaid side of the fare line and as required at end of Line Stations; and,
 - iii. At Terminal Stations with a side Platform configuration, DB Co shall provide additional PIDS at key decision points in order to direct Passengers to the correct Platform.
 - iv. All PIDS shall be double sided except where mounted on a wall parallel with the same.
 - D. PIDS shall be individually addressable and shall be accessed from the existing PA/PIDS console located in the TOCC. Under normal operating conditions, information presented on the PIDS shall include, but not be

limited to: date, time, minimum next three arrival time and destination of the next Train (one arrival time per line), Safety messages, Train delays, holiday schedules, and other ad-hoc messaging. In an Emergency condition, the PIDS shall display both pre-programmed Emergency announcements and simultaneous visual display of the PA system Emergency announcements. Refer to Schedule 15-2, Part 3, Article 4 - PA System/Passenger Information Display System, for additional requirements.

- (ii) DB Co shall coordinate and install the City supplied Nexus/directory/entrance PIDS in accordance with the following:
 - A. DB Co shall coordinate, design, construct and equip each Station with the structural, mechanical, electrical, and communications infrastructure provisions to support the installation of City supplied PIDS and enclosures. DB Co shall identify designated locations including; but not limited to: one PID at the concourse level of each Underground Station, at the nexus points between modes at Transfer Stations, outside each fare gate, each bus Platform entrance, and one PID at each after hours entrance.
 - B. The locations shall be incorporated into the Station designs considering: mounting surfaces, sightlines, wayfinding, accessibility, vandalism, to allow viewing from either side of PIDS and security.
 - C. DB Co shall coordinate and supply required infrastructure at these locations including: power and communications requirements, blocking within walls, ceiling structure, or posts as required and identified by the City.
 - D. The City will provide and install the required PID components including enclosures and mounting hardware.
 - E. PIDS at these locations will be operated using a City supplied application and software controlled through the City network.
 - F. PIDS at these locations will be maintained by the City.
- (iii) DB Co shall coordinate and install the City supplied bus terminal PIDS in accordance with the following:
 - A. DB Co shall equip each bus terminal with provisions to support the installation of City supplied PIDS and enclosures. DB Co shall identify designated locations including; one PID for each shelter, one PID at each bus stop Platform, one PID on each bus Platform centrally located at the entrance to the Train portion of the Station and shall allow for viewing from either side of PID.

- B. Locations shall be incorporated into the Station designs considering: mounting surfaces, sightlines, wayfinding, accessibility, vandalism, and security.
- C. DB Co shall coordinate and supply required infrastructure at these locations including: power and communications requirements, blocking within walls, ceiling structure, or posts as required and identified by the City.
- D. The City will provide and install the required PID components including enclosures and mounting hardware.
- E. PIDs at these locations will be operated using a City supplied application and software through the City network.
- F. PIDS at these locations will be maintained by the City.

(t) Enclosed pedestrian Bridges

- (i) Enclosed pedestrian Bridges, where included as a requirement in this Part 4 shall be designed and constructed in accordance with the following;
 - A. DB Co shall provide enclosed pedestrian Bridge designs to limit snow and ice from falling onto surfaces below the Structure;
 - B. DB Co shall provide a system that allows for glazing to be replaced from the inside of the Bridge; and,
 - C. DB Co shall ventilate enclosed pedestrian Bridges in accordance with OBC where applicable. Where OBC is not applicable, DB Co shall provide ventilation in accordance with ASHRAE 62.1.

(u) Traction Power Substation Locations:

- (i) DB Co shall locate TPSS and associated electrical service in accordance with the following:
 - A. DB Co shall be permitted to install a TPSS within any Station Structure, provided the TPSS is fully enclosed within the Station Structure, constructed with the same materials and detailing utilized for the Station design and is constructed within the Lands.
 - B. Specific requirements of Confederation Line East Extension;
 - i. TPSS shall be at each Station or in the vicinity of each Station located within the Lands in accordance with Schedule 20 - Lands.
 - C. Specific requirements of Confederation Line West Extension:

- i. From Tunney's Pasture Station to the east end of Dominion Station Platform, DB Co shall be permitted to locate a TPSS at Track level only within the Lands. Access to the TPSS shall be via Track level from a Station as described in Schedule 15-2, Part 3, Clause 13.4. [REDACTED] owned transformers and switchgear supporting the TPSS shall be located at street level within the Lands;
- ii. DB Co shall be permitted to locate a TPSS at Track level on the north side of the alignment at Dominion Station within the Lands, provided the western end of the TPSS is located no further the 35m from the western face of the Station entrance plaza crossing the alignment. Access to the TPSS shall be via Track level from Dominion Station as described in Schedule 15-2, Part 3, Clause 13.4. [REDACTED] owned transformers and switchgear serving the TPSS shall be located at grade;
- iii. DB Co shall be permitted to locate a TPSS at Track level within the Parkway Tunnel from Cleary Station to New Orchard Station provided the structure is entirely below the level of Byron Linear Park. At this location, electrical service entry, transformers and switchgear shall be permitted to be located at grade level provided the equipment is housed within the Station Structure, constructed of materials consistent with the Station design and combined with Station Emergency egress facilities;
- iv. TPSS located at Lincoln Fields Station shall be constructed within the Station Structure;
- v. TPSS located at Baseline Station shall be constructed within the Station Structure or within the Baseline Tunnel;
- vi. DB Co shall be prohibited from constructing TPSS in the following locations:
 - 1 From the Dominion Station location identified above to the East Portal of the Parkway Tunnel;
 - 2 Within the Parkway Tunnel from the East Portal to the crossing of the Tunnel under Richmond Road;
 - 3 From New Orchard Station to Lincoln Fields Station;
 - 4 From Lincoln Fields Station to the portal of Baseline Tunnel; and,

5 From Lincoln Fields Station to the west portal of the Connaught Tunnel.

- vii. The TPSS at Moodie Station shall be constructed within the Station Structure, or constructed as a standalone Ancillary Facility. If constructed as a standalone Ancillary Facility, DB Co shall construct the TPSS to be aesthetically compatible with the architecture and materials of the LRT Station.

2.8 Materials

- (a) Materials used for the construction of Stations shall be low VOC and contain recycled content to the maximum extent possible where not specified below:
- (i) Cast in Place Concrete:
 - A. Provide steel materials with postconsumer recycled content of not less than 60%.
 - (ii) Precast Concrete:
 - A. Provide steel materials with postconsumer recycled content of not less than 60%.
 - (iii) Architecturally exposed structural steel:
 - A. Provide steel materials with postconsumer recycled content of not less than 25%.
 - (iv) Painted metal fabrications:
 - A. Provide steel materials with postconsumer recycled content of not less than 25%.
 - (v) Stainless steel fabrications:
 - A. Provide steel materials with postconsumer recycled content of not less than 25%.
 - B. Provide materials with the maximum postconsumer recycled content recommended by the selected manufacturer, where finish quality may be compromised by the percentage of postconsumer recycled content.
 - (vi) Aluminum materials:
 - A. Aluminum curtainwall and skylights systems:

- i. Provide aluminum materials with postconsumer recycled content of not less than 50%.
 - B. Aluminum extrusions fabrications, etc.:
 - i. Provide aluminum materials with postconsumer recycled content of not less than 25%.
- (vii) Glazing:
 - i. Provide glass products with postconsumer recycled content of not less than 25%.
 - ii. Sealants used inside of the weatherproofing system protecting interior spaces shall have a VOC content of not more than 100 g/L.
- (b) Architectural cast in place concrete (applicable to all Stations)
 - (i) Where concrete is left exposed as the final finish outside and within Stations, exposed concrete in the public realm shall be architectural cast in place concrete. DB Co shall provide architectural concrete as per the following:
 - A. Provide architectural cast in place concrete in accordance with CSA-A23.1/A23.2, 8.3 Architectural Concrete and ACI 347.3 Guide to Formed Concrete Surfaces, including proposed reference samples and mock-up field samples.
 - B. Architectural Cast in Place Concrete Finishes:
 - i. Finish : Smooth
 - ii. Formed Concrete Surface: CSC3 as defined in ACI 347.3R, Table 3.1a – Description of formed concrete surfaces
 - iii. Colour: Light grey.
 - C. Limit of Concrete Surface Irregularities:
 - i. Consistent with CSC3 concrete surfaces per ACI 347.3R.
 - D. Tie Holes: Uniform profile and diameter, in symmetrical layout, filled with plugs matching appearance of adjacent concrete.
 - (ii) Related Unformed Surfaces: Strike off smooth and finish with a texture matching adjacent formed surfaces, at tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces.

- (iii) Mock-up field samples: Preconstruction mock-up field samples shall be made for each finish or shall incorporate all finishes proposed to be utilized, using equipment, materials, and procedures planned for the actual construction. The City shall examine the mock-up field samples and compare them with the reference samples prepared in accordance with CSA-A23.1/A23.2, Clause 8.3.2 for approval prior to ordering formwork. The panels should be full-size to match the actual work as closely as possible. Additional samples shall be cast by DB Co to the satisfaction of the Design Architect and the City to achieve the required matching. Mock-up panels shall be standalone elements and are prohibited from forming permanent construction of any facility. The sample(s) shall serve as the standard for acceptance of the finished construction.
 - A. Construct field mock-ups using same procedures, equipment, and materials that will be used for production of architectural concrete. Accepted field mock-up shall serve as the reference to which architectural concrete will be compared for periodic and final acceptance. Construct field mock-ups at an acceptable location on Site.
 - B. Provide a simulated repair area to demonstrate an acceptable repair procedure. Repair procedure shall provide an acceptable color and texture match. Protect from physical damage and retain mock-ups until final acceptance of architectural concrete.
 - C. Construct a minimum 3m x 3m mock-up for Platforms, for review and acceptance using procedures detailed.
 - D. All mock-up panels shall be reviewed and approved by the Design Architect.
- (iv) Periodic acceptance
 - A. DB Co's Lead Architect shall periodically observe completed portions of architectural concrete for conformance with accepted field mock-up. The frequency of periodic acceptance and acceptance criteria shall include at a minimum, including but not limited to:
 - i. At a minimum, the Lead Architect shall conduct 1 review of in place formwork prior to first placement of architectural concrete for a Station;
 - ii. At a minimum the Lead Architect shall witness the first placement of architectural concrete in a Station; and
 - iii. At a minimum, the Lead Architect shall be present for the removal of the formwork of the first architectural concrete pour and assessment of finish for a Station.

- (v) Patching and repair procedures:
 - A. Surface sacking or abrasive blasting to conceal surface imperfections shall not be permitted without prior approval from the Lead Architect.
 - B. Patching and repair procedures shall be prepared and submitted to the Lead Architect for review and approval, prior to submission to the City for the same.
- (c) Precast concrete (applicable to all Stations)
 - (i) Where precast concrete is proposed, provide precast concrete in accordance with CSA-A23.4, Precast concrete - Materials and construction Surfaces.
 - (ii) Where precast concrete is left exposed as the final finish outside and within Stations, exposed precast concrete in the public realm shall be architecturally finished. DB Co shall provide architectural precast concrete per the following:
 - A. Category for precast forming part of the Stations shall be:
 - i. Group A1;
 - ii. Group BA1 – BA4;
 - iii. Group CA1 – CA4.
 - B. All precast shall be finish grade A.
 - C. Acceptance criteria;
 - i. Precast located between floor level to 2.8m above floor level or walking surface shall be viewed at a distance of 2m for acceptability defects such as chips, bug holes, and forming defects. Precast installed in other locations shall be viewed at a distance of 6m for acceptability defects.
 - ii. Finishes on vertical surfaces compared to finishes on horizontal surfaces such as returns shall be similar.
 - iii. Panel colour shall be uniform.
 - iv. Textures shall be uniform.
 - v. Prior to commencement of construction, DB Co shall provide 300mm x 300mm samples of each type of precast to be used on the Project. Samples shall be used to demonstrate the mix, colour and type of finish.

- vi. DB Co shall provide a 1200mm x 1200mm mock-up panel of each type of precast concrete to be used on the Project, located on site to be used as the model to judge acceptance.
- (d) Architecturally exposed structural steel (applicable to all Stations):
- (i) Where left exposed to public view, all structural steel shall be AESS conforming to CISC Code of Standard Practice for Structural Steel, APPENDIX I, as supplemented by CISC Guide for Specifying Architecturally Exposed Structural Steel.
 - (ii) All structural steel exposed to public view shall be AESS as follows:
 - A. Exposed structural steel that is 6m or greater measured vertically or horizontally from a walking surface and is visible to a person standing on that walking surface shall be Category 2 AESS; and
 - B. Exposed structural steel that is less than 6m measured vertically or horizontally from a walking surface and is visible to a person standing on that walking surface shall be Category 3 AESS.
 - (iii) All Exposed structural steel shall be finished with a high performance coating.
- (e) Overhead coiling grilles (applicable to all Stations):
- (i) Where used to secure Station entrances and to secure bus Platforms from Train Platforms, coiling grills shall be as follows:
 - A. Curtain Material: Stainless steel, ASTM A666, Type 316.
 - B. Curtain consisting of a network of minimum, 8mm diameter horizontal rods, or rods covered with tube spacers.
 - C. Bottom Bar: Stainless Steel tube, finished to match grille.
 - D. Grille Curtain Jamb Guides: Stainless steel angles with stainless steel mounting brackets.
 - E. Equipped with an electric operator.
 - i. Operator shall be controlled both locally and remotely from the TOCC.
 - F. Shall have manual operation device for use in the event of motor failure or power outage.
 - G. Connection for off-site remote control by the TOCC.

- H. Overhead coiling doors shall be equipped with IAC.
 - I. Safety Edge: Located at grille bottom bar, full width, electro mechanical pneumatic sensitized type, wired to immediately stop grille upon striking object, and reverse downward grille travel; hollow covered seal.
- (f) Graffiti-resistant Coating (applicable to all Stations)
- (i) Graffiti-Resistant Coating shall be applied to all porous opaque surfaces including but not limited to concrete masonry and stone up to a minimum of 2.5 m above adjacent floor/ ground or where surfaces are reachable to tag.
- (g) Bird protection devices (applicable to all Stations)
- (i) Provide a system of bird control using devices to prevent pest birds from landing, roosting, nesting, or climbing on horizontal surfaces at Stations, except for the roof exterior, tops of windscreens, light fixtures, security fences, handrails, guardrails, stone, and architectural concrete.
- (h) Wood soffit (applicable to Federally Mandated Stations)
- (i) Wood soffits shall be a suspended wood slat ceiling system with eight blades per foot and four blades per foot with scrim above consistent with the material and design utilized in the Existing Confederation Line Stations as follows:
 - A. Material shall be:
 - i. Manufactured for exterior use, with ACGI WeatherResist Cores, or equal;
 - ii. System shall be ACGI Backer Series 1, or equal; and,
 - iii. Mixed grain Douglas Fir, pressure treated and stained to match Existing Confederation Line Station material.
- (i) Floor grilles (applicable to all Stations)
- (i) Provide floor grilles consistent with those provided for the Existing Confederation Line Stations.
 - (ii) Provide manufacturer's aluminum floor-grille assemblies modified to comply with heavy load product line, consisting of treads joined together by cross members, and with support legs and other components needed to produce a complete installation. Include locking device for each panel and lifting hooks.
 - (iii) Floor grille:
 - A. Tread Rails: 4.7mm wide x 50mm deep 'T' profile, 3mm thickness.

- B. Maximum Span: 610mm, or as recommended by the manufacturer.
 - C. Maximum Individual Panel Size: 1200 x 1200mm.
 - D. Finish: Mill finish.
 - E. Frames: Manufacturer's standard frames, including perimeter frames, of size and style for grille type, for permanent recessed installation in floor, complete with installation anchorages and accessories, same material and finish as grilles. Provide concealed frameless supports except at perimeter frame.
- (iv) Support system:
- A. Manufacturer's special deep-pit frame and support system with intermediate support beams, sized and spaced as recommended by manufacturer and equipped with vinyl support cushions.
- (v) Drain pan:
- A. Aluminum sheet, 1.5mm minimum thickness, welded construction, bottom surface with positive slope to drain; holes cut for drain and equipped with adaptors for connection to drain lines; bottom of pan with protective coating as recommended by manufacturer; provision for heat-traced drainage.
- (j) Refer to Appendix C to this Part 4 for additional material and equipment specification requirements applicable to Federally Mandated Stations and where applicable to all Stations where consistency is required by this Part 4.

ARTICLE 3 STATION SPECIFIC ARCHITECTURAL DESIGN CRITERIA

3.1 Tunney's Pasture Station

- (a) Tunney's Pasture is an existing Station serving as the interim western terminus of the Existing Confederation Line. DB Co shall modify the existing bus terminal to satisfy the reduced bus terminal requirements.
- (b) The Station is a Federally Mandated Station.
- (c) DB Co scope within the existing Station is limited to modifications required to services related to the site modifications.

3.2 Westboro Station

- (a) DB Co shall design and construct the Station in accordance with this Article 3:
- (b) Westboro Station is an existing Transitway station. The new Westboro Station shall be located on Scott Street between Tweedsmuir and Athlone Avenues.
- (c) The Station Platform shall be located within the existing Transitway trench.
- (d) There shall be a minimum of two fare controlled entrances. One entrance shall be located on Scott Street and one entrance shall be located on the north side of the existing Transitway trench to facilitate the transfer of Passengers from the bus drop off area to the LRT Platform through fare gates.
- (e) Bus access to the Station shall be via the existing bus access drives to the east and west of the Station. Curb to curb dimension of the bus driveways on the east and west Bridges shall not be reduced from existing. The bus boarding Platform shall be located on the north side of the existing Transitway trench. A dedicated bus drop off Platform with a minimum of 4.0m shall be provided on the west bus access drive to allow buses to unload all customers before entering the layby facility located to the west of the Station. DB Co shall provide a fare paid entrance to the Station from the north bus Platform. Bus lay-by area shall be located to the west of the Station on the north side of the existing Transitway trench.
- (f) Public access across the Guideway to destinations north of the Station shall be provided on the east and west bus access drives.
- (g) DB Co shall be responsible to determine the extent of reuse of existing structure, and selective or complete demolition of the existing structures, based on required Design Life outlined in Schedule 15-2, Part 1, Article 4 – Design and Construction.

3.3 Dominion Station

- (a) DB Co shall design and construct the Station in accordance with this Article 3:

- (b) Dominion Station is an existing Transitway station. The new Dominion Station shall be located within the existing Transitway trench between Dominion and Berkley Avenues.
- (c) There shall be a minimum of one fare controlled entrance between Dominion Avenue and Berkley Avenue. The Station public entrance plaza shall be designed to provide a public access across the Guideway linking pedestrians and cyclists from Dominion Avenue to Workman Avenue.
- (d) Passengers shall have direct visual and physical access to the existing and new cycling and pedestrian pathways along the Guideway.
- (e) DB Co shall be responsible for the complete demolition and removal of foundations, and all elements of the existing Dominion station.

3.4 Cleary Station

- (a) DB Co shall design and construct the Station in accordance with this Article 3:
- (b) The new Cleary Station shall be located within Byron Linear Park at Sherbourne Road.
- (c) A minimum of one fare paid Station entrance shall be provided. DB Co shall locate one Station entrance east of the intersection of Bryon Avenue and Sherbourne Road and no less than 25m east of the east curb line of Sherbourne Road.
- (d) The above grade portions of this Station shall be minimized to reduce visual impact on Byron Park, and be configured as such to maintain sidewalks and MUPs as required by Schedule 15-2, Part 6 - Urban Design, Landscape Architecture and Connectivity Requirements.
- (e) All Station Facilities and system support spaces, shall be completely below grade with the exception of the fare paid entrance building.
 - (i) DB shall be permitted to construct a hydro room(s) to house [REDACTED] transformer and switch gear above grade, provided the utility spaces are housed with the Station emergency egress facilities as “one” structure.
- (f) The Station shall have three PPUDO spaces in each direction of travel on Byron Avenue.
- (g) The Station Platform shall be located below the level of existing grade, and DB Co shall design and construct the Station so that it shall be an open Station as defined by OBC and NFPA.
- (h) DB Co shall provide a 2m x 3m storage room located at Platform Level for the exclusive use of ESP.

3.5 New Orchard Station

- (a) DB Co shall design and construct the Station in accordance with this Article 3:

- (b) New Orchard Station shall be located between Richmond Road and Byron Avenue, immediately east of New Orchard Ave within Byron Park.
- (c) The eastern end of Station Platform shall be no less than 700m from the western end of the Cleary Station Platforms.
- (d) A minimum of one fare paid entrance shall be provided. The entrance shall be located no further east than the western curb line of Woodland Avenue.
- (e) The above grade portions of this Station shall be minimized to reduce visual impact on Byron Park. And be configured as such to maintain sidewalks and MUPs as required by Schedule 15-2, Part 6 - Urban Design, Landscape Architecture and Connectivity Requirements.
- (f) The Station Platform shall be located below the level of existing grade, and DB Co shall design and construct the Station so that it shall be an open Station as defined by OBC and NFPA.
- (g) DB Co shall design and construct the bus stop with shelter adjacent to New Orchard Station and provide the bus shelter and other customer amenities as required by the City.
- (h) DB Co shall provide a 2m x 3m storage room located at Platform Level for the exclusive use of ESP.
- (i) All Station Facilities and system support spaces, shall be completely below grade with the exception of the fare paid entrance.
 - (i) DB shall be permitted to construct a hydro room(s) to house [REDACTED] transformer and switch gear above grade, provided the utility spaces are housed with the Station Emergency egress facilities as “one” Structure.

3.6 Lincoln Fields Station

- (a) DB Co shall design and construct the Station in accordance with this Article 3:
- (b) Lincoln Fields Station is an existing Transitway Station. The new Transfer Station shall be in the location of the existing Transitway Facility.
- (c) The Transfer Station shall be a three Track Station with 2 centre Platforms or one centre Platform and one side Platform and an integrated fare paid bus terminal. All three Tracks shall be utilized for the loading and unloading of Passengers.
- (d) Station is a Federally Mandated Station and shall be subject to FLUDTA.
- (e) The Station Train Platform shall be located north of Carling Avenue and east of the existing Transitway.

- (f) There shall be a minimum of three fare controlled entrances. A Station entrance shall be provided from Carling Avenue; an entrance shall provide access from the west side of the Guideway at grade, and an entrance shall be provided at the bus loop to allow 24/7 access to the bus loop and access to and from the PPUDO.
- (g) DB Co shall provide an entrance to the Train Platform via the fare paid bus terminal. Bus Platforms, lay-by area, and bus operator facility shall be located of the east of the Guideway. Buses shall access the terminal from the existing access from Carling Avenue.
- (h) The PPUDO shall be outside of the Fare Paid Zone separated by fencing accessible by vehicles from the existing Carling Avenue access drive.
- (i) DB Co shall be responsible for the complete demolition and removal of foundations, and all elements of the existing Transitway Structures including existing pedestrian Bridges.

3.7 Iris Station

- (a) DB Co shall design and construct the Station in accordance with this Article 3:
- (b) Iris Station is an existing Transitway station.
- (c) Station is a Federally Mandated Station and shall be subject to FLUDTA.
- (d) DB Co shall provide a grade separation between the Guideway and Iris Street.
- (e) DB Co shall design and construct two bus stops with shelters on Iris Street, one in each direction of travel.
- (f) The Station Platform shall be located below the level of Iris Street. DB Co shall provide vertical circulation elements for Passengers to access the Station from the sidewalk, PPUDO and bus stops located on Iris Street.
- (g) DB Co shall design and construct on street bus Facilities to support transfer of customers.
- (h) Station entrance plazas on the east and west side of the Guideway shall be large and generous to safely accommodate both pedestrian and cycling traffic.

3.8 Baseline Station

- (a) DB Co shall design and construct the Station in accordance with this Article 3:
- (b) Baseline Station is an existing Transitway Station. The current on street surface bus facilities shall be decommissioned and relocated as part of this Project. Baseline Station will serve as the southernmost terminus of the Confederation Line.
- (c) The new Terminal/ Station shall be located between College Avenue and Navaho Drive beneath the landscaped plaza just west of [REDACTED].

- (d) The Station shall be centre Platform configuration, with the Platform being located within the center cell of the existing below grade Structure.
- (e) The Station shall have three fare controlled entrances. One entrance building shall front the south side of College Avenue, a second entrance building shall be provided at the north end of the Platform, within the existing plaza and a third entry from the pedestrian Bridge connecting to the [REDACTED].
- (f) The south entrance building fronting the south side of College Avenue, shall be designed and constructed to permit Passengers to transfer between bus service and Train service without passing through fare control gates and/or revalidating fare payment.
- (g) DB Co shall design and construct the bus access from Woodroffe Avenue so that it is restricted to College Avenue and the current transit vehicle only access south of Parkglen Drive. A secondary bus access shall be provided from the west terminus of College Avenue via the future Baseline bus facility with interim access via the current Transitway road,
- (h) DB Co's design and construction of the Station shall maximize the number of parking spaces located in the Park and Ride Facility between the Station Facilities and Woodroffe Avenue.
 - (i) DB Co shall provide at a minimum 202 parking spaces within the existing Park and Ride Facility, with 5% being for compact vehicles.
 - A. A minimum of 182 of the parking spaces shall be dedicated to Park and Ride spaces; and
 - B. A minimum of 20 parking spaces shall be designated for system operational staff and signed appropriately.
- (i) The Train Platform shall be underground within an existing Structure. DB Co shall utilize the existing structural design and framed openings where possible within the elevated floor slab in the Station design.
- (j) The center cell(s) of the existing underground structure shall be utilized for the Train Platform, operations, support spaces and vertical circulation.
- (k) The north entrance building shall be designed and constructed to accommodate future overhead connections to adjacent developments: east to [REDACTED], and to future development to the west including:
 - (i) Protecting for a second floor level;
 - (ii) Elevators designed for extension to second floor level;
 - (iii) Design for additional stairs and escalator to access second floor level; and,

- (iv) Finished floor elevation of the future second floor of the north entrance shall be at elevation 92.00m.
- (l) The south entrance building shall be designed and constructed with an overhead connection to [REDACTED], and to future developments as follows:
 - (i) DB Co shall design and construct the south entry to allow 24 hour access between the bus terminal, the College Avenue entry and the pedestrian Bridge access, while securing the Station Platform at grade level during Train non-Operating hours.
 - A. The second floor shall be served by elevators, stairs and escalators;
 - B. The second floor shall allow for a future pedestrian Bridge connection to the west; and,
 - C. Finished floor elevation of the second floor of the south entrance shall have a minimum floor elevation 92.65m.
 - (ii) DB Co shall design and construct the new pedestrian Bridge as follows:
 - A. The Bridge shall be fully enclosed with floor to ceiling glazed walls;
 - B. The Bridge shall be mechanically ventilated;
 - C. The Bridge shall have a minimum clear width between Structure or handrails of 4.0m;
 - D. DB Co shall provide fire separations as required by the OBC;
 - E. DB Co shall include provisions to maintain the integrity of the existing building's HVAC systems;
 - F. DB Co shall design and construct the Bridge to allow for connection to future development along Woodroffe at College Ave;
 - G. DB Co shall be responsible for the integration of fire alarm systems between the Station, pedestrian Bridge and the [REDACTED] as required by applicable codes and standards;
 - H. The Bridge shall have full CCTV coverage from fare gates to the [REDACTED] connection. The CCTV system shall have the ability to be controlled and transmit images to multiple locations including the TOCC and the [REDACTED] security centre; and,
 - I. The roof of the Bridge shall be equipped with electric snow melting system to prevent the accumulation of snow and ice.

- (m) Storage of Revenue Vehicles:
 - (i) The Facility and Trackwork design and construction of the centre cell shall accommodate a total of four Tracks (inclusive of the Revenue Service Tracks) and Revenue Vehicle storage for eight Trains during non-revenue service hours.
 - (ii) The outer cells shall be protected for the future installation of one Track to accommodate an additional three Trains on each Track.
- (n) DB Co shall provide a 2m x 3m storage room located at Platform Level for the exclusive use of ESP.
- (o) DB Co shall design and construct the Platform level to be visually distinct from all other Underground Stations to be easily identified by customers.
- (p) DB Co shall design and construct the Station so as to not preclude the extension of the Confederation Line to points further south as outlined in Schedule 15-2, Part 1, Article 2 – Physical Layout.

3.9 Queensview Station

- (a) DB Co shall design and construct the Station in accordance with this Article 3:
- (b) Queensview Station is a new Station located to the north of Highway 417.
- (c) The western end of the Station Platform(s) shall be no less than 650m from the eastern end of Pinecrest Station Platform(s).
- (d) The Station is to be served by a minimum of one fare controlled entrance.
- (e) DB Co shall design and construct a north entrance building and entry plaza which shall also serve a new pedestrian Bridge spanning Highway 417. The Station and Bridge shall be accessed via a combination of sloped pathway, stairs and elevators on the north side of Highway 417 and by stairs and two elevators on the south side of Highway 417 north of Baxter Road.
- (f) The north elevator and stairs outside of the Fare Paid Zone shall extend to a Station access point at grade.
 - (i) The north elevators shall extend to the plaza bordering the parking lot, providing direct access the adjacent business and sidewalk to Queensview Drive.
- (g) The new fully enclosed glazed pedestrian Bridge shall be naturally ventilated. Where natural ventilation is inadequate, mechanical ventilation shall be provided. Adequacy of natural ventilation shall be confirmed by calculation or simulation modeling.
 - (i) Access to the pedestrian overpass shall be outside of the Fare Paid Zone of the Station.

- (ii) Pedestrian access to the Bridge overpass at the north and south sides of Highway 417 shall be accessible. Redundant elevators shall be provided at both access points.
- (iii) The pedestrian Bridge and supporting Structure shall be located to accommodate the future expansion of Highway 417.
- (iv) Pedestrian Bridge shall be designed and constructed with minimal camber to provide a line of sight from end to end.
- (v) Pedestrian Bridge shall be designed to allow the Bridge to remain accessible to the public while securing the Train Station during Train non-Operating hours.

3.10 Pinecrest Station

- (a) DB Co shall design and construct the Station in accordance with this Article 3.
- (b) Pinecrest Station is an existing Transitway Station. DB Co shall be responsible for the complete demolition and removal of foundations, and all elements of the existing Station, and shall make good the finished grades and landscaping. The new Pinecrest Station shall be located on the north side Highway 417 west of Pinecrest Road.
- (c) The eastern end of the Station Platform(s) shall be no less than 650m from the western end of Queensview Station Platform(s).
- (d) Pedestrian access shall be via MUPs, from the southbound lanes of Pinecrest Road and a MUP from Dumaui Avenue.
- (e) DB Co shall design and construct off street bus Facilities to support transfer of customers from bus stops located adjacent to the Station. DB Co shall provide a bidirectional route from Pinecrest Road to the Station bus stop location and a bus turnaround after the bus stop to return buses to Pinecrest Road. The transfer of customers at this Station shall not be required to be within a Fare Paid Zone.
- (f) The Station shall be served by a minimum of one fare controlled entrance.
- (g) ESP access shall be via the existing Transitway access roadway.

3.11 Bayshore Station

- (a) DB Co shall design and construct the Station in accordance with this Article 3:
- (b) Bayshore Station is an existing Transitway Station that is currently located adjacent to Bayshore Shopping Centre and Highway 417. The Station shall be converted to serve as a Transfer Station of the Confederation Line.
- (c) The Station Platform shall be located to provide convenient access to Bayshore Shopping Centre at the southwest corner of the existing shopping centre building.

- (d) The Station shall facilitate direct and rapid movement of Passengers between local buses, Trains, and the adjacent commercial development.
- (e) The Station shall be served by a minimum of two fare controlled entrances. One shall be an at grade entrance from the MUP and shopping centre driveway and one serving the existing connecting Bridge entrance.
- (f) Entrances allowing Passengers to transfer between bus service and Train service without passing through fare control gates and/or revalidating fare payment shall be provided from all bus Platforms.
- (g) The Station shall be designed to allow the bus terminal to remain accessible to the public while securing the Train Station during Train non-Operating hours.
- (h) DB Co shall design and construct the Station so Passengers are not permitted to cross bus lanes within the Station to exit or transfer between bus services to Train service.
- (i) DB Shall provide knockout panels as follows:
 - (i) A total of two knockout panels shall be provided at the new entrance building serving the future development to the north of the bus terminal;
 - (ii) DB Co shall provide one knockout panel on each level of the new entrance building: one at bus terminal entrance level and one at the pedestrian bridge level;
 - (iii) Knockout panels shall be 4.0m wide x 3.0m high clear opening; and,
 - (iv) The final location of knockout panels shall be determined during the design phase in consultation with the City and developer.
- (j) Existing bus Platform widths are considered acceptable provided DB Co's design solution does not reduce the current width.
- (k) Existing bus layby configuration is acceptable provided turning radii for all design vehicles are accommodated.

3.12 Moodie Station

- (a) DB Co shall design and construct the Station in accordance with this Article 3.
- (b) Moodie Station is an existing Transitway Station that is currently located southeast of the intersection of Moodie Drive and Corkstown Road. The existing Station shall be converted to a Terminal Station serving as the western terminus of the Confederation Line.
- (c) The Station Platform shall be located between Corkstown Road and the eastbound off ramp of Highway 417, east of Moodie Drive.

- (d) The Station shall facilitate direct and rapid movement of Passengers between local buses, Trains, and the adjacent development.
- (e) The Station shall be served by a minimum of one fare controlled entrance.
- (f) Entrances allowing Passengers to transfer between bus service and Train service without passing through fare control gates and/or revalidating fare payment shall be provided from all bus Platforms.
- (g) Two PPUDOs shall be provided. One PPUDO with four paces shall be accessed from Corkstown Road at the west end of the site and one PPUDO with two spaces shall be located on Corkstown Road at the east end of the site.
- (h) The Station shall be designed to allow the bus terminal to remain accessible to the public while securing the Train Station during Train non-Operating hours.
- (i) The bus terminal shall have a secondary entrance from the existing Moodie Drive free flow bus ramp as follows:
 - (i) The access shall be secured with a lockable manual gate forming part of the fare paid zone perimeter; and,
 - (ii) The access shall be permitted to cross a bus Platform, provided DB Co's design includes a depressed area of the Platform; the Platform is free and clear of lighting fixtures, shelters etc., and the Platform is designed to accommodate the vehicular load of the buses.

3.13 Blair Station

- (a) DB Co shall design and construct the Station in accordance with this Article 3:
- (b) Blair Station is an Existing Confederation Line Station serving as the interim eastern terminus of the Existing Confederation Line. DB Co shall modify the existing bus terminal to satisfy the bus Facility requirements.
- (c) DB Co scope within the existing Station and Bus Operator building shall be limited to modifications required for the site modifications, unless required elsewhere in this Schedule 15-2 – Design and Construction Requirements.
- (d) The extension of the Trackwork to the east shall maintain protection for the future Platform extension to the east.

3.14 Montreal Road Station

- (a) DB Co shall design and construct the Station in accordance with this Article 3:
- (b) Montreal Road Station shall be a new Line Station located at the crossing of OR 174 and Montreal Road.

- (c) The Station shall be served by two fare controlled entrances located on Montreal Road. One entrance shall serve the eastbound lane and one shall serve the westbound lane.
- (d) The Platform shall be located in the median of OR174, above Montreal Road and shall be located so that the Platform spans Montreal Road.
- (e) Bus stops and shelters shall be provided in each direction of travel on Montreal Road.
- (f) Sidewalks and Station entry plazas shall be sized appropriately to serve movement of and the volume of pedestrians and cyclist along Montreal Road, bus stops, and Passengers transferring from bus to Train.
- (g) DB Co shall provide off street parking for two service vehicles within the highway interchange, north of the Station with access from Montreal Road.

3.15 Jeanne d’Arc Station

- (a) DB Co shall design and construct the Station in accordance with this Article 3:
- (b) Jeanne d’Arc Station shall be a new Station located at the crossing of OR 174 and Jeanne d’Arc Boulevard.
- (c) The Station shall be served by two fare controlled entrances located on Jeanne d’Arc Boulevard. One entrance shall serve the north-bound lane and one shall serve the southbound lane.
- (d) The Platform shall be located below Jeanne d’Arc Boulevard in the median of OR 174.
- (e) The Station Structure, vertical circulation elements, Station entry and Station entry plaza shall be designed and constructed to permit the widening of Jeanne d’Arc Boulevard to an ultimate ROW width of 37.5m without the relocation of fare gates, vertical circulation elements, etc. and without modifications to the main roof of the Station. The future widening of the roadway shall not reduce the entrance plaza to a size where it is of an insufficient size to accommodate the number of pedestrians and cyclist, or their movement, as required.
 - (i) The Station design inclusive of the main roof structure shall protect the fare gates from precipitation in accordance with this Part 4 in both the initial construction and with the future widening of Jeanne d’Arc Boulevard.
- (f) In addition to the plaza space identified in Clause (e) above, DB Co shall provide a plaza space of a minimum of 200 m² at the entrance serving the southbound lanes of Jeanne d’Arc Boulevard. A minimum of 40% of the plaza shall have weather protection for waiting bus Passengers outside of the Fare Paid Zone.
- (g) In addition to the plaza space identified in Clause (e) above, DB Co shall provide a plaza space of a minimum of 60 m² at the entrance serving the northbound lanes of Jeanne

d'Arc Boulevard. A minimum of 20% of the plaza shall have weather protection for waiting Passengers bus Passengers outside of the Fare Paid Zone.

- (h) Plaza spaces required in Clauses (f) and (g) above shall not be required when the ultimate ROW width of 37.5m, is achieved in the future.
- (i) DB Co shall provide parking for two service vehicles on the vacated portion of the existing bridge/ramp access or within the within the highway interchange, north or south of the Station.

3.16 Orléans Boulevard Station

- (a) DB Co shall design and construct the Station in accordance with this Article 3:
- (b) Orléans Boulevard Station is a new Line Station located at the crossing of OR 174 and Orléans Boulevard.
- (c) The Station shall be served by two fare controlled entrances located on Orléans Boulevard. One entrance shall serve the northbound lane and one shall serve the southbound lane.
- (d) The Platform shall be located below Orléans Boulevard in the median of OR 174.
- (e) Sidewalks and Station entry plazas shall be sized to accommodate the number of pedestrians and cyclists, and their movement as required to serve the general public along Orléans Boulevard, the bus stops, and the Passengers transferring from bus to Train.
 - (i) DB Co shall provide a plaza space of a minimum of 60 m² at each entrance. A minimum of 20% of the plaza shall have weather protection for waiting bus Passengers outside of the Fare Paid Zone.

3.17 Place d'Orléans Station

- (a) DB Co shall design and construct the Station in accordance with this Article 3:
- (b) Place d'Orléans Station is an existing Transitway Station that is currently located adjacent to Place d'Orléans Shopping Centre and OR 174. The Station shall be converted to serve as a Transfer Station.
- (c) DB Co shall ensure that a pedestrian Bridge spanning OR 174, connecting the Park and Ride Facility, the bus terminal and Place d'Orléans Shopping Center is included as a non-fare paid connection in the final configuration.
- (d) The Station shall be served by four fare controlled entrances.
 - (i) An entrance shall provide access from the existing pedestrian Bridge to the Train Platform located in the median of OR 174.

- (ii) An entrance shall provide access from the existing pedestrian Bridge to the existing bus terminal.
- (iii) An entrance shall provide access from grade in the existing Place d'Orléans Shopping Centre parking lot to the bus terminal.
 - A. Passengers using this entrance shall be permitted to cross the bus traffic lanes.
- (iv) An entrance shall provide access from the existing Champlain Street Bridge to the Train Platform located in the median of OR 174.
- (e) A connection to the LRT Station, allowing Passengers to transfer between bus service and Train service without passing through fare control gates and/or revalidating fare payment shall be provided from the bus Platform area.
 - (i) DB Co shall provide a new, fully enclosed, ventilated, glazed Bridge corridor.
- (f) The Station shall be designed to allow the bus terminal to remain accessible to the public while securing the Train Station during Train non-operating hours.

3.18 Trim Station

- (a) DB Co shall design and construct the Station in accordance with this Article 3:
- (b) Trim Road Station is an existing Transitway Station that is currently located southeast of the intersection of Trim Road and OR 174. The existing Station shall be converted to a Terminal Station serving as the eastern terminus of the Confederation Line.
 - (i) DB Co shall redesign, reconfigure, and construct the existing bus terminal and Park and Ride Facility to satisfy the bus terminal and parking capacity requirements of the Project, including:
 - A. The Station bus terminal, PPUDO and Park and Ride facilities shall be designed and constructed to satisfy the requirements of the relocated Trim Road and also with the future Trim Road overpass constructed;
 - B. The bus terminal and Park and Ride facility shall be designed to allow segregated access for public parking and bus service in both the initial configuration and in the future reconfiguration when Trim Road overpass is constructed. DB Co shall provide conceptual design illustrating both conditions in accordance with Schedule 10 – Review Procedure;
 - C. Bus access to the bus terminal shall be from the truncated portion of Trim Road north of the relocated E-S OR 174 ramp terminal. The truncated Trim Road, north of the ramp terminal shall be restricted access for buses and authorized vehicles only;

- D. In addition to the bus access from the truncated portion of Trim Road, the bus terminal shall have a manually operated gated secondary access and exit point at the east end;
 - i. The secondary exit point may be routed through the Park and Ride facility provided drive widths, turning radii, etc. are adequate for all buses utilized by the City.
 - E. The bus terminal configuration shall be as required to accommodate the facilities in the initial and future Trim Road configurations without relocating the fencing/barrier segregating the Fare Paid Zone from the Park and Ride facility, modifying utilities and SWM features, or acquiring property to the north of the existing City property limit;
 - F. The bus terminal configuration shall allow Passengers transferring from bus service to have unimpeded access to the Station entry without crossing bus drive access roads, bus terminal lanes, laybys, etc.;
 - G. PPUDO and Park and Ride customers shall have direct access to the Station entry without crossing the bus access drive;
 - H. The Park and Ride facility shall have a minimum of two vehicular access points segregated from the normal bus operational access route;
 - I. The Park and Ride facility main drive lanes shall be designed and constructed to accommodate both the initial and future Trim Road configurations; and,
 - J. The Park and Ride facility shall be designed to allow for the Trim Road overpass and associated road modifications to be constructed without relocation of parking spaces or drive lanes;
- (c) The Train Platform shall be in the median of OR 174. The bus terminal and Park and Ride Facilities shall be located south of OR 174 and east of existing Trim Road.
 - (d) The Station shall be a centre Platform configuration.
 - (e) The Station shall be served by one fare controlled entrance providing access from the Park and Ride area and PPUDO to the Station.
 - (f) An entrance allowing Passengers to transfer between bus service and Train service without passing through fare control gates and/or revalidating fare payment shall be provided from the bus Platform area.
 - (g) The Station shall be designed to allow the bus terminal to remain accessible to the public while securing the Train Station during Train non-Operating hours.

- (h) DB Co shall design and construct the Station to accommodate the future works described below:
 - (i) Construction of new Trim Road overpass with a fare paid entrance from the Trim Road southbound sidewalk; and,
 - (ii) Construction of an entrance located north of OR 174 and east of Trim Road connected to the Station Platform with and overhead pedestrian Bridge.
- (i) DB Co shall provide a total of 1,111 Park and Ride spaces on the site. Parking spaces shall be surface parking.
- (j) DB Co shall provide a formal PPUDO.
- (k) DB Co shall provide a new fully enclosed glazed Bridge corridor within the Fare Paid Zone, linking the bus terminal and the LRT Platform. The enclosed Bridge corridor shall be naturally ventilated. Where natural ventilation is inadequate, mechanical ventilation shall be provided. Adequacy of natural ventilation shall be confirmed by calculation or a computer program.

ARTICLE 4 STRUCTURAL DESIGN CRITERIA

4.1 Introduction

- (a) DB Co shall design and construct Stations and Facilities in accordance with this Article 4. The structural design shall include design of new members, inspection and documentation of existing Structures impacted by the Station construction and corresponding rehabilitation design.
- (b) In addition to the submittals required elsewhere, the structural engineering services shall include the preparation of complete calculations (appropriately indexed), coordination with other disciplines and general review of construction. Structural calculations shall be submitted in accordance with Schedule 10 – Review Procedure.
- (c) In addition to the requirements set forth in this Article 4, refer to Schedule 15-2, Part 8 – Underground Structures for Underground Structure requirements and Schedule 15-2, Part 2, Article 4 – Structural Design Criteria and Requirements, for pedestrian Bridges not forming part of the Station Structure.

4.2 Reference Documents

- (a) The structural design shall comply with the criteria contained in this Article 4, and all standards, regulations, policies, Applicable Law, guidelines or practices applicable to the Project, including but not limited to each of the following Reference Documents. In the event of a structural component conflict between criteria, commitments or requirements contained within one document when compared with another, the more stringent shall apply:
 - (i) OBC;
 - (ii) NBC; where applicable
 - (iii) User's Guide – NBC: Structural Commentaries (Part 4); where applicable
 - (iv) CAN/CSA S6 - CHBDC*;
 - A. *Note: Portions of the Station that support Vehicle loads shall be considered Train Structures. Train Structures shall be designed to satisfy the requirements of this Article 4 and the remainder of Schedule 15-2 – Design and Construction Requirements and shall meet or exceed the applicable building code(s) and the CHBDC.
 - (v) CAN/CSA A23.1/A23.2 - Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete;
 - (vi) CAN/CSA A23.3 - Design of Concrete Structures;
 - (vii) CAN/CSA O86 - Engineering Design in Wood;

- (viii) CAN/CSA S16 - Design of Steel Structures;
- (ix) CAN/CSA S304.1 - Design of Masonry Structures;
- (x) CAN/CSA S136 – North American Specification for the Design of Cold-Formed Steel Structural Members;
- (xi) Canadian Foundation Engineering Manual;
- (xii) CAN/CSA S478 – Guideline on Durability in Buildings;
- (xiii) ACI 201.2R – Guide to Durable Concrete;
- (xiv) AREMA Manual for Railway Engineering hereinafter referred to as the AREMA Manual
- (xv) ACI 360R – Design of Slabs on Grade;
- (xvi) CSA S448.1 – Repair of Reinforced Concrete in Buildings and Parking Structures;
- (xvii) AISC/CISC Steel Design Guide Series 11 – Floor Vibrations Due to Human Activity;
- (xviii) Ontario Occupational Health and Safety Act;
- (xix) PEO Professional Engineers Providing Services for Demolition of Buildings and Other Structures;
- (xx) MTO Structure Rehabilitation Manual;
- (xxi) MTO Ontario Structure Inspection Manual;
- (xxii) MTO Structural Manual;
- (xxiii) MTO Structural Steel Coating Manual;
- (xxiv) Ontario Provincial Standards (<http://www.raqsb.mto.gov.on.ca/techpubs/>);
- (xxv) ASTM E2018 Standard Guide for Property Condition Assessments: Baseline Property Condition Assessment Process;
- (xxvi) ASCE Structural Condition Assessment of Existing Structures;
- (xxvii) AASHTO LRFD Guide Specifications for the Design of Pedestrian Bridges;
- (xxviii) OC Transpo Transitway and Station Design Guidelines; and,

(xxix) ISO 12944-5 Paints and varnishes - Corrosion protection of steel structures by protective paint systems - Part 5: Protective paint systems.

4.3 Federally Mandated Stations

- (a) Federally Mandated Stations shall be subject to the regulations of the NCC shall meet the requirements of both the OBC and the NBC.

4.4 Durability

- (a) Provide materials, details and protection systems to meet or exceed the specified requirements for Project durability.
- (b) Time-dependent design calculations, including corrosion, fatigue and creep shall be based on the required Design Life as outlined in Schedule 15-2, Part 1, Article 4 – Design and Construction.
- (c) At a minimum, DB Co shall provide concrete meeting exposure Class C-1 per CSA 23.1, for all concrete at or above grade.
 - (i) DB Co shall provide testing report for chloride penetrability for concrete of exposure class C-1 and C-XL in accordance with Schedule 10 – Review Procedure.
- (d) Reinforcing steel in substructure concrete within the splash zone of adjacent roadways treated with de-icing salts shall be stainless steel. Splash zone shall be as defined in MTO Structural Manual.
- (e) All structure members not within the heated space shall be capable of withstanding freeze-thaw effects without negatively impacting the design objectives.
- (f) DB Co shall detail members to minimize exposed surface area and avoid pockets, crevices, recesses, re-entrant corners, and locations that collect and retain water, debris, and moisture.
- (g) DB Co shall coat or galvanize all permanent iron and steel utility supports, fittings, and accessories. Design utility supports to prevent stray electrical currents between the Structure and the utility supports.
- (h) DB Co shall use weldable reinforcement and suitable welding procedure where electrical continuity is required for managing stray currents.
- (i) DB Co shall provide access for maintenance and inspection with conventional techniques included in MTO's Ontario Structure Inspection Manual, Structure Rehabilitation Manual and Structural Manual for all components of the Structure. Inspection and maintenance access and maintainability shall meet the requirements in Clause 1.8.3 in CSA S6-14.

4.5 Station Structural Loads

(a) Dead Loads

- (i) Dead loads or permanent loads shall be as specified in OBC, NBC and CAN/CSA S6, as applicable.
- (ii) Mass densities for materials shall be standard unless analysis or testing indicates that other criteria shall be used. Perform a sensitivity analysis for the actual weight where a variation might affect the adequacy of the design or in cases where the construction may vary from normal practice.

(b) Live Loads

- (i) Live loads include the Revenue Vehicle design loads and highway vehicular loads specified in Schedule 15-2, Part 2, Article 4 – Structural Design Criteria and Requirements as well as all floor and roof live loads as described in the design codes and standards specified earlier in this Article 4.
- (ii) Vehicle Live Load:
 - A. Refer to Schedule 15-2, Part 2, Article 4 – Structural Design Criteria and Requirements for Train loads.
 - B. Design Platforms and ramp slabs wider than 3m and accessible to Maintenance Vehicles for a concentrated vehicle load as per OBC, or the Maintenance Vehicle load as defined in CHBDC, whichever produces the more critical structural responses.
 - C. Design the structures supporting Sidewalks, Plazas, and other open areas wider than 3m, adjacent to road way and without permanent barrier to separate the roadway from the area for CL-625-ONT truck load as defined in CHBDC, or fire truck load as per OBC, whichever produces the more critical structural responses. Design structural members within this area for collision force defined below.
- (iii) DB Co shall design and provide electrical equipment rooms, pump rooms, machinery rooms, storage rooms, service rooms, battery rooms and fan equipment rooms containing fire ventilation equipment for a specified live load of 12kPa, or the actual equipment load where greater than 12 kPa, applied uniformly over the entire area, or on any portion of the area, whichever produces the most critical effects in each member.

(c) Environmental Loads

- (i) Snow, rain, ice, ice accretion, wind and earthquake loads shall be as described in the design codes outlined earlier in this Article 4 using the OBC Importance Category of “Normal”.

- (ii) Include allowance for the build-up of ice on Track slabs and the build-up of compacted snow on vertical faces of barrier walls and Platform support walls adjacent to Track slabs at exposed parts of above grade Stations where the potential for such build-up exists.
 - (iii) Design Station Structures, partitions and affected non-structural elements to resist the piston effect wind pressures from Revenue Vehicles. DB Co shall be responsible to determine the required pressures to be resisted by all elements of the Station. DB Co shall provide data and reports supporting the determination of the design pressure based on SES modeling of the underground system. The minimum uniform design pressure for these elements shall be 1kPa in either the positive or negative direction.
- (d) Fatigue Loading
 - (i) DB Co shall assess operational requirement in Schedule 15-2, Part 1 Article 3 – Operational Performance Requirements to determine the expected number of Trains the Structure will support during its Design Life. A service load analysis for fatigue shall be applied to affected structural elements and is generally based on the number of full loading cycles that are applied to the Structure. The loading cycles applied to each member and connection shall include the number of Revenue Vehicles, trucks or wheel load passes, whichever produces the most critical effect.
- (e) Earth Loading
 - (i) Vertical and horizontal earth pressures acting on retaining walls and Underground Station Structures: refer to Schedule 15-2, Part 2, Article 7 – Geotechnical Design Criteria and Requirements and Schedule 15-2, Part 2, Article 4 – Structural Design Criteria and Requirements.
 - (ii) Design Structures which retain earth for horizontal earth pressure due to earth against the Structure and load surcharges resting on the soil above or beside the Structure.
 - (iii) Vertical pressure from superimposed earth load shall be based on a mass density of 22 kN/m³ for compacted granular materials. Consider a minimum earth load assuming that 1m of fill may be removed for road or utility construction.
- (f) Water/Buoyancy/Flood Loading
 - (i) DB Co shall consider the effects of water pressure and buoyancy whenever groundwater is present. DB Co shall establish high and low water tables for the life of the Structure with due consideration given to the possibility of future changes in groundwater elevation.

- (ii) The design shall take into account the effect of water pressures during the construction sequence.
 - (iii) DB Co shall observe and control the elevation of the groundwater during construction and backfill operations, so that the calculated total mass of Structure and backfill shall always exceed the calculated uplift due to buoyancy by a safe margin. The backfill shall be considered as the volume contained within vertical planes defined by the outside limits of the Structure.
 - (iv) Design of the Structure shall make allowance for flood elevations based on 100 year flood data where it may add load to Structures.
- (g) Adjacent Structure/Additional Surcharge Loading
 - (i) DB Co shall determine horizontal and vertical distribution of loads from foundations of existing buildings.
 - (ii) DB Co shall determine the minimum and maximum loads which can be transferred to the underground Structure. These loads shall be based on the actual design loads for the Adjacent Structure where this information is available. In the absence of this information, DB Co shall use the methods in the Reference Documents in Clause 4.2 of this Part 4 to evaluate probable loading of the existing Structure. The loading shall have at least the minimum level of performance on the objectives and functional statements stated or implied in Reference Documents in Clause 4.2 of this Part 4.
 - (iii) DB Co shall determine the need for all permanent underpinning of buildings or Structures when performing the above analyses.
- (h) Thermal, Shrinkage, and Creep Loading
 - (i) The secondary effects due to the stresses and movements resulting from temperature changes, thermal gradients, creep and shrinkage shall be considered in the design. DB Co shall determine these loads and the appropriate design solution in accordance with the requirements of OBC, NBC, CAN/CSA S6 and AREMA, as applicable.
- (i) Other Loads and Effects:
 - (i) as applicable to the use and occupancy for the Structure or element under consideration;
 - (ii) as required by the design codes, standards and references listed in this Article 4;
 - (iii) refer to Schedule 15-2, Part 2, Article 4 – Structural Design Criteria and Requirements for Revenue Vehicle and Vehicle loads;
 - (iv) Construction loads, construction staging loads and maintenance loads;

- (v) loads due to fan induced airflows during operation of fire ventilation fans;
- (vi) loads induced on the Structures by tolerable differential settlement;
- (vii) loads to protect for future expansion where applicable; and
- (viii) other loads and effects specified in Schedule 15-2, Part 2, Article 9 – Protection of Existing Adjacent Structures and Schedule 15-2, Part 2, Article 4 – Structural Design Criteria and Requirements where applicable.

4.6 Load Combinations

- (a) Load factors, resistance factors and load combinations shall be in accordance with the applicable building and Bridge codes for the particular Station and structural element under consideration.
- (b) Refer to Schedule 15-2, Part 2, Article 4 – Structural Design Criteria and Requirements for load factors, resistance factors and load combinations for Station Structures supporting Revenue Vehicles.
- (c) Where the Station structure is subject to Revenue Vehicle load, the structure shall be designed for OBC and CHBDC.
- (d) For Structures carrying more than one Track, determine the combination of Revenue Vehicle axle loads on one or more Tracks which produces the most critical effect.

4.7 Design Considerations for Retaining Walls

- (a) Design considerations and factors influencing the behaviour of retaining walls shall be as per CAN/CSA S6 and OBC. The design of any retaining wall is site specific, necessitating the need for specific geotechnical input and an understanding of wall construction methods. Provide architectural enhancement of walls where specified in the architectural design.
- (b) DB Co shall design retaining walls to resist the following loads:
 - (i) Superimposed surface and subsurface loads (adjacent vehicles and Structures);
 - (ii) System imposed forces (trackway vicinity);
 - (iii) Earth or rock pressures and hydrostatic pressures;
 - (iv) Earthquake lateral pressures;
 - (v) Wind Loads, where required;
 - (vi) Self-weight;

- (vii) Loads during construction;
 - (viii) Thermal, shrinkage, and creep loads; and,
 - (ix) Other retaining wall loads specified in Schedule 15-2, Part 2, Article 7 – Geotechnical Design Criteria and Requirements, and Schedule 15-2, Part 2, Article 4 – Structural Design Criteria and Requirements.
- (c) Retaining Walls shall be analyzed for:
- (i) Stability against sliding;
 - (ii) Stability against bearing failure and overturning;
 - (iii) Settlement;
 - (iv) Overall stability;
 - (v) Structural strength;
 - (vi) Protect for future wall repair when locating retaining walls;
 - (vii) Provide Compensating Construction where existing retaining walls are impacted by the Station renovations as required by OBC and NBC, as applicable; and
 - (viii) Other requirements specified in Schedule 15-2, Part 2, Article 7 – Geotechnical Design Criteria and Requirements, and Schedule 15-2, Part 2, Article 4 – Structural Design Criteria and Requirements.

4.8 Other Design Considerations

- (a) DB Co shall design the structural foundations, superstructures, systems, elements and connections to meet all of the requirements stipulated in the codes, standards and references listed in this Article 4.
- (b) DB Co shall slope structural members to provide drainage where required.
- (c) DB Co shall incorporate into their pedestrian Bridge design MTO design requirements to address snow and ice from falling on vehicles.
- (d) Deflection and Vibration Control
 - (i) All structural members shall have adequate stiffness to limit deflections which may adversely affect the strength and serviceability of the Station Structure.
 - (ii) Deflections due to live load, including dynamic factors, in members supporting Train loads, shall not exceed 1/1000 of the span for interior spans and 1/300 for cantilever arm length.

- (iii) The maximum total (dead and live load) long term total deflection considering creep and cracking for members supporting Train loads shall be limited to 1/500 of the interior spans and 1/180 of cantilever arm length.
 - (iv) Members not supporting rail loads, such as roofs, concourse and Platform slabs, shall be designed to standard acceptable engineering practices for serviceability taking into consideration the flexibility, or lack of flexibility, of the materials supported by the Structure.
 - (v) Members and systems supporting the system shall be proportioned so that the natural frequency of the first mode of vertical vibration is greater than 2.5 Hz.
 - (vi) Design floor systems susceptible to vibration in accordance with AISC/CISC Steel Design Guide Series 11 – Floor Vibrations Due to Human Activity, to meet the acceptance criteria for indoor footbridges.
- (e) Foundation
 - (i) Settlements
 - A. Design foundations so that total and differential settlements do not adversely affect the strength or serviceability of the Station Structures.
 - B. Design structural members and systems supporting Revenue Vehicles so that total and differential settlements do not adversely affect the operation and serviceability of the Revenue Vehicles.
 - (ii) Pile design and detailing shall meet requirements in OBC, MTO Structural Manual, CHBDC. DB Co. shall follow the requirements in AASHTO LRFD Section 10 if requirements are not specific in the above documents.
 - (iii) Provide measures to prevent frost heave. The acceptable measures shall be taken from Reference Documents in Section 4.2.
- (f) Seismic Design for Elements of Station Structures, Non-Structural Components and Equipment
 - (i) Seismic Importance Category shall be “Normal” as per OBC.
 - (ii) DB Co shall design elements and components of buildings, non-structural components and equipment for earthquake loads and effects as required by OBC and NBC.
 - (iii) The load factor for earthquake effect on Revenue Vehicle shall be in accordance with Schedule 15-2, Part 2, Article 4 – Structural Design Criteria and Requirements.
- (g) Waterproofing

- (i) The following areas shall be sealed to prevent water ingress:
 - A. Underground pits, shafts and rooms.
 - B. Platforms, walkways, Track structure and roadways over rooms or spaces
 - C. Walls and floors of buildings subject to hydrostatic pressure.
 - (ii) For the locations identified above, DB Co shall provide full impervious membrane protection.
 - A. For walls, a backup hidden drainage system within the wall shall be provided.
 - (iii) The material and construction of waterproofing shall follow requirements in ASTM, OPSS, and CAN/CGSB.
- (h) Fire Protection
- (i) Structural elements and load bearing assemblies shall be of the required type of construction and shall have fire resistance ratings as required by the code analysis and the architectural design.
 - (ii) DB Co shall provide concrete cover to reinforcing steel in reinforced concrete elements as required to provide the required fire resistance rating for the element or assembly.
 - (iii) DB Co shall provide intumescent paint where the architectural design utilizes exposed structural steel assemblies that require a fire resistance rating.
 - (iv) Adhesive anchors shall not be used for connections for structural assemblies required to have a fire resistance rating.
- (i) DB Co shall protect for the future replacement of elevators, escalators, transformers, ventilation fans and other large/heavy equipment without strengthening and/or temporary removal and replacement of structural members.
 - (j) DB Co shall not locate columns in public circulation areas. When unavoidable, the column cladding and size be minimized so as to maximize sightlines and customer circulation.

4.9 Considerations of Existing Structure

- (a) Conditions of existing Structures affected by new construction
 - (i) An existing structure is considered modified under one or more of the following situations.

- A. geometries are modified,
 - B. material properties are modified,
 - C. support condition are modified,
 - D. loads are changed,
 - E. environmental condition is changed,
 - F. a new member is attached to an existing structural member resulting in load sharing between the new and existing members, or
 - G. it is within the ZOI, which shall be defined by DB Co's Geotechnical Engineer in accordance with *User 's Guide - NBC 2015, Structural Commentaries (Part 4 of Division B), Commentary on CSA S6 (C6), and CFEM.*
- (ii) DB Co shall demonstrate that the performance of the modified existing Structure meets all the applicable standards and requirements in this Article 4, regardless of the deficiencies in the existing Structures at the time of Contract Award, where deficiencies could result from construction, material, design, normal course of deterioration, or damage prior to the Commercial Close.
 - (iii) DB Co shall investigate the structural soundness of the existing member affected by the construction and ensure it is capable of supporting the new member for the Design Life of the new member.
 - (iv) DB Co shall inspect and document the conditions of the existing structures affected by the construction. The content and the documentation of the inspection should follow the requirements in MTO Ontario Structure Inspection Manual, MTO Structure Rehabilitation Manual, ASTM E2018, or ASCE Structural Condition Assessment of Existing Structures. The requirements in the above references apply only when appropriate. Necessary additional or alternative criteria are subject to approval by the City.
 - (v) Refer to Schedule 15-2, Part 2, Clause 4.4 (v) (ii) for requirements for Structures within ZOI.
- (b) DB Co shall perform and comply with the following for the renovation of existing Structures:
 - (i) OBC and NBC as applicable.
 - (ii) The Heritage Act as applicable.
 - (iii) MTO Structure Rehabilitation Manual if the structural member is exposed.

- (iv) DB Co shall obtain background drawings, specifications and construction records for the affected Structures.
 - (v) Perform as built surveys to verify the accuracy of the background drawings.
 - (vi) Excavate test pits to verify the size and depth of existing foundations.
 - (vii) Conduct destructive investigations to verify existing conditions.
 - (viii) Conduct materials testing to determine and verify existing material properties.
 - (ix) The requirements for Basic Renovation or Extensive Renovation as determined by the code analysis at each location.
 - (x) Provide Compensating Construction as required by OBC and NBC, as applicable.
 - (xi) Perform selective demolition in accordance with OBC and NBC as applicable,
 - (xii) Perform Repairs on any damage caused by the Work to the satisfaction of the property owner.
- (c) Interface between existing and new deck Structures supporting pedestrian and vehicular traffic:
- (i) At locations where new framed floors are built adjacent to existing floor/Bridge Structures, design and construct the new Structure in a manner that minimizes the vertical differential movement at the interface between Structures so that normal serviceability of the Station is maintained under permanent and transient loads. Joints between new and existing slabs shall be flush with no vertical offsets that could create pedestrian tripping hazards or bumps under wheel loading. The design shall address: long term deflection (creep) of concrete; differential live loading; total and differential footing settlement; beam and slab camber; expansion joint cover design; and other effects where applicable.
 - (ii) DB Co shall pre-consult the City on any modification needed to all existing Bridge Structures.
- (d) Where existing Structures are incorporated into or form part of the Station Structures, DB Co shall rehabilitate the existing Structures as required to meet the required Design Life as per Schedule 15-2, Part 1, Article 4 – Design and Construction.
- (i) Estimate the remaining life of the existing structure using a method and parameters recommended in peer-reviewed publications. Submit the documents supporting the estimated remaining life to the City for review and approval.

4.10 Reinforced Concrete

- (a) This Subsection applies to reinforced, prestressed, and precast concrete Structures.

- (b) DB Co shall provide a nonslip surface finish in accordance with CAN/CSA A23.1 at exterior slabs subject to pedestrian traffic and at other locations as required in this Part 4.
- (c) DB Co shall apply hardener at exposed concrete floors.
- (d) Joints in Structures
 - (i) DB Co shall provide expansion joints, contraction joints and construction joints: in accordance with the all Applicable Codes and standards and in accordance with good industry practice; to control shrinkage stresses and minimize shrinkage cracking; and to meet or exceed the requirements for durability specified in Clause 4.4 of this Article 4.
 - (ii) DB Co shall provide waterstops in all joints below grade.
 - (iii) Plan construction joint locations in advance in order to minimize the number of joints while still keeping the length of individual concrete pours within standard acceptable maximum lengths. The shape of the pour as well as the amount of reinforcement in the section shall be taken into consideration when determining joint location and spacing.
- (e) Field sampling and testing of concrete and acceptance criteria for quality assurance shall follow the requirements in OPSS 1350.
- (f) DB Co shall design all concrete on or above grade for exposure to chlorides.

4.11 Structural Steel

- (a) The Code of Standard Practice for Structural Steel published by the CISC shall govern the furnishing of structural steel.
- (b) Design of structural steel Structures shall be in accordance with CAN/CSA S16 Design of Steel Structures and CAN/CSA S6 Canadian Highway Bridge Design Code, where they are applicable.
- (c) Design of cold formed steel Structures shall be in accordance with CAN/CSA-S136 North American Specification for the Design of Cold-Formed Steel Structural Members.
- (d) All structural steel left exposed and viewable by the public shall be architecturally exposed structural steel.
 - (i) DB Co shall provide architecturally exposed structural steel conforming to CISC Code of Standard Practice for Structural Steel, APPENDIX I, as supplemented by CISC Guide for Specifying Architecturally Exposed Structural as required by Clause 2.8 of this Part 4.
- (e) DB Co shall provide concealed connections where required by the architectural design.

- (f) Protection of Steelwork
 - (i) DB Co shall make all parts of a Structure accessible for inspection, cleaning, and maintenance. Where this is not possible, DB Co shall use concrete encasement of steelwork, and use of special protective coatings or the use of atmospheric corrosion resistant steel.
- (g) Protective Coatings
 - (i) DB Co shall protect structural steel members and connections exposed to weather, high humidity or water spray against corrosion in accordance with MTO Coating Structural Manual. Minimize localized corrosion likely to occur from entrapped water, excessive condensation, or from other factors by suitable design and detail. Provide positive means of drainage to prevent standing water on steel surfaces.
 - (ii) Painting of interior structural steel shall meet the requirements of ISO 12944-5 for the applicable corrosive environment and desired Design Life of the coating system.
 - (iii) Co-ordinate the protective coating systems with the architectural design.
 - (iv) The minimum protection system shall be painting with a high performance coating system.
 - (v) The following shall apply where hot dip galvanized protection system is utilized:
 - A. Protection shall be restored when damage to the galvanized coating has occurred during welding or as a result of rough handling or abrasion.
 - B. All galvanized surfaces shall be finish painted where exposed to public view.
- (h) DB Co shall not use steel deck for Structures exposed to the exterior or to deicing salts.

4.12 Masonry

- (a) Design of masonry Structures shall be in accordance with CAN/CSA S304.1
- (b) Horizontal joint reinforcing shall be galvanized.
- (c) DB Co shall design masonry Structures to resist all applied vertical and lateral loads as required by the OBC (and the NBC where applicable). This requirement applies to load-bearing and non load-bearing masonry.

4.13 Concrete Slabs on Grade

- (a) DB Co shall design Track slabs in accordance with AREMA, CAN/CSA S6 and ACI 201.2R.

- (i) Refer to Schedule 15-2, Part 2, Article 3 - Trackwork for Track slab design requirements.
 - (ii) Transition areas such as behind end of Station end wall (or Bridge abutment) where Train transitions from at grade Track Structure to over the Station structure require special design and construction solutions. An approach slab shall be used in these areas.
- (b) DB Co shall design Platform and other slabs on grade in accordance with CAN/CSA A23.3 and ACI 360R.
- (c) DB Co shall remove existing fill material below slabs on grade and replace with engineered fill to a depth and extent as required to meet the limitations for settlement specified in Clause 4.8 of this Article 4. Reuse of existing excavated fill material is subject to Geotechnical Engineer's confirmation that the existing fill is suitable for re-use.
- (d) DB Co shall design and construct the interface between Track slabs and Platform slabs to maintain the vertical distance between TOR elevation and finished Platform elevation as required by the Revenue Vehicle with short and long term differential settlements not to exceed the tolerance specified by the Revenue Vehicle manufacturer for vertical offset between the Track and finished Platform elevations. Refer to Schedule 15-2, Part 2, Figure 2-2.1 for vehicle dynamic envelope and Platform construction tolerance.
- (e) DB Co shall provide control joints or other measures to prevent uncontrolled shrinkage cracking.
- (f) DB Co shall provide connection design and detailing at the interface between slabs to address differential concrete shrinkage, where the location and spacing of transverse joints in Track slabs does not match the location and spacing of joints in the adjacent Platform slabs.
- (g) DB Co shall design joints to prevent vertical differential movement between slab panels.
- (h) DB Co shall provide slopes to drain slabs and prevent ponding.
- (i) DB Co shall provide subdrainage systems below slabs at locations where the potential exists for the groundwater elevation to reach the underside of the slab subbase.

ARTICLE 5 MECHANICAL DESIGN CRITERIA

5.1 Introduction

- (a) This Article 5 outlines mechanical systems requirements to be developed for the Stations and Ancillary Facilities of the Project.
- (b) These requirements govern the functional, operational and control requirements of the HVAC, Plumbing & Drainage Systems, Fire Protection Systems, and BAS.

5.2 Reference Documents

- (a) The provision of mechanical components shall comply with the criteria contained in this Article 5, and all Applicable Codes, standards, regulations, policies, applicable laws, guidelines or practices applicable to the Project requirements, including but not limited to the latest version of each of the following Documents. In the event of a conflict between criteria, commitments or requirements contained within the document and this Article 5 when compared with another, the most stringent shall apply.
 - (i) OBC;
 - (ii) OFC;
 - (iii) OESC;
 - (iv) CEC;
 - (v) CSA;
 - (vi) OHSA;
 - (vii) AHRI;
 - (viii) AMCA Standards;
 - (ix) ANSI Standards;
 - (x) ASHRAE Standards and Handbooks;
 - (xi) MNECB;
 - (xii) Green Energy Act;
 - (xiii) ASPE;
 - (xiv) ASME;
 - (xv) ASTM;

- (xvi) NEMA;
- (xvii) SMACNA;
- (xviii) TIAC;
- (xix) UL;
- (xx) ULC;
- (xxi) OC Transpo Transitway and Station Design Guidelines;
- (xxii) NFPA Standards;
- (xxiii) Relevant Authorities

5.3 General Requirements

- (a) All mechanical systems including but not limited to equipment, ductwork, pipes, supports, accessories, and their connections to the structure, shall be designed to resist seismic force and to accommodate building seismic deflection in accordance with the OBC. Piping, ducts etc. shall be attached in a manner that accommodates the differential movement where mechanical infrastructure crosses expansion joints, or other places where differential lateral displacement may occur.
- (b) DB Co shall install floor-mounted equipment on concrete housekeeping pads designed to facilitate the weight and inertia of the equipment.
- (c) DB Co shall install roof-mounted equipment on supports/roof curbs provided by the equipment manufacturer.
- (d) DB Co shall coordinate associated architectural and structural requirements for mechanical systems.
- (e) DB Co shall provide adequate service spaces around all equipment. As a minimum, such spaces shall not be less than that indicated in the equipment specification and installation instructions.
- (f) Mechanical equipment and systems shall be designed so that the maximum noise transmitted by the systems does not exceed OHSA and Regulations and ASHRAE Standards.
- (g) Where new mechanical systems are connected to existing mechanical systems, the existing mechanical systems shall be modified to suit the requirements of new systems. The modifications shall be in compliance with OBC, codes, standards, and meet requirements set forth in this Article 5.

- (h) DB Co shall provide technical calculations for review in accordance with Schedule 10 – Review Procedure.
- (i) TAB and Commissioning shall be performed for all mechanical systems.
- (j) Requirements set forth in this Article 5 for Stations shall also apply to service facilities located in Tunnels.
- (k) Electric motors shall be NEMA premium efficiency. Fractional horsepower motors shall be electronically commutated motors.
- (l) All mechanical systems and equipment shall be designed and installed to eliminate the transmission of vibration and noise to other part of the building and to applicable standards, regulations and codes. Provide vibration isolators for mechanical equipment and components.

5.4 HVAC

- (a) DB Co shall design and construct HVAC in accordance with the following design parameters for Stations and Ancillary Facilities:
 - (i) System concepts shall be based on the energy conservation guideline of the MNECB, OBC, and ASHRAE 90.1.
 - (ii) Service equipment rooms, that require reliability, such as communication rooms, telephone rooms, signal rooms, elevator machine rooms shall be positively pressurized to mitigate infiltration of brake dust from Train movements.
 - (iii) Rooms containing equipment that requires condition control shall be designed to suit the equipment as per the manufacturer's recommendations or the occupancy requirements, whichever are the most stringent.
 - (iv) Rooms that are occupied shall be provided with outside air requirements per person as defined in ASHRAE, and, if found to be applicable, air-conditioning, and heating based on the number of occupants.
 - (v) Rooms that are infrequently occupied and do not require condition control for equipment shall have a minimum air change rate as determined to suit the room functions.
 - (vi) Rooms that contain equipment and systems that give off airborne particles, odours, or chemicals shall be exhausted to outside at grade level.
 - (vii) Washrooms and janitor rooms shall be exhausted to outside at grade level.
 - (viii) Battery rooms shall be exhausted to outside at grade level via duty and standby exhaust fans.

- (ix) Air-conditioning systems serving elevator machine rooms shall be designed such that elevator equipment shall be operational during Station fire Emergency.
 - (x) HVAC systems serving critical rooms such as but not limited to communication rooms, signal rooms, control rooms, telephone rooms shall be designed such that those equipment shall be operational during Station fire Emergency.
 - (xi) Elevator shafts shall be provided with HVAC to meet requirements CSA B44 and elevator manufacturer.
 - (xii) Maximum room design temperatures shall be selected to suit the room function and occupancy.
 - (xiii) Spaces requiring heating only shall have ventilation systems (as a separate system or a combined heating and ventilating system if deemed size appropriate) that provides cooling by introducing ambient (outside) air at a rate to limit the maximum space temperature to 5.5°C above ambient (outside) temperature unless otherwise required in this Article 5.
 - (xiv) Systems shall be designed to be capable of providing free cooling by introducing 100% ambient (outside) air. Where the use of outside air results in unacceptable air change and flow rates, provide mechanical air conditioning.
 - (xv) Outside air intakes shall be located at grade level to avoid the introduction of dirt, debris, fumes, odours, noise, irritants and biological agents from traffic and other external sources.
 - (xvi) All occupied spaces or rooms that contain critical equipment shall have individual temperature control.
 - (xvii) Natural gas-fired equipment shall not be permitted inside Underground Stations.
 - (xviii) All equipment, dampers, fittings installed in ductwork shall have flange duct connections.
 - (xix) The analytical design of the ventilation systems serving the public area of the Stations shall be performed by the use of a certified applicable computer modeling program.
 - (xx) Where piston effect is inadequate for ventilation of the Station public areas, mechanical ventilation systems shall be provided for these areas. Adequacy of the piston effect shall be confirmed by the CFD analysis.
 - (xxi) Roughed in ductwork for ventilation exhaust to grade for the retail spaces.
- (b) DB Co shall design and construct HVAC to the following design conditions

- (i) The HVAC outdoor design conditions for both Underground Stations and At-Grade Stations shall be as per OBC.
- (ii) The HVAC indoor design conditions for Station spaces shall be as detailed in Table 4-5.1 below
- (iii) DB Co shall determine the indoor environmental requirements for all support spaces not included in Table 4-5.1 in accordance with Applicable Law, and within the manufacturer's operating range of equipment housed within the space.

Table 4-5.1 - HVAC Indoor Design Conditions

| Space/Room | Minimum Temperature (°C) | Maximum Temperature (°C) | Outside Air per Occupant(l/s) | Air Filtration (MERV) | Humidity Summer / Winter (%RH) |
|--------------------------|--------------------------|--------------------------|-------------------------------|-----------------------|--------------------------------|
| Fare Equipment Room | 22 | 26 | 12 | 12 | 50/30 |
| Staff room/Lunch Room | 22 | 24 | 17 | 8 | 50/10 |
| Bus supervisor's office | 22 | 24 | 17 | 8 | 50/10 |
| Rail Supervisor's Office | 22 | 24 | 17 | 8 | 50/10 |
| Multi-purpose Room | 22 | 24 | 17 | 8 | 50/10 |
| Public Washrooms | 22 | 5.5 (See Note ii) | (See Note iii) | 8 | - |

Notes:

- i. *Ventilation design shall maintain space temperature design for 5.5°above outside ambient summer design temperature. Space may be included in central air handling system that provides heating and cooling as add-on to space(s) that require mechanical cooling.*
 - ii. *Provide mechanical exhaust system at exhaust rate as required by the OBC. Provide outside air for exhaust air make-up. Recirculation of supply air to this space is not permitted.*
- (c) DB Co shall design and construct HVAC equipment and systems as per the following:
- (i) Select equipment to provide the highest operating efficiencies.
 - (ii) Mechanical equipment shall be commercial or industrial grade.
 - (iii) Condensing units shall be located at grade or heat from condensing units shall be rejected to outside at grade.

- (iv) Condensing units shall not be located in Tunnels, shafts, or any other areas subject to brake dust and debris.
- (v) Condensing air for ducted condensing units shall be taken from a location at grade, free from brake dust and debris.
- (vi) Heat recovery systems as well as free cooling shall be utilized to facilitate energy conservation as per ASHRAE 90.1, OBC and local standards.
- (vii) The level of fresh air supplied to occupied space shall be automatically controlled for energy conservation.
- (viii) Gas-fired unit heaters shall be high efficiency with stainless steel burner.
- (ix) Heating systems shall be integral with cooling systems. Heated spaces shall be heated with electric heaters where heating and cooling air-handling units are not provided for the space.
- (x) For above grade buildings only, indirect high efficiency gas-fired heating equipment shall be permitted.
- (xi) Provide electrical radiant heaters for each new and existing warming shelter and TSAs.
 - A. Heaters shall be monitored and controlled by the BAS.
 - B. Each unit(s) serving a shelter shall be independently controlled by a customer activated switch, controlling a rated contactor with a maximum run time of 15 minutes. Contactor shall have a hand-off-auto selector switch with pilot light.
 - C. The BAS shall prevent the operation of the heaters when the ambient temperature is greater the 5 degrees Celsius.
 - D. Heaters shall be UL/ULC listed for horizontal outdoor surface and suspended mounting.
 - E. Enclosures shall be a minimum 20 gauge cold rolled steel finished with powered coated paint.
 - F. Reflectors shall be one-piece construction and a minimum 0.030 gold anodized aluminum with the proper angle to reflect infrared heat.
 - G. Elements shall be double tubular infrared quartz tube with high thermal shock characteristics.
 - H. Each individual unit shall be rated at 4,200W minimum; and

- I. Heaters shall nominally extend the full length of the shelters and TSAs.
- (xii) Electric duct heaters shall be provided with SCR control.
- (xiii) Electric unit heaters shall be provided with remote wired wall mounted thermostat.
- (xiv) Electric force flow heater shall be provided with remote wired wall mounted thermostat.
- (d) DB Co shall design and construct ductwork as per the following
 - (i) Ductwork shall be galvanized steel unless otherwise specified. Construction, joints, fittings and accessories shall be in accordance with the latest SMACNA standards and the OBC.
 - (ii) Ductwork serving shower exhaust, battery exhaust, humidifiers (two meters downstream), and other corrosive gas or high moisture air shall be stainless steel.
 - (iii) Flexible ducts shall be manufacturer pre-insulated.
 - (iv) Flexible ducts shall not be used in Stations.
- (e) DB Co shall design and construct supply diffusers, registers and grilles as per the following:
 - (i) Diffusers shall be extruded aluminum construction with manufacturer applied finish, and opposed-blade adjustable-volume dampers.
 - (ii) Registers and grilles shall be extruded aluminum construction with manufacture applied finish.
 - (iii) Registers and grilles shall be equipped with opposed-blade, adjustable-volume dampers.
- (f) DB Co shall design and construct intake and exhaust wall louvers as per the following:
 - (i) Wall louvers shall be weather resistant, extruded aluminum construction with insect/bird screen.
 - (ii) Wall louvers located in public areas shall be located at minimum 2500mm high level above floor and out of reach of Passengers.
- (g) DB Co shall design and construct volume dampers in branch ducts as per the following:
 - (i) Adjustable volume dampers shall be provided for all branch ducts serving more than one outlet.

- (h) DB Co shall design and construct backdraft dampers as per the following:
 - (i) Dampers shall be counter balancing type for assisted damper operation.
 - (ii) Silencers shall be made of not less than 22 gauge Type G90 galvanized steel or stainless steel to match material of connecting ducts.
- (i) DB Co shall design and construct access doors as per the following:
 - (i) Duct access doors shall be provided at each damper, duct heater, and any other accessories and equipment that require maintenance.
 - (ii) Access doors installed in insulated ducts shall be pre-insulated.
 - (iii) Access doors shall be made of same material as ducts they serve.
- (j) DB Co shall design and construct fire dampers as per the following:
 - (i) Fire dampers shall be Type B or C dynamic dampers.
- (k) DB Co shall design and construct thermal insulation as per the following:
 - (i) Externally applied thermal insulation shall be provided for the ductwork as per ASHRAE 90.1 and OBC, and as indicated below.
 - (ii) Insulate exhaust air ducts and plenums 3m from the exhaust louver.
 - (iii) Insulate outside air ducts and plenums to air handling equipment.
 - (iv) Exhaust air duct from a shower area where duct is in unheated space.
 - (v) Insulate all supply or return air duct transporting air that is above or below the conditioned space design temperature or in an unconditioned space.
 - (vi) Insulation jacketing in public areas or to public view shall be minimum 0.5 mm thick rigid aluminum sheet.
- (l) DB Co shall design and construct acoustic lining as per the following:
 - (i) Acoustic lining shall be permitted at supply and suction ducts of air handling equipment only when installation of silencer is unfeasible.
 - (ii) Interconnecting ductwork between men's and women's washrooms shall be acoustically lined to prevent cross-talk.
- (m) DB Co shall design and construct humidifier as per the following:
 - (i) Humidifier shall be in-duct type.

- (n) DB Co shall design and construct air filtration as per the following:
 - (i) All return air and make-up air shall be filtered.
 - (ii) Filters shall be standardized in type and sizes.
 - (iii) Differential pressure gauge shall be provided across each filter bank and monitored by BAS.
- (o) DB Co shall design and construct HVAC piping as per the following:
 - (i) Non-metallic piping shall not be used in the Facilities.
 - (ii) Steel pipe shall be ASTM A53 Grade B, minimum Schedule 40; natural gas pipe shall be ASTM A53 Grade B, minimum Schedule 40, seamless.
- (p) DB Co shall design and construct instrument test ports as per the following:
 - (i) Provide instrument test ports to recommendations of SMACNA/HVAC and in accordance with manufacturer's instructions.
- (q) DB Co shall design and construct HVAC systems controls as per the following:
 - (i) Each item of equipment shall have an independent control panel to control the operation of the equipment.
 - (ii) Where interface between systems (e.g. heating/cooling) is required, a local control panel shall provide control of the equipment. Controls shall be such that simultaneous cooling & heating of the same space is not possible.
 - (iii) All control panels shall incorporate the ability to send a trouble alarms via the BAS or SCADA to the TOCC.
 - (iv) Equipment in public spaces shall have vandal/tamper resistant housing and mounting.

5.5 Plumbing and Drainage

- (a) DB Co shall follow the general design requirements below:
 - (i) Each Station shall be serviced by one municipal water connection split prior to the property line for two service connections. Each service shall be provided with an isolation valve at the property line. One connection shall be metered for potable water and one un-metered to serve the fire protection systems.
 - (ii) Each Station shall be serviced by a minimum of one sanitary and one storm connection to the property line.

- (iii) Piping shall not be embedded in concrete structure.
- (iv) Piping shall not be routed through critical equipment rooms.
- (v) Equipment requiring drainage shall not be located directly over critical equipment rooms.
- (vi) All domestic cold water and domestic hot water pipes shall be insulated as per ASHRAE 90.1 and OBC with a minimum of 25mm thickness insulation.
- (vii) All horizontal sanitary pipes and pipes subject to exterior surface condensation shall be insulated with 25mm thickness insulation.
- (viii) All storm pipes shall be insulated with 25mm thick insulation.
- (ix) Insulation jacketing in public areas or to public view shall be 0.5 mm thick rigid aluminum sheet.
- (x) The incoming domestic water pipes, main sanitary and storm pipes shall be one nominal size oversized to accommodate future expansion. Where new plumbing and drainage systems are connected to existing systems of the existing Station, the existing incoming domestic water pipe, main sanitary and storm pipes shall be replaced with new.
- (xi) Domestic cold and hot water pipes, hot water recirculation pipes within the Stations or Facilities shall be copper as per OBC.
- (xii) Isolation valve shall be provided at each domestic cold water and domestic hot water main branches and branches that service a group of fixtures, area, floor, and equipment.
- (xiii) Storm, sanitary and vent pipes within the Stations or Facilities shall be copper (less than 100 mm in diameter) or cast iron (100 mm or greater in diameter).
- (xiv) Non-metallic pipes shall not be permitted within the Stations or Facilities, with the exception of buried pipes that are permitted by codes and Relevant Authorities.
- (xv) Buried non-metallic pipes shall be provided with tracer wires.
- (xvi) Metered cold water shall be provided for the retail area.
- (xvii) Sanitary and vent pipes rough-in shall be provided for the retail area.
- (b) DB Co shall design and construct piping systems as per the following:
 - (i) Pipes and fittings

- A. Pipes and fittings shall be selected to suit the fluids they are to convey.
- B. Corrosion control measures shall be provided for buried pipes where required.
- C. Piping exposed to freezing temperatures shall be heat traced and insulated.
- (ii) Cold water service
 - A. The domestic cold water shall be metered per the City of Ottawa requirements.
 - B. Each service shall have a main shut-off valve immediately inside the structure wall.
 - C. Pressure reducing valve assemblies shall be provided where service water pressure is above the recommended.
 - D. Provide pressure gauge at water incoming pipes.
 - E. Provide pressure gauges at pump suction and discharge pipes.
 - F. Provide pressure gauges at inlet and outlet pipes of pressure reducing valves, backflow preventers, and strainers.
 - G. Minimum fixture service requirements shall be calculated in accordance with the OBC.
- (iii) Hot water service
 - A. Water heaters shall be commercial grade electric (or alternatively natural gas-fired for above grade buildings) meeting the requirements of ASHRAE 90.1 / OBC SB-10 and MNECB.
 - B. DB Co shall avoid runs of hot water supply piping that exceed 15m, if runs exceed this distance, hot water recirculation pump shall be provided.
- (c) DB Co shall design and construct plumbing fixtures and specialties as per the following:
 - (i) Plumbing fixtures shall be water conserving type and shall meet the consumption outlined in the OBC, ASHRAE 90.1.
 - (ii) Shock-absorbing devices shall be provided at each pipe riser, branch, group of plumbing fixtures and other locations in accordance with standard PDI-WH201.
 - (iii) Emergency eye / face wash and shower stations

- A. Emergency eyewash station with tempered water shall be provided as required by Applicable Law and as follows:
 - i. Janitorial Rooms; and,
 - ii. HVAC equipment rooms.
 - B. Emergency showers and or shower eyewash stations with tempered water shall be provided as required by Applicable Law.
- (iv) Hose bibs and wall hydrants
- A. Provide hose bibs or wall hydrants in HVAC rooms, pump rooms, washrooms, janitor rooms, refuse rooms, and open areas such that all open areas of the buildings and the concourses, Platforms shall be reached with a 30 m hose.
 - B. Provide non-freeze hose bibs or wall hydrants in locations subject to freezing.
 - C. Wall hydrants in public areas shall be wall recessed and lockable.
 - D. Shall be equipped with integral backflow preventers.
- (v) Drinking Fountains
- A. Drinking fountains shall be accessible, and protected from freezing.
 - B. Drinking fountains shall be provided in Operator's Facilities.
 - C. Drinking fountains shall feature bottle refill and built-in cooler.
 - D. Drinking fountains shall not be provided on the Platform level.
- (vi) Floor drains
- A. Provide floor drains in all areas, shafts or rooms where any source of water can be expected, including but not limited to: public areas, mechanical rooms, HVAC rooms, pump rooms, janitor rooms, washrooms, valve rooms, ventilation rooms, elevator/escalator rooms, electrical rooms, elevator and escalator pits, storage rooms, supervisor's rooms, ticket/information rooms, Operator Facilities, and service trenches.
 - B. Floor drains in elevator and escalator pits shall be equipped with backwater valves.
 - C. Provide floor drain at floor grilles at Station entrances.

- D. Provide funnel floor drains for condensate and water disposal.
 - E. Floor drains, funnel floor drains and floor cleanouts shall be heavy duty.
 - F. Floor drains shall be provided with trap seal primers.
- (vii) Trench drains
- A. Provide trench drains at top and bottom of stairs at Station entrances and outdoor stairs.
 - B. Provide trench drains at bottom of other stairs.
 - C. Provide trench drains at Track level within Stations.
 - D. Provide trench drains at pedestrian underpasses.
 - E. Trench drains shall be heavy duty.
 - F. Trench drains shall be provided with trap seal primers.
- (viii) Sump pumps & sewage ejectors
- A. Sump pumps and sewage ejectors shall be duplex configuration with 100% redundancy.
 - B. Submersible sump pumps shall be equipped with stainless steel quick connection, installation guide bars.
 - C. Sump pits shall be equipped with stainless steel ladder and stainless steel gas-tight cover.
 - D. Large pumps weighing greater than 22kg shall be provided with permanent monorail lifting devices.
 - E. Provide pressure gauges at sump pump discharge pipes.
 - F. Sanitary pumps servicing elevator pits shall not be located in the elevator shaft.
 - G. Storm sump pits shall be provided with a sediment trap section.
 - H. Where oil or grease may be present in the sanitary waste, oil sensors shall be provided.
 - I. Pump control panels shall be stainless steel construction and facilitate fault or trouble signals back to TOCC via the SCADA system.

- J. All pumping stations shall incorporate level controls with high level alarms that shall be sent to TOCC via the SCADA system

5.6 Fire Protection:

- (a) DB Co shall design and construct fire protection as per the following:

- (i) General design requirements

- A. Fire protection systems shall meet the requirements of all codes.
- B. Fire water service shall be provided with double check detector assembly, and installed as per requirements of the City.
- C. Provide fire pumps as required to meet code requirements.
- D. Provide complete automatic sprinkler system for areas of each Station including the Storage Tracks, Tail Tracks, and Ancillary Facility as required by the OBC, NFPA-130, NFPA-13, and Relevant Authorities.
- E. Provide complete standpipe system for all Stations and Ancillary Facilities, and portions of Tunnels within 20m of the Platform. The standpipe system shall meet the requirements of, but not limited to, the OBC, NFPA-130, NFPA-14 and Relevant Authorities.
- F. Provide NOVEC 1230 clean agent fire suppression systems for all communications, telephone equipment rooms and any other rooms of similar function, in compliance with NFPA-2001.
- G. Provide portable fire extinguishers as required by the OBC, OFC, NFPA-10, and Relevant Authorities.
- H. Non-metallic pipes shall not be permitted for fire protection systems unless for buried pipes and where permitted by codes.
- I. Flexible pipes shall not be permitted for fire protection systems.
- J. Drum drips in unheated areas for dry systems shall be heat traced and insulated.

- (ii) Sprinkler systems

- A. Sprinkler systems shall be wet type if not subject to freezing weather conditions; otherwise dry-pipe systems are acceptable upon approval by City authorities.
- B. Pipes shall be steel pipe of minimum Schedule 40 meeting ASTM A795/A795M or ASTM A53/A53M Grade B and NFPA 13.

- (iii) Standpipe systems
 - A. Standpipe systems shall be Class I or III, as required by the local fire department.
 - B. Provide standpipe systems for the Storage Tracks and Tail Tracks in the Stations.
 - C. Fire protection cabinets in public areas shall be wall recessed stainless steel.
 - D. Fire protection cabinet shall contain a portable fire extinguisher.
 - E. Pipes shall be steel pipe of minimum Schedule 40 meeting ASTM A795/A795M or ASTM A53A/53M Grade B and NFPA 13.
- (iv) Clean agent fire suppression systems
 - A. Where rooms are protected by clean agent fire suppression systems, raised floor and ceiling spaces in these rooms shall be provided with fire suppression systems.
 - B. Audible and visual alarms shall be provided within the room as well as outside for occupied and occasionally occupied (staffed) rooms.
 - C. Pipes shall be seamless steel pipe of minimum Schedule 80 and as required in NFPA-2001.
- (v) Portable fire extinguishers
 - A. Station rooms containing electrical, electronic, and signal equipment shall be provided with CO₂ fire extinguishers, in addition to dry chemical fire extinguishers.
 - B. A Class A fire rated water pump tank extinguisher shall be provided within all Stations.
 - C. Extinguishers in public areas shall be installed in wall recessed stainless steel cabinets.
- (vi) Fire department connections
 - A. DB Co shall provide and install free standing or wall mounted connections and signage constructed of polished bronze, which shall be verified by City Authorities.

5.7 Building Automation System

- (a) DB Co shall provide an open-protocol BACnet Ethernet LAN BAS system for each Station and each Ancillary Facility to control and monitor all systems, components, and equipment in this Article 5.
 - (i) System shall be compatible with the BAS of the Existing Confederation Line.
 - (ii) All Ancillary Facilities supporting bus operations shall be compatible with the existing OC Transpo BAS.
- (b) DB Co shall provide an OWS at each Station and each ancillary facility, complete with a graphical user interface, printer, all computer hardware and software.
- (c) DB Co shall design and construct systems, components, and equipment that are controlled by BAS and that shall also have their own local standalone controllers and monitoring.
- (d) DB CO shall provide each workstation to be connected to the TOCC, BCC, BYCC and MYCC, and communicate with other control systems.
- (e) DB Co shall design and construct the system to have minimum 25% spare points and be expandable for future system expansion without hardware upgrade.

ARTICLE 6 ELECTRICAL DESIGN CRITERIA

6.1 Introduction

- (a) This Article 6 presents the basic electrical design guidelines, codes, and standard references that DB Co shall follow throughout the electrical design process of the Stations.
- (b) DB Co shall design and construct electrical spaces that are properly located and sized to facilitate the installation and maintenance of equipment.
- (c) DB Co shall design the Station electrical systems shall provide for safe, reliable, and continuous operation.
- (d) DB Co shall provide accessibility to permit removal and replacement of major equipment. These requirements are intended to promote uniformity in the design approach and to standardize the type of equipment and its location throughout the system.
- (e) DB Co shall provide electrical power distribution equipment to be heavy duty construction and shall provide arc flash hazard mitigation features to limit personal protective equipment to level 2 or lower.
- (f) For the design of all electrical systems, sustainable design elements shall be utilized where applicable and practical as recommended by CAN/CSA 802, EnergyStar®, RoHS.
- (g) DB Co shall design and construct the electrical distribution system to distribute power for Passenger Station lighting, heating, ventilation and other equipment and systems. Power and circuit requirements for signal and communication systems are subject to Schedule 15-2, Part 3 - Systems.
- (h) DB Co shall ensure that all electrical equipment shall be individually identified by unique number matching equipment schedule designation. The label shape, letter size, color coding and background color shall be standardized for the Project. Project identifying labels shall be designated for: cable trays, conduits, junction boxes, cables/wires and all electrical and electronic equipment. In addition to the identification labels approval labels shall be provided as required per CSA, ULC, [REDACTED], or [REDACTED].
- (i) Reuse of existing Station infrastructure shall be permitted in accordance with the following:
 - (i) DB Co shall replace all major distribution equipment with a remaining life expectancy of less than 15 years as identified in the Station Condition Audit Reports. In addition, DB Co shall replace all existing communication, security, life safety equipment that has less than 5 years of remaining life expectancy at Substantial Completion that is compatible with the new systems;

- (ii) DB Co shall perform all rehabilitation, refurbishment etc., as identified in the Background Information for all existing equipment retained for use in DB Co's design.
- (iii) DB Co shall limit the loading (KVA, Amps) on existing services and power distribution equipment where used for the purposes of expanding existing distribution to meet new load demand such as not to exceed 80% of existing distribution equipment rating. Where the loading of the existing distribution equipment exceeds 80% of its rating with the addition of new loads to meet Station expansion, DB Co shall replace such equipment with new equipment that shall meet the new load demand and include a minimum of 25% capacity for future expansion.

6.2 Reference Documents

- (a) DB Co's design and construction shall comply with the criteria contained in this Article 6, and all standards, regulations, policies, Applicable Law, guidelines or practices applicable to the Project, including but not limited to each of the following Reference Documents. In the event of a conflict between criteria, commitments or requirements contained within one document when compared with another, the more stringent shall apply:
 - (i) OBC*;
 - (ii) NBC*;
 - (iii) Ontario Electrical Safety Code,;
 - (iv) Canadian Electrical Code, Part I: Safety Standard for Electrical Installations;
 - (v) ANSI;
 - (vi) UL/ULC;
 - (vii) NEMA;
 - (viii) CSA;
 - (ix) IESNA Lighting Handbook;
 - (x) IESNA, IES RP-20 – Lighting for Parking Facilities
 - (xi) ASHRAE 90.1;
 - (xii) City of Ottawa Standards;
 - (xiii) NFPA 130: Standard for Fixed Guideway Transit and Passenger Rail Systems;

- (xiv) NFPA 110: Standard for Emergency and Standby Power Systems;
- (xv) ASME A17.1: Safety Code for Elevators and Escalators;
- (xvi) IEEE;
- (xvii) IEC; and
- (xviii) [REDACTED] Specifications.
- (xix) [REDACTED] Specification
- (xx) IDA-IES
- (xxi) EEMAC
- (xxii) OC Transpo Transitway & Station Design Guidelines

**Note: Federally Mandated Stations shall meet the requirements of both the OBC and the NBC.*

6.3 Basis for Design

- (a) DB Co shall utilize the following electrical load classification:
 - (i) Normal systems include loads which, if de-energized, would have no effect on Passenger Safety or adverse effect to Facility systems. This load classification includes all non-essential Station loads and the majority of Station lighting. These loads can tolerate occasional prolonged power outages and do not require a backup power source.
 - (ii) Emergency systems classed per NFPA 130 and NFPA 110
 - A. Level 1 systems include loads such as Emergency egress lighting, communication systems (if used in Emergency response procedures) and fire alarm systems that cannot tolerate normal electrical supply outages and require an Emergency power supply.
 - B. Level 2 systems include loads such as fire pumps, Emergency ventilation and smoke removal systems, sewage pumps, and elevators that require a reliable power source, feeders from two separate and distinct utility substations or combination of sources as approved by the AHJ.

**Note: DB Co shall perform FMEA and vulnerability/system assurance/reliability analysis in order to determine any other Safety Critical loads that require Emergency power.*

- (b) Calculations

- (i) DB Co shall perform short-circuit calculations to determine the AIC rating of the electrical distribution system based upon the actual available short-circuit value or per-unit impedance values obtained from the [REDACTED] at the electric service entrance or point of connection.
- (ii) DB Co shall base system device coordination and selectivity on calculated short-circuit values and used for selection of ratings and settings of protection devices.
- (iii) DB Co shall complete voltage drop calculations for maximum loads, long run circuits and feeders, and under motor starting conditions. Motor circuit calculations shall be based on an 85% lagging power factor. Branch circuit voltage drop from service entrance distribution equipment to point of utilization shall not exceed 5%.
- (iv) DB Co shall complete lighting-level calculations for all interior and exterior spaces in conjunction with architectural and/or landscaping design. The point-by-point method utilizing computer generated calculations shall be used to validate adequate illumination levels and boundaries. The software used shall be industry recognized and the calculations shall follow IESNA procedures. Calculation results shall include maximum, minimum, and average illumination levels along with the appropriate uniformity ratios. Calculations shall also include luminaire locations, mounting heights, manufacture's catalog data sheet with product selections and options indicated, lamp data sheet, wattage, lumens, color rendering index, color temperature, room surface reflectance values, light loss factors, and photometric file used. Lamp or LED fixture color rendering temperature shall be consistent throughout the Station and the Station site, complement architectural finishes and have CRI of 80 or more within the Station and a CRI of 70 or more throughout the Station site and other areas.
- (v) DB Co shall complete arc flash hazard calculations for equipment that is required to be field marked for arc flash warning per CAN/CSA Z462. DB Co shall provide and perform calculations based on actual distribution system installed, actual minimum and maximum available utility short circuit current and according to IEEE 1584 and CAN/CSA Z462. Values to be calculated shall include, but not be limited to: (a) flash protection boundary in units of centimeter from equipment; (b) incident energy at 45.72cm working distance from equipment in units of calories per square centimeter (cal/cm²). The calculated values shall be permanently displayed on equipment arc flash hazard warning labels.
- (vi) DB Co shall complete computations for service, feeder and branch circuit loads based on the nominal system voltage used and applicable demand factors in accordance with the Canadian Electrical Code.
- (vii) DB Co shall provide protection for future growth for all major electrical equipment and [REDACTED] service feeders as identified by the City plus an additional allowance of at least 25% of the total loading, rounded upwards to the

next standard rating (KVA or A). Before determining the size of service an economic analysis shall be made to determine the most feasible way of protecting for the future growth. Special consideration shall be given to requirements for load growth, for anticipated usage and life expectancy with particular attention to the possibility of adding heavy loads such as elevators and escalators, electric heating etc.

- (c) DB Co shall include the following electrical safety provisions in the design:
- (i) EGFP shall be provided as required by the latest Applicable Codes. Ground fault “annunciation only” shall be provided where EGFP is required by code for equipment or feeders serving Level 2 Emergency Systems.
 - (ii) PGFP shall be provided on branch circuits that have equipment or outlets for which personnel protection is required by either the latest Applicable Codes or Good Industry Practice.
 - (iii) Arc flash hazard warning labels shall be provided on the equipment as per required code. Flash boundary and incident energy values shall be displayed.

6.4 Functional Requirements

- (a) Identification of Stations for TPSS and ventilation requirements:
- (i) At Grade Stations with no TPSS, no ventilation loads, no provision for backup of ventilation loads of adjacent Station: Westboro, Iris.
 - (ii) At Grade Stations with no TPSS, no ventilation loads, provision for backup of ventilation loads of adjacent Station: Pinecrest.
 - (iii) At Grade Stations with TPSS, no ventilation loads, no provision for backup of ventilation loads of adjacent Station: Bayshore, Lincoln Fields, Dominion, Moodie, Montreal, Orleans Boulevard, Place d’Orleans, Jeanne D’Arc, Trim.
 - (iv) Underground or Below Grade Stations with TPSS, ventilation loads, no provision for backup of ventilation loads of adjacent Station: Baseline, Queensview
 - (v) Underground or Below Grade Stations with TPSS, ventilation loads, provision for backup of ventilation loads of adjacent Station: Cleary.
 - (vi) Below Grade Stations with no TPSS, ventilation loads, provision for backup of ventilation loads of adjacent Station: New Orchard.
- (b) DB Co shall design and construct the electrical service as per the following:
- (i) The secondary voltages described herein are the basis of the Reference Concept electrical distribution design. DB Co may select alternative voltages for secondary distribution system.

- (ii) The [REDACTED] supply strategy for Stations including supply points, responsibilities and associated costs is discussed in “[REDACTED]” report.
- (iii) At At-Grade Stations not served by TPSS, and not providing backup for ventilation loads of an adjacent Station, the primary switchgear and transformers shall be owned by [REDACTED].
- (iv) At At-grade, Underground or Below-grade Stations with a TPSS and/or level 2 (including ventilation) loads and/or provision for backup of level 2 (including ventilation) loads of an adjacent Station, the Primary switchgear will be owned by [REDACTED] and the downstream distribution including two metal clad MV switchgears (except where the Station has no ventilation loads, DB Co shall provide one metal clad MV switchgear), transformers and associated cabling shall be customer owned. DB Co shall provide separate and dedicated breaker for the TPSS, level 2 Emergency and non-level 2 loads (normal and level 1 Emergency) with customer owned revenue class metering. [REDACTED] metering shall be required immediately downstream of the primary service main breaker. Downstream 0.6KV distribution for At-Grade Stations with a TPSS and/or provision for backup of level 2 (including ventilation) loads of an adjacent Station shall follow Clauses 6.4(c)(i), (ii) and (iii) of this Part 4.
 - A. Additionally, at Moodie LMSF, the main substation including but not limited to the 44KV switchgear, 44KV/13.2KV transformers and all associated cabling shall be provided by DB Co and owned by the City. The demarcation point and metering requirement shall be coordinated and confirmed with [REDACTED]. DB Co shall provide cubicles in the customer owned switchgear for [REDACTED] revenue metering. DB Co shall provide 13.2 KV switchgears to feed the LMSF, Station and associated TPSS’s. Moodie Station shall receive a single 13.2KV feed that shall have customer owned revenue class metering on the load side of the feeder breaker in the TPSS supplying the Station loads. DB Co shall provide 13.2/0.6KV transformer and associated cabling to the 600V AC main switchboard at Moodie Station.
 - B. At Trim Station, the primary MV switchgear, transformers and all associated cabling shall be provided by DB Co and owned by the City. The demarcation point and metering requirement shall be coordinated and confirmed with [REDACTED].
- (v) Electrical protection devices shall be automatically coordinated with upstream/downstream distribution system in order to minimize disruption to the operations.
- (vi) Provide electric heat tracing where required by the mechanical and architectural design.

- (vii) All Emergency service raceways/feeders shall be fire rated in accordance with Applicable Codes requirements. Main feeder raceways shall be embedded in concrete slabs/walls and shall be rated for at least two hours.
 - (viii) The superstructure and substructure shall accommodate all required embedded ducts for interior and exterior electrical services as applicable.
- (c) At-Grade Stations without a TPSS or no requirement for ventilation loads, where redundancy supplies are not required by NFPA requirements, shall be provided with a single underground service feeder from [REDACTED] at 600VAC, 3phase, 60Hz with the exception of Moodie Station where the feeder will originate from the LMSF. DB Co shall coordinate with [REDACTED], as referenced in the [REDACTED] Planning Reports, all requirements related to the installation of the on-site transformer and underground duct-banks.
 - (i) At-Grade Stations shall be provided with 600VAC main switchboard, [REDACTED] metering immediately after the main service breaker, customer owned revenue class metering, associated downstream power distribution panels, feeders to 600VAC and 208/120VAC equipment and (if applicable) transfer switch for the Emergency power distribution, and UPS, batteries, etc. Main electrical room will contain, in addition LV transformers, UPS (if applicable), LV lighting control cabinet, heating controls, etc.
 - (ii) Emergency lighting, fire alarm and other Emergency equipment loads shall be connected to UPS or batteries and with capacity as required by applicable code and AHJ requirement.
 - (iii) Connection for a mobile generator shall be provided in all At-Grade Stations. The portable generator system shall be used only for stand-by operation during prolonged Utility outages and is independent of the required Emergency (UPS or battery) power supply systems.
- (d) At Underground and At-Grade Stations, where pad-mounted primary equipment cannot be installed at grade, DB Co shall provide a primary switching room for incoming service and shall be:
 - (i) Designed in accordance to [REDACTED] Specification GCS0002: Primary Voltage Service Specification and coordinated with [REDACTED];
 - (ii) at grade or within 5m below grade with two walls on the outside to allow ease of access for [REDACTED] incoming feeders and designed for a three (3) hour fire envelope;
 - (iii) dimensions as outlined in the [REDACTED] or as specified by [REDACTED]; and,

- (iv) coordinated with [REDACTED] in terms of room locations, switchgear location and placement within the rooms.
- (e) At Underground or Below Grade Stations with requirements for level 2 loads, where redundant supplies are required by NFPA requirements, DB Co shall utilize an ATS and reserve capacity for only level 2 loads from adjacent Stations (except at Baseline Station where two redundant radial feeds shall be provided) as per the [REDACTED] planning report. DB Co shall coordinate the design for the ATS with [REDACTED] and shall provide remote monitoring and blocking of transfer switches for [REDACTED].
 - (i) Provide feeders from two separate and distinct Utility substations or combination of sources as approved by the AHJ to serve Emergency systems only classified as “Level 2” and used for Emergency ventilation or fire suppression equipment. Provide two incoming service feeders at a supply voltage no less than specified in the [REDACTED] planning report, 3-Phase, 60 Hz from the Utility. Circuit each incoming service feeder from a separate and independent Utility source or TPSS that is electrically and physically isolated from each other. All power sources shall be as approved by the AHJ and in conformance with the Applicable Code. [REDACTED] metering shall be immediately downstream of the Station’s main primary service breaker.
 - (ii) The service feeders shall be electrically and physically separated and approved by the AHJ for use as an Emergency power source.
 - (iii) At New Orchard, Cleary and Queensview Stations:
 - A. Upstream distribution will comprise of a single underground service feeder from [REDACTED] owned switchgear at 13.2KVAC, 3phase, 60Hz to be terminated in a customer owned primary 13.2KVAC switchgear. The demarcation point between [REDACTED] and DB Co responsibility shall be the customer termination point of the [REDACTED] switchgear. Provide feeders and customer owned revenue class metering from the customer owned primary MV switchgear to downstream station normal and Emergency (non-level 2) loads, a second MV switchgear as noted in Clause 6.4 (b)(iv) of this Part 4, feeding downstream Station level 2 loads, TPSS and where applicable, adjacent Station’s level 2 loads.
 - B. DB Co shall provide a second 13.2KVAC switchgear that shall be double ended with main/tie/tie/main breakers in the MV electrical room at each Station feeding only level 2 loads where redundant supplies for level 2 systems are required per code. This switchgear shall be interconnected to the customer owned primary 13.2KVAC switchgear of the adjacent Station with 13.2 KV or 27.6 KV tie cables running between these stations designated for providing backup power for level 2 loads. Provide tie cables, complete with routing, between the pad mounted switchgears at these stations. Routing shall be coordinated with and approved by the AHJ

and in conformance with the Applicable Code. Provide interlocks between these switchgears to close the redundant feeder breaker in the adjacent Station in the event the primary source for the level 2 loads in the station fails

- C. An ATS connected to both bus “A” and bus “B” of the second MV switchgear shall provide power to the Station downstream distribution system for all level 2 loads at each Station.
- D. Downstream distribution for each Station’s level 2 loads shall also include two 13.2kV/600VAC or 27.6kV/600VAC redundant dry type transformers feeding double ended 600VAC switchgear located in 600VAC electrical room that shall feed all 600/347V level 2 loads including additional two 600/208/120VAC redundant dry type transformers that shall feed double ended 208VAC switchgear located in the 208VAC Room that shall feed all 208/120V level 2 loads. Redundant circuit feeders shall be in physically separated raceways. ATSS connected to both buses shall be provided in the double ended 600VAC and 208VAC switchgears.
- E. Downstream distribution for each Station’s normal and Emergency (non-level 2) (excluding TPSS) loads shall include a single 13.2kV/600VAC or 27.6kV/600VAC dry type transformer feeding a 600VAC main switchboard that shall feed all 600V loads including but not limited to 600-208/120V dry type transformers, power distribution panels, feeders to 600VAC and 208/120VAC equipment and transfer switch for the Emergency power distribution, UPS, batteries, etc.
- F. Emergency lighting, fire alarm and other Emergency loads (non-level 2) shall be connected to UPS or batteries and with capacity as required by applicable code and AHJ.

(iv) At Baseline station:

- A. Upstream distribution shall comprise of two underground service feeders from separate [REDACTED] owned switchgears at 13.2KVAC, 3phase, 60Hz to be terminated in a customer owned double ended 13.2KVAC switchgear with main/tie/tie/main arrangement in the MV electrical room. The demarcation point between [REDACTED] and DB Co responsibility shall be the customer termination point of the [REDACTED] switchgear. Provide feeders and customer owned revenue class metering from the customer owned primary MV switchgear to downstream Station normal and Emergency loads, and TPSS.
- B. An ATS connected to bus “A” and bus “B” shall provide power to the Station downstream distribution system for all loads.

- C. Downstream distribution shall also include two 13.2kV/600VAC redundant dry type transformers feeding double ended 600VAC switchgear located in 600VAC electrical room that shall feed all 600/347V loads including but not limited to 600VAC distribution panels and, additional two 600/208/120VAC redundant dry type transformers that shall feed double ended 208VAC switchgear that shall feed all 208/120V loads including but not limited to distribution panels, UPS, batteries, etc. located in the 208VAC Room. Redundant circuit feeders shall be in physically separated raceways. ATSS connected to both buses shall be provided in the double ended 600VAC and 208VAC switchgears.
 - D. Emergency lighting, fire alarm and other Emergency equipment loads shall be connected to UPS or batteries and with capacity as required by applicable code and AHJ requirement.
- (f) The electrical service for Moodie Station and associated TPSS (located at Moodie Station) shall be provided by DB Co. Refer to Schedule 15-2, Part 5 –LMSF for additional information related to the incoming service. The feeders shall originate from the customer demarcation point at the LMSF. DB Co shall be responsible for the design, construction and supply of service feeders, all ductbanks, cabling, equipment, etc. from the customer demarcation point at the LMSF to the Moodie Station site main step down transformer.
- (g) Metering and Monitoring
- (i) Utility revenue metering shall be provided as required by [REDACTED] as per [REDACTED] standard GCS0008.
 - A. For 600V services from an [REDACTED] owned transformer, provisions shall be made at the main 600V switchboard as required by [REDACTED].
 - B. For a primary service (13.2kV, 27.6kV or 44kV), provisions shall be made in the customer owned metalclad switchgear in the MV electrical room as required by [REDACTED].
 - (ii) DB Co shall provide remote monitoring system for:
 - A. Station main switchboard breakers position;
 - B. Voltage availability at the main buses; and,
 - C. Fire alarm per CAN/ULC S561.
- (h) DB Co shall design and construct duct banks, manholes and handholes as per the following:

- (i) Duct banks and manholes shall be designed in accordance with the seismic criteria defined for the Project. Duct banks shall be designed to include at least 25% spare capacity to protect for future growth and expansion. Requirements for the installation of additional fibre along the Confederation Line for the use of the City is included in Schedule 15-2, Part 3 – Systems.
 - (ii) Underground ducts shall be sloped to manholes to provide adequate drainage. Provide concrete encasement where required by Applicable Code.
 - (iii) Manholes and/or handholes shall be designed as per City Standards.
- (i) Electrical rooms
 - (i) DB Co shall size electrical rooms to have sufficient space to house all required equipment. Adequate space shall achieve minimum working clearances, conduit entry points and routing, equipment removal / replacement, building repair, and ventilation requirements.
 - (ii) DB Co shall size with additional 20% space for future growth.
- (j) DB Co shall design and construct grounding and bonding as per the following:
 - (i) The Station grounding system shall be designed to meet applicable codes and standards.
 - (ii) The grounding electrode system shall be supplemented and bonded together with an embedded ground grid on each side of the Tracks for side Station Platforms. The Station grounding grid shall not be interconnected with any Traction Power (DC) grounding system. DB Co shall coordinate interconnection grounding points with signal and communication systems to avoid noise propagation.
 - (iii) A separate grounding system for signalling and communication shall be provided. All signal and communication equipment including cables shall be properly grounded.
 - (iv) All non-current-carrying metal enclosures and all alternating current equipment shall be securely connected/bonded to the Station grounding system.
 - (v) Each metallic equipment housing shall provide a welded boss for attaching a protective ground connection and shall be sized for expected trip currents.
 - (vi) Grounding of the future Platform edge doors for Underground Stations and other metal surfaces within 2 m of the Revenue Vehicle stopped at the Platform shall be coordinated with Traction Power design in order to prevent or limit possible excessive touch potential in tolerable values as specified in OESC.
 - (vii) Avoid natural gas piping and pipe connected to an active cathodic protection system with the exception where required by the corrosion protection

- (k) DB Co shall design and construct emergency and standby power sources as per the following:
- (i) Power sources shall be selected based on efficiency, reliability and most economic life cycle cost as per CAN/CSA and NFPA requirements.
 - (ii) Emergency and standby power sources are identified as follows:
 - A. Standby on-site internal combustion engine generator;
 - B. *Mobile generator;
 - C. UPS system;
 - D. Central battery system or battery packs for unit equipment; and
 - E. **Second utility power source – Dual/redundant utility power source for loads classified emergency Level 2.

***Note: Provisions for quick connection for a mobile generator shall be provided in At-Grade Stations and where practical for underground Stations. The mobile generator system will be used only for stand-by operation during prolonged utility outages and is independent of the required Emergency power supply systems.*

***Note: AHJ shall review the design and approve the dual redundant utility service feeders as Emergency power supply source.*
 - (iii) When standby fixed mounted engine generators are to be installed outdoors, a completely enclosed weatherproof/sound attenuated housing to protect the generator from adverse weather conditions and reduce sound levels for surrounding residential neighbourhoods shall be provided. Enclosure shall have critical grade silencing suitable for residential installation. DB Co design shall follow NEMA/IEC/EEMAC enclosure/environmental protection standards.
 - (iv) When second Utility power source is selected, Emergency lighting, fire alarm and other Emergency equipment loads shall be connected to a UPS or battery system as required for loads classified as “emergency level 1”. Automatic transfer switches serving life safety loads shall be equipped with means of bypass to both sources.
 - (v) DB Co shall design and construct all UPS systems with bypass switches to allow the UPS to be taken off line for maintenance without disruption to downstream loads.
- (l) DB Co shall design and construct general purpose receptacles as per the following:

- (i) In public areas, general purpose receptacles shall be GFI and provided at 20m distance, and shall have lockable covers. No more than six outlets shall be connected to a branch circuit.
 - (ii) GFI receptacles shall be provided also for Station sign boxes and art elements where required.
 - (iii) In non-public areas general purpose receptacles shall be provided at 7m apart and shall be supplemented where needed for fixed equipment. No more than five outlets shall be connected to a branch circuit.
 - (iv) A flush-mounted duplex ground fault type receptacle with weatherproof lockable cover shall be provided close to hose bibs.
- (m) DB Co shall design and construct lighting as per the following:
- (i) The lighting systems for Stations, Park and Ride areas, Pedestrian Walkways, trackway, Tunnels and portals shall be coordinated with architectural/landscaping and signage/wayfinding design objectives. Lighting design shall be consistent across all Stations. Standardization of lighting system components is required for perceptual unity and to simplify maintenance. Lighting design shall be consistent with the principals, philosophy and frame work for lighting design as contained in The Lighting Handbook, Tenth Edition as published by the Illuminating Engineering Society. The required illumination targets for items not listed in Table 4-6.1 and Table 4-6.2 shall be based on visual observers group 25-65 for all public spaces as recommended by IESNA, unless otherwise dictated by the building code or accessibility standards. The lighting design shall meet the illumination levels and uniformity requirements for both day and night time operations.
 - (ii) Lighting levels shall define and differentiate between task areas, decision and transition points, Platform edges and areas of potential hazard. In addition to quantity of light, it is essential that lighting be designed to minimize glare and provide uniform distribution. Luminaires shall be selected, located, and/or aimed to accomplish their primary purpose while producing a minimum of objectionable glare and/or interference with task accuracy, vehicular traffic, and neighbouring areas.
 - (iii) Luminaires that emit light above the horizontal plane shall be avoided in the exterior design, unless luminaires are located under overhangs or other architectural features shielding the sky from upward light. Luminaires shall be provided with full cut-off optics and if necessary external shielding to minimize light spill-over onto adjacent properties. L. Refer to IESNA TM-11-2000, Light Trespass for Roadway Lighting, and to IDA-IESNA MLO 2011 and addendum A for IESNA TM-07-15 for all other exterior lighting.

- (iv) The lighting system shall be LED light sources and auxiliary equipment. Lighting equipment shall be vandal-resistant where accessible to the general public.
- (v) The lighting system shall be designed to satisfy OBC, AODA, CPTED, IESNACAN/CSA B651, UL/ULC, CE, FCC, CB requirements.
- (vi) Minimum illumination levels shall meet the criteria listed in Table 4-6.1 below:

Table 4-6.1: Facility Interior

| Illuminated Area | Illumination levels Targets | | |
|-------------------------------------|----------------------------------|--------------------|------------------------|
| | E_h lux | E_v lux | Uniformity Ave: Min |
| Platform Edge | 200 @ floor | 60 @ 5'AFF | 2:1 |
| Station Rail Platform | 100 @ floor | 30 @ 5'AFF | 2:1 |
| Fare Vending | 200 @ 3'AFF | 100 @ 4'AFF | 3:1 |
| Information Kiosk | 300 @ 3'-6" AFF | 150 @ 5'AFF | 3:1 |
| Stair, Ramps and Escalator Landings | 100 @ floor | 50 @ 5'AFF | 2:1 |
| Pedestrian Tunnels and Concourse | 50 @ floor | 20 @ 5'AFF | 3:1 |
| Transecure Area | 220 @ floor | 100 @ 5'AFF | 2:1 |
| Public Washrooms (General) | 150 @ 3'-5" AFF | 50 @ 5'AFF | 2:1 |
| Plumbing Fixtures | 300 @ Top of Plumbing Fixture | 100 @ 3'- 6"AFF | |

| | | | |
|---|-----------------|-----------------|-----|
| Lavatory | 150 @ 3'-0" AFF | 200 @ 3'-5" AFF | |
| Building Entries Vestibules Indoor /High Activity | | | 2:1 |
| Day | 150 @ floor | 75 @ 5' AFF | |
| Night | 100 @ floor | 50 @ 5' AFF | |

**Note: 1.) All lighting, including, but not limited to Normal and Emergency lighting illumination levels, shall be designed to meet or exceed OBC, accessibility requirements, and security requirements including but not limited to, AODA, COADS, CPTED, CCTV and CAN/CSA B651 requirements. 2.) Illuminated areas and values not listed in this table shall be per IESNA- Illumination Handbook, 10th Edition. 3.) Table 4-6.1: Facility Interior is applicable to all areas within the Fare Paid Zone of the Station utilized for Train operations and service; and interior spaces of enclosed Ancillary Facilities.*

- (vii) Provision of Emergency lighting systems is required by code. Emergency power shall be available at stable system voltage within 10 seconds or less. All batteries shall be sized to continuously carry the rated illumination for a minimum time required for evacuation and as required by Applicable Code.
- (viii) Emergency lighting fixtures shall be the same model and type as the rest of the lighting fixtures with the addition of Emergency battery pack.
- (ix) Lighting system shall be designed so that the failure of any single luminaire or lighting circuit in areas accessible to the public does not leave an area in total darkness.
- (x) Lighting layout shall be coordinated with other building elements so as not to affect the illumination.
- (xi) BAS system shall monitor and control Station lighting system. Where Facility remote control system is not provided, the following controls shall be provided:
 - A. Station central key / timer control system including override switches for service areas;
 - B. Exterior luminaries, including luminaries in signage, shall be group controlled by photo-cell and/or the facility BAS system. Exterior light control shall include a maintenance bypass switch (Hand-Off Auto) located on external wall of the facility for night services such as snow plow and cleaning;
- (xii) Exterior Lighting areas as required for Safety and comfort shall meet requirement of City Standards, IDA-IESNA MLO 2011, IESNA RP-33 and addendum A for TM-07-15, and ANSI/ASHRAE/IESNA Standards 90.1 Exterior Lighting Section;

- (xiii) Adopt site lighting criteria to maintain safe light levels while avoiding off-site lighting and night sky pollution. Use computer software to model the site lighting. Technologies to reduce light pollution include full cutoff luminaires, low-reflectance surfaces and low-angle spotlights; and
- (xiv) Minimum illumination levels shall meet the criteria listed below:

Table 4-6.2: Exterior Areas

| Illuminated Area | Illumination Targets | | |
|---|--|--|---------------------|
| | E_h lux | E_v lux | Uniformity Ave: Min |
| Building Entries Canopied Outdoor-High Activity | 10 to 40 @ grade according to location/ Lighting Zone | 6 to 20 @ 5'AFF according to location/ Lighting Zone | 2:1 |
| At-Grade Pedestrian Crossing | 20 to 10 @ grade | 10 to 5 @ 5'AFF | 4:1 |
| Bicycle Parking Area (Covered) | 40 to 10 @ grade | 20 to 6 @ 5'AFF | 2 to 4:1 |
| Bicycle Parking Area (Uncovered) | 20 to 10 @ grade | 8 to 1 @ 5'AFF | 2 to 4:1 |
| Shelter and Ticket Information Area | 20 to 6 @ grade | 10 to 2 @ 5'AFF | 3 to 6:1 |
| Bus Platforms | 100 @ grade | 40 @ 5'AFF | 2:1 |
| Exterior Station Building (Public Area) | 20 to 10 @ grade | 4 to 0 @ 5'AFF | 3 to 6:1 |
| Stairwell | 50 @ grade | | 4:1 |
| PPUDO | 20 to 10 @ grade | 4 to 0 @ 5'AFF | 3 to 6:1 |
| Pedestrian Underpasses and Overpasses | Night 40 @ grade | Night 20 @ 5'AFF | 3:1 |
| Pathways in the vicinity of Busways | 20 to 10 @ grade | 4 to 0 @ 5'AFF | 6 to 4:1 |
| Pathways/MUPs in the vicinity Stations, as required in Schedule 15-2, Part 6 – Urban Design, Landscape Architecture and Connectivity Requirements | 20 to 10 @ grade | 4 to 0 @ 5'AFF | 6 to 4:1 |

**Note: 1.) All lighting, including but not limited to Normal and Emergency lighting illumination levels, shall be designed to meet or exceed OBC requirements, accessibility requirements, and security requirements including but not limited to, AODA, COADS, CPTED, CCTV and CAN/CSA B651 requirements. 2.) Illuminated areas and values not listed in this table shall be per IESNA- Illumination Handbook, 10th Edition.*

- (n) With the exception of items listed in Table 6-5.2 above, DB Co shall design and construct lighting levels for Park and Ride surface lots in accordance with IES RP-20 in conjunction with the requirements contained in the OC Transpo Transitway and Station design guidelines.
- (o) DB Co shall design and construct fire detection and alarm system as per the following:
 - (i) All Stations shall be provided with a fire detection and alarm system in accordance with the Applicable Codes and ULC S561 Fire Alarm monitoring.
 - (ii) The fire detection and alarm system shall be a zoned, non-coded, addressable, microprocessor-based system with automatic alarm initiation, addressable smoke detectors, and automatic multi-detector algorithm for alarms initiated by smoke detectors.
 - (iii) Fire panels shall include the ability to verify alarms (2 stages) prior to evacuation. The fire alarm wiring system shall be electrically supervised. The system shall be designed such that the TOCC is notified and monitored via CCTV, to validate the event and determine if the fire department is to be dispatched when an alarm signal takes place.
 - (iv) The fire detection and alarm system shall be provided with an Emergency power supply, consisting of either a generator and/or battery source. The Emergency power supply shall power the supervisory function of the fire alarm system for no less than 24 hours and full function for no less than 30 minutes. Upon failure of the normal power source, immediate transfer to the Emergency power supply shall take place with no loss of information in the process.
 - (v) The fire detection and alarm system shall be connected to the TOCC, BCC, BYCC and MYCC, and monitored through the City's ULC listed monitoring company.
 - (vi) A fire alarm annunciator panel with a flush mounted vandal resistant polycarbonate shield when accessible to the public shall be provided at every Confederation Line Station in a readily accessible location to fire fighters upon entering the Station. A second annunciator shall be located where required by the City and connected to TOCC. The annunciator panels shall be monitored simultaneously through the City's ULC listed monitoring company.
 - (vii) Manual pull stations need not be installed in areas accessible to the public. Exceptions are doors to be released in the event of fire alarm by TOCC.
 - (viii) Visual signal devices shall be installed such that the signal from one device is visible throughout the floor area in which they are installed.
- (p) DB Co shall design and construct power for systems and communication equipment as per the following:

- (i) Provide power or conduit complete with pull wire as required.
- (q) DB Co shall design and construct conduits and raceway in accordance with the following:
 - (i) Conduits installed in finished areas of new construction shall be concealed in walls, below or in slabs, or above suspended ceilings. Exposed conduits shall not be run on the exterior surface of buildings. Conduits shall not be run through structural members across pipe shafts or ventilation duct openings.
 - (ii) Conduits in concrete slabs shall be placed between the bottom and top reinforcing steel. Separate conduits to ensure proper concrete bond.
 - (iii) Conduits shall not be embedded in waterproofed or waterbearing walls.
 - (iv) Conduits penetrating exterior walls of any Structure (other than handholes, manholes, or pullboxes) below grade, at grade floors, or below grade floors shall be sealed to prevent moisture migration.
 - (v) Grounding-type expansion fittings shall be installed in raceways every 60m or less of linear run or wherever structural joints are crossed to allow for expansion and contraction.
 - (vi) DB Co shall provide the raceway system and cable pulling for equipment described and identified by facility/systems and the City. Raceways shall be designed to include at least 25% spare capacity to protect for future growth and expansion. Refer to Clause 6.3 (b) (vii) above for direction.

6.5 Incident Control Panel

- (a) DB Co shall provide an ICP at each Confederation Line Station.
 - (i) Each ICP shall house the following equipment as a minimum:
 - A. A FTEL to allow for firefighters to talk with the TOCC/BCC as well as other FTELs along the alignment;
 - B. Activate/Silence Fire Alarm Horn/Strobes including an LED indicator; and,
 - C. Station/Tunnel lighting control switch.
 - D. A PA microphone for making public announcements at respective Stations.
 - (ii) In Underground Stations, and at Baseline Station, each ICP shall house the following equipment, in addition to the equipment listed in Clause 6.5 (a)(i), of this Part 4:

- A. A video feed from the Station's CCTV system to allow ESP to view Station areas on a local video screen within the ICP;
 - B. A second telephone handset to serve as the local handset and dial pad for calls within the Station or to the area of refuge.
- (iii) At each Station that has an active controllable Tunnel ventilation system, a ventilation control panel shall be provided as per Schedule 15-2, Part 8, Clause 7.3.
- (b) Fire Life Safety Protocols
 - (i) The role of the ICPs in Stations as described in this Part 4 shall be coordinated with the overall FLS System.
- (c) General
 - (i) All environmental performance characteristics for the ICPs including EMC are as set out in this Project Agreement. These shall be coordinated with the other systems and equipment and shall meet all other requirements of the Project Agreement.
- (d) Codes, Standards and Manuals
 - (i) In the event of a conflict between criteria, commitments or requirements contained within one document when compared with another, the more stringent specification shall apply:
- (e) Functional Requirements
 - (i) Physical equipment housing:
 - A. The ICP shall be located in a protective and locked cabinet.
 - B. The ICP shall permit a minimum of two people ease of access to its internal equipment.
 - C. The ICP shall provide a localized operating environment which supports the functioning of the internal equipment when the access panel is opened and exposed to external ambient temperatures specified.
 - D. The location of the ICP within a Station shall be as agreed with ESP and shall be easily accessible but out of the way of evacuating Passengers.
 - E. Access to the ICP shall be through the front only, unless space restrictions require double sided access.

- F. The ICP shall be grounded and bonded in accordance with electrical code and CSA standards. Grounding continuity of front panels shall be maintained when opened.
- G. A means of protection for the user from rain, sun, snow and ice shall be included in the design (if location is exposed to the elements) and the solution may be stowable in the unit. If permanently connected it shall not present a hazard to Passengers walking in close proximity.
- H. Access to the interior shall be through a key which will be contained within an Ottawa Fire Services compliant lock box provided by DB Co.
- I. When the ICP is open, all equipment shall be resistant against the ingress of climatic elements.
- J. The ICP shall provide a minimum of seven 'Legal size' rigid pockets to assist with the management of maps and safety data within the ICP.
- K. Space shall be provided within the ICP to permit the display of instructions and key contact telephone numbers at a viewable level for the user.

(ii) Communications

A. Telephone Access

- i. The ICP shall provide a telephone handset in all Stations. This is the FTEL connected through FDAS and shall be hardwired and monitored.
- ii. The second telephone handset in Underground Stations and Baseline Station shall be VOIP based.

B. PA

- i. The PA microphone in Station ICPs shall permit the user of the ICP to gain access to the local PA system and broadcast voice messages through the PA microphone.

C. ICP Alarm

- i. The ICP shall provide an alarm contact on the front panel access door which shall be connected to the SCADA system and displayed as an alarm to the operator at the TOCC, BCC, MYCC and BYCC when the front panel is opened.

D. Fire Alarm Annunciator Panel

- i. The ICP shall contain the fire alarm annunciator panel.

E. Power Requirements

- i. The ICP shall provide a duplex 110VAC 60Hz GFCI protected 15A socket for connections of ancillary AC equipment.
- ii. The ICP shall be connected to the 4 hour Emergency UPS system to maintain operation during an Emergency.
- iii. The addition of a supplementary 15A AC load and the ICP electrical load shall be accommodated by the UPS to provide the required 4 hour operational performance.

F. CCTV video feed in Underground Stations

- i. The local video screen for viewing CCTV video feeds in the ICP shall be located at standing eye level for the user.
- ii. The local video screen shall be a minimum of 19" diagonal.
- iii. The video screen shall be able to view the details of a single view or a view of four camera images.
- iv. CCTV camera images shall be transmitted to the ICP by the TOCC & BCC personnel when requested via radio or telephone communication
- v. The TOCC & BCC personnel shall be able to select the CCTV camera image and the ICP to which the image will be transmitted.
- vi. No local storage or recording of the video at the ICP shall be required.

6.6 Incident Control Location

- (a) DB Co shall provide signage at each Tunnel portal in a location as agreed with ESP to indicate the meeting point for incident control.

ARTICLE 7 WAYFINDING AND SIGNAGE

7.1 Introduction

- (a) This Article 7 describes wayfinding and signage performance requirements for the Project including performance criteria for wayfinding and signage design.
- (b) The performance specifications will provide brand neutral examples for the application and integration of a comprehensive wayfinding and signage system with the specific architectural and art finishes and features of the Project.

7.2 Goals & Objectives

- (a) The overall goal of this Article 7 is to provide a standard signage and wayfinding system that makes transit Facilities easy to identify and navigate system wide, that utilize language and visual techniques that people understand, comply with accessibility guidelines, integrate with the design approach of other design disciplines and assist in delivering a successful journey for Passengers.
- (b) The objectives for the wayfinding and signage program are as follows:
 - (i) To improve the overall function and aesthetics of the Project by providing accessible, attractive, identifiable and understandable signage;
 - (ii) To improve wayfinding for Passengers by providing map, text and or pictograph signage for important Station destinations and features;
 - (iii) To provide plain language signage and not 'over sign' Stations;
 - (iv) To develop Project outcomes that inform and meet the timing of the design requirements for Station pre-engineering and final designs; and
 - (v) To achieve the above goals sustainably.

7.3 Scope

- (a) This Article 7 includes requirements for the design, manufacture, supply, delivery, storage, assembly, installation, protection, inspection and testing of all components as described herein, necessary to achieve and deliver a successful, comprehensive and integrated wayfinding and signage system for the Project.
- (b) The wayfinding and signage system shall be consistent with the Existing Confederation Line signage and wayfinding system. Refer to Appendix D to this Part 4 for exemplary Station signage and way finding drawings.
 - (i) Appendix D represents the signage and wayfinding system for the Stage 1 Confederation Line Project

- (ii) DB Co shall apply the design principles, materials, details colors, location etc. contained in Appendix D to inform the design of the signage and way finding systems for the Project;
 - (iii) Appendix D does not relieve DB Co of any requirements of the Project agreement; and
 - (iv) DB Co shall retain all professional and design responsibilities for the signage and way finding system.
- (c) The wayfinding and signage system includes but is not limited to providing signage that addresses the following areas and uses:
 - (i) Station identification signage - Signage that identifies a Station and is visible whether approaching a Station by foot, bicycle, transit vehicle, taxi or private vehicle;
 - (ii) Community orientated wayfinding signage - Signage that identifies and provides a link to other modes of transport, public services, landmarks, pedestrian and bicycle routes or significant destinations in the general vicinity of each Station;
 - (iii) Station located wayfinding signage - Signage that assists the movement of Passengers through a Station or to facilities located within the Station. This includes signage that identifies and or directs users to and from Platforms, exits, ticketing and fare payment facilities, information services, elevators, escalators, accessible pathways, bicycle routes through each Station, taxi and connecting bus services;
 - (iv) Navigation signage - Signage that works in conjunction with (iii) and provides wayfinding through the available multi modal forms of transportation by identifying directions, major destinations, adjacent Stations and confirms the appropriate transport service.
 - (v) Schedule and service status signage - Signage that displays real time information on the status of transport services communicated through the use of dynamic visual displays, panels, electronic updates and audio announcements when a service is operating, due to arrive, delayed or cancelled and provides information and notices for hours of operation, trip schedules and timetables; and
 - (vi) Regulatory and utility signs - Signage used within a Station that provides users and staff with regulatory notifications such as no smoking, hazards, no littering, Emergency exit, Emergency phones, fire alarms, elevator buttons, rules of use, disclaimers, etc. Standard traffic signage is also required for private vehicles and for buses circulating through or around a Station.

7.4 General Responsibilities

- (a) DB Co shall design, fabricate, install, and maintain all wayfinding equipment.
- (b) The City will confirm content of all wayfinding including signage (directional, orientation, information, regulatory, commemorative), electronic displays, transit information panels, and maps, and will provide such content to DB Co at the appropriate stage of design.
- (c) Proposed wayfinding equipment shall be coordinated and compatible with existing wayfinding equipment as per Existing Confederation Line.
- (d) Wayfinding equipment shall support and contribute to the transit customer experience on the system and overall transit network as per Existing Confederation Line, in Appendix D.

7.5 General Requirements

- (a) Reference Documents
 - (i) The design and construction of wayfinding and signage shall comply with the criteria contained in this Article 7, and all standards, regulations, policies, Applicable Law, guidelines or practices applicable to the Project, including but not limited to each of the following Reference Documents. In the event of a conflict between criteria, commitments or requirements contained within one document when compared with another, the more stringent shall apply:
 - A. OBC;
 - B. AODA;
 - C. COADS;
 - D. OC Transpo Transitway and Station Design Guidelines;
 - E. OC Transpo Signage and Wayfinding Manual;
 - F. Appendix D Exemplary Station Signage and Wayfinding Drawings – Existing Confederation Line, of this Part 4.
 - G. Canadian Transportation Agency, Code of Practice, Passenger Terminal Accessibility
 - H. Canadian Transportation Agency, Code of Practice, Removing Communication Barriers for Travelers with Disabilities
 - I. City of Ottawa Construction Specifications and Details; and

J. Ontario Traffic Manual.

(b) Signage System Design

(i) Design for the wayfinding and signage system for the Project is comprised of identification, directional, information, operational, regulatory, and temporary signage.

(ii) The City shall determine Station names for all Stations.

(iii) Identification Signage

A. The key functions of the identification signage are to identify:

- i. Stations within the built environment;
- ii. Station entries;
- iii. Station facilities;
- iv. Passenger services and amenities;
- v. Elevator access; and
- vi. Accessible entries.

(iv) Directional Signage

A. The key functions of the directional signage are to direct:

- i. Passengers from the Station entries to fare equipment and on to the Platform and to the exits;
- ii. Passengers to connecting modes and Infrastructure;
- iii. Passengers to facilities within the Station; and
- iv. Passengers to accessible access points.

(v) Information Signage

A. The key functions of the information signage are:

- i. Provide transit network information;
- ii. Notify Passengers of available services; and
- iii. Notify Passengers of delays or changes to scheduled services.

- (vi) Operational Signage
 - A. The main purposes of the operational signage are:
 - i. Identify doors, areas and access points for staff and facilities management; and
 - ii. Identify ancillary room functions.
 - iii. Notify Passengers of video surveillance.
- (vii) Regulatory Signage
 - A. The key functions of the regulatory signage are:
 - i. Identify potential hazards to Passengers and the public; and
 - ii. Identify potential hazards to staff and Third Party Contractors.
- (viii) Temporary Signage
 - A. The key function of temporary signage is to:
 - i. Temporarily identify changes to services, Station facilities, Station closures or hours of operations;
 - ii. Temporarily identify hazards to Passengers and the public; and
 - iii. Temporarily identify hazards to staff and Third Party Contractors.
- (ix) Sign Types shall be consistent with Existing Confederation Line signage.
- (x) Sign Dimensions shall be consistent with Existing Confederation Line signage.
- (xi) DB Co shall use the Existing Confederation Line signage packages provided in Appendix D of this Part 4 which includes expectations for sign dimensions, sign and information hierarchy, sign types, sign content, visibility, contrast, layout, sign mass and sophistication.
- (xii) Sign Quantities
 - A. DB Co shall be responsible for designing the wayfinding program including providing sufficient quantities of signs as deemed necessary to design and supply a clear, concise and consistent wayfinding sign system in order to meet the Project requirements.
- (xiii) Sign Information

- A. DB Co shall be responsible for updating and maintaining sign information content and messages to ensure that all signage is relevant and reflects relevant changes to the City transit system.
- (xiv) For Stations subject to FLUDTA, the following requirements apply:
 - A. Signage design shall comply with the NCC commercial signage guidelines.
 - B. All text shall to appear in both official languages.
 - C. Exterior signage shall not be permitted above the ground floor level.
 - D. Backlit signage, with the exception of Station entrance lanterns, billboard signage and digital signage shall not be permitted outside of the Station.
- (c) Design Elements and Considerations
 - (i) The design and implementation of the Project wayfinding and signage system requires DB Co to incorporate the following key considerations and elements into the designs.
 - (ii) Line & Letter Spacing
 - A. Line spacing where a set of messages is displayed shall be at least 75% of the cap height so messages can be quickly scanned and destinations identified.
 - (iii) Language
 - A. All signage for the Project shall feature messages in both English and French.
 - B. Where both languages appear on a single sign, DB Co shall follow one of the following two options:
 - i. English text on the left side and French text on the right; or
 - ii. English text on the upper portion of the sign with French text below.
 - C. Where pairs of signs are used the sign displaying English text shall be placed at the beginning of the viewing sequence with the second sign in French located beyond it.
 - D. Where the two signs are required they shall be far enough apart to ensure the messages are differentiated and not read as a single message and close enough to one another allowing users to recognize that they represent the

same message displayed in the two languages. A minimum gap of four character strokes shall be maintained between English and French messages. A minimum of two character strokes shall be permitted where a graphic device such as a vertical line or hyphen is used to visually separate the two messages.

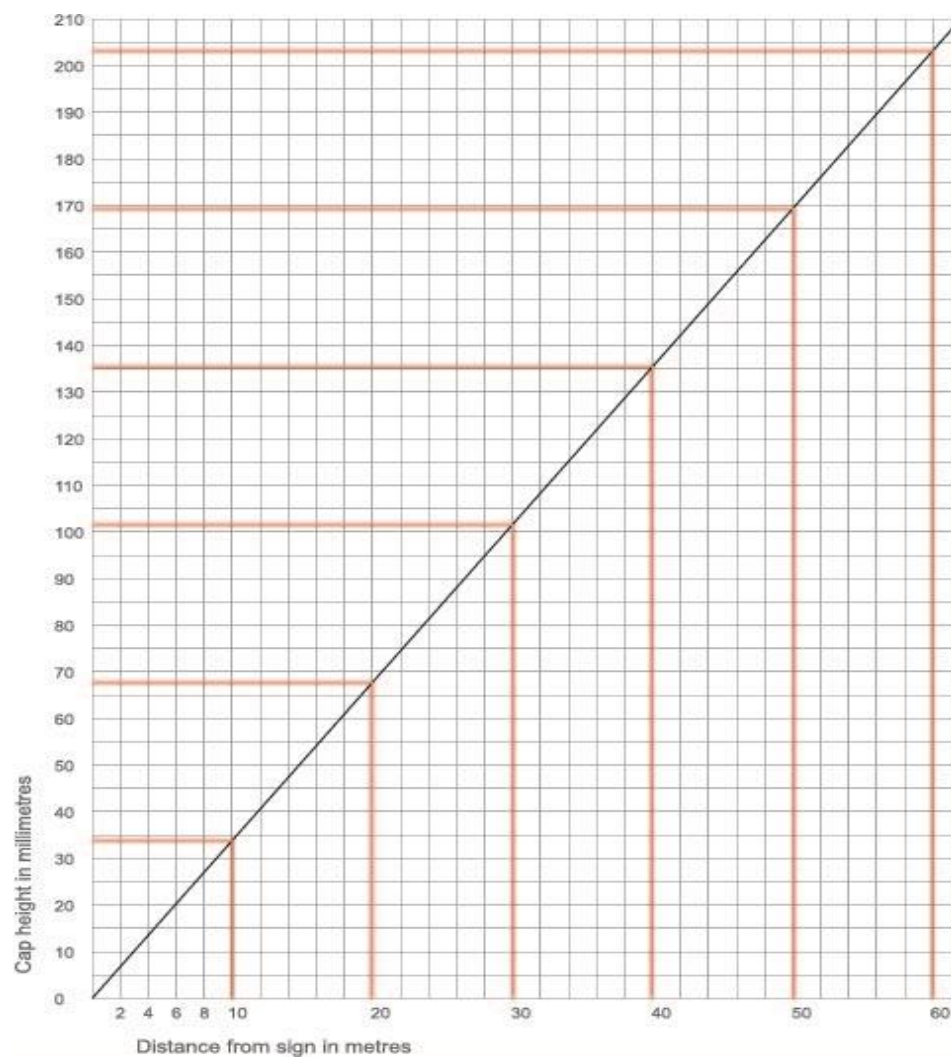
- E. Bilingual or unilingual paired signs shall employ the same size, fonts, letter heights, colours and general design principles for each language.

(iv) Pictograms

- A. Pictograms shall be used to reinforce sign messages, aid quick recognition and clearly communicate information to all languages and cultures.
- B. Pictograms shall be based on Existing Confederation Line standards approved by the City. Any additional pictograms proposed by DB Co that are not based on the existing standards shall be presented to the City for acceptance.

(v) Legibility & Viewing Distance

- A. All signage shall be legible and feature letters and graphic elements of the appropriate size for the identified viewing distances. The chart below provides the viewing distances for text of a particular height. These values are based on the viewer having good vision and reading the signs in daylight whilst stationary.



- B. It shall be noted that many factors negatively impact the legibility of sign text. These include angular distortion, speed of travel and low light levels. Factors such as these shall be considered when determining the height of text appearing on signs. DB Co shall increase text heights from those described in the chart as required to maintain sign legibility based on the impact of the above conditions.
- (vi) Mock ups of all sign types shall be provided by DB Co to assess the legibility of the proposed design and text heights. Mock ups shall be reviewed by user groups comprised of a cross section of the community and representing people with diverse abilities.
- (vii) Sign Placement

- A. Signage shall be placed in visible locations, free from obstructions. Special care shall be taken to ensure that signs are not obstructed by other signs, design elements or items such as security cameras.
- B. DB Co shall place signs within the accepted standard for a viewers' cone of vision, being 15° above and below the viewers' horizontal line of sight. Signs viewed outside a viewers' cone of vision are read peripherally and with much less detail. DB Co shall consider the viewers' cone of vision when selecting the height of the sign from floor level and the height of the typeface.
- C. The average persons' eye level when standing is 1500mm from floor level. When seated it is approximately 1000mm from floor level and when driving eye level is approximately 1200mm from floor level. Signage shall be placed depending on how it shall be viewed and taking into account differences in eye level and a sign's audience.
- D. Placement of signage shall be coordinated with the landscaping, architecture, interior design lighting and other equipment in order to standardize locations within a Station and across the system. Signage shall be applied consistently, assist users to know where to expect sign information and aid navigation.

(viii) Contrast and Colour

- A. DB Co shall ensure contrast between sign backgrounds and messages are at a level considered acceptable to maintain sign legibility and deliver a successful signage system.
- B. For environments with light levels between 10-70 foot candles DB Co shall provide signs with a contrast of 75% or higher between the background and message.
- C. For environments with higher light levels (70 foot candles and above) DB Co shall provide signs with a lower contrast level of 65-75%. A dark background shall be used to absorb light and prevent glare.

(ix) Halation

- A. When signs are backlit care shall be taken to reduce flare or halation. Halation makes backlit or reversed lettering difficult to read especially when travelling at speed or at night. DB Co shall ensure that signs are designed to minimize the effects of halation. Directional signage shall not feature designs which purposely use the effect of halation as a feature. This includes signage with halo lighting effects.

- B. Internally illuminated signage shall have reversed opaque or translucent backgrounds to reduce halation and increase legibility.
 - C. Internally illuminated signs shall not feature light coloured illuminated backgrounds.
- (x) Lighting
- A. Design and implementation of internal or external signage illumination shall be coordinated by DB Co with the City to ensure compatibility with the design intent for the overall lighting scheme.
- (xi) Universal Design
- A. The principles of Universal Design shall be applied to designs for the wayfinding and signage system by DB Co. The signage system shall whenever possible seek to integrate accessible design features with the design as a whole. The goal is to deliver a wayfinding signage system that assists in providing an environment accessible to people with all levels of abilities. As a minimum, signage for the Stations shall be designed in accordance with the relevant accessibility codes referenced in this document. All directional signage shall be located in compliance with the stated codes.
 - B. The application of tactile indicators shall be coordinated with key sign locations to assist with the recognition of tactile signage locations and aid navigation by the visually impaired.
- (xii) CPTED
- A. The principles of CPTED shall be applied in order to ensure the design and placement of the wayfinding and signage system does not compromise the Safety of Passengers or the general public. In general, signage shall enhance public Safety by providing uninterrupted site lines in critical areas, reduce areas where people or devices may be concealed and provide sufficient information to users to instil confidence and minimize confusion. All Station, security facilities and supporting transport services shall be easily differentiated and identified whilst being recognisable as part of an organised system.
- (xiii) Vandalism
- A. All signage elements shall be designed and fabricated to dissuade and provide protection against vandalism and graffiti.
 - B. Tough, scratch and impact resistant materials shall to be utilized to resist damage, maintain appearance, increase product life spans and reduce

operational costs. Sacrificial and non-sacrificial anti-graffiti coatings are to be applied to signs where the risk of graffiti is deemed to be high.

- C. All accessible mechanical fixings shall be 'security fixings' with nonstandard drives. All accessible fixings shall be tamper proof.
- D. Damaged signs shall be repaired or replaced by DB Co in a timely manner and without negatively impacting Passengers, staff or the general public.

(xiv) Local Conditions

- A. All signage components designed and supplied by DB Co shall be fit for purpose, able to perform in the climatic conditions outlined in Schedule 15-2, Part 1, Article 4 – Design and Construction.
- B. The effects of snow, ice and the effects of methods of snow dispersal on signage shall be addressed in the design.

(d) Fabrication Materials & Finishes

- (i) Sign material selections and colours are subject to final brand review by the City.

(ii) Metalwork

- A. All work shall be accurately and neatly constructed and securely fitted and fixed.
- B. DB Co shall use types and grades of metals suited to their required function, finish and method of fabrication, in sections of adequate strength and stiffness for their purpose.
- C. Where appropriate, prefabricate and preassemble items in the workshop before delivering items to Site.
- D. Care shall be taken to ensure all visible metal surfaces are free from damage, scratching or other surface degradation.
- E. Fabrication techniques, surface detailing and application of finishes shall be closely controlled to ensure continuity of appearance between individual items.
- F. All visible metal edges shall be cut with machine tools. No visible edges of metal shall be cut with a guillotine or break press. No radius to edges unless specified.

(iii) Stainless Steel

- A. All stainless steel used externally; in basement levels and non-air conditioned areas shall be marine alloy, AISI grade 316. In internal areas all stainless steel shall be grade AISI grade 304 unless otherwise specified.
- B. All stainless steel surface finishes shall be factory or machine finishes. Stainless steel products with a standard mill or 2B finish shall not be hand finished or polished, by the contractor to match factory finishes.
- C. All brushed or finish stainless steel shall be No.4 finish unless otherwise specified. Grain of finish is to run with long dimension of each sign unless otherwise specified.
- D. All polished or mirror stainless steel shall be No.8 mirror finish, unless otherwise specified.
- E. All surfaces shall be ground and polished to produce uniform, directionally textured, polished finishes free of cross scratches.
- F. All corners shall be 90° and mitred, with a hairline joint and with surface finishes meeting at mitre. No visible welds.

(iv) Aluminium

- A. All aluminium shall be of an alloy suitable for purpose. For signage applications where sheet and plate is required, alloy 5005 shall be used.
- B. All welding shall be carried out in accordance with international standards, using techniques to avoid buckling and discolouration.
- C. All exposed welds shall be ground smooth and where aluminium is to be painted all surfaces shall be suitably sanded, primed, filled and smoothed prior to final paint treatment.

(v) Mild Steel

- A. Steel components shall be of quality mild steel of a gauge and alloy appropriate for location and use.
- B. Method of welding used shall provide the maximum strength along joints, fill all gaps and run to a clean and regular finish. All welds shall be continuous along joints with no raw or exposed edges.
- C. Irregular welds shall be ground smooth with particular attention to visible areas.
- D. After fabrication and prior to pre-treatment and finishing processes, all rust, scale, burrs, weld slag and splatter shall be removed from the weld and surrounding areas.

- E. Steel work shall be free of grind and machine marks by way of finishing or sandblasting without causing damage to the designed form or creating surface irregularities.
 - F. All mild steel framing and signage support Structure, located in external areas shall be hot dipped galvanised regardless of the application of paint finishes unless otherwise specified.
- (vi) Glass
- A. All glass used in the fabrication of signage shall be toughened safety glass.
 - B. Where glass is used in conjunction with applied graphics for the purposes of visual display, all glass shall be low iron toughened safety glass.
 - C. All edges are to be ground and polished smooth. All edges shall be square without chamfered or sharp edges.
 - D. All glass installations located in direct contact with Passengers and staff shall be certified by a Professional Engineer.
- (vii) Acrylic & Polycarbonate
- A. All acrylic used shall contain 90% or more polymethyl methacrylate.
 - B. Where possible cast acrylic shall be used instead of extruded acrylic or polycarbonate products.
 - C. Cut edges shall be finished smooth and polished. No flame polished edges shall be provided.
- (viii) Fastenings
- A. Fastenings, including anchors, lugs, screws, rivets, and the like shall be fit for purpose and capable of transmitting the loads and stresses imposed. All fastenings shall be sufficient to ensure the assembly is secure and rigid.
 - B. All fastenings and associated components such as sleeves shall be finished to match the sign body treatment and colour, unless otherwise approved.
 - C. All exposed screw heads shall be countersunk. All screw heads shall finish flush with the adjacent exposed surface.
 - D. DB Co shall ensure that all fixings are protected against corrosion and will not mark or stain existing finishes.
 - E. Fixings shall be compatible with the types of metal they are used to secure.

(ix) Welding

- A. Welded, brazed or soldered joints on exposed surfaces shall be ground, buffed or polished as applicable to the material and specified finishes. There shall be no buckling or visible surface colour variations in exposed metal finishes.
- B. Welds and brazes on finished surfaces shall be indistinguishable from the parent metal.

(x) Precision Cutting

- A. All cut edges shall be smooth, ground and polished. No visible cut marks, burn marks, splatter or discolouration shall be accepted.
- B. All start and end cuts for laser and waterjet cutting and shall be located outside the form to be cut. All cut edges shall be de-burred. All edges shall be square. No sharp edges.

(xi) Metal Separation

- A. Incompatible metals shall be separated to prevent galvanic reactions. Separation materials shall not be visible on exposed surfaces or cause discolouration to the surrounding finishes over time.

(xii) Graphic Films

- A. All corners and edges of finished letterforms, numerals, arrows, pictograms, logotypes and other graphic elements shall be sharp and true to the selected typeface or artwork, with accurate even curves and serifs where applicable.

(xiii) Screen Printing

- A. All screen printed graphics shall be applied according using a screen of 120 threads per inch. Registration shall be accurate.
- B. Screen printing ink shall be Sericol Polyscreen 2 pac system or similar.

(xiv) Anti-Graffiti Coatings

- A. All applied coatings shall be compliant with the sustainability goals for the Project and be applied to the manufacturers' instructions by qualified personnel trained in the correct use and application and/or removal of these types of products.

(e) Electrical

- (i) Internal Lighting
 - A. DB Co shall ensure that all illumination is fit for purpose and provides even illumination. No shadows, visible wiring or hotspots shall be permitted.
 - B. DB Co shall fabricate all signs with internal lighting in such a way as to prevent all light leaks
 - C. All lighting shall be LED Type.
 - D. All control gear shall be compatible with the lamps used and shall be located within the sign or concealed in a remote location. In all cases DB Co shall ensure that all control gear including transformers, drivers and ballasts are installed in an accessible and safe location which does not interfere with the functioning of the lighting or the sign itself.
 - E. All wiring shall be encased in non-conductive, insulated, electrical conduit, fit for purpose.
 - F. All ballasts and control gear shall be electronic. No solid core transformers or ballasts shall be used.
 - G. All interior lighting fixtures located underneath skylights shall be full cutoff.
- (ii) External Lighting
 - A. Where additional illumination is required for the purposes signage illumination, light fixtures shall match in colour temperature, lumen output and intent.
 - B. All exterior lighting fixtures shall be full cutoff, light trespass on to adjacent properties shall not be permitted.
 - C. All lighting shall be LED Type.
- (iii) Activation of Signage Illumination
 - A. Activation for sign illumination shall be controlled by the station BAS.
- (iv) LED Displays
 - A. DB Co shall be responsible for the design and placement for all LED displays. DB Co shall be responsible for the design and supply of all shrouds and fixing systems required to maintain a consistent design language and integrate the displays with the designs for the wayfinding

and signage system. design of the shrouds and or fixing systems shall not negatively impact the performance of the base LED displays in any way.

- B. Placement of LED displays as part of the Passenger information systems shall be the responsibility of DB Co. Placement of Passenger information displays shall not obscure or interfere with the operational performance of the wayfinding and signage system.

(v) LCD Displays

- A. DB Co shall be responsible for the design and placement for all LCD displays. DB Co shall be responsible for the design and supply and of all shrouds and fixing systems required to maintain a consistent design language and integrate the displays with the designs for the wayfinding and signage system. design of the shrouds and or fixing systems must not negatively impact the performance of the base LCD displays in any way.
- B. Placement of LCD displays as part of the Passenger information systems shall be the responsibility of DB Co. Placement of Passenger information displays shall not obscure or interfere with the operational performance of the wayfinding and signage system.

7.6 Conditions

(a) Site

(i) Site Conditions

- A. No signage shall be fabricated or finished on-site.

APPENDIX A

Room Data Sheets

| | | | | | | | |
|------------|----------------------------------|--|--|--|--|--------------|----|
| Building | Moodie LMSF Maintenance Building | | | | | | |
| Room Name: | Comms/PS&D Technician Shop | | | | | Room Number: | NA |

ARCHITECTURAL

Function: Workshop and Storage Net Area: 20 m2 Number of Occupants: 3
Fire Rating: NA Barrier Free: Yes

ROOM CHARACTERISTICS

Sound Control: Standard Special Ceiling Conditions:
STC Rating: 45 Special Floor Conditions
Other: - Special Wall Conditions :

ROOM FINISHES

Floor: SC Base: RB Wall: PT
Ceiling: NA Millwork:
Doors (Size): 1800x2100 Type: Fire Rating: Hardware: Access Control
O/H Doors (Size): Type: - Fire Rating: - Hardware: -
Windows: - Frame: - Fire Rating: - Glazing: -
Wind Screens: - Frame: - Fire Rating: - Glazing: -
Security Barriers: - Frame: - Fire Rating: - Glazing: -

MILLWORK

Counter: - Matl: - Comment:
Shelving: - Matl: - Comment: -

FIXTURES: -

EQUIPMENT:

OTHER: First floor, direct access to main shop

REMARKS:

MECHANICAL

| | | | |
|----------------------------|------------------------|------------------|------------------------|
| HVAC system: | Standard office | Air Supply: | Standard Office |
| Min. # of air changes/hr.: | - | Air Exhaust: | Ceiling |
| LAVS: | - | Number: | - |
| Water Closet: | - | Number: | - |
| Urinal: | - | Number: | - |
| Drinking Fountain: | - | Room Thermostat: | No |
| Floor Drain: | | Drain Type: | - |
| Other: | | | |

Comments:

ELECTRICAL

| | | | |
|------------------------------|---|--------------------------------|--------------|
| Receptacles: | Minimum 10 120VAC/15A duplex outlets at 1000mm AFF | | |
| Switches: | Low Voltage | - | Dimmer |
| | (Qty.): | | (Qty.): |
| | Other: | - | |
| Emergency Lighting Required: | All lighting on backup power (genset) | | |
| Lighting Type: | LED | Lighting Level (Lux): | 500 - |
| Communications: | Minimum 4 network data outlets | | |
| Fire Alarm to OBC3.2.4: | - | P.A. System Coverage Required: | Yes |
| T.V. Outlet (Qty.): | - | | |
| Telephone/Data Outlet (Qty.) | (1) Wall mounted | | |
| Security Requirements: | Provide access control hardware | | |
| A/V Systems: | - | | |
| Comments: | Coordinate location of power/data outlets with RTG | | |

NOTES

CAN_DMS: \132040802\1

| | | | | | | | |
|-----------------------------|----------------------------------|--|--|--|--|--------------|----|
| Moodie LMSF Office Building | Moodie LMSF Maintenance Building | | | | | | |
| Room Name: | Janitor's Closet | | | | | Room Number: | NA |

ARCHITECTURAL

Function: Janitor's Closet Net Area: 4 m2 Number of Occupants: NA
Fire Rating: NA Barrier Free: Yes

ROOM CHARACTERISTICS

Sound Control: Standard Special Ceiling Conditions:
STC Rating: 55 Special Floor Conditions
Other: - Special Wall Conditions :

ROOM FINISHES

Floor: PCT Base: CT Wall: PT/1220mm CT Wainscot
Ceiling: LAT Millwork:
Doors (Size): 900x2100 Type: SC Fire Rating: Varies Hardware: Access Control;
O/H Doors (Size): Type: - Fire Rating: - Hardware: -
Windows: Frame: - Fire Rating: - Glazing: -
Wind Screens: - Frame: - Fire Rating: - Glazing: -
Security Barriers: - Frame: - Fire Rating: - Glazing: -

MILLWORK

Counter: - Matl: Comment:
Shelving: Minimum 150 x450 (mm) Matl: SS Comment:

FIXTURES: One porcelain coated cast iron floor mounted janitorial sink, mop racks

EQUIPMENT: -

OTHER: -

REMARKS: .

MECHANICAL

HVAC system: - Air Supply: Undercut door
Min. # of air changes/hr.: - Air Exhaust: 100%

LAVS: Janitorial Number: Min. Per Code Fixture: -
Water Closet: No Number: Min. Per Code Fixture: -
Urinal: No Number: -Min. Per Code Fixture: -

Drinking - Room Thermostat: No
Fountain:
Floor Drain: 1 per every 25m² or portion thereof Drain Type: -

Other:

Comments: -

ELECTRICAL

Receptacles: 1 quad
Switches: Low Voltage - Dimmer -
(Qty.):
Other: - (Qty.):

Emergency Lighting Required:
Lighting Type: LED Lighting Level (Lux): 300 -
-

Communications:
Fire Alarm to OBC3.2.4: - P.A. System Coverage Required: Yes

T.V. Outlet -
(Qty.):
Telephone/Data Outlet (Qty.) -
Security Requirements: Access Control
A/V Systems: -

Comments: -

NOTES

RFP: Request for Quotation

OESC: Ontario Electrical Safe Code

| | | | | | | | |
|------------|----------------------------------|--|--|--|--|--------------|----|
| Building | Moodie LMSF Maintenance Building | | | | | | |
| Room Name: | RTG Break Room | | | | | Room Number: | NA |

ARCHITECTURAL

Function: Break Room Net Area: 40 m2 Number of Occupants: 20
Fire Rating: NA Barrier Free: Yes

ROOM CHARACTERISTICS

Sound Control: Standard Special Ceiling Conditions:
STC Rating: 45 Special Floor Conditions
Other: - Special Wall Conditions :

ROOM FINISHES

Floor: VCT Base: RB Wall: PT
Ceiling: LAT Millwork:
Doors (Size): 900x2100 Type: Fire Rating: Per code Hardware: Latch
O/H Doors Type: - Fire Rating: - Hardware: -
(Size):
Windows: Provide daylighting Frame: - Fire Rating: - Glazing: -
Wind Screens: - Frame: - Fire Rating: - Glazing: -
Security Barriers: - Frame: - Fire Rating: - Glazing: -

MILLWORK

Counter: Kitchenette case work; Matl: Solid surface at kitchenette Comment:
Shelving: Single adjustable lowers two adjustable uppers Matl: HPL Comment:
FIXTURES: Provide casework with stainless steel kitchen sink with waste disposer, countertop space sufficient for coffee maker and microwave; full length overhead cabinets
Provide floor area, water, floor sink and electrical for not less than two vending machines
EQUIPMENT: Provide (1) 1220mm LCD monitor and connection to digital broadcast media (cable TV); microwave, coffee maker, 480 litre frost free refrigerator-freezer.

OTHER: Providing seating and multiple tables for 20 (4-6 persons per table maximum).

REMARKS:

MECHANICAL

| | | | |
|----------------------------|------------------------|------------------|---------------------------------|
| HVAC system: | Standard office | Air Supply: | Standard Office, Ceiling |
| Min. # of air changes/hr.: | - | Air Exhaust: | Ceiling |
| LAVS: | - | Number: | - |
| Water Closet: | - | Number: | - |
| Urinal: | - | Number: | - |
| Drinking Fountain: | - | Room Thermostat: | Yes |
| Floor Drain: | - | Drain Type: | - |
| Other: | | | |

Comments:

ELECTRICAL

| | | | |
|-------------------------------|---|--------------------------------|--------------|
| Receptacles: | Standard office | | |
| Switches: | Low Voltage | - | Dimmer |
| | (Qty.): | | (Qty.): |
| | Other: | - | |
| Emergency Lighting Required: | All lighting on backup power (genset) and UPS | | |
| Lighting Type: | LED room, LED under counter | Lighting Level (Lux): | 300 - |
| Communications: | | | |
| Fire Alarm to OBC3.2.4: | - | P.A. System Coverage Required: | Yes |
| T.V. Outlet | Wall mounted | | |
| (Qty.): | | | |
| Telephone/Data Outlet (Qty.): | -1 wall mounted phone; 1 wall mounted at LCD monitor | | |
| Security Requirements: | - | | |

CAN_DMS: \132040802\1

A/V Systems: **See above**

Comments: -

NOTES

| | | | | | | | |
|------------|----------------------------------|--|--|--|--|--------------|----|
| Building | Moodie LMSF Maintenance Building | | | | | | |
| Room Name: | Conference Room | | | | | Room Number: | NA |

ARCHITECTURAL

Function: RTG Conference Room Net Area: 50 m2 Number of Occupants: 10
Fire Rating: NA Barrier Free: Yes

ROOM CHARACTERISTICS

Sound Control: Standard Special Ceiling Conditions:
STC Rating: 45 Special Floor Conditions
Other: - Special Wall Conditions :

ROOM FINISHES

Floor: VCT Base: RB Wall: PT
Ceiling: LAT Millwork:
Doors (Size): 900x2100 Type: Fire Rating: Hardware: -
O/H Doors Type: - Fire Rating: - Hardware: -
(Size):
Windows: - Frame: - Fire Rating: - Glazing: -
Wind Screens: - Frame: - Fire Rating: - Glazing: -
Security Barriers: - Frame: - Fire Rating: - Glazing: -

MILLWORK

Counter: - Matl: - Comment:
Shelving: - Matl: - Comment: -

FIXTURES: Data and power connection all walls; data and power outlet flush with floor centered on conference room table

EQUIPMENT:

OTHER:

REMARKS: Room shall be configured to seat 10 comfortably around a conference table with space to move behind seated occupants.

MECHANICAL

| | | | |
|----------------------------|------------------------|------------------|---------------------------------|
| HVAC system: | Standard office | Air Supply: | Standard Office, Ceiling |
| Min. # of air changes/hr.: | - | Air Exhaust: | Ceiling |
| LAVS: | - | Number: | - |
| Water Closet: | - | Number: | - |
| Urinal: | - | Number: | - |
| Drinking Fountain: | - | Room Thermostat: | Yes |
| Floor Drain: | | Drain Type: | - |
| Other: | | | |

Comments:

ELECTRICAL

| | | | |
|-------------------------------|--|--------------------------------|--------------|
| Receptacles: | Minimum four outlets at workstation | | |
| Switches: | Low Voltage | - | Dimmer |
| | (Qty.): | | (Qty.): |
| | Other: | - | Yes |
| Emergency Lighting Required: | All lighting on backup power (genset) | | |
| Lighting Type: | LED | Lighting Level (Lux): | 500 - |
| Communications: | | | |
| Fire Alarm to OBC3.2.4: | - | P.A. System Coverage Required: | Yes |
| T.V. Outlet (Qty.): | Wall mounted | | |
| Telephone/Data Outlet (Qty.): | Standard plus data and power on one wall for connection to large format monitor. | | |
| Security Requirements: | - | | |
| A/V Systems: | - | | |
| Comments: | Lighting shall be arranged to enable dimming at media presentation wall (end wall relative to conference table) | | |

NOTES

| | | | | | | | |
|------------|----------------------------------|--|--|--|--|--------------|----|
| Building | Moodie LMSF Maintenance Building | | | | | | |
| Room Name: | Facility Maintenance Shop | | | | | Room Number: | NA |

ARCHITECTURAL

Function: Workshop and Storage Net Area: 20 m2 Number of Occupants: 3
Fire Rating: NA Barrier Free: Yes

ROOM CHARACTERISTICS

Sound Control: Standard Special Ceiling Conditions:
STC Rating: 45 Special Floor Conditions
Other: - Special Wall Conditions :

ROOM FINISHES

Floor: SC Base: RB Wall: PT, 1220mm painted 19mm plywood
A/C exterior grade all walls or other impact resistant material of similar performance
Ceiling: NA Millwork:
Doors (Size): 1800x2100 to exterior and interior Type: Fire Rating: Hardware: Access Control
O/H Doors (Size): Type: - Fire Rating: - Hardware: -
Windows: - Frame: - Fire Rating: - Glazing: -
Wind Screens: - Frame: - Fire Rating: - Glazing: -
Security Barriers: - Frame: - Fire Rating: - Glazing: -

MILLWORK

Counter: - Matl: - Comment:
Shelving: - Matl: - Comment: -

FIXTURES: -

EQUIPMENT:

OTHER: Direct access to outside and interior

REMARKS: Lawn mowers, snow blowers, and other gas powered equipment to be stored in this room.

MECHANICAL

| | | | |
|----------------------------|------------------------|------------------|------------------------|
| HVAC system: | Standard office | Air Supply: | Standard Office |
| Min. # of air changes/hr.: | - | Air Exhaust: | Ceiling |
| LAVS: | - | Number: | - |
| Water Closet: | - | Number: | - |
| Urinal: | - | Number: | - |
| Drinking Fountain: | - | Room Thermostat: | No |
| Floor Drain: | | Drain Type: | - |
| Other: | | | |

Comments:

ELECTRICAL

| | | | |
|------------------------------|---|--------------------------------|--------------|
| Receptacles: | Minimum 10 120VAC/15A duplex outlets at 1000mm AFF for | | |
| Switches: | Low Voltage | - | Dimmer |
| | (Qty.): | | (Qty.): |
| | Other: | - | |
| Emergency Lighting Required: | All lighting on backup power (genset) | | |
| Lighting Type: | LED | Lighting Level (Lux): | 500 - |
| Communications: | Minimum 4 network data outlets | | |
| Fire Alarm to OBC3.2.4: | - | P.A. System Coverage Required: | Yes |
| T.V. Outlet | - | | |
| (Qty.): | | | |
| Telephone/Data Outlet (Qty.) | (1) Wall mounted | | |
| Security Requirements: | Provide access control hardware | | |
| A/V Systems: | - | | |

Comments: **Coordinate location of power/data outlets with RTG**

NOTES

| | | | | | | | |
|------------|----------------------------------|--|--|--|--|--------------|----|
| Building | Moodie LMSF Maintenance Building | | | | | | |
| Room Name: | First Aid | | | | | Room Number: | NA |

ARCHITECTURAL

Function: Storage of First Aid Materials Net Area: 8 m2 Number of Occupants: NA
Fire Rating: NA Barrier Free: Yes

ROOM CHARACTERISTICS

Sound Control: Standard Special Ceiling
STC Rating: 45 Conditions:
Other: - Special Floor
Special Wall Conditions :

ROOM FINISHES

Floor: VCT Base: RB Wall: PT
Ceiling: LAT Millwork:
Doors (Size): 900x2100 Type: Fire Rating: Hardware: Latch
O/H Doors Type: - Fire Rating: - Hardware: -
(Size):
Windows: - Frame: - Fire Rating: - Glazing: -
Wind Screens: - Frame: - Fire Rating: - Glazing: -
Security Barriers: - Frame: - Fire Rating: - Glazing: -

MILLWORK

Counter: - Matl: - Comment:
Shelving: - Matl: - Comment: -

FIXTURES: -

EQUIPMENT:

OTHER:

REMARKS:

MECHANICAL

| | | | |
|----------------------------|------------------------|------------------|---------------------------------|
| HVAC system: | Standard office | Air Supply: | Standard Office, Ceiling |
| Min. # of air changes/hr.: | - | Air Exhaust: | Ceiling |
| LAVS: | - | Number: | - |
| Water Closet: | - | Number: | - |
| Urinal: | - | Number: | - |
| Drinking Fountain: | - | Room Thermostat: | No |
| Floor Drain: | | Drain Type: | - |
| Other: | | | |

Comments:

ELECTRICAL

| | | | |
|------------------------------|--|--------------------------------|--------------|
| Receptacles: | Minimum four outlets at workstation | | |
| Switches: | Low Voltage | - | Dimmer |
| | (Qty.): | | (Qty.): |
| | Other: | - | |
| Emergency Lighting Required: | All lighting on backup power (genset) | | |
| Lighting Type: | LED | Lighting Level (Lux): | 200 - |
| Communications: | | | |
| Fire Alarm to OBC3.2.4: | - | P.A. System Coverage Required: | Yes |
| T.V. Outlet (Qty.): | Wall mounted | | |
| Telephone/Data Outlet (Qty.) | 1 | | |
| Security Requirements: | | | |
| A/V Systems: | - | | |
| Comments: | - | | |

NOTES

| | | | | | | | |
|------------|----------------------------------|--|--|--|--|--------------|----|
| Building | Moodie LMSF Maintenance Building | | | | | | |
| Room Name: | Storage | | | | | Room Number: | NA |

ARCHITECTURAL

Function: Storage of Office Materials Net Area: 8.6 m2 Number of Occupants: NA
Fire Rating: NA Barrier Free: Yes

ROOM CHARACTERISTICS

Sound Control: Standard Special Ceiling Conditions:
STC Rating: 45 Special Floor Conditions
Other: - Special Wall Conditions :

ROOM FINISHES

Floor: VCT Base: RB Wall: PT
Ceiling: LAT Millwork:
Doors (Size): 900x2100 Type: Fire Rating: Hardware: Access Control
O/H Doors (Size): Type: - Fire Rating: - Hardware: -
Windows: - Frame: - Fire Rating: - Glazing: -
Wind Screens: - Frame: - Fire Rating: - Glazing: -
Security Barriers: - Frame: - Fire Rating: - Glazing: -

MILLWORK

Counter: - Matl: - Comment:
Shelving: - Matl: - Comment: -

FIXTURES: -

EQUIPMENT:

OTHER:

REMARKS:

MECHANICAL

HVAC system: **Standard office** Air Supply: **Standard Office, Ceiling**
 Min. # of air changes/hr.: - Air Exhaust: **Ceiling**

LAVS: - Number: - Fixture: -
 Water Closet: - Number: - Fixture: -
 Urinal: - Number: - Fixture: -

Drinking - Room Thermostat: **No**
 Fountain: -
 Floor Drain: Drain Type: -

Other:

Comments:

ELECTRICAL

Receptacles: **Minimum four outlets at workstation**

Switches: Low Voltage - Dimmer -
 (Qty.): (Qty.):
 Other: -

Emergency Lighting Required: **All lighting on backup power (genset)**
 Lighting Type: **LED** Lighting Level (Lux): **300 -**

Communications:
 Fire Alarm to OBC3.2.4: - P.A. System Coverage **Yes**
 Required:

T.V. Outlet **Wall mounted**
 (Qty.):
 Telephone/Data Outlet (Qty.) **Standard**
 Security Requirements: **Provide access control hardware**
 A/V Systems: -

Comments: -

NOTES

| | | | | | | | |
|----------|----------------------------------|--|--|--|--|--|--|
| Building | Moodie LMSF Maintenance Building | | | | | | |
|----------|----------------------------------|--|--|--|--|--|--|

CAN_DMS: \132040802\1

| | | | | | | | |
|------------|-------------|--|--|--|--|--------------|----|
| Room Name: | Open Office | | | | | Room Number: | NA |
|------------|-------------|--|--|--|--|--------------|----|

ARCHITECTURAL

Function: RTG Open Office Net Area: 50 m2 Number of Occupants: 6
Fire Rating: NA Barrier Free: Yes

ROOM CHARACTERISTICS

Sound Control: Standard Special Ceiling Conditions:
STC Rating: 45 Special Floor Conditions
Other: - Special Wall Conditions :

ROOM FINISHES

Floor: VCT Base: RB Wall: PT
Ceiling: LAT Millwork:
Doors (Size): 900x2100 Type: Fire Rating: Hardware: Access Control
O/H Doors (Size): Type: - Fire Rating: - Hardware: -
Windows: Required Frame: - Fire Rating: - Glazing: -
Wind Screens: - Frame: - Fire Rating: - Glazing: -
Security Barriers: - Frame: - Fire Rating: - Glazing: -

MILLWORK

Counter: - Matl: - Comment:
Shelving: - Matl: - Comment: -

FIXTURES: (6) 5m2 office cubicles with “L” shaped work surfaces, (2) two-drawer pedestals, full upper cabinets with under cabinet lighting; 1 task chair per cubicle; 1 data and 4 duplex power connections below counter, integral with system furniture. 1370mm partition on open side and 1780 elsewhere.

Data and power connection for office copier/printer

EQUIPMENT:

OTHER:

REMARKS: In suite with Supervisor's Office.

MECHANICAL

| | | | |
|----------------------------|------------------------|------------------|---------------------------------|
| HVAC system: | Standard office | Air Supply: | Standard Office, Ceiling |
| Min. # of air changes/hr.: | - | Air Exhaust: | Ceiling |
| LAVS: | - | Number: | - |
| Water Closet: | - | Number: | - |
| Urinal: | - | Number: | - |
| Drinking Fountain: | - | Room Thermostat: | Yes |
| Floor Drain: | - | Drain Type: | - |
| Other: | | | |

Comments:

ELECTRICAL

| | | | |
|-------------------------------|--|--------------------------------|--------------|
| Receptacles: | Minimum four outlets at workstation | Dimmer | Yes |
| Switches: | Low Voltage - | (Qty.): | |
| | (Qty.): | | |
| | Other: - | | |
| Emergency Lighting Required: | All lighting on backup power (genset) | | |
| Lighting Type: | LED | Lighting Level (Lux): | 500 - |
| Communications: | | | |
| Fire Alarm to OBC3.2.4: | - | P.A. System Coverage Required: | Yes |
| T.V. Outlet (Qty.): | - | | |
| Telephone/Data Outlet (Qty.): | Standard plus data and power for each cubicle | | |
| Security Requirements: | Access Control | | |
| A/V Systems: | - | | |
| Comments: | - | | |

NOTES

| | | | | | | | |
|------------|----------------------------------|--|--|--|--|--------------|----|
| Building | Moodie LMSF Maintenance Building | | | | | | |
| Room Name: | Quiet Room | | | | | Room Number: | NA |

ARCHITECTURAL

Function: Quiet Room for RTG Net Area: 8 m2 Number of Occupants: 2
Fire Rating: NA Barrier Free: Yes

ROOM CHARACTERISTICS

Sound Control: Standard Special Ceiling
Conditions:
STC Rating: 45 Special Floor
Conditions
Other: - Special Wall Conditions :

ROOM FINISHES

Floor: CPT Base: RB Wall: PT
Ceiling: LAT Millwork:
Doors (Size): 900x2100 Type: Fire Rating: Hardware: Latch
O/H Doors Type: - Fire Rating: - Hardware: -
(Size):
Windows: - Frame: - Fire Rating: - Glazing: -
Wind Screens: - Frame: - Fire Rating: - Glazing: -
Security Barriers: - Frame: - Fire Rating: - Glazing: -

MILLWORK

Counter: - Matl: - Comment:
Shelving: - Matl: - Comment: -

FIXTURES: -

EQUIPMENT:

OTHER:

REMARKS:

MECHANICAL

| | | | |
|----------------------------|------------------------|------------------|---------------------------------|
| HVAC system: | Standard office | Air Supply: | Standard Office, Ceiling |
| Min. # of air changes/hr.: | - | Air Exhaust: | Ceiling |
| LAVS: | - | Number: | - |
| Water Closet: | - | Number: | - |
| Urinal: | - | Number: | - |
| Drinking Fountain: | - | Room Thermostat: | Yes |
| Floor Drain: | - | Drain Type: | - |
| Other: | | | |

Comments:

ELECTRICAL

| | | | |
|------------------------------|--|--------------------------------|--------------|
| Receptacles: | Minimum four outlets | Dimmer | Yes |
| Switches: | Low Voltage - | (Qty.): | |
| | (Qty.): | | |
| | Other: - | | |
| Emergency Lighting Required: | All lighting on backup power (genset) | | |
| Lighting Type: | LED | Lighting Level (Lux): | 500 - |
| Communications: | | | |
| Fire Alarm to OBC3.2.4: | - | P.A. System Coverage Required: | Yes |
| T.V. Outlet (Qty.): | - | | |
| Telephone/Data Outlet (Qty.) | 2 | | |
| Security Requirements: | - | | |
| A/V Systems: | - | | |
| Comments: | - | | |

NOTES

| | | | | | | | |
|------------|----------------------------------|--|--|--|--|--------------|----|
| Building | Moodie LMSF Maintenance Building | | | | | | |
| Room Name: | RTG Server Room | | | | | Room Number: | NA |

ARCHITECTURAL

Function: RTG Computer Equip. Net Area: 8.6 m2 Number of Occupants: 1
Fire Rating: 1-hr Barrier Free: Yes

ROOM CHARACTERISTICS

Sound Control: Standard Special Ceiling Conditions:
STC Rating: 55 Special Floor Antistatic floor
Other: - Special Wall Conditions :

ROOM FINISHES

Floor: RAF Base: RB Wall: PT/minimum 10m² comm. backboard
Ceiling: LAT Millwork:
Doors (Size): 900x2100 Type: Fire Rating: 20 Hardware: Access Control
O/H Doors Type: - Fire Rating: - Hardware: -
(Size):
Windows: Frame: - Fire Rating: - Glazing: -
Wind Screens: - Frame: - Fire Rating: - Glazing: -
Security Barriers: - Frame: - Fire Rating: - Glazing: -

MILLWORK

Counter: - Matl: Comment:
Shelving: - Matl: Comment:

FIXTURES: -

EQUIPMENT: Assume two standard, full height server racks; must be accessible front and back

OTHER: -

REMARKS: -

MECHANICAL

| | | | | |
|----------------------------|--|---------|------------------|-----------------------------------|
| HVAC system: | 3x Redundant Data Center Type | | Air Supply: | Below floor (see comments) |
| Min. # of air changes/hr.: | - | | Air Exhaust: | Ceiling |
| LAVS: | - | Number: | - | Fixture: |
| Water Closet: | - | Number: | - | Fixture: |
| Urinal: | - | Number: | - | Fixture: |
| Drinking Fountain: | - | | Room Thermostat: | - |
| Floor Drain: | | | Drain Type: | - |
| Other: | Provide clean agent and pre-action fire sprinkler system. | | | |

Comments: **Provide minimum 3-tons HVAC. System shall be on emergency backup power (genset). Volume shall be controllable at each diffuser.**

ELECTRICAL

| | | | |
|-------------------------------|--|--------------------------------|--------------|
| Receptacles: | On emergency backup power | | |
| Switches: | Low Voltage | - | Dimmer |
| | (Qty.): | | (Qty.): |
| | Other: | - | |
| Emergency Lighting Required: | All lighting on backup power (genset) and UPS | | |
| Lighting Type: | LED | Lighting Level (Lux): | 500 - |
| Communications: | Tie to OC Transpo [REDACTED] | | |
| Fire Alarm to OBC3.2.4: | - | P.A. System Coverage Required: | Yes |
| T.V. Outlet (Qty.): | - | | |
| Telephone/Data Outlet (Qty.): | 1 | | |
| Security Requirements: | Provide access control hardware | | |
| A/V Systems: | - | | |
| Comments: | Fire stop all conduit | | |

NOTES

RFP: Request for Quotation

CAN_DMS: \132040802\1

OESC: Ontario Electrical Safe Code

| | | | | | | | |
|------------|----------------------------------|--|--|--|--|--------------|----|
| Building | Moodie LMSF Maintenance Building | | | | | | |
| Room Name: | Storage | | | | | Room Number: | NA |

ARCHITECTURAL

Function: Storage Net Area: 20 m2 Number of Occupants: NA
Fire Rating: NA Barrier Free: Yes

ROOM CHARACTERISTICS

Sound Control: Standard Special Ceiling Conditions:
STC Rating: 45 Special Floor Conditions
Other: - Special Wall Conditions :

ROOM FINISHES

Floor: VCT Base: RB Wall: PT
Ceiling: LAT Millwork:
Doors (Size): 900x2100 Type: Fire Rating: Hardware: Access Control
O/H Doors (Size): Type: - Fire Rating: - Hardware: -
Windows: - Frame: - Fire Rating: - Glazing: -
Wind Screens: - Frame: - Fire Rating: - Glazing: -
Security Barriers: - Frame: - Fire Rating: - Glazing: -

MILLWORK

Counter: - Matl: - Comment:
Shelving: - Matl: - Comment: -

FIXTURES: -

EQUIPMENT:

OTHER: Heavy duty industrial shelving, min 500 kg/m²; 600mm deep, min. 100 lm; brace at floor and floor deck above

REMARKS:

MECHANICAL

HVAC system: **Standard office** Air Supply: **Standard Office, Ceiling**
 Min. # of air changes/hr.: - Air Exhaust: **Ceiling**

LAVS: - Number: - Fixture: -
 Water Closet: - Number: - Fixture: -
 Urinal: - Number: - Fixture: -

Drinking - Room Thermostat: **No**
 Fountain: -
 Floor Drain: Drain Type: -

Other:

Comments:

ELECTRICAL

Receptacles: **Minimum four outlets at workstation**

Switches: Low Voltage - Dimmer -
 (Qty.): (Qty.):
 Other: -

Emergency Lighting Required: **All lighting on backup power (genset)**
 Lighting Type: **LED** Lighting Level (Lux): **300 -**

Communications:
 Fire Alarm to OBC3.2.4: - P.A. System Coverage **Yes**
 Required:

T.V. Outlet -
 (Qty.):
 Telephone/Data Outlet (Qty.) **1 wall mounted**
 Security Requirements: **Provide access control hardware**
 A/V Systems: -

Comments: -

NOTES

| | | | | | | | |
|----------|----------------------------------|--|--|--|--|--|--|
| Building | Moodie LMSF Maintenance Building | | | | | | |
|----------|----------------------------------|--|--|--|--|--|--|

CAN_DMS: \132040802\1

| | | | | | | | |
|------------|--------|--|--|--|--|--------------|----|
| Room Name: | Office | | | | | Room Number: | NA |
|------------|--------|--|--|--|--|--------------|----|

ARCHITECTURAL

Function: Supervisor Office Net Area: 19 m2 Number of Occupants: 1
Fire Rating: NA Barrier Free: Yes

ROOM CHARACTERISTICS

Sound Control: Standard Special Ceiling Conditions:
STC Rating: 45 Special Floor Conditions
Other: - Special Wall Conditions :

ROOM FINISHES

Floor: CPT Base: RB Wall: PT
Ceiling: LAT Millwork:
Doors (Size): 900x2100 Type: Fire Rating: Hardware: Lock
O/H Doors Type: - Fire Rating: - Hardware: -
(Size):
Windows: Preferred Frame: - Fire Rating: - Glazing: -
Wind Screens: - Frame: - Fire Rating: - Glazing: -
Security Barriers: - Frame: - Fire Rating: - Glazing: -

MILLWORK

Counter: - Matl: - Comment:
Shelving: - Matl: - Comment: -

FIXTURES: -

EQUIPMENT:

OTHER:

REMARKS: All Project Co communications systems shall be accessible from this room. Provide desk, credenza, book shelving, task chair, and two guest chairs. View of shop preferred.

MECHANICAL

CAN_DMS: \132040802\1

| | | | |
|----------------------------|------------------------|------------------|---------------------------------|
| HVAC system: | Standard office | Air Supply: | Standard Office, Ceiling |
| Min. # of air changes/hr.: | - | Air Exhaust: | Ceiling |
| LAVS: | - | Number: | - |
| Water Closet: | - | Number: | - |
| Urinal: | - | Number: | - |
| Drinking Fountain: | - | Room Thermostat: | Yes |
| Floor Drain: | | Drain Type: | - |
| Other: | | | |

Comments:

ELECTRICAL

| | | | |
|------------------------------|--|--------------------------------|------------------------------|
| Receptacles: | Minimum four outlets at workstation | | |
| Switches: | Low Voltage - | Dimmer | - |
| | (Qty.): | (Qty.): | |
| | Other: - | | |
| Emergency Lighting Required: | All lighting on backup power (genset) | | |
| Lighting Type: | LED | Lighting Level (Lux): | 500 - |
| Communications: | Minimum 4 network data outlets | | |
| Fire Alarm to OBC3.2.4: | - | P.A. System Coverage Required: | Via phone system only |
| T.V. Outlet | Wall mounted | | |
| (Qty.): | | | |
| Telephone/Data Outlet (Qty.) | Standard | | |
| Security Requirements: | Provide access control hardware | | |
| A/V Systems: | - | | |
| Comments: | - | | |

NOTES

| | | | | | | | |
|------------|------------------------------------|--|--|--|--|--------------|----|
| Building | Moodie LMSF Maintenance Building | | | | | | |
| Room Name: | Typical Multiple-Occupant Washroom | | | | | Room Number: | NA |

ARCHITECTURAL

Function: Wash/Locker/Shower Room Net Area: 45 m2 Number of Occupants: Varies
Fire Rating: NA Barrier Free: Yes

ROOM CHARACTERISTICS

Sound Control: Standard Special Ceiling Conditions:
STC Rating: 55 Special Floor Conditions
Other: - Special Wall Conditions :

ROOM FINISHES

Floor: PCT Base: CT Wall: PT/1220mm CT Wainscot
Ceiling: LAT Millwork:
Doors (Size): 900x2100 Type: SC Fire Rating: Varies Hardware: Class/Self Closing
O/H Doors (Size): Type: - Fire Rating: - Hardware: -
Windows: Frame: - Fire Rating: - Glazing: -
Wind Screens: - Frame: - Fire Rating: - Glazing: -
Security Barriers: - Frame: - Fire Rating: - Glazing: -

MILLWORK

Counter: - Matl: Comment:
Shelving: Minimum 150 x450 (mm) Matl: SS Comment: Above urinals, water closets, lavatories

FIXTURES: As required by code but not less than one urinal and one toilet per men's washroom and two toilets per women's wash room. Washrooms shall have not less than two lavatories. Provide stainless steel shelving above all fixtures

Stainless steel washroom accessories:

- Toilet stalls (each): recessed or semi recessed toilet tissue dispenser, two roll; seat cover dispenser, accessibility accessories as required;
- Lavatories (for every two, but not less than one each): recessed or semi-recessed C-fold paper towel dispensers and waste receptacle;
- Other: electric high velocity hand drier
- Shower stall (each): mirror, wooden bench with stainless steel legs two clothes hooks

EQUIPMENT: Furnish painted metal lockers including those as required for accessibility. Provide a minimum of 12 lockers for women and 24 men Provide benches where required for accessibility. Lockers shall be 305mm x 610mm, with sloped tops and 150mm high based faced in tile matching floor finish. Locker rooms shall be sized to accommodate the maximum number of lockers required for ultimate system capacity or the design shall provide for contiguous enlargement of the locker room in a logical fashion that does not disrupt other necessary facility functions

OTHER: Shower rooms shall be provided in the main wash rooms/locker rooms serving RTG maintenance crews. Floors shall be PCT, walls full height CT. Showers shall be individual occupancy with a lockable door and may be accessed independently from wash rooms.

Provide niche for clean linen (uniform) delivery storage and dirty linen disposal bins

REMARKS: Provide one men's and one women's wash/shower/locker room

MECHANICAL

HVAC system: - Air Supply: -

Min. # of air changes/hr.: - Air Exhaust: -

LAVS: **Yes** Number: **Min. Per Code** Fixture: -

Water Closet: **Yes** Number: **Min. Per Code** Fixture: -

Urinal: **Yes** Number: **-Min. Per Code** Fixture: -

Drinking - Room Thermostat: **No**

Fountain:

Floor Drain: **1 per every 25m² or portion thereof** Drain Type: -

Other:

Comments: Shower rooms shall have 100% exhaust air

ELECTRICAL

Receptacles: **1 per lavatory and shower stall**

Switches: Low Voltage - Dimmer -

(Qty.): (Qty.):

Other: -

Emergency Lighting Required:

Lighting Type: **LED** Lighting Level (Lux): **200** -

CAN_DMS: \132040802\1

| | | | |
|------------------------------|---|-----------------------------------|------------|
| Communications: | - | | |
| Fire Alarm to OBC3.2.4: | - | P.A. System Coverage Required: | Yes |
| T.V. Outlet (Qty.): | - | | |
| Telephone/Data Outlet (Qty.) | - | | |
| Security Requirements: | - | | |
| A/V Systems: | - | | |
| Comments: | - | | |

NOTES

RFP: Request for Quotation

OESC: Ontario Electrical Safe Code

| | | | | | | | |
|-----------------------------|----------------------------------|--|--|--|--|--------------|----|
| Moodie LMSF Office Building | Moodie LMSF Maintenance Building | | | | | | |
| Room Name: | Typical Single Occupant Washroom | | | | | Room Number: | NA |

ARCHITECTURAL

Function: Washroom Net Area: 6 m2 Number of Occupants: NA
Fire Rating: NA Barrier Free: Yes

ROOM CHARACTERISTICS

Sound Control: Standard Special Ceiling Conditions:
STC Rating: 55 Special Floor Conditions
Other: - Special Wall Conditions :

ROOM FINISHES

Floor: PCT Base: CT Wall: PT/1220mm CT Wainscot
Ceiling: LAT Millwork:
Doors (Size): 900x2100 Type: SC Fire Rating: Varies Hardware: Access Control; Self-Closing
O/H Doors (Size): Type: - Fire Rating: - Hardware: -
Windows: Frame: - Fire Rating: - Glazing: -
Wind Screens: - Frame: - Fire Rating: - Glazing: -
Security Barriers: - Frame: - Fire Rating: - Glazing: -

MILLWORK

Counter: - Matl: Comment:
Shelving: Minimum 150 x450 (mm) Matl: SS Comment: Above urinals, water closets, lavatories

FIXTURES: One lavatory and one toilet per wash room

Stainless steel washroom accessories:

- Recessed or semi recessed toilet tissue dispenser, two roll; seat cover dispenser, accessibility accessories as required;
- Recessed or semi-recessed C-fold paper towel dispensers and waste receptacle;
- Other: electric high velocity hand drier

EQUIPMENT: -

OTHER:

REMARKS: .

MECHANICAL

| | | | |
|----------------------------|---|------------------|-----------------------|
| HVAC system: | - | Air Supply: | - |
| Min. # of air changes/hr.: | - | Air Exhaust: | - |
| LAVS: | Yes | Number: | Min. Per Code |
| Water Closet: | Yes | Number: | Min. Per Code |
| Urinal: | No | Number: | -Min. Per Code |
| Drinking Fountain: | - | Room Thermostat: | - |
| Floor Drain: | 1 per every 25m² or portion thereof | Drain Type: | - |
| Other: | | | |

Comments: -

ELECTRICAL

| | | | |
|------------------------------|-----------------------|--------------------------------|--------------|
| Receptacles: | 1 per lavatory | Dimmer (Qty.): | - |
| Switches: | Low Voltage | | |
| | (Qty.): | | |
| | Other: | | |
| Emergency Lighting Required: | | Lighting Level (Lux): | 200 - |
| Lighting Type: | LED | | |
| | - | | |
| Communications: | | P.A. System Coverage Required: | Yes |
| Fire Alarm to OBC3.2.4: | - | | |
| T.V. Outlet (Qty.): | - | | |

CAN_DMS: \132040802\1

Telephone/Data Outlet (Qty.) -
Security Requirements: -
A/V Systems: -

Comments: -

NOTES

RFP: Request for Quotation
OESC: Ontario Electrical Safe Code

| | | | | | | | |
|------------|----------------------------------|--|--|--|--|--------------|----|
| Building | Moodie LMSF Maintenance Building | | | | | | |
| Room Name: | Vehicle Maintenance Shop | | | | | Room Number: | NA |

ARCHITECTURAL

Function: Workshop and Storage Net Area: 30 m2 Number of Occupants: 4
Fire Rating: NA Barrier Free: Yes

ROOM CHARACTERISTICS

Sound Control: Standard Special Ceiling
Conditions:
STC Rating: 45 Special Floor
Conditions
Other: - Special Wall Conditions :

ROOM FINISHES

Floor: SC Base: RB Wall: PT, 1220mm painted 19mm plywood
A/C exterior grade all walls or other
impact resistant material of similar
performance
Ceiling: NA Millwork:
Doors (Size): 1800x2100 Type: Fire Rating: Hardware: Access
Control
O/H Doors Type: - Fire Rating: - Hardware: -
(Size):
Windows: - Frame: - Fire Rating: - Glazing: -
Wind Screens: - Frame: - Fire Rating: - Glazing: -
Security Barriers: - Frame: - Fire Rating: - Glazing: -

MILLWORK

Counter: - Matl: - Comment:
Shelving: - Matl: - Comment: -

FIXTURES: -

EQUIPMENT:

OTHER: First floor, direct access to main shop

REMARKS:

MECHANICAL

| | | | |
|----------------------------|------------------------|------------------|------------------------|
| HVAC system: | Standard office | Air Supply: | Standard Office |
| Min. # of air changes/hr.: | - | Air Exhaust: | Ceiling |
| LAVS: | - | Number: | - |
| Water Closet: | - | Number: | - |
| Urinal: | - | Number: | - |
| Drinking Fountain: | - | Room Thermostat: | No |
| Floor Drain: | - | Drain Type: | - |
| Other: | | | |

Comments:

ELECTRICAL

| | | | |
|------------------------------|---|--------------------------------|--------------|
| Receptacles: | Minimum 10 120VAC/15A duplex outlets at 1000mm AFF | | |
| Switches: | Low Voltage | - | Dimmer |
| | (Qty.): | | (Qty.): |
| | Other: | - | |
| Emergency Lighting Required: | All lighting on backup power (genset) | | |
| Lighting Type: | LED | Lighting Level (Lux): | 500 - |
| Communications: | Minimum 4 network data outlets | | |
| Fire Alarm to OBC3.2.4: | - | P.A. System Coverage Required: | Yes |
| T.V. Outlet | - | | |
| (Qty.): | | | |
| Telephone/Data Outlet (Qty.) | (1) Wall mounted | | |
| Security Requirements: | Provide access control hardware | | |
| A/V Systems: | - | | |

Comments: **Coordinate location of power/data outlets with RTG**

NOTES

| | | | | | | | |
|------------|----------------------------------|--|--|--|--|--------------|----|
| Building | Moodie LMSF Maintenance Building | | | | | | |
| Room Name: | Phase 1 Shop Storage | | | | | Room Number: | NA |

ARCHITECTURAL

Function: Storage Net Area: 90 m² Number of Occupants: NA
Fire Rating: NA Barrier Free: Yes

ROOM CHARACTERISTICS

Sound Control: Standard Special Ceiling Conditions:
STC Rating: 45 Special Floor Conditions
Other: - Special Wall Conditions :

ROOM FINISHES

Floor: SC Base: Wall: PT
Ceiling: NA Millwork:
Doors (Size): 900x2100 Type: Fire Rating: Hardware: Access Control
O/H Doors (Size): Type: - Fire Rating: - Hardware: -
Windows: - Frame: - Fire Rating: - Glazing: -
Wind Screens: - Frame: - Fire Rating: - Glazing: -
Security Barriers: - Frame: - Fire Rating: - Glazing: -

MILLWORK

Counter: - Matl: - Comment:
Shelving: - Matl: - Comment: -

FIXTURES: -

EQUIPMENT:

OTHER: Heavy duty pallet rack shelving, min 500 kg/m²; 600mm deep, min. 200 lm; brace at floor and floor deck above

REMARKS:

MECHANICAL

| | | | | |
|----------------------------|----------------------------------|---------|------------------|---------------------------------|
| HVAC system: | Heat and ventilation only | | Air Supply: | Standard Office, Ceiling |
| Min. # of air changes/hr.: | - | | Air Exhaust: | Ceiling |
| LAVS: | - | Number: | - | Fixture: |
| Water Closet: | - | Number: | - | Fixture: |
| Urinal: | - | Number: | - | Fixture: |
| Drinking Fountain: | - | | Room Thermostat: | No |
| Floor Drain: | | | Drain Type: | - |
| Other: | | | | |

Comments:

ELECTRICAL

| | | | | |
|-------------------------------|---|--------------------------------|------------|---|
| Receptacles: | Minimum four outlets at workstation; every 6,000mm along walls | | | |
| Switches: | Low Voltage | - | Dimmer | - |
| | (Qty.): | | (Qty.): | |
| | Other: | - | | |
| Emergency Lighting Required: | All lighting on backup power (genset) | | | |
| Lighting Type: | LED | Lighting Level (Lux): | 300 | - |
| Communications: | | | | |
| Fire Alarm to OBC3.2.4: | - | P.A. System Coverage Required: | Yes | |
| T.V. Outlet (Qty.): | - | | | |
| Telephone/Data Outlet (Qty.): | 1 wall mounted | | | |
| Security Requirements: | Provide access control hardware | | | |
| A/V Systems: | - | | | |
| Comments: | - | | | |

NOTES

| | | | | | | | |
|------------|----------------------------------|--|--|--|--|--------------|----|
| Building | Moodie LMSF Maintenance Building | | | | | | |
| Room Name: | Phase 2 & 3 Shop Storage | | | | | Room Number: | NA |

ARCHITECTURAL

Function: Storage Net Area: 300 m² Number of Occupants: NA
Fire Rating: NA Barrier Free: Yes

ROOM CHARACTERISTICS

Sound Control: Standard Special Ceiling Conditions:
STC Rating: 45 Special Floor Conditions
Other: - Special Wall Conditions :

ROOM FINISHES

Floor: SC Base: Wall: PT
Ceiling: NA Millwork:
Doors (Size): 900x2100 Type: Fire Rating: Hardware: Access Control
O/H Doors 3660x3660 Type: - Fire Rating: - Hardware: -
(Size): min.
Windows: - Frame: - Fire Rating: - Glazing: -
Wind Screens: - Frame: - Fire Rating: - Glazing: -
Security Barriers: - Frame: - Fire Rating: - Glazing: -

MILLWORK

Counter: - Matl: - Comment:
Shelving: - Matl: - Comment: -

FIXTURES: -

EQUIPMENT:

OTHER: Heavy duty industrial pallet rack shelving, min 500 kg/m²; 600mm deep, min. 400 lm; brace at floor and floor deck above

REMARKS: Provide 200m² storage on ground floor and 100m² on mezzanine; mezzanine shall be accessible with monorail crane from adjacent light maintenance track.

MECHANICAL

| | | | | |
|----------------------------|----------------------------------|---------|------------------|---------------------------------|
| HVAC system: | Heat and ventilation only | | Air Supply: | Standard Office, Ceiling |
| Min. # of air changes/hr.: | - | | Air Exhaust: | Ceiling |
| LAVS: | - | Number: | - | Fixture: |
| Water Closet: | - | Number: | - | Fixture: |
| Urinal: | - | Number: | - | Fixture: |
| Drinking Fountain: | - | | Room Thermostat: | No |
| Floor Drain: | | | Drain Type: | - |
| Other: | | | | |

Comments:

ELECTRICAL

| | | | | |
|-------------------------------|---|--------------------------------|------------|---|
| Receptacles: | Minimum four outlets at workstation; every 6,000mm along walls | | | |
| Switches: | Low Voltage | - | Dimmer | - |
| | (Qty.): | | (Qty.): | |
| | Other: | - | | |
| Emergency Lighting Required: | All lighting on backup power (genset) | | | |
| Lighting Type: | LED | Lighting Level (Lux): | 300 | - |
| Communications: | | | | |
| Fire Alarm to OBC3.2.4: | - | P.A. System Coverage Required: | Yes | |
| T.V. Outlet (Qty.): | - | | | |
| Telephone/Data Outlet (Qty.): | 1 wall mounted | | | |
| Security Requirements: | Provide access control hardware | | | |
| A/V Systems: | - | | | |
| Comments: | - | | | |

NOTES

| | | | | | | | |
|-----------------------------|-----------------------------|--|--|--|--|--------------|----|
| Moodie LMSF Office Building | Moodie LMSF Office Building | | | | | | |
| Room Name: | Janitor's Closet | | | | | Room Number: | NA |

ARCHITECTURAL

Function: Janitor's Closet Net Area: 4 m2 Number of Occupants: NA
Fire Rating: NA Barrier Free: Yes

ROOM CHARACTERISTICS

Sound Control: Standard Special Ceiling Conditions:
STC Rating: 55 Special Floor Conditions
Other: - Special Wall Conditions :

ROOM FINISHES

Floor: PCT Base: CT Wall: PT/1220mm CT Wainscot
Ceiling: LAT Millwork:
Doors (Size): 900x2100 Type: SC Fire Rating: Varies Hardware: Access Control;
O/H Doors (Size): Type: - Fire Rating: - Hardware: -
Windows: Frame: - Fire Rating: - Glazing: -
Wind Screens: - Frame: - Fire Rating: - Glazing: -
Security Barriers: - Frame: - Fire Rating: - Glazing: -

MILLWORK

Counter: - Matl: Comment:
Shelving: Minimum 150 x450 (mm) Matl: SS Comment:

FIXTURES: One porcelain coated cast iron floor mounted janitorial sink, mop racks

EQUIPMENT: -

OTHER: -

REMARKS: .

MECHANICAL

HVAC system: - Air Supply: Undercut door
Min. # of air changes/hr.: - Air Exhaust: 100%

LAVS: Janitorial Number: Min. Per Code Fixture: -
Water Closet: No Number: Min. Per Code Fixture: -
Urinal: No Number: -Min. Per Code Fixture: -

Drinking - Room Thermostat: No
Fountain:
Floor Drain: 1 per every 25m² or portion thereof Drain Type: -

Other:

Comments: -

ELECTRICAL

Receptacles: 1 quad
Switches: Low Voltage - Dimmer -
(Qty.):
Other: - (Qty.):

Emergency Lighting Required:
Lighting Type: LED Lighting Level (Lux): 300 -
-

Communications:
Fire Alarm to OBC3.2.4: - P.A. System Coverage Required: Yes

T.V. Outlet -
(Qty.):
Telephone/Data Outlet (Qty.) -
Security Requirements: Access Control
A/V Systems: -

Comments: -

NOTES

RFP: Request for Quotation

OESC: Ontario Electrical Safe Code

| | | | | | | | |
|------------|----------------------------------|--|--|--|--|--------------|----|
| Building | Moodie LMSF Office Building | | | | | | |
| Room Name: | Operator's Locker/Break/Day Room | | | | | Room Number: | NA |

ARCHITECTURAL

Function: Waiting Room for Transportation Crews Net Area: 55 m2 Number of Occupants: 16
Fire Rating: NA Barrier Free: Yes

ROOM CHARACTERISTICS

Sound Control: Standard Special Ceiling Conditions:
STC Rating: 45 Special Floor Conditions
Other: - Special Wall Conditions :

ROOM FINISHES

Floor: VCT Base: RB Wall: PT
Ceiling: LAT Millwork:
Doors (Size): 900x2100 Type: Fire Rating: Per code Hardware: Latch
O/H Doors Type: - Fire Rating: - Hardware: -
(Size):
Windows: Provide daylighting Frame: - Fire Rating: - Glazing: -
Wind Screens: - Frame: - Fire Rating: - Glazing: -
Security Barriers: - Frame: - Fire Rating: - Glazing: -

MILLWORK

Counter: Kitchenette case work; Computer station Matl: HPL at computer; solid surface at kitchenette Comment:
Shelving: Single adjustable lowers two adjustable uppers Matl: HPL Comment:

FIXTURES: Furnish painted metal lockers including those as required for accessibility. Provide benches where required for accessibility. Lockers shall be size in accordance with the City of Ottawa Standards for Interior Design and shall be provided in sufficient number at each location for opening day of service needs.

Provide floor area, water, floor sink and electrical for not less than two vending machines

EQUIPMENT: Provide (1) 1220mm LCD monitor and connection to digital broadcast media (cable TV).

OTHER: Seating at table for not less than eight, with full room capacity of not less than 16. Provide minimum two computer workstations for crews, min. 900mm wide x 900mm deep work station (seated) with side vision screens (carrel set-up).

REMARKS: Network connectivity and power to be provided at workstations

MECHANICAL

| | | | |
|----------------------------|------------------------|------------------|---------------------------------|
| HVAC system: | Standard office | Air Supply: | Standard Office, Ceiling |
| Min. # of air changes/hr.: | - | Air Exhaust: | Ceiling |
| LAVS: | - | Number: | - |
| Water Closet: | - | Number: | - |
| Urinal: | - | Number: | - |
| Drinking Fountain: | - | Room Thermostat: | Yes |
| Floor Drain: | - | Drain Type: | - |
| Other: | | | |

Comments:

ELECTRICAL

| | | | |
|-------------------------------|--|--------------------------------|--------------|
| Receptacles: | Standard office, at ea. comp. station, and at counter | | |
| Switches: | Low Voltage | - | Dimmer |
| | (Qty.): | | (Qty.): |
| | Other: | - | |
| Emergency Lighting Required: | All lighting on backup power (genset) and UPS | | |
| Lighting Type: | LED | Lighting Level (Lux): | 200 - |
| Communications: | | | |
| Fire Alarm to OBC3.2.4: | - | P.A. System Coverage Required: | Yes |
| T.V. Outlet | Wall mounted | | |
| (Qty.): | | | |
| Telephone/Data Outlet (Qty.): | - Standard; 2 computer | | |
| Security Requirements: | - | | |

CAN_DMS: \132040802\1

A/V Systems: **See above**

Comments: -

NOTES

| | | | | | | | |
|------------|-----------------------------|--|--|--|--|--------------|----|
| Building | Moodie LMSF Office Building | | | | | | |
| Room Name: | Operator's Lunch Room | | | | | Room Number: | NA |

ARCHITECTURAL

Function: Lunch Room for Transportation Crews Net Area: 33 m2 Number of Occupants: 8
Fire Rating: NA Barrier Free: Yes

ROOM CHARACTERISTICS

Sound Control: Standard Special Ceiling Conditions:
STC Rating: 45 Special Floor Conditions
Other: - Special Wall Conditions :

ROOM FINISHES

Floor: VCT Base: RB Wall: PT
Ceiling: LAT Millwork:
Doors (Size): 900x2100 Type: Fire Rating: Per code Hardware: Latch
O/H Doors Type: - Fire Rating: - Hardware: -
(Size):
Windows: Provide daylighting Frame: - Fire Rating: - Glazing: -
Wind Screens: - Frame: - Fire Rating: - Glazing: -
Security Barriers: - Frame: - Fire Rating: - Glazing: -

MILLWORK

Counter: Kitchenette case work; Computer station
Shelving: Single adjustable lowers two adjustable uppers
Matl: solid surface
Matl: HPL
Comment:

FIXTURES: Provide casework with stainless steel kitchen sink with waste disposer, countertop space sufficient for coffee maker and microwave plus 100% linear open; full length overhead cabinets

Provide floor area, water, floor sink and electrical for not less than two vending machines

EQUIPMENT: Provide microwave, coffee maker, 480 litre frost free refrigerator-freezer

OTHER: Seating at table for not less than six, with full room capacity of not less than 8.

REMARKS:

MECHANICAL

| | | | |
|----------------------------|------------------------|------------------|---------------------------------|
| HVAC system: | Standard office | Air Supply: | Standard Office, Ceiling |
| Min. # of air changes/hr.: | - | Air Exhaust: | Ceiling |
| LAVS: | - | Number: | - |
| Water Closet: | - | Number: | - |
| Urinal: | - | Number: | - |
| Drinking Fountain: | - | Room Thermostat: | Yes |
| Floor Drain: | - | Drain Type: | - |
| Other: | | | |

Comments:

ELECTRICAL

| | | | |
|-------------------------------|--|--------------------------------|--------------|
| Receptacles: | Standard office and at counter | | |
| Switches: | Low Voltage - | Dimmer (Qty.): | - |
| | (Qty.): | | |
| | Other: - | | |
| Emergency Lighting Required: | All lighting on backup power (genset) and UPS | | |
| Lighting Type: | LED | Lighting Level (Lux): | 200 - |
| Communications: | | | |
| Fire Alarm to OBC3.2.4: | - | P.A. System Coverage Required: | Yes |
| T.V. Outlet (Qty.): | Wall mounted | | |
| Telephone/Data Outlet (Qty.): | - Standard | | |
| Security Requirements: | - | | |

CAN_DMS: \132040802\1

A/V Systems: **See above**

Comments: -

NOTES

| | | | | | | | |
|------------|-----------------------------|--|--|--|--|--------------|----|
| Building | Moodie LMSF Office Building | | | | | | |
| Room Name: | Open Office | | | | | Room Number: | NA |

ARCHITECTURAL

Function: OC Transpo Open Office Net Area: 50 m² Number of Occupants: 5
Fire Rating: NA Barrier Free: Yes

ROOM CHARACTERISTICS

Sound Control: Standard Special Ceiling Conditions:
STC Rating: 45 Special Floor Conditions
Other: - Special Wall Conditions :

ROOM FINISHES

Floor: VCT Base: RB Wall: PT
Ceiling: LAT Millwork:
Doors (Size): 900x2100 Type: Fire Rating: Hardware: Access Control
O/H Doors (Size): Type: - Fire Rating: - Hardware: -
Windows: Required Frame: - Fire Rating: - Glazing: -
Wind Screens: - Frame: - Fire Rating: - Glazing: -
Security Barriers: - Frame: - Fire Rating: - Glazing: -

MILLWORK

Counter: - Matl: - Comment:
Shelving: - Matl: - Comment: -

FIXTURES: (5) 7.5m² office cubicles with “L” shaped work surfaces, (2) two-drawer pedestals, full upper cabinets with under cabinet lighting; 1 task chair per cubicle; 1 data and 4 duplex power connections below counter, integral with system furniture. 1370mm partition on open side and 1780 elsewhere.

Data and power connection for office copier/printer

EQUIPMENT:

OTHER:

REMARKS: In suite with Supervisor's Office.

The Open Offices and the Operators' Day Room (aka Break Room) shall be immediately adjacent. One of the work stations in the Open Office Area shall have an operable (sliding) window into the Operators' Day Room to facilitate Dispatch of Drivers. Additionally a stainless steel cabinet with doors on either side of the wall, measuring in area approximately 0.42 metres square and 200mm deep, shall be provided for storage and charging of driver radios. Access control shall be provided on the Day Room side; locking is not required on the Open Office side. Stainless steel shelving and charging connections shall be provided for 24 radios.

MECHANICAL

| | | | |
|----------------------------|-----------------|------------------|--------------------------|
| HVAC system: | Standard office | Air Supply: | Standard Office, Ceiling |
| Min. # of air changes/hr.: | - | Air Exhaust: | Ceiling |
| LAVS: | - | Number: | - |
| Water Closet: | - | Number: | - |
| Urinal: | - | Number: | - |
| Drinking Fountain: | - | Room Thermostat: | Yes |
| Floor Drain: | - | Drain Type: | - |
| Other: | | | |

Comments:

ELECTRICAL

| | | | |
|-------------------------------|---|--------------------------------|-------|
| Receptacles: | Minimum four outlets at workstation | Dimmer (Qty.): | Yes |
| Switches: | Low Voltage (Qty.): | | |
| | Other: | | |
| Emergency Lighting Required: | All lighting on backup power (genset) | | |
| Lighting Type: | LED | Lighting Level (Lux): | 500 - |
| Communications: | | | |
| Fire Alarm to OBC3.2.4: | - | P.A. System Coverage Required: | Yes |
| T.V. Outlet (Qty.): | - | | |
| Telephone/Data Outlet (Qty.): | Standard plus data and power for each cubicle | | |
| Security Requirements: | Access Control | | |
| A/V Systems: | - | | |

CAN_DMS: \132040802\1

Comments: -

NOTES

| | | | | | | | |
|------------|-----------------------------|--|--|--|--|--------------|----|
| Building | Moodie LMSF Office Building | | | | | | |
| Room Name: | Transportation Quiet Room | | | | | Room Number: | NA |

ARCHITECTURAL

Function: Quite Room for OC Transpo Crew Net Area: 16 m2 Number of Occupants: 4
Fire Rating: NA Barrier Free: Yes

ROOM CHARACTERISTICS

Sound Control: Standard Special Ceiling Conditions:
STC Rating: 45 Special Floor Conditions
Other: - Special Wall Conditions :

ROOM FINISHES

Floor: CPT Base: RB Wall: PT
Ceiling: LAT Millwork:
Doors (Size): 900x2100 Type: Fire Rating: Hardware: Latch
O/H Doors Type: - Fire Rating: - Hardware: -
(Size):
Windows: - Frame: - Fire Rating: - Glazing: -
Wind Screens: - Frame: - Fire Rating: - Glazing: -
Security Barriers: - Frame: - Fire Rating: - Glazing: -

MILLWORK

Counter: - Matl: - Comment:
Shelving: - Matl: - Comment: -

FIXTURES: -

EQUIPMENT:

OTHER:

REMARKS:

MECHANICAL

| | | | |
|----------------------------|------------------------|------------------|---------------------------------|
| HVAC system: | Standard office | Air Supply: | Standard Office, Ceiling |
| Min. # of air changes/hr.: | - | Air Exhaust: | Ceiling |
| LAVS: | - | Number: | - |
| Water Closet: | - | Number: | - |
| Urinal: | - | Number: | - |
| Drinking Fountain: | - | Room Thermostat: | Yes |
| Floor Drain: | - | Drain Type: | - |
| Other: | | | |

Comments:

ELECTRICAL

| | | | |
|-------------------------------|---|--------------------------------|--------------|
| Receptacles: | Minimum four outlets at workstation | | |
| Switches: | Low Voltage - | Dimmer (Qty.): | Yes |
| | (Qty.): | | |
| | Other: - | | |
| Emergency Lighting Required: | All lighting on backup power (genset) and UPS | | |
| Lighting Type: | LED | Lighting Level (Lux): | 200 - |
| | Individually controlled task lighting to be provided at work station | | |
| Communications: | | | |
| Fire Alarm to OBC3.2.4: | - | P.A. System Coverage Required: | Yes |
| T.V. Outlet (Qty.): | - | | |
| Telephone/Data Outlet (Qty.): | Standard | | |
| Security Requirements: | - | | |
| A/V Systems: | - | | |
| Comments: | - | | |

NOTES

| | | | | | | | |
|------------|-----------------------------|--|--|--|--|--------------|----|
| Building | Moodie LMSF Office Building | | | | | | |
| Room Name: | OC Transpo Server | | | | | Room Number: | NA |

ARCHITECTURAL

Function: OC Transpo Computer Equip. Net Area: 60 m2 Number of Occupants: 1
Fire Rating: 1-hr Barrier Free: Yes

ROOM CHARACTERISTICS

Sound Control: Standard Special Ceiling Conditions:
STC Rating: 55 Special Floor Antistatic raised access floor
Other: - Special Wall Conditions :

ROOM FINISHES

Floor: RAF Base: RB Wall: PT/minimum 10m² comm. backboard
Ceiling: LAT Millwork:
Doors (Size): 900x2100 Type: Fire Rating: 20 Hardware: Access Control
O/H Doors (Size): Type: - Fire Rating: - Hardware: -
Windows: Frame: - Fire Rating: - Glazing: -
Wind Screens: - Frame: - Fire Rating: - Glazing: -
Security Barriers: - Frame: - Fire Rating: - Glazing: -

MILLWORK

Counter: - Matl: Comment:
Shelving: - Matl: Comment:

FIXTURES: -

EQUIPMENT: -

OTHER: -

REMARKS: Will serve as SER Room.

MECHANICAL

| | | | | |
|----------------------------|--|---------|------------------|-----------------------------------|
| HVAC system: | 3x Redundant Data Center Type | | Air Supply: | Below floor (see comments) |
| Min. # of air changes/hr.: | - | | Air Exhaust: | Ceiling |
| LAVS: | - | Number: | - | Fixture: |
| Water Closet: | - | Number: | - | Fixture: |
| Urinal: | - | Number: | - | Fixture: |
| Drinking Fountain: | - | | Room Thermostat: | - |
| Floor Drain: | | | Drain Type: | - |
| Other: | Provide clean agent and pre-action fire sprinkler system. | | | |

Comments: **Provide minimum 3-tons HVAC. System shall be on emergency backup power (genset). Volume shall be controllable at each diffuser.**

ELECTRICAL

| | | | |
|-------------------------------|--|--------------------------------|--------------|
| Receptacles: | Under floor, on emergency backup power | | |
| Switches: | Low Voltage | - | Dimmer |
| | (Qty.): | | (Qty.): |
| | Other: | - | |
| Emergency Lighting Required: | All lighting on backup power (genset) and UPS | | |
| Lighting Type: | LED | Lighting Level (Lux): | 200 - |
| Communications: | Tie to OC Transpo [REDACTED] | | |
| Fire Alarm to OBC3.2.4: | - | P.A. System Coverage Required: | Yes |
| T.V. Outlet (Qty.): | - | | |
| Telephone/Data Outlet (Qty.): | 1 | | |
| Security Requirements: | Provide access control hardware | | |
| A/V Systems: | - | | |
| Comments: | Fire stop all conduit | | |

NOTES

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OESC: Ontario Electrical Safe Code

| | | | | | | | |
|------------|-----------------------------|--|--|--|--|--------------|----|
| Building | Moodie LMSF Office Building | | | | | | |
| Room Name: | Storage | | | | | Room Number: | NA |

ARCHITECTURAL

Function: Storage area for OC Transpo Staff Net Area: 20 m2 Number of Occupants: -
Fire Rating: None Barrier Free: Yes

ROOM CHARACTERISTICS

Sound Control: Standard Special Ceiling Conditions:
STC Rating: 45 Special Floor Conditions
Other: - Special Wall Conditions Provide wall protection to 2m above finished floor, sufficient to resist damage from carts

ROOM FINISHES

Floor: ERC Base: FRP Wall: FRP to 2400mm AFF
Ceiling: PMC Millwork:
Doors (Size): 1800x2100 Type: Fire Rating: - Hardware: Access Control
O/H Doors (Size): Type: - Fire Rating: - Hardware: -
Windows: - Frame: - Fire Rating: - Glazing: -
Wind Screens: - Frame: - Fire Rating: - Glazing: -
Security Barriers: - Frame: - Fire Rating: - Glazing: -

MILLWORK

Counter: - Matl: Comment:
Shelving: Steel Adjustable Matl: Comment: Minimum 54m adjustable shelving (4 tiers) 610mm deep; 300 kg per 1000mm load capacity

FIXTURES: -

EQUIPMENT: Heavy duty industrial shelving, min 500 kg/m²; 600mm deep, min. 100 lm; brace at floor and floor deck above

OTHER: -

REMARKS:

MECHANICAL

| | | | |
|----------------------------|----------------|---------------------|---|
| HVAC system: | Typical office | Air Supply Exhaust: | - |
| Min. # of air changes/hr.: | - | Air Exhaust: | - |
| LAVS: | - | Number: | - |
| Water Closet: | - | Fixture: | - |
| Urinal: | - | Number: | - |
| | | Fixture: | - |
| Drinking Fountain: | - | Room Thermostat: | - |
| Floor Drain: | - | Drain Type: | - |
| Other: | | | |
| Comments: | - | | |

ELECTRICAL

| | | | |
|-------------------------------|--|--------------------------------|------------------|
| Receptacles: | One per each cart stall; one duplex on each wall minimum | | |
| Switches: | Low Voltage (Qty.): | - | Dimmer (Qty.): - |
| | Other: | - | |
| Emergency Lighting Required: | Exit level only | | |
| Lighting Type: | LED | Lighting Level (Lux): | 400 - |
| Communications: | - | | |
| Fire Alarm to OBC3.2.4: | - | P.A. System Coverage Required: | Yes |
| T.V. Outlet (Qty.): | - | | |
| Telephone/Data Outlet (Qty.): | 1 | | |
| Security Requirements: | Access Control | | |
| A/V Systems: | - | | |

Comments: -

NOTES

RFP: Request for Quotation

OESC: Ontario Electrical Safe Code

| | | | | | | | |
|------------|-----------------------------|--|--|--|--|--------------|----|
| Building | Moodie LMSF Office Building | | | | | | |
| Room Name: | Transportation Supervisors | | | | | Room Number: | NA |

ARCHITECTURAL

Function: Office for OC Transpo Crew Supervisor Net Area: 18 m2 Number of Occupants: 2
Fire Rating: NA Barrier Free: Yes

ROOM CHARACTERISTICS

Sound Control: Standard Special Ceiling Conditions:
STC Rating: 45 Special Floor Conditions
Other: - Special Wall Conditions :

ROOM FINISHES

Floor: CPT Base: RB Wall: PT
Ceiling: LAT Millwork:
Doors (Size): 900x2100 Type: Fire Rating: Hardware: Access Control
O/H Doors (Size): Type: - Fire Rating: - Hardware: -
Windows: - Frame: - Fire Rating: - Glazing: -
Wind Screens: - Frame: - Fire Rating: - Glazing: -
Security Barriers: - Frame: - Fire Rating: - Glazing: -

MILLWORK

Counter: - Matl: - Comment:
Shelving: - Matl: - Comment: -

FIXTURES: -

EQUIPMENT:

OTHER:

REMARKS: All OC Transpo communications systems shall be accessible from this room. Provide 2 each of: desk, credenza, book shelving, and guest chair.

MECHANICAL

| | | | |
|----------------------------|-----------------|------------------|--------------------------|
| HVAC system: | Standard office | Air Supply: | Standard Office, Ceiling |
| Min. # of air changes/hr.: | - | Air Exhaust: | Ceiling |
| LAVS: | - | Number: | - |
| Water Closet: | - | Number: | - |
| Urinal: | - | Number: | - |
| Drinking Fountain: | - | Room Thermostat: | Yes |
| Floor Drain: | - | Drain Type: | - |
| Other: | | | |

Comments:

ELECTRICAL

| | | | |
|-------------------------------|--|--------------------------------|-----------------------|
| Receptacles: | Minimum four outlets at workstation | | |
| Switches: | Low Voltage - | Dimmer - | |
| | (Qty.): | (Qty.): | |
| | Other: - | | |
| Emergency Lighting Required: | All lighting on backup power (genset) and UPS | | |
| Lighting Type: | LED | Lighting Level (Lux): | 200 - |
| | Individually controlled task lighting to be provided at work station | | |
| Communications: | | | |
| Fire Alarm to OBC3.2.4: | - | P.A. System Coverage Required: | Via phone system only |
| T.V. Outlet (Qty.): | Wall mounted | | |
| Telephone/Data Outlet (Qty.): | Standard | | |
| Security Requirements: | Provide access control hardware | | |
| A/V Systems: | - | | |

Comments: -

NOTES

| | | | | | | | |
|------------|-----------------------------|--|--|--|--|--------------|----|
| Building | Moodie LMSF Office Building | | | | | | |
| Room Name: | Yard Control Centre | | | | | Room Number: | NA |

ARCHITECTURAL

Function: Yard Control and Redundant Operations Control Centre Net Area: 30 m2 Number of Occupants: 3
Fire Rating: 1-hr Barrier Free: Yes

ROOM CHARACTERISTICS

Sound Control: Standard Special Ceiling Conditions:
STC Rating: 45 Special Floor Antistatic raised access floor
Other: - Special Wall Conditions :

ROOM FINISHES

Floor: VCT Base: RB Wall: PT
Ceiling: LAT Millwork:
Doors (Size): 900x2100 Type: Fire Rating: 20 Hardware: Access Control
O/H Doors Type: - Fire Rating: - Hardware: -
(Size):
Windows: Brise Soleil Frame: - Fire Rating: - Glazing: -
Wind Screens: - Frame: - Fire Rating: - Glazing: -
Security Barriers: - Frame: - Fire Rating: - Glazing: -

MILLWORK

Counter: - Matl: SS Comment:
Shelving: - Matl: SS Comment:

FIXTURES: YCC workstations will require space for 7 monitors all associated peripherals: 2 monitors for CBTC, 2 for SCADA, 1 for P25 Radio touchscreen, 1 for CCTV, 1 for ProjectCo business network

EQUIPMENT:

OTHER: Provide minimum two YCC workstations. To the fullest extent possible, YCC Workstations shall have panoramic view of yard in south and west directions. Provide one workstation for OC Transpo.

REMARKS: All OC Transpo communications systems shall be accessible from the OC Transpo workstation; workstations shall have functionality of similar capacity to those at the primary OCC.

MECHANICAL

| | | | |
|----------------------------|----------------|------------------|---------|
| HVAC system: | Typical office | Air Supply: | - |
| Min. # of air changes/hr.: | - | Air Exhaust: | Ceiling |
| LAVS: | - | Number: | - |
| Water Closet: | - | Number: | - |
| Urinal: | - | Number: | - |
| Drinking Fountain: | - | Room Thermostat: | Yes |
| Floor Drain: | - | Drain Type: | - |
| Other: | | | |

Comments: Provide one diffuser per YCC workstation and not less than one per every 10m² or portion thereof. System shall be on emergency backup power (genset). HVAC volume shall be controllable at each workstation

ELECTRICAL

| | | | |
|-------------------------------|--|--------------------------------|---|
| Receptacles: | Minimum four outlets per workstation | | |
| Switches: | Low Voltage (Qty.): | - | Dimmer (Qty.): One dimmer to serve room |
| | Other: | - | |
| Emergency Lighting Required: | All lighting on backup power (genset) and UPS | | |
| Lighting Type: | LED | Lighting Level (Lux): | 200 - |
| | Individually controlled task lighting to be provided at each work station | | |
| Communications: | | | |
| Fire Alarm to OBC3.2.4: | - | P.A. System Coverage Required: | Yes |
| T.V. Outlet (Qty.): | Minimum 1320mm LCD display at north wall, | | |
| Telephone/Data Outlet (Qty.): | Minimum four outlets per workstation and at each LCD display | | |
| Security Requirements: | Provide access control hardware | | |
| A/V Systems: | 3 1320mm wall mounted LCD displays to be provided which are capable of displaying various CBTC and SCADA displays as required by YCC staff | | |

Comments: -

NOTES

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| | | | | | | | |
|------------|-------------------------------------|--|--|--|--|--------------|----|
| Building | Moodie LMSF Office Building | | | | | | |
| Room Name: | Typical Multiple-Occupant Wash Room | | | | | Room Number: | NA |

ARCHITECTURAL

Function: Wash Room Net Area: 45 m2 Number of Occupants: Varies
Fire Rating: NA Barrier Free: Yes

ROOM CHARACTERISTICS

Sound Control: Standard Special Ceiling Conditions:
STC Rating: 55 Special Floor Conditions
Other: - Special Wall Conditions :

ROOM FINISHES

Floor: PCT Base: CT Wall: PT/1220mm CT Wainscot
Ceiling: LAT Millwork:
Doors (Size): 900x2100 Type: SC Fire Rating: Varies Hardware: Class/Self Closing
O/H Doors (Size): Type: - Fire Rating: - Hardware: -
Windows: Frame: - Fire Rating: - Glazing: -
Wind Screens: - Frame: - Fire Rating: - Glazing: -
Security Barriers: - Frame: - Fire Rating: - Glazing: -

MILLWORK

Counter: - Matl: Comment:
Shelving: Minimum 150 x450 (mm) Matl: SS Comment: Above urinals, water closets, lavatories

FIXTURES: As required by code but not less than one urinal and one toilet per men's wash room and two toilets per women's wash room. Washrooms shall have not less than two lavatories. Provide stainless steel shelving above all fixtures

EQUIPMENT: -

OTHER: Shower rooms shall be provided in the main wash rooms or locker rooms serving OC Transpo transportation crews. Floors shall be PCT, walls full height CT. Showers shall be individual occupancy with a lockable door and may be accessed independently from wash rooms.

REMARKS: Multi-occupant OC Transpo Crew Wash Rooms shall be accessible from within the dedicated OC Transpo suite only. Dedicated and properly sized wash rooms shall be provided separately for office areas and maintenance areas to limit soiling. Finishes shall be appropriate for each.

MECHANICAL

| | | | |
|----------------------------|---|------------------|----------------|
| HVAC system: | - | Air Supply: | - |
| Min. # of air changes/hr.: | - | Air Exhaust: | - |
| LAVS: | Yes | Number: | Min. Per Code |
| Water Closet: | Yes | Number: | Min. Per Code |
| Urinal: | Yes | Number: | -Min. Per Code |
| Drinking Fountain: | - | Room Thermostat: | - |
| Floor Drain: | 1 per every 25m ² or portion thereof | Drain Type: | - |
| Other: | | | |

Comments: Shower rooms shall have 100% exhaust air

ELECTRICAL

| | | | |
|------------------------------|----------------|--------------------------------|---------|
| Receptacles: | 1 per lavatory | | |
| Switches: | Low Voltage | - | Dimmer |
| | (Qty.): | | (Qty.): |
| | Other: | - | |
| Emergency Lighting Required: | | | |
| Lighting Type: | LED | Lighting Level (Lux): | 300 - |
| | - | | |
| Communications: | | | |
| Fire Alarm to OBC3.2.4: | - | P.A. System Coverage Required: | Yes |
| T.V. Outlet | - | | |
| (Qty.): | | | |
| Telephone/Data Outlet (Qty.) | - | | |
| Security Requirements: | - | | |
| A/V Systems: | - | | |

Comments: -

NOTES

RFP: Request for Quotation

OESC: Ontario Electrical Safe Code

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APPENDICES

APPENDIX A Room Data Sheets

**SCHEDULE 15-2
DESIGN AND CONSTRUCTION REQUIREMENTS**

**PART 5
LMSF**

ARTICLE 1 INTRODUCTION

1.1 Introduction

- (a) This article outlines the guidelines and performance criteria that are necessary for DB Co to carry out the final design and construction for the various components and elements of the Moodie LMSF for the Project. The LMSF shall serve as the maintenance and storage facility for the City and shall house the Vehicles for the initial Confederation Line Extension of the Vehicle fleet. This Work requires coordination and interaction with other work by DB Co, including but not limited to the Mainline Track. DB Co shall design the LMSF to meet the Vehicle peak daily service requirements.
- (i) Features of the Work shall include,
- A. Construct all Track;
 - i. Furnish and install new turnouts, crossties, ballast, and necessary appurtenances.
 - ii. Install new rail throughout.
 - B. Retaining walls and miscellaneous concrete Structures;
 - C. Buildings as further defined below.
- (b) This section summarizes the requirements that are otherwise detailed in the remaining Articles of this Part 5.
- (i) Site Summary
- A. The site is located on a parcel of land located between Highway 417 and Corkstown Road. The western site boundary is the ROW for the [REDACTED] and the eastern site boundary is the Moodie Drive/Highway 417 interchange. The development of the facility for Phase 1 shall not disturb the Trans Canada Trail, also located at the western boundary of the site.
 - B. This site currently is a greenfield site.
 - C. A neighbouring development to the north of LMSF Corkstown Road is Wesley Clover Parks recreational facility.
- (c) Facility Summary

- (i) The LMSF (Phase 1) shall be designed to maintain and store 24 Vehicles required by the City and shall protect for the future interim Vehicle storage capacity of 64 Vehicles (Phase 2) within the confines of the Lands and the ultimate build-out for storage capacity of 90 Vehicles (Phase 3) in the yard area. The specific timeline for the future expansion is unknown.
- (ii) Phase 2 shall add capacity to the storage yard, augment the Phase 1 Vehicle Service & Maintenance Shop with two additional light maintenance shop Tracks, offices, welfare spaces, back shops, and storage; provide for MOW functions as described for Phase 1, and include a new Office Building as detailed below. Phase 2 shall be contained within the existing Land.
- (iii) Phase 3 shall add capacity to the storage yard, augment the Phase 2 Vehicle Service & Maintenance Shop with one additional, stub-ended heavy maintenance shop Track, as detailed below. MOW functions as described for Phase 1 shall be provided
- (iv) The LMSF will serve as the service center and light maintenance center for the portion of the Vehicle fleet prescribed above. Any design for the initial build out shall take into consideration, be compatible with and protect for any future expansion or build-out requirements.
 - A. DB Co shall plan, design and construct facilities as required to perform all necessary operations and maintenance activities required by the Project Agreement.
 - B. Buildings may be designed to take advantage of the pre-engineered delivery method.
 - C. DB Co shall design the site to protect for Phase 2 including future interim Storage Tracks within the Lands provided in Schedule 20 – Lands.
 - D. DB Co shall protect for Phase 3 inclusive of the additional final build-out of Storage Tracks an expanded administrative office and operator welfare building (LMSF Office Building) with associated parking.
 - i. The City acknowledges for implementation, Phase 3 may require the realignment of Corkstown Road and additional property not identified in Schedule 20.
 - E. The design shall incorporate space for snow storage for current and interim site development for Phase 2.
 - F. The site shall be secured at the perimeter with a minimum 2.4m high fence and gate system. Gates shall be motorized and shall be operable through the facility access control system. The fence along Corkstown Road shall be architectural and shall comprise of powder coated weld wire mesh or steel pickets. Other fenced areas, not readily visible to the public, may be

chain link. The security fence between the yard and Highway 417 shall be provided with a glare screen, where required, so that Vehicle headlights will not shine on Highway 417. The yard shall be designed so that snow cleared by Highway 417 does not fall into the yard. Intrusion detection shall be contiguous with the perimeter fence.

- G. All structures crossing Stillwater Creek shall be designed and constructed to minimize the reduction of daylight at the creek level and along its banks. Crossing Track structures shall be open design. Only a single crossing shall be permitted for pedestrians and motorized service carts and this shall be limited to 3m in width. The pedestrian and motorized service cart Structure will be permitted to have a closed deck. The only other crossings permitted shall be for Tracks. DB Co shall design the crossing structures with particular attention given to the requirement that the creek shall receive the maximum amount of daylight. DB Co shall demonstrate that its design solution minimizes the impact of the development on the creek.
- (v) DB Co shall design the site so that there shall be six or less parallel sets of Tracks for the initial site development.
- (vi) LEED:
 - A. The Office Building shall be designed for LEED® “Certified” status.
 - B. DB Co shall register the LMSF with the GBC and provide documentation for all credits necessary for “Certified” status.
- (vii) Accessibility:
 - A. Where applicable, DB Co shall ensure the project site and facilities are designed to be universally accessible including satisfying the requirements of Transport Canada, AODA and applicable City Guidelines and CSA Standards. The application of design guidelines and criteria, standards and practices shall accommodate the needs of persons with physical, sensory, and mental disabilities.
- (viii) The LMSF shall be designed in accordance with CPTED. For further clarity, the design of the LMSF shall be included in DB Co’s independently contracted CPTED review and report, required under Schedule 15-2, Part 4, Clause 1.3(b).
- (d) General Maintenance Philosophy: The LMSF design shall allow for flexibility in Vehicle maintenance procedures.
 - (i) The design and operation of the LMSF, shall be based on the following concepts:
 - A. To ensure that the required number of Vehicles needed for specified levels of service are available for revenue service, clean, sanded and in good

mechanical order and that they are paired as two car Trains within the storage yard;

- B. The goal of the maintenance building is to return the Vehicles to “ready for revenue service” status as quickly as possible. Therefore, maintenance procedures shall focus on exchanging good components (from shop stores) for defective components; and,
- C. Heavy maintenance shall be performed at the MSF on Belfast Road.

(e) General LMSF Operations Philosophy

- (i) The LMSF shall provide for maximum safety and flexibility in Train movements. Direct access from the mainline to the LMSF Tracks shall be provided. Track shall be designed free of single points of failure and shall limit the number of turnouts and other special Trackwork for the most heavily used portions of the yard (i.e. those associated with daily routines). Designs shall be free of single point of failures for each phase of the construction. However, in Phase 1, a failure at the east end of the storage yard that will allow access to the Mainline for half of the storage Tracks is not desirable, but is acceptable.
- (ii) Double leads shall be provided off of the Mainline Track extending to the Yard Track ladder, and shall be accessible from either Mainline Track via a double or universal crossover arrangement that precedes the yard limits. One of the leads may pass through the S&I building and then through to the storage yard.
- (iii) Positive mechanical protection shall be provided to ensure no stray Trains escape onto the Mainline and shall be under the control of the TOCC and interlocked with the Train Control System and signals governing movement across those Track segments. Runaway or stub-end Track shall be provided to ensure stray Trains safely traverse off the Yard Lead Tracks, through the diverging route of a turnout, preventing access to the Mainline. Positive mechanical control shall ensure stray Trains safely traverse onto runaway or stub-end Track from any proposed or future handover Track. Runaway or stub-end Track shall be equipped with a bumping post to ensure Vehicles are undamaged and able to return to service in the event of a stray Train escaping.
- (iv) DB Co shall design and construct a parking facility (minimum 40 spaces) for the City within logical proximity of the Vehicle handoff platform and no fewer than 10 additional parking spaces at Vehicle maintenance building.
- (v) At the location within the LMSF, where the Operator will take control of Trains, DB Co shall provide the following facilities:
 - A. An enclosed/heated office for the City supervisor who will be responsible for the handoff; and,

- B. DB Co shall work with the City to define the specific functional requirements for the spaces outlined above.
 - C. One handoff platform shall be provided. The staging area for the handoff platform shall be a conditioned vestibule integrated into the LMSF Office Building, which provides a clear view and direct access to the Operator handoff platform.
 - D. MYCC windows shall have a full view of the Operator handoff platform, plus as wide a view of the yard as possible. Optimized and logical flow of the yard (handoff, daily servicing and storage) shall take precedence over this latter criterion.
 - E. Ancillary spaces such as fire sprinkler, mechanical, electrical rooms, equipment, etc. shall be provided as required to support the facility by DB Co. They may be placed as needed for functionality and as permitted by Code. Designs shall exhibit that they are not environmentally detrimental (visually intrusive or causing noise and vibration) to the community or to work areas.
- (f) LMSF Operations Criteria
- (i) Maximum LMSF design speed shall be 15km/hr.

1.2 LMSF Functions and Requirements

- (a) At a minimum, DB Co shall design and construct the LMSF to accommodate the following:
- (i) To satisfy all Operational scenarios of the Agreement;
 - (ii) All necessary functions to support the initial LRT line network while protecting for the future expansion of the facility. DB Co shall present designs that show how the future expansion will be accommodated without interruption of normal facility function;
 - (iii) Rooms and spaces within the facility as identified in the room Data sheets, in Appendix A of this Part 5, for use and occupation by City staff and Project Co;
 - (iv) Phase 2 and 3 level of design development shall be sufficient to illustrate the future build out can occur and how it would meet functional requirements (e.g. Operator access to handoff platform during construction or truck access to parts storage, expansion of Shop and Storage Yard/Building). DB Co shall clearly demonstrate its approach to phased build out throughout the submittal process. DB Co shall demonstrate that Phase 2 facilities will fit within the Lands identified for the LMSF, and that it can be constructed without interruption of transit operations. DB Co shall indicate the impact of the proposed Phase 3 concept on Corkstown Road, the Trans Canada Trail, and [REDACTED] mainline.

- (v) Roadways and other paved areas, Utilities, signaling, communications, access control and other security features, and other miscellaneous features for a complete and operational facility; and,
 - (vi) Delivery and warehousing of parts, equipment and materials. Roadway circulation shall accommodate tractor-trailers with 16m trailers. Vehicles delivering parts and materials shall not foul Tracks when on or off loading.
 - (vii) The City recognizes that some demolition may be required to permit the Phase 2 and 3 expansions in order to optimize ultimate functionality. DB Co shall present designs that minimize impacts to operations during construction.
 - (viii) With the exception of persons performing maintenance of Vehicles on shop Tracks or cleaning Vehicles in the storage shed, at no time shall any staff be required to cross facility Tracks to access any area of any LMSF building or parking area.
 - (ix) S&I, light maintenance, and heavy repair Tracks shall be adjacent to one another. Movement between Tracks shall not be interfered with or blocked by storage, office, or other ancillary space.
- (b) The LMSF is subject FLUDTA and design approval by the NCC under Section 12 of the National Capital Act.
- (i) Refer to Schedule 15-2, Part 4, Clause 1.2 (l) for general requirements.

1.3 Administrative, Welfare and Training Functions

- (a) The administrative and training functions for the LMSF facility shall be at the LMSF Office Building, providing easy and direct access from Corkstown Road to the public, employees, and visitors. It shall include the following areas and features:
- (i) Access: entrance to/exit from the site shall be easily recognizable and shall not require passing through “industrial” areas of the site;
 - (ii) These areas of the LMSF shall be conceived and designed to permit ready expansion to accommodate the staffing and functional requirements of interim and final LMSF build-out. The Phase 1 building shall not be required to be conceived as an integrated part of the interim and final building. Should DB Co opt to show the expansion of the LMSF Office Building as an addition to the initial building, it shall demonstrate how the spaces in the initial build out will be repurposed or expanded;
 - (iii) Public access shall be through a secure vestibule on the first floor. Direct public access to the shop, warehouse, and any other industrial areas shall not be permitted;

- (iv) Administrative, training and welfare areas shall be isolated from the transmission of sound and vibration;
 - (v) Administrative and management shall be provided with offices or open office cubicles in accordance with the standards established by Interior Planning Standards, City of Ottawa, Real Property and Assets Management. Finishes shall also be consistent with these standards;
 - (vi) Dispatcher shall, to the fullest extent possible, be positioned with a view of Operator staff;
 - (vii) The LMSF Office Building shall be sufficient to house the specified program for the initial LMSF build-out. It shall be positioned to be fully operational and not impinge upon the construction of a new LMSF Office Building size to house the Operator for subsequent interim and final build-out stages of the LMSF development.
 - (viii) DB Co shall submit designs that clearly indicate the future welfare expansion of the site can be constructed without impact or compromise to the operations of the LMSF as initially constructed and operated.
- (b) Design shall protect for:
- (i) A Phase 2 Office Building which shall be 934m² minimum area.
 - (ii) Handoff platforms shall be expanded to two during the Phase 2 expansion. Operators shall not be required to cross any Track to access a handoff platform.

1.4 Vehicle Storage and Future Expansion of LMSF

- (a) The Vehicle Storage Tracks shall be provided with storage capacity of sufficient size to accommodate the operational performance requirements.
- (b) Vehicle Storage Tracks shall be under roof, illuminated, and have full fire sprinkler coverage. Side walls shall be incorporated to the full extent possible without triggering the requirement for mechanical ventilation. The location of wall openings shall be subject to a microclimate analysis in order to reduce the impact of extreme weather conditions on the parked Vehicles. The storage shed shall be designed to accommodate storage of two-Vehicle Trains, but space for up to 4 single uncoupled Vehicles shall be accommodated (within the total shed Vehicle capacity).
- (c) Initial yard storage capacity shall be 24 Vehicles
- (d) Design shall protect for:
 - (i) Interim yard storage capacity of 64 Vehicles within the confines of the property;

- (ii) Full build-out yard storage capacity of 90 Vehicles which may require the realignment of Corkstown Road northward. Other development shall be within the Lands;
 - (iii) System expansion to Kanata from the LMSF yard via a grade separated, two-Track expansion across the [REDACTED] with Storage Track geometry designed to be completely double ended at the completion of this expansion. The elevation of the [REDACTED] alignment shall remain as currently fixed. DB Co shall design and demonstrate that its design complies with this requirement for all phases, although it is not presently anticipated that this crossing will be completed before Phase 2 is constructed;
 - (iv) Phase 2: Two light maintenance (progressive maintenance) Tracks in a shop building expansion. See Clause 1.7 (f) and (g) of this Part 5. Phase 3: An additional third heavy repair Track in a shop building expansion. See Clause 1.7 (i) of this Part 5.
 - (v) DB Co shall present staged designs that show how these requirements will be accomplished; and,
 - (vi) Future expansion of Highway 417 to the north of the existing travelled lane limit of pavement including a 3.75m travel lane, 3m shoulder and provisions for required barriers between Highway 417 and the future system expansion to Kanata.
- (e) At least one side of each Vehicle parked in the shed shall be accessible from a paved surface of adequate width and structural capacity to permit the passage of a 1255mm wide, 3,000mm long, 1,000 kg, motorized utility cart. Walkways shall permit turnaround of cart at each end. Pedestrian and road vehicle access to the Vehicle storage shed is required.
- (f) CBTC sectionalization in the shed shall allow for all Tracks adjacent to an asphalt walkway to be closed to automatic Trains when a worker is on the walkway. The system shall allow for this to be done from the MYCC and locally using keyed CBTC Emergency stop switches. The number of zones may vary based on the DB Co design
- (g) OCS shall also be sectionalized with separate feeders, one for the two north most Tracks, and one for the two south most Tracks.
- (h) A heated and ventilated building shall be provided of approximately 15m² and shall be constructed immediately adjacent or as a part of the Vehicle storage shed to provide convenient access for car cleaners for cleaning supplies and storage of materials. Provide standard office lighting levels, double, lockable swinging doors, a floor mounted janitorial sink with minimum 7.5L/min instantaneous hot water heater. Heavy duty industrial shelving, min 500 kg/m²; 600mm deep, min. 75L/min; brace at floor and floor deck above.

1.5 Moodie Yard Operational Control Functions

- (a) Facility shall provide for the day to day operations of the yard via UTO which shall be the primary method of positioning Vehicles for maintenance, inspection, storage, and revenue service handoff to the Operator.
- (b) All routes within the Moodie LMSF yard limits shall be under operational control of the MYCC.
- (c) All routes exiting the Moodie LMSF limits onto the Mainline Tracks shall be under operational control of the TOCC/BCC.
- (d) The transfer of operational control between the MYCC and the TOCC/BCC for Trains entering and exiting the Moodie LMSF to/from the Mainline Tracks is to integrate an S&TCS to address the following:
 - (i) All switches located on the Mainline Tracks that provide access to the Moodie LMSF shall be under separate control by the TOCC/BCC through means of a signalized interlocking with wayside signals in addition to the on board cab signaling system.
 - (ii) All switches located within the Moodie LMSF shall be under separate control by the MYCC through means of signalized interlockings with wayside signals in addition to the on board cab signaling system.
 - (iii) Routing of all Vehicles between the mainline interlockings and the Moodie LMSF interlockings shall be established by direct data communications shared between the S&TCS GUI of the TOCC/BCC and the S&TCS GUI of the MYCC.
 - (iv) A Train Control transition zone shall be established to hold Vehicles entering or exiting the Moodie LMSF until the appropriate route is established. The signals of either interlocking shall be used to govern the Train movement through the entire route until the Train is fully under control of the TOCC/BCC or the MYCC.
 - (v) The length of the transition zone shall ideally be sufficient to accommodate the maximum anticipated length of a Train without having any part of the Train stopped over a switch. However, in the event that Track geometry design and available spacing cannot prevent the Train from sitting over a switch while stopped in the transition zone, a Train may be stopped over a yard switch provided that the following is adhered to:
 - A. The position indications of the yard switch(s), for both normal and reverse, are shared from the MYCC to the TOCC/BCC.
 - B. The position indications of the interlocking switch(s), for both normal and reverse, are shared from the TOCC/BCC to the MYCC.

- C. The Track occupancy of the transitions zone area is shared with both the TOCC/BCC and the MYCC.
 - D. Safety precautions shall be taken to ensure that any switch cannot be thrown underneath the Train due to loss of shunting.
 - E. The Train shall never be stopped over a mainline switch under any circumstances.
- (e) The overall design concept involving a Train stopped over a switch in the transition zone shall be submitted to the City prior to procurement and installation.
- (f) The interface design for route establishments between the S&TCS of the mainline interlockings and the S&TCS of the Moodie LMSF interlockings shall be compliant with the operational procedures established between the City and Project Co.
- (g) All elements of the S&TCS of the Moodie LMSF and the mainline interlocking, that require design adjustments for the operational control functions noted above, shall remain in compliance with the S&TCS as described under Schedule 15-2, Part 3 – Systems.

1.6 Crew Dispatch

- (a) Crew dispatch areas shall be under control of the Operator and shall be independently controllable from Project Co areas.
- (b) Crew dispatch areas shall be located proximate to and provide convenient access to Vehicle handoff platform. The handoff platform shall be a part of the Operator building. The Open Offices and the Operators' Day Room (aka Break Room) shall be immediately adjacent. One of the work stations in the Open Office area shall have an operable (sliding) window into the Operators' Day Room to facilitate dispatch of Operators. Additionally a stainless steel cabinet with doors on either side of the wall, measuring in area approximately 0.42m² and 200mm deep, shall be provided for storage and charging of Operator radios. Access control shall be provided on the Day Room side; locking shall not be required on the Open Office side. Stainless steel shelving and charging connections shall be provided for 24 radios.
- (c) Functional areas include:
 - (i) Lobby;
 - (ii) Data and communications room;
 - (iii) MYCC;
 - (iv) Day room for the Operator;
 - (v) Welfare facilities for the Operator;

- (vi) Management offices for the Operator;
- (vii) Storage areas for the Operator; and,
- (viii) Visitor's office area.

1.7 LMSF Vehicle Maintenance Service & Inspection Building

- (a) It is of paramount importance that the LMSF in general shall be designed with safety as the preeminent design factor. In particular, because of the use of UTO within the Service & Inspection Building, industrial workflows and process shall consider that this can be a noisy environment and that optimizing sight lines and minimizing blind corners and safe crossing of potentially live Tracks is essential to the safety and wellbeing of facility employees. DB Co shall present designs that clearly indicate how potential work place hazards have been eliminated or mitigated;
- (b) The LMSF S&I Facility shall comprise a single, double-ended S&I Track, welfare and office facilities for Project Co, materials storage and ancillary spaces to support the maintenance and daily servicing of the Vehicle fleet housed at the LMSF
- (c) The S&I Facility shall include any and all light progressive maintenance (that does not require lifting Vehicles), including seat repairs, window replacement, flooring replacement, door repair, electronic component replacement, replacement of pantographs and AC units, and systems testing.
- (d) The S&I Track shall be fully capable of and designed for UTO operation.
- (e) High bay parts storage of not less than 7600mm vertically clear shall be provided for the activities performed on this Track and shall include a full inventory of the parts, supplies, and materials required to maintain the Vehicles. Mezzanine storage is not required for Phase 1. Areas by Phase shall be as follows:
 - (i) Phase 1: 90m².
 - (ii) Phases 2 & 3: 200m² on ground floor and 100m² on mezzanine (areas are not expanded in Phase 3).
- (f) S&I Track shall provide ample space for the daily service and inspection of Trains which shall be conducted on a single Track of sufficient length to enclose the Train in a conditioned S&I space per the mechanical requirements specified herein.
 - (i) Inspection Track shall be direct fixation on a slab that slopes at 2% to a continuous floor drain centered on the gage of the Track, running the full length of the space. Bottom of rail shall be 40mm above finish floor to allow water and detritus to move freely to a gage centered trench drain. Crossing aisles, flush with TOR not less than 3.5m wide shall be provided at each end of the S&I Track. At least one side and both ends of the Vehicle shall be accessible by a forklift without repositioning the Vehicle.

- (ii) Platforms at rooftop elevation shall be provided along one side of the Track for the length of the consist to provide access to and visual inspection of the Train rooftop and pantograph. Platform shall provide access to the Vehicle roof for the specified maintenance activities. Platform shall have guardrails that prohibit access to the Vehicle and OCS without the OCS being deenergized first. Fall protection shall be provided for the length of the consist.
- (iii) A fail safe system (e.g. Kirk key) shall be employed to integrate OCS deenergization with locked vestibules that prohibit entering the platform if the OCS is not deenergized. This system shall be operable in a failsafe mode from both ends of the platform.
- (iv) Lighting shall be provided as specified for Maintenance Facility occupancy and additional low level lighting shall be provided for undercarriage inspection.
- (v) Compressed air hose and trouble light with duplex outlet shall be on 4 reel sets at 4m centres along each consist side and on each side of the Track. Length of hoses and cords shall be sufficient to reach all areas of potential service for a given level of shop floor.
- (vi) The S&I Track shall be on and precede an automatic, drive-through trainwasher. It shall be isolated from the trainwasher by a high-speed bi-fold door and have positive pressure mechanically in comparison to the train washer space.
- (vii) An automatic, drive-through trainwasher shall be positioned in a conditioned space on the same Track and immediately adjacent to and contiguous with the S&I space. The Train washer shall employ equipment that is designed for the specific purpose of washing Vehicles and which is capable of providing a spot free wash that does not damage the Vehicle, applied graphics including advertising, or components. Washer shall clean all sides of the Vehicle including the under carriage and trucks, rooftops and interstitial space between Vehicles.
- (viii) A water reclamation system shall be employed that is compatible with the sustainability goals of the project. Final rinse water shall be stripped from the vehicle surface using high pressure air blowers or other acceptable means prior to exiting the wash enclosure. All effluent discharged from the system to the sanitary sewer shall be pretreated to comply with applicable codes and effluent quality standards. See Article 8 for additional requirements.
- (ix) Provide level Track crossings (embedded Track) at both ends of the S&I bay to allow equipment movements from one side of the bay to the other.
- (x) Shop doors shall be bi-fold due to OCS. Note that all maintenance shop Train doors shall be bi-fold as there shall be OCS on all Tracks.
- (xi) DB Co shall work with the car washer manufacturer to determine the specific requirements for a car washer that meets the requirements of this Part 5 inclusive

of, but not limited to: room sizes, clearances, wash and drying equipment, utility connections, effluent discharge, and storage, for a fully functioning system.

- (xii) A hot water pressure washing system shall be provided in the S&I bay and shall provide full Vehicle coverage for a Train. Pressure washing: three stations at each Vehicle; minimum overlap of coverage shall be 3m, at Vehicle ends, hose shall be capable of extending to the far corner of the Vehicle on opposite rail. Stations shall be located at 8.15m, 24.445m, and 40.74m.
- (xiii) A 2-ton monorail crane shall be configured to facilitate movements of parts and equipment from the Vehicles and rooftop platform to the main floor at each end of the consist. The crane shall be interlocked with the OCS, such that the OCS cannot be energized unless the crane trolley is in the home position and the hook is fully retracted. The crane shall run the entire length of the S&I Track and shall be centred on the rail gage. The monorail crane shall extend fully over the crossing aisles at both ends of the S&I Track.
- (xiv) Distribution of sand and windshield washer fluid and pressure washing wands shall be as follows (zero point for dimensions is coupler face of Vehicle when parked):
 - A. Pneumatic sanding with storage capacity of 45000kg/28000L of sand. Sand distribution shall be provided with dispensers aligned with all sand fill ports on a 2-Vehicle consist; 5.23m from either end and at the midpoint of the Vehicle; minimum 4m reach shall be possible as measured from the midpoint along the face of the Vehicle;
 - B. Washer fluid: 1m from each end of Vehicle. Washer fluid tank shall hold 2200L and shall be located in the Train wash equipment room providing same access as the wash chemical tanks. All tanks shall be accessible by facility roadway; and,
 - C. Road access to the sanding system silo and the Train washer chemical rooms shall be provided with sufficient width, design section and clearances to permit tractor and 12m trailers combos to access equipment.
- (g) The design shall protect for the future Phase 2 construction of two light maintenance shop Tracks. They shall be double ended and have the capacity for two uncoupled Vehicles on each Track. Tracks shall each have independent stinger power. These Tracks shall have the following characteristics:
 - (i) Sufficient space shall be provided for maintenance and materials movement activities at all ends and sides of all Vehicles. Tracks shall have 5m of clear floor area, measured parallel with the Track.
 - (ii) The general arrangement of Track shall be on pedestal Track with a main pit elevation of 950mm below finished floor/TOR and gage pits with elevation an additional 800mm below that. Gage pits shall be long enough to permit access to

ends of vehicles for coupler work including meeting couplers between vehicles. Main pit shall be minimum 14,350mm wide. Tracks shall be on minimum 7,700mm centers. Provide forklift accessible ramps to all sides of Tracks. Forklift access shall also be provided at grade for the entire length of the pit area, providing access to the cross aisles at the far ends of the shop.

- (iii) All pit floors shall be slabs that slope at 2% to a continuous floor drain centered on the gage of each Track, running the full length of the space.
- (iv) Continuous rooftop maintenance platforms shall be provided at 2954mm above finished floor and shall run the full length of the shop on both sides of each car. Stair access shall be provided at each end and mid-points of all platforms (4); Kirk key or other failsafe means of deenergizing the OCS shall be provided and shall control all access points to individual upper platforms. Track upper platforms shall be fully segregated from each other (as one can remain energized while the other is not), and have a gate at the midpoint to isolate half of the platform.
- (v) Code compliant fall protection shall be provided at all elevated platforms. Removable guardrail sections shall be provided as required, as well as gates dividing platforms east-west at midpoints required to mitigate fall hazard if a single Vehicle is in the bay. They shall be fabricated from aluminium of a grade suitable to withstand loading and the industrial environment.
- (vi) Hotel power stingers shall be provided at the midpoint of each Vehicle. Jibs shall be a minimum of 2.5m clear over the walking surface of the platform and shall extend to the centerline of the Track. Stinger cable shall be capable of reaching the connection point on the Vehicle regardless of from what direction it enters the shop from. Stingers shall be interlocked with the OCS such that the OCS cannot be energized unless the stinger is disconnected and the jib is secured in the home position.
- (vii) Monorail crane service shall be provided for the full length of the shop. The crane immediately adjacent to the mezzanine associated with the upper parts storage and equipment shops shall directly access back shops and storage at a second floor mezzanine long one side of the shop. The cranes shall be 2-ton and one shall be configured to facilitate movements of parts and equipment from the upper platform and to the mezzanine as noted above. The intention for the monorail crane accessing the mezzanine is to create horizontal work processes, i.e. storage of AC units and pantographs on mezzanine adjacent to Vehicle rooftop on light maintenance Track. Both shall also be capable of accessing parts and equipment from the main floor and service pit. All monorail cranes shall be interlocked with the OCS, such that the OCS cannot be energized unless the crane trolley is in the home position and the hook is fully retracted.
- (viii) Compressed air and trouble light with duplex outlet shall be distributed via hose reel sets at each Vehicle truck. Hose reel sets on pit wall sides shall be recessed in

alcoves in the pit walls. Centre reel sets shall be supported from the overhead catwalk. Similarly compressed air and trouble light with duplex outlet shall be on reel sets at the quarter points of each Vehicle and on each sides of the Vehicles.

- (ix) Pit lighting and other fixtures shall be recessed where possible or in plane with structural columns so that the available working width of the pits is maximized.
- (x) Specific utilities shall be placed as follows (zero point for dimensions is nose of vehicle when parked):
 - A. At floor level:
 - i. 120V 20A every 20m, both sides, mounted to rail posts;
 - ii. Compressed air, every 25m, both sides, mounted to rail posts; and,
 - iii. Water, every 50m.
 - B. At upper platform level:
 - i. 120V 20A on both sides of platforms, every 20m;
 - ii. Compressed air paired with 120V (every 20m); and,
 - iii. Stinger power, two per Track, positioned as noted above.
- (xi) Road access to the sanding system silo and the Train wash chemical rooms shall be provided with sufficient width, design section and clearances to permit tractor and 12m trailers combos to access equipment.
- (h) Phase 1 non-shop functional areas shall include:
 - (i) Secure lobby;
 - (ii) Conference room;
 - (iii) First aid/safety equipment room;
 - (iv) Break room;
 - (v) Women's locker room, shower and washroom;
 - (vi) Men's locker room, shower and washroom;
 - (vii) Janitor's closet;
 - (viii) Data and Communications (server) room;
 - (ix) Open office;

- (x) Copy/office supply room; and,
- (xi) Supervisors' offices (2).
- (i) The design shall protect for the future Phase 3 construction of a dedicated heavy repair Track in a shop building expansion. The Track shall have capacity to work on two, decoupled Vehicles and provide enough separation between Vehicles to allow simultaneous work on the facing ends of the Vehicles. The provision for this LMSF Track shall be adjacent to, and in the same space, as the two light maintenance Tracks. Track shall be flat floor, may be stub ended, and shall be in close proximity to and directly accessible to parts storage without crossing other Tracks. Forklift access shall be provided to each side of the Track. Track shall be fitted with a 10-tonne overhead crane. The addition shall not impact major utility installation nor block access to them. It shall be located so as to have virtually no impact to ongoing LMSF operations during construction.
- (j) Parking shall be provided for future phases as follows:
 - (i) 96 parking spaces for Phase 2; and,
 - (ii) 144 parking spaces for Phase 3.

1.8 Service and Inspection

- (a) A Vehicle or Vehicle consist coming out of service shall be routed to the S&I Track constructed as described herein.
- (b) Daily Activities:
 - (i) The operator will spot the consist at the appropriate point. The Train will generally remain energized during the daily activities. The primary daily activities shall consist of the following:
 - A. Walk-through of the consist to identify any issues related to damage or vandalism;
 - B. Adding sand to the sand boxes (as required based on consumption) – pneumatic sanding system with a filling hose at each sandbox fill point;
 - C. Checking window washer fluid and topping off as necessary; and,
 - D. Visual inspection of the Vehicle exterior and couplers.
- (c) Additional Activities:
 - (i) The S&I Track shall be configured such that minor repairs and component change-outs can also be completed on the Track. At roof level, visual inspection of the Vehicle roof, including pantograph wear strip, by means of the roof-level platform

(key interlock system requires the OCS catenary to be de-energized before accessing the platform). The carbon wear strip on the pantograph can be replaced. The 2-ton monorail hoist and OCS shall be configured to enable [REDACTED] to perform change-out of an HVAC unit, the entire pantograph or remove other rooftop elements. Enabling fall protection system(s) shall be provided for rooftop work activities.

- (ii) Basic car cleaning, and vandalism repairs, will occur later when the Vehicle is on a Storage Track.
- (iii) Phase 1 undercar inspections, especially of the brakes, will require the Vehicle to be placed over a pit at another offsite facility, typically on a weekly basis.
- (iv) For Phase 1 scheduled / preventive maintenance will occur at another offsite facility equipped for that work.
- (v) Vehicle wash:
 - A. After S&I activities are complete, the Vehicle proceeds forward into the automatic washer.
 - B. Vehicle presence detectors shall sense the leading and trailing edges of the Vehicle, and automatically activate and deactivate the detergent application arch, brushes and rinse arches, and blowers, in the correct sequence. The Vehicle normally will pass through the washer at a low constant speed (approximately 3 km/hr). Excessive speed or stopping shall trigger an alert and eventually an automatic shutdown of the machine. Colored lights and digital speed display shall assist maintenance personnel in maintaining the optimum speed for detergent “dwell time” and brushing action.
 - C. There shall also be a “no wash” option that can be selected by the maintenance personnel.
 - D. After being washed, the Vehicle will typically be routed to the storage Tracks for cleaning and overnight storage, or into the shop for scheduled or unplanned repairs.

1.9 Room Data Sheets

- (a) DB Co shall include within the LMSF, the rooms identified in the room data sheets provided in Appendix A. These sheets contain additional requirements for the design and construction of required rooms within the LMSF. All rooms included in Appendix A shall be included in Phase 1, unless otherwise noted.

1.10 LMSF Maintenance of Way Facility

- (a) The LMSF MOW facility shall be at a minimum 435m² (minimum clear width of 10m measured perpendicular to Tracks) with an embedded Track of not less than 45m in length and shall be suitable for materials storage of all components associated with the maintenance of the Confederation Line East or West Extensions that must be stored in a weatherized, heated and ventilated enclosure. The MOW facility shall be designed and constructed as follows:
- (i) Facility shall allow the passage of rail and hi-rail vehicles commonly used for MOW activities.
 - (ii) Rail shall be embedded type and shall be designed to 26 kPa minimum in areas of rail vehicle influence and minimum 12 kPa loading elsewhere.
 - (iii) Electrical, lighting and mechanical systems shall be as specified for LMSF facility except that the space shall only be heated and ventilated. Air conditioning shall not be required. Fire suppression system shall be as per Code.
 - (iv) A diesel fuel storage tank adjacent to the MOW Storage Track and accessible to delivery trucks, with a capacity no less than 2400L, shall be provided in order to fuel rail borne MOW equipment. Fuel dispensing and spill protection shall be provided.
 - (v) A suitable exhaust extraction system shall be provided to permit diesel equipment to be operated inside the MOW.
 - (vi) Provide single occupancy, universal washroom if location of MOW facility on property so dictates.
 - (vii) Provide cold and hot water source and enameled cast iron wall or floor mounted janitorial sink. Faucet shall be industrial grade and able to accept a water hose fitting.
 - (viii) Provide continuous grated trench drain 1.675m from centerline of the MOW Track on the shop/storage side of the Track.
 - (ix) Provide 120V 20A duplex outlets every 10m on walls parallel to Tracks. Provide 2x 240V connection evenly spaced on one wall parallel to track, and 1x 575V 3-phase connection along the same wall.
 - (x) Provide compressed air: two on each wall parallel to Track, evenly spaced, wall mounted. Hose reels shall be provided and have sufficient length and capacity to service all point of Vehicles stored on enclosed MOW Track.
- (b) MOW facility is required in all phases (Phases 1 – 3).

- (c) Provide an exterior laydown area for Track, bulk materials, other Track material, etc. of not less than 1,000m². Area shall be accessible by road and rail, shall have a compacted gravel surface and shall be secure (fenced) from public access.

1.11 LMSF Operation

- (a) The LMSF shall be able to operate as either CBTC or non-CBTC territory.
- (b) DB Co shall design and implement a solution for S&TCS in the LMSF that provides:
 - (i) Control of power switches and interlockings from the MYCC control panel.
 - (ii) A display on the MYCC panel of all Trains on all Tracks and the order of the Vehicles in them.
 - A. The level of detail shall be selectable.
 - (iii) Standard signal system interlocking protection such as route locking, approach locking, detector locking, etc.
 - (iv) Signals at all interlockings to allow safe movement of Trains without functioning onboard CBTC systems.
 - (v) Yard speed limit enforcement for CBTC equipped Trains.
 - (vi) The Design of the yard S&TCS shall allow for coupling and uncoupling of Trains on any Tracks between interlockings.
- (c) The design of the LMSF shall be based on UTO
 - (i) The MYCC shall not control the signals and switches in the interlockings entering or leaving the yard. These shall be controlled by the TOCC, BCC and the CBTC system.
 - A. CBTC transponders and wireless APs shall be installed throughout the yard including Yard Track leads approaching the interlockings interfacing with the mainline.
 - B. Trains which are not registered and initialized with the CBTC system shall not be permitted to leave the LMSF yard without a manual override.
 - C. Track design shall provide adequate clearances for UTO operation. Geometry shall not require Vehicles to stop or be stored on turnouts as part of the normal operational scenario.
- (d) Moodie Yard TPSS(s)
 - (i) TPSS(s) shall be provided in the LMSF yard to provide DC power to support the operation of the yard. The TPSS(s) shall be sized to satisfy all traction loading for

- Train movements to Storage Tracks, storage, Yard Lead operation and Train movements into and out of the shop.
- (ii) Yard TPSS and TPSS Equipment shall be of the same arrangement and design and manufacturer as the mainline TPSS.
 - (iii) Yard Traction Power positive circuits and negative rail returns shall be electrically isolated from the mainline Traction Power positive circuits and mainline negative rail returns.
 - (iv) Yard Traction Power positive circuits and negative rail returns shall be electrically isolated from the shop Traction Power positive circuits and shop negative rail returns.
 - (v) Yard Traction Power ductwork and cabling shall be installed to the respective demark maintenance hole system provided.
 - (vi) Yard TPSS shall have sufficient quantity and size DC circuit breakers to service the sectionalizing requirements and provide sufficient quantity and size circuit breakers for growth of the yard to the ultimate build out.
 - (vii) Yard TPSS shall be controlled and monitored through TPSS SCADA by TOCC, BCC and MYCC.
 - (viii) Yard negative rail system shall be electrically continuous through and be directly connected to the Yard TPSS negative return.
- (e) Moodie Shop TPSS
- (i) TPSS shall be provided in the LMSF shop to provide DC power to support the operation and sectionalization of the shop Tracks. The TPSS(s) shall be sized to satisfy the traction loading for Train movements to, into and out of each Track, and Train loads during repair, testing and maintenance through an auxiliary quick connect system to interface with the Vehicle auxiliary power receptacle.
 - (ii) Shop TPSS and TPSS Equipment shall be of the same design and manufacturer as the mainline TPSS and shall provide an interlocked contactor system for circuiting each Track and respective auxiliary quick connect distribution system.
 - (iii) Shop Traction Power system to each Track contact wire shall be through an isolation switch, wall-mounted for manual operation, and be interlocked for Safety through any crane, lifting jacking or maintenance device (wheel truing) or other device that may cause serious injury or damage if Traction Power remains energized.
 - (iv) Shop Traction Power system shall be interlocked throughout the shop through a resettable visual and audible Emergency trip system reporting directly to the MYCC and resettable only by the MYCC.

- (v) Shop TPSS shall be provided with a SCADA system reportable and controllably only through the MYCC through the MSF BMS SCADA.
- (vi) Shop negative rail system shall be continuous throughout and grounded.
- (f) Moodie Mainline TPSS
 - (i) Refer to Schedule 15-2, Part 3, Article 13 – Traction Power System.
- (g) Moodie AC Service
 - (i) DB Co shall design, furnish, install, test and commission a 44kV switch yard, including 72kV switchgear, stepdown transformers, a 15kV substation and all auxiliary systems to service the Moodie LMSF power facility. DB Co shall develop the site plan for the switchyard, and 15kV substation. The switchyard and 15kV substation shall be located at the Moodie LMSF.
 - (ii) The 44kV switch yard shall be supplied by two [REDACTED] supply feeders. The feeders shall be equipped with a pole mounted line side tie switch. The tie switch shall be owned by [REDACTED], controlled by [REDACTED] and maintained by [REDACTED]. The switch yard shall consist of two 72kv incoming line circuit breakers equipped with line side and load side disconnects, two 44kV to 13.2kV 9MVA stepdown transformers and all required auxiliary systems. The line side load break disconnect switches shall serve as the demarcation point between [REDACTED] and DB Co. Each stepdown transformer supplies a bus feeder circuit breaker located in the 15kV substation. The switchyard and its equipment shall be owned by the city, controlled by [REDACTED]. and maintained by DB Co.
 - (iii) The 15kV substation shall be a prefabricated enclosure housing 15kv switchgear consisting of two line circuit breakers, two 15kV busses with bus tie, four feeder circuit breakers and all auxiliary systems. Refer to Schedule 15-2, Part 3, Article 13- Traction Power System, for details of the 15kV substation construction. [REDACTED]'s revenue metering shall be provided through CT's and PT's on the two incoming feeder breakers in the 15kV substation. The revenue metering CT's and PT's shall be owned by [REDACTED], monitored by [REDACTED] through SCADA and maintained by [REDACTED]. The 15kV substation shall be owned by the City, controlled by DB Co and maintained by Project Co.
 - (iv) The switchyard shall be serviced by two [REDACTED], 3-phase 4-wire 44kV feeders. The assigned [REDACTED] feeders have a maximum capacity of 9MVA each. One 44kV [REDACTED] feeder shall be in service at all times. At the discretion of [REDACTED], the load from one feeder can be switched to the alternate feeder through a normally open tie switch connected between the two incoming feeders. The bus tie switch shall be owned by [REDACTED], controlled by [REDACTED] and maintained by [REDACTED]. 9MVA shall be the maximum power limit for the Moodie LMSF Facility.

- (v) Each incoming 44kV feeder shall have an overhead disconnect switch as part of the load break gang operated or cluster mount switches, owned by the City, controlled by [REDACTED] and maintained by Project Co;
- (h) DB Co shall ensure that the following control requirements are met:
 - (i) The TPSS shall be designed for unattended operation with remote supervision and control from all control centres through the SCADA system.
 - (ii) Local control shall be provided for all elements of the TPSS through a HMI and computer based TPSS control unit (PLC). Remote control shall be disabled when in local control. Local control shall be enabled by means of a “local/remote” switch. This switch shall enable and disable local control of the entire TPSS excepting circuit breaker trip functions. All TPSS indication and alarms shall be provided to the HMI.
 - (iii) HMI located in each TPSS shall be the local TPSS status screen annunciator. The HMI/PLC shall provide all information to SCADA at the TOCC, BCC, MYCC and BYCC. This includes alarms, equipment status and real-time metering values. The default screen shall be a representation of the TPSS single line indicating the current status.
- (i) DB Co shall ensure that the following SCADA requirements are met:
 - (i) Moodie LMSF power facility shall be provided with a SCADA monitored and controlled reporting directly to TOCC, BCC, MYCC and BYCC.
 - (ii) DB Co shall provide a system where all metering is monitored and logged by the SCADA system.
 - (iii) The LMSF power facility shall be provided with a SCADA RTU that shall interface with the SCADA systems specified in Schedule 15-2, Part 3, Article 8 – SCADA System, for the purposes of transmitting the information and control to TOCC, BCC, MYCC and BYCC.
 - (iv) The following status and control points, at a minimum, shall be incorporated into the LMSF power facility SCADA system functionality:
 - A. AC switchgear – Status and control:
 - i. Protective devices – Status; and,
 - ii. Lockout device – Status.
 - B. Loss of utility power – Status;
 - C. Transformer:

- i. Winding over temperature – Status.
 - D. LMSF power facility Local Control Enabled – Status;
 - E. Loss of Station auxiliary power – Status;
 - F. Intrusion detection – Status; and,
 - G. Fire alarm:
 - i. Trouble – Status;
 - ii. Power Supply – Status; and,
 - iii. Alarm – Status.
 - H. Loss of control power – Status;
 - I. Battery charger trouble/failure – Status;
 - J. Climate Control – Status;
 - K. LMSF power facility air temperature – Status;
 - L. Emergency trip activated – Status; and,
 - M. Mass trip control – Status.
- (v) 25% additional status and control point spare capacity shall be provided at the LMSF power facility.
- (vi) Communication between the local SCADA system, the TOCC, BCC, MYCC and BYCC shall be redundant via the CTS.
- (j) DB Co shall ensure that the following climate control requirement is met:
 - (i) The LMSF power facility 15kV substation shall include a climate control system which shall maintain indoor temperature and humidity to allow for PLC and SCADA equipment operational performance to be maintained throughout all expected external temperature variations. The climate control system shall be designed to continuously maintain the temperature within the LMSF power facility and provide status to the SCADA system.
 - (ii) Moodie’s AC service provides AC power to Moodie’s mainline TPSS, Station, LMSF TPSS and LMSF facility;
 - A. Moodie’s mainline TPSS: 13.2 kV, 3 phase, 4 wire.

- B. Moodie's Station: 13.2 kV, 3 phase, 4 wire to Station stepdown transformer.
- C. Moodie's LMSF TPSS: 13.2 kV, 3 phase, 4 wire.
- D. Moodie's LMSF facility: 13.2 kV, 3 phase, 4 wire to facility stepdown transformer.

(iii) Feeder protection schemes will be provided by electrical interlocking.

1.12 LMSF Coordination

- (a) DB Co shall provide the City access to and storage space within the LMSF in accordance with the requirements of Clause 5.2(m) of Schedule 15-2, Part 1 – General Requirements.

ARTICLE 2 ARCHITECTURAL DESIGN CRITERIA

2.1 Introduction

(a) General Requirements

(i) Reference Documents

A. The design and construction of the architectural requirements of the LMSF shall comply with the criteria contained in this Article, and all standards, regulations, policies, Applicable Law, guidelines or practices applicable to the Project, including but not limited to each of the following Reference Documents. In the event of a conflict between criteria, commitments or requirements contained within one document when compared with another, the more stringent shall apply:

- i. OBC;
- ii. NBC;
- iii. CGSB;
- iv. ASTM;
- v. ODA;
- vi. AODA;
- vii. The Ontario Heritage Act;
- viii. OHSA;
- ix. CSA Standards;
- x. ULC;
- xi. MNECB;
- xii. ASHRAE;
- xiii. NFPA, including but not limited to NFPA 130;
- xiv. NCC Regulations when applicable;
- xv. Others:
 - 1 the City standards;
 - 2 City of Ottawa Bylaws;

- 3 City of Ottawa Standards;
 - 4 City of Ottawa Guidelines;
 - 5 APTA Transit Standards; and
 - xvi. Ontario Fire Code
 - xvii. Canada GBC – LEED® Program.
- (ii) Scope of Construction Work
 - A. Materials employed in the construction of exterior façades shall be consistent with City standards.
 - B. The LMSF shall be designed and constructed as a campus with a common aesthetic throughout all Structures.
- (b) Materials
 - (i) All materials used in the construction of the interior and exterior of facility shall be of any code compliant material suitable for the appropriate type and durability of facility or otherwise indicated in the Project Agreement.
- (c) General Architecture
 - (i) The location of the LMSF Facility is considered a Scenic Entry Route in accordance with the City of Ottawa Official plan and a Capital Arrival Route in accordance with the NCC Greenbelt Master Plan.
 - (ii) DB Co shall consider the location of the LMSF in the design of the architecture of the site while confirming to the specific requirements of these documents.
 - (iii) The landscaping for the site shall use landscaping features to provide visual abatement of the Moodie LMSF from adjacent communities and uses, particularly in the vicinity of the Wesley Clover Facility and take into consideration views to and from the Capital Arrival perspective.

2.2 Signage

- (a) General Requirements:
 - (i) Shall comply with Schedule 15-2, Part 4, Article 7 – Wayfinding and Signage and the City of Ottawa Visual Identity Standards Manual.
 - (ii) Site signage including illuminated entry monument, roadway and rail signage and wayfinding signage for visitors and delivery vehicles.

- (iii) Building signage identifying address and facility for each building and as required to identify Track numbers at each rail door. Provide Emergency contact information and hours of operation (as relates to public access) at main entry doors.
- (iv) Interior signage identifying all departments and rooms: offices, workstations, breakrooms, washrooms, shop functions, etc. Provide meeting room agenda, staff directory, and daily events holders.
- (v) Regulatory signage for accessibility, Safety, and hazardous materials.
- (vi) Provide a fire safety plan(s) for the facility as approved by the AHJ.

2.3 Building Code Analysis

- (a) DB Co shall perform a code analysis with respect to the OBC.
- (b) Provide a complete code analysis for the LMSF, in accordance with Schedule 10 – Review Procedure, addressing the following minimum requirements:
 - (i) Building Size, Use and Occupancy:
 - A. Building area and number of storeys; and,
 - B. Mezzanines.
 - (ii) Structural Design:
 - A. Approach to compliance for structural design.
 - (iii) Occupant Load:
 - A. Occupant load factors and design occupant loads; and,
 - B. Occupant load calculation;
 - (iv) Construction Requirements:
 - A. Construction classification and construction requirements; and,
 - B. Interior finishes.
 - (v) Interconnected Floor Spaces:
 - A. Description of interconnected floor spaces; and,
 - B. Special protection for interconnected floor spaces.
 - (vi) Spatial Separation:

- A. Spatial separation and exposure protection.
- (vii) Fire Department Access:
 - A. Fire Department access route;
 - B. Fire Department access openings;
 - C. Water supply for firefighting; and,
 - D. Hydrants and Fire Department connections.
- (viii) Fire Separations and Compartmentalization:
 - A. Required fire separations;
 - B. Voluntary fire separations; and,
 - C. Fire resistance rating of assemblies and fire protection ratings of closures.
- (ix) Egress and Exiting:
 - A. Exiting concept including number and location of exits;
 - B. Travel distance;
 - C. Exit capacity;
 - D. Egress widths including, vertical egress widths and horizontal egress widths;
 - E. Egress time to protected route or exterior; and,
 - F. Door hardware.
- (x) Fire Protection Systems, Emergency Power and Communication Systems:
 - A. Fire alarm system and devices;
 - B. Standpipe system;
 - C. Sprinkler system: All buildings shall be sprinklered, including any Vehicle storage building, except where special extinguishing agents are required in sensitive areas\rooms;
 - D. Voluntary systems;
 - E. Emergency lighting and exit signage;

- F. Emergency power; and,
- G. Communication Systems.
- (xi) Ventilation:
 - A. Emergency ventilation.
- (xii) Washrooms:
 - A. Number of washroom fixtures; and,
 - B. Location of gender specific toilet rooms.
- (xiii) Barrier Free Design:
 - A. Provide analysis consisting of description of barrier free design requirements to meet the following to provide the most accommodating environment:
 - i. Barrier free access in accordance with the AODA Accessible Built Environment Standard.
 - B. Protection of a barrier-free path of travel.

ARTICLE 3 STRUCTURAL DESIGN CRITERIA

3.1 General Structural Design Criteria

(a) General Requirements

- (i) This structural Design Criteria presents the basic structural design guidelines, codes, and standards references that must be followed throughout the structural design process of the entire LMSF.
- (ii) Design and construction shall conform with the below mentioned codes with any amendments from City codes.
- (iii) Wood and wood products shall not be used for structural members.

(b) Reference Documents

- (i) The design and construction of structural Work shall comply with the criteria contained in this Article, and all standards, regulations, policies, Applicable Law, guidelines or practices applicable to the Project, including but not limited to each of the following Reference Documents. In the event of a conflict between criteria, commitments or requirements contained within one document when compared with another, the more stringent shall apply:
 - A. OBC;
 - B. NBC;
 - C. User's Guide – NBC: Structural Commentaires (Part 4);
 - D. CSA;
 - E. CAN/CSA S6-06 including Supplement No. 1;
 - F. CAN/CSA S6 Package – Canadian Highway Design Code and CHBDC;
 - G. AREMA Manual for Railway Engineering;
 - H. CAN/CSA A23.1/A23.2;
 - I. CAN/CSA A23.3;
 - J. CAN/CSA G40.20-04/G40.21-04;
 - K. CAN/CSA O86;
 - L. CAN/CSA S16;
 - M. CAN/CSA S304.1; and

- N. ASTM International.
- (c) Structural Loads
 - (i) Dead Loads
 - A. Dead Load shall include all actual weight of materials used and shall not be less than minimum requirements by OBC and NBC and any amendments by the City.
 - (ii) Live Loads
 - A. Vertical and horizontal live loads shall be as described in the above Reference Documents based on occupancy and use of area. Any Equipment loads such as Bridge crane, jib crane, fork lift etc. shall be considered as live load.
 - (iii) Environmental Loads:
 - A. Snow, wind, ice and seismic loads shall be as described in the relevant Reference Documents, using the Importance Category of “Normal” with the building code and “Other” within CHBDC.
 - (iv) Lateral Earth Pressure Loads
 - A. All underground Structures including retaining walls and pits shall be designed for lateral earth pressure including surcharge. Lateral earth pressure and surcharge shall be as described in relevant Reference Documents and as may be prescribed in Schedule 15-2, Part 2, Article 7 – Geotechnical Design Criteria and Requirements.
- (d) Load Combinations
 - (i) Load Combinations shall be in accordance with the applicable building codes for the Facility Buildings and foundations and shall include any possible load combinations (dead load, live load, equipment load, crane loads, impact load, snow load, wind load, seismic load and lateral earth pressure).
- (e) Design Considerations for Structures above ground
 - (i) Seismic requirements shall be as per OBC and NBCC.
- (f) Design Considerations for Foundations
 - (i) Foundations for Structures shall be designed such that their displacements (SLS), as defined in the Reference Documents identified in this article and as may be prescribed in Schedule 15-2, Part 2, Article 7 – Geotechnical Design Criteria and Requirements, are compatible with the structural design, function, and structure

performance requirements, and clearance envelope requirements over their Design Life.

- (ii) Where there is a potential for new construction to adversely impact any Adjacent Structures, DB Co shall prepare and implement an appropriate instrumentation and monitoring plan for the existing Structure to confirm that the new construction will not adversely impact the Existing Adjacent Structures, as prescribed in Schedule 15-2, Part 2, Article 9 – Protection of Existing Adjacent Structures.

3.2 Materials

(a) Concrete

- (i) Design of concrete Structures shall be in accordance with CAN/CSA A23.3 and CAN/CSA S6.
- (ii) Design of prestressed and precast concrete Structures shall be in accordance with CAN/CSA A23 and CAN/CSA A251-00.
- (iii) Structures supporting Train loads, including ground-supported slabs, shall meet CHBDC standards for fatigue.
- (iv) For durability design within CAN/CSA A23.1, concrete shall be considered class C-1. Concrete supporting Train loads shall be class C-XL. Exterior slabs-on-grade may be class C-2.
- (v) All concrete exposed to freezing and thawing cycles shall be air entrained.
- (vi) All non-prestressed reinforcement and testing methods shall conform to the following standards:
 - A. CSA; and
 - i. CAN/CSA G30.18-M92
 - ii. CAN/CSA W186-M1990
 - B. ASTM International.
 - i. ASTM A82/A82M
 - ii. ASTM A182/A185M
 - iii. ASTM A496/A496M
 - iv. ASTM A497/A497M
 - v. ASTM A775/A775M

- (vii) All concrete materials, testing methods, and construction practices for plain and reinforced concrete shall conform to the following standards:
 - A. CSA; and
 - i. CAN/CSA A23.1/A23.2
 - ii. CAN/CSA A3000 (Consists of A3001, A3002, A3003, A3004, A3005)
 - B. ASTM International.
 - i. ASTM C260
 - ii. ASTM C494/C494M
 - iii. ASTM C1017/C1017M
- (viii) Concrete reinforcement shall conform to CAN/CSA G30.18 M, and welded wire mesh shall conform to CAN/CSA G30.5.
- (ix) Weldable reinforcing steel: CAN/CSA G30.18-M.
- (x) All bent reinforcing bars shall meet the bend test requirements of CAN/CSA G30.18.
- (xi) Joints
 - A. Construction joints
 - i. Waterstop shall be provided for the entire joint between units including invert slab, external walls and roof slab for Structures partially or completely underground. Wall construction joints above invert slab and below roof level shall have a horizontal water seal only.
- (b) Masonry
 - (i) Design of masonry Structures shall be in accordance with CAN/CSA S304.1 and CAN/CSA S6, where they are applicable.
 - (ii) Masonry Structures shall be designed to resist all applied vertical and lateral loads as required by the OBC (and the NBC where applicable). This requirement applies to load-bearing and no- load-bearing masonry.
 - (iii) All concrete materials, testing methods, and construction practices for reinforced and unreinforced masonry shall conform to the following standards:
 - A. CSA

- i. CAN/CSA A23.1/A23.2
 - ii. CAN/CSA A179
 - iii. CAN/CSA A370
 - iv. CAN/CSA A371
- (iv) All masonry walls shall have galvanized horizontal reinforcing.
- (c) Steel
 - (i) Design of cold formed steel Structures shall be in accordance with CAN/CSA S136.
 - (ii) All steel materials shall confirm to the following standards:
 - A. CSA; and
 - i. CAN/CSA G40.20/G40.21.
 - ii. Beam connections, columns, base plates, beams, purlins, girts and sag rods: CAN/CSA G40.20/G40.21-M.
 - iii. Welding materials: CAN/CSA W59-M, and certified by the Canadian Welding Bureau.
 - B. High strength bolts: ASTM A325M, Type 1. Nuts: ASTM A563. Washers: ASTM F436.
 - (iii) Protection of Steelwork
 - A. The minimum thickness of concrete when used as an encasement for steelwork shall be 60mm.
 - (iv) Protective Coatings
 - A. Structural steel members and connections shall be protected against corrosion.
 - B. Acceptable methods of protection are painting and hot dip galvanizing as follows:
 - i. Bolts, nuts and washers used with galvanized Structures shall also be galvanized in accordance with CAN/CSA G164-M92 (R2003).
 - ii. Protection shall be restored when severe damage to the galvanized coating has occurred during welding or as a result of rough handling or abrasion.

- iii. Methods of painting shall be in accordance with CISC/CPMA.
- (d) Metal Deck
 - (i) Design and Performance Requirements
 - A. Design steel deck to CAN/CSA S16, Update No. 1.
 - B. Formed steel sheet: CSSBI 101 M, Grade A and ASTM A653/A653M.
- (e) Metal Studs
 - (i) This section applies to all light gauge metal work
 - A. Include design, manufacture, supply, installation, inspection and testing of load bearing metal studs as described in these performance specifications and summarized in the following elements of the work:
 - i. Load bearing metal studs shall be capable of carrying live, dead, and imposed loads.
 - (ii) Design and Performance Requirements
 - A. Design load-bearing metal studs based on Limit States Design principles using factored loads and resistances. Loads and load factors to be in accordance with the OBC. Resistances and resistance factors to be determined in accordance with the OBC and CAN/CSA S136-M.

ARTICLE 4 MECHANICAL DESIGN CRITERIA

4.1 HVAC

(a) General HVAC Requirements

- (i) DB Co shall provide complete design and construction of HVAC systems for all facilities as required by and in accordance with all referenced codes and standards and where required in the Project Agreement.
- (ii) HVAC equipment shall be screened so as to not be visible from Corkstown Road and the MUP.

(b) Reference Documents

- (i) The design and construction of the mechanical systems shall comply with the criteria contained in this Article, and all standards, regulations, policies, Applicable Law, guidelines or practices applicable to the Project, including but not limited to each of the following Reference Documents. In the event of a conflict between criteria, commitments or requirements contained within one document when compared with another, the more stringent shall apply:
 - A. Ontario Regulation 350/06 OBC;
 - B. NBCC;
 - C. ODA;
 - D. AODA;
 - E. CSA Codes and Standard;
 - F. Model National Energy Code of Canada for Buildings;
 - G. ULC;
 - H. NFC;
 - i. NFPA 70
 - ii. NFPA 90
 - iii. NFPA 91
 - iv. NFPA 130
 - I. ASHRAE Handbooks and Standards; and
 - J. SMACNA.

(c) Design Criteria and Parameters

- (i) The design of HVAC systems shall conform to the requirements of this Article, and all the applicable codes and standards.
- (ii) Noise Criteria
 - A. Mechanical Equipment and systems shall be designed so that the maximum transmitted by the systems do not exceed Ontario health and safety codes, ASHRAE Standards, or the following noise criteria.

Table 5-4.1

| Noise Level Criteria | | |
|----------------------------------|-----------------|---|
| Area | Noise Criterion | Equivalent Air-Weighted Sound Level dB(A) |
| Office and Staff Break Room | NC-40 | 49 |
| Conference Room | NC-35 | 44 |
| Toilet Room and Janitor's Closet | NC-45 | 53 |
| Communication Room | NC-50 | 58 |
| Equipment Room | NC-60 | 67 |
| Shop Areas | NC-60 | 67 |

(iii) Vibration Requirements

- A. All HVAC Equipment shall be designed and installed to eliminate or to reduce the transmission of vibration and noise to any part of the building as follows:
 - i. Provide vibration isolators to mechanical Equipment and components; and
 - ii. Provide seismic restraints for mechanical Equipment or components including ductwork and piping.

(iv) Design Conditions

- A. The design conditions shall be based on ASHRAE Handbook Fundamentals.

(v) Design Parameters

- A. The design parameter shall be based on ASHRAE standards 55, 62.1, 90.1 and 189.1

(vi) Duct Sizing Criteria

- A. Use equal pressure method to size ducts serving air conditioning system, heating and ventilation system, and normal building exhaust system. Use

velocity method for any other system that may require it due to system requirement or noise control or as indicated in the individual system.

(d) HVAC Equipment and Systems

(i) General Requirement

(ii) Design and Performance Requirements

A. Equipment

- i. Select HVAC Equipment containing no CFC refrigerant
- ii. Select HVAC Equipment utilizing refrigerant that will not contribute to ozone depletion and global climate change, such as Refrigerant 410A.
- iii. All HVAC Equipment shall be isolated from the building and anchored for seismic restraint.

B. System:

- i. Design high efficiency HVAC system to meet or exceed ASHRAE 90.1-2007.
- ii. System ventilation Design shall meet ASHRAE 62.1-2007 for indoor air quality.

(iii) Material and Product

- A. All Equipment shall be certified to be installed in Canada and meet the requirements of MNECB.

(e) HVAC Controls

(i) Design and Performance Requirements

- A. All building controllers, application controllers and all input/output devices shall use industry standard protocols.

(f) Testing and Balancing

(i) Performance Requirements

- A. Provide testing, adjusting and balancing by an agency certified by an agency certified by the AABC or NEBB.

4.2 Plumbing and Fire Protection

- (a) DB Co shall provide complete design and construction of plumbing and fire protection systems for all facilities as required by and in accordance with all referenced codes and standards and where required in the Project Agreement.
- (b) Reference Documents
 - (i) DB Co shall comply with all, applicable, municipal, provincial, and federal codes, standards, regulations and best practices.
 - A. Ontario Regulation 350/06
 - B. Ontario Mechanical Code
 - C. CSA Codes and Standard
 - D. NFPA 70
 - E. Ontario Regulation 213/07
- (c) Plumbing Fixture
 - (i) General Requirement
 - A. Provide design, approvals, supply of materials, installation, inspection and testing of works associated with the plumbing fixtures as described in these performance specifications and summarized in the following elements of the Work.
 - i. Urinal: Waterless type urinals are prohibited.
 - (ii) Design and Performance Requirements
 - A. Fixtures and fittings, where applicable, shall be in accordance with requirements of CSA B45 Series.
- (d) Fire Protection System
 - (i) Design of the fire protection systems shall conform to the latest edition of the following applicable codes and standards:
 - A. Ontario Regulation 350/06 OBC;
 - B. Ontario Fire Code (latest issue);
 - C. Ontario Mechanical Code;
 - D. CSA Codes and Standard;

- E. NFC: NFPA 13;
 - F. NFPA 14.
 - i. Provide dry standpipe systems in areas subject to freezing temperature. Provide pressure gauge at top of each standpipe riser. Siamese fire department connection for standpipe shall match connection for sprinkler systems;
 - G. NFPA 20 and
 - H. NFPA 2001.
- (ii) Fire Protection Specialties
- A. Design and performance requirements: All fire extinguishers shall be pressurized (stored pressure) rechargeable type, in accordance with NFPA 10, and ULC listed and labeled for the class of fires for which they are specified.

ARTICLE 5 ELECTRICAL DESIGN CRITERIA

5.1 Introduction

- (a) This article presents the basic electrical design guidelines, codes, and standards references that shall be followed throughout the electrical design process of the LMSF.
- (b) DB Co shall provide complete design and construction of electrical and communication systems for all facilities as required by and in accordance with all referenced codes and standards and where required in the Project Agreement.

5.2 Reference Documents

- (a) The design and construction of electrical Work shall comply with the criteria contained in this Article, and all standards, regulations, policies, Applicable Law, guidelines or practices applicable to the Project, including but not limited to each of the following Reference Documents. In the event of a conflict between criteria, commitments or requirements contained within one document when compared with another, the more stringent shall apply:
 - (i) OBC;
 - (ii) NBCC;
 - (iii) Ontario Regulation 164/99, Current Edition;
 - (iv) CEC, Part I, 21st Ed: Safety Standard for Electrical Installations;
 - (v) ANSI;
 - (vi) ULC;
 - (vii) NEMA;
 - (viii) CSA;
 - (ix) IESNA, Lighting Handbook;
 - (x) ASHRAE 90.1;
 - (xi) City of Ottawa Standards;
 - (xii) NFPA 130;
 - (xiii) ASME A17.1;
 - (xiv) IEEE; and
 - (xv) [REDACTED] Standards.

5.3 Basis for Design

(a) Calculations:

- (i) Lighting-level calculations shall be completed for all interior and exterior spaces occupied by staff.

(ii) Light levels in lux:

| | |
|----------------------------------|-----|
| Offices Meeting & Training Rooms | 500 |
| Corridors | 200 |
| Kitchens | 500 |
| Maintenance Facility | 750 |
| Parking Lots | 35 |
| Utility Rooms | 300 |
| Wash, Shower & Locker Rooms | 200 |
| Stairways | 200 |

(b) An illumination plan shall be completed.

- (i) EA compliant Lighting Treatment Plan, in accordance with municipal standards, shall be prepared during the pre-construction phase. This plan shall include lighting fixtures and illumination along the various sections of the corridor. A lighting audit of the preferred lighting design plan may be conducted to confirm clear sight lines and appropriate illumination. City of Ottawa policy regarding lighting of connections to LRT stations shall be followed. Consideration shall also be given to the use of wavelengths safe for wildlife.
- (ii) The MTO requires illumination plans as part of the development package of any construction within permit control. The MTO requires that there be no light spillover from the development onto the ROW. However, since this development is within the right of way, light shall not spill over onto the existing and future widened Highway 417 travel lanes.

5.4 Functional Requirements

(a) Electrical Service

- (i) The LMSF will receive its service feeder from [REDACTED]. DB Co shall determine whether to receive medium voltage power from the Utility and distribute around the site at this level to pad mounted transformers at the various load points.
- (ii) Primary switching rooms for incoming service shall be:

- A. designed in partnership with [REDACTED] and in accordance to [REDACTED] Specification GCS0002: Primary Voltage Service Specification;
 - B. at grade or within five (5) meters below grade with two walls on the outside to allow ease of access for [REDACTED] incoming feeders and designed for a three (3) hour fire envelope;
 - C. a minimum of 5.5m wide, 9.5m long and a ceiling height of 3.2m; and
 - D. coordinated with [REDACTED] in terms of switchgear location and placement within the rooms.
- (iii) Emergency ventilation or fire suppression Equipment shall be provided a reliable power source or combination of sources. On-site power generation shall be provided as the backup source for these loads. All power sources shall be as approved by the Authority Having Jurisdiction and in conformance with the applicable code.
- (b) Metering
 - (i) Customer-owned metering shall be provided.
 - (ii) Utility revenue metering shall be provided as required by [REDACTED].
- (c) Duct banks, Maintenance Holes and Handholes
 - (i) Duct banks and maintenance holes shall be designed in accordance with the seismic criteria defined for this Project. Duct banks shall be designed to include spare capacity after completion of installation to protect for future growth and expansion. Ducts shall be sloped to maintenance holes to provide adequate drainage. Concrete encasement shall be provided where required by applicable code. Requirements for the installation of additional fibre along the Confederation Line for the use of the City is included in Schedule 15-2, Part 3 – Systems.
 - (ii) Maintenance holes and/or handholes shall be sufficiently sized and provided where access to or installation of cable is necessary.
- (d) Electrical Rooms
 - (i) Electrical rooms shall have sufficient space to house all Equipment. Adequate space shall consider minimum working clearances, conduit entry points and routing, Equipment removal / replacement and ventilation requirements.
- (e) Grounding and Bonding
 - (i) The electrical distribution system shall be solidly grounded.

- (ii) An applicable code compliant grounding electrode system shall be provided.
 - (iii) All non-current-carrying metal enclosures and all alternating current Equipment shall be securely connected to the grounding system.
 - (iv) Avoid natural gas piping and pipe connected to an active cathodic protection system.
- (f) Lighting
 - (i) Emergency fixtures, exit lights and essential signs shall be independently wired from the Emergency lighting panel. Emergency lighting shall be automatically energized upon failure of commercial power. Emergency lighting for stairs and passageways shall be designed to accommodate egress.
- (g) Fire Alarm
 - (i) The fire alarm system shall be analog addressable, non-coded with a general alarm sounding and strobe lights activated in the building when alarm conditions are initiated. Visual and audible alarms shall be initiated at the fire alarm control panel in each building. The central fire alarm control panel shall have the capability to receive alarm, supervisory and trouble signals from all buildings. Sprinkler systems and post indicator valves will be monitored by the fire alarm system, with water flow initiating a general alarm. The panel shall be provided with a dialer for calls of alarm and trouble conditions. A remote annunciator shall be placed in the lobby at the fire department's designated show-up location to aid in their locating the fire. The system shall be integrated with system wide fire alarm system.
- (h) Emergency and Standby Power System
 - (i) The critical loads of the electrical system shall be designated as an Emergency system as defined in CSA C282 and shall meet IEEE standard 446.
- (i) Emergency and Standby Power Sources
 - (i) The Emergency generator connections shall be able to assume the entire load of the Facility during critical events including 25% spare capacity for future growth. The Emergency generator shall comply with local noise and emissions requirement and the required approvals shall be obtained by the DB Co from Governmental Authorities.
 - (ii) The Emergency generator shall be designed in correlation with the UPS system to ensure the quality required for the MYCC.
 - (iii) Transient voltage surge suppression shall be provided for the generator output.

- (iv) Provide manual synchronization means beyond the automatic synchronization control for the back-up generator.
 - (v) All UPS systems shall be of the online, double conversion type, and shall be equipped with automatic static bypass switches, as well as an external manual maintenance bypass.
 - (vi) Emergency power feeders shall be rated for 2 hours either through the use of fire-rated cables/wiring or embedment in concrete.
 - (vii) Non-life safety loads shall automatically and instantaneously be shed in the event of generator overload.
 - (viii) Generator, fire pumps and main life safety switchboards shall not be located below grade.
 - (ix) The Emergency generator shall be diesel generator compliant with the requirements of CSA C282.
 - (x) Standby fixed mounted engine generator shall be installed in a conditioned indoor space (heated and ventilated) or outdoors, a completely enclosed weatherproof/sound attenuated housing to protect the generator from adverse weather conditions and reduce sound levels for surrounding residential neighbourhoods shall be provided. The generator shall be mounted on spring isolators with a floating floor, or equivalent means, to minimize the transmission of vibration. Enclosure shall have critical grade silencing suitable for residential installation. DB Co design shall follow NEMA/IEC enclosure/environmental protection standards.
 - (xi) The Emergency power generator shall be located in the area easily accessible for maintenance and refuelling.
 - (xii) Provide 120V/20A GFCI outlets around back-up diesel generators from UPS to provide power in the event of a concurrent generator and utility failure.
 - (xiii) Automatic transfer switches serving life safety loads shall be equipped with means of bypass to both sources
 - (xiv) When second Utility power source is selected, Emergency lighting, fire alarm and other Emergency equipment loads shall be connected to a UPS or battery system as required for loads classified as “emergency level 1”.
 - (xv) BACS – The BACS system within the LMSF shall provide supervisory control of the shop Traction Power System, LMSF electrical and mechanical systems, and communications subsystems. It shall be compatible with the SCADA system and supervision from the MYCC.
- (j) Automatic Transfer Switches/Load Bank

- (i) Multiple ATS shall be provided to transfer loads between the normal power system and the emergency power system. Loads shall be assigned to the ATS in accordance with CSA C282. Provide a load bank to allow exercising the generator under load without interruption of the building emergency loads. The load bank shall be sized at 100% of the maximum generator rating and shall have a step load capability in increments of 25%, 50%, 75% and 100% of the load bank rating.
- (k) Emergency Loads
 - (i) The crane and other Vehicle maintenance facility equipment do not require full generator support for continued operation, but a method to lower the cranes need to be identified whether it is mechanical, hydraulic pressure release, or control voltage which may require Emergency power.
- (l) UPS System
 - (i) Loads which cannot tolerate more than a ¼ cycle interruption shall be provided with internal or dedicated battery backup and/or connected to a central UPS or inverter system. These loads shall include, but are not limited to:
 - A. Fire alarm systems (inverter);
 - B. CCTV systems (UPS);
 - C. Yard control systems (inverter);
 - D. Telecommunications equipment (UPS);
 - E. ETEL (UPS);
 - F. AC/DC switchgear controls (inverter);
 - G. Emergency lighting and signage (inverter);
 - H. BMS PLC (UPS); and,
 - I. Access control (UPS).
 - (ii) The building UPS/inverter systems shall be sized to serve the anticipated demand load plus spare capacity of 25%. The UPS/inverter batteries shall be sized to carry the maximum UPS rated load for a period of 90 minutes. DB Co shall submit calculations which support the proposed size of the UPS/inverters and batteries. The UPS/inverter input shall be fed from the generator or the secondary utility feed for continued operation following the rated load period of 90 minutes.

ARTICLE 6 TRACKWORK

6.1 Order of Precedence

(a) General

(i) The design and construction of Trackwork shall comply with the criteria contained in this Article, and all standards, regulations, policies, Applicable Law, guidelines or practices applicable to the Project, including but not limited to each of the following Reference Documents. In the event of a conflict between the criteria, commitments or requirements contained within one document when compared with another, the more stringent shall apply:

A. AREMA Track Standards, unless otherwise approved, or approved equivalent; and

B. The criteria in TCRP Report 57 may be used as a source for proposed alternative requirements.

6.2 General Requirements

(a) The scope of the Trackwork includes all Works related to the design and construction of a complete light rail yard for the maintenance and storage facility as specified herein. This includes, but is not limited to, the design, supply, installation, and testing of Yard Tracks and any and all related incidentals.

(b) The scope of the Special Trackwork consists of all Works related to the complete construction of Special Trackwork as described in these Output Specifications. This includes, but is not limited to, the design, supply, and installation of Special Trackwork, including all turnouts, adjoining Trackwork, fastening components, and all other Track materials.

(c) The limits of the yard begin at the points of switches for the yard Special Trackwork that designate the end of the LMSF connection Tracks and the beginning of the Yard Tracks.

(d) Grade

(i) The maximum grade on Storage Tracks shall be 0.3%.

(e) Horizontal curves shall not be less than 35m radius and vertical curves not less than 30m length crest and sag on the LMSF Tracks.

6.3 Operational Requirements

(a) Yard Tracks designed to hold or store full-length Trains clear of other Tracks and Structures shall accommodate the maximum Train consist between clear points, defined as the location where Track centres between two diverging Tracks from a given turnout are exactly 4m.

- (b) Track at handoff platform(s) shall be level or of sag geometry aligned to prevent unintended movement of Vehicles when stationed at the platform for operator access.

6.4 Track Types

- (a) General

- (i) The Track Structure shall be built to 1435mm Track gauge.
 - (ii) The running rails of all Track, including Special Trackwork, shall be electrically isolated from the ground.
 - (iii) The rail length shall be 23.8m, which will be used to establish the CWR.

- (b) Ballasted Track

- (i) Yard ballasted Track shall utilize timber or precast concrete crossties with a resilient rail fastening system.
 - (ii) Crushed stone or other material shall conform to AREMA ballast specifications.
 - (iii) The particle size requirements shall conform to AREMA requirements in relation to the crushed stone ballast, class number 4A.
 - (iv) Minimum depth of ballast below the bottom of ties under the running rail shall be 225mm. Shoulder ballast shall extend a minimum of 300 mm beyond the ends of ties before sloping at 2:1 to the sub-ballast.
 - (v) Ballast shall be well drained and shall not contact the running rails (25mm minimum clear) for mitigation of stray current and loss of shunting or calibration with signal systems.

- (c) Asphalt Concrete Paved Track

- (i) Paved Yard Track shall be utilized for grade crossings with site roadways, service aisles, cart paths.
 - (ii) Compacted asphalt shall be placed to embed the rails to top-of-rail elevation. Gaps shall be left on the inside of the rails for wheel flange ways. Rail shall be isolated from asphalt.

- (d) Embedded Track

- (i) Embedded Yard Track shall, except for gaps formed for wheel flange ways, consist of the rails fully embedded in concrete to top-of-rail elevation.
 - (ii) The embedment concrete and base slab concrete shall be designed to support and hold the rails in place to the correct Alignment, profile, and Track gauge.

- (iii) Embedded Track shall be utilized in the shop buildings and aprons immediately outside of buildings.
 - (iv) Embedded Track design shall include provisions for providing resiliency and electrical isolation between the rail and concrete slab.
 - (v) Embedded Track shall be drained.
 - (vi) Rails embedded in concrete require gauge flangeways and field side rail wear relief.
- (e) Pedestal Track
 - (i) Pedestal Track shall be utilized in pit areas of the shop building.
 - (ii) Rails shall be supported on short steel columns and fastened with crane rail clamps.
- (f) Direct Fixation Track
 - (i) DF Track shall be utilized in the car wash area of the shop building.
 - (ii) Rails shall be fastened to a concrete pedestal (plinth), leaving the rail fully exposed and isolated for stray current protection and fastened with crane rail clamps.

6.5 Track Materials

- (a) General
 - (i) Materials identified in the following sections shall be used for all Track construction.
- (b) Rail/115 lb. RE
 - (i) Supply rail that meets:
 - A. AREMA Volume 1, Chapter 4, Part 2; and
 - B. ASTM A1.
 - (ii) Second-hand Rail
 - A. Second-hand, or relay rail shall not be used.
 - (iii) Rail Lengths
 - A. All rail shall be CWR.

- B. Rail length to be provided is 23.8m, which will be used to establish the CWR.
- (c) Restraining Rails
 - (i) DB Co shall install restraining rails against the gauge side of the low rail for all mainline horizontal curves with a radius of 145m or less. Restraining rail is not required on Tracks within yards operating at or below yard speed.
 - (ii) Restraining rail shall be electrically isolated from running rail in order to maintain broken rail protection.
- (d) Rail Joints
 - (i) DB Co shall supply insulated glued joints for 115lb RE rail manufactured to AREMA standards.
 - (ii) Rail joints must be electrically tested prior to and after placement in Track.
- (e) Rail Bonding
 - (i) DB Co shall supply and install rail bonds that meet AREMA specifications in Volume 3, Chapter 33, Parts 7 and 12.
 - (ii) Rails shall be welded in continuous lengths and bolted joints must be electrically bonded.
 - (iii) At locations requiring insulated joints, the Traction Power direct current continuity of negative rails must be maintained by use of impedance bonds.
 - (iv) Rail shall be isolated from all Pavement.
- (f) Switch Clearing Device
 - (i) Switch clearing devices shall be supplied and installed by DB Co at Special Trackwork locations. DB Co shall provide conduits and junction boxes and other supporting Infrastructure for these devices.
 - (ii) DB Co shall provide switch clearing devices that are proven in railway industry and meet accepted industry standards and do not compromise safety.
 - (iii) Additional separate controlled heating that can melt snow in the critical switch areas shall be provided. Switch heaters shall be gas fired.
- (g) Switch Machines and other Turnout Appliances
 - (i) Switch machines and other associated Equipment shall be provided and installed by DB Co.

- (ii) DB Co shall allow for the location of trackside terminal boxes, which shall be located near the switch machine. Terminal boxes shall not be located within a position that would restrict the ability of maintenance personnel to maintain or manually throw the switch.
 - (iii) Switch machines shall be positively drained.
- (h) End-of-Track Devices (Bumping Posts)
 - (i) These devices shall be mounted near the end of Track on stub-end storage Tracks. The end-of-Track device shall meet the following requirements:
 - A. It shall be capable of stopping an unoccupied Train travelling at 10km/h;
 - B. It shall be suitable for permanent exterior exposure;
 - C. It shall engage the vehicle symmetrically about the coupler at bumper height;
 - D. It shall have a cushioned face and not produce any damage to a vehicle at vehicle speeds less than 5 km/h. DB Co shall coordinate the design of the stopping device to ensure engagement to the car is adequate to prevent damage; and
 - E. Upon approval(s), DB Co shall procure and install the approved end-of-Track devices as part of the Works.
 - (ii) Rail-mounted wheels stops shall be used at the ends of shop Tracks to impede the travel of any car beyond the end of the Track(s).

6.6 Special Trackwork

- (a) General
 - (i) All Special Trackwork shall be supplied and installed by DB Co. Special Trackwork assemblages include all materials necessary for construction.
 - (ii) All Special Trackwork joints shall be butt welded in-field except where DB Co can demonstrate that space does not permit. At these locations thermite welds performed in accordance with manufacturer's weld procedures are acceptable. Compromise welds shall be considered part of the Mainline Track conditions and installation. No holes, for temporary joint installation, or otherwise, shall be permitted within 150mm of the weld location.
 - (iii) All turnouts shall utilize curved switch points.
 - (iv) Special Trackwork components shall be based on AREMA specifications for turnout construction.

- (v) All components shall be designed so that the specified tolerances can be maintained throughout the operating life of the Special Trackwork with minimal maintenance.
 - (vi) Turnouts and switch machines shall be drained.
- (b) Types of Special Trackwork
 - (i) Turnouts
 - A. Provide minimum #6 turnouts within the yard.
 - B. All yard turnouts shall be power operated.

6.7 Track Construction Tolerances

- (a) Verification of the Track installation shall include a Trackstar Geometry Test (or equivalent).
- (b) Clearances shall be verified by laser measurement using an L-Kopia vehicle (or equivalent).

ARTICLE 7 COMMUNICATION AND PA SYSTEM

7.1 General Requirements

- (a) DB Co shall ensure that the communication systems and PA system for the LMSF provide support to the City and Project Co operations. The communications systems for the LMSF shall include the following:
 - (i) CTS;
 - (ii) MYCC;
 - (iii) Yard/shop PA system;
 - (iv) CCTV;
 - (v) Telephone system;
 - (vi) IT Infrastructure System;
 - (vii) SCADA which includes;
 - A. Traction Power SCADA; and,
 - B. LMSF BMS.
 - (viii) Intrusion Access Control; and
 - (ix) Train-to-wayside wireless communications.

7.2 Operational Description

- (a) CTS Interface – DB Co shall provide an interface to the CTS, which provides hi-speed fiber optic communications transmission for the various communications subsystems at the LMSF, including CCTV, PA, telephone, IAC, train-to-wayside communications, BMS, and SCADA systems.
 - (i) DB Co shall provide dual redundant hi-speed network nodes located at the main control room in the LMSF for sending and receiving voice and data information to the TOCC, BCC, BYCC and MYCC.
 - (ii) All backup for the system servers shall be located at the BCC at 805 Belfast MSF. DB Co shall provide data connectivity to the City's IT service for connectivity to the BCC at the Belfast MSF. Data connectivity between the TOCC at 875 Belfast and the BCC at 805 Belfast already exists.
- (b) LMSF PA System – The LMSF shall be equipped with a PA loudspeaker system that shall allow personnel at the MYCC to make announcements throughout the facility concerning Train movements, maintenance, and repair operations in the yard shop. The

system shall operate within local regulations and applicable laws with respect to ambient noise.

- (c) CCTV – CCTV cameras shall be deployed strategically throughout the LMSF to provide visual images of the LMSF to be viewed at TOCC, BCC, BYCC and MYCC. The CCTV system shall use video analytics and/or intrusion detection systems to detect if people or objects have made unauthorized entry into the LMSF Tracks including the yard wye and road crossings into the facility. The CCTV system shall be capable of monitoring Train movements throughout the yard. Additionally DB Co shall furnish and install two local CCTV PTZ cameras to inspect the Train roof/pantograph, with a CCTV workstation at floor level of the S&I Track. The final locations and arrangement shall be determined by the City.
- (d) Telephone System – DB Co shall provide maintenance telephones and administration telephones for all the offices and equipment rooms, including the MYCC, TPSS, signal equipment rooms, and electrical equipment rooms. DB Co shall provide an interface to the Existing Confederation Line PBX for the management and routing of the telephone extensions.
- (e) IT Infrastructure – An IT infrastructure shall be provided to support the daily office operations of the City and Project Co including desktop workstations, printing equipment, and teleconferencing equipment.
- (f) SCADA – The SCADA systems required for the LMSF includes the following subsystems:
 - (i) Traction Power – The Traction Power SCADA shall be an on-line, real-time, interactive system operated by TOCC, BCC, BYCC and MYCC personnel at the maintenance console to monitor and control power distribution and equipment. The shop Traction Power System shall include the shop TPSS, traction interlock systems, traction Emergency trip systems, shop Traction Power switch status and shop stinger system monitoring and control.
- (g) LMSF BMS – The BMS system within the LMSF shall provide supervisory control of the shop Traction Power System, LMSF electrical and mechanical systems, and communications subsystems. It shall be compatible with the Confederation Line SCADA system and supervision from the TOCC, BCC, BYCC and MYCC.
- (h) Voice/Data Radio System – The City and DB Co shall utilize the existing and planned Public Safety Service Radio System for its operations. DB Co shall procure from the Radio Supplier and install the dispatch workstations required in the MYCC. DB Co shall work with the Radio System Supplier to determine quantity and functionality required to efficiently operate and maintain the system. One full Voice/Data Radio System touchscreen radio console shall be procured and installed in the MYCC.
- (i) IAC – The IAC system shall control access and provide for detection of intrusion into entrance points of the LMSF. Intrusion sensor activation shall sound an audible alarm

locally and trigger an alarm notification for unauthorized entry or tampering to the TOCC, BCC (when active), BYCC and MYCC.

- (j) Train-to-wayside wireless System – A Train-to-wayside wireless system enabling wireless transmission of data from one device to a receptor within a limited range shall be provided in the LMSF. This system shall support the transfer of Train diagnostics, passenger counts, and the transfer of recorded video between the Trains and the data servers located within a secure data room.

7.3 Performance Requirements

(a) CTS

- (i) The LMSF CTS shall utilize the same network topology as the main Confederation Line CTS.
- (ii) The CTS shall provide hi-speed dual redundant fiber optic data connectivity to the TPSSs within the LMSF, MYCC, TOCC, BCC and main LMSF communications room.

(b) MYCC

- (i) The functions within the MYCC for operation and control of the LMSF shall include CCTV, IAC, PA, SCADA, Voice/Data Radio System Radio System and BMS monitoring of the electrical substation, sump pumps, pump systems, ventilation systems, car wash, cranes, lifts, wheel trueing, shop TPSS, Emergency trip system, Traction Power interlock system, shop Traction Power switch position, yard Train Control system controlling all Yard Track switch movements, monitoring of all Yard Track switch movements, monitoring of vehicles in yard, monitoring of vehicles within the yard and up to the Yard lead demark for turn over to mainline operations. In addition, the MYCC shall have access to maintenance monitoring, reporting and scheduling, defect reporting, vehicle scheduling, rostering of drivers, and status of in service fleet.
- (ii) Three wall mounted displays shall be provided which are capable of displaying various CBTC and SCADA displays as required by MYCC staff.
- (iii) The MYCC shall contain two workstations capable of administration of all LMSF communications systems. Functions shall vary based upon the responsibility and access rights of the person who is logged on at that workstation at any given time.
 - A. Workstations shall include visual displays, keyboards, telephones, headset connection and headset, microphone, printer, and portable radio station.
 - B. The workstations shall have a yard GUI installed which shall provide a graphic representation of the Track layouts and switch positions, power status, vehicle location and identification, CCTV images of the yard, logs

of maintenance, SCADA status, report generation daily logs, and security status.

- (iv) The MYCC shall contain three 40" wall mounted displays capable of administration of all LMSF communications systems. Functions shall vary based upon the responsibility and access rights of the person who is accessing the displays at any given time.

(c) Yard/Shop PA System

- (i) Announcements shall be addressed to single and multiple zones within the LMSF. Separate zones with separate amplifying channels and speaker systems shall be accessible individually or in combination. Zones shall be defined by operational needs and announcement sound levels shall be within applicable codes and standards.
- (ii) The LMSF PA system shall maintain a uniformly distributed sound level not less than 60dB plus or minus 30 degrees off axis, 1 meter above the floor, at Vehicle ambient noise level.
- (iii) Automatic gain adjustment of the PA system shall be provided based upon ambient noise levels captured by ambient noise sensors. The system shall adjust volume and clarity in proportion to the increase in noise level from a preset quiet level.
- (iv) The PA system shall be fully supervised with failure annunciation at the MYCC of all major system components such as preamplifiers, power amplifiers, supervision detectors, and power supplies.

(d) CCTV

- (i) The CCTV system camera views shall comply with any Applicable Law.
- (ii) The CCTV system cameras within the LMSF shall be capable of being controlled from the MYCC, TOCC, BCC (when active) or BYCC.
- (iii) The system shall include both fixed and PTZ cameras. Cameras shall be rated for the environment installed, including day/night capabilities, heater/blower, appropriate housing, etc.
- (iv) Camera locations shall be strategically selected to view the following, ensuring the views are clear, unobstructed, and not impaired by Structures, signage, foliage, intense lights, or any other obstacles:
 - A. All areas of the LMSF exterior and perimeter;
 - B. Entrances and exits to LMSF buildings and access controlled locations;

- C. Entrances to yard wye, access roads and pedestrian access through perimeter fence; and
 - D. All maintenance activities that require safety and security.
 - (v) The CCTV system shall have video analytics and/or intrusion detection systems to detect if there has been unauthorized entry into the LMSF Track areas within the perimeter fence.
 - (vi) The CCTV system shall interface to the IAC system. The CCTV system shall be capable of automatically displaying the best view of an access control device at MYCC, TOCC, BCC (when active) or BYCC automatically either via fixed camera or PTZ preset, upon activation of an IAC system. The system shall be capable of overriding the automatic panning if necessary.
 - (vii) All CCTV video shall be recorded and stored digitally for a minimum of 30 days. The system shall automatically archive all alarm events automatically detected to the Existing Confederation Line's head-end storage system.
 - (viii) The system shall capture, record, store, download, view (playback), and allow monitoring of all CCTV cameras. The system shall be capable of providing simultaneous viewing, recording, and playback.
 - (ix) The resolution and clarity of captured images shall be maintained under a range of lighting conditions from darkness (>10 lux) through bright sunlight while ensuring optimal picture quality.
 - (x) The system shall safeguard and maintain authenticity of the video images using security techniques such as digital image watermarking or encryption and shall be able to demonstrate a chain of custody for data that will be used as evidence in a court of law.
 - (xi) All cameras shall have a camera identity displayed so that image loss can be detected.
 - (xii) The system shall be capable of configuring recording rate and resolution individually for each camera locally or remotely.
 - (xiii) The system shall store all recorded images in an industry accepted standard authenticated format. At a minimum, the system shall be capable to support MPEG4 and H.264 video formats.
- (e) Telephone System
- (i) The telephone system, at a minimum, shall provide maintenance telephones located in communications rooms, electrical equipment TPSSs, signal equipment rooms, and the MYCC.

- (ii) The system shall provide clear and intelligible communication suitable for the environment the telephones are installed in.
 - (iii) The telephone system shall be fully compatible with the Existing Confederation Line's telephone system. The Existing Confederation Line's PBX shall provide call routing and processing for all telephones in the LMSF.
- (f) SCADA System
 - (i) The SCADA systems within the LMSF shall be capable of being controlled from the MYCC, BYCC, TOCC or BCC (when active).
 - (ii) The SCADA system shall facilitate the transmission of indications and alarms from the RTUs to the TOCC, BCC or MYCC as described previously via the CTS. Transmissions shall include:
 - A. Traction Power alarms, indications, and control signals.
 - B.
 - C. Facility power alarms, indications, and control signals.
 - D. Communications Systems alarms, indications, and control signals.
 - E. Lighting controls, auxiliary equipment monitoring such as HVAC and electrical equipment.
 - (iii) Indications transmitted from the RTUs to the processors shall be processed to provide monitoring information to all required subsystems, generate commands to be transmitted back to the RTUs, provide information for displays and alarm processing at the control consoles, and store information and historical data for future processing.
 - (iv) For each remote location, the SCADA system shall display the following items on the SCADA monitoring workstations:
 - A. Current system and subsystem status
 - B. Control panel status
 - C. Remote control RTU functions
 - D. Alarm handling and fault resets
 - E. Historical event logging
 - (v) RTUs shall operate in a full-duplex mode in which each continuously scans and reports the status of indicators and commands.

- (vi) Each RTU shall be designed to interface to the CTS. The RTU shall have electrical isolation between the system inputs/outputs and the CTS units.
- (vii) Each remote, monitored location shall contain a local human-machine interface for local alarm annunciation and system local control.
- (viii) Emergency conditions shall immediately be displayed within 3 seconds on the operating displays in TOCC, BCC, MYCC and BYCC to permit the monitoring of device actions.
- (g) Radio Communications
 - (i) The radio communications system shall provide full radio coverage of the LMSF, indoors and outside to support operations, maintenance, security and management personnel. A dispatch console with connectivity to the City's Radio Control Centre shall be installed in the MYCC.
- (h) Cellular System
 - (i) A cellular system shall provide full cellular coverage of the LMSF, indoors and outside.
- (i) Intrusion Access Control System
 - (i) The IAC systems within the LMSF shall be capable of being monitored from the MYCC, BYCC, TOCC and BCC (when active).
 - (ii) The system shall provide controlled access and detect intrusion of the following:
 - A. TPSS;
 - B. Signal equipment rooms;
 - C. MYCC;
 - D. CER;
 - E. External doors, entrances and exits of the LMSF; and
 - F. Yard perimeter and access gates including the yard wye.
 - (iii) All cardholders shall have access based on facility, card reader, time, and day. The system shall allow Project Co or the City to define access levels and apply them to any or all cardholders. Access authorization shall be denied by credential holder, time of day, group of staff, shift, and any additional characteristics that are identified by the system controller database.
 - A. Access cards shall be provided by DB Co to approved City staff for entry into the LMSF, CIHs, TPSS, and vent plants.

- B. Access cards shall be provided by the City to Project Co staff for entry into private station areas, the TOCC and BCC (when active).
- (iv) The IAC system which is interfaced with the CCTV system shall provide staff within the TOCC, BCC, BYCC and MYCC with the display of video of the nearest CCTV camera providing coverage of that area, upon activation of an IAC alarm.
- (j) Train-to-Wayside Wireless System
 - (i) The Train-to-wayside wireless system shall provide all Vehicles with a wireless data connection at the LMSF for the data transfer of Train diagnostics, passenger counts and recorded video from the NVR.
 - (ii) The Train-to-wayside wireless system shall be an extension of the CTS. A LAN connection shall be provided between the wireless access points and the nearest communications room in order to connect to the CTS WAN.
 - (iii) The system shall provide the latest wireless technology standards with backwards compatibility of established standards as needed. The system shall be fully compatible with the Vehicle systems.
- (k) Systems Infrastructure Interface
 - (i) Each communications system element has a requirement for both power supply and data transmission. DB Co shall supply and connect the power requirements necessary for each communications device to operate properly in accordance with appropriate codes to each device location in a raceway system. DB Co shall supply and connect the data transmission requirements necessary for each communications device to operate properly to each device in a raceway system.

ARTICLE 8 VEHICLE SERVICE EQUIPMENT

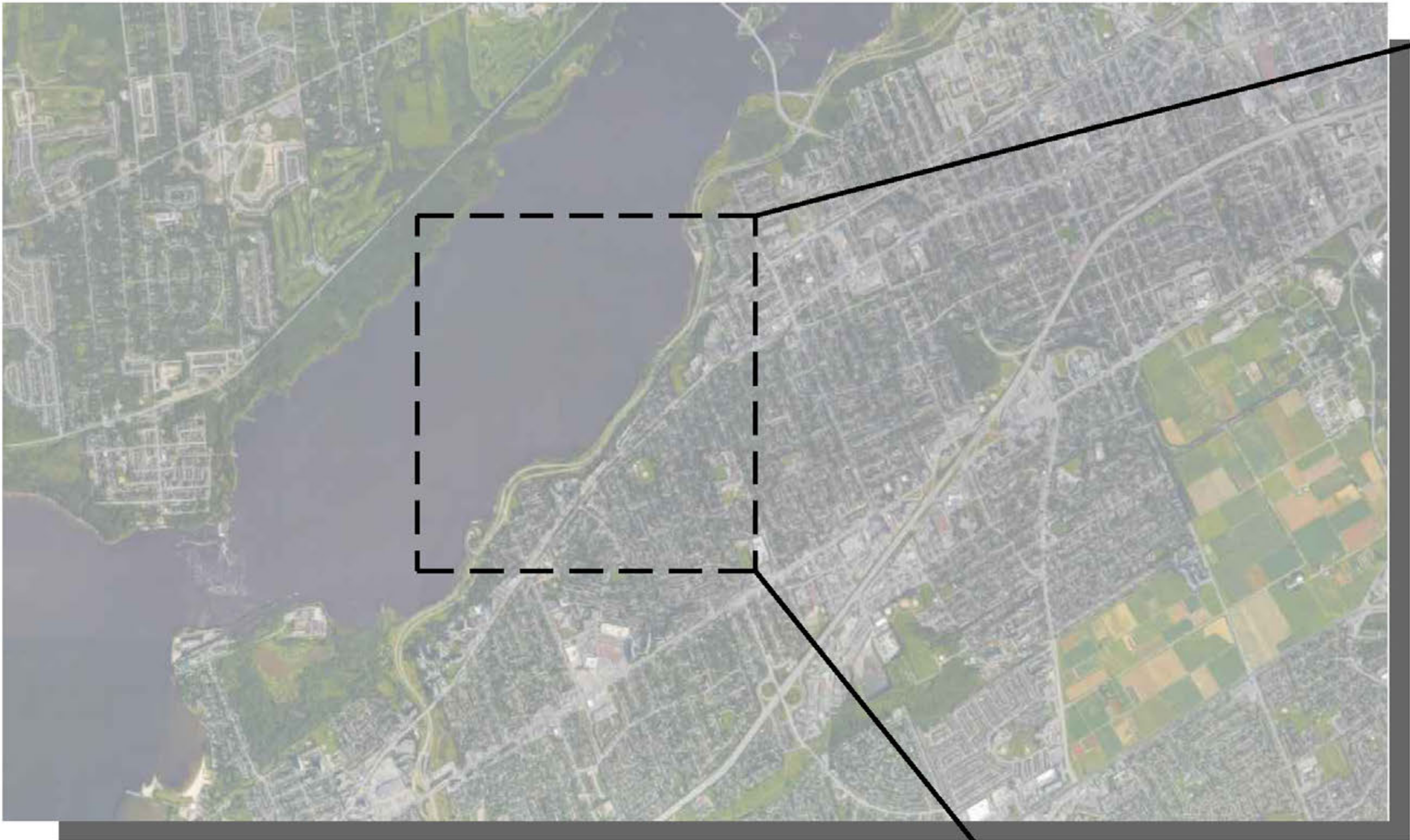
8.1 Overview

- (a) DB Co shall provide all equipment, accessories, materials, etc., and building systems required for the maintenance requirements of the Vehicles.
- (b) DB Co shall supply and install equipment as listed in Schedule 36 – Interface Agreement, Appendix 2.

8.2 Baseline Requirements for Industrial Equipment

- (a) This section sets forth baseline requirements that apply to all Vehicle service Equipment defined herein.
- (b) General Requirements
 - (i) Equipment shall be manufactured, installed and operated in accordance with all industrial and safety standards (or portions thereof) that apply to the Work, including but not limited to:
 - A. CCOHS;
 - i. OHSA
 - B. CSA;
 - i. CSA Standard C22.2 No 94
 - ii. CSA Standard C390-10
 - iii. CSA W47.1
 - iv. CSA W59
 - C. CEAA;
 - D. CGSB;
 - E. CISC;
 - F. CWB;
 - G. NBCC;
 - H. NFCC;
 - I. NPCC;

- J. OBC; and
 - K. OESC (Ontario Regulation 164/99).
- (ii) Labeling
- A. Manufacturer shall securely attach in a prominent location on each major item of Equipment a noncorrosive, indelible nameplate showing manufacturer's name, address, model number, serial number, and pertinent utility or operating data.
 - B. All electrical Equipment and materials shall be new and shall have attached labels attesting to CSA or Electrical Safety Authority approval, in categories for which standards have been set by that agency and labeled as such in the manufacturer's plant.



SIR JOHN A. MACDONALD
RIVERFRONT LINEAR PARK

LANDSCAPE PLANS - SOUTH OF SJAM (12/03/18)

| PAGE | TITLE / TITRE |
|-------|--|
| LA-01 | LANDSCAPE PLANS SOUTH OF SJAM - ZONE 1 |
| LA-02 | LANDSCAPE PLANS SOUTH OF SJAM - ZONE 2 |
| LA-03 | LANDSCAPE PLANS SOUTH OF SJAM - ZONE 3 |
| LA-04 | LANDSCAPE PLANS SOUTH OF SJAM - ZONE 4 |
| LA-05 | LANDSCAPE PLANS SOUTH OF SJAM - ZONE 5 |
| LA-06 | LANDSCAPE PLANS SOUTH OF SJAM - ZONE 6 |
| LA-07 | LANDSCAPE PLANS SOUTH OF SJAM - ZONE 7 |
| LA-08 | LANDSCAPE PLANS SOUTH OF SJAM - ZONE 8 |
| LA-09 | (NOT IN CONTRACT) LANDSCAPE PLANS SOUTH OF SJAM - ATLANTIS PARKING LOT PLANTING PLAN |
| LA-10 | LANDSCAPE PLANS SOUTH OF SJAM - DETAILS 1 |
| LA-11 | LANDSCAPE PLANS SOUTH OF SJAM - DETAILS 2 |
| LA-12 | LANDSCAPE PLANS SOUTH OF SJAM - DETAILS 3 - TYPICAL AT GRADE CROSSING |

KEY PLAN / PLAN DE LOCALISATION

- 

director - Claude Robert - directeur

- Grading of proposed path shall match grades of existing path except where agreed upon LRT and parkway realignment/regrading requires the path grades to change, with approval of NCC. The Commission requires that contour grading along the pathway be established to respect UA requirements.
- All damages areas to be reinstated by contractor
- Underground locates to be completed prior to any excavation
- NCC to provide seeding bed layout and pathway coordinates once city has confirmed parkway alignment.
- South trail offset plant materials 2.5m from centreline

LOW MAINTENANCE LAWN: 'INDIGO GRAMINS' SEED PLANTING WITH 'INDIGO GRAMISEL' ALONG 2M OFFSET OF ALL PARKWAY EDGES

65% 'INDIGO-ULTRA POLINISATION' MIXED WITH 35% 'INDIGO-PLANTES MELLIFÈRES'

CUSTOM SEED MIX (TYPE 1 - COOL)

CUSTOM SEED MIX (TYPE 2 - WARM)

EXISTING TREES

PROPOSED CONIFEROUS TREE

PROPOSED DECIDUOUS TREE

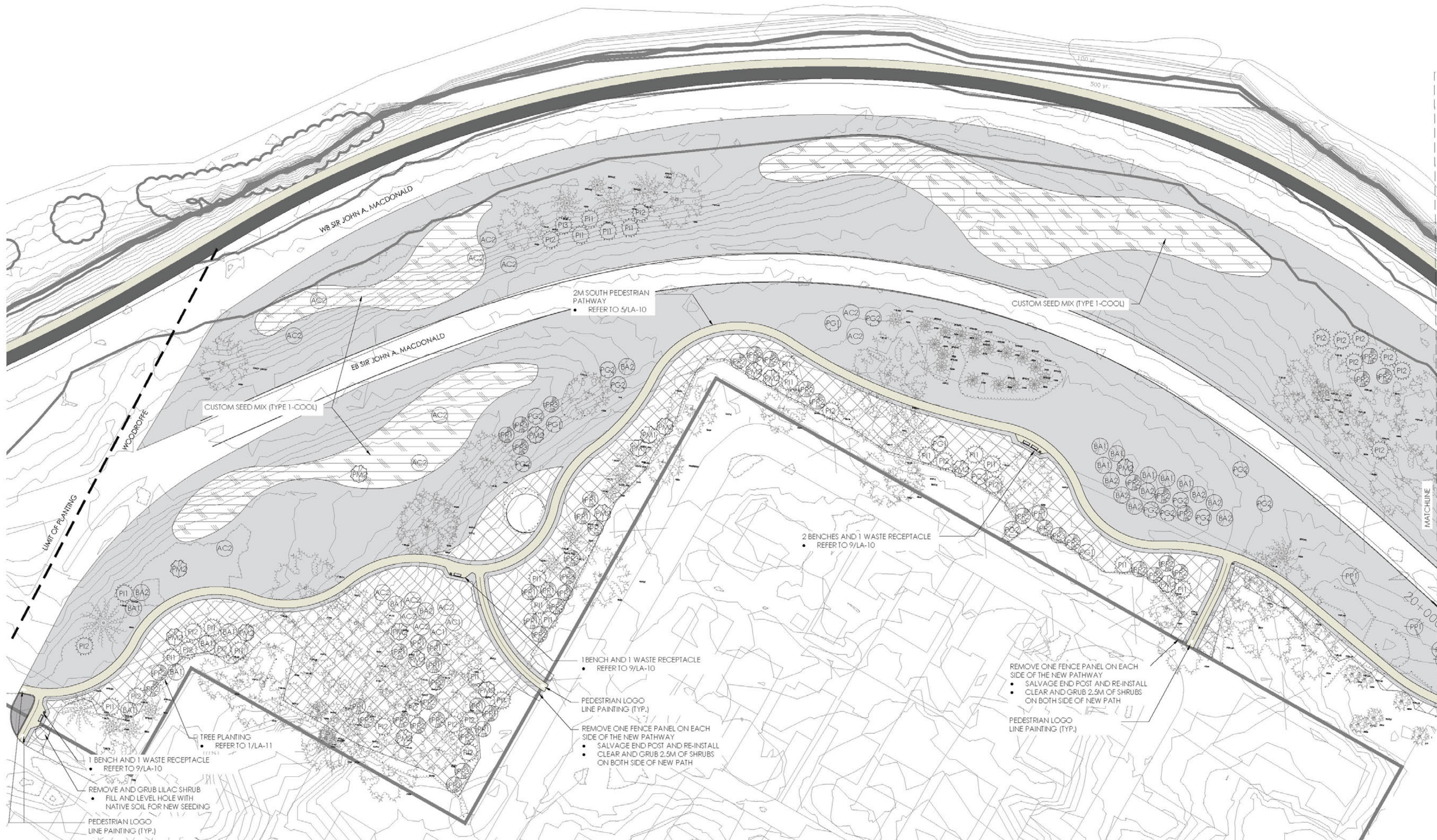
| issued or revised émis ou révisé | | |
|-------------------------------------|-------------------------|----------|
| no. | description | date |
| 5 | RESUBMIT REVISED SJAM | 12/03/18 |
| 4 | REVISION 3 | 22/02/18 |
| 3 | REVISION 2 | 05/05/17 |
| 2 | REVISION 1 | 12/04/17 |
| 1 | 100% DESIGN DEVELOPMENT | 06/02/17 |

SIR JOHN A. MACDONALD
RIVERFRONT LINEAR PARK /
PARC LINÉAIRE RIVERAIN
SIR-JOHN-A.-MACDONALD

LANDSCAPE PLANS
SOUTH OF SJAM - ZONE 1

| | | |
|--|--------------------------------|------------------------|
| approved by approuvé par | S.FISHER | |
| designed by conçu par | S.FISHER/ S.DEGUIRE | |
| drawn by dessiné par | S.DEGUIRE | |
| date | 13/09/16 | scale échelle 1:500 |
| NCC project no. no. du projet de la CCN | sheet no. no. de la feuille | |
| DC 5205-16 | | LA-01 |

| SYM. | BOTANICAL NAME | COMMON NAME | QTY. | SIZE | REMARKS |
|------|------------------------|------------------|------|------------------|---------|
| | DECIDUOUS TREE | | | | |
| AC1 | Acer saccharinum | Silver Maple | 2 | 2m HT | 4m O/C |
| AC2 | Acer saccharinum | Silver Maple | 15 | 2.5m HT | 4m O/C |
| BA1 | Betula alleghaniensis | Yellow Birch | 12 | 2 stem 40mm WB | 4m O/C |
| BA2 | Betula alleghaniensis | Yellow Birch | 10 | Cu. ing. 50mm WB | 4m O/C |
| PG1 | Populus grandidentata | Largetooth aspen | 4 | 1.5m HT | 4m O/C |
| PG2 | Populus grandidentata | Largetooth aspen | 13 | 2.5m HT | 4m O/C |
| | CONIFEROUS TREE | | | | |
| PI1 | Picea Glauca | White Spruce | 21 | 1.5 HT | 4m O/C |
| PI2 | Picea Glauca | White Spruce | 22 | 2m HT. | 4m O/C |
| PI3 | Picea Glauca | White Spruce | 1 | 3m HT. | 4m O/C |
| PM1 | Picea Mariana | Black Spruce | 2 | 1.5m HT | 4m O/C |
| PM2 | Picea Mariana | Black Spruce | 16 | 1.75m HT | 4m O/C |
| PR1 | Pinus resinosa | Red Pine | 15 | 1.75m HT | 4m O/C |



GENERAL NOTE:
• EXISTING SOUTH ASPHALT PATHWAY AND GRANULAR BASE REMOVAL IS INCLUDED IN THIS CONTRACT
• REFER TO SEED SPECIFICATION FOR BED PREPARATION
• PROTECT EXISTING TREES AND ROOTS THROUGHOUT CONSTRUCTION

PLANT LIST - LA-02

| SYM. | BOTANICAL NAME | COMMON NAME | QTY. | SIZE | REMARKS |
|----------------------------------|--------------------------------|-----------------------|------|---------------|---------|
| DECIDUOUS TREE | | | | | |
| BA2 | Betula cespiciosa var. pendula | Yellow Birch | 6 | Clump 50mm WB | 4m O/C |
| PT2 | Populus tremuloides | Trembling aspen | 10 | 3m HT | 4m O/C |
| PB | Populus balsamifera | Balsam poplar | 1 | 1.5m HT | 4m O/C |
| CONIFEROUS TREE | | | | | |
| PA2 | Picea Abies | Norway Spruce | 3 | 2.5m HT. | 4m O/C |
| PB2 | Pinus Banksiana | Jack Pine | 10 | 2m HT. | 4m O/C |
| PR3 | Pinus Banksiana | Jack Pine | 2 | 2.5m HT. | 4m O/C |
| PT2 | Picea Glauca | White Spruce | 1 | 2m HT. | 4m O/C |
| PP1 | Picea Fungens Engelm. | Green Colorado Spruce | 3 | 1.5m HT | 4m O/C |
| PP2 | Picea Fungens Engelm. | Green Colorado Spruce | 5 | 2m HT | 4m O/C |
| PP3 | Picea Fungens Engelm. | Green Colorado Spruce | 9 | 2.5m HT | 4m O/C |
| PR2 | Pinus resinosa | Red Pine | 4 | 2m HT. | 4m O/C |
| PR3 | Pinus resinosa | Red Pine | 3 | 2.5m HT. | 4m O/C |

| SPECIES | Common name | N of file |
|--|----------------------|-----------|
| CUSTOM SEED MIX (TYPE 2 - WARM) | | |
| Deciduous | | |
| Asperula rubra | butterfly weed | 10% |
| Erigeron philadelphicus | Yellow Carduus | 7% |
| Rudbeckia hirta | Brown Seed Sunflower | 8% |
| Coreopsis verticillata | Lanceleaf Coreopsis | 10% |
| Solidago canadensis | Canada goldenrod | 8% |
| Prunella virginica | Swamp Prunella | 10% |
| Rudbeckia hirta | Brown-seed Sunflower | 10% |
| Thalictrum flavum | Yellow Meadow Rue | 10% |
| Achillea millefolium | Yarrow | 10% |
| sub total | | 60% |
| Grasses | | |
| Lolium multiflorum | Perennial Ryegrass | 7% |
| Stachytarax canadensis | Indian grass | 4% |
| Deschampsia cespitosa | Tufted hairgrass | 3% |
| Sporobolus heterostachyus | Prairie Dropseed | 4% |
| Deschampsia flexuosa | Wavy hairgrass | 10% |
| Calamagrostis canadensis | Bluegrass | 7% |
| Lolium multiflorum | Annual Ryegrass | 8% |
| sub total | | 40% |
| Total | | 100% |



- Grading of proposed path shall match grades of existing path except where agreed upon LRT and parkway realignment/regrading requires the path grades to change, with approval of NCC. The Commission requires that contour grading along the pathway be established to respect UA requirements.
- All damages areas to be reinstated by contractor
- Underground locates to be completed prior to any excavation
- NCC to provide seeding bed layout and pathway coordinates once city has confirmed parkway alignment.
- South trail offset plant materials 2.5m from centreline

LEGEND

LOW MAINTENANCE LAWN: 'INDIGO GRAMINIS' SEED PLANTING WITH 'INDIGO GRAMINIS' ALONG 2M OFFSET OF ALL PARKWAY EDGES

65% 'INDIGO-ULTRA POLINISATION' MIXED WITH 35% 'INDIGO-PLANTES MELLIFÈRES'

CUSTOM SEED MIX (TYPE 1 - COOL)

CUSTOM SEED MIX (TYPE 2 - WARM)

EXISTING TREES

PROPOSED CONIFEROUS TREE

PROPOSED DECIDUOUS TREE

| Issued or revised émis ou révisé | | |
|-------------------------------------|-------------------------|----------|
| | | |
| | | |
| | | |
| 5 | RESUBMIT REVISED SJAM | 12/03/18 |
| 4 | REVISION 3 | 22/02/18 |
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| 2 | REVISION 1 | 12/04/17 |
| 1 | 100% DESIGN DEVELOPMENT | 06/02/17 |
| no. | description | date |

project
projet

SIR JOHN A. MACDONALD
RIVERFRONT LINEAR PARK /
PARC LINÉAIRE RIVERAIN
SIR-JOHN-A-MACDONALD

drawing
dessin

LANDSCAPE PLANS
SOUTH OF SJAM - ZONE 2

approved by
approuvé par S.FISHER

designed by
conçu par S.FISHER/S.DEGUIRE

drawn by
dessiné par S.DEGUIRE

date 13/09/16 scale
échelle 1:500

NCC project no.
no. du projet de la CCN sheet no.
no. de la feuille

DC 5205-16 LA-02

| SYM. | BOTANICAL NAME | COMMON NAME | QTY. | SIZE | REMARKS |
|------|------------------------|-----------------------|------|-----------------|---------|
| | DECIDUOUS TREE | | | | |
| BA1 | Betula alleghaniensis | Yellow birch | 7 | 2 stem 40mm W.B | 4m O/C |
| BA2 | Betula alleghaniensis | Yellow birch | 11 | Clump 50mm W.B | 4m O/C |
| FG3 | Quercus prinus | American Beech | 12 | 40mm W.B. | 4m O/C |
| FB | Populus balsamifera | Balsam poplar | 9 | 1.5m HT | 4m O/C |
| PT1 | Populus tremuloides | Trembling aspen | 12 | 2m HT | 4m O/C |
| PT2 | Populus tremuloides | Trembling aspen | 56 | 3m HT | 4m O/C |
| | CONIFEROUS TREE | | | | |
| FA1 | Picea Abies | Norway Spruce | 5 | 2m HT | 4m O/C |
| FA2 | Picea Abies | Norway Spruce | 37 | 2.5m HT | 4m O/C |
| FB2 | Pinus Banksiana | Jack Pine | 21 | 2m HT | 4m O/C |
| FB3 | Pinus Banksiana | Jack Pine | 22 | 2.5m HT | 4m O/C |
| FP1 | Picea pungens Engelm. | Green Colorado Spruce | 9 | 1.5m HT | 4m O/C |
| FP2 | Picea pungens Engelm. | Green Colorado Spruce | 13 | 2m HT | 4m O/C |
| FP3 | Picea pungens Engelm. | Green Colorado Spruce | 36 | 2.5m HT | 4m O/C |
| LL2 | Larix laricina | Tamarack | 7 | 2m HT | 4m O/C |

[illegible]

director - Claude Robert - directeur

- ### LEGEND

- | issued or revised
émis ou révisé | | |
|-------------------------------------|-------------------------|----------|
| no. | description | date |
| 5 | RESUBMIT REVISED SJAM | 12/03/18 |
| 4 | REVISION 3 | 22/02/18 |
| 3 | REVISION 2 | 05/05/17 |
| 2 | REVISION 1 | 12/04/17 |
| 1 | 100% DESIGN DEVELOPMENT | 06/02/17 |

SIR JOHN A. MACDONALD
RIVERFRONT LINEAR PARK /
PARC LINÉAIRE RIVERAIN
SIR-JOHN-A.-MACDONALD

| | | |
|--|--------------------------------|------------------------|
| approved by approuvé par | S.FISHER | |
| designed by conçu par | S.FISHER/ S.DEGUIRE | |
| drawn by dessiné par | S.DEGUIRE | |
| date | 13/09/16 | scale échelle 1:500 |
| NCC project no. no. du projet de la CCN | sheet no. no. de la feuille | |
| DC 5205-16 | | A-03 |

| SYMA | BOTANICAL NAME | COMMON NAME | QTY. | SIZE | REMARKS |
|------|------------------------|-----------------------|------|-----------|---------|
| | DECIDUOUS TREE | | | | |
| BPS | Betula papyrifera | Paper birch | 4 | 2 1/2m HT | 4m O/C |
| CO | Celtis occidentalis | Hickberry | 1 | 2m HT | 4m O/C |
| FG1 | Fagus grandifolia | American Beech | 1 | 2m HT | 4m O/C |
| FG2 | Fagus grandifolia | American Beech | 3 | 3m HT | 4m O/C |
| FG3 | Fagus grandifolia | American Beech | 1 | 6m W.B. | 4m O/C |
| PI1 | Populus tremuloides | Trembling aspen | 2 | 3m HT | 4m O/C |
| PI2 | Populus tremuloides | Trembling aspen | 7 | 3m HT | 4m O/C |
| QR1 | Quercus rubra | Red oak | 4 | 1.5m HT | 4m O/C |
| QR2 | Quercus rubra | Red oak | 4 | 2m HT | 4m O/C |
| QR3 | Quercus rubra | Red oak | 8 | 3m HT | 4m O/C |
| | CONIFEROUS TREE | | | | |
| LL1 | Larix laricina | Tamarack | 1 | 1.5m HT | 4m O/C |
| LL2 | Larix laricina | Tamarack | 13 | 2m HT | 4m O/C |
| PR2 | Pinus banksiana | Jack Pine | 6 | 2m HT | 4m O/C |
| PR3 | Pinus banksiana | Jack Pine | 11 | 2.5m HT | 4m O/C |
| PR4 | Pinus pungens Engelm. | Green Colorado Spruce | 2 | 1.5m HT | 4m O/C |
| PR2 | Pinus pungens Engelm. | Green Colorado Spruce | 3 | 2m HT | 4m O/C |
| PR3 | Pinus pungens Engelm. | Green Colorado Spruce | 2 | 2.5m HT | 4m O/C |
| PR1 | Pinus resinosa | Red Pine | 5 | 1.5m HT | 4m O/C |
| PR3 | Pinus resinosa | Red Pine | 10 | 2.5m HT | 4m O/C |
| TS1 | Tsuga canadensis | Eastern Hemlock | 1 | 1.5m HT | 4m O/C |
| TS2 | Tsuga canadensis | Eastern Hemlock | 1 | 2m HT | 4m O/C |

| SPECIES | Common name | % of N/A |
|--------------------------------------|-------------------------|-----------|
| ECOSYSTEM MIX (TYPE 2 - WARM) | | |
| Perennials | | |
| <i>Fuchsia latifolia</i> | hazilly weed | 8% |
| <i>Echinacea purpurea</i> | Native Coneflower | 7% |
| <i>Fuchsia varia</i> | Black Eyed Susan | 3% |
| <i>Coreopsis lanceolata</i> | Black-headed Coneflower | 1% |
| <i>Silene dioica</i> | Cornia goldfinch | 1% |
| <i>Penstemon digitalis</i> | Penstemon | 10% |
| <i>Fuchsia viridis</i> | Black-headed Coneflower | 0% |
| <i>Thalictrum dasycarpum</i> | Black-headed Coneflower | 0% |
| <i>Asclepias tuberosa</i> | Asclepias | 0% |
| | | sub total |
| | | 100% |
| Grasses | | |
| <i>Carex musklinghamii</i> | Indian Sedge | 8% |
| <i>Deschampsia cespitosa</i> | Indian Sedge | 4% |
| <i>Deschampsia cespitosa</i> | Tall fescue | 3% |
| <i>Sporobolus heterophyllus</i> | St. Augustine | 4% |
| <i>Deschampsia cespitosa</i> | St. Augustine | 4% |
| <i>Leptocarpus tenuifolius</i> | St. Augustine | 7% |
| <i>Lolium multiflorum</i> | Annual Ryegrass | 0% |
| | | sub total |
| | | 100% |

| SPECIES | Common name | % of Mix | BD SIZE | Size | Seeding | No. per m. m. | Total by species |
|---|-----------------------|----------|---------|-------------|---------|---------------|------------------|
| BIODIVERSITY PLANT MIX (20/80) | | | | | | | |
| Perennials (grouped 3-5 per species) | | | | | | | |
| <i>Helianthus maximiliani</i> | Common milkweed | 2% | 30-35 | 2-pal. pots | 40cm | 8.2 | 2177 |
| <i>Achillea millefolium</i> | Yarrow | 1% | 100-120 | 2-pal. pots | 40cm | 8.2 | 832 |
| <i>Echinacea purpurea</i> | Yellow Coneflower | 5% | 105-6 | 2-pal. pots | 90cm | 46 | 735 |
| <i>Rudbeckia hirta</i> | Black-eyed Susan | 5% | 105-6 | 2-pal. pots | 40cm | 7.2 | 822 |
| <i>Coreopsis lanceolata</i> | Coreopsis lanceolata | 4% | 40-52 | 2-pal. pots | 75cm | 4.9 | 492 |
| <i>Senecio jacobinae</i> | Gold aster | 4% | 40-52 | 2-pal. pots | 75cm | 2.6/5 | 346 |
| <i>Helianthus scaberrimus</i> | Scraggy Ironweed | 4% | 40-52 | 2-pal. pots | 40cm | 8.2 | 125 |
| <i>Desmodium illinoense</i> | Illinois Tickseed | 3% | 11-9 | 2-pal. pots | 40cm | 5.5 | 324 |
| <i>Thalictrum dasycarpum</i> | Yale Bluebell Flower | 5% | 36-5 | 2-pal. pots | 40cm | 5.9 | 537 |
| Grasses (grouped 3-5 per species) | | | | | | | |
| <i>Sporobolus holcus</i> | Prairie Dropseed | 11% | 30-7 | 2-pal. pots | 40cm | 8.2 | 332 |
| <i>Calamagrostis canadensis</i> | Canadian grass | 6% | 100-2 | 2-pal. pots | 40cm | 8.2 | 609 |
| <i>Carex pedunculata</i> | Blue sedge | 2.5% | 20-17 | 2-pal. pots | 75cm | 2.6/5 | 425 |
| <i>Sorghastrum nutans</i> | Indian grass | 7% | 110-8 | 2-pal. pots | 75cm | 2.6/5 | 249 |
| <i>Deschampsia cespitosa</i> | Tuff-top hairgrass | 13% | 22-9 | 2-pal. pots | 75cm | 2.6/5 | 463 |
| Shrubs (grouped 3-5 per species) | | | | | | | |
| <i>Desmodium illinoense</i> | Shrubby cinquefoil | 2% | 34-8 | 2-pal. pots | 100cm | 8.8/5 | 40 |
| <i>Diervilla lonicera</i> | Common bush hollyhock | 2% | 34-8 | 2-pal. pots | 100cm | 8.8/5 | 40 |
| <i>Sorbus latifolia</i> | Amelanchier | 2% | 34-8 | 2-pal. pots | 100cm | 8.8/5 | 40 |
| Total | | 100% | | 82/9 | | | 82/9 |
| SPECIES | | | | | | | |
| BIODIVERSITY PLANT MIX (20/80) | | | | | | | |
| Perennials (grouped 3-5 per species) | | | | | | | |
| <i>Parthenocissus vitacea</i> | Common Parthenociss | 9% | 277-5 | 2-pal. pots | 40cm | 6.6 | 1417 |
| <i>Helianthus scaberrimus</i> | Scraggy Ironweed | 7% | 213-9 | 2-pal. pots | 40cm | 8.2 | 895 |
| <i>Rudbeckia hirta</i> | Black-eyed Susan | 13% | 119-3 | 2-pal. pots | 40cm | 8.2 | 3593 |
| <i>Thalictrum dasycarpum</i> | Yale Bluebell Flower | 5% | 105-6 | 2-pal. pots | 40cm | 5.9 | 1093 |
| Grasses (grouped 3-5 per species) | | | | | | | |
| <i>Carex lasiocarpa</i> | Blue sedge | 4% | 120-3 | 2-pal. pots | 40cm | 5.5 | 723 |
| <i>Carex vulpinoidea</i> | Violet sedge | 4% | 120-3 | 2-pal. pots | 40cm | 5.5 | 723 |
| <i>Sorghastrum nutans</i> | Indian grass | 7% | 110-7 | 2-pal. pots | 100cm | 2.6/5 | 75 |
| <i>Scirpus americanus</i> (area 3%) | Scirpus americanus | 3% | 75-5 | 2-pal. pots | 90cm | 8.4 | 323 |
| <i>Sorghastrum nutans</i> | Indian grass | 7% | 110-7 | 2-pal. pots | 75cm | 2.6/5 | 179 |
| <i>Deschampsia flexuosa</i> | Prairie Dropseed | 3% | 80-3 | 2-pal. pots | 40cm | 8.2 | 167 |
| <i>Carex lasiocarpa</i> | Violet sedge | 4% | 120-3 | 2-pal. pots | 40cm | 5.5 | 696 |
| <i>Carex lasiocarpa</i> | Violet sedge | 4% | 120-3 | 2-pal. pots | 40cm | 5.5 | 723 |
| <i>Sporobolus holcus</i> | Prairie Dropseed | 1% | 105-0 | 2-pal. pots | 40cm | 8.2 | 592 |
| <i>Calamagrostis canadensis</i> | Canadian grass | 1% | 110-0 | 2-pal. pots | 40cm | 8.2 | 1104 |
| Total | | 100% | | 80/3 | | | 80/3 |
| Shrubs (grouped 3-5 per species) | | | | | | | |
| <i>Spiraea alba</i> | White hawthorn | 2% | 10-5 | 2-pal. pots | 100cm | 8.8/5 | 306 |
| <i>Aronia melanocarpa</i> | Black chokeberry | 2% | 92-5 | 2-pal. pots | 100cm | 6.7 | 65 |
| <i>Cornus latifolia</i> 'Variegata' | Acidic tree dogwood | 2% | 62-7 | 2-pal. pots | 90cm | 8.4 | 85 |
| Total | | 100% | | 80/3 | | | 40/3 |



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- All damages areas to be reinstated by contractor
- Underground locales to be completed prior to any excavation
- NCC to provide seeding bed layout and pathway coordinates once city has confirmed parkway alignment.
- South trail offset plant materials 2.5m from centreline

LOW MAINTENANCE LAWN: 'INDIGO GRAMINIS' SEED PLANTING WITH 'INDIGO GRAMISEL' ALONG 2M OFFSET OF ALL PARKWAY EDGES

65% 'INDIGO-ULTRA POLINISATION' MIXED WITH 35% 'INDIGO-PLANTES MELLIFÈRES'

CUSTOM SEED MIX (TYPE 1 - COOL)

CUSTOM SEED MIX (TYPE 2 - WARM)

EXISTING TREES

PROPOSED CONIFEROUS TREE

PROPOSED DECIDUOUS TREE

| issued or revised émis ou révisé | | |
|-------------------------------------|-------------------------|----------|
| | | |
| | | |
| 5 | RESUBMIT REVISED SJAM | 12/03/18 |
| 4 | REVISION 3 | 22/02/18 |
| 3 | REVISION 2 | 05/05/17 |
| 2 | REVISION 1 | 12/04/17 |
| 1 | 100% DESIGN DEVELOPMENT | 06/02/17 |
| no. | description | date |

SIR JOHN A. MACDONALD
RIVERFRONT LINEAR PARK /
PARC LINÉAIRE RIVERAIN
SIR-JOHN-A.-MACDONALD

LANDSCAPE PLANS
SOUTH OF SJAM - ZONE 4

| | |
|--|--------------------------------|
| approved by approuvé par | S.FISHER |
| designed by conçu par | S.FISHER/ S.DEGUIRE |
| drawn by dessiné par | S.DEGUIRE |
| date 13/09/16 | scale échelle 1:500 |
| NCC project no. no. du projet de la CCN | sheet no. no. de la feuille |

DC 5205-16

A-04

[illegible]

ROCHESTER FIELD
• REFER TO LARF & ROC DWGS.)

DESIGN OF PROPOSED CROSSWALK TO BE DEVELOPED WITH CENTRELINE OF FUTURE NCC WALKWAY.

21+100 ELECTRICAL BOX
• REFER TO CIVIL/ELECTRICAL DWG.

21+200 LRT PORTAL

20+900

20M SOUTH PEDESTRIAN PATHWAY
• REFER TO 5/LA-10

1 BENCH AND 1 WASTE RECEPTACLE
• REFER TO 9/LA-10

EXISTING BUTTERNUT TO BE PROTECTED WITH FENCING AT DRIPLINE THROUGHOUT ENTIRE CONSTRUCTION

REMOVE ONE FENCE PANEL ON EACH SIDE OF THE NEW PATHWAY
• SALVAGE END POST AND RE-INSTALL
• CLEAR AND GRUB 2.5M OF SHRUBS ON BOTH SIDE OF NEW PATH

PEDESTRIAN LOGO LINE PAINTING (TYP.)

3M SOUTH CYCLING PATHWAY
• REFER TO 4/LA-11

100% 'INDIGO' - ULTRA POINSETTIA SEED MIX

ROCHESTER FIELD
• REFER TO LARF & ROC DWGS.)

SOUTH REFERENCE POINT

Control Point
North: 5027764.048
East: 362557.880
- CENTRELINE OF FUTURE NCC WALKWAY

CENTRELINE OF FUTURE NCC WALKWAY
• REFER TO INSET FOR SOUTH REFERENCE POINT

BIOSWALE PLANT MIX A (WARM)
• 602m²

BIOSWALE PLANT MIX B (WARM)
• 590m²

BIOSWALE PLANT MIX B (WARM)
• 272m²

BIOSWALE PLANT MIX A (WARM)
• 244m²

CUSTOM SEED MIX (TYPE 2-WARM)

LRT TUNNEL LIMIT




PRECAST PAVER ENTRANCE
• 100X300X100
• LAYOUT TO BE PROVIDED BY NCC

| SYM. | BOTANICAL NAME | COMMON NAME | QTY. | SIZE | REMARKS |
|------|------------------------|-----------------|------|-------------------|---------|
| | DECIDUOUS TREE | | | | |
| B43 | Betula alleghaniensis | Yellow Birch | 5 | 2 1/2" x 10m W.B. | 4m O/C |
| R31 | Fagus grandifolia | American Beech | 4 | 2m HF | 4m O/C |
| F32 | Fagus grandifolia | American Beech | 1 | 3m HT | 4m O/C |
| R33 | Fagus grandifolia | American Beech | 4 | 50mm W.B. | 4m O/C |
| R32 | Populus tremuloides | Trembling aspen | 4 | 3m HF | 4m O/C |
| Q31 | Quercus rubra | Red oak | 1 | 1.5m HF | 4m O/C |
| Q33 | Quercus rubra | Red oak | 1 | 3m HF | 4m O/C |
| | CONIFEROUS TREE | | | | |
| L11 | Larix laricina | Tamarack | 2 | 1.5m HT | 4m O/C |
| L12 | Larix laricina | Tamarack | 2 | 2m HT. | 4m O/C |
| P32 | Pinus banksiana | Jack Pine | 3 | 2m HT. | 4m O/C |
| P33 | Pinus banksiana | Jack Pine | 1 | 2.5m HT. | 4m O/C |
| F3 | Picea Glauca | White Spruce | 11 | 3m HT. | 4m O/C |
| P31 | Pinus resinosa | Red Pine | 5 | 1.75m HT | 4m O/C |
| P33 | Pinus resinosa | Red Pine | 3 | 2.5m HT. | 4m O/C |
| F32 | Pinus strobus | White Pine | 2 | 2m HT. | 4m O/C |
| P33 | Pinus strobus | White Pine | 4 | 2m HT. | 4m O/C |
| I31 | Tsuga canadensis | Eastern Hemlock | 0 | 1.5m HT. | 4m O/C |
| I32 | Tsuga canadensis | Eastern Hemlock | 0 | 2m HT. | 4m O/C |
| I33 | Tsuga canadensis | Eastern Hemlock | 8 | 3m HT. | 4m O/C |



director - Claude Robert - directeur

- ### LEGEND

- 

 PROPOSED CONIFEROUS TREE

 PROPOSED DECIDUOUS TREE

| Issued or revised émis ou révisé | | |
|-------------------------------------|-------------------------|----------|
| | | |
| 5 | RESUBMIT REVISED SJAM | 12/03/18 |
| 4 | REVISION 3 | 22/02/18 |
| 3 | REVISION 2 | 05/05/17 |
| 2 | REVISION 1 | 12/04/17 |
| 1 | 100% DESIGN DEVELOPMENT | 06/02/17 |
| no. | description | date |

projec
projet

SIR JOHN A. MACDONALD
RIVERFRONT LINEAR PARK /
PARC LINÉAIRE RIVERAIN
SIR-JOHN-A-MACDONALD

drawing
dessin

LANDSCAPE PLANS
SOUTH OF SJAM - ZONE 5

| | |
|--|--------------------------------|
| approved by approuvé par | S.FISHER |
| designed by conçu par | S.FISHER/ S.DEGUIRE |
| drawn by dessiné par | S.DEGUIRE |
| date 13/09/16 | scale échelle 1:500 |
| NCC project no. no. du projet de la CCN | sheet no. no. de la feuille |

DC 5205-16

*BIOSWALE QUANTITIES INCLUDE TOTAL OF EACH MIX. CONTRACTOR TO DETERMINE EXACT QUANTITIES PER INDIVIDUAL BED

[illegible]

- Grading of proposed path shall match grades of existing path except where agreed upon LRT and parkway realignment/grading requires the path grades to change, with approval of NCC. The Commission requires that contour grading along the pathway be established to respect UA requirements.
- All damages areas to be reinstated by contractor
- Underground locates to be completed prior to any excavation
- NCC to provide seeding bed layout and pathway coordinates once city has confirmed parkway alignment.
- South trail offset plant materials 2.5m from centreline

LOW MAINTENANCE LAWN: 'INDIGO GRAMINE' SEED PLANTING WITH 'INDIGO GRAMISEL' ALONG 2M OFFSET OF ALL PARKWAY EDGES

65% 'INDIGO-ULTRA POLINISATION' MIXED WITH 35% 'INDIGO-PLANTES MELLIFERES'

CUSTOM SEED MIX (TYPE 1 - COOL)

CUSTOM SEED MIX (TYPE 2 - WARM)

EXISTING TREES

PROPOSED CONIFEROUS TREE

PROPOSED DECIDUOUS TREE

| issued or revised émis ou révisé | | |
|-------------------------------------|-------------------------|----------|
| | | |
| 5 | RESUBMIT REVISED SJAM | 12/03/18 |
| 4 | REVISION 3 | 22/02/18 |
| 3 | REVISION 2 | 05/05/17 |
| 2 | REVISION 1 | 12/04/17 |
| 1 | 100% DESIGN DEVELOPMENT | 06/02/17 |
| no. | description | date |

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projet

SIR JOHN A. MACDONALD
RIVERFRONT LINEAR PARK /
PARC LINÉAIRE RIVERAIN
SIR-JOHN-A.-MACDONALD

drawing
dessin

LANDSCAPE PLANS
SOUTH OF SJAM - ZONE 6

| | |
|--|--------------------------------|
| approved by approuvé par | S.FISHER |
| designed by conçu par | S.FISHER/ S.DEGUIRE |
| drawn by dessiné par | S.DEGUIRE |
| date 13/09/16 | scale échelle 1:500 |
| NCC project no. no. du projet de la CCN | sheet no. no. de la feuille |

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- ### LEGEND

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émis ou révisé

| no. | description | date |
|-----|-------------------------|--------|
| 1 | 100% DESIGN DEVELOPMENT | 06/02/ |
| 2 | REVISION 1 | 12/04/ |
| 3 | REVISION 2 | 05/05/ |
| 4 | REVISION 3 | 22/02/ |
| 5 | RESUBMIT REVISED 5.IAM | 12/03/ |

projec
projet

SIR JOHN A. MACDONALD
RIVERFRONT LINEAR PARK /
PARC LINÉAIRE RIVERAIN
SIR-JOHN-A.-MACDONALD

drawing
dessin

LANDSCAPE PLANS
SOUTH OF SJAM - ZONE 7

approved by
approuvé par S.FISHER

designed by
concupar S.FISHER/ S.DEGUIRE

drawn by
dessiné par S.DEGUIRE

| | | | |
|------|----------|---------|-------|
| date | 13/09/16 | scale | 1:500 |
| | | échelle | |

| | |
|--|--------------------------------|
| NCC project no. no. du projet de la CCN | sheet no. no. de la feuille |
|--|--------------------------------|

DC 5205-16 LA-07

PLANT LIST - LA-07

| SYM. | BOTANICAL NAME | COMMON NAME | QTY. | SEE | REMARKS |
|------|--------------------------------|------------------------|------|-----------------|---------|
| | DECIDUOUS TREE | | | | |
| BP3 | Betula papyrifera | Paper birch | 3 | Clump 45mm W.B. | 4m O/C |
| CO | Celtis occidentalis | Hackberry | 16 | 2m HT | 4m O/C |
| CO1 | Celtis occidentalis | Hackberry | 16 | 60mm CAL. | 6m O/C |
| FG1 | Fagus grandifolia | American Beech | 1 | 2m HT | 4m O/C |
| FG2 | Fagus grandifolia | American Beech | 5 | 3m HT | 4m O/C |
| FG3 | Fagus grandifolia | American Beech | 10 | 60mm W.B. | 4m O/C |
| FT1 | Populus tremuloides | Trembling aspen | 0 | 2m HT | 4m O/C |
| P22 | Populus tremuloides | Trembling aspen | 6 | 3m HT | 4m O/C |
| UA | Ulmus americana 'Valley Forge' | Valley Forge white elm | 2 | 2m HT | 4m O/C |
| | CONIFEROUS TREE | | | | |
| FA2 | Picea Abies | Norway Spruce | 3 | 2.5m HT. | 4m O/C |
| F81 | Pinus banksiana | Jack Pine | 5 | 1.75m HT. | 4m O/C |
| F82 | Pinus banksiana | Jack Pine | 6 | 2m HT. | 4m O/C |
| F83 | Pinus banksiana | Jack Pine | 37 | 2.5m HT. | 4m O/C |
| FP2 | Picea Fungens engelm. | Green Colorado Spruce | 2 | 2m HT | 4m O/C |
| FP3 | Picea Fungens engelm. | Green Colorado Spruce | 8 | 2.5m HT | 4m O/C |
| FR1 | Pinus resinosa | Red Pine | 0 | 1.75m HT. | 4m O/C |
| FR2 | Pinus resinosa | Red Pine | 2 | 2m HT. | 4m O/C |
| FR3 | Pinus resinosa | Red Pine | 13 | 2.5m HT. | 4m O/C |
| TC2 | Thuja occidentalis | Eastern White Cedar | 8 | 2.5m HT. | 4m O/C |

| SYN | BOTANICAL NAME | COMMON NAME | QTY. | SIZE | REMARKS |
|-----|--------------------------------|------------------------|------|----------|---------|
| | DECIDUOUS TREE | | | | |
| QF2 | Populus tremuloides | Trembling aspen | 2 | 3m HT | 4m O/C |
| PF2 | Quercus puberula | Pin oak | 8 | 2m HT | 4m O/C |
| TA | Tilia americana | Basswood | 2 | 2.5m HT | 4m O/C |
| UA | Ulmus americana 'Valley Forge' | Valley Forge white elm | 5 | 2m HT | 4m O/C |
| | CONIFEROUS TREE | | | | |
| AB1 | Abies balsamea | Balsam Fir | 0 | 1.5m HT | 4m O/C |
| AB2 | Abies balsamea | Balsam Fir | 0 | 2m HT | 4m O/C |
| FB2 | Pinus banksiana | Jack Pine | 15 | 2m HT. | 4m O/C |
| FB3 | Pinus banksiana | Jack Pine | 0 | 2.5m HT. | 4m O/C |
| PF2 | Picea glauca | White Spruce | 0 | 2m HT | 4m O/C |
| PF3 | Picea glauca | White Spruce | 0 | 3m HT. | 4m O/C |
| TC2 | Thuja occidentalis | Eastern White Cedar | 2 | 2.5m HT. | 4m O/C |

[illegible]

Director - Claude Robert - directeur

- ### LEGEND

- Issued or revised

| no. | description | date |
|-----|-------------------------|----------|
| 1 | 100% DESIGN DEVELOPMENT | 06/02/17 |
| 2 | REVISION 1 | 12/04/17 |
| 3 | REVISION 2 | 05/05/17 |
| 4 | REVISION 3 | 22/02/18 |
| 5 | RESUBMIT REVISED SJAM | 12/03/18 |

project
projet

SIR JOHN A. MACDONALD
RIVERFRONT LINEAR PARK /
PARC LINÉAIRE RIVERAIN
SIR-JOHN-A.-MACDONALD

drawing
dessinLANDSCAPE PLANS
SOUTH OF SJAM - ZONE 8

approved by
approuvé par S.FISHER

designed by
conçu par S.FISHER/ S.DEGUIRE

drawn by
dessiné par S.DEGUIRE

| | | | |
|------|----------|---------|-------|
| date | 13/09/16 | scale | 1:500 |
| | | échelle | |

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| NCC project no. no. du projet de la CCN | sheet no. no. de la feuille |
| DC 5205-16 | A-08 |

| PLANT SCHEDULE | | | | | |
|------------------|-----------------------------------|---------------------------------|------|---------------------------|-----------|
| SYM. | LATIN NAME | COMMON NAME | QTY. | SIZE | SPACING |
| DECIDUOUS TREES | | | | | |
| CO | CELTIS OCCIDENTALIS | HACKBERRY | 4 | 60mm. CAL. | 8m o/c |
| PT | POPULUS TREMULOIDES | TREMBLING ASPEN | 4 | 60mm CAL. | 8m o/c |
| QR | QUERCUS RUBRA | RED OAK | 2 | 60mm CAL. | 8m o/c |
| DECIDUOUS SHRUBS | | | | | |
| AM | ARONIA MELANOCARPA | BLACK CHOKEBERRY | 57 | 2 gal. pot | 0.7m o/c |
| CA | CEANOTHUS AMERICANUS | NEW JERSEY TEA | 25 | 2 gal. pot | 0.8m o/c |
| CS | CORNUS SERICEA | ARCTIC FIRE DOGWOOD | 48 | 2 gal. pot | 0.8m o/c |
| DL | DIERVILLA LONICERA | BUSH HONEYSUCKLE | 128 | 50% 2 gal. pot / 50% plug | 0.7m o/c |
| JH | JUNIPERUS HORIZONTALIS 'WILTONII' | BLUE RUG JUNIPER | 70 | 2 gal. pot | 0.6m o/c |
| HP | HYPERICUM PROLIFICUM | SHRUBBY ST JOHN'S WORT | 50 | 2 gal. pot | 0.7m o/c |
| PO | PHYSOCARPUS OPULIFOLIUS | COMMON NINEBARK | 45 | 50% 2 gal. pot / 50% plug | 1m o/c |
| RC | ROSA CAROLINA | PASTURE ROSE | 34 | 2 gal. pot | 1m o/c |
| PERENNIALS | | | | | |
| AI | ASCLEPIAS INCARNATA | SWAMP MILKWEED | 78 | 50% 1 gal. pot / 50% plug | 0.5m o/c |
| AM | ACHILLEA MILLEFOLIUM | COMMON YARROW | 176 | 50% 1 gal. pot / 50% plug | 0.35m o/c |
| AMo | ALCHEMILLA MOLLIS | LADY'S MANTLE | 66 | 1 gal. pot | 0.4m o/c |
| AM | ALLIUM x 'MILLENIUM' | ORNAMENTAL ONION | 40 | 1 gal. pot | 0.25m o/c |
| AN | ASTER NOVAE-ANGLIAE 'PURPLE DOME' | 'PURPLE DOME' NEW ENGLAND ASTER | 133 | 50% 1 gal. pot / 50% plug | 0.4m o/c |
| AS | ARTEMESIA SCHMIDTIANA 'NANA' | SILVERMOUND WORMWOOD | 110 | 1 gal. pot | 0.35m o/c |
| AT | ASCLEPIAS TUBEROSA | BUTTERFLY MILKWEED | 103 | 1 gal. pot | 0.3m o/c |

| SYM. | LATIN NAME | COMMON NAME | QTY. | SIZE | SPACING |
|-------------------|--------------------------|----------------------|------|----------------------------|-----------|
| PERENNIALS CONT'D | | | | | |
| BA | BAPTISIA AUSTRALIS | BLUE FALSE INDIGO | 24 | 50% 1 gal. pot / 50% plug | 0.8m o/c |
| EJ | ECHINACEA x 'JULIA' | JULIA CONEFLOWER | 110 | 1 gal. pot | 0.3m o/c |
| FV | FRAGARIA VIRGINIANA | WILD STRAWBERRY | 153 | 50% 1 gal. pot / 50% plug | 0.25m o/c |
| GM | GERANIUM MACULATUM | WILD GERANIUM | 148 | 1 gal. pot | 0.4m o/c |
| HH | HELIOPSIS HELIANTHOIDES | FALSE SUNFLOWER | 63 | 50% 1 gal. pot / 50% plug | 0.4m o/c |
| LS | Liatris SPICATA | DENSE BLAZING STAR | 70 | 1 gal. pot | 0.3m o/c |
| MR | MAIANTHEMUM RACEMOSUM | FALSE SOLOMON'S SEAL | 78 | 1 gal. pot | 0.4m o/c |
| MF | MONARDA FISTULOSA | WILD BEE BALM | 68 | 50% 1 gal. pot / 50% plug | 0.5m o/c |
| OB | OENOTHERA BIENNIS | EVENING PRIMROSE | 170 | 50% 1 gal. pot / 50% plug | 0.3 o/c |
| GRASSES | | | | | |
| CC | CALAMAGROSTIS CANADENSIS | CANADA BLUEJOINT | 89 | 50% 1 gal. pot / 50% plug | 0.65m o/c |
| CF | CAREX PENNSYLVANICA | OAK SEDGE | 160 | 1 gal. pot | 0.3m o/c |
| DC | DESCHAMPSIA CESPITOSA | TUFTED HAIR GRASS | 84 | 1 gal. pot | 0.5m o/c |
| PV | PANICUM VIRGATUM | SWITCH GRASS | 71 | 50% 1. gal. pot / 50% plug | 0.6m o/c |
| SA | SESLERIA AUTUMNALIS | AUTUMN MOOR GRASS | 167 | 1 gal. pot | 0.4m o/c |
| SS | SCHIZACHYRIUM SCOPARIUM | LITTLE BLUESTEM | 115 | 50% 1. gal. pot / 50% plug | 0.45m o/c |
| SH | SPOROBOLUS HETEROLEPSIS | PRAIRIE DROPSEED | 56 | 50% 1. gal. pot / 50% plug | 0.40m o/c |
| TOTAL | | | 2799 | | |

NOTES:
REFER TO ATL-C DRAWINGS FOR DEMOLITION, SITE SERVICING AND GRADING, ASPHALT PAVING AND CURB DETAILS AND BIOSWALE GRADING;
ALL DRAWINGS ARE TO BE ADHERED TO, ALL CHANGES TO BE DISCUSSED WITH THE NCC AND TO BE SUBJECT TO NCC'S FINAL DETERMINATION OF ACCEPTANCE



Design and Construction Division
Division design et construction

director - Claude Robert - directeur

LEGEND

- PROPERTY LINES
- ASPHALT PATHWAY PER ATL-C1
- TACTILE WALKING SURFACE INDICATOR PER CITY OF OTTAWA STANDARD DETAIL SC7.3
- DEPRESSED CURB PER CITY STANDARD DETAIL
- EXISTING CHAIN LINK FENCING TO REMAIN
- PLANT LABEL
- INTERPLANT WITH SPECIES INDICATED
- PROPOSED DECIDUOUS TREE IN CONTINUOUS MULCHED BEDS PER PLANT SCHEDULE
- PROPOSED DECIDUOUS SHRUBS IN CONTINUOUS MULCHED BEDS PER PLANT SCHEDULE
- PROPOSED PERENNIALS IN CONTINUOUS MULCHED BEDS PER PLANT SCHEDULE
- PROPOSED GRASSES IN CONTINUOUS MULCHED BEDS PER PLANT SCHEDULE
- DRIPLINE OF EXISTING VEGETATION MASSING TO REMAIN
- TREES TO REMAIN

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| | | |
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| 4 | REVISION 3 | 22/02/18 |
| 3 | REVISION 2 | 05/05/17 |
| 2 | REVISION 1 | 12-04-17 |
| 1 | 100% DESIGN DEVELOPMENT | 06-02-17 |
| no. | description | date |

project
projet

LANDSCAPE PLAN
SOUTH OF SJAM
ATLANTIS PARKING LOT

drawing
dessin

BIOSWALE PLANTING PLAN

approved by
approuvé par

S.FISHER

designed by
conçu par

S. DEGUIRE / H. MARTIN

drawn by
dessiné par

S. DEGUIRE / H. MARTIN

date

12-12-2016

scale

1:250

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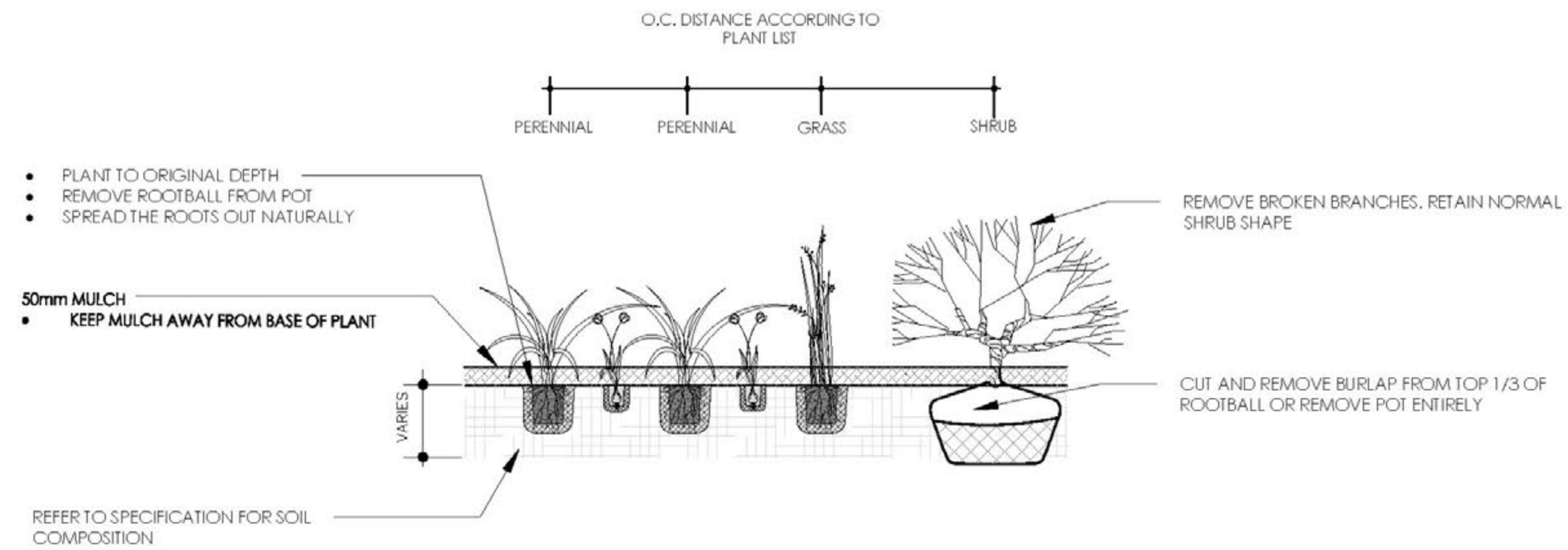
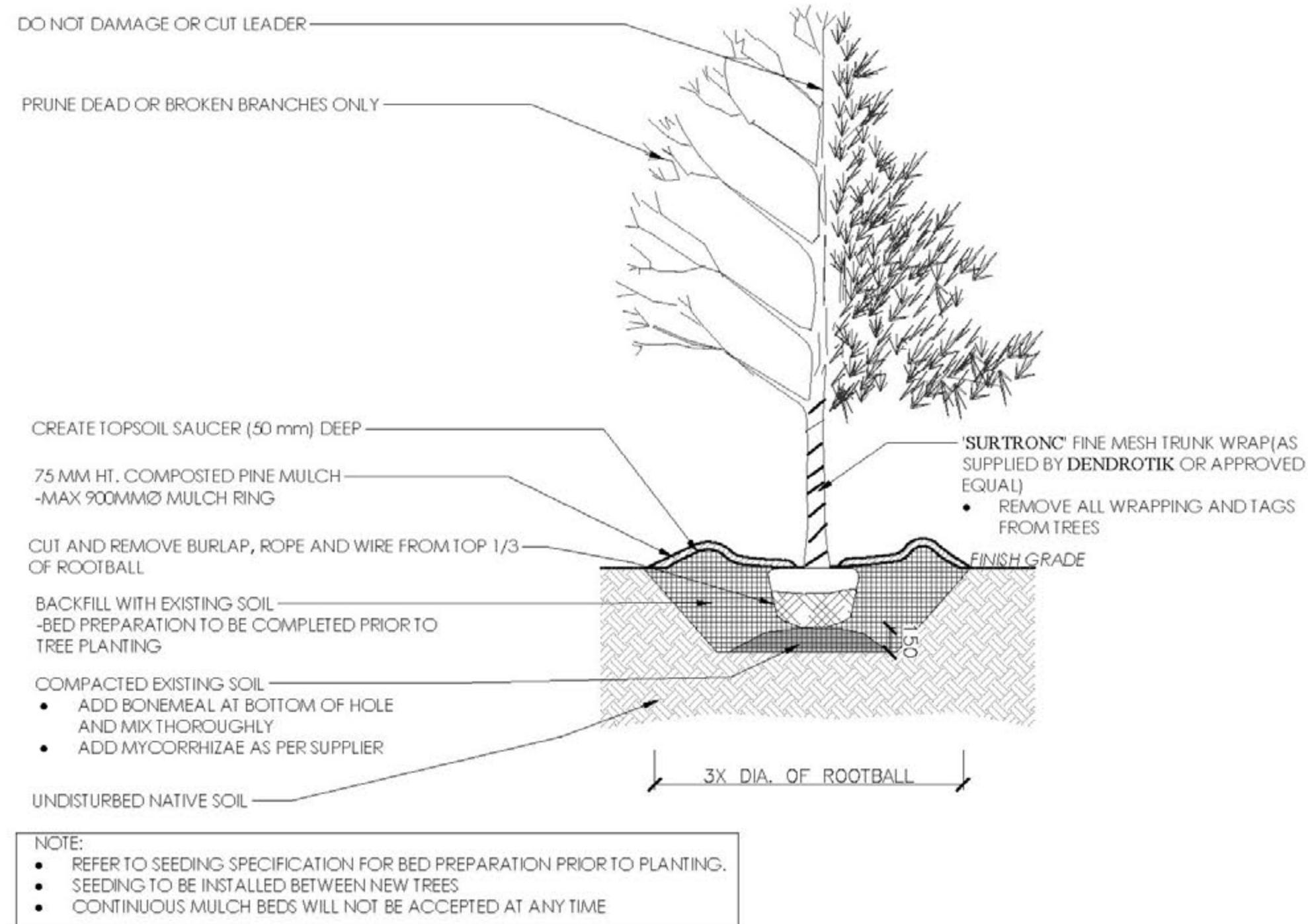
DC 5205-18

LA-09



1 BIOSWALE PLANTING PLAN

LA-09

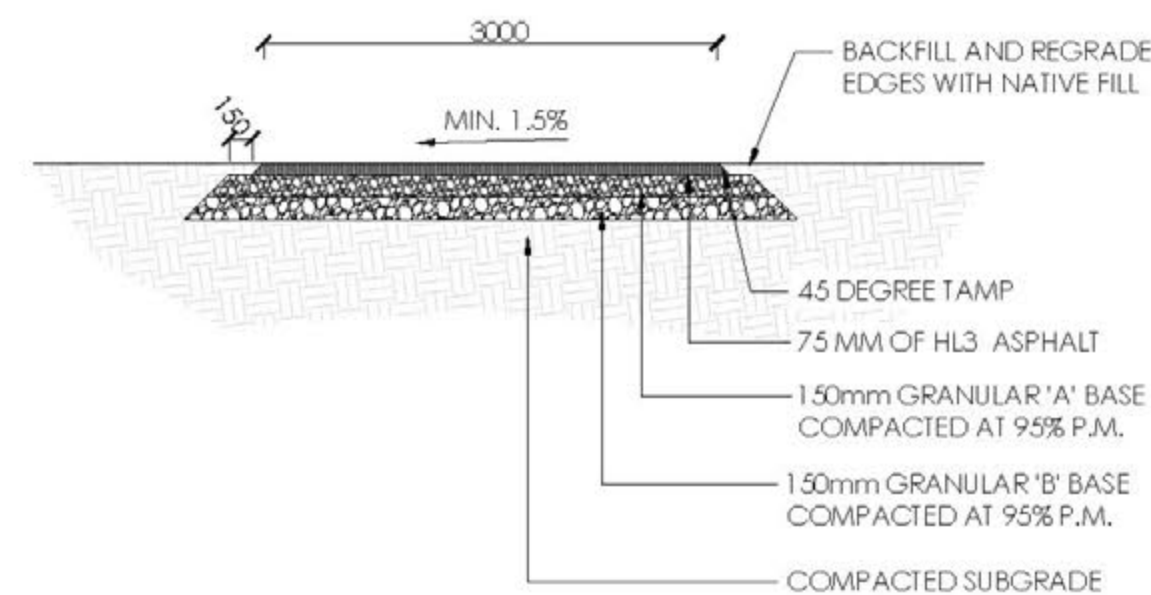
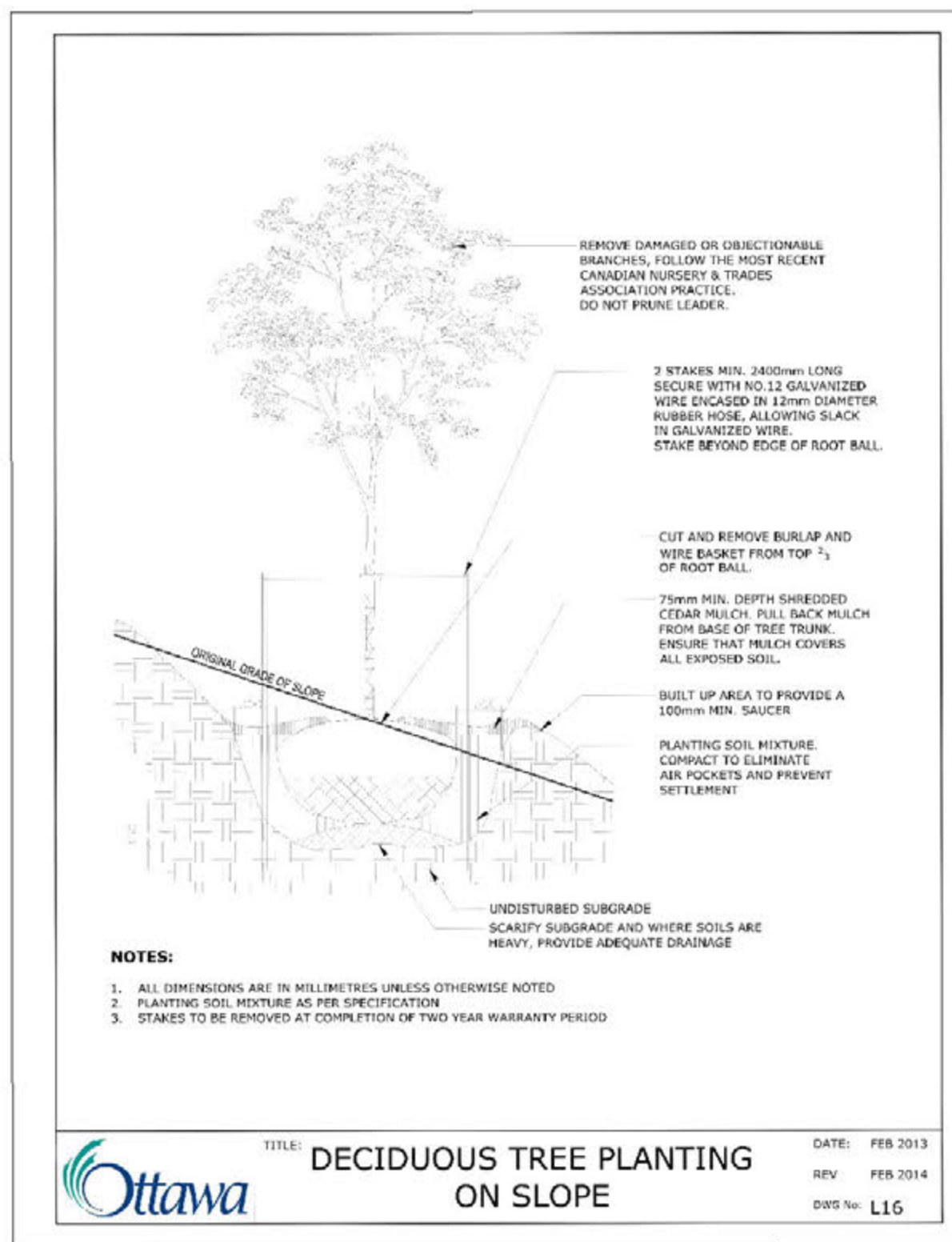


1 TREE PLANTING

LA-11

2 SHRUB, PERENNIAL AND GRASS PLANTING

LA-11



- NOTE:
- ALWAYS ENSURE POSITIVE DRAINAGE TOWARDS OTTAWA RIVER
 - ENSURE CROSS SLOPE FROM PARKWAY TO OTTAWA RIVER
 - CENTERLINE TO BE SOLID AND PAINTED WHITE
 - CYCLING SYMBOLS AT EACH END TO BE PAINTED IN WHITE

3 DECIDUOUS TREE PLANTING IN SLOPE

LA-11

4 3M SOUTH CYCLING PATHWAY (FRASER TO ROCHESTER FIELD)

(CLEARY AREA)

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|-----|-------------------------|----------|
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project
projet

SIR JOHN A. MACDONALD
RIVERFRONT LINEAR PARK /
PARC LINÉAIRE RIVERAIN
SIR-JOHN-A-MACDONALD

drawing
dessin

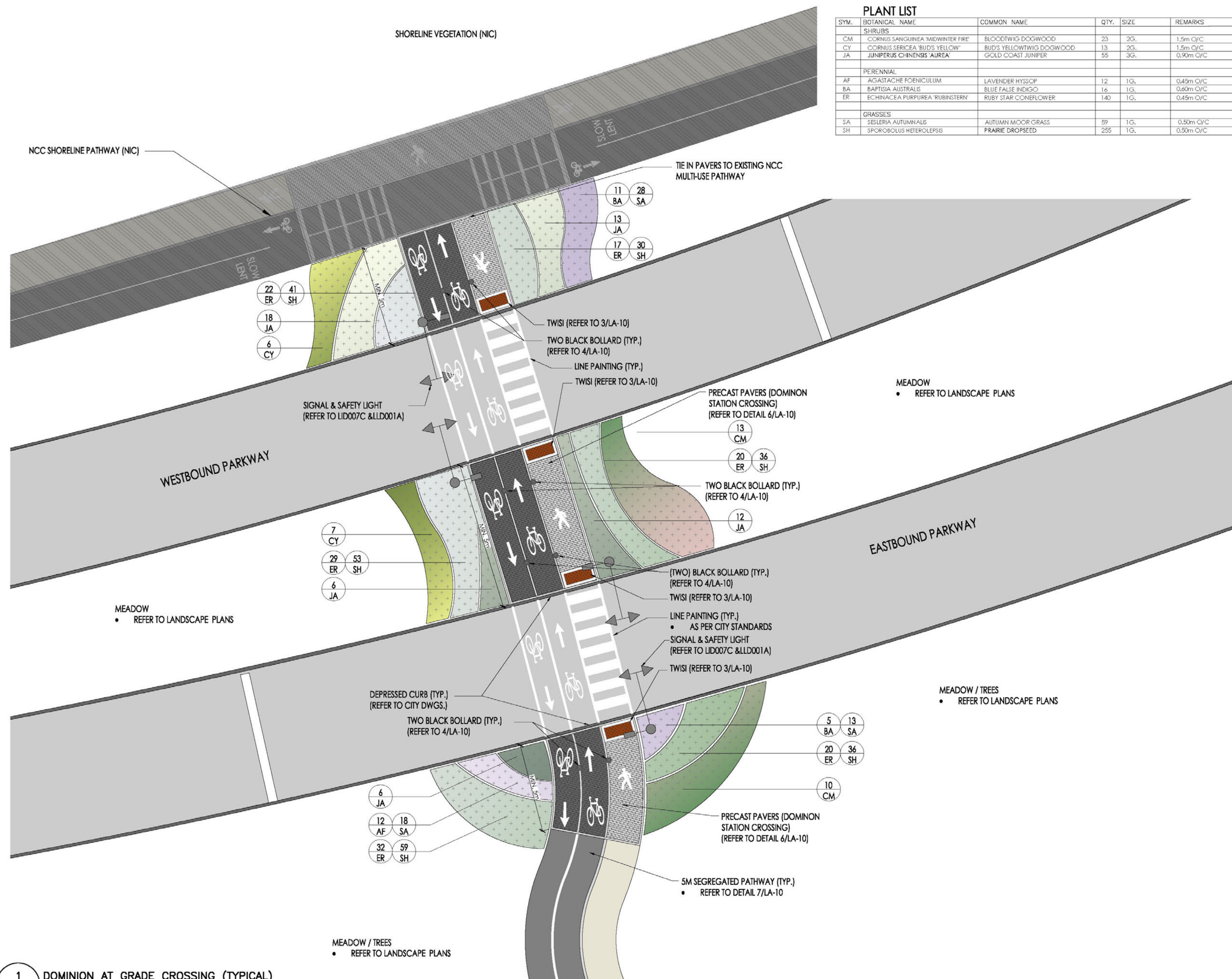
LANDSCAPE DETAILS 2
SOUTH OF SJAM

| | |
|--|--------------------------------|
| approved by approuvé par | S.FISHER |
| designed by conçu par | S.FISHER/ S.DEGUIRE |
| drawn by dessiné par | S.DEGUIRE |
| date | 13/09/16 |
| scale échelle | AS NOTED |
| NCC project no. no. du projet de la CCN | sheet no. no. de la feuille |
| DC 5205-16 | LA-11 |

- NOTE:
- ALL DRAWINGS ARE TO BE ADHERED TO. ALL CHANGES TO BE DISCUSSED WITH NCC AND TO BE SUBJECTS TO NCC FOR FINAL DETERMINATION OF ACCEPTANCE
 - LOCATION OF TRAFFIC CONTROL SIGNAL AND DISCONNECT FOUNDATION TO BE APPROVED BY NCC"

PLANT LIST

| SYM. | BOTANICAL NAME | COMMON NAME | QTY. | SIZE | REMARKS |
|-----------|-----------------------------------|--------------------------|------|------|-----------|
| SHRUBS | | | | | |
| CM | CORNUS SANGUINEA 'MIDWINTER FIRE' | BLOODTWIG DOGWOOD | 23 | 2G. | 1.5m O/C |
| CY | CORNUS SERICEA 'BUD'S YELLOW' | BUD'S YELLOWTWIG DOGWOOD | 13 | 2G. | 1.5m O/C |
| JA | JUNIPERUS CHINENSIS 'AUREA' | GOLD COAST JUNIPER | 55 | 3G. | 0.90m O/C |
| PERENNIAL | | | | | |
| AF | AGASTACHE FOENICULUM | LAVENDER HYSSOP | 12 | 1G. | 0.45m O/C |
| BA | BAPTISIA AUSTRALIS | BLUE FALSE INDIGO | 16 | 1G. | 0.60m O/C |
| ER | ECHINACEA PURPUREA 'RUBINSTEIN' | RUBY STAR CONEFLOWER | 140 | 1G. | 0.45m O/C |
| GRASSES | | | | | |
| SA | SESLERIA AUTUMNALIS | AUTUMN MOOR GRASS | 59 | 1G. | 0.50m O/C |
| SH | SPOROBOLUS HETEROLEPSIS | PRAIRIE DROPSEED | 255 | 1G. | 0.50m O/C |



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|-------------------------------------|-------------------------|----------|
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| 1 | 100% DESIGN DEVELOPMENT | 06/02/17 |

project
projet

SIR JOHN A. MACDONALD
RIVERFRONT LINEAR PARK /
PARC LINÉAIRE RIVERAIN
SIR-JOHN-A-MACDONALD

drawing
dessin

LANDSCAPE DETAILS 3
TYPICAL AT GRADE
CROSSING

approved by
approuvé par S.FISHER

designed by
conçu par S.FISHER/S.DEGUIRE

drawn by
dessiné par S.DEGUIRE

date 13/09/16 scale
échelle NTS

NCC project no.
no. du projet de la CCN sheet no.
no. de la feuille

DC 5205-16 LA-12

**NATIONAL CAPITAL COMMISSION
CAPITAL PLANNING BRANCH; DESIGN AND CONSTRUCTION**

**SJAM RIVERFRONT LINEAR PARK
LANDSCAPE SOUTH OF SJAM**

Reference Number: DC-5205-16

Date: February 2017

INDEX - SPECIFICATIONS

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| | 32 12 16 | Asphalt Paving | 2 |
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END OF SECTION

1.0 GENERAL

1.1 REFERENCES

- .1 American Society for Testing and Materials (ASTM)
 - .1 ASTM C 260-06, Standard Specification for Air-Entraining Admixtures for Concrete.
 - .2 ASTM C 309-07, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
 - .3 ASTM C 494/C 494M-08, Standard Specification for Chemical Admixtures for Concrete.
 - .4 ASTM C 1017/C 1017M-07, Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete.
 - .5 ASTM D 412-06ae1, Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension.
 - .6 ASTM D 624-00(2007), Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomer.
 - .7 ASTM D 1751-04, Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
 - .8 ASTM D 1752-04a, Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction.
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-37.2-M88, Emulsified Asphalt, Mineral Colloid-Type, Unfilled, for Dampproofing and Waterproofing and for Roof Coatings.
 - .2 CAN/CGSB-51.34-M86(R1988), Vapour Barrier, Polyethylene Sheet for Use in Building Construction
- .3 Green Building Council of Canada (CaGBC)
 - .1 LEED Canada-NC Version 1.0-2004, LEED (Leadership in Energy and Environmental Design) Rating System for Green Building New Construction and Major Renovations (Reference Package) (including Addendum 2007).
 - .2 LEED Canada-CI Version 1.0-2007, LEED (Leadership in Energy and Environmental Design) Rating System for Sustainable Building interior commercial spaces
- .4 OPSS.MUNI 1010 Material Specification for Aggregates – Base, sub base, Subgrade Material and backfill material, November 2013.

- .5 Canadian Standards Association (CSA International)
 - 1 CSA-A23.1/A23.2-F04, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
 - .2 CSA A283-06, Qualification Code for Concrete Testing Laboratories.
 - .3 CSA-A3000-F08, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).

1.2 RELATED SECTION

- .1 01 33 00 – Shop Drawing, Product Data and Samples
- .2 03 10 00.01 – Concrete forming and accessories
- .3 03 20 00.01 – Concrete reinforcing

1.3 SAMPLES

- .1 Submit required documents in accordance with Section 01 33 00 Shop Drawings, Products Data and Samples for review by NCC representative and do not proceed without written approval when deviations from mix design or parameters are found.
- .2 Concrete hauling time: submit for review by NCC representative, deviations exceeding maximum allowable time of 120 min for concrete to be delivered to site of Work and discharged after batching.

1.4 QUALITY ASSURANCE

- .1 Submit to NCC representative, minimum 1 week prior to starting concrete work, valid and recognized certificate from plant delivering concrete.
 - .1 When plant does not hold valid certification, provide test data and certification by qualified independent inspection and testing laboratory that materials used in concrete mixture will meet specified requirements.
- .2 Minimum 1 week prior to starting concrete work submit to NCC representative manufacturer's test data and certification by qualified independent inspection and testing laboratory that following materials will meet specified requirements:
 - .1 Falsework erection.
 - .2 Hot weather concrete.
 - .3 Cold weather concrete.
 - .4 Curing.
 - .5 Finishes.
 - .6 Formwork removal.
 - .7 Joints.
- .3 Quality Control Plan: submit written report, to NCC representative verifying compliance that concrete in place meets performance requirements of concrete as established in PART 2 - PRODUCTS.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Delivery and acceptance:

- .1 Concrete hauling time: maximum allowable time for concrete to be delivered to site of Work and discharged not to exceed 120 minutes after batching.
 - .1 Modifications to maximum time limit must be agreed to NCC representative and concrete producer as described in CSA A23.1/A23.2.
 - .2 Deviations to be submitted for review by NCC Representative
- .2 Concrete delivery: ensure continuous concrete delivery from plant meets CSA A23.1/A23.2.

2.0 PRODUCTS

2.1 SUSTAINABLE REQUIREMENTS

- .1 According to the CSA A23.1/A23.2 and indications of Article DOSAGE FORMS PART 2 standard - PRODUCTS.

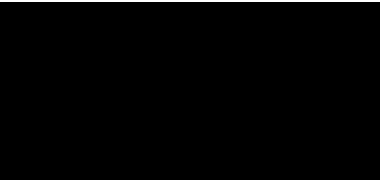
2.2 SUSTAINABLE REQUIREMENTS

- .1 Quality Control Plan : Ensure that the concrete supplier is able to provide concrete meeting the performance criteria established by the NCC representative and provide control of the compliance of the material according to the requirements of article QUALITY ASSURANCE, PART 1.

2.3 MATERIALS

- .1 Cement: to CAN/CSA-A3001, Type GU.
- .2 Water: to CAN/CSA-A23.1.
- .3 Aggregates: to CAN/CSA-A23.1. Coarse aggregates to be normal density.
- .4 Admixtures
 - .1 Air entraining admixture: to ASTM C 260.
 - .2 Chemical Admixtures: ASTM C494 standard. The NCC representative must accept accelerators used during concrete work.
- .5 Shrinkage compensating grout: premixed compound consisting of non-metallic aggregate, Portland cement, water reducing and plasticizing agents.
 - .1 Compressive strength: XXXXXXXXXX.
- .6 Tactile walking surface strip indicators

- .1 Tactile walking surface indicators shall be made of cast iron, according to CSA B651-2012 and follow Ontario Regulation 191/11, and meet the following requirements:

| Standard | Property | Minimum Result |
|---------------|------------------|---|
| ASTM A 8 | tensile strength |  |
| ASTM C 1028 | slip resistance | |
| ASTM C 501-84 | wear resistance | |

- .2 The truncated domes shall be of uniform size and shape. Units shall be uniform in texture, be free from pouring faults, sponginess, cracks, blowholes, and other defects, and have clean-cut and well-defined edges. All surfaces shall be bare, without any coating, and be uniform and free of flaking rust or mounts of rust or debris. Tactile walking surface indicators shall have ribs cast to the underside of the unit, have vent holes, and have a minimum plate thickness of 5 mm.

2.4 GRANULAR BASE COURSE

- .1 Granular base course quality: sound, hard, durable material free from soft, thin, elongated or laminated particles, organic material, clay lumps or minerals, or other substances that would act in deleterious manner for use intended.
- .2 Any granular materials specified for the various works, on the drawings or in other sections of the specifications or by direction of the NCC Representative, shall conform OPSS.MUNI 1010 Material Specification for Aggregates – Granular A, B, M, and Select Subgrade Material
- .3 Blending to obtain the correct gradation shall be permitted when the Contractor demonstrates that he can produce a correct gradation and has a plant capable of producing to the satisfaction of the NCC Representative.
- .4 Granular "A" : This materials shall conform to OPSS.MUNI 1010.
- .5 Granular "B": This material shall conform to OPSS.MUNI 1010.
- .6 Select Subgrade material: See section 31 23 10 Excavation, Trenching and Backfilling
- .7 Provide samples as per Section 01 33 00 – Shop Drawings, Product data and Samples

2.5 MIXES

- .1 Alternative 1 - Performance Method for specifying concrete: to meet NCC representative performance criteria in accordance with CAN/CSA-A23.1/A23.2.
 - .1 Ensure concrete supplier meets performance criteria as established below and provide verification of compliance as described in quality control plan.
 - .2 Provide concrete mix to meet following hard state requirements:
 1. Durability and class of exposure: C-1.
 2. Minimum compressive strength at [REDACTED].
 3. Intended application: C-1
 4. Diameter of aggregates: at least 20 mm.
 5. Air entrained 5 to 8%
 - .3 Provide quality management plan to ensure verification of concrete quality to specified performance.
 - .4 Concrete supplier's certification.

3.0 EXECUTION

3.1 PREPARATION

- .1 Obtain NCC representative's approval before placing concrete.
 1. Provide 48 hours notice prior to placing of concrete.
- .2 Place concrete reinforcing in accordance with Section 03 20 00.01 - Concrete Reinforcing
- .3 During concreting operations:
 1. Development of cold joints not allowed.
 2. Ensure concrete delivery and handling facilitates placing with minimum of re-handling, and without damage to existing structure or Work.
- .4 Pumping of concrete will not be permitted after approval of equipment and mix
- .5 Ensure reinforcement and inserts are not disturbed during concrete placement.
- .6 Prior to placing of concrete obtain NCC representative's approval of proposed method for protection of concrete during placing and curing in adverse weather.
- .7 Protect previous Work from staining.
- .8 Clean and remove stains prior to application for concrete finishes.
- .9 Maintain accurate records of poured concrete items to indicate date, location of pour, quality, air temperature and test samples taken.
- .10 In locations where new concrete is dowelled to existing work, drill holes in existing concrete.

3.2 IMPLEMENTATION

- .1 Do cast-in-place concrete work in accordance with CAN/CSA-A23.1.
- .2 Sleeves and inserts:
 - .1 Do not permit penetrations, sleeves, ducts, pipes or other openings to pass through joists, beams, column capitals or columns, except where indicated or approved by NCC representative.
 - .2 Sleeves and openings greater than 100 x 100 mm not indicated must be reviewed by NCC representative.

- .3 Do not eliminate or displace reinforcement to accommodate hardware. If inserts cannot be located as specified, obtain approval of modifications from NCC Representative before placing of concrete.
 - .4 Check locations and sizes of sleeves and openings shown on drawings.
 - .5 Set special inserts for strength testing as indicated and as required by non-destructive method of testing concrete.
 - .3 Anchor bolts.
 - .1 Set anchor bolts to templates under supervision of appropriate trade prior to placing concrete.
 - .2 With approval of NCC Representative, grout anchor bolts in preformed holes or holes drilled after concrete has set.
 - .1 Formed holes to be minimum 100 mm diameter.
 - .3 Protect anchor bolt holes from water accumulations, snow and ice build-ups.
 - .4 Set bolts and fill holes with shrinkage compensating grout.
 - .4 Finishing and curing:
 - .1 Finish concrete in accordance with CAN/CSA-A23.1.
 - .2 Concrete Pads and concrete barrier curbs (type 01 & Type 02) finish: Magnesium trowel finish
 - .3 Concrete mountable curb and dropped sidewalk finish: as per City of Ottawa's Standards – meet and match existent.
 - .4 Rub exposed sharp edges of concrete with carborundum to produce 3 mm radius edges unless otherwise indicated.
 - .5 Proceed to the sawing of the slab 200 mm thick concrete as soon as the support without leaving workers impression 6 to maximum 18 hours after pouring of concrete.
- 3.3 SITE TOLERANCE
- .1 Concrete tolerance in accordance with CAN/CSA-A23.1 straight edge method.
- 3.4 FIELD QUALITY CONTROL
- .1 Inspection and testing of concrete and concrete materials will be carried out by a Testing Laboratory designated by Consultant in accordance with CAN/CSA-A23.1.
 - .1 Concrete pours.

- .2 Slump tests.
- .3 Air entrained
- .4 Compressive strength at [REDACTED].
- .5 Ambient temperature and temperature of the concrete.
- .2 Inspection and testing of concrete and concrete materials will be carried out by testing laboratory designated by NCC Representative for review, to his satisfaction and in accordance with CSA-A23.1/A23.2. Testing of concrete and concrete materials will be paid by the Owner.
- .3 Contractor to paid repeat testing on fail sampling.
- .4 Ensure test results are distributed for discussion at pre-pouring concrete meeting between testing laboratory and NCC Representative.
- .5 Testing laboratory will take additional test cylinders during cold weather concreting. Cure cylinders on job site under same conditions as concrete which they represent.
- .6 Non-Destructive Methods for Testing Concrete: in accordance with CSA-A23.1/A23.2
- .7 Inspection or testing by NCC representative will not augment or replace Contractor quality control nor relieve Contractor of his contractual responsibility.

3.5 CLEANING

- .1 Perform cleanup as follow:
 - .1 Provide on-site, adequate space for safely washing concrete trucks.
 - .2 It is prohibited to dump unused adjuvants into sewers, in a stream, a lake, on the ground or any other place where it could pose a risk to health or the environment.
 - .3 Make the necessary arrangements to prevent contaminating adjuvants waterbodies or drinking water sources.
 - .4 If necessary, collect the liquid or solidify with an inert non-combustible taking all appropriate safety material.
 - .5 Remove and dispose of waste in accordance with the requirements of federal provincial territorial and local laws.

END OF SECTION

PART 1 GENERAL

1.1 REFERENCES

- .1 American Society for Testing and Materials (ASTM)
 - .1 ASTM D698, Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (600 kN-m/m³).

1.2 Related section

- .1 01 35 43 – Environmental Protection
- .2 01 61 20 – Material & Equipment
- .3 31 23 10.01 – Excavation, Trenching and Backfilling
- .4 32 91 21.01 – Topsoil and Finish Grading

1.3 PROTECTION

- .1 Protect existing fencing, landscaping, natural features, bench marks, buildings, pavement, surface or underground utilities which are to remain as directed by NCC Representative. If damaged, restore to original or better condition unless directed otherwise.
- .2 Maintain access roads to prevent accumulation of construction related debris on roads.

PART 2 PRODUCTS

2.1 GRANULAR BASE COURSE MATERIAL

- .1 Granular base course quality: sound, hard, durable material free from soft, thin, elongated or laminated particles, organic material, clay lumps or minerals, or other substances that would act in deleterious manner for use intended.
- .2 Any granular materials specified for the various works, on the drawings or in other sections of the specifications or by direction of the NCC Representative, shall conform OPSS.MUNI 1010 Material Specification for Aggregates – Granular A, B, M, and Select Subgrade Material
- .3 Blending to obtain the correct gradation shall be permitted when the Contractor demonstrates that he can produce a correct gradation and has a plant capable of producing to the satisfaction of the NCC Representative.
- .4 Granular "A" : This materials shall conform to OPSS.MUNI 1010.
- .5 Granular "B": This material shall conform to OPSS.MUNI 1010.
- .6 Select Subgrade material: See section 31 23 10 Excavation, Trenching and Backfilling
- .7 Provide samples as per Section 01 33 00 – Shop Drawings, Product data and Samples

PART 3 EXECUTION

3.1 STRIPPING OF TOPSOIL AND TURF

- .1 Do not strip or disturb existing soil and turf, unless otherwise indicated.
- .2 Any excavated topsoil from site to be disposed of as per Section 01 61 10 - Management and Disposal of Excess Material.

- .3 No excavated material can be re-used as backfilling material.

3.2 PLACING

- .1 Place granular material to depth and grade in areas indicated.
- .2 Ensure no frozen material is placed.
- .3 Place material only on clean unfrozen surface, free from snow and ice.
- .4 Place material using methods which do not lead to segregation or degradation of aggregate.
- .5 Spread and shape material in uniform layers of required thickness.
- .6 Shape each layer to smooth contour and compact to specify density before succeeding layer is placed.
- .7 Remove and replace that portion of layer in which material becomes segregated during spreading.

3.3 GRADING, COMPACTING AND TESTING

- .1 Rough grade to levels, profiles, and contours allowing for surface treatment as indicated in the contract documents. Compact to specified density as shown on the contract drawings.
- .2 Shape and roll alternately to obtain smooth, even and uniformly compacted base.
- .3 Apply water as necessary during compacting to obtain specified density. If material is excessively moist, aerate by scarifying with suitable equipment until moisture content is corrected.
- .4 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers.
- .5 Compaction and testing as per OPSS.MUNI 501.
- .6 Compaction tests to be paid by owner and performed by pre-approve testing agency.
- .7 Contractor to pay for repeat testing on fail samples.
- .8 Testing to be performed throughout progress of work to determine adequacy of compaction.
- .9 Co-operate with inspection staff during testing period.
- .10 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.
- .5 Do not disturb existing contaminated bare soil, soil within branch spread of trees or shrubs to remain unless otherwise specified by the NCC Representative.

3.4 PROTECTION

- .1 Maintain finished base in condition conforming to this Section until succeeding material is applied or until acceptance by NCC Representative.

3.5 CLEANING

- .1 Leave aggregate stockpile site in tidy, well drained condition, free of standing surface water.
- .2 For temporary or permanent abandonment of aggregate source, restore source to condition meeting requirements of authority having jurisdiction

3.6 SURPLUS MATERIAL

- .1 Remove surplus material and material unsuitable for fill, grading or landscaping as directed by NCC Representative.

END OF SECTION

PART 1- GENERAL

- 1.1 Related Work Specified Elsewhere
 - .1 Environmental Protection Section 01 35 43
 - .2 Site Work Demolition and Removals Section 02 41 13
 - .3 Site Grading Section 31 23 13
- 1.2 Utility Lines
 - .1 Before commencing work, establish location and extent of underground utility lines in area of excavation. Notify Contract Administrator of findings.
 - .2 Advise Contract Administrator to re-route existing lines in area of excavation. Costs for such work will be paid by Owner.
 - .3 Record locations of maintained and re-routed underground utility lines.
 - .4 Make good and pay for damage to existing utility lines resulting from work.
- 1.3 Protection
 - .1 Protect bottoms of excavations from softening. Should softening occur, remove softened soil and replace with material as directed by Contract Administrator.
 - .2 Protect bottoms of excavations from freezing.
 - .3 Provide adequate protection around bench markers, layout markers, survey markers, and geodetic monuments.
 - .4 Provide protection to ensure no damage to existing facilities and equipment situated on site.
 - .5 Effect approved measures to minimize dust as a result of this work.
 - .6 Do not stockpile excavated material to interfere with site operation or drainage.
- 1.4 Compaction Densities
 - .1 Compaction densities are percentages of maximum densities obtainable from ASTM D698-70.

PART 2 - PRODUCTS

- 2.1 Materials
 - .1 Backfill: native fill as per Section 31 22 13 – Site Grading.
- 2.2 Stockpiling
 - .1 Stockpile fill materials in areas designated by Contract Administrator. Stockpile native fill in a manner to prevent segregation. Protect stockpiled fill material from freezing.
 - .2 Protect fill materials from contamination.

PART 3- EXECUTION

- 3.1 Excavating
 - .1 Excavate to elevations and dimensions indicated for installation, construction and inspection of work specified.
 - .2 Excavate all vegetation and surficial organic material (topsoil, rootmat, peat, etc.)
 - .3 Excavate to well defined lines to minimize quantity of fill material required.
 - .4 Earth bottoms of excavations to be dry undisturbed soil, level, free from loose or organic matter.
 - .5 Notify Contract Administrator when bottom of excavation is reached
 - .6 Obtain Contract Administrator's approval of completed excavation.
 - .7 Keep excavation free of water while work is in progress.
 - .8 Protect open excavations against flooding and damage due to surface run off.
 - .9 Provide sediment control measures in accordance with Section 01 35 43 and as indicated

- elsewhere in the contract.
- .10 Excavation must not interfere with normal 45 degree splay of bearing from bottom of any footing.
- .11 When complete, have Contract Administrator inspect excavations to verify soil bearing capacity, depths and dimensions.
- .12 Correct unauthorized excavation at no extra cost as follows:
 - .1 Fill under bearing surfaces with Select Subgrade Material compacted to 95% SPMDD as directed by Contract Administrator.
- .13 Do not disturb soil within branch spread of trees or shrubs that are to remain. If excavating through roots, excavate by hand and cut roots with sharp saw.
- .14 Remove concrete masonry, paving, walks, rubble and other obstructions encountered in course of excavation.
- .15 Dispose of all excavated non re-usable material off site.
- .16 Do not obstruct flow of surface drainage or natural watercourses.

3.2 Backfilling

- .1 Do not commence backfilling until areas of work to be backfilled have been inspected and approved by Contract Administrator.
- .2 Areas to be backfilled and backfill material must be free from debris, snow, ice, water or frozen ground.
- .3 Prior to installation of granular materials, compact existing subgrade to obtain required bearing capacity. Remove **"soft"**, unstable or weak subgrade materials and fill with approved material.
- .4 Backfill simultaneously each side of walls and other structures to equalize soil pressures.
- .5 Where temporary unbalanced earth pressures are liable to develop on walls or other structures, erect bracing or shoring to counteract unbalance, and leave in place until removal is approved by Contract Administrator.
- .6 Place and compact fill materials in continuous horizontal layers not exceeding 150 mm compacted depth. Compact to at least 95% Standard Proctor Maximum Dry Density. Compact each layer before placement of the next layer.
- .7 Use methods to prevent disturbing or damaging buried services. Make good any damage.

3.3 Surplus Material

- .1 Dispose of material unsuitable for fill, grading or landscaping off site.

END OF SECTION

PART 1 - GENERAL

1.1 Section Includes

- .1 Materials and installation for fertilizing and preserving root systems of plants affected by changing grades or excavation.
- .2 Materials and installation of ground protection and other measures as deemed necessary to protect existing trees according to contract drawings and conditions outlined in this section.

1.2 Related Sections

- .1 Section 01 33 00 – Submittal Procedures
- .2 Section 01 56 00 – Temporary Barriers and Enclosures
- .3 Section 01 74 19 – Waste Management

1.3 References

- .1 Canadian Standards Association (CSA International)
 - .1 CSA G30.5-M1983 Welded Steel Wire Fabric for Concrete Reinforcement.
- .2 Department of Justice Canada
 - .1 Canadian Environmental Protection Act (CEPA), 1999, c.33.
 - .2 Fertilizers Act (R.S. 1985, c. F-10).
 - .3 Fertilizers Regulations (C.R.C., c. 666).
 - .4 Transportation of Dangerous Goods Act (TDGA), 1992, c.34.
- .3 Health Canada - Pest Management Regulatory Agency (PMRA)
 - .1 National Standard for Pesticide Education, Training and Certification in Canada 1995.
- .4 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).

1.4 Submittals

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit monthly written reports on maintenance during warranty period to the NCC Representative identifying:
 - .1 Maintenance work carried out.
 - .2 Development and condition of plant material.
 - .3 Preventative or corrective measures required which are outside Contractor's responsibility.

1.5 Delivery, Storage and Handling

- .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 19 – Waste Management.
- .2 Place materials defined as hazardous or toxic in designated containers.
- .3 Dispose of unused fertilizer material at official hazardous material collections site approved by the NCC Representative.
- .4 Handle and dispose of hazardous materials in accordance with CEPA, TDGA, regional and municipal regulations.
- .5 Do not dispose of unused fertilizer material into sewer system, into streams, lakes, onto ground in any other location where they will pose health or environmental hazard.
- .6 Ensure emptied containers are sealed and stored safely.

1.6 Scheduling

- .1 Obtain approval from the NCC Representative of schedule indicating beginning of Work.

1.7 Maintenance during Warranty Period

- .1 From time of acceptance by the NCC Representative to end of warranty period, perform following maintenance operations.
 - .1 Water to maintain soil moisture conditions for optimum growth and health of plant material without causing erosion.
 - .2 Apply fertilizer in early spring at manufacturer's suggested rate.
 - .3 Remove dead, broken or hazardous branches from plant material. Seek approval from NCC Representative prior to removing any branches. Pruning may only be carried out by a certified arborist.
 - .4 During periods of extended drought, wind or grading, trunks, limbs and foliage should be sprayed with water to remove accumulated construction dust.
 - .5 Maintain tree protection fencing in good repair.
 - .6 Maintain ground protection in good repair.

PART 2 - PRODUCTS

2.1 Materials

- .1 Fertilizer:
 - .1 To Canada Fertilizer Act and Fertilizers Regulations.
 - .2 Complete, commercial, slow release with 35 % of nitrogen content in water-insoluble form.
- .2 Anti-desiccant: commercial, wax-like emulsion.
- .3 Water: potable - free from impurities that inhibit growth.

2.2 Tree Protection Fencing

- .1 The modular construction fencing shall act as the tree protection fencing. Refer to Section 01 56 00 – Temporary Barriers and Enclosures.

2.3 Ground Protection

- .1 Mulch: 2" unpainted, untreated wood chip or bark mulch.
- .2 Granular A.
- .3 Steel plates.

PART 3 - EXECUTION

3.1 Identification and Protection

- .1 Do construction occupational health and safety in accordance with Section 01 35 30 – Health and Safety.
- .2 The trees on this site are ceremonial trees and are designated cultural assets of great importance. They are considered irreplaceable.
- .3 Extreme care must be taken to protect existing trees (including crown, trunk and root system) from damage, compaction and contamination during all stages of work. The roots of a tree can extend from the trunk to approximately 2-3 times the distance of the dripline.
- .4 No material, construction equipment, or vehicles are to be stored in the tree protection zone (TPZ) or within the critical root zone (drip line) of trees at any time.
- .5 No movement of vehicles, equipment or pedestrian in the TPZ will be permitted.
- .6 The use of tree trunks as a backstop, winch support, anchorage, as a temporary power pole, signpost or other similar function is prohibited.

- .7 Any disturbed vegetation or landscaping will be repaired or replaced without delay to the satisfaction of the NCC Representative.

3.2 Tree Protection Fencing (**Green colored**)

- .1 Supply and install **Green** colored tree protection fencing to protect existing trees.
- .2 Tree protection fencing must be installed before construction begins and equipment arrives on site and maintained until the project is completed.
- .3 Removal of fences, even temporarily to allow deliveries or equipment access is not allowed unless approved by the NCC Representative and ground protection is installed.

3.3 Ground Protection within the Critical Root Zone

- .1 Ground protection must be installed before construction begins and equipment arrives on site and maintained until the project is completed.
- .2 In areas where the critical root zone cannot be fenced and is within the limits of work, wood chip or bark mulch must be installed to a minimum depth of 6", followed by a layer of Granular A with ¾" plywood sheets laid on top. Steel plates can also be used in place of plywood. Leave the tree trunks clear of mulch. Install where indicated in the drawings and as directed by the NCC Representative to protect the sensitive root zone.
- .3 Asphalt removal from within the critical root zone must be supervised by a certified arborist. Once removed, the granular base shall be protected from repeated compaction from vehicular circulation by the placement of steel plates.

3.4 Excavation within the Critical Root Zone

- .1 Limits of excavation to be approved by the NCC Representative prior to commencing work.
- .2 Hand digging, hydraulic, or pneumatic excavations are permitted methods for excavation within the critical root zone.
- .3 Do not cut or damage roots greater than 25mm (1") diameter. When larger roots are encountered, consult a certified arborist before proceeding. If there are no roots greater than 25mm diameter, leave at least two (2) of the largest roots per meter of trench. Retain as many roots as possible.
- .4 Prune roots that must be removed using sharp, clean tools such as secateurs or a landscape handsaw. Make a clean cut and leave as small a wound as possible. All root pruning to be supervised by a certified arborist.
- .5 If any roots are exposed during construction, they should be immediately reburied with soil or wrapped in peat moss and burlap and kept moist until they can be buried permanently. Avoid exposing roots during hot, dry weather.
- .6 Directional micro-tunneling and boring may be permitted within the limits of the critical root zone subject to the approval of the NCC Representative.
- .7 Open face cuts that are consistent with an approved plan and that require root pruning, require the services of a certified arborist. An exploratory dig, either by hand or using a low water pressure hydro vacuum, or air spade method, must be completed prior to commencing with open face cuts.

3.5 Lowering Grade Around Existing Tree

- .1 Begin Work in accordance with schedule approved by the NCC Representative.
- .2 Cut slope not less than 500 mm from tree trunk to new grade level.
- .3 Excavate to depths as indicated. Protect from damage root zone which is to remain.
- .4 When severing roots at excavation level, cut roots with sharp tools.
- .5 Cultivate excavated surface manually to 15 mm depth.
- .6 Prepare homogeneous soil mixture consisting by volume of:
 - .1 60 % excavated soil cleaned of roots, plant matter, stones, debris.

- .2 25 % coarse, clean sterile sand.
- .3 15 % organic matter.
- .4 Grade 2:12:8 fertilizer at rate of 1.5 kg/m³.
- .7 Place soil mixture over area of excavation to finished grade level. Compact to 85 % Standard Proctor Density.
- .8 Water entire root zone to optimum soil moisture level.

3.6 Watering

- .1 Ensure that the ongoing maintenance and irrigation of the site vegetation is performed by a qualified contractor, while the construction hoarding is in place.
- .2 During the construction period, water existing trees within protected areas by applying water to surface, soaking area 1.5 times the diameter of the dripline of each tree.
- .3 Watering schedule to be approved by the NCC Representative.

3.7 Damage to Trees

- .1 Any damage or injury to trees shall be reported as soon as possible to the NCC Representative.
- .2 A substantial fine, as determined by the NCC Representative, may be enforced for any damage to the trees including unauthorized pruning.

3.8 Pruning

- .1 If pruning is required, consult an arborist and seek approval from the NCC Representative.
- .2 Prune in accordance with Section 32 93 45 - Tree Pruning.
- .3 Prune crown to compensate for root loss while maintaining general form and character of plant.

3.9 Anti-Desiccant

- .1 Apply anti-desiccant to foliage where applicable and as directed by the NCC Representative.

END OF SECTION

PART 1 – GENERAL

1.1 Related Work

- | | | |
|----|----------------------------|------------------|
| .1 | Excavating and Backfilling | Section 31 23 10 |
| .2 | Pathway Construction | Section 32 11 30 |

1.2 References

- | | |
|----|---|
| .1 | Ontario Provincial Standard Specification (OPSS): |
| .1 | OPSS 1010 Material Specification for Aggregates – Granular A and B. |

PART 2 – PRODUCTS

2.1 Materials -
General Requirements

- | | |
|-----|---|
| .1 | Any granular materials specified for the various works, on the drawings or in other sections of the specifications or by direction of the Contract Administrator, shall conform to this material specification for the class of granular material required. |
| .2 | The materials shall be selected or produced from pits or quarries to conform to the requirements specified herein for each class of granular materials. |
| .3 | Material retained on the number 4 sieve shall consist of hard durable particles or fragments of stone or gravel. |
| .4 | Materials that break up when alternatively frozen and thawed or wetted and dried shall not be permitted. |
| .5 | Fine aggregate passing the Number 4 sieve shall consist of natural or crushed sand, and, material passing the Number 200 sieve shall consist of fine mineral particles. |
| .6 | The material shall be free from vegetable matter and lumps or balls of clay. |
| .7 | The material shall be non-plastic and non-frost susceptible. |
| .8 | Blending to obtain the correct gradation will be permitted when the Contractor demonstrates that he can produce a correct gradation and has a plant capable of producing to the satisfaction of the Contract Administrator. |
| .9 | The Contractor shall advise the Contract Administrator two weeks in advance of the intent use of any of the specified materials to allow sufficient time for sampling and testing. The Contractor shall submit samples of granular materials to be used in the works if so requested by the Contract Administrator. |
| .10 | Approval of a sample does not mean acceptance of the whole |

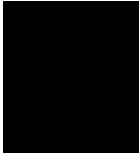
GRANULAR MATERIALS

source. Each load of material received at the job site shall be subject to all the requirements of that material.

- .11 All gradation requirements are shown as percentage by weight passing U.S. Standards Sieves, A.A.S.H.O. M-92-65.

2.2 Materials:
Specific Requirements

- .1 Granular "A":
.1 This material shall conform to OPSS 1010.
- .2 Granular "B" Type II
.1 This material shall conform to OPSS 1010
- .3 Granular "D" (stonedust):
.1 This material shall be crushed rock screenings or stone dust.
.2 Gradation Requirements:

| <u>Sieve</u> | | | <u>% Passing</u> |
|--------------|----|-----------|--|
| 9.5 | mm | (3/8") |  |
| 4.75 | mm | (No. 4) | |
| 1.18 | mm | (No. 16) | |
| 300 | um | (No. 50) | |
| 75 | um | (No. 200) | |

- .4 Select Subgrade Material (SSM):
.1 As per Section 31 23 10.

END OF SECTION

PART 1- GENERAL

- | | | | |
|-------------------|----|---|------------------|
| 1.1 Related Works | .1 | Excavating and Backfilling | Section 31 23 10 |
| | .2 | Geotextiles | Section 31 32 21 |
| | .3 | Granular Materials | Section 32 11 23 |
| | .4 | Concrete Sewer and Pipe Culverts | Section 33 42 13 |
| 1.2 Protection | .1 | Prevent damage to buildings, landscaping, curbs, sidewalks, roads and trees. Make good on any damage. | |

PART 2- PRODUCTS

- | | | |
|---------------|----|--|
| 2.1 Materials | .1 | Granular "A": as per Section 32 11 23 |
| | .2 | Granular "B" Type II as per Section 32 11 23 |
| | .3 | Granular "D" as per Section 32 11 23 |
| | .4 | Geotextiles as per Section 31 32 21 |

PART 3- EXECUTION

- | | | | |
|-----------------------|----|---|--|
| 3.1 Layout of Pathway | .1 | Notify Contract Administrator after completion of each stage and receive approval of layout prior to proceeding to next stage. Stages: .1 Staking of centerline. .2 Subgrade .3 Sub-base .4 Prior to laying of Granular D, Contract Administrator to inspect alignment and grades | |
| | .2 | All curves shall be true. No tangents shall be accepted at the beginning or end of curves. Obtain approval of Contract Administrator on site during work. | |
| 3.2 Inspection | .1 | Check graded subgrade for conformity with elevations and sections before placing granular base materials and obtain approval of Contract Administrator. | |
| | .2 | Proof roll graded subgrade surface with a heavy smooth drum roller (weight and type of roller to be approved by Contract Administrator). .1 Check for unstable areas. .2 Check for areas requiring additional compaction. .3 Notify Contract Administrator of unsatisfactory conditions. | |
| 3.3 Sub-base | .1 | Refer to Section 31 23 10, Excavating and Backfilling | |
| 3.4 Base Course | .1 | Place Granular 'A' and Granular 'B' base materials to compacted thickness as indicated. | |

PATHWAY CONSTRUCTION

- .2 Place in layers not exceeding 150mm compacted thickness. Compact each layer to 100% maximum dry density as determined by Standard Proctor Density.

- .3 Obtain approval of Contract Administrator prior to laying of stonedust .

3.5 Surface Course

- .1 Place stonedust surface course to compacted thickness as indicated and compact to 98% SPMDD.

3.6 Reinstatement of Edges

- .1 Reinstatement edges of pathway with approved earth fill and topsoil as indicated.

END OF SECTION

PART 1 - GENERAL

- 1.1 Related Works Specified Elsewhere
 - .1 Excavating and Backfilling Section 31 23 10
 - .2 Granular Materials Section 32 11 23
 - .3 Pathway Construction Section 32 11 30
- 1.2 References
 - .1 Ontario Provincial Standard Specification (OPSS):
 - .1 310, 311
 - .2 City of Ottawa Special Provisions 2009:
 - .1 F-3104
 - .3 City of Ottawa Standard Detailed Drawings 2009:
 - .1 R-10
- 1.3 Protect existing items designated to remain and materials designated for salvage and relocation. In event of damage, immediately replace such items or make repairs to the satisfaction of Contract Administrator and at no additional cost to the Commission.
- 1.4 Site Conditions
 - .1 Contractor to contact appropriate utilities to verify presence and location of all overhead and underground services and establish location for all such services in the field before commencing work. Report any discrepancies to Contract Administrator
- 1.5 Basis of Payment
 - .1 Basis of payment clauses included in references are deleted in their entirety and will be measured and paid as per Section 01 10 00 – Pay Items Description

PART 2 - PRODUCTS

- 2.1 Materials
 - .1 Performance Graded HL3 Hot Mix Asphalt – (Beige colored and black colored) submit samples prior to commencement of work. :
 - .1 This material shall conform to OPSS 310 as amended by City of Ottawa Special Provisions F-3104
 - .2 Tack Coat - (Beige colored and black colored) submit samples prior to commencement of work. :
 - .1 This material shall conform to OPSS 310 as amended by City of Ottawa Special Provision F-3107

PART 3 - EXECUTION

- 3.1 Asphalt Paving
 - .1 The Contractor shall notify the Contract Administrator five (5) days prior to paving.
 - .2 The Contractor must obtain the Contract Administrators approval before placing any asphalt.
 - .3 Asphalt is to be placed to thicknesses, grades and lines as shown on plans or as indicated by the Contract Administrator
 - .4 The Contractor paving shall be conducted as specified in OPSS 310 or as directed by the Contract

Administrator

- .5 Step joints shall be used as indicated where new asphalt will connect to existing pavement

3.2 Quality Control and Assurance

- .1 OPSS 310 sub-sections 310.07.01 and 310.07.05 are deleted in their entirety.
- .2 The Contractor must supply a minimum of one (1) quality assurance sample and one (1) referee sample to the Contract Administrator. The samples shall be randomly chosen or as directed by the Contract Administrator. The Contract Administrator may request additional samples.
- .3 The samples shall be delivered within 4 hours to a location as specified by the Contract Administrator.
- .4 Samples shall be accompanied by the City of Ottawa 'Quality Assurance Sample Data Sheet' for Hot Mix Asphalt and completed to the satisfaction of the Contract Administrator.

3.3 Compaction

- .1 Compaction requirements shall be as specified in OPSS sub-section 310.08.015.03 and meet the requirements specified in OPSS 310, Table 9, to the satisfaction of the Contract Administrator
- .2 The Contractor shall conduct the compaction testing and supply the Contract Administrator with the results.

END OF SECTION

PART 1- GENERAL

1.1 RELATED SECTIONS

- .1 Section 31 23 10 – Excavation and Backfilling
- .2 Section 31 05 17 – Granular Materials

1.2 PROTECTION

- .1 Prevent damage to landscaping, curbs, sidewalks, trees, fences, roads and adjacent property. Make good any damage.

1.3 SAMPLES

- .1 Submit a full-size sample of each type of unit paver used.
- .3 Install a mock-up of pavers layout for NCC Representative approval's before commencement of work. Mock-up to be at minimum 1m x 1m.

PART 2- PRODUCTS

2.1 MATERIALS

- .1 Prefabricated concrete unit pavers:
 - .A Dimension : 100x300x100mm
Range color: Dark Grey
Finish: Smooth
 - .b Dimension : 100x300x100mm
Range color: Light Grey
Finish: Smooth
- .2 On granular base: 150mm granular 'A' & 150mm granular 'B'
- .3 Laying Course: dry clean masonry sand, 25mm thickness
- .4 Joint materials: Polymeric Sand, dark Grey colour
- .5 Edge Restraint: Flexible PVC such as SNAP EDGE (or approved equal) with min 300mm spikes at 300mm O.C..

PART 3- EXECUTION

3.1 SUBGRADE

- .1 Ensure that subgrade preparation conforms to levels and compaction required to allow for installation of granular base.

- .1 Ensure that subgrade preparation conforms to levels and compaction required to allow for installation of granular base.

3.2 GRANULAR BASE

- .1 Place base to compacted thicknesses as indicated on drawings.
- .2 Compact to a density of not less than 95% Standard Density in accordance with ASTM D698.
- .3 Shape and roll alternately to obtain a smooth, even and uniformly compacted granular base and ensure conformity of grades with finish surface.
- .4 Apply water as necessary during compaction to obtain specified density. If granular base is excessively moist, aerate by scarifying with suitable equipment until moisture content is corrected.
- .5 In areas not accessible to rolling equipment, compact to specified density with approved mechanical tampers.
- .6 Ensure top of granular base does not exceed plus or minus 10 mm of finished grade, less combined thickness of sand laying course plus concrete unit pavers.

3.3 LAYING COURSE

- .1 Place masonry sand laying course to compacted thickness as indicated on drawings.
- .2 Ensure laying course is dry (4-8% moisture content) prior to placement of unit pavers.

3.4 SURFACE COURSE

- .1 Install unit paving true to grade, in location, layout and pattern as indicated on drawings.
- .2 Install stone step tight to building face, and in same manner as unit paving on granular base and sand levelling course (slope step away from building).
- .3 Where required, cut unit pavers accurately without damaging edges.
- .4 Tamp down and level pavers with mechanical plate vibrator on minimum 19 mm thick plywood until pavers are true to grade and free of movement.
- .5 Fill spaces between pavers by sweeping polymeric sand into joints, vibrating, wetting and cleaning as per manufacturer's instructions. Completely fill joints.
- .6 Surface of finished pavement: free from depressions exceeding 5 mm as measured with 3 m straight edge.
- .7 Sweep surface course clean.

END OF SECTION

PART 1 - GENERAL

- 1.1 Related Works Specified Elsewhere
 - .1 Site Work Demolition and Removals Section 02 41 13
 - .2 Asphalt Paving Section 32 12 16
- 1.2 Basis of Payment
 - .1 Basis of payment clauses included in references are deleted in their entirety and will be measured and paid as per Section 01 10 00 – Pay Items Description

PART 2 - PRODUCTS

- 2.1 .1 Paint:
 - .1 To CGSB 1-GP-74M, alkyd traffic paint.
 - .2 Color: white
 - .3 Upon request, NCC Representative will supply a qualified product list of paints applicable to work. Qualified paints may be used but NCC Representative reserves right to perform further tests.
- .2 Thinner: to CGSB 1-GP-5M.
- .3 Templates and Stencils: as required to produce symbols as indicated on drawings. Submit manufacturer's data including size of each stencil.
- 2.2 EQUIPMENT REQUIREMENT
 - .1 Paint applicator to be an approved pressure type mobile distributor capable of applying paint in single solid lines. Applicator to be capable of applying marking components uniformly, as rates specified, and to dimensions as indicated, and to have positive shut-off.

PART 3 - EXECUTION

- 3.1 CONDITIONS OF SURFACES
 - .1 Pavement surface to be dry, free from ponded water, frost, ice, dust, oil, grease and other foreign materials.
 - .2 Remove existing markings that will interfere with legibility of new painted lines and symbols.
- 3.2 APPLICATION
 - .1 Lay out pavement markings and obtain approval by NCC Representative.
 - .2 Unless otherwise approved by NCC Representative, apply paint only when air temperature is above 10°C, wind speed is less than 60 km/h and no rain is forecast within next 4 h.
 - .3 Apply traffic paint evenly at rate of 3 m²/L.
 - .4 Do not thin paint unless approved by NCC Representative.
 - .5 Symbols and letters to conform to dimensions indicated.
 - .6 Paint lines to be of uniform color and density with sharp edges.
 - .7 Width of paint lines to be 65 mm.
 - .8 Thoroughly clean distributor tank before refilling with paint.

3.3 TOLERANCE

- .1 Paint markings to be within plus or minus 12 mm of dimensions indicated.
- .2 Remove incorrect markings as indicated by NCC Representative.

3.4 PROTECTION OF WORK

- .1 Protect pavement markings until dry.

END OF SECTION

PART 1- GENERAL

1.1 RELATED SECTION

- .1 01 33 00 - Shop Drawing, product data and samples

1.2 SUBMITTALS

- .1 Submit product data in accordance with Section 01 33 00 – Shop Drawing, product data and samples
- .2 Submit required shop drawings in accordance with Section 01 33 00 - Shop Drawing, product data and samples.
- .3 Indicate dimensions, sizes, assembly, anchorage and installation details for each furnishing specified.
- .4 Provide maintenance data for care and cleaning of site furnishings.

1.3 DELIVERY, STORAGE AND HANDLING

- .1 Damaged furniture and components will not be accepted and will have to be replaced at no charge for the NCC.

PART 2- PRODUCTS

2.1 BENCHES

- .1 Type: Model C-140 from the [REDACTED] as supplied by [REDACTED].
 - Specifications:
 - .1 C-140 components
 - .2 6 foot length
 - .3 Standard metalwork color: black
 - .4 2x3 IPE Slats
 - .5 No stain
 - Installation :
 - .1 Install and secure to asphalt covered concrete base (refer to landscape plans)
 - .2 Clearance for 3/8" (10mm) anchor bolts (anchor bolts to be provided by contractor)
 - .3 Mounting: It is not recommended to locate anchor bolts until bench is in place.

2.2 WASTE RECEPTACLE

- .1 Type: Model S-42 from the [REDACTED] as supplied by [REDACTED].
 - .1 Standard metalwork color: black
 - .2 Mounting plate: (3) anchor bolt holes.
 - Installation :
 - .1 Install and secure to asphalt covered concrete base (refer to landscape plans)
 - .2 Clearance for 3/8" (10mm) anchor bolts (anchor bolts to be provided by contractor)

- .3 Mounting: It is not recommended to locate anchor bolts until bench is in place.

2.3 BOLLARD (BLACK) - FIXED BOLLARD

- .1 Model: Maglin MTB500-B1 Bollard
 - a. Dimensions:
 - 1. Height: 34.5" (87.6 cm)
 - 2. Diameter: 4.5" (11.4 cm)

PART 3- EXECUTION

3.1 INSTALLATION

- .1 Assemble furnishings in accordance with manufacturer's instructions.
- .2 Install furnishing true, plumb, anchored and firmly supported, as indicated by the NCC Representative.
- .3 Touch-up damaged finishes to approval of the NCC Representative.

END OF SECTION

PARTIE 1 - GENERAL

- 1.1 Related Work Specified Elsewhere
- | | |
|-----------------------------|------------------|
| .1 Excavating & Backfilling | Section 31 23 10 |
| .2 Seeding | Section 32 92 20 |
| .3 Sodding | Section 32 92 23 |
- 1.2 Testing
- .1 Obtain Contract Administrator's initial approval of imported topsoil at source.
 - .2 Test existing and imported topsoil for NPK, Mg, soluble salt content, organic matter and pH value prior to delivery to site.
 - 1 Submit 0.5 kg sample of topsoil to testing laboratory and indicate intended use.
 - 2 Determine requirements for amendments to bring pH value of soil to 5.5 to 7.7 level.
 - 3 Submit two copies of soil analysis and recommendations for corrections to Contract Administrator.
 - .4 Inspection and testing of topsoil will be carried out by testing laboratory designated by Contract Administrator.
 - .5 National Capital Commission will pay cost of testing.
- 1.3 Scheduling of Work
- .1 Schedule placing of topsoil to permit immediate seeding and sodding operations.

PARTIE 2 - PRODUCTS

- 2.1 Bioswale soil (Atlantis parking area)

Mix ratio:

50% sand (0.05-2mm)

30% soil consisting of:

50-85% sand

0-50% silt (0.002-0.05mm)

10-20% clay (<0.002mm)

- 1.5-10% organic matter
- 20% well decomposed, stable compost, free of weeds and weed seeds
- pH: 5.5-7.5

- 2.2 [REDACTED] (seeding and reforestation soil amendment areas)

[REDACTED] as supplied by [REDACTED] or approved equal. Submit sample and name of supplier five (5) days in advance and obtain approval by NCC representative prior to shipping to site.

- 2.3 [REDACTED] (soil amendment under existing trees within seeding area)

[REDACTED] as supplied by [REDACTED] or approved equal. Submit sample and

name of supplier five (5) days in advance and obtain approval by NCC representative prior to shipping to site.

2.4 Topsoil: (imported should be avoided, re-use on site soil for all grading requirements)

- .1 Stockpiled topsoil: see Section 31 23 10
- .2 If additional soil is required, it should meet the following requirements: friable loam, neither heavy clay nor of very light sandy nature containing minimum of 10% organic matter for sandy loams to maximum of 25% by volume. Free from subsoil, roots, grass, weeds, toxic materials, stones, foreign objects and an acidity range (Ph) of 5.5 to 7.5. Topsoil containing crabgrass, couch grass or other noxious weeds, not acceptable.

PARTIE 3 - EXECUTION

3.1 Preparation

- .1 Grade subgrade, eliminating uneven areas and low spots, ensuring positive drainage. Remove stones larger than 50 mm diameter and other deleterious materials. Remove subsoil that has been contaminated with oil, gasoline or calcium chloride. Dispose of removed materials as directed.
- .2 Cultivate entire area receiving topsoil to depth of 50 mm. Core aerate in those areas where equipment used for hauling and spreading has compacted subgrade. Do not cultivate soils around existing trees and shrubs.

3.2 Reuse of Existing Topsoil

- .1 Unless otherwise indicated existing stockpiled topsoil shall be used for all reinstatement. Imported sources of topsoil shall only be used when all approved sources of existing topsoil have been used.

3.3 Spreading of Topsoil

- .1 Do not spread topsoil until Contract Administrator has inspected and approved subgrade.
- .2 Spread topsoil with adequate moisture in uniform layers during dry weather over approved, dry, unfrozen subgrade, where seeding is indicated.
- .3 Bring topsoil up to finished grade.
- .4 Remove stones, roots, grass, weeds, construction materials, debris and foreign non-organic objects from topsoil.
- .5 Manually spread topsoil around trees, plants, surface utilities and other obstacles.

3.4 Soil Amendments

- .1 If required, apply lime, sulphur or other soil amendment at rate determined from soil sample test.

- .2 Mix soil amendment well into full depths of topsoil by cultivating.

3.5 Finish Grading

- .1 Fine grade entire topsoiled area to contours and elevations as indicated or as directed. Eliminate rough spots and low areas to ensure positive drainage.
- .2 Roll topsoil with 50 kg roller, minimum 900 mm wide, to compact and retain surface.
- .3 Leave surface smooth, uniform, firm against deep foot printing, with fine loose texture.

3.6 Surplus Material

- .1 Dispose of surplus topsoil not required for fine grading/landscaping off site.

END OF SECTION

PART 1 – GENERAL

- 1.1 Related Works
.1 01 33 00 – Shop Drawings, Product Data and Samples
.2 32 91 21.01 - Topsoil and Finish Grading

PART 2 – PRODUCTS

2.1 MATERIALS

- .1 Seed:
.1 [REDACTED] as supplied by [REDACTED] or approved equal.
Contact info: [REDACTED]
(Sowing rate of 15,0 g/m²)
* add additional Lolium Multiflorum nurse crop to mix (Sowing rate of 3 g/m²)
- .2 [REDACTED] as supplied by [REDACTED] or approved equal.
Contact info: [REDACTED]
(Sowing rate of 25,0 g/m²)
- .3 [REDACTED] as supplied by [REDACTED] or approved equal. Contact info: [REDACTED]
(Sowing rate of 4,0 g/m²)
* add additional Lolium Multiflorum nurse crop to mix (Sowing rate of 3 g/m²)
- .4 [REDACTED] as supplied by [REDACTED] or approved equal. Contact info: [REDACTED]
(Sowing rate of 7 g/m²)
- .5 **Type 1- cool custom seed mix**
Agastache foeniculum - 10%
Allium cernuum - 4%
Asclepias syriaca - 5%
Asclepias verticillata - 4%
Aster laevis - 7%
Echinacea pallida - 9%
Iris Versicolor - 5%
Liatris Spicata - 12%
Monarda fistulosa - 5%
Physostegia Virginiana - 2%
Tradescantia ohiensis - 5%
Verbena Hastata - 5%
- Grasses:
Carex pensylvanica -4%
Carex Vulpinoida -4%
Deschampsia flexuosa -4%
Elymus Canadensis -5%
Lolium multiflorum -8%
Schizachyrium scoparium -2%
- (Sowing rate to be determined by supplier)
* add additional Lolium Multiflorum nurse crop to mix (Sowing rate of 3 g/m²)
- .6 **Type 2- warm custom seed mix**
Perennials:
Achillea millefolium -8%
Asclepias tuberosa -5%

| | |
|-----------------------|------|
| Coreopsis lanceolate | -5% |
| Echinacea paradoxa | -7% |
| Penstemon digitalis | -10% |
| Rudbeckia hirta | -9% |
| Rudbeckia triloba | -5% |
| Solidago Canadensis | -5% |
| Thalictrum dasycarpum | -6% |

Grasses:

| | |
|--------------------------|-----|
| Calamagrostis Canadensis | -7% |
| Carex muskingumensis | -9% |
| Deschampsia cespitosa | -3% |
| Deschampsia flexuosa | -5% |
| Lolium multiflorum | -8% |
| Sorghastrum nutans | -4% |
| Sporobolus heterolepis | -4% |

(Sowing rate to be determined by supplier)

* add additional Lolium Multiflorum nurse crop to mix (Sowing rate of 3 g/m²)

.7 Mown lawn

55% *Festuca rubra*
30% *Poa pratensis*
15% *Lolium perenne*

(Sowing rate to be determined by supplier)

- .2 Packages will be individually labeled in accordance with 'Seeds Regulations' and indicate clearly the name of the supplier, species, content, grade and mass.
- .3 Use appropriate agriculture broadcast or no till planter seeder and mulching equipment. The Contract Administrator to approve all proposed products and equipment for the work. Ensure soil cover over all new seeds.

2.2 WATER

- .1 Free of impurities that would inhibit germination and growth.
- .2 Water must be supplied from a designated source.

2.3 CELLULOSE-BASED MULCH (PAPER MULCH)

- .1 Use only cellulose-based mulch if seeds were broadcasted to ensure moisture retention during germination. Do not use a tackifier since wildflower seeds can't penetrate through.

PART 3 - EXECUTION

3.1 WORKMANSHIP

- .1 Do not perform work under adverse field conditions as determined by the NCC Representative.
- .2 Additional care shall be taken when seeding adjacent to watercourses or paved area to ensure that seed does not spread or blown onto those areas.

3.2 PERMANENT COVER

- .1 Seeding shall not be carried out under adverse conditions, of high wind, frozen ground or ground covered with snow, ice or standing water.
- .2 Sowing shall be done during the following periods:
 1. Between May 15 and June 15th;
 2. Between September 1st and October 15. (Preferable)
 3. Dormant seeding after November 1st when daytime temperatures are consistently below 5oC.

3.3 SEED BED PREPARATION ON DISTURBED SOIL OR NEW CONSTRUCTION SITE

- .1 Mow existing weeds as low as possible and disposed off-site.
- .2 Remove and dispose of all debris, stones 50 mm in diameter and larger, soil contaminated by oil, gasoline and other deleterious materials off-site.
- .3 Aerate all compacted soil due to construction traffic.
- .4 Add 50mm of live mulch (as supplied by [REDACTED] or approved equivalent) and till in top 200mm of existing soil.
- .5 Do not carry out seed bed preparation more than 1 calendar day before the seeding operation so the Contractor shall avoid run-off problems.
- .6 Surface preparation will produce a soil surface that is predominantly fine in nature (particle sizes of 5 to 10 mm), with no more than five lumps measuring between 10-25 mm in diameter in any 1m² area, and no lumps larger than 25 mm.

SEED BED PREPARATION UNDER EXISTING TREES

- .1 Mow existing grass as low as possible and dispose off-site.
- .2 Remove and dispose of all debris, stones 50 mm in diameter and larger, soil contaminated by oil, gasoline and other deleterious materials off-site.
- .3 Add 50mm of [REDACTED] soil (as supplied by [REDACTED] or approved equivalent) and spread by hand under protected root zone. Ensure mulch doesn't touch trunk at any time
- .4 Do not carry out seed bed preparation more than 1 calendar day before the seeding operation so the Contractor shall avoid run-off problems.
- .5 Surface preparation will produce a soil surface that is predominantly fine in nature (particle sizes of 5 to 10 mm), with no more than five lumps measuring between 10-25 mm in diameter in any 1m² area, and no lumps larger than 25 mm.

SEED BED PREPARATION IN UNDISTURBED GRASS AREAS

- .1 Mow existing grass as low as possible. and disposed off-site.
- .2 Remove and dispose of all debris, stones 50 mm in diameter and larger, soil contaminated by oil, gasoline and other deleterious materials off-site.
- .3 Remove the top 75mm of existing grass and soil with a sod cutter off-site.
- .4 Add 50mm of live mulch (as supplied by [REDACTED] or approved equivalent) and till in top 200mm of existing soil.
- .5 Do not carry out seed bed preparation more than 1 calendar day before the seeding operation so the Contractor shall avoid run-off problems.
- .6 Surface preparation will produce a soil surface that is predominantly fine in nature (particle sizes of 5 to 10 mm), with no more than five lumps measuring between 10-25 mm in diameter in any 1m² area, and no lumps larger than 25 mm.

3.4 HYDROSEEDING (HYDRAULIC SEEDING)

- .1 This application method will **NOT** be accepted for any of the seeding within this contract. It does not ensure firm seed to soil contact and prevents seed stratification to happen which will lead the seed to germinate at the wrong time of the year.

3.5 MECHANICAL PLANTERS

- .1 Use appropriate agriculture broadcast or no till planter seeder. Specific models that can successfully plant native grasses and flowers include the Tye drill, Truax drill, John Deere Rangeland drill, and properly outfitted Brillion seeders.
- .2 Ensure soil cover over all new seeds.
- .3 Roll the seeded area after planting. This step is very important for germination success
- .4 The Contract Administrator to approve all proposed products and equipment for the work.
- .5 Sowing rate to be followed and never increased as it will result in a dominant grass meadow rather than flower meadow where indicated.

3.6 CELLULOSE-BASED MULCH (PAPER MULCH)

- .1 All bare soil areas shall be stabilized with paper mulch immediately after seeding.
- .2 The Contract Administrator to approve all proposed products and equipment for the work.

3.7 MAINTENANCE DURING ESTABLISHMENT AND 2 YEAR WARRANTY PERIOD

Establishment:

- .1 Water seeded areas to maintain optimum soil moisture level for germination and continued growth of grass. Control watering to prevent washouts.
- .2 Gully formations and washouts as a result of rain events greater than 20 mm per day shall be repaired, including regrading and re-seeding.
- .3 Seeded areas shall be accepted by the NCC Representative provided that:
 - .1 seeded areas are properly established;
 - .2 seeded areas are free of weeds and bare or dead spots;
 - .3 no surface soil is visible when grass has been cut to a height of 50 mm;
(mown lawn only)
 - .4 seeded areas have been cut minimum 2 times, the second cut within 24 hours prior to acceptance.
- .4 Areas seeded in fall will be accepted the following spring, one month after the beginning of the growing season, provided the acceptance conditions are met.
- .5 The Contractor shall maintain the seeded areas including mowing until acceptance by the NCC Representative. Unacceptable areas shall be reseeded.
- .6 Weed control:
 - .1 Do not pull weeds at any time. Mowing or hand cutting will be accepted.

First year of maintenance:

- .1 Weed control:
 - a. Mow weeds when they reach a maximum height of at 200-250mm height on a regular basis to prevent them from self-seeding throughout 1st growing season.
 - b. A flail-type mower works best, as it chops up the weeds so they can dry out rapidly. Rotary mowers and sickle bar mowers will not be accepted.

- c. Do not pull weeds at any time due to soil disturbance. Large weeds can be cut by hand if required.
- d. If weeds become thick by mid-summer they should be cut back, along with the nurse crop. If weeds are thin, cut when in bloom, before they set seed.
- e. Do not mow down the year's growth at the end of the season. Leave it to help protect the young plants over the winter. The plant litter and the snow that it catches insulate the soil from rapid changes in soil temperatures, which can cause plant losses due to frost heaving.

Second year of maintenance:

- .1 Weed control:
 - a. Mow the meadow in spring of the second year right to the ground and rake off the cuttings.
 - b. If weeds remain a problem in the second year, mow the meadow in late spring or early summer (before the weeds reach 200-250mm height)
 - c. A flail-type mower works best, as it chops up the weeds so they can dry out rapidly. Rotary mowers and sickle bar mowers will not be accepted.

END OF SECTION

PART 1 GENERAL

1.1 RELATED SECTION

- .1 32 91 21.01 – Topsoil and finish grading
- .2 32 93 12.01 – Plant maintenance and warranty

1.2 SOURCE QUALITY CONTROL

- .1 The Contractor shall commence sourcing the specified material immediately upon award of the Contract.
- .2 Plant materials shall be conformed to species specified in the contract document. All plant materials shall be identified with their complete name and caliper.
- .3 No substitutions will be considered unless the Contractor can demonstrate to the NCC Representative's satisfaction that a prolonged and widespread search for the specified cultivars has been undertaken. The NCC Representative's written approval of plant substitution is required.
- .4 Obtain approval of source of plant material. Acceptance and selection of plant at its source does not prevent rejection on site prior to or after planting operations.
- .5 After harvesting and prior to shipping any plants from the growing nursery, notify the NCC Representative to allow for an inspection of the plants at the growing nursery to assure that all harvesting requirements have been satisfied.

1.3 SHIPMENT AND PRE-PLANTING CARE

- .1 All plants shall be inspected by the Contractor for damage in transit. No defective material shall be delivered to the site. Material subsequently damaged shall be replaced immediately at no additional cost for the NCC.
- .2 Protect plant materials against abrasion, exposure and extreme temperature change during transit.
- .3 Keep roots moist and protected from sun and wind

1.4 STORAGE AND PROTECTION

- .1 Protect plant materials from frost, excessive heat, wind and sun during delivery.
- .2 Immediately store and protect plant material which will not be installed within 1 hour after their arrival on site, in storage locations approved by NCC Representative.
- .3 Protect plant material from damage during transportation
 - .1 When delivery distance is less than 30 km, and vehicle travels at speeds under 80 km/h, tie tarpaulins around plants or over vehicle box.
 - .2 When delivery distance exceeds 30 km or vehicle travels at speeds over 80 km/h, use enclosed vehicle where practical.

- .3 Protect foliage and root balls using anti-desiccants and tarpaulins, where use of enclosed vehicle is impractical due to size and weight of plant material.
- .4 Protect stored plant material from frost, wind and sun and as follows:
 - .1 For pots and containers, maintain moisture level in containers.
 - .3 For balled and burlapped, and wire basket root balls, place to protect branches from damage. Maintain moisture level in root zones.

PART 2 PRODUCTS

2.1 PLANT MATERIALS

- .1 Comply with Guide Specification for Nursery Stock, latest edition, of Canadian Nursery Trades Association referring to size and development of plant material and root ball.
- .2 All plant material to come from a commercial nurseries. The plant material shall be grown in zone 4b or 5a, according to the hardiness zones for plants in Canada established by Agriculture Canada.
- .3 Use plants with strong fibrous root systems free of disease, insects, defects or injuries and structurally sound. Plants must have been root pruned regularly, but not later than one growing season prior to arrival on site.
- .4 Substitution to plant material as indicated on planting plan are not permitted unless written approval has been obtained as to type, variety and size.
- .5 Size indicated are the minimum allowable after pruning.

2.2 WATER

- .1 Free of impurities that would inhibit plant growth.

2.3 MYCORRHIZE INOCULANTS

- .1 Apply mycorrhize inoculants [REDACTED] of [REDACTED], following application instructions, or an equivalent approved by the NCC and registered in Canada;

2.4 STAKES

- .1 No staking required

2.5 GUYING COLLAR

- .1 N/A

2.6 TREE TRUNK PROTECTION

- .1 'Surtronic' fine mesh trunk wraps as supplied by Dendrotik or approved equal.

2.7 MULCH

- .1 [REDACTED] Composted Pine Mulch as supplied by [REDACTED] or approved equal. Submit sample and name of supplier five (5) days in advance and obtain approval by NCC representative prior to shipping to site.

2.8 GROWING MEDIUM

Growing medium according to section 32 91 21.01 – Topsoil and finish grading

2.9 ANTI-DESICCANT

- .1 Wax-like emulsion to provide film over plant surfaces reducing evaporation but permeable enough to permit transpiration.

2.10 BONEMEAL

- .1 Bonemeal: raw bonemeal, finely ground (minimum analysis of 4% nitrogen and 20% phosphoric acid) to be added at the bottom of each tree and shrub planting hole as per manufacturer recommendations. Mix bonemeal thoroughly with soil.

PART 3 EXECUTION

3.1 PRE-PLANTING PREPARATION

- .1 Delivered plant material to be inspected and approved NCC Representative.
- .2 NCC Representative to approve layout mockup of plant material for all beds until advised differently. Planting bed grades will also need to be approved before planting.

3.2 PLANTING TIME

- .1 Plant materials shall be planted from May 15 to June 30 or from August 15 to October 1, unless otherwise approved by the NCC Representative
- .2 The Contractor shall arrange for all plant species recommended for spring only digging, to be dug and containerized in the spring, immediately upon award of the Contract.
- .3 The foliage of deciduous trees which have broken buds shall be sprayed with anti-desiccant to slow down transpiration prior to transplanting.

3.3 EXCAVATION

- .1 Excavate planting holes to width and depth as indicated on drawings.
- .2 The sides of the planting hole shall be scarified so that water and roots can readily penetrate.

- .3 Place mycorrhize inoculants and bonemeal in the bottom of each plant hole as per manufacturer recommendation.

3.4 PLANTING

- .1 Planting trees and shrubs vertically in the places indicated, oriented in a manner to produce the best possible visual effect with the surrounding structures such as buildings, roads and sidewalks.
- .2 For burlapped root balls, cut away top one third of wrapping and wire basket without damaging root ball. Do not pull burlap or rope from under root ball.
- .3 For container stocks or root balls in non-degradable wrapping, remove entire container or wrapping without damaging root ball.
- .4 Place plant material at a depth similar to depth in nursery.
- .5 Backfill with existing soil in 150 mm layers. Tamp each layer to eliminate air pockets. When two thirds of depth of planting pit has been backfilled, fill remaining space with water. After water has penetrated into soil, backfill to finish grade. Form watering saucer as indicated.
- .6 Water plant material thoroughly.
- .7 After soil settlement has occurred, fill with soil to finish grade.
- .8 Spread 75mm of mulch over all areas of bare soil. Mulch heavily contaminated with soil is not acceptable. Diameter of 400mm around all plant material.
- .9 Remove dead and injured branches and branches that rub causing damage to bark.
- .10 Dispose of burlap, wire and container material off site.

3.5 TRUNK PROTECTION

- .1 Install fine mesh trunk wraps on deciduous trees as indicated.

3.6 TREE SUPPORTS

- .1 No staking required

3.7 PROTECTION DURING CONSTRUCTION

- .1 The Contractor shall protect all work and materials from damage due to planting operations; operations by other Contractors; or trespassers. Maintain protection during installation until acceptance. Treat, repair or replace damaged work immediately.
- .2 Damage done to any of the work by the Contractor, or any of their sub-contractors, shall be replaced by the Contractor at their own expense.

3.8 MAINTENANCE PRIOR TO FINAL INSPECTION

- .1 Perform following maintenance operations from time of planting until the project has been approved by the NCC Representative and the interim certificate of Approval has been issued at Substantial Performance.
 - .1 Water to maintain soil moisture conditions, for optimum establishment, growth and health of plant material without causing erosion.
 - .2 **Structural pruning by a certified arborist must be completed once a year and arborist must provide report to NCC representative.**
 - .3 If acceptance is delayed due to a drawn out schedule by the Contractor, the Contractor shall be responsible for the scope of maintenance outlined in section 32 93 12.01 until final acceptance of the site. The Contractor shall still be responsible for the full term of the warranty as of the date of approval.

3.9 FINAL INSPECTION

- .1 At final inspection, plant material shall be acceptable when it is properly installed, unbroken, shows adequate formation of buds and is free from blight of any description. All planting areas shall be free of weeds, litter and in good order.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED WORKS

- .1 Trees and shrub planting Section 32 93 10.01

1.2.1 WARRANTY

- .1 All plant material shall be warranted for a period of two years from the date of substantial performance.
- .2 The warranty shall cover any defects in materials and workmanship.
- .3 A warranty inspection shall be carried out at the end of the warranty period.
- .4 Extend 2 year warranty on all replacement of plant material.

1.3 DURATION

- .1 Plant material maintenance shall begin immediately after each portion of planting has been completed and shall continue throughout the maintenance and warranty period to the satisfaction of the NCC Representative.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Water: shall be free from any contaminants which could adversely affect plant growth.
- .2 Pruning Tools: shall be designed specifically for horticultural purposes and shall be clean, sharp and in proper, safe, working order. Pruning equipment shall be capable of producing clean, flush cuts without tearing or fraying the bark.

PART 3 - EXECUTION

3.1 OPERATIONAL CONSTRAINTS

- .1 Do each maintenance operation continuously and complete within a reasonable time period.
- .2 No maintenance equipment, materials or other miscellaneous items may be stored on site.
- .3 All debris, waste and other extraneous material resulting from the maintenance operation shall be removed from the site daily upon completion of maintenance.
- .4 The Contractor shall be fully acquainted with all relevant Provincial and Municipal By-laws and Regulatory Codes relating to the work of this contract, and will be required to comply with such by-laws and codes without extra compensation.
- .5 Notify the NCC Representative immediately of damage incurred by pest, disease, mechanical or vandalism.

3.2 INTERIM REPLACEMENT OF PLANT MATERIAL

- .1 Throughout the maintenance and warranty period, units of plant material that are found to be unacceptable will be replaced by the Contractor. Any unacceptable material must be replaced within one month unless otherwise directed by the NCC representative. Weekly inspections must be reported for the first growing season.
- .2 At the discretion of the NCC Representative, plant material that is identified as dead or in a poor or diseased condition shall be immediately removed from the site.

3.3 WATERING

- .1 The Contractor is responsible for interim manual watering of all plant material, from time of planting until the end of the warranty period (24 MONTHS).
- .2 Water all plant material immediately after installation. Thereafter,
 - .1 Water daily for the first week after planting;
 - .2 Water every second day for the next 3 weeks;
- .3 For the first warranty year;
 - .1 The contractor shall submit for approval a watering schedule at the beginning of the warranty period. The watering shall occur at least once a week, on Thursday, Wednesday or Tuesday. Once the day is chosen, the watering shall happen each week at the same day.
 - .2 Provide all water required to keep soil within and around the root and in the soil at optimum moisture content between 10 and 20% as measured using a General Digital Moisture Meter.
 - .3 Proceed to watering with a slow water spray jet oriented toward the growing media.
 - .4 The watering shall be made before 11h am or after 14h30 pm to avoid full sun period. Watering should also be avoided during peak use period between 7-9am, 12-1pm and 3-5pm.
 - .5 Proceed to the watering even on rainy days unless receiving written notice of the NCC representative.
 - .6 Hose bibs are available on site, see plans.
- .4 For the remainder of the warranty period, thoroughly water whenever natural precipitation falls below 20 mm per week (Sunday to Saturday) for 2 consecutive weeks. Precipitation data shall be as per Environment Canada from the Macdonald-Cartier Airport weather station.
- .5 Ensure the root zone is thoroughly saturated during each watering operation.
- .6 Repair any damage caused by watering operations.

3.4 WEEDING

- .1 All weeds, dead plants, leaves, branches, paper and other refuse within planting beds shall be removed by hand and disposed of off the Contract site.
- .2 Weeds shall not exceed 5 cm in height between weeding's.
- .3 Ensure the entire root system of weeds is removed and not just the above ground growth.
- .4 At a minimum, weeding shall occur:
 - .1 Weekly from June 1 to August 15;
 - .2 Every two weeks from May 1 to May 31, and from August 16 to October 31.
 - .3 A final weeding shall be completed immediately prior to the final warranty inspection.
- .5 The application of herbicides or mechanical weed removers is prohibited.
- .6 Ensure planting beds are weed free prior to the application of mulch material.
- .7 The scope of work also includes weeding of joints between pavers and between curbs.

3.5 PRUNING

- .1 Prune off dead and injured branches in accordance with accepted arboricultural practices.

3.6 GARBAGE REMOVAL

- .1 Keep planting beds free of garbage and other foreign debris. Remove garbage off-site.

3.7 PEST MANAGEMENT

- .1 Monitor plant material throughout the warranty period for any sign of disease or insect problems. Practice integrated pest management.
- .2 The use of pesticides shall not be permitted.

3.8 WINTER PREPARATION

- .1 In the fall of each warranty year, the Contractor is responsible for completion of the following:
 - .1 Ensure all plant material is watered before freeze-up.

3.9 SPRING PREPARATION

- .1 In late spring of each warranty year, after the soil has thawed and dried up, re-apply mulch over all thin or bare areas to ensure good weed suppression. Mulch thicknesses shall be in accordance with Section 32 93 10.01, Trees and shrubs planting. Ensure new growth is not suppressed by the application of mulch material. Ensure mulch is neat and tidy with clean edges.

3.10 INCIDENTAL MAINTENANCE

- .1 The Contractor shall, in general, be responsible for any incidental maintenance to ensure healthy plant growth and a satisfactory appearance of plant material.

3.11 REINSTATEMENT

- .1 Any damage to vegetation, hard surfaces, structures or services caused as a result of the Contractor's work methods and practices for plant material maintenance shall be reinstated or repaired to the satisfaction of the NCC Representative. The cost of such reinstatement or repair shall be solely at the Contractor's expense.

3.12 FINAL WARRANTY INSPECTION

- .1 A one-time inspection of all plant material shall be carried out by the NCC Representative upon completion of the maintenance and warranty period.
- .2 Plant material shall be **acceptable** when it is undamaged, shows adequate growth and formation of buds, and is free from blight of any description. All planting beds and tree pits shall be free of weeds, litter and in good order, including the removal of all tree supports.
- .3 Plant material shall be **unacceptable** when it does not meet this quality standard.
- .4 Units of plant material that are found to be unacceptable will be replaced by the Contractor at the earliest opportunity. The NCC Representative reserves the right to extend the Contractor's maintenance and warranty responsibilities for an additional one-year for replacement plant material.
- .5 In the event that this inspection is satisfactory to the NCC Representative, and that there are no outstanding commitments to the contracted works, the Contractor will be given final approval of the maintenance and warranty requirements.
- .6 Where, in the opinion of the NCC Representative, the Contractor has failed to complete obligations as detailed in this Specification; and further, fails to rectify said deficiency within two days of written notification from the NCC Representative, the NCC Representative reserves the right to retain others to complete the work and deduct incurred expenses from monies owing to the Contractor.

END OF SECTION

PART 1 – GENERAL

- 1.1 Related Work Specified Elsewhere
 - .1 Clearing and Grubbing Section 31 11 00
- 1.2 References
 - .1 Ontario Ministry of Agriculture and Food
 - .1 Pruning Ornamentals - 1992.
- 1.3 Qualifications
 - .1 Pruning shall be carried out by a certified arborist, as designated by the ISA. Please provide ISA # and name of arborist to NCC representative prior to commencement of work.
- 1.4 Field Sample
 - .1 Do sample pruning acceptable to Contract Administrator to identify:
 - .1 Knowledge of target areas including branch bark ridge and branch collars.
 - .2 Technique for selection process and pruning used to establish desired form and shape for each species.
 - .2 Acceptance of work will be determined by Contract Administrator from field sample.

PART 2 - PRODUCTS

- 2.1 Pruning Equipment
 - .1 All pruning or cutting equipment shall be designed specifically for tree work and shall be clean, sharp, and in proper safe, working order. Pruning equipment shall be capable of producing clean, flush cuts without tearing or fraying the bark.
- 2.2 Disinfectant
 - .1 20% solution of sodium hypochlorite or 70% solution of ethyl alcohol.

PART 3 - EXECUTION

- 3.1 General
 - .1 Prune in accordance with Pruning Ornamentals, and as directed by Contract Administrator. Where discrepancies occur between standard and specifications, specifications govern.
 - .2 Tool maintenance:
 - .1 Ensure that tools are clean and sharp throughout pruning operation. Do not use tools which crush or tear bark.
 - .2 Disinfect tools before each tree is pruned.
 - .3 On diseased plant material disinfect tools before each cut.
 - .3 Notify immediately Contract Administrator of conditions detrimental to health of plant material or operations.

- .4 Prune during plant dormant period or after leaves have matured. Avoid pruning during leaf formation, at time of leaf fall, or when seasonal temperature drops below minus 10°C.
- .5 Retain natural form and shape of plant species.
- .6 Do not:
 - .1 Flush cut branches.
 - .2 Crush or tear bark.
 - .3 Cut behind branch bark ridge.
 - .4 Damage branch collars.
 - .5 Damage branches to remain.
- 3.2 Safety Pruning
 - .1 Remove dead, dying, diseased and weak growth from plant material designated by Contract Administrator in order to promote healthy growth and the safety of pathway users.
 - .2 Remove loose branches, twigs and other debris lodged in tree.
 - .3 For branches under 50 mm in diameter:
 - .1 Locate branch bark ridge and make cuts smooth and flush with outer edge of branch collar to ensure retention of branch collar. Cut target area to bottom of branch collar at an angle equal to that formed by line opposite to branch bark ridge.
 - .2 Make cuts on dead branches smooth and flush with swollen callus collar. Do not injure or remove callus collar.
 - .3 Do not cut lead branches unless directed by Contract Administrator.
 - .4 For branches greater than 50 mm in diameter:
 - .1 Make first cut on lower side of branch 300mm from trunk, one third diameter of branch.
 - .2 Make second cut on upper side of branch 500mm from trunk until branch falls off.
 - .3 Make final cut adjacent to and outside branch collar.
 - .5 Ensure that trunk bark and branch collar are not damaged or torn during limb removal. Repair areas which are damaged, or remove damaged area back to next branch collar.
- 3.3 Structural Pruning
 - .1 Follow: ISA ANSI A300 pruning standard - part 1
- 3.4 Care of Wounds
 - .1 Shape bark around wound to an oblong configuration ensuring minimal increase in wound size. Retain peninsulas of existing live bark.
- 3.5 Clean-Up
 - .1 Collect and dispose of pruned material daily and remove from site.
 - .2 Dispose of woody material in accordance with Section 31 11 00, Clearing and Grubbing.

END OF SECTION

PART 6

**URBAN DESIGN, LANDSCAPE ARCHITECTURE AND CONNECTIVITY
REQUIREMENTS**

Appendix A - Sir John A. MacDonald Riverfront Linear Park, NCC Landscape Plans

PART 6

**URBAN DESIGN, LANDSCAPE ARCHITECTURE AND CONNECTIVITY
REQUIREMENTS**

Appendix B - Sir John A. MacDonald Riverfront Linear Park, NCC Specifications

PART 6

**URBAN DESIGN, LANDSCAPE ARCHITECTURE AND CONNECTIVITY
REQUIREMENTS**

Appendix C - Rochester Fields, NCC Grading Plan and Landscape Plans

PART 6

**URBAN DESIGN, LANDSCAPE ARCHITECTURE AND CONNECTIVITY
REQUIREMENTS**

Appendix D - Rochester Fields - Grading

**NATIONAL CAPITAL COMMISSION
CAPITAL PLANNING BRANCH; DESIGN AND CONSTRUCTION**

**SJAM RIVERFRONT LINEAR PARK
LANDSCAPE SOUTH OF SJAM**

Reference Number: DC-5205-16

Date: February 2017

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END OF SECTION

1.0 GENERAL

1.1 REFERENCES

- .1 American Society for Testing and Materials (ASTM)
 - .1 ASTM C 260-06, Standard Specification for Air-Entraining Admixtures for Concrete.
 - .2 ASTM C 309-07, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
 - .3 ASTM C 494/C 494M-08, Standard Specification for Chemical Admixtures for Concrete.
 - .4 ASTM C 1017/C 1017M-07, Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete.
 - .5 ASTM D 412-06ae1, Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension.
 - .6 ASTM D 624-00(2007), Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomer.
 - .7 ASTM D 1751-04, Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
 - .8 ASTM D 1752-04a, Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction.
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-37.2-M88, Emulsified Asphalt, Mineral Colloid-Type, Unfilled, for Dampproofing and Waterproofing and for Roof Coatings.
 - .2 CAN/CGSB-51.34-M86(R1988), Vapour Barrier, Polyethylene Sheet for Use in Building Construction
- .3 Green Building Council of Canada (CaGBC)
 - .1 LEED Canada-NC Version 1.0-2004, LEED (Leadership in Energy and Environmental Design) Rating System for Green Building New Construction and Major Renovations (Reference Package) (including Addendum 2007).
 - .2 LEED Canada-CI Version 1.0-2007, LEED (Leadership in Energy and Environmental Design) Rating System for Sustainable Building interior commercial spaces
- .4 OPSS.MUNI 1010 Material Specification for Aggregates – Base, sub base, Subgrade Material and backfill material, November 2013.

- .5 Canadian Standards Association (CSA International)
 - 1 CSA-A23.1/A23.2-F04, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
 - .2 CSA A283-06, Qualification Code for Concrete Testing Laboratories.
 - .3 CSA-A3000-F08, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).

1.2 RELATED SECTION

- .1 01 33 00 – Shop Drawing, Product Data and Samples
- .2 03 10 00.01 – Concrete forming and accessories
- .3 03 20 00.01 – Concrete reinforcing

1.3 SAMPLES

- .1 Submit required documents in accordance with Section 01 33 00 Shop Drawings, Products Data and Samples for review by NCC representative and do not proceed without written approval when deviations from mix design or parameters are found.
- .2 Concrete hauling time: submit for review by NCC representative, deviations exceeding maximum allowable time of 120 min for concrete to be delivered to site of Work and discharged after batching.

1.4 QUALITY ASSURANCE

- .1 Submit to NCC representative, minimum 1 week prior to starting concrete work, valid and recognized certificate from plant delivering concrete.
 - .1 When plant does not hold valid certification, provide test data and certification by qualified independent inspection and testing laboratory that materials used in concrete mixture will meet specified requirements.
- .2 Minimum 1 week prior to starting concrete work submit to NCC representative manufacturer's test data and certification by qualified independent inspection and testing laboratory that following materials will meet specified requirements:
 - .1 Falsework erection.
 - .2 Hot weather concrete.
 - .3 Cold weather concrete.
 - .4 Curing.
 - .5 Finishes.
 - .6 Formwork removal.
 - .7 Joints.
- .3 Quality Control Plan: submit written report, to NCC representative verifying compliance that concrete in place meets performance requirements of concrete as established in PART 2 - PRODUCTS.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Delivery and acceptance:

- .1 Concrete hauling time: maximum allowable time for concrete to be delivered to site of Work and discharged not to exceed 120 minutes after batching.
 - .1 Modifications to maximum time limit must be agreed to NCC representative and concrete producer as described in CSA A23.1/A23.2.
 - .2 Deviations to be submitted for review by NCC Representative
- .2 Concrete delivery: ensure continuous concrete delivery from plant meets CSA A23.1/A23.2.

2.0 PRODUCTS

2.1 SUSTAINABLE REQUIREMENTS

- .1 According to the CSA A23.1/A23.2 and indications of Article DOSAGE FORMS PART 2 standard - PRODUCTS.

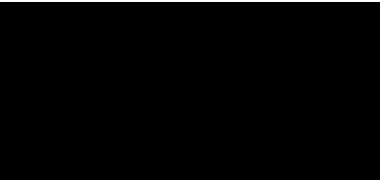
2.2 SUSTAINABLE REQUIREMENTS

- .1 Quality Control Plan : Ensure that the concrete supplier is able to provide concrete meeting the performance criteria established by the NCC representative and provide control of the compliance of the material according to the requirements of article QUALITY ASSURANCE, PART 1.

2.3 MATERIALS

- .1 Cement: to CAN/CSA-A3001, Type GU.
- .2 Water: to CAN/CSA-A23.1.
- .3 Aggregates: to CAN/CSA-A23.1. Coarse aggregates to be normal density.
- .4 Admixtures
 - .1 Air entraining admixture: to ASTM C 260.
 - .2 Chemical Admixtures: ASTM C494 standard. The NCC representative must accept accelerators used during concrete work.
- .5 Shrinkage compensating grout: premixed compound consisting of non-metallic aggregate, Portland cement, water reducing and plasticizing agents.
 - .1 Compressive strength: XXXXXXXXXX.
- .6 Tactile walking surface strip indicators

- .1 Tactile walking surface indicators shall be made of cast iron, according to CSA B651-2012 and follow Ontario Regulation 191/11, and meet the following requirements:

| Standard | Property | Minimum Result |
|---------------|------------------|---|
| ASTM A 8 | tensile strength |  |
| ASTM C 1028 | slip resistance | |
| ASTM C 501-84 | wear resistance | |

- .2 The truncated domes shall be of uniform size and shape. Units shall be uniform in texture, be free from pouring faults, sponginess, cracks, blowholes, and other defects, and have clean-cut and well-defined edges. All surfaces shall be bare, without any coating, and be uniform and free of flaking rust or mounts of rust or debris. Tactile walking surface indicators shall have ribs cast to the underside of the unit, have vent holes, and have a minimum plate thickness of 5 mm.

2.4 GRANULAR BASE COURSE

- .1 Granular base course quality: sound, hard, durable material free from soft, thin, elongated or laminated particles, organic material, clay lumps or minerals, or other substances that would act in deleterious manner for use intended.
- .2 Any granular materials specified for the various works, on the drawings or in other sections of the specifications or by direction of the NCC Representative, shall conform OPSS.MUNI 1010 Material Specification for Aggregates – Granular A, B, M, and Select Subgrade Material
- .3 Blending to obtain the correct gradation shall be permitted when the Contractor demonstrates that he can produce a correct gradation and has a plant capable of producing to the satisfaction of the NCC Representative.
- .4 Granular "A" : This materials shall conform to OPSS.MUNI 1010.
- .5 Granular "B": This material shall conform to OPSS.MUNI 1010.
- .6 Select Subgrade material: See section 31 23 10 Excavation, Trenching and Backfilling
- .7 Provide samples as per Section 01 33 00 – Shop Drawings, Product data and Samples

2.5 MIXES

- .1 Alternative 1 - Performance Method for specifying concrete: to meet NCC representative performance criteria in accordance with CAN/CSA-A23.1/A23.2.
 - .1 Ensure concrete supplier meets performance criteria as established below and provide verification of compliance as described in quality control plan.
 - .2 Provide concrete mix to meet following hard state requirements:
 1. Durability and class of exposure: C-1.
 2. Minimum compressive strength at [REDACTED].
 3. Intended application: C-1
 4. Diameter of aggregates: at least 20 mm.
 5. Air entrained 5 to 8%
 - .3 Provide quality management plan to ensure verification of concrete quality to specified performance.
 - .4 Concrete supplier's certification.

3.0 EXECUTION

3.1 PREPARATION

- .1 Obtain NCC representative's approval before placing concrete.
 1. Provide 48 hours notice prior to placing of concrete.
- .2 Place concrete reinforcing in accordance with Section 03 20 00.01 - Concrete Reinforcing
- .3 During concreting operations:
 1. Development of cold joints not allowed.
 2. Ensure concrete delivery and handling facilitates placing with minimum of re-handling, and without damage to existing structure or Work.
- .4 Pumping of concrete will not be permitted after approval of equipment and mix
- .5 Ensure reinforcement and inserts are not disturbed during concrete placement.
- .6 Prior to placing of concrete obtain NCC representative's approval of proposed method for protection of concrete during placing and curing in adverse weather.
- .7 Protect previous Work from staining.
- .8 Clean and remove stains prior to application for concrete finishes.
- .9 Maintain accurate records of poured concrete items to indicate date, location of pour, quality, air temperature and test samples taken.
- .10 In locations where new concrete is dowelled to existing work, drill holes in existing concrete.

3.2 IMPLEMENTATION

- .1 Do cast-in-place concrete work in accordance with CAN/CSA-A23.1.
- .2 Sleeves and inserts:
 - .1 Do not permit penetrations, sleeves, ducts, pipes or other openings to pass through joists, beams, column capitals or columns, except where indicated or approved by NCC representative.
 - .2 Sleeves and openings greater than 100 x 100 mm not indicated must be reviewed by NCC representative.

- .3 Do not eliminate or displace reinforcement to accommodate hardware. If inserts cannot be located as specified, obtain approval of modifications from NCC Representative before placing of concrete.
- .4 Check locations and sizes of sleeves and openings shown on drawings.
- .5 Set special inserts for strength testing as indicated and as required by non-destructive method of testing concrete.
- .3 Anchor bolts.
 - .1 Set anchor bolts to templates under supervision of appropriate trade prior to placing concrete.
 - .2 With approval of NCC Representative, grout anchor bolts in preformed holes or holes drilled after concrete has set.
 - .1 Formed holes to be minimum 100 mm diameter.
 - .3 Protect anchor bolt holes from water accumulations, snow and ice build-ups.
 - .4 Set bolts and fill holes with shrinkage compensating grout.
- .4 Finishing and curing:
 - .1 Finish concrete in accordance with CAN/CSA-A23.1.
 - .2 Concrete Pads and concrete barrier curbs (type 01 & Type 02) finish: Magnesium trowel finish
 - .3 Concrete mountable curb and dropped sidewalk finish: as per City of Ottawa's Standards – meet and match existant.
 - .4 Rub exposed sharp edges of concrete with carborundum to produce 3 mm radius edges unless otherwise indicated.
 - .5 Proceed to the sawing of the slab 200 mm thick concrete as soon as the support without leaving workers impression 6 to maximum 18 hours after pouring of concrete.

3.3 SITE TOLERANCE

- .1 Concrete tolerance in accordance with CAN/CSA-A23.1 straight edge method.

3.4 FIELD QUALITY CONTROL

- .1 Inspection and testing of concrete and concrete materials will be carried out by a Testing Laboratory designated by Consultant in accordance with CAN/CSA-A23.1.
 - .1 Concrete pours.

- .2 Slump tests.
- .3 Air entrained
- .4 Compressive strength at [REDACTED].
- .5 Ambient temperature and temperature of the concrete.
- .2 Inspection and testing of concrete and concrete materials will be carried out by testing laboratory designated by NCC Representative for review, to his satisfaction and in accordance with CSA-A23.1/A23.2. Testing of concrete and concrete materials will be paid by the Owner.
- .3 Contractor to paid repeat testing on fail sampling.
- .4 Ensure test results are distributed for discussion at pre-pouring concrete meeting between testing laboratory and NCC Representative.
- .5 Testing laboratory will take additional test cylinders during cold weather concreting. Cure cylinders on job site under same conditions as concrete which they represent.
- .6 Non-Destructive Methods for Testing Concrete: in accordance with CSA-A23.1/A23.2
- .7 Inspection or testing by NCC representative will not augment or replace Contractor quality control nor relieve Contractor of his contractual responsibility.

3.5 CLEANING

- .1 Perform cleanup as follow:
 - .1 Provide on-site, adequate space for safely washing concrete trucks.
 - .2 It is prohibited to dump unused adjuvants into sewers, in a stream, a lake, on the ground or any other place where it could pose a risk to health or the environment.
 - .3 Make the necessary arrangements to prevent contaminating adjuvants waterbodies or drinking water sources.
 - .4 If necessary, collect the liquid or solidify with an inert non-combustible taking all appropriate safety material.
 - .5 Remove and dispose of waste in accordance with the requirements of federal provincial territorial and local laws.

END OF SECTION

PART 1 GENERAL

1.1 REFERENCES

- .1 American Society for Testing and Materials (ASTM)
 - .1 ASTM D698, Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (600 kN-m/m³).

1.2 Related section

- .1 01 35 43 – Environmental Protection
- .2 01 61 20 – Material & Equipment
- .3 31 23 10.01 – Excavation, Trenching and Backfilling
- .4 32 91 21.01 – Topsoil and Finish Grading

1.3 PROTECTION

- .1 Protect existing fencing, landscaping, natural features, bench marks, buildings, pavement, surface or underground utilities which are to remain as directed by NCC Representative. If damaged, restore to original or better condition unless directed otherwise.
- .2 Maintain access roads to prevent accumulation of construction related debris on roads.

PART 2 PRODUCTS

2.1 GRANULAR BASE COURSE MATERIAL

- .1 Granular base course quality: sound, hard, durable material free from soft, thin, elongated or laminated particles, organic material, clay lumps or minerals, or other substances that would act in deleterious manner for use intended.
- .2 Any granular materials specified for the various works, on the drawings or in other sections of the specifications or by direction of the NCC Representative, shall conform OPSS.MUNI 1010 Material Specification for Aggregates – Granular A, B, M, and Select Subgrade Material
- .3 Blending to obtain the correct gradation shall be permitted when the Contractor demonstrates that he can produce a correct gradation and has a plant capable of producing to the satisfaction of the NCC Representative.
- .4 Granular "A" : This materials shall conform to OPSS.MUNI 1010.
- .5 Granular "B": This material shall conform to OPSS.MUNI 1010.
- .6 Select Subgrade material: See section 31 23 10 Excavation, Trenching and Backfilling
- .7 Provide samples as per Section 01 33 00 – Shop Drawings, Product data and Samples

PART 3 EXECUTION

3.1 STRIPPING OF TOPSOIL AND TURF

- .1 Do not strip or disturb existing soil and turf, unless otherwise indicated.
- .2 Any excavated topsoil from site to be disposed of as per Section 01 61 10 - Management and Disposal of Excess Material.

- .3 No excavated material can be re-used as backfilling material.

3.2 PLACING

- .1 Place granular material to depth and grade in areas indicated.
- .2 Ensure no frozen material is placed.
- .3 Place material only on clean unfrozen surface, free from snow and ice.
- .4 Place material using methods which do not lead to segregation or degradation of aggregate.
- .5 Spread and shape material in uniform layers of required thickness.
- .6 Shape each layer to smooth contour and compact to specify density before succeeding layer is placed.
- .7 Remove and replace that portion of layer in which material becomes segregated during spreading.

3.3 GRADING, COMPACTING AND TESTING

- .1 Rough grade to levels, profiles, and contours allowing for surface treatment as indicated in the contract documents. Compact to specified density as shown on the contract drawings.
- .2 Shape and roll alternately to obtain smooth, even and uniformly compacted base.
- .3 Apply water as necessary during compacting to obtain specified density. If material is excessively moist, aerate by scarifying with suitable equipment until moisture content is corrected.
- .4 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers.
- .5 Compaction and testing as per OPSS.MUNI 501.
- .6 Compaction tests to be paid by owner and performed by pre-approve testing agency.
- .7 Contractor to pay for repeat testing on fail samples.
- .8 Testing to be performed throughout progress of work to determine adequacy of compaction.
- .9 Co-operate with inspection staff during testing period.
- .10 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.
- .5 Do not disturb existing contaminated bare soil, soil within branch spread of trees or shrubs to remain unless otherwise specified by the NCC Representative.

3.4 PROTECTION

- .1 Maintain finished base in condition conforming to this Section until succeeding material is applied or until acceptance by NCC Representative.

3.5 CLEANING

- .1 Leave aggregate stockpile site in tidy, well drained condition, free of standing surface water.
- .2 For temporary or permanent abandonment of aggregate source, restore source to condition meeting requirements of authority having jurisdiction

3.6 SURPLUS MATERIAL

- .1 Remove surplus material and material unsuitable for fill, grading or landscaping as directed by NCC Representative.

END OF SECTION

PART 1- GENERAL

- 1.1 Related Work Specified Elsewhere
 - .1 Environmental Protection Section 01 35 43
 - .2 Site Work Demolition and Removals Section 02 41 13
 - .3 Site Grading Section 31 23 13
- 1.2 Utility Lines
 - .1 Before commencing work, establish location and extent of underground utility lines in area of excavation. Notify Contract Administrator of findings.
 - .2 Advise Contract Administrator to re-route existing lines in area of excavation. Costs for such work will be paid by Owner.
 - .3 Record locations of maintained and re-routed underground utility lines.
 - .4 Make good and pay for damage to existing utility lines resulting from work.
- 1.3 Protection
 - .1 Protect bottoms of excavations from softening. Should softening occur, remove softened soil and replace with material as directed by Contract Administrator.
 - .2 Protect bottoms of excavations from freezing.
 - .3 Provide adequate protection around bench markers, layout markers, survey markers, and geodetic monuments.
 - .4 Provide protection to ensure no damage to existing facilities and equipment situated on site.
 - .5 Effect approved measures to minimize dust as a result of this work.
 - .6 Do not stockpile excavated material to interfere with site operation or drainage.
- 1.4 Compaction Densities
 - .1 Compaction densities are percentages of maximum densities obtainable from ASTM D698-70.

PART 2 - PRODUCTS

- 2.1 Materials
 - .1 Backfill: native fill as per Section 31 22 13 – Site Grading.
- 2.2 Stockpiling
 - .1 Stockpile fill materials in areas designated by Contract Administrator. Stockpile native fill in a manner to prevent segregation. Protect stockpiled fill material from freezing.
 - .2 Protect fill materials from contamination.

PART 3- EXECUTION

- 3.1 Excavating
 - .1 Excavate to elevations and dimensions indicated for installation, construction and inspection of work specified.
 - .2 Excavate all vegetation and surficial organic material (topsoil, rootmat, peat, etc.)
 - .3 Excavate to well defined lines to minimize quantity of fill material required.
 - .4 Earth bottoms of excavations to be dry undisturbed soil, level, free from loose or organic matter.
 - .5 Notify Contract Administrator when bottom of excavation is reached
 - .6 Obtain Contract Administrator's approval of completed excavation.
 - .7 Keep excavation free of water while work is in progress.
 - .8 Protect open excavations against flooding and damage due to surface run off.
 - .9 Provide sediment control measures in accordance with Section 01 35 43 and as indicated

- elsewhere in the contract.
- .10 Excavation must not interfere with normal 45 degree splay of bearing from bottom of any footing.
- .11 When complete, have Contract Administrator inspect excavations to verify soil bearing capacity, depths and dimensions.
- .12 Correct unauthorized excavation at no extra cost as follows:
 - .1 Fill under bearing surfaces with Select Subgrade Material compacted to 95% SPMDD as directed by Contract Administrator.
- .13 Do not disturb soil within branch spread of trees or shrubs that are to remain. If excavating through roots, excavate by hand and cut roots with sharp saw.
- .14 Remove concrete masonry, paving, walks, rubble and other obstructions encountered in course of excavation.
- .15 Dispose of all excavated non re-usable material off site.
- .16 Do not obstruct flow of surface drainage or natural watercourses.

3.2 Backfilling

- .1 Do not commence backfilling until areas of work to be backfilled have been inspected and approved by Contract Administrator.
- .2 Areas to be backfilled and backfill material must be free from debris, snow, ice, water or frozen ground.
- .3 Prior to installation of granular materials, compact existing subgrade to obtain required bearing capacity. Remove **"soft"**, unstable or weak subgrade materials and fill with approved material.
- .4 Backfill simultaneously each side of walls and other structures to equalize soil pressures.
- .5 Where temporary unbalanced earth pressures are liable to develop on walls or other structures, erect bracing or shoring to counteract unbalance, and leave in place until removal is approved by Contract Administrator.
- .6 Place and compact fill materials in continuous horizontal layers not exceeding 150 mm compacted depth. Compact to at least 95% Standard Proctor Maximum Dry Density. Compact each layer before placement of the next layer.
- .7 Use methods to prevent disturbing or damaging buried services. Make good any damage.

3.3 Surplus Material

- .1 Dispose of material unsuitable for fill, grading or landscaping off site.

END OF SECTION

PART 1 - GENERAL

1.1 Section Includes

- .1 Materials and installation for fertilizing and preserving root systems of plants affected by changing grades or excavation.
- .2 Materials and installation of ground protection and other measures as deemed necessary to protect existing trees according to contract drawings and conditions outlined in this section.

1.2 Related Sections

- .1 Section 01 33 00 – Submittal Procedures
- .2 Section 01 56 00 – Temporary Barriers and Enclosures
- .3 Section 01 74 19 – Waste Management

1.3 References

- .1 Canadian Standards Association (CSA International)
 - .1 CSA G30.5-M1983 Welded Steel Wire Fabric for Concrete Reinforcement.
- .2 Department of Justice Canada
 - .1 Canadian Environmental Protection Act (CEPA), 1999, c.33.
 - .2 Fertilizers Act (R.S. 1985, c. F-10).
 - .3 Fertilizers Regulations (C.R.C., c. 666).
 - .4 Transportation of Dangerous Goods Act (TDGA), 1992, c.34.
- .3 Health Canada - Pest Management Regulatory Agency (PMRA)
 - .1 National Standard for Pesticide Education, Training and Certification in Canada 1995.
- .4 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).

1.4 Submittals

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit monthly written reports on maintenance during warranty period to the NCC Representative identifying:
 - .1 Maintenance work carried out.
 - .2 Development and condition of plant material.
 - .3 Preventative or corrective measures required which are outside Contractor's responsibility.

1.5 Delivery, Storage and Handling

- .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 19 – Waste Management.
- .2 Place materials defined as hazardous or toxic in designated containers.
- .3 Dispose of unused fertilizer material at official hazardous material collections site approved by the NCC Representative.
- .4 Handle and dispose of hazardous materials in accordance with CEPA, TDGA, regional and municipal regulations.
- .5 Do not dispose of unused fertilizer material into sewer system, into streams, lakes, onto ground in any other location where they will pose health or environmental hazard.
- .6 Ensure emptied containers are sealed and stored safely.

1.6 Scheduling

- .1 Obtain approval from the NCC Representative of schedule indicating beginning of Work.

1.7 Maintenance during Warranty Period

- .1 From time of acceptance by the NCC Representative to end of warranty period, perform following maintenance operations.
 - .1 Water to maintain soil moisture conditions for optimum growth and health of plant material without causing erosion.
 - .2 Apply fertilizer in early spring at manufacturer's suggested rate.
 - .3 Remove dead, broken or hazardous branches from plant material. Seek approval from NCC Representative prior to removing any branches. Pruning may only be carried out by a certified arborist.
 - .4 During periods of extended drought, wind or grading, trunks, limbs and foliage should be sprayed with water to remove accumulated construction dust.
 - .5 Maintain tree protection fencing in good repair.
 - .6 Maintain ground protection in good repair.

PART 2 - PRODUCTS

2.1 Materials

- .1 Fertilizer:
 - .1 To Canada Fertilizer Act and Fertilizers Regulations.
 - .2 Complete, commercial, slow release with 35 % of nitrogen content in water-insoluble form.
- .2 Anti-desiccant: commercial, wax-like emulsion.
- .3 Water: potable - free from impurities that inhibit growth.

2.2 Tree Protection Fencing

- .1 The modular construction fencing shall act as the tree protection fencing. Refer to Section 01 56 00 – Temporary Barriers and Enclosures.

2.3 Ground Protection

- .1 Mulch: 2" unpainted, untreated wood chip or bark mulch.
- .2 Granular A.
- .3 Steel plates.

PART 3 - EXECUTION

3.1 Identification and Protection

- .1 Do construction occupational health and safety in accordance with Section 01 35 30 – Health and Safety.
- .2 The trees on this site are ceremonial trees and are designated cultural assets of great importance. They are considered irreplaceable.
- .3 Extreme care must be taken to protect existing trees (including crown, trunk and root system) from damage, compaction and contamination during all stages of work. The roots of a tree can extend from the trunk to approximately 2-3 times the distance of the dripline.
- .4 No material, construction equipment, or vehicles are to be stored in the tree protection zone (TPZ) or within the critical root zone (drip line) of trees at any time.
- .5 No movement of vehicles, equipment or pedestrian in the TPZ will be permitted.
- .6 The use of tree trunks as a backstop, winch support, anchorage, as a temporary power pole, signpost or other similar function is prohibited.

- .7 Any disturbed vegetation or landscaping will be repaired or replaced without delay to the satisfaction of the NCC Representative.

3.2 Tree Protection Fencing (**Green colored**)

- .1 Supply and install **Green** colored tree protection fencing to protect existing trees.
- .2 Tree protection fencing must be installed before construction begins and equipment arrives on site and maintained until the project is completed.
- .3 Removal of fences, even temporarily to allow deliveries or equipment access is not allowed unless approved by the NCC Representative and ground protection is installed.

3.3 Ground Protection within the Critical Root Zone

- .1 Ground protection must be installed before construction begins and equipment arrives on site and maintained until the project is completed.
- .2 In areas where the critical root zone cannot be fenced and is within the limits of work, wood chip or bark mulch must be installed to a minimum depth of 6", followed by a layer of Granular A with ¾" plywood sheets laid on top. Steel plates can also be used in place of plywood. Leave the tree trunks clear of mulch. Install where indicated in the drawings and as directed by the NCC Representative to protect the sensitive root zone.
- .3 Asphalt removal from within the critical root zone must be supervised by a certified arborist. Once removed, the granular base shall be protected from repeated compaction from vehicular circulation by the placement of steel plates.

3.4 Excavation within the Critical Root Zone

- .1 Limits of excavation to be approved by the NCC Representative prior to commencing work.
- .2 Hand digging, hydraulic, or pneumatic excavations are permitted methods for excavation within the critical root zone.
- .3 Do not cut or damage roots greater than 25mm (1") diameter. When larger roots are encountered, consult a certified arborist before proceeding. If there are no roots greater than 25mm diameter, leave at least two (2) of the largest roots per meter of trench. Retain as many roots as possible.
- .4 Prune roots that must be removed using sharp, clean tools such as secateurs or a landscape handsaw. Make a clean cut and leave as small a wound as possible. All root pruning to be supervised by a certified arborist.
- .5 If any roots are exposed during construction, they should be immediately reburied with soil or wrapped in peat moss and burlap and kept moist until they can be buried permanently. Avoid exposing roots during hot, dry weather.
- .6 Directional micro-tunneling and boring may be permitted within the limits of the critical root zone subject to the approval of the NCC Representative.
- .7 Open face cuts that are consistent with an approved plan and that require root pruning, require the services of a certified arborist. An exploratory dig, either by hand or using a low water pressure hydro vacuum, or air spade method, must be completed prior to commencing with open face cuts.

3.5 Lowering Grade Around Existing Tree

- .1 Begin Work in accordance with schedule approved by the NCC Representative.
- .2 Cut slope not less than 500 mm from tree trunk to new grade level.
- .3 Excavate to depths as indicated. Protect from damage root zone which is to remain.
- .4 When severing roots at excavation level, cut roots with sharp tools.
- .5 Cultivate excavated surface manually to 15 mm depth.
- .6 Prepare homogeneous soil mixture consisting by volume of:
 - .1 60 % excavated soil cleaned of roots, plant matter, stones, debris.

- .2 25 % coarse, clean sterile sand.
- .3 15 % organic matter.
- .4 Grade 2:12:8 fertilizer at rate of 1.5 kg/m³.
- .7 Place soil mixture over area of excavation to finished grade level. Compact to 85 % Standard Proctor Density.
- .8 Water entire root zone to optimum soil moisture level.

3.6 Watering

- .1 Ensure that the ongoing maintenance and irrigation of the site vegetation is performed by a qualified contractor, while the construction hoarding is in place.
- .2 During the construction period, water existing trees within protected areas by applying water to surface, soaking area 1.5 times the diameter of the dripline of each tree.
- .3 Watering schedule to be approved by the NCC Representative.

3.7 Damage to Trees

- .1 Any damage or injury to trees shall be reported as soon as possible to the NCC Representative.
- .2 A substantial fine, as determined by the NCC Representative, may be enforced for any damage to the trees including unauthorized pruning.

3.8 Pruning

- .1 If pruning is required, consult an arborist and seek approval from the NCC Representative.
- .2 Prune in accordance with Section 32 93 45 - Tree Pruning.
- .3 Prune crown to compensate for root loss while maintaining general form and character of plant.

3.9 Anti-Desiccant

- .1 Apply anti-desiccant to foliage where applicable and as directed by the NCC Representative.

END OF SECTION

PART 1 – GENERAL

1.1 Related Work

- | | | |
|----|----------------------------|------------------|
| .1 | Excavating and Backfilling | Section 31 23 10 |
| .2 | Pathway Construction | Section 32 11 30 |

1.2 References

- | | |
|----|---|
| .1 | Ontario Provincial Standard Specification (OPSS): |
| .1 | OPSS 1010 Material Specification for Aggregates – Granular A and B. |

PART 2 – PRODUCTS

2.1 Materials -
General Requirements

- | | |
|-----|---|
| .1 | Any granular materials specified for the various works, on the drawings or in other sections of the specifications or by direction of the Contract Administrator, shall conform to this material specification for the class of granular material required. |
| .2 | The materials shall be selected or produced from pits or quarries to conform to the requirements specified herein for each class of granular materials. |
| .3 | Material retained on the number 4 sieve shall consist of hard durable particles or fragments of stone or gravel. |
| .4 | Materials that break up when alternatively frozen and thawed or wetted and dried shall not be permitted. |
| .5 | Fine aggregate passing the Number 4 sieve shall consist of natural or crushed sand, and, material passing the Number 200 sieve shall consist of fine mineral particles. |
| .6 | The material shall be free from vegetable matter and lumps or balls of clay. |
| .7 | The material shall be non-plastic and non-frost susceptible. |
| .8 | Blending to obtain the correct gradation will be permitted when the Contractor demonstrates that he can produce a correct gradation and has a plant capable of producing to the satisfaction of the Contract Administrator. |
| .9 | The Contractor shall advise the Contract Administrator two weeks in advance of the intent use of any of the specified materials to allow sufficient time for sampling and testing. The Contractor shall submit samples of granular materials to be used in the works if so requested by the Contract Administrator. |
| .10 | Approval of a sample does not mean acceptance of the whole |

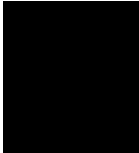
GRANULAR MATERIALS

source. Each load of material received at the job site shall be subject to all the requirements of that material.

- .11 All gradation requirements are shown as percentage by weight passing U.S. Standards Sieves, A.A.S.H.O. M-92-65.

2.2 Materials:
Specific Requirements

- .1 Granular "A":
.1 This material shall conform to OPSS 1010.
- .2 Granular "B" Type II
.1 This material shall conform to OPSS 1010
- .3 Granular "D" (stonedust):
.1 This material shall be crushed rock screenings or stone dust.
.2 Gradation Requirements:

| <u>Sieve</u> | | | <u>% Passing</u> |
|--------------|----|-----------|--|
| 9.5 | mm | (3/8") |  |
| 4.75 | mm | (No. 4) | |
| 1.18 | mm | (No. 16) | |
| 300 | um | (No. 50) | |
| 75 | um | (No. 200) | |

- .4 Select Subgrade Material (SSM):
.1 As per Section 31 23 10.

END OF SECTION

PART 1- GENERAL

- | | | | |
|-------------------|----|---|------------------|
| 1.1 Related Works | .1 | Excavating and Backfilling | Section 31 23 10 |
| | .2 | Geotextiles | Section 31 32 21 |
| | .3 | Granular Materials | Section 32 11 23 |
| | .4 | Concrete Sewer and Pipe Culverts | Section 33 42 13 |
| 1.2 Protection | .1 | Prevent damage to buildings, landscaping, curbs, sidewalks, roads and trees. Make good on any damage. | |

PART 2- PRODUCTS

- | | | |
|---------------|----|--|
| 2.1 Materials | .1 | Granular "A": as per Section 32 11 23 |
| | .2 | Granular "B" Type II as per Section 32 11 23 |
| | .3 | Granular "D" as per Section 32 11 23 |
| | .4 | Geotextiles as per Section 31 32 21 |

PART 3- EXECUTION

- | | | | |
|-----------------------|----|---|--|
| 3.1 Layout of Pathway | .1 | Notify Contract Administrator after completion of each stage and receive approval of layout prior to proceeding to next stage. Stages: .1 Staking of centerline. .2 Subgrade .3 Sub-base .4 Prior to laying of Granular D, Contract Administrator to inspect alignment and grades | |
| | .2 | All curves shall be true. No tangents shall be accepted at the beginning or end of curves. Obtain approval of Contract Administrator on site during work. | |
| 3.2 Inspection | .1 | Check graded subgrade for conformity with elevations and sections before placing granular base materials and obtain approval of Contract Administrator. | |
| | .2 | Proof roll graded subgrade surface with a heavy smooth drum roller (weight and type of roller to be approved by Contract Administrator). .1 Check for unstable areas. .2 Check for areas requiring additional compaction. .3 Notify Contract Administrator of unsatisfactory conditions. | |
| 3.3 Sub-base | .1 | Refer to Section 31 23 10, Excavating and Backfilling | |
| 3.4 Base Course | .1 | Place Granular 'A' and Granular 'B' base materials to compacted thickness as indicated. | |

PATHWAY CONSTRUCTION

- .2 Place in layers not exceeding 150mm compacted thickness. Compact each layer to 100% maximum dry density as determined by Standard Proctor Density.
- .3 Obtain approval of Contract Administrator prior to laying of stonedust .

3.5 Surface Course

- .1 Place stonedust surface course to compacted thickness as indicated and compact to 98% SPMDD.

3.6 Reinstatement of Edges

- .1 Reinstatement of edges of pathway with approved earth fill and topsoil as indicated.

END OF SECTION

PART 1 - GENERAL

- 1.1 Related Works Specified Elsewhere
 - .1 Excavating and Backfilling Section 31 23 10
 - .2 Granular Materials Section 32 11 23
 - .3 Pathway Construction Section 32 11 30
- 1.2 References
 - .1 Ontario Provincial Standard Specification (OPSS):
 - .1 310, 311
 - .2 City of Ottawa Special Provisions 2009:
 - .1 F-3104
 - .3 City of Ottawa Standard Detailed Drawings 2009:
 - .1 R-10
- 1.3 Protect existing items designated to remain and materials designated for salvage and relocation. In event of damage, immediately replace such items or make repairs to the satisfaction of Contract Administrator and at no additional cost to the Commission.
- 1.4 Site Conditions
 - .1 Contractor to contact appropriate utilities to verify presence and location of all overhead and underground services and establish location for all such services in the field before commencing work. Report any discrepancies to Contract Administrator
- 1.5 Basis of Payment
 - .1 Basis of payment clauses included in references are deleted in their entirety and will be measured and paid as per Section 01 10 00 – Pay Items Description

PART 2 - PRODUCTS

- 2.1 Materials
 - .1 Performance Graded HL3 Hot Mix Asphalt – (Beige colored and black colored) submit samples prior to commencement of work. :
 - .1 This material shall conform to OPSS 310 as amended by City of Ottawa Special Provisions F-3104
 - .2 Tack Coat - (Beige colored and black colored) submit samples prior to commencement of work. :
 - .1 This material shall conform to OPSS 310 as amended by City of Ottawa Special Provision F-3107

PART 3 - EXECUTION

- 3.1 Asphalt Paving
 - .1 The Contractor shall notify the Contract Administrator five (5) days prior to paving.
 - .2 The Contractor must obtain the Contract Administrators approval before placing any asphalt.
 - .3 Asphalt is to be placed to thicknesses, grades and lines as shown on plans or as indicated by the Contract Administrator
 - .4 The Contractor paving shall be conducted as specified in OPSS 310 or as directed by the Contract

Administrator

- .5 Step joints shall be used as indicated where new asphalt will connect to existing pavement

3.2 Quality Control and Assurance

- .1 OPSS 310 sub-sections 310.07.01 and 310.07.05 are deleted in their entirety.
- .2 The Contractor must supply a minimum of one (1) quality assurance sample and one (1) referee sample to the Contract Administrator. The samples shall be randomly chosen or as directed by the Contract Administrator. The Contract Administrator may request additional samples.
- .3 The samples shall be delivered within 4 hours to a location as specified by the Contract Administrator.
- .4 Samples shall be accompanied by the City of Ottawa 'Quality Assurance Sample Data Sheet' for Hot Mix Asphalt and completed to the satisfaction of the Contract Administrator.

3.3 Compaction

- .1 Compaction requirements shall be as specified in OPSS sub-section 310.08.015.03 and meet the requirements specified in OPSS 310, Table 9, to the satisfaction of the Contract Administrator
- .2 The Contractor shall conduct the compaction testing and supply the Contract Administrator with the results.

END OF SECTION

PART 1- GENERAL

1.1 RELATED SECTIONS

- .1 Section 31 23 10 – Excavation and Backfilling
- .2 Section 31 05 17 – Granular Materials

1.2 PROTECTION

- .1 Prevent damage to landscaping, curbs, sidewalks, trees, fences, roads and adjacent property. Make good any damage.

1.3 SAMPLES

- .1 Submit a full-size sample of each type of unit paver used.
- .3 Install a mock-up of pavers layout for NCC Representative approval's before commencement of work. Mock-up to be at minimum 1m x 1m.

PART 2- PRODUCTS

2.1 MATERIALS

- .1 Prefabricated concrete unit pavers:
 - .A Dimension : 100x300x100mm
Range color: Dark Grey
Finish: Smooth
 - .b Dimension : 100x300x100mm
Range color: Light Grey
Finish: Smooth
- .2 On granular base: 150mm granular 'A' & 150mm granular 'B'
- .3 Laying Course: dry clean masonry sand, 25mm thickness
- .4 Joint materials: Polymeric Sand, dark Grey colour
- .5 Edge Restraint: Flexible PVC such as SNAP EDGE (or approved equal) with min 300mm spikes at 300mm O.C..

PART 3- EXECUTION

3.1 SUBGRADE

- .1 Ensure that subgrade preparation conforms to levels and compaction required to allow for installation of granular base.

- .1 Ensure that subgrade preparation conforms to levels and compaction required to allow for installation of granular base.

3.2 GRANULAR BASE

- .1 Place base to compacted thicknesses as indicated on drawings.
- .2 Compact to a density of not less than 95% Standard Density in accordance with ASTM D698.
- .3 Shape and roll alternately to obtain a smooth, even and uniformly compacted granular base and ensure conformity of grades with finish surface.
- .4 Apply water as necessary during compaction to obtain specified density. If granular base is excessively moist, aerate by scarifying with suitable equipment until moisture content is corrected.
- .5 In areas not accessible to rolling equipment, compact to specified density with approved mechanical tampers.
- .6 Ensure top of granular base does not exceed plus or minus 10 mm of finished grade, less combined thickness of sand laying course plus concrete unit pavers.

3.3 LAYING COURSE

- .1 Place masonry sand laying course to compacted thickness as indicated on drawings.
- .2 Ensure laying course is dry (4-8% moisture content) prior to placement of unit pavers.

3.4 SURFACE COURSE

- .1 Install unit paving true to grade, in location, layout and pattern as indicated on drawings.
- .2 Install stone step tight to building face, and in same manner as unit paving on granular base and sand levelling course (slope step away from building).
- .3 Where required, cut unit pavers accurately without damaging edges.
- .4 Tamp down and level pavers with mechanical plate vibrator on minimum 19 mm thick plywood until pavers are true to grade and free of movement.
- .5 Fill spaces between pavers by sweeping polymeric sand into joints, vibrating, wetting and cleaning as per manufacturer's instructions. Completely fill joints.
- .6 Surface of finished pavement: free from depressions exceeding 5 mm as measured with 3 m straight edge.
- .7 Sweep surface course clean.

END OF SECTION

PART 1 - GENERAL

- 1.1 Related Works Specified Elsewhere
 - .1 Site Work Demolition and Removals Section 02 41 13
 - .2 Asphalt Paving Section 32 12 16
- 1.2 Basis of Payment
 - .1 Basis of payment clauses included in references are deleted in their entirety and will be measured and paid as per Section 01 10 00 – Pay Items Description

PART 2 - PRODUCTS

- 2.1 .1 Paint:
 - .1 To CGSB 1-GP-74M, alkyd traffic paint.
 - .2 Color: white
 - .3 Upon request, NCC Representative will supply a qualified product list of paints applicable to work. Qualified paints may be used but NCC Representative reserves right to perform further tests.
 - .2 Thinner: to CGSB 1-GP-5M.
 - .3 Templates and Stencils: as required to produce symbols as indicated on drawings. Submit manufacturer's data including size of each stencil.
- 2.2 EQUIPMENT REQUIREMENT
 - .1 Paint applicator to be an approved pressure type mobile distributor capable of applying paint in single solid lines. Applicator to be capable of applying marking components uniformly, as rates specified, and to dimensions as indicated, and to have positive shut-off.

PART 3 - EXECUTION

- 3.1 CONDITIONS OF SURFACES
 - .1 Pavement surface to be dry, free from ponded water, frost, ice, dust, oil, grease and other foreign materials.
 - .2 Remove existing markings that will interfere with legibility of new painted lines and symbols.
- 3.2 APPLICATION
 - .1 Lay out pavement markings and obtain approval by NCC Representative.
 - .2 Unless otherwise approved by NCC Representative, apply paint only when air temperature is above 10°C, wind speed is less than 60 km/h and no rain is forecast within next 4 h.
 - .3 Apply traffic paint evenly at rate of 3 m²/L.
 - .4 Do not thin paint unless approved by NCC Representative.
 - .5 Symbols and letters to conform to dimensions indicated.
 - .6 Paint lines to be of uniform color and density with sharp edges.
 - .7 Width of paint lines to be 65 mm.
 - .8 Thoroughly clean distributor tank before refilling with paint.

3.3 TOLERANCE

- .1 Paint markings to be within plus or minus 12 mm of dimensions indicated.
- .2 Remove incorrect markings as indicated by NCC Representative.

3.4 PROTECTION OF WORK

- .1 Protect pavement markings until dry.

END OF SECTION

PART 1- GENERAL

1.1 RELATED SECTION

- .1 01 33 00 - Shop Drawing, product data and samples

1.2 SUBMITTALS

- .1 Submit product data in accordance with Section 01 33 00 – Shop Drawing, product data and samples
- .2 Submit required shop drawings in accordance with Section 01 33 00 - Shop Drawing, product data and samples.
- .3 Indicate dimensions, sizes, assembly, anchorage and installation details for each furnishing specified.
- .4 Provide maintenance data for care and cleaning of site furnishings.

1.3 DELIVERY, STORAGE AND HANDLING

- .1 Damaged furniture and components will not be accepted and will have to be replaced at no charge for the NCC.

PART 2- PRODUCTS

2.1 BENCHES

- .1 Type: Model C-140 from the [REDACTED] as supplied by [REDACTED].
 - Specifications:
 - .1 C-140 components
 - .2 6 foot length
 - .3 Standard metalwork color: black
 - .4 2x3 IPE Slats
 - .5 No stain
 - Installation :
 - .1 Install and secure to asphalt covered concrete base (refer to landscape plans)
 - .2 Clearance for 3/8" (10mm) anchor bolts (anchor bolts to be provided by contractor)
 - .3 Mounting: It is not recommended to locate anchor bolts until bench is in place.

2.2 WASTE RECEPTACLE

- .1 Type: Model S-42 from the [REDACTED] as supplied by [REDACTED].
 - .1 Standard metalwork color: black
 - .2 Mounting plate: (3) anchor bolt holes.
 - Installation :
 - .1 Install and secure to asphalt covered concrete base (refer to landscape plans)
 - .2 Clearance for 3/8" (10mm) anchor bolts (anchor bolts to be provided by contractor)

- .3 Mounting: It is not recommended to locate anchor bolts until bench is in place.

2.3 BOLLARD (BLACK) - FIXED BOLLARD

- .1 Model: Maglin MTB500-B1 Bollard
 - a. Dimensions:
 - 1. Height: 34.5" (87.6 cm)
 - 2. Diameter: 4.5" (11.4 cm)

PART 3- EXECUTION

3.1 INSTALLATION

- .1 Assemble furnishings in accordance with manufacturer's instructions.
- .2 Install furnishing true, plumb, anchored and firmly supported, as indicated by the NCC Representative.
- .3 Touch-up damaged finishes to approval of the NCC Representative.

END OF SECTION

PARTIE 1 - GENERAL

- 1.1 Related Work Specified Elsewhere
- | | |
|-----------------------------|------------------|
| .1 Excavating & Backfilling | Section 31 23 10 |
| .2 Seeding | Section 32 92 20 |
| .3 Sodding | Section 32 92 23 |
- 1.2 Testing
- .1 Obtain Contract Administrator's initial approval of imported topsoil at source.
 - .2 Test existing and imported topsoil for NPK, Mg, soluble salt content, organic matter and pH value prior to delivery to site.
 - 1 Submit 0.5 kg sample of topsoil to testing laboratory and indicate intended use.
 - 2 Determine requirements for amendments to bring pH value of soil to 5.5 to 7.7 level.
 - 3 Submit two copies of soil analysis and recommendations for corrections to Contract Administrator.
 - .4 Inspection and testing of topsoil will be carried out by testing laboratory designated by Contract Administrator.
 - .5 National Capital Commission will pay cost of testing.
- 1.3 Scheduling of Work
- .1 Schedule placing of topsoil to permit immediate seeding and sodding operations.

PARTIE 2 - PRODUCTS

- 2.1 Bioswale soil (Atlantis parking area)

Mix ratio:

50% sand (0.05-2mm)

30% soil consisting of:

50-85% sand

0-50% silt (0.002-0.05mm)

10-20% clay (<0.002mm)

- 1.5-10% organic matter
- 20% well decomposed, stable compost, free of weeds and weed seeds
- pH: 5.5-7.5

- 2.2 [REDACTED] (seeding and reforestation soil amendment areas)

[REDACTED] as supplied by [REDACTED] or approved equal. Submit sample and name of supplier five (5) days in advance and obtain approval by NCC representative prior to shipping to site.

- 2.3 [REDACTED] (soil amendment under existing trees within seeding area)

[REDACTED] as supplied by [REDACTED] or approved equal. Submit sample and

name of supplier five (5) days in advance and obtain approval by NCC representative prior to shipping to site.

2.4 Topsoil: (imported should be avoided, re-use on site soil for all grading requirements)

- .1 Stockpiled topsoil: see Section 31 23 10
- .2 If additional soil is required, it should meet the following requirements: friable loam, neither heavy clay nor of very light sandy nature containing minimum of 10% organic matter for sandy loams to maximum of 25% by volume. Free from subsoil, roots, grass, weeds, toxic materials, stones, foreign objects and an acidity range (Ph) of 5.5 to 7.5. Topsoil containing crabgrass, couch grass or other noxious weeds, not acceptable.

PARTIE 3 - EXECUTION

3.1 Preparation

- .1 Grade subgrade, eliminating uneven areas and low spots, ensuring positive drainage. Remove stones larger than 50 mm diameter and other deleterious materials. Remove subsoil that has been contaminated with oil, gasoline or calcium chloride. Dispose of removed materials as directed.
- .2 Cultivate entire area receiving topsoil to depth of 50 mm. Core aerate in those areas where equipment used for hauling and spreading has compacted subgrade. Do not cultivate soils around existing trees and shrubs.

3.2 Reuse of Existing Topsoil

- .1 Unless otherwise indicated existing stockpiled topsoil shall be used for all reinstatement. Imported sources of topsoil shall only be used when all approved sources of existing topsoil have been used.

3.3 Spreading of Topsoil

- .1 Do not spread topsoil until Contract Administrator has inspected and approved subgrade.
- .2 Spread topsoil with adequate moisture in uniform layers during dry weather over approved, dry, unfrozen subgrade, where seeding is indicated.
- .3 Bring topsoil up to finished grade.
- .4 Remove stones, roots, grass, weeds, construction materials, debris and foreign non-organic objects from topsoil.
- .5 Manually spread topsoil around trees, plants, surface utilities and other obstacles.

3.4 Soil Amendments

- .1 If required, apply lime, sulphur or other soil amendment at rate determined from soil sample test.

- .2 Mix soil amendment well into full depths of topsoil by cultivating.

3.5 Finish Grading

- .1 Fine grade entire topsoiled area to contours and elevations as indicated or as directed. Eliminate rough spots and low areas to ensure positive drainage.
- .2 Roll topsoil with 50 kg roller, minimum 900 mm wide, to compact and retain surface.
- .3 Leave surface smooth, uniform, firm against deep foot printing, with fine loose texture.

3.6 Surplus Material

- .1 Dispose of surplus topsoil not required for fine grading/landscaping off site.

END OF SECTION

PART 1 – GENERAL

- 1.1 Related Works
.1 01 33 00 – Shop Drawings, Product Data and Samples
.2 32 91 21.01 – Topsoil and Finish Grading

PART 2 – PRODUCTS

2.1 MATERIALS

- .1 Seed:
.1 [REDACTED] as supplied by [REDACTED] or approved equal.
Contact info: [REDACTED]
(Sowing rate of 15,0 g/m²)
* add additional Lolium Multiflorum nurse crop to mix (Sowing rate of 3 g/m²)
- .2 [REDACTED] as supplied by [REDACTED] or approved equal.
Contact info: [REDACTED]
(Sowing rate of 25,0 g/m²)
- .3 [REDACTED] as supplied by [REDACTED] or approved equal. Contact info: [REDACTED]
(Sowing rate of 4,0 g/m²)
* add additional Lolium Multiflorum nurse crop to mix (Sowing rate of 3 g/m²)
- .4 [REDACTED] as supplied by [REDACTED] or approved equal. Contact info: [REDACTED]
(Sowing rate of 7 g/m²)
- .5 **Type 1- cool custom seed mix**
Agastache foeniculum - 10%
Allium cernuum - 4%
Asclepias syriaca - 5%
Asclepias verticillata - 4%
Aster laevis - 7%
Echinacea pallida - 9%
Iris Versicolor - 5%
Liatris Spicata - 12%
Monarda fistulosa - 5%
Physostegia Virginiana - 2%
Tradescantia ohiensis - 5%
Verbena Hastata - 5%
- Grasses:
Carex pensylvanica -4%
Carex Vulpinoida -4%
Deschampsia flexuosa -4%
Elymus Canadensis -5%
Lolium multiflorum -8%
Schizachyrium scoparium -2%
- (Sowing rate to be determined by supplier)
* add additional Lolium Multiflorum nurse crop to mix (Sowing rate of 3 g/m²)
- .6 **Type 2- warm custom seed mix**
Perennials:
Achillea millefolium -8%
Asclepias tuberosa -5%

| | |
|-----------------------|------|
| Coreopsis lanceolate | -5% |
| Echinacea paradoxa | -7% |
| Penstemon digitalis | -10% |
| Rudbeckia hirta | -9% |
| Rudbeckia triloba | -5% |
| Solidago Canadensis | -5% |
| Thalictrum dasycarpum | -6% |

Grasses:

| | |
|--------------------------|-----|
| Calamagrostis Canadensis | -7% |
| Carex muskingumensis | -9% |
| Deschampsia cespitosa | -3% |
| Deschampsia flexuosa | -5% |
| Lolium multiflorum | -8% |
| Sorghastrum nutans | -4% |
| Sporobolus heterolepis | -4% |

(Sowing rate to be determined by supplier)

* add additional Lolium Multiflorum nurse crop to mix (Sowing rate of 3 g/m²)

.7 Mown lawn

55% *Festuca rubra*
30% *Poa pratensis*
15% *Lolium perenne*

(Sowing rate to be determined by supplier)

- .2 Packages will be individually labeled in accordance with 'Seeds Regulations' and indicate clearly the name of the supplier, species, content, grade and mass.
- .3 Use appropriate agriculture broadcast or no till planter seeder and mulching equipment. The Contract Administrator to approve all proposed products and equipment for the work. Ensure soil cover over all new seeds.

2.2 WATER

- .1 Free of impurities that would inhibit germination and growth.
- .2 Water must be supplied from a designated source.

2.3 CELLULOSE-BASED MULCH (PAPER MULCH)

- .1 Use only cellulose-based mulch if seeds were broadcasted to ensure moisture retention during germination. Do not use a tackifier since wildflower seeds can't penetrate through.

PART 3 - EXECUTION

3.1 WORKMANSHIP

- .1 Do not perform work under adverse field conditions as determined by the NCC Representative.
- .2 Additional care shall be taken when seeding adjacent to watercourses or paved area to ensure that seed does not spread or blown onto those areas.

3.2 PERMANENT COVER

- .1 Seeding shall not be carried out under adverse conditions, of high wind, frozen ground or ground covered with snow, ice or standing water.
- .2 Sowing shall be done during the following periods:
 1. Between May 15 and June 15th;
 2. Between September 1st and October 15. (Preferable)
 3. Dormant seeding after November 1st when daytime temperatures are consistently below 5oC.

3.3 SEED BED PREPARATION ON DISTURBED SOIL OR NEW CONSTRUCTION SITE

- .1 Mow existing weeds as low as possible and disposed off-site.
- .2 Remove and dispose of all debris, stones 50 mm in diameter and larger, soil contaminated by oil, gasoline and other deleterious materials off-site.
- .3 Aerate all compacted soil due to construction traffic.
- .4 Add 50mm of live mulch (as supplied by [REDACTED] or approved equivalent) and till in top 200mm of existing soil.
- .5 Do not carry out seed bed preparation more than 1 calendar day before the seeding operation so the Contractor shall avoid run-off problems.
- .6 Surface preparation will produce a soil surface that is predominantly fine in nature (particle sizes of 5 to 10 mm), with no more than five lumps measuring between 10-25 mm in diameter in any 1m² area, and no lumps larger than 25 mm.

SEED BED PREPARATION UNDER EXISTING TREES

- .1 Mow existing grass as low as possible and dispose off-site.
- .2 Remove and dispose of all debris, stones 50 mm in diameter and larger, soil contaminated by oil, gasoline and other deleterious materials off-site.
- .3 Add 50mm of [REDACTED] soil (as supplied by [REDACTED] or approved equivalent) and spread by hand under protected root zone. Ensure mulch doesn't touch trunk at any time
- .4 Do not carry out seed bed preparation more than 1 calendar day before the seeding operation so the Contractor shall avoid run-off problems.
- .5 Surface preparation will produce a soil surface that is predominantly fine in nature (particle sizes of 5 to 10 mm), with no more than five lumps measuring between 10-25 mm in diameter in any 1m² area, and no lumps larger than 25 mm.

SEED BED PREPARATION IN UNDISTURBED GRASS AREAS

- .1 Mow existing grass as low as possible. and disposed off-site.
- .2 Remove and dispose of all debris, stones 50 mm in diameter and larger, soil contaminated by oil, gasoline and other deleterious materials off-site.
- .3 Remove the top 75mm of existing grass and soil with a sod cutter off-site.
- .4 Add 50mm of live mulch (as supplied by [REDACTED] or approved equivalent) and till in top 200mm of existing soil.
- .5 Do not carry out seed bed preparation more than 1 calendar day before the seeding operation so the Contractor shall avoid run-off problems.
- .6 Surface preparation will produce a soil surface that is predominantly fine in nature (particle sizes of 5 to 10 mm), with no more than five lumps measuring between 10-25 mm in diameter in any 1m² area, and no lumps larger than 25 mm.

3.4 HYDROSEEDING (HYDRAULIC SEEDING)

- .1 This application method will **NOT** be accepted for any of the seeding within this contract. It does not ensure firm seed to soil contact and prevents seed stratification to happen which will lead the seed to germinate at the wrong time of the year.

3.5 MECHANICAL PLANTERS

- .1 Use appropriate agriculture broadcast or no till planter seeder. Specific models that can successfully plant native grasses and flowers include the Tye drill, Truax drill, John Deere Rangeland drill, and properly outfitted Brillion seeders.
- .2 Ensure soil cover over all new seeds.
- .3 Roll the seeded area after planting. This step is very important for germination success
- .4 The Contract Administrator to approve all proposed products and equipment for the work.
- .5 Sowing rate to be followed and never increased as it will result in a dominant grass meadow rather than flower meadow where indicated.

3.6 CELLULOSE-BASED MULCH (PAPER MULCH)

- .1 All bare soil areas shall be stabilized with paper mulch immediately after seeding.
- .2 The Contract Administrator to approve all proposed products and equipment for the work.

3.7 MAINTENANCE DURING ESTABLISHMENT AND 2 YEAR WARRANTY PERIOD

Establishment:

- .1 Water seeded areas to maintain optimum soil moisture level for germination and continued growth of grass. Control watering to prevent washouts.
- .2 Gully formations and washouts as a result of rain events greater than 20 mm per day shall be repaired, including regrading and re-seeding.
- .3 Seeded areas shall be accepted by the NCC Representative provided that:
 - .1 seeded areas are properly established;
 - .2 seeded areas are free of weeds and bare or dead spots;
 - .3 no surface soil is visible when grass has been cut to a height of 50 mm;
(mown lawn only)
 - .4 seeded areas have been cut minimum 2 times, the second cut within 24 hours prior to acceptance.
- .4 Areas seeded in fall will be accepted the following spring, one month after the beginning of the growing season, provided the acceptance conditions are met.
- .5 The Contractor shall maintain the seeded areas including mowing until acceptance by the NCC Representative. Unacceptable areas shall be reseeded.
- .6 Weed control:
 - .1 Do not pull weeds at any time. Mowing or hand cutting will be accepted.

First year of maintenance:

- .1 Weed control:
 - a. Mow weeds when they reach a maximum height of at 200-250mm height on a regular basis to prevent them from self-seeding throughout 1st growing season.
 - b. A flail-type mower works best, as it chops up the weeds so they can dry out rapidly. Rotary mowers and sickle bar mowers will not be accepted.

- c. Do not pull weeds at any time due to soil disturbance. Large weeds can be cut by hand if required.
- d. If weeds become thick by mid-summer they should be cut back, along with the nurse crop. If weeds are thin, cut when in bloom, before they set seed.
- e. Do not mow down the year's growth at the end of the season. Leave it to help protect the young plants over the winter. The plant litter and the snow that it catches insulate the soil from rapid changes in soil temperatures, which can cause plant losses due to frost heaving.

Second year of maintenance:

- .1 Weed control:
 - a. Mow the meadow in spring of the second year right to the ground and rake off the cuttings.
 - b. If weeds remain a problem in the second year, mow the meadow in late spring or early summer (before the weeds reach 200-250mm height)
 - c. A flail-type mower works best, as it chops up the weeds so they can dry out rapidly. Rotary mowers and sickle bar mowers will not be accepted.

END OF SECTION

PART 1 GENERAL

1.1 RELATED SECTION

- .1 32 91 21.01 – Topsoil and finish grading
- .2 32 93 12.01 – Plant maintenance and warranty

1.2 SOURCE QUALITY CONTROL

- .1 The Contractor shall commence sourcing the specified material immediately upon award of the Contract.
- .2 Plant materials shall be conformed to species specified in the contract document. All plant materials shall be identified with their complete name and caliper.
- .3 No substitutions will be considered unless the Contractor can demonstrate to the NCC Representative's satisfaction that a prolonged and widespread search for the specified cultivars has been undertaken. The NCC Representative's written approval of plant substitution is required.
- .4 Obtain approval of source of plant material. Acceptance and selection of plant at its source does not prevent rejection on site prior to or after planting operations.
- .5 After harvesting and prior to shipping any plants from the growing nursery, notify the NCC Representative to allow for an inspection of the plants at the growing nursery to assure that all harvesting requirements have been satisfied.

1.3 SHIPMENT AND PRE-PLANTING CARE

- .1 All plants shall be inspected by the Contractor for damage in transit. No defective material shall be delivered to the site. Material subsequently damaged shall be replaced immediately at no additional cost for the NCC.
- .2 Protect plant materials against abrasion, exposure and extreme temperature change during transit.
- .3 Keep roots moist and protected from sun and wind

1.4 STORAGE AND PROTECTION

- .1 Protect plant materials from frost, excessive heat, wind and sun during delivery.
- .2 Immediately store and protect plant material which will not be installed within 1 hour after their arrival on site, in storage locations approved by NCC Representative.
- .3 Protect plant material from damage during transportation
 - .1 When delivery distance is less than 30 km, and vehicle travels at speeds under 80 km/h, tie tarpaulins around plants or over vehicle box.
 - .2 When delivery distance exceeds 30 km or vehicle travels at speeds over 80 km/h, use enclosed vehicle where practical.

- .3 Protect foliage and root balls using anti-desiccants and tarpaulins, where use of enclosed vehicle is impractical due to size and weight of plant material.
- .4 Protect stored plant material from frost, wind and sun and as follows:
 - .1 For pots and containers, maintain moisture level in containers.
 - .3 For balled and burlapped, and wire basket root balls, place to protect branches from damage. Maintain moisture level in root zones.

PART 2 PRODUCTS

2.1 PLANT MATERIALS

- .1 Comply with Guide Specification for Nursery Stock, latest edition, of Canadian Nursery Trades Association referring to size and development of plant material and root ball.
- .2 All plant material to come from a commercial nurseries. The plant material shall be grown in zone 4b or 5a, according to the hardiness zones for plants in Canada established by Agriculture Canada.
- .3 Use plants with strong fibrous root systems free of disease, insects, defects or injuries and structurally sound. Plants must have been root pruned regularly, but not later than one growing season prior to arrival on site.
- .4 Substitution to plant material as indicated on planting plan are not permitted unless written approval has been obtained as to type, variety and size.
- .5 Size indicated are the minimum allowable after pruning.

2.2 WATER

- .1 Free of impurities that would inhibit plant growth.

2.3 MYCORRHIZE INOCULANTS

- .1 Apply mycorrhize inoculants [REDACTED] of [REDACTED], following application instructions, or an equivalent approved by the NCC and registered in Canada;

2.4 STAKES

- .1 No staking required

2.5 GUYING COLLAR

- .1 N/A

2.6 TREE TRUNK PROTECTION

- .1 'Surtronic' fine mesh trunk wraps as supplied by Dendrotik or approved equal.

2.7 MULCH

- .1 [REDACTED] Composted Pine Mulch as supplied by [REDACTED] or approved equal. Submit sample and name of supplier five (5) days in advance and obtain approval by NCC representative prior to shipping to site.

2.8 GROWING MEDIUM

Growing medium according to section 32 91 21.01 – Topsoil and finish grading

2.9 ANTI-DESICCANT

- .1 Wax-like emulsion to provide film over plant surfaces reducing evaporation but permeable enough to permit transpiration.

2.10 BONEMEAL

- .1 Bonemeal: raw bonemeal, finely ground (minimum analysis of 4% nitrogen and 20% phosphoric acid) to be added at the bottom of each tree and shrub planting hole as per manufacturer recommendations. Mix bonemeal thoroughly with soil.

PART 3 EXECUTION

3.1 PRE-PLANTING PREPARATION

- .1 Delivered plant material to be inspected and approved NCC Representative.
- .2 NCC Representative to approve layout mockup of plant material for all beds until advised differently. Planting bed grades will also need to be approved before planting.

3.2 PLANTING TIME

- .1 Plant materials shall be planted from May 15 to June 30 or from August 15 to October 1, unless otherwise approved by the NCC Representative
- .2 The Contractor shall arrange for all plant species recommended for spring only digging, to be dug and containerized in the spring, immediately upon award of the Contract.
- .3 The foliage of deciduous trees which have broken buds shall be sprayed with anti-desiccant to slow down transpiration prior to transplanting.

3.3 EXCAVATION

- .1 Excavate planting holes to width and depth as indicated on drawings.
- .2 The sides of the planting hole shall be scarified so that water and roots can readily penetrate.

- .3 Place mycorrhize inoculants and bonemeal in the bottom of each plant hole as per manufacturer recommendation.

3.4 PLANTING

- .1 Planting trees and shrubs vertically in the places indicated, oriented in a manner to produce the best possible visual effect with the surrounding structures such as buildings, roads and sidewalks.
- .2 For burlapped root balls, cut away top one third of wrapping and wire basket without damaging root ball. Do not pull burlap or rope from under root ball.
- .3 For container stocks or root balls in non-degradable wrapping, remove entire container or wrapping without damaging root ball.
- .4 Place plant material at a depth similar to depth in nursery.
- .5 Backfill with existing soil in 150 mm layers. Tamp each layer to eliminate air pockets. When two thirds of depth of planting pit has been backfilled, fill remaining space with water. After water has penetrated into soil, backfill to finish grade. Form watering saucer as indicated.
- .6 Water plant material thoroughly.
- .7 After soil settlement has occurred, fill with soil to finish grade.
- .8 Spread 75mm of mulch over all areas of bare soil. Mulch heavily contaminated with soil is not acceptable. Diameter of 400mm around all plant material.
- .9 Remove dead and injured branches and branches that rub causing damage to bark.
- .10 Dispose of burlap, wire and container material off site.

3.5 TRUNK PROTECTION

- .1 Install fine mesh trunk wraps on deciduous trees as indicated.

3.6 TREE SUPPORTS

- .1 No staking required

3.7 PROTECTION DURING CONSTRUCTION

- .1 The Contractor shall protect all work and materials from damage due to planting operations; operations by other Contractors; or trespassers. Maintain protection during installation until acceptance. Treat, repair or replace damaged work immediately.
- .2 Damage done to any of the work by the Contractor, or any of their sub-contractors, shall be replaced by the Contractor at their own expense.

3.8 MAINTENANCE PRIOR TO FINAL INSPECTION

- .1 Perform following maintenance operations from time of planting until the project has been approved by the NCC Representative and the interim certificate of Approval has been issued at Substantial Performance.
 - .1 Water to maintain soil moisture conditions, for optimum establishment, growth and health of plant material without causing erosion.
 - .2 **Structural pruning by a certified arborist must be completed once a year and arborist must provide report to NCC representative.**
 - .3 If acceptance is delayed due to a drawn out schedule by the Contractor, the Contractor shall be responsible for the scope of maintenance outlined in section 32 93 12.01 until final acceptance of the site. The Contractor shall still be responsible for the full term of the warranty as of the date of approval.

3.9 FINAL INSPECTION

- .1 At final inspection, plant material shall be acceptable when it is properly installed, unbroken, shows adequate formation of buds and is free from blight of any description. All planting areas shall be free of weeds, litter and in good order.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED WORKS

- .1 Trees and shrub planting Section 32 93 10.01

1.2.1 WARRANTY

- .1 All plant material shall be warranted for a period of two years from the date of substantial performance.
- .2 The warranty shall cover any defects in materials and workmanship.
- .3 A warranty inspection shall be carried out at the end of the warranty period.
- .4 Extend 2 year warranty on all replacement of plant material.

1.3 DURATION

- .1 Plant material maintenance shall begin immediately after each portion of planting has been completed and shall continue throughout the maintenance and warranty period to the satisfaction of the NCC Representative.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Water: shall be free from any contaminants which could adversely affect plant growth.
- .2 Pruning Tools: shall be designed specifically for horticultural purposes and shall be clean, sharp and in proper, safe, working order. Pruning equipment shall be capable of producing clean, flush cuts without tearing or fraying the bark.

PART 3 - EXECUTION

3.1 OPERATIONAL CONSTRAINTS

- .1 Do each maintenance operation continuously and complete within a reasonable time period.
- .2 No maintenance equipment, materials or other miscellaneous items may be stored on site.
- .3 All debris, waste and other extraneous material resulting from the maintenance operation shall be removed from the site daily upon completion of maintenance.
- .4 The Contractor shall be fully acquainted with all relevant Provincial and Municipal By-laws and Regulatory Codes relating to the work of this contract, and will be required to comply with such by-laws and codes without extra compensation.
- .5 Notify the NCC Representative immediately of damage incurred by pest, disease, mechanical or vandalism.

3.2 INTERIM REPLACEMENT OF PLANT MATERIAL

- .1 Throughout the maintenance and warranty period, units of plant material that are found to be unacceptable will be replaced by the Contractor. Any unacceptable material must be replaced within one month unless otherwise directed by the NCC representative. Weekly inspections must be reported for the first growing season.
- .2 At the discretion of the NCC Representative, plant material that is identified as dead or in a poor or diseased condition shall be immediately removed from the site.

3.3 WATERING

- .1 The Contractor is responsible for interim manual watering of all plant material, from time of planting until the end of the warranty period (24 MONTHS).
- .2 Water all plant material immediately after installation. Thereafter,
 - .1 Water daily for the first week after planting;
 - .2 Water every second day for the next 3 weeks;
- .3 For the first warranty year;
 - .1 The contractor shall submit for approval a watering schedule at the beginning of the warranty period. The watering shall occur at least once a week, on Thursday, Wednesday or Tuesday. Once the day is chosen, the watering shall happen each week at the same day.
 - .2 Provide all water required to keep soil within and around the root and in the soil at optimum moisture content between 10 and 20% as measured using a General Digital Moisture Meter.
 - .3 Proceed to watering with a slow water spray jet oriented toward the growing media.
 - .4 The watering shall be made before 11h am or after 14h30 pm to avoid full sun period. Watering should also be avoided during peak use period between 7-9am, 12-1pm and 3-5pm.
 - .5 Proceed to the watering even on rainy days unless receiving written notice of the NCC representative.
 - .6 Hose bibs are available on site, see plans.
- .4 For the remainder of the warranty period, thoroughly water whenever natural precipitation falls below 20 mm per week (Sunday to Saturday) for 2 consecutive weeks. Precipitation data shall be as per Environment Canada from the Macdonald-Cartier Airport weather station.
- .5 Ensure the root zone is thoroughly saturated during each watering operation.
- .6 Repair any damage caused by watering operations.

3.4 WEEDING

- .1 All weeds, dead plants, leaves, branches, paper and other refuse within planting beds shall be removed by hand and disposed of off the Contract site.
- .2 Weeds shall not exceed 5 cm in height between weeding's.
- .3 Ensure the entire root system of weeds is removed and not just the above ground growth.
- .4 At a minimum, weeding shall occur:
 - .1 Weekly from June 1 to August 15;
 - .2 Every two weeks from May 1 to May 31, and from August 16 to October 31.
 - .3 A final weeding shall be completed immediately prior to the final warranty inspection.
- .5 The application of herbicides or mechanical weed removers is prohibited.
- .6 Ensure planting beds are weed free prior to the application of mulch material.
- .7 The scope of work also includes weeding of joints between pavers and between curbs.

3.5 PRUNING

- .1 Prune off dead and injured branches in accordance with accepted arboricultural practices.

3.6 GARBAGE REMOVAL

- .1 Keep planting beds free of garbage and other foreign debris. Remove garbage off-site.

3.7 PEST MANAGEMENT

- .1 Monitor plant material throughout the warranty period for any sign of disease or insect problems. Practice integrated pest management.
- .2 The use of pesticides shall not be permitted.

3.8 WINTER PREPARATION

- .1 In the fall of each warranty year, the Contractor is responsible for completion of the following:
 - .1 Ensure all plant material is watered before freeze-up.

3.9 SPRING PREPARATION

- .1 In late spring of each warranty year, after the soil has thawed and dried up, re-apply mulch over all thin or bare areas to ensure good weed suppression. Mulch thicknesses shall be in accordance with Section 32 93 10.01, Trees and shrubs planting. Ensure new growth is not suppressed by the application of mulch material. Ensure mulch is neat and tidy with clean edges.

3.10 INCIDENTAL MAINTENANCE

- .1 The Contractor shall, in general, be responsible for any incidental maintenance to ensure healthy plant growth and a satisfactory appearance of plant material.

3.11 REINSTATEMENT

- .1 Any damage to vegetation, hard surfaces, structures or services caused as a result of the Contractor's work methods and practices for plant material maintenance shall be reinstated or repaired to the satisfaction of the NCC Representative. The cost of such reinstatement or repair shall be solely at the Contractor's expense.

3.12 FINAL WARRANTY INSPECTION

- .1 A one-time inspection of all plant material shall be carried out by the NCC Representative upon completion of the maintenance and warranty period.
- .2 Plant material shall be **acceptable** when it is undamaged, shows adequate growth and formation of buds, and is free from blight of any description. All planting beds and tree pits shall be free of weeds, litter and in good order, including the removal of all tree supports.
- .3 Plant material shall be **unacceptable** when it does not meet this quality standard.
- .4 Units of plant material that are found to be unacceptable will be replaced by the Contractor at the earliest opportunity. The NCC Representative reserves the right to extend the Contractor's maintenance and warranty responsibilities for an additional one-year for replacement plant material.
- .5 In the event that this inspection is satisfactory to the NCC Representative, and that there are no outstanding commitments to the contracted works, the Contractor will be given final approval of the maintenance and warranty requirements.
- .6 Where, in the opinion of the NCC Representative, the Contractor has failed to complete obligations as detailed in this Specification; and further, fails to rectify said deficiency within two days of written notification from the NCC Representative, the NCC Representative reserves the right to retain others to complete the work and deduct incurred expenses from monies owing to the Contractor.

END OF SECTION

PART 1 – GENERAL

- 1.1 Related Work Specified Elsewhere
 - .1 Clearing and Grubbing Section 31 11 00
- 1.2 References
 - .1 Ontario Ministry of Agriculture and Food
 - .1 Pruning Ornamentals - 1992.
- 1.3 Qualifications
 - .1 Pruning shall be carried out by a certified arborist, as designated by the ISA. Please provide ISA # and name of arborist to NCC representative prior to commencement of work.
- 1.4 Field Sample
 - .1 Do sample pruning acceptable to Contract Administrator to identify:
 - .1 Knowledge of target areas including branch bark ridge and branch collars.
 - .2 Technique for selection process and pruning used to establish desired form and shape for each species.
 - .2 Acceptance of work will be determined by Contract Administrator from field sample.

PART 2 - PRODUCTS

- 2.1 Pruning Equipment
 - .1 All pruning or cutting equipment shall be designed specifically for tree work and shall be clean, sharp, and in proper safe, working order. Pruning equipment shall be capable of producing clean, flush cuts without tearing or fraying the bark.
- 2.2 Disinfectant
 - .1 20% solution of sodium hypochlorite or 70% solution of ethyl alcohol.

PART 3 - EXECUTION

- 3.1 General
 - .1 Prune in accordance with Pruning Ornamentals, and as directed by Contract Administrator. Where discrepancies occur between standard and specifications, specifications govern.
 - .2 Tool maintenance:
 - .1 Ensure that tools are clean and sharp throughout pruning operation. Do not use tools which crush or tear bark.
 - .2 Disinfect tools before each tree is pruned.
 - .3 On diseased plant material disinfect tools before each cut.
 - .3 Notify immediately Contract Administrator of conditions detrimental to health of plant material or operations.

- .4 Prune during plant dormant period or after leaves have matured. Avoid pruning during leaf formation, at time of leaf fall, or when seasonal temperature drops below minus 10°C.
- .5 Retain natural form and shape of plant species.
- .6 Do not:
 - .1 Flush cut branches.
 - .2 Crush or tear bark.
 - .3 Cut behind branch bark ridge.
 - .4 Damage branch collars.
 - .5 Damage branches to remain.
- 3.2 Safety Pruning
 - .1 Remove dead, dying, diseased and weak growth from plant material designated by Contract Administrator in order to promote healthy growth and the safety of pathway users.
 - .2 Remove loose branches, twigs and other debris lodged in tree.
 - .3 For branches under 50 mm in diameter:
 - .1 Locate branch bark ridge and make cuts smooth and flush with outer edge of branch collar to ensure retention of branch collar. Cut target area to bottom of branch collar at an angle equal to that formed by line opposite to branch bark ridge.
 - .2 Make cuts on dead branches smooth and flush with swollen callus collar. Do not injure or remove callus collar.
 - .3 Do not cut lead branches unless directed by Contract Administrator.
 - .4 For branches greater than 50 mm in diameter:
 - .1 Make first cut on lower side of branch 300mm from trunk, one third diameter of branch.
 - .2 Make second cut on upper side of branch 500mm from trunk until branch falls off.
 - .3 Make final cut adjacent to and outside branch collar.
 - .5 Ensure that trunk bark and branch collar are not damaged or torn during limb removal. Repair areas which are damaged, or remove damaged area back to next branch collar.
- 3.3 Structural Pruning
 - .1 Follow: ISA ANSI A300 pruning standard - part 1
- 3.4 Care of Wounds
 - .1 Shape bark around wound to an oblong configuration ensuring minimal increase in wound size. Retain peninsulas of existing live bark.
- 3.5 Clean-Up
 - .1 Collect and dispose of pruned material daily and remove from site.
 - .2 Dispose of woody material in accordance with Section 31 11 00, Clearing and Grubbing.

END OF SECTION

APPENDIX C

[REDACTED]

APPENDIX D

[REDACTED]

APPENDIX E

[REDACTED]

APPENDIX F

[REDACTED]

APPENDIX G

[REDACTED]

PART 6

**URBAN DESIGN, LANDSCAPE ARCHITECTURE AND CONNECTIVITY
REQUIREMENTS**

Appendix H – [Intentionally deleted]

PART 6

**URBAN DESIGN, LANDSCAPE ARCHITECTURE AND CONNECTIVITY
REQUIREMENTS**

Appendix I [Intentionally deleted]

PART 6

**URBAN DESIGN, LANDSCAPE ARCHITECTURE AND CONNECTIVITY
REQUIREMENTS**

Appendix J [Intentionally deleted]

PART 6

**URBAN DESIGN, LANDSCAPE ARCHITECTURE AND CONNECTIVITY
REQUIREMENTS**

Appendix K [Intentionally deleted]

PART 6

**URBAN DESIGN, LANDSCAPE ARCHITECTURE AND CONNECTIVITY
REQUIREMENTS**

Appendix L [Intentionally deleted]

APPENDIX M

[REDACTED]

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| APPENDIX M | [REDACTED] |

**SCHEDULE 15-2
DESIGN AND CONSTRUCTION REQUIREMENTS**

**PART 6
URBAN DESIGN, LANDSCAPE ARCHITECTURE AND CONNECTIVITY
REQUIREMENTS**

ARTICLE 1 INTRODUCTION

1.1 Introduction

- (a) The work under this Part 6 identifies the requirements for the integration of the Stations, sidewalks, MUPs, additional work on NCC lands and City lands that shall be developed to enhance the public realm.
- (b) The Site plans shall be developed in conjunction with the Project Stations, Civil and Guideway and Federal Land requirements to provide a comprehensive solution for the alignment.

1.2 Overview

- (a) The Project includes the design and construction of the Site development for the proposed Stations, Park and Ride facilities, MUPs, PPUDO, bike rack and storage areas, sidewalks and landscape restoration of lands affected by the construction of the Confederation Line.
- (b) DB Co shall obtain all the necessary Permits, Licences and Approvals for the construction of the Site works. Refer to Schedule 17 – Environmental Obligations and Schedule 15-2, Part 2, Article 5 – Drainage and Stormwater Management Design Criteria for coordination with final Site works.
- (c) In general, the work includes the Site plans for:
 - (i) 17 Stations;
 - (ii) Protection of, and enhancement to, the Connectivity for the Stations, and the adjacent community;
 - (iii) Modification to, and additional development of, the Park and Ride facilities;
 - (iv) MUPs adjacent to the Track alignment, with connections to existing Facilities, as indicated within this Part 6;
 - (v) Completion of the landscape works as identified by the NCC for the SJAM Parkway, Kitchissippi Lookout and Rochester Fields lands;

- A. Works within the Rochester Field lands shall include the centerline axis for the Rochester Field pathway and crossing, including associated rough grading and site servicing plans, contained within this Part 6.
- (vi) Completion of the Streetscape for the Richmond Road Complete Street;
 - (vii) Completion of Byron Linear Park, and Bryon Avenue;
 - (viii) Completion of Miscellaneous Site Works as identified within this Part 6;
 - (ix) Development of Tree Mitigation Report(s) and Tree Compensation Drawing(s);
 - (x) Development of the mitigation plan for the SWM requirements;
 - (xi) Miscellaneous mitigation works as identified within this Part 6; and
 - (xii) Restoration of lands required for the construction of the Confederation Line, including the construction staging areas.

ARTICLE 2 DESIGN CRITERIA

2.1 Introduction

- (a) This Article 2 presents the design requirements for the landscape architecture and urban design that shall be integrated into the design of the Project, including the standards for streetscape elements, bicycle facilities, Park and Ride facilities, fencing, pedestrian and cycling access to the Stations, planting, and tree compensation.

2.2 Reference Documents

- (a) Order of Precedence
 - (i) All Project urban design and landscape works shall comply with the criteria contained within this Article 2 and the Applicable Law, guidelines or practices applicable to the Project, including but not limited to the following Reference Documents. The Order of Precedence for this portion of the Contract shall be as follows:
 - A. The criteria in this Article 2;
 - B. OBC;
 - C. COADS;
 - D. AODA;
 - E. OTM (Books 1 through to 12 and 18);
 - F. City of Ottawa Construction Specifications, Drawings and Details;
 - G. Other relevant City Operation Policy, Procedures and Guidelines;
 - H. OPSS and OPSD;
 - I. TAC Guidelines for Understanding Use and Implementation of Accessible Pedestrian Signals;
 - J. Canadian Standards for Nursery Stock, most recent edition;
 - K. NCC Landscape Drawings, as identified in Appendix A, B, C and D;

2.3 Scope of Work

- (a) The general scope of work shall include, but not limited to:

- (i) Public realm: Station entry plazas, Site furnishings, pedestrian lighting, sidewalk and MUP connections from the community to the plaza entry, PPUDOs, plant material, and miscellaneous items to complete the Work;
- (ii) Park and Rides: the parking lot configuration, pedestrian requirements, lighting, plant material, and coordination with Site plan requirements;
- (iii) Any restoration and rehabilitation of the lands disturbed by the construction of the Project; and,
- (iv) All other works identified within this Part 6.

2.4 Urban Design and Landscape Architectural Design

- (a) Designs shall meet COADS and AODA standards for all Works surrounding bus waiting areas, sidewalks, entrances and pathways to the Station Platform/Revenue Vehicle area. Safe, efficient and accessible pedestrian circulation shall be given the highest priority in Station design.
- (b) There shall be a consistent use of standard landscape elements including fencing, paving, plant material, and other items identified in this Article 2, utilized throughout the alignment and within the Existing Confederation Line.
- (c) Urban development and landscape treatments shall compliment the adjacent land use. Pedestrian and cycling links shall be protected and connections to the adjacent communities provided.
- (d) Refer to Article 3 – Connectivity Requirements, and Article 4 – Site Specific Desired Outcomes, of this Part 6 for additional requirements.
- (e) Native plant material shall be used wherever feasible.
- (f) Where appropriate, existing landforms and vegetation shall be preserved and incorporated into urban design. Designs shall be achieved with the intent to minimize impacts to the surrounding environment.
- (g) The landscape design of each Station shall have standard and common finishes. All Stations shall express the local character and qualities of their communities and planning context and assist in wayfinding/Station identification. Station entrances shall be easily identifiable and be designed to discourage loitering and to maximize safety/observation through the use of lighting and glazing.
- (h) DB Co shall design and construct the urban design elements and landscaping in accordance with CPTED principles. DB Co shall submit a CPTED report outlining all measures undertaken to conform to CPTED principles.

- (i) All Emergency egress points shall be designed to accommodate snow removal and clearing operations. DB Co shall provide a turn-around for the snow clearing equipment as per Schedule 15-2, Part 2, Article 1 – Introduction.

2.5 Park and Ride Facilities

- (a) Parking lot shall adhere to City standards, including the following:
 - (i) There shall be a minimum of 15% landscape treatment within the parking lot. This landscape treatment may contain a combination of paved walking surfaces, dry SWM facilities, street trees, and sod. Wet ponds shall not be considered part of the 15% landscape requirements;
 - (ii) The alignment of the stalls shall be developed to accommodate unobstructed pedestrian paths along the drive aisles to the sidewalk connections to the Station Platform and Station Plaza. The direct pedestrian routes to the sidewalks and Station should not bisect the drive aisles;
 - (iii) The accessible parking spaces shall be designed according to COADS and located immediately adjacent to the Station entry;
 - (iv) Refer to Schedule 15-2, Part 4, Article 2.6, (i) for additional park and ride requirements;
 - (v) There shall be a main drive aisle, with sidewalks on either side, perpendicular from the Station to the furthest limit of the parking lot. This main drive aisle shall have shade trees adjacent to the sidewalk, with a maximum of 7m on centre spacing;
 - (vi) There shall be a continuous sidewalk connecting the Park and Ride facility to the Station entry plaza. Where the pedestrian route crosses a traffic lane(s), a painted crosswalk demarcating the pedestrian route shall be provided;
 - (vii) The parking lot shall be divided into parking cells, aligned with drive aisle access, and a maximum of 200 parking spaces per cell;
 - (viii) The cells shall be defined with parking islands at the end of each row of parking spaces;
 - (ix) In each cell, the islands closest to the Station shall have a minimum of two deciduous trees, with a minimum width of 3m, and a surface treatment capable of allowing precipitation to percolate into the soil;
 - (x) In each cell, the islands furthest from the Station shall have a minimum width of 2.4m, paved walking surface, and TWSI to current City standards;

- (xi) The pedestrian route between the islands shall be delineated on the roadway surface;
- (xii) The pedestrian sidewalk shall be immediately adjacent to the parking lot, and offset a minimum of 2.4m from any MUP. There shall be a landscape buffer between the sidewalk and MUP, and shall include shade trees, with a maximum of 7m on centre; and,
- (xiii) Supplemental lighting for the sidewalk shall be provided as required to provide lighting levels to meet the Schedule 15-2, Part 4, Article 6 - Electrical Design Criteria.

2.6 Landscape Plans

- (a) DB Co shall submit Landscape Plans in accordance with Schedule 10 – Review Procedure:
- (b) Station, Facilities and Site Specific Drawing Requirements:
 - (i) Layout drawings, dimensioning all landscape items;
 - (ii) Grading drawings, indicating the drainage in accordance with the criteria of Schedule 15-2, Part 2, Article 5 – Drainage and Stormwater Management Design Criteria and shall include the finished elevations of all built elements from the edge of the Station façade to the original surface, edge of roadway curb, or limits of adjacent landscape not disturbed by the construction;
 - (iii) Fencing plans, indicating all fence locations, maintenance and access gates, bridge fences, heights, and connections to existing and proposed features;
 - (iv) Planting plans;
 - (v) Details indicating all construction requirements for the landscape items; and,
 - (vi) All coordination Site works, including civil, electrical, architectural, existing and proposed above and below services, and existing vegetation, Structures and miscellaneous works to provide a complete illustration of the proposed Site within the adjacent lands.
- (c) Proposed MUP and Connectivity Requirements:
 - (i) Layout and grading, including cross-slopes for all proposed pathways, MUPs and sidewalks, bridges, Culverts, lighting and wayfinding signage, roadway crossings, beyond the individual Stations and connections into the existing pedestrian and cycling system.

- (ii) All coordination Site works, including civil, electrical, architectural, fencing, existing and proposed above and below services, stormwater management criteria, and existing vegetation, Structures and miscellaneous works to provide a complete illustration of the proposed Site within the adjacent lands.
- (d) Tree Mitigation Report(s) and a Tree Compensation Plans(s)
 - (i) DB Co shall submit a package for the Tree Mitigation Report(s) and Tree Compensation Plan(s) for review prior to commencement of work for each segment.
 - (ii) Tree Mitigation Plan(s) shall include:
 - A. Survey of all existing trees, including species, caliper, and evaluation within the Lands;
 - B. Survey of all existing trees, including species, caliper and evaluation within 20m of the limits of construction on City, Federal, or private lands;
 - C. Identify all SAR Butternut trees, and SAR bat maternity roost trees, methodology of protection wherever feasible, where removal is required, provide mitigation and/or compensation as per Schedule 17 – Environmental Obligations and as identified in any SARA permitting requirements; and,
 - D. Methodology for the review, and approval, of any trees identified for protection during the initial planning, and subsequently identified for potential removal due to construction conflicts.
 - (iii) Tree Compensation Plan(s) shall include:
 - A. Limits of construction as per Schedule 15-2, Part 1, Article 4 – Design and Construction, and Tree Protection Fence(s) as required to protect all existing trees identified to remain;
 - B. Location, species, quantity and size of all trees proposed to be removed to accommodate the construction requirements;
 - C. Location, species, quantity and size of proposed trees for the compensation for all the existing tree removals, as per City and Federal requirements. The compensation shall include all the proposed trees as identified within this Part 6;
 - D. Identification of proposed butternut plantings, as per Schedule 17 – Environmental Obligations.

- (e) The drawings and specifications identified in Appendices A, B, C, D, E, and G of this Part 6 reflect the requirements for the Federal Lands and shall be considered as the Pre-Final Design Development submittal. DB Co shall finalize the detailed drawings prepared by the NCC for the Federal Lands for the Final Design Development submittal, unless otherwise identified. The drawings identified in Appendix M of this Part 6 reflect the requirements for [REDACTED].
- (f) Restoration Drawings
 - (i) DB Co shall provide restoration drawings for all lands affected by the construction of the Works, including temporary construction facilities, and lands decommissioned after the closure of the Transitway;
 - (ii) The restoration drawings shall include all other lands affected by the construction, not identified above;
 - A. Existing structures and facilities to be removed, including all permanent and temporary roads and facilities;
 - B. Grading and layout of all pathways, roadways, sidewalks, lighting, and miscellaneous Site works; and,
 - C. Final landscape treatment, including seeding, sodding, plant material, and miscellaneous items to restore the Site.

2.7 Urban Design and Landscape Elements

- (a) Sidewalk, Pathways and Plaza Pavement
 - (i) Each Station shall have an entry plaza, across the façade of all Passenger entry points to the Station, large enough to accommodate the peak flow identified;
 - (ii) The Station entry plaza shall extend from the front face of the Station to the adjacent roadway, and encompass any existing sidewalks;
 - (iii) There shall be a minimum of 3m clear from the front façade of the entry or ticket machines to any intersecting MUP;
 - (iv) There shall be a minimum of 3m clear from the front façade of the entry to any intersecting MUP. A combination of concrete and unit paving stones shall be used to construct primary sidewalks and plaza spaces. Sidewalks and plazas shall apply COADS, have a minimum width of 3m, unless specified elsewhere in this Part 6, and shall be a paved surface capable of withstanding heavy duty commercial use including access by Emergency and Maintenance Vehicles as per City standards.

- (v) Contrasting pavers and textures delineating thresholds and pedestrian routes to meet the current COADS, AODA and CAN/CSA B651 shall be provided at all Stations and bus Platforms. This shall commence at the limit of the Station Entry plaza and be continuous through to the Station. The pavers and textures shall be consistent with the materials utilized within the Station, and match the pavers utilized in the Existing Confederation Line, including:
 - A. Type 1 Paving Stones: Cambrian Black Buffed, as manufactured by [REDACTED], or approved equal.
 - B. Type 2 Paving Stones: Beige/Grey, as manufactured by [REDACTED], or approved equal.
- (vi) Sidewalks and MUPs shall be designed in accordance with the applicable existing and recreational networks of the surrounding community and shall adhere to City of Ottawa Construction Specifications, Drawings and Details for MUPs. Within Federal Lands, MUPs, and Pathways shall adhere to NCC standards. Design and selection of construction materials and layout alignment shall be consistent with specific Site context and associated landscape type.
- (vii) There shall be a sufficient offset of all streetscape elements to have a minimum of 1.8m clear space for all sidewalks.
- (viii) Sidewalks and MUPs shall be reconstructed to the full width. Patching shall not be permitted.
- (ix) All existing recreational pathways, MUPs, and sidewalks shall remain open to public use during construction. Refer to Article 3 – Connectivity Requirements, of this Part 6.
- (x) The primary sidewalks and secondary pathways shall meet the requirements of the AODA and COADS, and shall not exceed a grade of 5% with a minimum landing distance of 6m at the bottom of each slope prior to a horizontal alignment shift. Sidewalks adjacent to roadways shall follow the same grade profile of the roadway and may exceed 5%. Cross slopes shall not exceed 2%. The primary sidewalks and secondary MUPs shall be designed to maintain positive Drainage and eliminate water accumulation in accordance with City guidelines.
- (xi) DB Co shall delineate the intersections between the bus and LRT Passengers accessing the system from the cyclists and MUP users with the following:
 - A. Where a cycle track or MUP intersects with a Station entry plaza, the concrete paving of the entry plaza will extend across the cycling/MUP facility.

- B. Where a bus stop occurs on a Roadway, the concrete paving from the bus waiting area shall extend across any MUP or segregated cycling facility. The minimum length of the concrete paving shall be 9m.
- C. Three double soldier course bands of interlocking paving, minimum 600mm on centre spacing, shall be installed as warning indicators on the cycle track or MUP in the asphalt paving.
- (xii) Pedestrian crosswalks with vehicular traffic, including cycle lanes shall include TWSI as per City of Ottawa Construction Specifications, Drawings and Details;
- (xiii) PPUDOs shall be installed with a continuous pedestrian sidewalk to the Station with the quantities delineated in Article 4 – Site Specific Desired Outcomes, of this Part 6.
- (xiv) Paving materials shall be as follows:
 - A. Primary Paving Stones: Cambrian Black Buffed, as manufactured by [REDACTED], or approved equal. Size to meet and match the dimensions of the Platform edge pavers;
 - B. Accent Paving Stones: Beige/Grey, as manufactured by [REDACTED], or approved equal. Size to meet and match the dimensions of the Platform edge pavers. When utilized as the contrasting colour for the visually impaired, the paver shall have a texture variation to meet the standards of the AODA;
 - C. Concrete Paving: shall be to 35 MPa, with a magnesium float finish, caulked expansion joints and saw cut control joints. There shall be no tooled edges;
 - D. DB Co shall design and construct new work to provide smooth, safe and seamless transition of materials where the construction of, including but not limited to, sidewalks, pathways, MUPs, and plazas adjoins existing installations; and,
 - E. Where the proposed sidewalk is immediately adjacent to a cycle track or MUP, there shall be a 200mm wide delineator strip between the sidewalk, and the asphalt surface.
- (b) Site Furnishing
 - (i) Site furniture shall be in the family of complementary Site furnishings, from the Existing Confederation Line, that provide an unobstructed view of the underside of the furniture, coordinated with the interior Station furniture and sustainable in terms of its recycled content and long-term durability. Site furnishings shall be

strategically placed along sidewalks, plaza spaces and Platform areas to maximize their use and not encumber pedestrian movement. All furniture shall be fastened to the surface with non-corrosive fastenings to reduce vandalism and to protect for future replacement requirements. All furniture and landscape features shall be coordinated with light standards, CCTV and other elements to reduce vandalism. Site furnishings utilized on the Existing Confederation Line include:

- A. 3-Stream Recycling Container CAR-205, by [REDACTED];
 - B. Narrow U-stand, stainless steel Bicycle Rack MBR-500 DB, by [REDACTED];
 - C. Ipe wood slats, powder coated cast aluminum sides, Bench, MLB 100-W-A, by [REDACTED]; and,
 - D. KicK – K4 Small Scale Luminaire, Light Standard, by [REDACTED].
- (ii) The Site furniture shall be located to provide clear access and visibility to any Site wayfinding signage, so that it does not obstruct views for CCTV and with sufficient offset to restrict unauthorized access.
 - (iii) Waste/Recycle Receptacle units shall be provided and shall be easily accessible for maintenance and trash pick-up. A clear, transparent type of waste/recycle receptacle design is required. Waste/recycle receptacles shall be open installed outside of all Stations and at the bus platform areas. A minimum of one waste/recycle receptacle unit shall be required per Station entrance and shall be located such that it does not obstruct pedestrian and cycling traffic flow. Additional waste receptacles shall be provided as per drawings.
 - (iv) Benches shall be strategically placed at key gathering and waiting zones, be highly visible (CPTED) and clear of any pedestrian traffic. Benches shall be designed according to AODA and COADs standards.
 - (v) New Bicycle Racks shall be provided in accordance with the quantities noted in this Article 4. A minimum of 80% of bicycle racks, shall be sheltered. Clear access from the MUP to the bicycle parking shall be provided and additional area to accommodate dismounting and mounting of the bicycle beyond the width of the MUP. There shall be sufficient space to double the bicycle parking within the plaza or the adjacent turf, without the requirement for additional grading/retaining walls or elimination of streetscape elements and identified on the Landscape Plans.
 - (vi) All bicycle parking shall be consolidated in groups as per Article 4.1 of this Part 6, with the nearest bicycle rack provided within 9m of the Station Entry, unless otherwise approved by the City.

- (vii) Bicycle Repair stations shall be installed as indicated within this Part 6, as manufactured by [REDACTED], or approved equal. Each self-service bike repair station shall include a work stand, an air pump and the following tools:
 - A. Philips screwdriver and stand
 - B. two steel core tire levers
 - C. pedal wrench
 - D. two cone wrenches (8/10mm 9/11mm)
 - E. Torx T-25
 - F. Hex key set
- (c) Access Control
 - (i) Fencing barriers at all Stations shall be provided to prevent public access to the Tracks and Fare-Paid Zones. Fences shall also serve as dividers separating pedestrians and cyclists at specific areas and prevent customers from crossing the bus roadways.
 - (ii) Landscape handrails shall be designed to meet the OBC and the AODA and shall be integrated with the design of the stairways and ramps to meet the above codes. All handrails and fastenings shall be stainless steel, exterior grade.
 - (iii) Bollards shall be provided to control vehicular and cycling activities adjacent to the Stations. Bollards shall be designed to facilitate replacement as required.
- (d) Fencing
 - (i) The alignment shall be fenced to restrict public access to the Track and Fare Paid Zones, and shall meet the following criteria:
 - A. General:
 - i. Shall be within the Lands identified for the alignment and Stations;
 - ii. Shall be continuous along the alignment and Stations and connect to vertical walls and abutments at Stations and Bridges;
 - iii. Shall be a minimum of 1.8m high chain link fence except at Structures over the alignment;
 - iv. The height shall be measured from the publicly accessible side;

- v. Shall be offset a minimum of 1.2m from any Structures or built elements that would assist in facilitating public access to the Track or Fare Paid Zones;
 - vi. Shall be offset a minimum of 600mm from the base of any landform; and,
 - vii. All new fencing shall be black vinyl coated.
- B. Station fencing:
 - i. Shall encompass the Fare-Paid Zone, as required, to restrict access to the entry points at all Stations;
 - ii. Shall encompass the bus Stations to accommodate for unrestricted Passenger flow between the Train and the bus; and,
 - iii. Shall have one set of two lockable gates, each a minimum 1.8m in width, situated between any bus Station and Train Station to accommodate Passenger movements during Train Station closure.
- C. NCC/Federal Lands:
 - i. In addition to the above, all fencing, within, or adjacent to, NCC or Federal Lands, shall be black vinyl coated chain link fencing, with black powder coated posts.
- D. Track alignment fencing shall;
 - i. Extend continuously along the Track throughout the alignment;
 - ii. DB Co shall inspect the alignment, install new fencing as required and repair any damaged sections of the fence to meet the Requirements of this Article 2;
 - iii. Be located within the Lands;
 - iv. Have lockable service gates, as required for service and Emergency vehicle access, as per Schedule 15-2, Part 1, Article 2 – Physical Layout;
 - v. Each service gate shall be a minimum of 1.8m in width, with a lock box fixed to the adjacent fence fabric, for Emergency access; and,

- vi. Each service gate shall have a 1.8m wide paved pathway from the nearest MUP, roadway or service access road. There shall be sufficient paved surface to accommodate the turnaround of snow clearing equipment Schedule 15-2, Part 2, Article 1 - Introduction.

E. Bridge Structure Fencing:

- i. DB Co shall provide Guideway protection fencing on all new and existing Bridge Structures that span the alignment and have pedestrian or cyclist movements. The minimum height from the adjacent pedestrian accessible spaces shall be 2.4m clear as measured from the walking surface or accessible ledge of parapet wall;
 - 1 It shall be acceptable to include the height of a non-climbable parapet wall when measuring the required 2.4m height.
- ii. Shall be non-climbable;
- iii. Shall extend the full length of the Bridge structure and parapet walls where the Bridge spans only the alignment;
 - 1 Where Bridge Structures span the Guideway and other elements including roadways, parks, and streams, the full height fencing is required to extend across the Track limit to a distance of 6.0m beyond the most adjacent Track centre;
 - 2 From the location identified in Clause 1 above (6.0m beyond the most adjacent Track centre), DB Co shall provide a transition zone of fencing from the 2.4m height to the required Bridge guardrail height. Length of the transition zone shall be no less than 3.5m.
- iv. Shall be designed to be integrated within the structural requirements of the Bridge;
- v. Shall have vertical pickets, 100mm on centre, with 150mm extending above the top horizontal member, and 100mm below the bottom horizontal member;
- vi. Shall have a steel mesh, maximum 25mm openings, attached to the alignment side of the pickets, and extend from the bottom to top rail; and,

- vii. All elements shall have a black vinyl coated finish.
- viii. DB Co may propose alternative decorative designs for the vertical picket and rail design described above. Acceptance of any design not conforming to these requirements shall be at the sole discretion of the City.

(e) Bridge Guardrails

- (i) Bridge guardrails shall be designed to accommodate the requirements for raised cycling facilities at the back of roadway curb. Refer to Schedule 15-2, Part 2, Article 4 – Structural Design Criteria and Requirements;
- (ii) Where Bridge guardrails are installed, there shall be minimum clearance, as indicated in Schedule 15-2, Part 2, Article 4 – Structural Design Criteria and Requirements, and Clauses 4.1 and 4.4 of this Part 6;
- (iii) The guardrails shall splay outwards, at a minimum of 15 degrees, to enhance the comfort of the cyclist along the perimeter of the MUP on the bridge structure; and
- (iv) There shall be a continuous handrail along the inside of the guardrail, which is outside of the 4.2m clear MUP pathway.

(f) Site Lighting

- (i) All Station plazas, sidewalks, Platforms and other areas external and immediately adjacent to Stations that are accessible to the public shall be lit with an LED light source to provide improved safety and security, and meet the requirements of Schedule 15-2, Part 4, Article 6, Table 4-6.2.
- (ii) All pedestrian lighting shall be LED, downcast and have full cut-off to minimize light pollution. Additional shielding or cut-off fixture shall be provided adjacent to residential communities.
- (iii) All direct pathway connections from the adjacent street to the front entry plaza shall be lit, and provide a continuous light level with the front entry plaza, and as indicated in this Part 6.
- (iv) All pathway lights shall have a 4.3m height pole.
- (v) No pedestrian lighting of federal lands, pathways and trails shall be permitted, unless specifically identified elsewhere in Article 4 – Site Specific Desired Outcomes, of this Part 6.

(g) Wayfinding Signage

- (i) All signage, including temporary construction staging, shall be bilingual.
 - (ii) Refer to Schedule 15-2, Part 7 - Traffic and Transit Management and Construction Access, for construction staging signage requirements.
 - (iii) Permanent bilingual wayfinding signage shall be provided throughout the corridor, and directing the community along the MUPs and sidewalks to the individual Stations.
 - (iv) Wayfinding signage shall be carefully located to protect the high quality views towards the Ottawa River, Parliament Hill or other landmarks.
 - (v) Based upon the graphics provided by the NCC, within the SJAM lands, DB Co shall provide the following pathway signage:
 - A. 70 regulatory signs: 50mm x 50mm x 4,000mm black metal post with 600mm x 300mm aluminum signs;
 - B. 50 painted standard symbols on pavement (pedestrian, cyclist, arrow). Pathway signage content and locations to be provided by NCC
 - (vi) At each Station, wayfinding signage shall be provided at the interface between the Station plaza and MUP providing direction to the adjacent Station and key Ottawa landmarks.
 - (vii) Directional wayfinding signage shall also be provided at each MUP junction indicating the next Station in either direction.
 - (viii) Bilingual wayfinding signage shall indicate the following:
 - A. Station Name;
 - B. Approximate distance to station;
 - (ix) Wayfinding signage graphics shall meet and match the existing signage on the pathway system. The content and location of the signage shall be approved by the City.
 - (x) The location of the wayfinding signage shall take precedence over the location of street furniture, plant material or other items which may restrict clear access to the view the signage.
- (h) Existing Plant Material
- (i) Existing plant material shall be protected where feasible and as per the Tree Mitigation Plan(s).

- (ii) Provide an Existing Tree Protection/Monitoring Plan, developed by a Licensed Arborist, which defines the methodology for the protection and maintenance of the existing trees;
 - (iii) Protect plant material during construction as per City and NCC specifications and standards. Ensure protective fencing is inspected and repaired as required.
 - (iv) Any plant material required to be removed for the construction of the Project shall be replaced as per Article 2.11 (b) of this Part 6, and the shrubs shall be reinstated at an equal ratio: for each square metre of shrubs removed, instate with a square metre of shrubs. The shrub spacing in the planting beds shall have a maximum on centre spacing of 750mm.
 - (v) Any existing trees identified for protection, and proposed for removal during construction, shall be reviewed, and approved by the City prior to removal.
- (i) Proposed Planting
- (i) Planting outside of Stations shall be used to define spaces, provide shade and reduce wind speed on Platforms to help direct customers safely between public streets and Station entrances and assist in deterring pedestrian crossings through restricted access areas. Plant material shall be designed to be harmonious with the architecture and scale of the Station and coordinated with sight line locations for security cameras and Station lighting, in particular with respect to anticipated vegetation growth.
 - (ii) Planting shall adhere to CPTED requirements.
 - (iii) Street trees shall be integrated into the pedestrian plazas adjacent to the Stations to provide shade and comfort to the pedestrians. Where the trees are integrated within a paved plaza surface, a structural support system or a root control system below the paved surfaces shall be integrated into the overall design to provide a sufficient root growth to sustain growth. A minimum of 30m³ of soil volume shall be provided per tree. This may include 16m³ of direct soil, and 14m³ of shared soil with an adjacent tree.
 - (iv) Street trees shall be reinstated in all City ROW where tree removals have occurred as a result of the Work. Trees shall be installed with a maximum of 7m on centre spacing.
 - (v) Street trees shall be proven to grow in the Ottawa roadside environment, and located to maximize the offset distance between the vehicle travel lanes and proposed trees.
 - (vi) Monocultures of a single species shall not be permitted, and species shall be large canopy species to provide shade to the Roadway and pedestrian realm.

- (vii) Quality and source shall comply with the CNLA metric guide referring to size, development and rootball of plant material. Measure plants when branches are in their natural position. Use trees and shrubs of No.1 Grade. All plant material shall be hardy to the local urban conditions and native to the Ottawa area where possible. All plant material shall meet the requirements of “Canadian Standards for Nursery Stock.”
- (viii) Plant material shall be hardy to the urban conditions, winter maintenance requirements and be designed to be low-maintenance both in the short and long term. Plant material shall be salt tolerant when used in areas adjacent to bus facilities and in areas identified for snow storage. Local native species shall be selected wherever feasible. Supplemental watering to assist in establishment of the plant material shall be required.
- (ix) An irrigation system shall not be permitted.
- (x) The plant material palette shall include a variety of plant material to provide seasonal variety and colour.

Minimum Planting Criteria for Station and Guideway Landscapes

| Plant Material | Size | Spacing |
|--------------------------|--------------|------------|
| Deciduous Trees – large | 70 mm cal. | 5.0 metres |
| Deciduous Trees – medium | 45 mm cal. | 4.0 metres |
| Coniferous Trees | 1.5 m ht | 3.0 metres |
| Coniferous Shrubs | 45 cm spread | 900 mm |
| Deciduous Shrubs | 45 cm ht | 900 mm |

- (j) Refer to Appendix A and D of this Part 6 for specific requirements on species size, location and quantities for the Federal lands within the SJAM Parkway, Atlantis and Rochester Fields.
- (k) Topsoil
 - (i) All in-situ topsoil stripped for construction requirements shall be removed off-Site unless there is sufficient room to stockpile topsoil at no greater height than 1.2m. Stockpiled topsoil shall only be used in areas of seeding adjacent to the alignment.
 - (ii) All topsoil shall be fertile, friable, natural sandy loam containing not less than 4% of organic matter for sandy loams, with an acidity value ranging from pH 6.0 to pH 7.5 and capable of sustaining vigorous plant growth. It shall be free of stems or roots, stones and clods more than 50mm diameter or other extraneous matter. Topsoil shall be screened. Topsoil shall not be supplied in a frozen state.
- (l) Sod

- (i) All turf areas within 9m of pedestrian pathways, entry plazas and paved public spaces, shall be sodded, unless otherwise specified in this Article 2.
 - (ii) Nursery Sod: quality and source shall comply with standards outlined in 'Canadian Standards for Nursery Stock', most recent addition.
 - (iii) DB Co shall scarify the existing subgrade a minimum of 150mm, and apply a minimum of 150mm of topsoil prior to installation of sod.
- (m) Seed
- (i) The limits of construction and staging areas for some Stations and sections of the Track are expected to extend beyond the limits of sodding indicated above. Any disturbed areas extending beyond the limits identified for sod above shall be rehabilitated as per Schedule 15-2, Part 1, Article 4 – Design and Construction. A review of the adjacent land uses and Site development shall be completed for these locations and the most appropriate groundcover shall be selected.
 - (ii) Seed: to meet the requirements of the City specifications, unless otherwise noted in this Article 2.
 - (iii) DB Co shall scarify the existing subgrade 150mm, and apply a minimum of 150mm of topsoil prior to installation of seed.
- (n) For planting within Highway Corridor Lands, DB Co shall use the following plant list. Additional species may be considered, and subject to review and acceptance from MTO
- (i) Deciduous Trees:
 - A. *Acer Fremanii* "Jeffersred", (Freeman Maple);
 - B. *Gleditsa Triacnathos* "Shademaster" (Shademaster Honeylocust);
 - C. *Quercus rubra*, (Red Oak);
 - D. *Tilia Americana*, (American Linden);
 - E. *Ulmus* "Morton", (Accolade Elm); and,
 - F. *Celtis Occidentalis*, (Common Hackberry).
 - (ii) Coniferous Trees
 - A. *Picea Pungens*, (Colorado Green Spruce); and,
 - B. *Pinus strobus*, (White Pine).

- (iii) Shrubs
 - A. *Amelanchier Canadensis*, (Serviceberry);
 - B. *Aronia Melanocarpa*, (Black Chokeberry);
 - C. *Rhus Aromatica* “Low-Gro”, (Low-gro Fragrant Sumac);
 - D. *Rhus Typhina*, (Staghorn Sumac); and,
 - E. *Sorbaria Sorbifolia*, (False Spirea).
- (iv) Vines
 - A. *Parthenocissus Tricuspidata*, (Boston Ivy).
- (o) Earth Borrow
 - (i) All in-situ non-contaminated overburden, and topsoil not appropriate for reuse as topsoil, stripped for the construction requirements, may be utilized as Earth Borrow backfill over the Tunnel alignment;
 - (ii) All stripped overburden shall be allowed to be stockpiled; and,
 - (iii) Imported Earth Borrow shall consist of material as defined by OPSS 212.

2.8 Natural Channel Restoration

- (a) Refer to Schedule 15-2, Part 2, Article 5 - Drainage and Stormwater Management Design Criteria, for the SWM requirements for the channel design.
- (b) DB Co shall design all watercourse embankments that are to be reinstated in accordance with the following:
 - (i) Maximum of 3:1 slopes.
 - (ii) Any embankments where the proposed slopes would be less than 3:1, shall be constructed with a retaining wall at the base of the slope, to provide a 3:1 embankment for planting. The retaining walls shall be made of natural materials, such as armour stone rock wall, wood revetments, root wads, or other measures. All built features shall meet the flow analysis and Design Criteria to ensure the slope stability.
 - (iii) Use biodegradable materials to anchor the logs and root wads to the embankment.
 - (iv) Rip rap or gabion baskets shall not be permitted.

- (v) On all outside bends of the creek, DB Co shall reinforce the channel embankment with root wads. The reinforcement shall protect the embankment for the 2 year flows and be a minimum 0.75m height, or as per the detailed design analysis, completed as per Schedule 15-2, Part 2, Article 5 - Drainage and Stormwater Management Design Criteria.
- (vi) All slopes shall be vegetated with native species woody plant material;
- (vii) DB Co shall ensure the slope stabilization of the final planting beds during the 2 year warranty and establishment of the plant material to control wash-outs and sediment movement into the watercourse;
- (viii) The vegetation shall be a blend of 90% trees and 10% shrubs, and shall be of an appropriate species for the location on the embankment. DB Co shall identify species that are tolerant for locations within the seasonal flooding, 10 year flood, 100 year flood and upland planting.
- (ix) The trees shall consist of a blend of the following:
 - A. 25% Coniferous Trees;
 - B. 70% Reforestation Trees;
 - C. 5% Caliper Deciduous Trees;
- (x) The shrubs shall include:
 - A. 70% shrubs;
 - B. 30% live stakes; and
- (xi) Meet the following planting criteria;

Minimum Planting Criteria for Restoration Landscapes

| Plant Material | Size | Spacing |
|---------------------------------|--------------|------------|
| Caliper Deciduous Trees | 60 mm cal. | 5.0 metres |
| Reforestation Trees | 20 mm cal | 3.0 metres |
| Coniferous Trees | 900 mm | 2.4 metres |
| Deciduous Shrubs | 45 cm ht | 600 mm |
| Riparian Planting | 450 mm ht | 450 mm |
| Live Stake Planting (Deciduous) | 90 cm length | 100 mm |

- A. Any live stakes shall consist of native species, rhizome spreaders, and be tolerant of the Site specific conditions at the creek edge.

2.9 LID SWM Landscapes

- (a) Refer to Schedule 15-2, Part 2, Article 5 – Drainage and Stormwater Management Design Criteria, for the SWM requirements for the drainage requirements.
- (b) All surface drainage swales shall be landscaped to the following criteria:
 - (i) Flat-bottomed swales;
 - (ii) Varying side slopes, with a maximum slope of 3:1 and a minimum slope of 8:1;
 - (iii) Establish a ground cover consisting of perennials, grasses, shrubs and trees that accommodates the periodic wetting;
 - (iv) All bioswales adjacent to areas of vehicular traffic shall be protected by a raised concrete curb, with curb openings to accommodate surface drainage; and,
 - (v) All plant material utilized within the bioswales shall be salt tolerant.

2.10 Existing Tree Protection

- (a) DB Co shall submit a Tree Mitigation Report, as per Schedule 10 – Review Procedure, and Clause 2.6 of this Part 6, to delineate existing trees impacted by the Work. These drawings shall be reviewed, and appropriate agency approval received, prior to commencement of work;
- (b) Within the SJAM lands, between Cleary and Dominion, DB Co shall protect all the existing trees, as identified in Appendix E. In addition, for work beyond the works identified in Appendix E, DB Co shall identify all trees to be removed for approval prior to commencement of work;
- (c) All tree protection shall be installed prior to the commencement of any Works.
- (d) DB Co shall develop a construction plan that minimizes the removals and impacts on the adjacent trees to be protected;
- (e) DB Co shall work within the following construction restrictions with respect to the existing tree removals within the SJAM Parkway. Refer to Schedule 20- Lands.
 - (i) A 3m offset north from the temporary road works for the SJAM Parkway;
 - (ii) Protection of the existing trees adjacent to the Richmond Road row of Rochester Fields. DB Co shall be permitted to remove a maximum of one tree to accommodate construction access. The exact trees to be removed shall be in consultation with the NCC;

- (iii) To accommodate the construction road access, DB Co shall relocate one existing trees adjacent to Richmond Road, as identified in Appendix C of this Part 6. This tree shall be assessed for health to determine feasibility of relocation within Rochester Fields;
- (iv) Protection of the existing trees along the west property line of Rochester Fields;
- (v) Protection of the existing trees along the east property line of Rochester Fields, including the woodlot east of the storm sewer leading to the Ottawa River;
- (vi) Protection of the existing woodlot south of the pedestrian path, on the south side of the SJAM Parkway, west of Rochester Fields;
- (vii) Protection of the existing stand of mature trees south of the pedestrian footpath, east of Rochester Fields, leading to Dominion Station;
- (viii) Protection of the existing trees north of the MUP, north of the SJAM Parkway, with the exception of the work area required to complete the storm sewer outfall works at the Ottawa River;
- (ix) Protection of the existing deciduous trees, south of Richmond Road, east of the alignment;
- (x) DB Co shall submit a plan, and rationale for the limits of work for review and approval, prior to proceeding in areas where the limits of construction extend within the areas identified above.

2.11 Tree Compensation

- (a) Based upon the required removals to accommodate the construction requirements, DB Co shall complete the Tree Compensation Plan(s), and submit as consolidated package and in accordance with Schedule 10 – Review Procedure.
- (b) The Tree Compensation Plan(s) shall be based upon the following criteria:
 - (i) For every deciduous tree, over 100mm, DB Co shall replace with two 70mm caliper trees;
 - (ii) For every coniferous tree DB Co shall replace with two 1.8m height trees;
- (c) The Tree Mitigation Plan shall be prepared by a Licensed Arborist in conjunction with the Landscape Architect.
- (d) DB Co shall develop the Tree Compensation Plan(s) in conjunction with the overall planting plan for the Project, including Stations and Guideway to ensure sufficient compensation for the required removals.

- (e) The Tree Compensation Plan(s) shall conform to approved tree species list and FLUDTA requirements.
- (f) Existing trees (including crown, trunk and root system) in proximity or vulnerable to damage by the Work, shall be protected during all stages of Work. No material, construction equipment or vehicles shall be stored under the drip-line of trees at any time. Trees shall be protected and watered regularly as required by standard horticultural practice during the construction period.

2.12 Site Restoration

- (a) DB co shall complete the following:
 - (i) Removal of all temporary and permanent roadway works, including granular bases;
 - (ii) Scarification of compacted subgrade a minimum of 150mm prior to the placement of topsoil for planting, seeding or sodding;
 - (iii) Core aerate within the drip line of all existing trees where any construction activities have occurred;
 - (iv) Regrading and shaping of the Site to reinstate the original contours and drainage patterns. In areas where the roadway will be removed, the regrading shall eliminate the engineered roadway grades and profile; and,
 - (v) Install a minimum of 150mm topsoil prior to final seeding or sodding for turf areas, and 450mm topsoil for shrub beds.
 - (vi) Where the Alignment is below grade, install a minimum of 300mm of topsoil, and 1.2m of Earth Borrow over the Alignment to facilitate the growth of the vegetation.

ARTICLE 3 CONNECTIVITY REQUIREMENTS

3.1 General Requirements

- (a) Existing pathways, sidewalks and MUPs are critical community connections that shall be maintained throughout construction, unless specifically identified and agreed to by the City for closure or removal.
- (b) DB Co shall develop a TTMP to identify any potential safety concerns for pedestrians and cyclists during construction and measures for protection, as per Schedule 15-2, Part 7, Article 6 – Traffic and Transit Management Plan.
- (c) DB Co shall implement any required measures to alleviate these potential safety concerns and ensure the community connections identified in this Part 6, and Schedule 15-2, Part 7 – Traffic and Transit Management and Construction Access, are maintained. Sidewalks and pathways shall be installed as required to provide connection between the adjacent communities to the Station and as indicated elsewhere in Schedule 15-2, Part 4 – Stations, and this Part 6.

3.2 Connectivity Elements

- (a) Design and selection of construction materials and layout alignment shall be consistent with specific Site context and associated landscape type.
- (b) Pathways and MUPs shall be minimum 3.0m in width unless specified otherwise in this Article 3 and shall be a paved surface capable of commercial use, including access by maintenance and Emergency vehicles and shall not be used for calculating the requirements for loading or unloading of the buses.
- (c) All pathways and MUP's shall have a TWSI located at vehicular intersections, or where a sidewalk crosses a cycle track.
- (d) A sodded clearance strip shall be provided on each side of a MUP, as per Article 2 – Design Criteria, of this Part 6, except in the following conditions;
 - (i) Where MUPs are located beneath a Bridge, provide 0.6m paved shoulder on each side of MUP;
 - (ii) Where MUP traverses an open paved plaza, provide pavement markings, change in paving colors or change in hard surface material to identify the route of the MUP. This shall include a minimum of four bands of interlocking pavers in a double soldier course, centred 0.6m prior to the MUP traversing the plaza.
 - (iii) Where a MUP traverses the entry plaza to a Station, there shall be a minimum of 3m offset from the Station entry.

- (iv) Where a MUP is adjacent to an existing or a proposed vertical constructed surface or element such as a building, guardrail, retaining wall, fence, etc., a 0.6m “buffer” space shall be provided from the existing constructed surface in addition to the width of the MUP.
- (e) The MUPs and sidewalks at Stations shall be designed to ensure crossing locations to minimize the potential conflict between cyclists and pedestrians. This may include “T” intersections, small walls, planters or other design elements.
- (f) Install bollards at all roadway intersections to restrict vehicular access to the MUP. These bollards shall be collapsible, to accommodate service vehicles.
- (g) DB Co shall provide reflective tape on all bollards.
- (h) Depressed curbs shall be provided at all sidewalk roadway interfaces and shall be in proximity to bicycle parking areas to facilitate safe access from roadway to sidewalk.
- (i) The City has a long term plan to institute additional MUP connections at a future date, as per the TMP, Ultimate Cycling Network. Where future connections are identified by the City, DB Co shall maintain a 6m unencumbered width to access the MUP corridor that would prevent the connection from being made. A 6m-wide clear corridor shall be established that will allow a connection to be constructed and therefore shall not be encumbered with utility boxes, grade difference or other obstacle that would reasonably prevent construction of such a connection.

3.3 Accommodation of Pedestrians and Cyclists During Construction

- (a) All trails, pathways and MUPs shall remain open throughout construction unless specifically identified. DB Co shall install a temporary granular pathway for closures less than 7 days in duration. Where the trail, sidewalk, pathway or MUP is required to be closed for longer than 7 days, DB Co shall provide an alternate route with a minimum of a paved asphalt surface for the duration of the closure.
- (b) DB Co to provide an alternate route that minimizes any detours for the pedestrians and cyclists, and is a maximum of 20% additional length.
- (c) Proposed temporary closure or re-routing of pedestrian and cycling routes shall be submitted in accordance with Schedule 10 – Review Procedure, and shall conform to the construction Site Pedestrian Control Plan as required by City of Ottawa Special Provision D-005 and as documented in COADS. DB Co shall include a Pedestrian Access Plan/construction Site Pedestrian Control Plan in the TTMP submissions per Schedule 15-2, Part 7, Article 6 – Traffic and Transit Management Plan.
- (d) Multiple subsequent closures of less than seven days, shall not be permitted, and an alternate route shall be provided and shall include:

- (i) Smooth paved surface to meet Universal Design requirements;
 - (ii) Curb cuts as required to provide barrier-free routes from pathways and sidewalks to roadway crossings;
 - (iii) A minimum width of 1.8m for sidewalks, as per COADS;
 - (iv) A minimum width of 3m for MUP;
 - (v) Positive drainage to ensure no ponding on the travelled route; and
 - (vi) Temporary routes shall be lit to the same level as the original route.
- (e) All existing pedestrian walkways and cycling facilities shall be maintained to the City standards at all times, during the construction period. DB Co shall be responsible for all design, approvals, construction and maintenance, including cleaning, of the pedestrian walkways and cycling facilities for the duration of time the detour is in service.
- (f) DB Co shall provide and maintain way-finding signage for pedestrian walkways, MUP and cycling closures and detours in accordance with the TTMP. The signs shall include maps of the affected routes, and shall be posted at least at all access points, key decision points and intersections between the existing route and the alternate route, and, on the Pedestrian Walkway 50m in advance of each pedestrian walkway closure or relocation. The maps shall provide detailed directions to the alternate routes in order to travel to the original destination point.
- (g) DB Co shall not close any MUP or sidewalk identified to remain open during construction, and the TTMP shall identify all measures to ensure the safety of pedestrians and cyclists. DB Co shall modify the TTMP as required to accommodate the pedestrian and cyclists.
- (h) The Site pedestrian control design shall include all temporary bilingual pedestrian signing, directional signing, maintenance of sidewalk, relocation and any other delineation to provide safe environment for pedestrians and cyclists.

3.4 Roadway Crossings

- (a) General
- (i) DB Co shall be responsible for liaising and coordinating with the City with regard to all modifications that may be required at municipal traffic signals both during and after completion of the design and construction. Proposed modifications shall be supported by traffic engineering analysis and meet the City traffic signal requirements and standards.
 - (ii) On Federal Lands, DB Co shall install the crosswalks as per Appendix C and D;

- (iii) DB Co shall provide Crossrides where a proposed multi-use pathway or cycle track crosses an intersection.
- (iv) DB Co shall complete a traffic study to finalize the configuration and review with the City with respect to the type of controlled crossing device to be implemented (pedestrian signal, full traffic signal, or PXO Type B, C or D). DB Co shall implement the type of controlled crossing device selected by the City at each intersection where a new controlled crossing is required as per this Part 6
- (v) DB Co shall coordinate the work of this Article 3 with Schedule 15-2, Part 2 – Civil and Guideway, and Schedule 15-2, Part 7 – Traffic and Transit Management and Construction Access.

3.5 Winter Maintenance

- (a) DB Co shall design the Station plazas, pedestrian Emergency egress, PPUDO, Park and Rides and MUP to accommodate winter maintenance, including providing a route for equipment to manoeuvre along the corridor. This shall include locations to stockpile snow along the pathways as required, with sufficient space for equipment turn around, including a minimum of 5m x 5m at all egress points at the building façades;
- (b) DB Co shall indicate the snow storage locations on the layout drawings and fencing drawings;
- (c) Any snow storage locations shall be located on unencumbered City lands and outside of any ROW;
- (d) Any allocated snow storage locations shall be offset from the existing and proposed Site features, bioswales and plant material; and,
- (e) Any snow storage locations shall ensure the drainage pattern is integrated within the overall SWM plan.

ARTICLE 4 SITE SPECIFIC DESIRED OUTCOMES

4.1 Station Specific Design Criteria

(a) Montreal Station

- (i) DB Co shall provide a 2.5m continuous sidewalk, on both the north and south sides of Montreal Road, from the existing sidewalks east of Shefford Road to the east side of the OR174 EB off-ramp or on-ramp, with the following exceptions:
 - A. Under the bridge structures and Station, the sidewalk width shall be reduced to 2m; and,
 - B. On the south side on Montreal Road, the sidewalk, between Shefford Road and the bus shelter immediately east of Shefford, Road shall not be widened to 2.5m, and on the north side the existing sidewalk between Shefford Road and a point approximately 140m east of Shefford Road, shall not be widened to 2.5m.
- (ii) On the south side of Montreal Road, DB Co shall provide:
 - A. A 3m MUP, behind the curb and offset from the sidewalk by a 3m landscape buffer, with a crosswalk/crossride, at the OR174 WB on-ramp, and a Protected Intersection, including crosswalk and bi-directional crossride, at the signalized OR174 WB off-ramp/Montreal Road intersection to provide a continuous MUP connection, as identified in Clause 4.4 (a)(i) of this Part 6;
 - B. This MUP shall also serve as the EB cycling lane for Montreal Road and DB Co shall provide the depressed curb, paving markings and COADS requirements at the intersection at the OR174 WB on-ramp, to delineate the pedestrian and cycling routes; and,
 - C. The EB cycling route shall continue as a segregated cycle lane, east of the OR174 WB off-ramp/Montreal Road signalized intersection, under the Montreal Road bridges, to the OR174 EB off-ramp, with the City standard Protected Intersection and pavement markings to connect to the on-road cycle lane adjacent to the vehicle travel lane east of the intersection.
- (iii) On the north side of Montreal Road, DB Co shall provide:
 - A. A 3m MUP, immediately adjacent to the sidewalk, from the crosswalk/crossride at Montreal Road/OR174 WB off-ramp to the east-west MUP, to provide the continuous MUP connection, as identified in Clause 4.4 (a)(i) of this Part 6;

- B. A 3m MUP, continuing westerly, and connecting to the south end of Rainbow Street and connecting to a new sidewalk on the west side of Rainbow that shall extend to Canotek Road;
 - C. A segregated westbound cycle track commencing from the east side of the OR174 EB on-ramp to the west side of the OR174 WB off-ramp; and,
 - D. Provide Protected Intersections and pavement markings to connect to the on-road cycle lane adjacent to the vehicle travel lanes at each intersection.
- (iv) Under the OR174 Bridge Structures, there shall be a minimum of 8m of paving, from the front face of the curb, to the front face of the Bridge abutments to generally include:
- A. 2m width for the bus shelter or streetscape elements;
 - B. 2m sidewalk width for the pedestrians;
 - C. 2m width for the bus staging/access;
 - D. 1.5m width for the cycle track;
 - E. 0.5m width for buffer between the cycle track, curb and sidewalk; and,
 - F. With the exception of the asphalt paving for the cycle track, and the interlocking pavers for the buffer, all the paving shall be concrete.
- (v) DB Co shall provide continuous concrete paving from the outer limit of the bus staging area, 18m from the bus flag location, to the outside limit of the Station entry, to create a pedestrian/cycling mixing zone across the full extent of the bus stop and Station entry.
- (vi) The cycle track shall be developed behind the roadway curb. At the bus stop location, the alignment for the cycle track shall offset from the curb to accommodate a 2m bus staging/access area.
- (vii) The bicycle parking shall have equal quantities at each entry, offset from the Station entry and Montreal Road bus stops.
- (b) Jeanne d'Arc Station
- (i) The bicycle parking for the Station shall be located immediately north and south of the Bridge Structure, on the east side of the ROW.

- (ii) 50% of the bicycle parking shall be provided on the north side of the bridge, and 50% of the bicycle parking shall be provided on the south. Provide retaining walls as required for the bicycle parking.
 - (iii) There shall be a MUP leading to the bicycle parking from Fortune Drive.
 - (iv) Provide 2m wide sidewalk on the east and west sides of Jeanne d'Arc Boulevard on the Bridge Structure. Extend the 2m sidewalk to the bicycle parking to the north, and the MUP to the south, on the east side of the roadway.
- (c) Orléans Station
 - (i) The bicycle parking for the Station shall be located in equal quantities to the north and south, and immediately adjacent to the Bridge Structure with retaining walls and guards as required.
 - (ii) Widen the sidewalk, from Lumberman Way and Fortune Drive, to 2.5m to accommodate pedestrian movements to the Station, with the exception of the sidewalks on the bridge structure.
- (d) Place d'Orléans Station
 - (i) DB Co shall provide a Station entry plaza within the existing lands of the BRT Station, with access from Champlain Street, and ensuring the plaza accommodates the bus movements within the Station.
 - (ii) DB Co shall provide a fence between the Fare Paid Zone and unpaid zone, from 9m west of the crosswalk at Champlain to the north side of the Station entry, and extend the fence on the south side of the Station Entry to the existing jersey barrier on the north side of the Shopping Centre parking lot. The existing sidewalks shall be extended to reduce the access point to one lane for Emergency access, with a lockable gate.
 - (iii) DB Co shall provide a paved Station plaza on either side of the fare gates, with deciduous trees within the pavement.
 - (iv) The Park and Ride on the north side of OR174 shall be reconfigured to accommodate a minimum of three PPUDO spaces adjacent to north end of the existing pedestrian bridge.
 - (v) Provide 2.4m wide concrete sidewalk adjacent to PPUDO spaces.
 - (vi) Provide a Station entry plaza at the Champlain Street entrance.
 - (vii) Bicycle parking for the Station shall be provided as follows:

- A. 70% north, at the existing Park and Ride;
- B. 30% south, at the entry plaza adjacent to Place d'Orléans.

(e) Trim Station

- (i) Provide a Station entry plaza that encompasses the LRT and bus Station of approximately 1,500 m², with 60% paved.
- (ii) Provide a shared parking lot with one cell for the Universal Accessible Parking and one cell for the PPUDO immediately adjacent to the Station plaza.
- (iii) Provide a 2.4m continuous sidewalk, from each parking lot cell to the Station plaza, with crosswalks as required.
- (iv) Provide 3.0m wide concrete sidewalk along the north side of the parking lot linking parking areas to the Station plaza.
- (v) Provide a secure fenced perimeter around the bus facility, extending from the Station to the fare controlled entrance, to restrict any unauthorized access to the Station and bus Station.
- (vi) Provide pedestrian lighting on sidewalks and pathways from the perimeter of the Site on all sidewalks and MUPs.
- (vii) Bicycle parking for the Station shall be provided to the south of the Station, and shall service both the LRT and Transitway Stations.
- (viii) Prior to the removal of existing Redblacks forest on the east side of the Park and Ride facility, DB Co shall:
 - A. Plant the equal number of trees, with the same caliper and species in Cumberland Millennium Park, 100 Millennium Blvd, Orleans, relocate the existing signage, relocate the existing maple trees of the Redblacks Forest, affected by the reconfiguration of the facility to a site selected by the City, within a 5km radius of the existing site, including the maintenance and warranty of the trees for two years.

(f) Westboro Station

- (i) Provide a MUP connection from the existing pathway northwest of the Station, leading from Lanark Avenue to Scott Street.
- (ii) The Station plaza on the south side of the alignment shall be developed as a transition zone for pedestrians and cyclists.

- (iii) The Station plaza shall extend from the Station Entry to Scott Street, and between the bus access loop to the bus stop on the north side of the Station.
- (iv) The bicycle parking shall be provided in equal quantities at both the east and west end of the Station plaza.
- (v) Provide equal number of PPUDO's on both the north and south side of Scott Street, offset on either side of the front Station plaza, beyond the bus access loop.
- (vi) The sidewalks to the east and west of the plaza shall be widened to 3m wide MUPs.
- (vii) A crosswalk/Crossride shall be provided at the MUP crossing of the bus loop staging area.
- (g) Dominion Station
 - (i) There shall be a Station plaza extending between Dominion Avenue and the Station entry, with an approximate size of 200 m².
 - (ii) There shall be a minimum 4.2m wide direct public lit MUP connection between Workman Avenue and Dominion Avenue, connecting to the Station plaza over the alignment.
 - (iii) There shall be a 3m MUP connection from Workman Avenue to the at-grade pedestrian crossing of the SJAM. Provide pathway connections to the existing NCC pathways east of the at-grade crossing, on the north and south sides of the SJAM Parkway.
 - (iv) Construct the at-grade crossing as per Clause 4.4, of this Part 6.
 - (v) The bicycle parking shall be located with 50% of the bicycle parking on the south side of the Station, and 50% on the north side, within the Station plaza.
 - (vi) The Station plaza shall provide a direct connection to the NCC pathway on the SJAM Parkway west of the Station, and connect with the MUP on the south side of the LRT corridor, along the Scott Street corridor.
 - (vii) A PPUDO shall be provided to the south side of the Station, on Dominion Avenue.
 - (viii) A continuous sidewalk, commencing at Richmond Road shall be constructed on the east side of Berkley Avenue and north side of Dominion Avenue to the Station plaza. DB Co shall complete the design of the drainage to ensure adequate drainage is provided.

(h) Cleary Station

- (i) There shall be a Station plaza extending from the Station entry to the east side of the Cleary intersection crosswalk.
- (ii) There shall be a 3m MUP from the northeast intersection of Cleary Avenue/Richmond Road connecting directly to the NCC Pathway.
- (iii) The bicycle parking shall be located within the Station plaza.
- (iv) There shall be a raised intersection at Cleary Avenue/Richmond Road that encompasses both the east and west crosswalk/Crossride, and shall be constructed of 100mm x 200mm, 100mm depth interlocking pavers, with 100mm concrete base, Sierra colour, in a herringbone pattern as manufactured by [REDACTED].
- (v) Provide equal number of PPUDO's on both the north and south side of Byron Avenue, adjacent to the Station plaza to the east of the Station.
- (vi) Reinstate the lands in the northeast quadrant of Richmond Road/Cleary Avenue with topsoil and sod.

(i) New Orchard Station

- (i) There shall be a Station plaza between the west crosswalk of New Orchard Avenue/Richmond Road, and the front entry of the Station;
- (ii) There shall be a raised intersection at New Orchard/Richmond Road that encompasses both the east/west, and north/south crosswalk/Crossride, and shall be constructed of interlocking pavers, with a 100mm concrete base. Meet and match the pavers and details developed for the Cleary Avenue intersection.
- (iii) The Station plaza shall be a minimum of 50% paving, and provide a direct pedestrian connection between the intersection and the Station entry.
- (iv) The Station plaza shall include lighting to City standards, and in accordance with Article 2.7 of this Part 6.
- (v) There shall be a 2.4m wide concrete sidewalk on the south side of the Station, connecting the Station plaza to Byron Linear Park, with a minimum of 3m landscape buffer, with tree planting. There shall be a minimum 5m landscape buffer, with tree planting on the north side.
- (vi) Refer to Clause 4.4 of this Part 6, for Richmond Road Complete Street streetscape requirements.

- (vii) Provide the PPUDO on the north side of Byron Avenue, adjacent to the Station plaza
- (j) Lincoln Fields Station
 - (i) There shall be a direct lit MUP connection, between the signalized intersection on SJAM Parkway and the at-grade Station entry on the west side of the alignment.
 - (ii) The MUP connection shall be designed to elevations above the 100 year flood, and where the MUP crosses the floodplain, it shall be elevated with a Bridge.
 - (iii) There shall be a Station plaza at the west entrance of sufficient size to accommodate the pedestrian movement to the entry and 40% of the required bicycle parking spaces.
 - (iv) There shall be a Station plaza on the south end of the Station, connecting the Station Entry with Carling Avenue, of an approximate size of 100m², with a minimum of 60% paved.
 - (v) There shall be a Station plaza on the east side of the Station, connecting the PPUDO, paid entry gates, bus Platforms and Station entry. The Station plaza shall contain 20% of the bicycle parking spaces.
 - (vi) 40% of the required bicycle parking spaces shall be accommodated at the Station plaza leading from Carling Avenue.
 - (vii) The traffic islands within the bus Station shall include infiltration trenches with tree and shrub planting.
 - (viii) Provide permeable pavers at the Station entrance and a permeable paver strip along the pedestrian walkway (adjacent to bus Platform) to a dry pond.
 - (ix) The bus Station shall have trees in the plaza adjacent to the bus shelters to provide shade and shelter to the transit users.
 - (x) Provide a separate PPUDO, with access from the existing signalized intersection at Carling Avenue/Lincoln Fields Station and have a sidewalk connection from the PPUDO, and Carling Avenue, to the at-grade entrance to the east side of Station.
 - (xi) Provide retaining walls to allow direct access from the PPUDO to the fare controlled entrance.
 - (xii) Provide a secure fenced perimeter around the bus facility, extending from the Station to the fare controlled entrance for the PPUDO, to restrict any unauthorized access to the Train Station and bus Station.

- (xiii) Provide a 2m wide sidewalk and 1.8m cycle lane on both sides of Carling Ave. between existing signalized crossing and proposed 6m wide crosswalk/Crossride.
 - (xiv) Locate the pedestrian activated crosswalk/Crossride signalized intersection approximately 120m west of the existing Transitway entry on Carling Avenue to align with the MUP on the south side of Carling and with the Station entry Plaza.
- (k) Iris Station
- (i) There shall be a Station plaza on both the east and west side of the Station which delineates the pedestrian space.
 - (ii) The West Station plaza shall extend from the proposed stairs connecting the plaza to Iris Street Bridge to the south to encompass the bicycle parking.
 - (iii) There shall be a lit MUP connection from Iris Street to both Station plazas and fare control entry location.
 - (iv) There shall be a MUP on the west side of the Station, extending from Baseline Station to the NCC Capital Trail on the north side of Iris Street.
 - (v) DB Co shall provide a controlled crossing of Iris Street between Iris Station and Parkway Drive. DB Co shall complete a traffic study to finalize the configuration and review with the City with respect to the type of controlled crossing device to be implemented (pedestrian signal, full traffic signal, or PXO Type B, C or D). DB Co shall implement the type of controlled crossing device selected by the City.
 - (vi) Provide equal number of PPUDO's on both the north and south side of Iris Street, and coordinated with the bus stops and signalized pedestrian crossing.
 - (vii) The Emergency exits shall provide a direct connection from the Station to the walkways.
 - (viii) There shall be bicycle parking provided adjacent to the Station entry, with 50% provided at each entry.
- (l) Baseline Station
- (i) The bus Station plaza shall extend from the Station entry at College Avenue, and encompass the interior of the bus Station. It shall be a minimum of 60% soft landscape and 40% paved areas, with sidewalks a minimum of 3m. The soft landscape shall contain earth forms with 3:1 slopes that direct the Passengers between the bus stops and the LRT entry. There shall be a break in the landforms to provide a direct pedestrian access between the east and west sides of the Transitway to accommodate transfers between the local and express buses.

- (ii) Provide lighting throughout the Station plaza to City Standards, and in accordance with Clause 2.7 of this Part 6.
 - (iii) Provide a secure fenced perimeter around the bus facility, extending from the Station to the fare controlled entrance, to restrict any unauthorized access to the Station and bus Station.
 - (iv) Relocate the MUP to the west side of [REDACTED] plaza.
 - (v) 60% of bicycle parking shall be provided at the south entry to the Station and 40% at the north Station entry.
 - (vi) Provide a plaza entry at the north Station Entry, with the following:
 - A. Remove all the existing turf at the north Station entry and install concrete paving.
 - B. Relocate existing café tables to accommodate Station entry
 - C. On the north side of the Station entry, remove existing turf and extend concrete paving a minimum of 350m².
 - (vii) Reinstate the remaining plaza to the west of the [REDACTED] building to match existing paving and soft landscape areas.
 - (viii) Remove the bus stops and two lanes of the Transitway and reinstate with topsoil and sod. Maintain two lanes of the existing Transitway between Navaho Drive and College Avenue, as per Schedule 15-2, Part 1, Article 14 – Demolition, Removals and Disposal.
 - (ix) Provide a MUP on the west side of the Transitway, extending from the existing east-west MUP, to Pallister Private.
- (m) Queensview Station
- (i) The bicycle parking shall be provided at street level, with 30% of the spaces provided at each the south side and 70% on the north side of the Station.
 - (ii) Provide a PPUDO on the north side of Baxter Road near the Station entry/Pedestrian Bridge with a sidewalk connection between the PPUDO and the Station Entry.
 - (iii) Provide a MUP leading from the PPUDO on Queensview Drive to the Station entry ramp on the west side with tree planting and lighting to City standards.
 - (iv) Provide a lit MUP from the east Station Entry to Roman Avenue.

- (v) Provide a PPUDO to the north of the Station on Queensview Drive.
 - (vi) Provide a lit 2.4m wide sidewalk, with a roll curb along the existing parking lot, from the MUP north to the Queensview Drive, to the Station north entry Station Plaza.
 - (vii) Provide an entry plaza of approximately 300m² on the north side adjacent to the retail parking lot, with 80% paving, and 20% soft landscaping.
 - (viii) Provide a sidewalk on the west side of the Station, along the south and west side of the parking lot, extending to Queensview Drive.
 - (ix) Provide a 6m wide pedestrian walkway from the north Station entry plaza to the existing retail building, framed on either side with a 2.0m wide planting bed. The pedestrian walkway shall provide a smooth slope between the existing retail building and the Station, with a raised crosswalk at the drive aisle.
 - (x) Reconfigure the parking lot to accommodate the proposed modifications, including the traffic island, with the two trees.
 - (xi) DB Co shall provide a Station plaza at Baxter Road of sufficient size to accommodate the entry to the Station entry/Pedestrian Bridge and the bicycle parking.
 - (xii) Provide a sidewalk on the north/west side of Baxter Road, from the Station Entry to Iris Street.
- (n) Pinecrest Station
- (i) Provide a lit MUP from the southwest corner of the intersection of Pinecrest Road/Hwy 417 WB off-ramp to the Station plaza.
 - (ii) Provide a lit Station Plaza with a minimum of 9m width between the bus Platform and the Station entry to accommodate the Passenger movement, and the east-west MUP on the north side of the Station. Provide a sidewalk with a 3m landscape buffer, between the MUP along the bus Platform and connecting to the Station entry plaza.
 - (iii) Provide a 3m wide lit MUP connection from Dumaaurier Avenue to the Station plaza and a controlled crossing at Dumaaurier Avenue. DB Co shall complete a traffic study to finalize the configuration and review with the City with respect to the type of controlled crossing device to be implemented (pedestrian signal, full traffic signal, or PXO Type B, C or D). DB Co shall implement the type of controlled crossing device selected by the City.

- (iv) There shall be a PPUDO on Dumaaurier Avenue with a sidewalk connection to the MUP leading to the Station.
- (o) Bayshore Station
 - (i) There shall be a Station Plaza from the limit of the Fare-Paid Zone to the Bayshore access road.
 - (ii) Provide a fence enclosure from the paid fare entry around the bus Station to restrict access to the Station.
 - (iii) There shall be a MUP from the Station plaza to Woodridge Crescent on the west side of the bus access, with an at-grade controlled crossing between the MUP and the sidewalk on the north side of Woodridge Crescent.
 - (iv) DB Co shall complete a traffic study to finalize the configuration and review with the City with respect to the type of controlled crossing device to be implemented (pedestrian signal, full traffic signal, or PXO Type B, C or D). DB Co shall implement the type of controlled crossing device selected by the City.
 - (v) Provide a crosswalk from the Station plaza, east to the sidewalk along the north face of the shopping centre.
 - (vi) DB Co shall extend a 3.0m sidewalk along the north side of the alignment under Richmond Road, and connecting to the Richmond Road/417 off-ramp. DB Co shall maximize the width of the sidewalk under the Richmond Road Bridge and widen to 3m east and west of the Richmond Road Bridge. DB Co shall maximize the sidewalk width on Richmond Road up to 3.0m by modifying the lane widths, and protecting the existing retaining wall.
 - (vii) There shall be a PPUDO on the south side of Woodridge Crescent.
 - (viii) Provide infiltration trench with tree and shrub planting within central island of Transitway zone.
 - (ix) Provide crosswalk/Crossride on the south side of the signalized intersection of the Highway 417 WB off-ramp at Richmond Road.
 - (x) Provide a MUP from Woodridge Crescent to Holly Acres Drive, on the north side of the alignment.
- (p) Moodie Station
 - (i) DB Co shall provide a Station entry plaza of approximately 600m², connecting the BRT to the LRT;

- (ii) Provide lockable gates from the BRT Station to the entry plaza, to accommodate passenger movement when the LRT is not operational;
- (iii) Realign the current MUP from Moodie Drive to the east of the Station, as required to accommodate the Station and the realignment of Corkstown Road. Any MUP relocation shall be no closer to Stillwater Creek. Reinstall the existing PXO, as per the original conditions prior to commencement of the works. Modify the grading of the MUP at the Moodie intersection to eliminate ponding on the MUP. The existing MUP south of Corkstown Road and east of Moodie Station shall remain in its current position and no realignments of this portion shall be permitted;
- (iv) DB Co shall provide two PPUDOs accessed from Corkstown Road: one west of the Station, and one east of the Station entry. Each PPUDO shall be located as close as possible to the Station entry. Should the PPUDO be located on the north side of Corkstown Road, provide a crossing at the PPUDO and Corkstown Road. DB Co shall complete a traffic study to finalize the configuration and review with the City with respect to the type of controlled crossing device to be implemented (pedestrian signal, full traffic signal, or PXO Type B, C or D). DB Co shall implement the type of controlled crossing device selected by the City.
- (v) Provide a secured perimeter enclosing the LRT and BRT Platform, with lockable gates located between the bus Platform and the LRT Platform.
- (vi) There shall be a 2.4m sidewalk from Corkstown Road to the Station entry plaza, connecting to the existing sidewalk, and offset from the MUP with a landscape median.
- (vii) Extend a MUP from the existing sidewalk along the north side of Corkstown Road, as required to provide a continuous connection between the existing MUP south of Corkstown Road to Moodie Drive. The MUP shall be lit.
- (viii) Provide a pedestrian connection between the PPUDOs and the Station entry.
- (q) Tunney's Pasture
 - (i) DB Co shall increase the size of the Existing Confederation Line Station plaza to accommodate the modifications to the bus layby area, west of the Station.
 - (ii) DB shall provide a secured fence perimeter around the bus staging area and the entrance to the LRT Station to create one Fare Paid Zone, with an Emergency access at the northeast corner to Yarrow Drive.
 - (iii) The Site design includes the Streetscape, Station plaza and the Bus Loop Green Space, as per Appendix N, Tunney's Pasture Concept Reference Plan. DB Co

shall be responsible to finalize the design, and submit drawings, as per Schedule 10 – review Procedure, for the landscape.

(iv) DB Co shall provide the following elements for the design:

A. Tree Planting:

- i. Provide a soil trench a minimum of 3.0m in width for trees installed in narrow planting beds;
- ii. All trenches and boulevard planters shall contain a breakthrough to catch basin in a series of 4 trees; and,
- iii. Include 150mm drainage tiles with filter sock, encompassed in 20mm washed clear stone, enclosed in Class 1 non-woven geotextile.

B. Tree Planting in Paving:

- i. Trees shall provide shade to seating zones during the summer and shall not obstruct key sightlines and access routes;
- ii. Trees planted in hard surface pavements be installed with structural soil and shall include tree grates to protect tree roots in the walking surface; and,
- iii. Irrigation shall be provided for the trees in the structural cells.

C. Plant Material Sizes:

| Plant Material | Spacing | Size |
|---|---|--------------------|
| Deciduous trees, large | 7.5 m on centre, with 10m on centre adjacent to streets | 70-90 mm caliper * |
| Shrubs | 600-900 mm on centre | 60 cm ht. / 3 gal. |
| Grasses & Groundcovers and Vines | 300 mm on centre | 1 gal. pot |
| * No more than 30% of trees shall be at the lowest size in the specified range. | | |

D. Concrete unit pavers:

- i. Concrete unit pavers shall accommodate maintenance and Emergency vehicle access;

- ii. Concrete unit pavers shall be a minimum 100mm thick and shall be laid over a concrete base; and,
- iii. Concrete unit pavers shall be rectangular with a length at least three times the width, and a minimum of two contrasting shades of grey.

E. Benches

- i. Curved benches shall be provided and shall be 450mm high x 500mm wide, typical. Benches shall be integrated into the planting beds adjacent to provide curved, concave seating spaces beyond the main sidewalk or plaza spaces;
- ii. Bench base shall be cast-in-place concrete with integral colour pigment to achieve a consistent mid-grey colour and include full depth footings;
- iii. Wood seating shall be provided over concrete bench base integrated into the overall design to achieve a visually cohesive effect:
 - 1 30% of seating shall also provide backrests and armrests to suit universal accessibility;
 - 2 wood shall be highly durable & low-maintenance (will not require re-coating after a one-time sealer application);
 - 3 ipe or approved equivalent;
 - 4 concealed galvanized steel connection brackets throughout;
 - 5 stainless steel fasteners throughout; and,
- iv. Skateboard deterrents shall be provided along benches, to be located maximum 1000mm on centre, maximum 450mm from corners. Shall be Grade 316 stainless steel, concealed fixing using mounting pin/drill & epoxy installation; Skatestoppers G-05-SS or approved equivalent.

F. Roadway Lighting

- i. Streetscape lighting shall be provided along Yarrow Driveway, Goldenrod Driveway and Tunney's Pasture Driveway;

- ii. Pole spacing shall be coordinated with tree plantings to achieve an equal spacing between trees, while meeting required illumination levels. Fixtures shall be full cut-off in accordance with dark-sky friendly best practices; and,
- iii. Poles shall have a minimal clean-lined aesthetic: slender vertical tapered pole, modern LED luminaires located close (maximum 150mm) to the pole and shall be premium light grey or mid-grey finish colour.

G. Pedestrian-scale lighting

- i. Pedestrian-scale lighting fixtures shall combine on street lighting poles with a separate davit arm facing the sidewalk. Modern LED luminaires located close (maximum 150mm) to the pole; pedestrian fixtures shall be consistent height between 3.5m and 5m. Lighting shall be full cut-off in accordance with dark-sky friendly best practices; and,
- ii. Where separate poles are required, light poles shall have a minimal clean-lined aesthetic, slender vertical tapered pole, modern LED luminaire located close (maximum 150mm) to the pole. Shall be consistent height between 3.5m and 5m. Shall have consistent spacing between 12m and 20m and shall be premium light grey or mid-grey finish colour.

H. Services

- i. Electrical and water services shall be provided from 101 Tunney's Pasture Driveway; and,
- ii. Sanitary services shall connect to the existing sewer on Yarrow Driveway, Goldenrod Driveway or Tunney's Pasture Driveway.

I. Streets: Goldenrod Driveway, Yarrow Driveway and Tunney's Pasture Driveway

- i. The paving shall match the adjacent paving for Station plaza or bus loop green space;
- ii. 1.5m high stainless steel, 200mm diameter bollards shall be installed throughout the south side of Yarrow Drive;
- iii. The following street trees, shall be planted framing the roads within the proposed plaza paving and sidewalks:

- 1 24 trees on the south side of Yarrow Drive; and,
 - 2 Six trees on the east side of Goldenrod Driveway;
 - iv. The following street trees shall be planted, framing the road, within the soft landscape treatment;
 - 1 Five trees on the west side of Tunney's Pasture Driveway.
 - v. Three benches, with a total 18m length, shall be installed to provide curved, concave seating spaces beyond the main sidewalk; and,
 - vi. The streets shall be lit.
- J. Station Plaza
- i. The Station plaza shall occupy the east half of the site, bordered by the bus loop, bus loop green space, Yarrow Driveway and Tunney's Pasture Driveway;
 - ii. There shall be 75% paving and 25% planting beds;
 - iii. Benches:
 - 1 DB Co shall provide 13 curved benches, totalling 55m in length. A minimum of nine benches shall be integrated into the three Station plaza sodded planting beds and provide curved, concave seating spaces, with three benches facing the central water feature. A minimum of four free-standing benches shall be provided in the east half of the plaza.
 - iv. Planting Beds:
 - 1 DB Co shall provide a total of four planting beds within the Station plaza. Planting beds shall be organically shaped, with rounded corners and sides;
 - 2 All planting beds shall be defined by continuous, 200mm wide flush concrete curbs;
 - 3 Three sodded planting beds shall be provided west of the main building entrance and configured to provide visual interest, convenient pedestrian access, and a range of places to sit in sun or in shade;

- 4 Grading within sodded planting beds shall provide gently mounded landforms with min 10% and maximum 25% slope;
 - 5 Planting within the sodded planting beds shall include large deciduous shade trees as outlined below;
 - 6 One bioswale planting bed shall be provided at the west edge of the Station plaza. Planting bed shall extend along the bus loop fence line and provide visual screening from activities within the bus loop;
 - 7 Grading within bioswale planting bed shall provide gently sloping swale with a maximum 8% slope.
 - 8 Planting within the bioswale planting bed shall be a mix of deciduous trees, deciduous and coniferous shrubs, ornamental grasses, perennials, and ground covers that provide variation, texture and visual interest to the site through all seasons. Plants shall be non-invasive species that are drought-tolerant, salt tolerant and low maintenance.
- v. Tree Planting within the plaza paving
- 1 DB Co shall provide a minimum of 38 large deciduous trees within the Station plaza; and,
 - 2 Large deciduous trees within the Station plaza shall be planted on a skewed 7.5m grid with one axis parallel to Yarrow Driveway and one axis perpendicular to the Station building face. Grid shall be continuous over entire plaza, including paved areas and planting beds.
- vi. Lighting
- 1 Pedestrian lights shall be aligned with the tree planting grid axes and coordinated to achieve an equal spacing between the trees, and maintaining required illumination levels;
 - 2 Feature/accent lighting shall be provided to within sodded planting beds to accentuate seating area; Continuous LED lighting shall be integrated into benches;
 - 3 Up-lighting shall be integrated into the tree grates and planting beds to illuminate large deciduous trees in Station plaza; and,

- 4 Two light sources per tree shall be provided.

vii. Electrical

- 1 A minimum of three power sources shall be provided within the Station plaza for outdoor programming;
- 2 Each power source shall provide 200 amp electrical service with eight outlets;
- 3 Power sources shall have stainless steel enclosures, and shall be fully integrated into the landscape design;
- 4 The assembly shall be able to withstand normal water-condensation and other environmental influences; and,
- 5 Exposed plastic receptacles shall not be permitted.

K. Bus Loop Green Space:

i. Paving

- 1 The paving shall be cast in place concrete, with no tooled margins or stamped finish, and designed to accommodate service and Emergency vehicle access, or as indicated below;
- 2 A vehicular access shall be provided at the east edge of the bus loop green space, min 7m wide connecting the bus Loop to Yarrow Driveway. The concrete paving shall be able to accommodate heavyweight vehicular traffic;
- 3 A continuous central 2,4m wide pathway shall be provided. The pathway shall have meandering curves with a mid-point connection to Yarrow Driveway and diagonal connections to the northwest and southwest corners of the park at Goldenrod Driveway. The central pathway shall increase in width to 4m minimum at the intersection of the main pathway and mid-point connection.

ii. Tree Planting

- 1 A minimum of 23 large deciduous trees shall be planted within the bus loop green space.

- 2 Large deciduous trees within the greenspace north of bus loop shall be planted on a skewed 7.5m grid with one axis parallel to Yarrow Driveway and one axis perpendicular to the Station building face. Grid shall be continuous throughout the bus loop green space, including raised planters, planting beds and central pathway.

iii. Planting Beds

- 1 A total of four planting beds shall be provided within the bus loop green space. Planting beds shall be organically shaped, with rounded corners and sides.
- 2 All planting beds shall be defined by continuous flush 200mm wide concrete curbs.
- 3 Three sodded planting beds shall be provided north of the central pathway.
- 4 Grading within sodded planting beds shall provide gently mounded landforms with min 10% and maximum 25% slope.
- 5 Planting within the sodded planting beds shall include large deciduous shade trees as outlined below.

iv. Bioswale

- 1 One bioswale planting bed shall be provided along the south side of the pathway. The planter shall be continuous between Goldenrod Driveway and the Station plaza, and extend to the south edge of the bus loop green space.
- 2 Grading within bioswale planting bed shall provide a gently sloping swale with a maximum 8% slope.
- 3 Planting within the bioswale planting bed shall be a mix of deciduous trees, deciduous and coniferous shrubs, ornamental grasses, perennials, and ground covers that provide variation, texture and visual interest to the site through all seasons. Plants shall be non-invasive species that are drought-tolerant, salt tolerant and low maintenance.

v. Lighting

- 1 Pedestrian lights shall be located along the main central pathway.
- 2 Pole spacing shall be coordinated with tree plantings to achieve an equal spacing between trees, while meeting required illumination levels.

(r) Moodie LMSF

- (i) DB Co shall develop a site plan for the LMSF with the following parameters:
 - A. Provide a 3m wide tree/shrub hedgerow, with a minimum of 70% trees, as a buffer between Corkstown Road and a minimum of 60% of the overall length of the facility and the alignment;
 - B. Provide a fenced perimeter around the facility to control access to the facility and meet the MTO safety requirements for Highway 417. The existing fence at the west end of the perimeter shall be maintained or replaces in its current location.
 - C. Provide a lit sidewalk connection from Corkstown Road to the main entrance to the Administration Building;
 - D. Provide trees along the sidewalks within the LMSF to provide pedestrian comfort and safety; and,
 - E. Provide accent planting at the main entrance to the Administration Building.

4.2 Station Elements

- (a) DB Co shall provide the minimum quantities of following elements for each Station:

| Station | PPUDO parking spaces | Total Bicycle Parking Spaces | Current Bicycle Parking | Accessible Benches | Waste Receptacles |
|-----------------|----------------------|------------------------------|-------------------------|--------------------|-------------------|
| Montreal | 0 | 40 | - | 4 | 2 |
| Jeanne d'Arc | 0 | 20 | 12 | 0 | 2 |
| Orléans Station | 0 | 20 | - | 0 | 2 |
| Place d'Orléans | 3 | 40 | 28 | 0 | 2 |
| Trim | 6 | 60 | 12 | 7 | 2 |
| Westboro | 6 | 40 | 12 | 4 | 3 |

| | | | | | |
|------------------|---|----|----|----|---|
| Dominion | 3 | 60 | 48 | 3 | 1 |
| Cleary | 6 | 20 | - | 1 | 1 |
| New Orchard | 2 | 20 | - | 4 | 2 |
| Lincoln Fields | 9 | 60 | 36 | 4 | 4 |
| Iris | 6 | 40 | 12 | 2 | 4 |
| Baseline | 0 | 60 | 36 | 20 | 2 |
| Queensview | 6 | 20 | - | 3 | 2 |
| Pinecrest | 3 | 20 | 12 | 5 | 1 |
| Bayshore | 3 | 40 | 24 | 3 | 1 |
| Moodie | 4 | 30 | - | 4 | 2 |
| Tunney's Pasture | 0 | 40 | | 10 | 8 |

4.3 Station Plantings

- (a) DB Co shall provide the minimum quantities of plant material for each Station:

| Station | Deciduous Trees | Coniferous Trees | Deciduous Shrubs | Coniferous Shrubs |
|-----------------|-----------------|------------------|------------------|-------------------|
| Montreal | 17 | 0 | 0 | 0 |
| Jeanne d'Arc | 0 | 0 | 0 | 0 |
| Orléans Station | 0 | 0 | 0 | 0 |
| Place d'Orléans | 50 | 0 | 0 | 0 |
| Trim | 325 | 0 | 900 | 385 |
| Westboro | 5 | 0 | 260 | 100 |
| Dominion | 20 | 5 | 900 | 400 |
| Cleary | 0 | 0 | 0 | 0 |
| New Orchard | 20 | 0 | 100 | 200 |
| Lincoln Fields | 80 | 0 | 2000 | 1000 |
| Iris | 23 | 0 | 300 | 100 |
| Baseline | 131 | 0 | 500 | 300 |
| Queensview | 45 | 0 | 100 | 230 |
| Pinecrest | 58 | 0 | 500 | 135 |
| Bayshore | 33 | 0 | 2000 | 500 |
| Moodie | 305 | 100 | 1500 | 300 |
| Tunney's | 65 | 35 | 600 | 900 |

4.4 Corridor Specific Design Requirements

- (a) Confederation East – Blair to Sir George-Étienne Cartier Parkway

- (i) DB Co shall provide a MUP continuous along north side of OR174 from Blair Station easterly to Montreal Road/OR174 EB off-ramp on the north side of the OR174. Continue the MUP easterly over Green's Creek, and connect to the existing NCC Greenbelt Pathway E, west of Sir George Etienne Cartier Parkway. Db Co shall design and construct the MUP to be limited to the Lands, as described in Schedule 20 – Lands.
 - (ii) DB Co shall provide MUP crossing of Green's Creek.
- (b) Confederation East - Sir George-Étienne Cartier Parkway to Jeanne d'Arc Boulevard
 - (i) No additional Connectivity requirements.
- (c) Confederation East - Jeanne d'Arc Boulevard to Trim Road
 - (i) DB Co shall provide 3.0m wide MUP continuous along the south side of OR174, from the north end of St. Pierre Street, easterly to Champlain Street and connecting to Place d'Orléans Drive, and south to Centrum Boulevard, including any Culverts required to maintain existing drainage.
- (d) Place d'Orléans Station
 - (i) DB Co shall add a crossride at Champlain Street on the north side of Place d'Orléans Drive to the existing signalized intersection.
 - (ii) DB Co shall widen existing footpath to the north of the Station between parking lot and Bilberry Drive to a 3m wide MUP and reconfigure parking lot to allow MUP access. Install collapsible bollards at MUP/parking lot interface to control vehicular movement.
 - (iii) DB Co shall widen existing pathway between Alpine Street and Champlain Street to 3m wide MUP and provide sufficient lighting to City of Ottawa standards.
 - (iv) DB Co shall add a crossride across Champlain Street linking Alpine Street MUP to Park and Ride to the north leg of the existing signalized intersection of Champlain Street and the OR174 WB off ramp.
- (e) Trim Station
 - (i) There shall be a MUP on the realigned Trim Road, connecting from the existing MUP at Dairy Drive, to the existing MUP on the north side of Jeanne d'Arc Boulevard, west of the existing Trim Road. The MUP shall be located on the west side of the realigned Trim Road, and the south side of Inlet Private, with crosswalks/crossrides at Trim/Jean d'Arc Boulevard.

- (ii) DB Co shall retain the two MUP connections from the existing MUPs to Cardinal Creek community, to the Station entry plaza and through to the Trim Road/OR174 intersection. The MUP connection to the north, shall cross at the OR174/Realigned Trim Road intersection, and the southern MUP shall cross the Roadway at the signalized intersection to the east access to the Park and Ride with a crosswalk/crossride.
- (f) Workman/Scott Street Bus Detour
 - (i) DB Co shall reinstate the Site, from Churchill Avenue to the SJAM, with the following:
 - A. Provide a continuous MUP from Churchill Avenue/Scott Street intersection to the Dominion Station plaza;
 - B. The centreline of the MUP shall be offset a minimum of 9m from the south abutment of the Roosevelt pedestrian bridge;
 - C. Provide a 100mm conduit, capped and sealed at each end, terminated at a hand hole, with a pull wire, on the south side of the MUP throughout the corridor to accommodate future City lighting requirements;
 - D. Provide and install plant material as per Appendix F for all City Lands. Appendix A, shall govern for all NCC lands;
 - E. Provide topsoil and seed to all areas disturbed by the construction activities, to City of Ottawa standards;
 - F. Provide a 1.2m high powder coated black fence, with vertical pickets, adjacent to the existing interlocking pathway leading to the entrance to 2100 Scott Street; and,
 - G. Reinstate the pathway connection between the interlocking pathway and the MUP.
 - (ii) DB Co shall protect the existing spruce trees immediately north of [REDACTED] wherever feasible. The Tree Mitigation Plan shall indicate the location of these trees, the BRT detours, and the limits of grading for approval, prior to commencement of Work.
- (g) Churchill Overpass
 - (i) DB Co shall design and construct the pathways, and provide a new MUP and connections within the SJAM Parkway lands to integrate the pathways with the proposed underpass, including the following:

- A. Provide a MUP from the north end of Churchill to the MUP and pathway on the north side of the SJAM Parkway, adjacent to the Ottawa River;
- B. The minimal clear width of the Structure shall be 5m;
- C. Modify the access point through the perimeter fence with the removal of one fence panel, and new termination posts on either side;
- D. Provide culvert(s) as required to provide a drainage swale on the west side of the proposed MUP to the Ottawa River;
- E. Realign the MUP on the north side of the SJAM Parkway to maintain the original elevations;
- F. Provide “Y” intersections for the MUP connections;
- G. Maintain the location of the existing pathway along the Ottawa River shoreline;
- H. Realign the pathway on the south side of the SJAM Parkway to minimize the impacts on the adjacent woodlots, and retain the original elevations;
- I. Upon the completion of the underpass, remove all the existing temporary works, including granular bases, scarify the sub-grade a minimum of 150mm, and regrade to original contours;
- J. Provide side slopes with an average of 6:1 for the MUP, and 4:1 for the drainage swale;
- K. Provide topsoil and seed to all areas disturbed by the construction activities, to City of Ottawa standards; and,
- L. The overall width of the pedestrian underpass shall be 5m, as per the NCC design drawings, with an exemption for the 0.5m offset from the MUP to the structural wall permitted.

(h) SJAM Parkway

- (i) The Site design including pathways, roadway crossings, grading, planting, seeding, and specifications have been developed by the NCC for SJAM Parkway and Rochester Fields. These include:
 - A. Appendix A: Landscape Plans and Details for SJAM, including Dominion at-grade crossing;
 - B. Appendix B: Landscape Specifications;

- C. Appendix C: Rochester Fields at-grade crossing, planting and grading; and
 - D. Appendix D: Rochester Fields Pedestrian Crossing Landscape.
- (ii) DB Co shall be responsible to finalize the design developed by the NCC and submit drawings as per Schedule 10 – Review Procedure, for the landscape including:
- A. Final grading to integrate the realigned SJAM Parkway with the parkway setting of the corridor;
 - B. Proposed asphalt pathway on the south side of the SJAM Parkway, from Woodroffe Avenue to Atlantis, including linkages to the community to the south, pathways under the underpass and connections to the existing pathway on the north side of the SJAM Parkway;
 - C. Supply and installation of the park furniture, including concrete bases, modifications to perimeter fence on south property line, line painting, signage and miscellaneous Site works to finalize the landscape on the south side of the SJAM Parkway and MUP connections to the existing MUP north;
 - D. Grading of Rochester Fields to accommodate the proposed pathway and crosswalk leading to the Ottawa River Promenade for the future development by the NCC. This shall include the granular bases for the pathway only, no pavers. Refer to Appendix A of this Part 6;
 - E. Final Site works for the pedestrian crossing at Rochester Fields and Dominion Station including the pavers, bollards, TWSI, line painting, plant material and miscellaneous works. Refer to Appendix C and D of this Part 6;
 - F. Contour grading, soil preparation, topsoil and seeding for the development of Rochester Fields. The berms identified adjacent to the Cleary Station Fan Plant shall be deleted, and the overall grading requirement for the SJAM shall be completed, as per Clause 4.4(h)(iii)A of this Part 6. Refer to Appendix A, of this Part 6;
 - G. Soil preparation, topsoil, planting bed preparation, installation of all plant material, within the median, south of the SJAM Parkway, including the two year warranty and maintenance. Refer to Appendix F of this Part 6 for the site works south of the NCC lands at Dominion Station;
 - H. Soil preparation, growing media, installation of plant material and seed mixes for the bioswales between the SJAM Parkway lanes, including the establishment, maintenance and warranty;

- I. Fine grading of all disturbed areas, soil preparation, topsoil, seeding, establishment, maintenance and warranty of the grass and meadow mixes.
- (iii) In addition to design drawings in Appendices A, C and D of this Part 6, the following design parameters shall be met during the design:
 - A. Site Grading
 - i. The gradient of the side slopes from the SJAM Parkway to the existing lands shall be a minimum of 6:1, and provide an even transition between the slope and the original grade.
 - ii. Side slopes of 3:1 from the SJAM Parkway to the existing lands shall be permitted in locations within 9m of existing trees to be protected. A 0.6m flat shoulder at the back of curb shall be provided prior to the commencement of the side slope.
 - iii. The grade transition between the tree protection locations and the general transition grading shall occur over a minimum of 15m.
 - iv. The pedestrian crossings shall meet and match the grades developed for the realigned SJAM Parkway.
 - v. The original drainage pattern of the SJAM lands south of the Parkway shall be maintained after the completion of the landscape works. DB Co shall install the proposed pathway at an elevation to provide overland drainage to the existing ditches and swales.
 - vi. The planting bed areas shall be excavated to the depths as required for the bed preparation. Raised beds for the plant material shall not be permitted.
 - vii. The overall width of the pedestrian underpass shall be 5m, as per the NCC design drawings, with an exemption for the 0.5m offset from the MUP to the structural wall permitted.
 - viii. The contouring grading for the proposed screening of the original fan plant adjacent to Cleary Station is required only if the fan plant is constructed within the SJAM parkway lands. Should the fan plant not be installed, the contour grading shall not be installed, and the grading criteria identified in this Article shall apply.
 - B. Reinstatement of all lands to the north of the realigned SJAM Parkway shall be completed with topsoil and City of Ottawa seed mix.

- C. Where there is a requirement for a depressed curb for the major storms, DB Co shall install a reinforced geogrid between the curb and the original grade. The width of the geogrid shall be no less than 5m and centred on the depressed curb location. This geogrid shall be of sufficient opening size to accommodate for the growth of turf.
 - D. Refer to Schedule 15-2, Part 2, Article 5 – Drainage and Stormwater Management Design Criteria, for the SWM requirements for the spillways from the roadway to the bioswales.
 - E. Catchbasins within the bioswales shall be centred on a riverwashed stone area, with a minimum of width of 1m, and length of 2m, with a filter fabric separation to subgrade.
 - F. The concrete headwall of the bioswales shall be delineated with an identification marker for visibility during maintenance, and grass cutting operations.
 - G. The bioswales to the north and south of the SJAM Parkway shall be planted with a blend of grasses and forbes;
 - H. Plant material as per Appendix A of this Part 6, shall be utilized within the median; and,
 - I. The clear width for the underpass shall be a minimum of 5m.
- (i) Pinecrest Creek Corridor – Richmond Road to Highway 417
- (i) Lawn Avenue Interface
 - A. DB Co shall protect the existing large deciduous trees at the east property line, south of Richmond Road, during construction of the alignment;
 - B. DB Co shall provide a berm and planting on the east side of the alignment, as per Appendix G;
 - C. DB Co shall provide a root barrier protection on all the underground utilities through the Lawn Avenue Parkette to accommodate planting within 1m of the realigned utilities;
 - D. DB Co shall complete the landscape plan for the Lawn Avenue Parkette including:
 - i. Provide an entrance plaza at Edgeworth with approximately 85m² of interlocking paving, two benches, and framed along the south side with a low natural stone wall, approximately 9m in length, and

- encompassing both crosswalks at Edgeworth Avenue/Lawn Avenue intersection;
- ii. Provide an interlocking sidewalk connection to the existing interlocking sidewalk, south of the parkette;
 - iii. Provide a 3m wide MUP connecting from the north intersection crosswalk to the NCC pathway, west of Lawn Avenue;
 - iv. The entrance plaza shall meet and match the grades of the Roadway, and a culvert shall be installed as required with the overall grading modifications to Edgeworth Avenue;
 - v. Provide bollards along the interface of the entry plaza, sidewalk and MUP to control vehicular movements into the parkette. There shall be lockable bollards at the MUP entry to provide service vehicle access to the corridor;
 - vi. The parkette shall be graded to ensure that overland drainage is towards the west, while providing a level terrain for a play area;
 - vii. Complete the planting plan including 13 deciduous trees, 190 deciduous shrubs and 50 coniferous shrubs to provide a buffer between the parkette and the adjacent home owners; and,
 - viii. The reinstatement of the turf areas shall be sod only, seeding shall not be permitted.
- E. DB Co shall remove the existing community garden, shed and auxiliary items and reinstate upon completion of the Work.
- (ii) DB Co shall complete the following MUP works adjacent to Lincoln Fields Station:
- A. Relocate the existing MUP north of the Woodroffe Pedestrian Bridge to between the SJAM and the alignment, with a connection to the at-grade signalized intersection at the SJAM and the MUP to the west Station Plaza.
 - B. Extend the MUP on the west side of alignment, north to connect to Richmond Road, the MUP on the east side of the alignment and the existing NCC pathway.
 - C. Provide a MUP on the east side of the alignment, from the signalized intersection at Carling to Richmond Road, with connection to Lawn Avenue Parkette, and the MUP west of the alignment.

- D. Realign the MUP on the east side of alignment to provide a continuous 3m wide MUP connection from Woodroffe Pedestrian Bridge to Woodroffe High School and Rosewood Avenue. Extend MUP to connect with proposed crosswalk/Crossride at Station entrance on Carling Avenue.
 - E. Provide a MUP connection from the intersection of Severn/Connaught to the Pinecrest Creek Pathway;
 - F. Provide a MUP connection from Roman Avenue to Pinecrest Creek Pathway.
- (iii) DB Co shall complete the overland Drainage swale from Carling Avenue to Richmond Road:
- A. Remove the existing Transitway connection at the SJAM Parkway, and reinstate the Parkway alignment with a concrete curb.
 - B. Remove all the existing infrastructure of the Transitway, including granular bases, scarify the subgrade and regrade to develop a swale between the alignment and the SJAM Parkway. Utilize earth borrow to raise the grade as required for the final landscape treatment.
 - C. Scarify the subgrade a minimum of 300mm to eliminate any hardpan.
 - D. Remove and cap existing catchbasins within the Transitway alignment to accommodate the overland drainage channel that commences at Carling Avenue and extends northerly to the ORPP inlet.
 - E. Create an overland swale with a minimum of 5 meanders between the SJAM Parkway and the alignment, with a channel to convey the local drainage from a 100 year flood between Carling Avenue and Richmond Road, and as per Schedule 15-2, Part 2, Article 5 – Drainage and Stormwater Management Design Criteria.
 - F. Commence the swale to the south of Carling Avenue, with a minimum of 20:1 side slopes.
 - G. North of Carling Avenue, vary the side slope between 3:1 and 8:1 to avoid existing manholes and structures identified to be protected. Maintain side slopes of 6:1 for 50% of the overall distance of the drainage swale on both sides. Refer to Appendix G.
- (iv) Connaught Fields

- A. DB Co shall provide two landforms to the north of the alignment to screen the alignment from the residential homes on Connaught Avenue with the following requirements:
- i. South landform:
 - 1 The landform shall be commencing at the north wall of the alignment, with a top of berm elevation of 71.00, and the drainage swale from the alignment at the eastern perimeter;
 - 2 Provide a berm with varying side slopes with a maximum of 3:1 at 30% of the berm;
 - 3 Provide surface drainage from the west to connect with the drainage swale from the pumping station on the south side of the alignment; and,
 - 4 Provide tree planting on the berm.
 - ii. North Landform:
 - 1 The landform shall be an extension of the berm located to the north of the MUP accessing Henley Street, with a top of berm elevation of 71.50;
 - 2 The toe of the berm shall be shaped to protect the existing trees to the north and west of the existing landform; and,
 - 3 There shall be a berm with 50% of the berm with side slopes of 3:1, 25% of the berm with 2:1 slopes to protect existing vegetation, and 25% of the slopes with 4:1 or greater.
- B. DB Co shall complete the overland Drainage:
- i. The overland drainage for the alignment shall drain to Pinecrest Creek, as per Schedule 15-2, Part 2, Article 5 – Drainage and Stormwater Management Design Criteria.
 - ii. The side slopes shall be a minimum of 4:1, and shall extend to the adjacent features, such as the MUPs and alignment.
- C. DB Co shall provide MUP connections from Connaught at Severn Avenue, and connect to the Pinecrest Creek north/south MUP.

- (v) DB Co shall provide a MUP connection from Roman Avenue to the north-south MUP on the west side of the alignment. Utilize the BRT on-ramp location to reduce potential impacts to the adjacent naturalized landscape.
- (vi) Environmental Passages
 - A. DB Co shall meet the requirements of Schedule 17 for the connectivity of small mammals to either side of the alignment.
- (vii) DB Co shall complete the following restoration work:
 - A. Remove all the original Transitway roadway, granular bases, catch basins, and infrastructure after the decommissioning of the Transitway.
 - B. Remove the existing jersey barrier at the east side of the SJAM at Lincoln Fields Station, and reinstate with a new concrete curb to delineate the roadway surface of the SJAM.
 - C. Remove the ramps from the 417 to the BRT at Queensway Station, and regrade to eliminate the surface contouring for the drainage and ramp configuration. Reshape the lands to meet and match the existing topography beyond the drainage swale, with the exception of rock cut locations. Regrade the areas within the rock cut to provide one central drainage swale, with a minimum of 6:1 side slopes.
 - D. Scarify the subgrade a minimum of 300mm to eliminate any hardpan.
 - E. Regrade all the disturbed lands to reinstate overland drainage to the Pinecrest Creek, and eliminate the landforms and shaping of the Transitway corridor.
 - F. Reinstate the existing sports field south of the alignment to City standards.
 - G. With the exception to the above works, the Pinecrest Creek corridor lands disturbed by the construction activities, shall be reinstated with the following seed mix. Refer to Appendix B of this Part 6:
 - i. 65% low maintenance lawn mix.
 - ii. 30% indigo-ultra (the blend of polinisation and melliferes).
 - iii. 5% custom seed mix (Type 1 cool) as accent.
 - H. Remove all the original Transitway roadway, granular bases, catchbasins, and infrastructure after the decommissioning of the Transitway. Refer to

Schedule 15-2, Part 1, Clause 14.1(c)(i), for the Queensway Station removal requirements.

- (viii) At Parkhaven Avenue DB Co shall:
 - A. At the south end of Parkhaven Avenue, provide a MUP through the NCC lands westerly to the Hanlon Baseball Diamond. This MUP shall connect the pedestrian access to the diamond, and be of sufficient alignment to accommodate service vehicles.
 - B. Provide a service vehicle lockable gate, at the northwest corner of the outfield. Provide bollards to control unauthorized vehicles entering into the NCC property.
- (j) Pinecrest Creek Corridor Highway 417 to Baseline Station
 - (i) DB Co shall realign the MUP to the west side of the alignment south of Iris Street to Baseline Station to eliminate the at-grade crossing of the alignment;
 - (ii) At Iris Street DB Co shall:
 - A. Maintain the MUP on the west side of the alignment, under the Iris Street Bridge.
 - B. On the north side of Iris Street, provide a MUP connection from the signalized intersection, northerly to the NCC Pinecrest Creek Pathway.
 - C. Provide a MUP on the south side of Iris Street from the signalized intersection, at Iris Street, including on the Iris Street Bridge, to the Pinecrest Creek Pathway on the east side of the alignment to provide an uninterrupted trail connection.
 - D. Provide a depressed curb, and 3m wide MUP, extending a minimum of 9m from the curb, on the northeast quadrant of Iris and the alignment to provide service vehicle access. This access route shall have bollards to control unauthorized vehicles entering into the NCC property.
 - (iii) DB Co shall complete the following restoration:
 - A. With the exception to the above works, the Pinecrest Creek corridor lands disturbed by the construction activities, shall be graded to provide overland drainage and reinstated with the following seed mix. Refer to Appendix B of this Part 6:
 - i. 65% low maintenance lawn mix;

- ii. 30% indigo-ultra (the blend of polinisation and melliferes);
 - B. Remove all the original Transitway roadway, granular bases, catchbasins, and infrastructure after the decommissioning of the Transitway. Refer to Schedule 15-2, Part 1, Clause 14.1(c)(i), for the Queensway Station removal requirements.
 - C. Remove the ramps from Highway 417 to the Transitway at Queensway Station, and regrade to eliminate the surface contouring for the drainage and ramp configuration. Reshape the lands to meet and match the existing topography beyond the Drainage swale, with the exception of rock cut locations. Regrade the areas within the rock cut to provide one central Drainage swale, with a minimum of 6:1 side slopes.
 - D. Scarify the subgrade a minimum of 300mm to eliminate any hardpan.
 - E. Regrade all the disturbed lands to reinstate overland Drainage to Pinecrest Creek, and eliminate the landforms and shaping of the Transitway corridor.
- (k) Pinecrest Creek Realignment
- (i) For the low flow channel design requirements, review to Schedule 15-2, Part 2 – Drainage and Stormwater Management Design Criteria.
 - (ii) For the channel embankment between the low flow and 2-year flow, the embankment shall consist of hydric soils or flood tolerant forbes and grasses, native to the Ottawa area.
 - (iii) For the channel embankments above the 2-year flows shall consist of a combination of reforestation trees, 70 % and shrubs, 30 %, as per Clause 2.8, of this Part 6. Within the 100 year flood elevation, all plant species shall be tolerant to the potential flooding. For the lands beyond the top of the embankment, install a minimum of 35 deciduous trees to provide a transition from the woodlot to Station.
 - (iv) On the outside meander of all sections of realigned Pinecrest Creek, the creek embankment up to the 2-year flow water level shall be constructed with a root wad retaining walls.
 - (v) Where required due to land and utility constraints, DB Co shall be permitted to construct an embankment to a maximum of 2:1. The extent of the 2:1 shall be minimized. Slope stabilization shall consist of natural materials as per Clause 2.8, of this Part 6.

- (vi) Provide tree planting to reinstate all woodlot removed for the implementation of the Pinecrest Creek alignment, temporary bus detours and Station construction.
- (vii) Environmental Passages
 - A. DB Co shall meet the requirements of Schedule 17 for the connectivity of small mammals to either side of the alignment.
- (l) Pinecrest Stormwater Management Facility
 - (i) DB Co shall finalize the Site design for the landscape works that have been developed for the Pinecrest Stormwater Management Facility, as per Schedule 15-2, Part 2, Appendix J.
 - (ii) DB Co shall be responsible to finalize the design development and complete the construction documents, as per Schedule 10 – Review Procedure, for the landscape including:
 - A. Final grading to integrate the stormwater facility within the adjacent landscape;
 - B. Development of the pathway systems;
 - C. Development of the pedestrian passages around and over the facility;
 - D. All final grading, topsoil and planting; and,
 - E. Miscellaneous items as per the design drawings to complete the site works.
 - (iii) DB Co shall salvage the tree stumps required for removal due to the works of this project and the alignment to be utilized as the root wads along the perimeter of the stormwater pond.
 - (iv) DB Co shall supply and install the hydric soil, to meet the following:
 - A. Provide the source of the hydric soil to the City for approval prior to commencement of work;
 - B. The hydric soil shall be handled a maximum of two times, including installation. The hydric soil may be stockpiled, with a maximum height of 3m, with no truck traffic on the stockpiles;
 - C. After installation, DB Co shall not move or operate equipment on the hydric soil. Should there be a requirement to move, the hydric soil shall be replaced with new material;

- D. There shall be a continuous goose barrier around the perimeter of the pond, at the limit of the bench on the pond side, to allow the hydric soils to establish. This barrier shall be installed prior to the commencement of the regeneration the soils, and maintained for the maintenance and warranty period for the adjacent plant material;
- E. The goose barrier shall be removed without damaging the vegetation established on the bench surrounding the pond; and,
- F. The plant material, seeding and hydric soil shall be installed in a timely manner to maximize the growing potential.

(m) Richmond Road Complete Street

- (i) Refer to Schedule 15-2, Part 2, Clause 6.19 for the technical civil requirements for the development of Richmond Road Complete Street.
- (ii) DB Co shall design and construct Richmond Road streetscape elements to create a high quality pedestrian environment on the north side of Richmond Road, with 2m segregated cycling facilities on both the north and south side of the Roadway, linking Cleary Station in the east with New Orchard Station to the west;
- (iii) There shall be a cohesive design selection of materials and products for the streetscape elements, strengthening the visual connection between the two Stations;
- (iv) The streetscape design shall be coordinated with the civil and Utility requirements, and develop specific details as required to provide the design within the constraints of the underground Utilities;
- (v) DB Co shall coordinate with the City to identify all proposed developments to ensure the streetscape design reflects the current conditions as well as the proposed developments;
- (vi) **On-Street Parking**
 - A. During the design development DB Co shall explore opportunities to include 20 on-street parking spaces on the north side of Richmond Road, in the form of parallel parking (parking pockets) in accordance with the City of Ottawa parking design standards and zoning. These will be established only where OC Transpo bus stops, SWM rain gardens, pedestrian, cycling and streetscape furniture, infrastructure and property access would not be compromised.
 - B. These locations shall be identified during the initial submission for review with the City prior to final integration within the roadway design.

(vii) Pathways, Sidewalks and MUPs

- A. Provide a concrete sidewalk on the north side of Richmond Road from east of the SJAM Parkway overpass to east of Cleary Station with a standard width of 3m, unless constrained by property requirements or intersection requirements.
- B. Provide a minimum 2m wide concrete sidewalk on the south side of Richmond Road from the SJAM Parkway overpass to the entrance of Byron Linear Park, at the Richardson Avenue ROW.
- C. Meet and match the east end of the sidewalk with the concrete pathway for Byron Linear Park. Refer to Article 3 – Connectivity Requirements of this Part 6.
- D. There shall be no sidewalk installed along the south side of Richmond Road adjacent to Byron Linear Park unless specifically outlined in this Article 4.
- E. A minimum of 200mm delineator strip shall be provided between all segregated cycle facilities and directly adjacent pathways, sidewalks or MUPs.
- F. Provide a separate material, texture and colour to distinguish the delineator strip between the sidewalk and the cycle track.
- G. Provide interlocking paving in boulevards less than 600mm width and sod in boulevards greater than 600mm width. Pavers to be 200mm x 100mm, 100mm depth Sierra pavers, installed in a herringbone pattern, as manufactured by [REDACTED], or approved equal.
- H. Provide interlocking paving installed at all bus stops, beyond the bus shelter pads, to distinguish from the concrete sidewalk. Interlock shall be installed in the sidewalk and within the adjacent boulevard. Pavers to match boulevard pavers.
- I. Refer to Schedule 15-2, Part 2, Clause 6.19 for cycle track requirements and pavement markings.
- J. Provide 3m concrete crosswalk for all pedestrian crossings of Richmond Road and the side streets.
- K. Provide a MUP on the south side of Richmond Road from the SJAM Parkway overpass to the entrance of Byron Linear Park. Extend the MUP to Byron Avenue, at the Richardson Avenue ROW, and extend the EB cycle track to the MUP.

- L. Provide a concrete sidewalk on the south side of Richmond Road to connect each bus stop to the nearest intersection.
 - M. Rain gardens shall be installed adjacent to the bus stops, as delineated under Schedule 15-2, Part 2, Article 5 – Drainage and Stormwater Management Design Criteria. Framing the rain garden at each end, shall be a 450mm height, 1.2m long seating height wall. The wall shall be centred on the rain garden to articulate the limits of the garden for pedestrians and cyclists. Each corner shall have a 314 grade stainless steel angle iron anchored in the wall to protect the wall from maintenance equipment and shadow lines, detailing to enhance the visual appearance
- (viii) Richmond/Cleary Intersection;
- A. Provide concrete paving for both the concrete sidewalk and the cycle track at Cleary intersection;
 - B. Provide interlocking paving between the concrete crosswalks and concrete curb on the south side of Richmond Road to connect with the Cleary plaza within Byron Linear Park.
 - C. Provide a raised intersection, which includes the crosswalks and Crossrides;
 - D. Provide interlocking pavers within the intersection; and,
 - E. Provide a MUP connection from the northeast corner of the Richmond Road/Cleary Avenue intersection northerly to the NCC pathway system in the SJAM Parkway, including a connection to the MUP underpass. The MUP shall have a minimum offset of 2m from the existing Cleary Avenue sidewalk.
- (ix) Richmond/New Orchard Intersection
- A. Provide a raised intersection, which includes the crosswalks and Crossrides;
 - B. Provide concrete paving for both the concrete sidewalk and the cycle track at New Orchard intersection;
 - C. Provide interlocking pavers within the intersection;
 - D. Provide interlocking paving between the concrete crosswalks and concrete curb on the south side of Richmond Road to connect with the Byron Linear Park and the New Orchard Station entrance plaza; and,

- E. Extend the concrete sidewalk, from the east cross walk, to the bus stop, located adjacent to the New Orchard Station.
- (x) Richmond Road shall be lit to City Standards. DB Co shall provide the lighting design for review with the City, with the following:
 - A. Tall Mount lights, alternating sides; and,
 - B. Pedestrian Lights, north side only.
- (xi) Street Tree Planting
 - A. All trees planted within the paving for the sidewalks and cycle lanes shall be planted in structural soil cell modules, with a conduit system to accommodate supplemental watering.
 - B. Openings for the tree trunks shall have a raised perimeter to ensure the sidewalk drainage does not enter into the soil.
 - C. Provide a minimum of 20m³ of soil per tree. Where utilities or services request a reduction in the soil volume of the trees, the City shall be notified for review and direction.
 - D. Where feasible, group trees together to share structural soil cell volumes.
 - E. Provide a trace wire around the perimeter of the structural soil cells.
 - F. Provide 33 trees along the north side of Richmond Road, east of New Orchard Avenue.
 - G. West of New Orchard Avenue, provide additional 25 street trees, on the south side of the roadway, and 30 street trees on the north side of the roadway, behind the concrete sidewalk.
 - H. Remove a minimum of 900mm depth of asphalt and granulars at the Richardson Road closure, and backfill with earth burrow and 300 mm of topsoil to accommodate the trees and landscape treatment.
- (xii) Street Furniture
 - A. Site furnishings shall be placed between the sidewalk and cycle track on the north side of Richmond Road to maximize their use and not encumber pedestrian or cyclist movement.

- B. Where required, benches may be placed at back of sidewalk, or in seating clusters, as reviewed and approved. All furniture shall be fastened to concrete paving to reduce vandalism.
- C. Provide the following street furniture along the north side of Richmond Road:
 - i. 50 Bicycle Racks;
 - ii. 21 Benches; and,
 - iii. 10 Recycling Units.
- D. Provide the following street furniture on the south side of Richmond Road, between the SJAM Parkway and Richardson Avenue:
 - i. 13 Bicycle Racks;
 - ii. 2 Benches; and,
 - iii. 2 Recycling Units.
- E. Provide bus shelters at each bus stop, as per OC Transpo standards.
- F. Site furnishings shall meet the City standard for roadways.

(n) Byron Linear Park

- (i) Approximately 17 m wide Byron Avenue Right-of-Way from the eastern edge of the Compton Avenue Right-of-Way to the western edge of the Woodroffe Avenue Right-of-Way (approximately 72 m) is existing road which is to be closed and converted to parkland. Approximately 15.6 m wide Byron Avenue Right-of-Way from the eastern edge of the Woodroffe Avenue Right-of-Way and the western edge of the Lockhart Avenue Right-of-Way (approximately 168 m) is also existing road which is to be closed and converted to parkland. In addition, Redwood Avenue, Hartleigh Avenue and Richardson Avenue through the Byron Linear Park shall be closed. As per Section 168.3.1 of the Environmental Protection Act and Ontario Regulation 153/04, DB Co Qualified Person shall, on behalf of the City of Ottawa, prepare the necessary documents and shall file for Record of Site Condition. Note that this will require, at a minimum, a Phase I ESA prepared in accordance with O. Reg. 153/04, and a plan of survey of the lands prepared by a licensed surveyor.
- (ii) This Park underlines the City's commitment to the importance of the urban design excellence for the Richmond/Byron corridor (Richmond Road Complete Street, Byron Linear Park and Byron Avenue). This shall be a transformative landscape

that creates a unique landscape for the community, and acts as a catalyst for community building. DB Co shall develop a design that creates a sense of place which welcomes the local community, and provides opportunities for the passive recreation, seating, park, and community programming, and a visual buffer between the communities to the south of Byron and Richmond Road.

- (iii) The community consultation response reinforced the requirement for Byron Linear Park to provide an environmentally sensitive design. DB Co shall design Byron Linear Park to be environmentally sustainable, and shall include LID SWM principles, diversity of native and ornamental species to provide biodiversity for both flora and fauna, use of natural materials, reuse of materials for built elements, and other elements identified during the design developments. No invasive species shall be permitted. Wet ponds for SWM shall not be permitted.
- (iv) DB Co shall develop a design for Byron Linear Park that integrates the diverse elements of pathways, gathering nodes, trees, SWM, land forms, seating walls and benches, lighting, and miscellaneous site works to create a landscape tapestry which connects to Byron Avenue and Richmond Road.
- (v) DB Co shall incorporate the following design elements within the park:
 - A. Cleary plaza, between Richmond Road and Byron Avenue, from the east side of the east crosswalk, and extending westerly to the front entry of the Station. This plaza shall consist of 50% hard surfacing and 50% soft landscape, and be configured to allow park programming including 10 market stalls, 3m x 3m, with 3m walking surface along the front of the stalls;
 - B. The Cleary plaza shall be provided with one 38mm water supply, complete with shut off value and three electrical outlets. The electrical outlets shall be stainless steel, weather proof to accommodate the exterior conditions;
 - C. The pedestrian sidewalks, connecting the crosswalks at Cleary intersection, through to Byron Avenue, shall be designed and constructed to include lighting;
 - D. Where the current land use changes from roadway and/or shoulders to Parkland, including Redwood Avenue, Hartleigh Avenue, Ancaster Avenue, Richardson Avenue and Byron Avenue use changes from roadway to Park, remove a minimum of 900mm of the original asphalt and granular base, scarify and backfill with Earth Borrow and topsoil to sustain the final landscape treatment. Granular bases shall be permitted to be retained where the hard surfacing is to remain, such as the cycling lanes along Richmond Road or Cleary plaza;

- E. New Orchard Station entry plaza shall be located west of the Station, and the park pathway shall extend on the north side of the Station to the entry plaza, and encompass the bus stop;
- F. A continuous 2.4m concrete pathway, meandering through the park, between New Orchard intersection and Cleary intersection, which connects Roadway intersections, pedestrian crossings, and bus stops;
- G. The concrete pathway shall be widened to a 3.0m asphalt MUP east between the Woodroffe Avenue intersection and Lockhart Avenue, and west between Woodroffe Avenue intersection and Compton Avenue;
- H. Provide two 38mm water supply lines, with a metered water chamber, and accessible drinking fountains, to be located within the Linear Park. The drinking fountains shall have a stainless steel basin, and be complimentary in design to the other park elements. One drinking fountain shall be installed west of Woodroffe Avenue, and one to the east. The exact location shall be determined and approved by the City during the design process;
- I. Pedestrian height lighting shall extend along the pathway throughout the park, and extend to the Roadway intersections;
- J. There shall be two ipe wood shade structures or trellises, with a minimum footprint of 6m x 9m integrated within the park, with one structure located near [REDACTED], and one structure located west of Woodroffe Avenue;
- K. There shall be a minimum of four gathering nodes within the park, excluding Cleary plaza and New Orchard plaza, along the pathway alignment, with a minimum size of 100m², and a maximum of 300m². Each gathering node shall have unique characteristics, which distinguishes the nodes including paving materials and patterns, walls, entry features, park elements, configuration, and lighting;
- L. A minimum of two of the nodes shall include an electrical outlet integrated into the site features;
- M. There shall be rain gardens designed and constructed in a natural configuration to accept the SWM requirements for the park only. Where the rain garden intersects with the pathway, a bridge over the rain garden shall be designed and constructed. There shall be a minimum of three bridges within the park. Galvanized or concrete culverts and rip rap side slopes shall not be permitted;

- N. There shall be a minimum of 18 low land forms to articulate the spaces and provide diversity of grades and contours. The land forms shall be a maximum of 1m in height, and have varying side slopes ranging from 3:1 to 10:1, with a minimum area of 100m² and the maximum of 1000m². The 3:1 slopes shall be placed inward towards the park. The land forms shall be balanced with the same overall area of open flat meadow areas to provide opportunity for recreational and community gathering opportunities;
 - O. The configuration of the land forms shall intersect with the pathway, creating opportunities for seating and viewing towards both Richmond Road and Byron Avenue at various locations throughout the Park;
 - P. Where the pathway intersects with the land forms, there shall be low seating height retaining walls. These walls shall be offset from the pathway by 600 mm, with the concrete paving extending to the base of the retaining wall. DB Co shall provide natural stone walls and finishes for review, and final selection by the City; and,
 - Q. DB Co shall install a bicycle repair station at the interface of the pathway and the entry plazas for both Cleary Station and New Orchard Station.
- (vi) Byron Linear Park shall provide a no net loss of greenspace from the original park to the final configuration and shall be a combination of park elements as described in Clause 4.4 (n) (v) of this Part 6. DB Co's design shall maintain the quantity of greenspace, based upon current turf areas, with the exception of the space required for the construction of the Cleary Station.
 - (vii) Byron Avenue, between Woodroffe Avenue and Lockhart Avenue, shall be converted from the existing roadway to the park, creating a gateway at the intersection of Richmond Road and Woodroffe Avenue.
 - (viii) A direct sidewalk connection from Allison Avenue to the PXO on Richmond Road shall be provided.
 - (ix) Park Planting
 - A. DB Co shall develop a planting palette and plan, that provides diversity of tree and shrub species to create seasonal interest and habitat throughout the year;
 - B. The deciduous trees shall provide the core element of the design, in a curvilinear patterning, providing the visual element that links the pathways, land forms and park elements, with Richmond Road and Byron Avenue;

- C. Deciduous shade trees shall be located to provide shade to the pathway and bench seating areas; and,
 - D. The planting plan shall be a range of deciduous and coniferous trees and shrubs, and plants to provide seasonal variety and colour and include the following:
 - i. 230 large deciduous trees;
 - ii. 80 coniferous trees;
 - iii. 70 small flowering deciduous trees;
 - iv. 1,000m² of shrubs; and,
 - v. Sufficient grasses, forbes and perennials for the rain gardens.
- (x) Park Furniture
- A. DB Co shall provide three park furniture alternatives for review, and final selection by the City, and based upon the following requirements:
 - i. 22 Benches to COADS; and,
 - ii. Seven Recycling Units with three streams.
 - B. Provide a minimum of one bench and one recycling unit in close proximity to each Roadway intersection abutting the Park; and,
 - C. DB Co shall not include play structures for children in the park furniture design.
 - D. All site furniture shall be suited for public use.
- (xi) DB Co shall complete the design and construction for [REDACTED] based upon the design drawing provided in Appendix M - [REDACTED] Parking Lot, of this Part 6, including the following:
- A. Layout and grading of the church parking lot and access;
 - B. Pedestrian sidewalks;
 - C. Landscape Plan;
 - D. Restoration of all disturbed areas; and,

- E. SWM. This drainage may be connected to the existing stormwater system within Byron Avenue.
- (o) Byron Avenue Modifications
- (i) DB Co shall reinstate Byron Avenue in accordance with the following:
 - A. A final travel width of 7m, commencing at the south side with the new concrete sidewalk/curb described in Clause 5.2 (f) of this Part 6;
 - B. All Roadway asphalt and granular bases, including the Roadway shoulders, shall be removed to a minimum of 900mm depth, and backfilled with Earth Borrow and topsoil to complete the final site design of the park beyond the final 7m Roadway width and on-street parking;
 - C. Curbs on both the north and south side of the Roadway;
 - D. West of Woodroffe Avenue, recessed on-street parking shall be provided on the north side of the roadway, and located between the hydro poles, with a total of 18 parking spaces, excluding the PPUDO. No on-street parking shall be permitted adjacent to Cleary Station;
 - E. On-street parking shall not be permitted:
 - i. between the hydro poles at Sherbourne intersection; and,
 - ii. on either side of Lockhart Avenue, at the north segment connecting Byron Avenue to Richmond Road.
 - F. A PPUDO, on the either side of Byron, adjacent to Cleary plaza, each with three parking spaces. The westbound PPUDO shall be located in close proximity to the Station Entry, and there shall be a sidewalk from the WB PPUDO to the Cleary plaza;
 - G. A PPUDO, on the north side of Byron, adjacent to the New Orchard Station plaza for two vehicle parking spaces;
 - H. Interlocking pavers shall be utilized for all the parking spaces;
 - I. LID SWM may be considered on the north side, at Lockhart, connecting with the LID SWM for the Park, upon review and approval by the City; and,
 - J. Roadway lighting shall meet the City standards.

- (ii) DB Co's design and construction of Byron Avenue corridor shall include the reinstatement of the 7m width of the impacted road pavement and as a minimum shall provide for an appropriate thickness of resurfacing pavement treatment so that the Byron Avenue's pavement will meet the requirements of Schedule 15-2, Part 2, Clause 6.10 – Pavement – Municipal Roads
- (p) Moodie Drive and Corkstown Road
 - (i) DB Co shall complete the following at Moodie Drive and Corkstown Road:
 - A. Provide a MUP connection from the existing TransCanada Trail south of Corkstown Road to the Corkstown/Moodie intersection on the north side of Corkstown Road;
 - B. Remove any portions of MUP that do not provide the continuous connection between the existing MUP east of the Station, and Moodie Drive;
 - C. Provide a crosswalk/crossride protected intersection at the Moodie/Corkstown intersection and extend the MUP to the existing TransCanada Trail;
 - D. Provide a lighted sidewalk on the north side of Corkstown, from the entrance to [REDACTED] to the pedestrian crossing/PPUDO at Moodie Station; and,
 - E. Provide a naturalized landscape along the corridor, extending across the Station and to the Moodie/Corkstown intersection.
 - (ii) DB Co shall complete the design and construction of the following on the west side of Moodie Drive, from the Corkstown Road intersection, southerly to the signalized intersection of the Highway 417 EB off-ramp;
 - A. A raised 2m width sidewalk, from the south side of Highway 417 WB on-ramp, southerly to the north side of Highway 417 EB off-ramp;
 - B. Realign the cycling lane to adjacent to the sidewalk, at the roadway elevation;
 - C. Paved shoulder north of the WB on-ramp to the Corkstown Road intersection; and,
 - D. Crosswalk/crossride at Highway 417 ramps, connecting to the facilities to the north and the south of the roadway.
- (q) Highway 417 - Highway Works

- (i) DB Co shall complete the Tree Compensation Plans for the Works identified in Schedule 15-2, Part 9 – Highway Works;
- (ii) In addition to the Tree Compensation requirements, DB Co shall reinstate the shrubs at an equal ratio: for each square metre of shrubs removed, reinstate with a square metre of shrubs. The shrub spacing in the planting beds shall have a maximum on centre spacing of 750mm;
- (iii) The plants shall be reinstated in approximately the same location within the corridor as those removed, while maintaining the MTO safety requirements;
- (iv) DB Co shall ensure a minimum of double the quantity of trees, and an equal area of shrubs, are reinstated for the plant material removed within an interchange;
- (v) The proposed planting shall be submitted in accordance with Schedule 10 – Review procedure, and shall reinforce the existing naturalized landscape of the Highway 417/Highway 416 interchange, commencing at the southwest quadrant of Richmond Road/Highway 417;
- (vi) Where, during the tree evaluation, trees greater than 500 mm diameter at breast height, or with environmental significance are identified, DB Co shall prove how the tree can be protected during construction, and develop compensation requirements, if removal is necessary;
- (vii) Where there is an existing watercourse, DB Co shall maintain a minimum of 10m offset from the top of the embankment. Should there be a requirement to reduce the construction offset, DB Co shall prove any encroachments and provide methodology for protection; and,
- (viii) Should there be a requirement for a SWM pond within MTO lands, DB Co shall include the following criteria in the design;
 - A. The pond shall be offset from the traffic safety zones;
 - B. The pond shall have varying side slopes with a blend of grasses and shrubs to naturalize the perimeter, and shall be able to withstand the varying water levels within the pond; and,
 - C. The maintenance requirements of the pond shall be integrated within overall design.

4.5 Corridor Planting

- (a) DB Co shall provide the minimum quantities of plant material for each Corridor Specific Section identified in this Article 4, in addition to the planting required within the SJAM

lands, the Pinecrest Creek realignment, the Richmond Road/Byron Park corridor and MTO Lands:

| Location | Deciduous Trees | Conifer Trees | Reforestation | Deciduous Shrubs | Conifer Shrubs | Riparian Shrubs |
|---------------------------------|------------------------|----------------------|----------------------|-------------------------|-----------------------|------------------------|
| Connaught Park | 110 | 125 | | 545 | 235 | |
| Dominion/Scott | 167 | 74 | | 1900 | 600 | |
| Lincoln Fields | 175 | 140 | | 300 | 130 | |
| Churchill Underpass | 21 | 11 | | - | - | |
| Woodroffe Stormwater Pond | 285 | 50 | 2000 | 9000 | 500 | 22000 |
| Moodie Drive and Corkstown Road | 75 | 50 | 1260 | 1000 | - | - |

ARTICLE 5 SITE SPECIFIC TEMPORARY REQUIREMENTS

5.1 Station Specific Temporary Requirements

(a) Westboro Station

- (i)** DB Co shall maintain pedestrian access from Lanark Avenue to Scott Street via the MUPs to the northeast and northwest of Westboro Station, at all times during construction.
- (ii)** DB Co shall maintain safe pedestrian/cyclist crossings at Westboro Station along the north side of Scott Street throughout construction.

(b) Dominion Station

- (i)** DB Co shall maintain the existing pedestrian connection for the existing or relocated Transitway from the community to the southwest of the Station throughout construction and Workman Avenue to the east. This may include the following:
 - A.** Flagperson at construction access route west of the alignment to accommodate the pedestrian movement at grade;
 - B.** Construction of the unpaid fare zone bridge adjacent the Station to allow public access to the Transitway Station;
- (ii)** DB Co shall maintain existing signalized crossings of the Transitway and SJAM Parkway at all times to accommodate pedestrian, cyclists and Transitway detour until pedestrian bridge at Station is available for public use;
- (iii)** DB Co shall remove the pedestrian connection from the southwest to the existing Dominion Transitway station, with a temporary relocation east to existing pedestrian overpass, temporary baily bridge for Transitway or Churchill Avenue, shall not be permitted.
- (iv)** DB Co shall maintain pathway located along the south side of the Transitway from Roosevelt Avenue to the at-grade signalized crossing of the Transitway in service at all times;

(c) Cleary Station

- (i)** DB Co shall provide a paved pathway connection between Cleary Avenue and the NCC trail to the west of the construction Site.

(d) Baseline Station

- (i) DB Co shall maintain the pedestrian and cycling connection between the pathway within the hydro corridor and Woodroffe Avenue.
 - (ii) DB Co shall maintain the Transitway access to [REDACTED].
- (e) Queensway Station
 - (i) DB Co shall maintain the MUP access from Queensway Station to Roman Avenue at all times throughout construction.

5.2 Corridor Specific Temporary Requirements

- (a) SJAM Parkway
 - (i) During construction, the pathway on the south side of the SJAM shall be closed from Cleary Avenue to the signalized intersection of the Transitway. DB Co shall provide a temporary pathway connection between Cleary Avenue and the pathway west of the point of closure.
 - (ii) The temporary closure signage to occur at each end of the pathway closure and at each community connection from the south, including one at Woodroffe Avenue and the pathway.
 - (iii) The MUP on the north side of the SJAM Parkway shall remain operational throughout construction.
- (b) Lincoln Fields Station to Highway 417
 - (i) DB Co shall maintain the pathway connection on the south side of Carling Avenue to Rosewood Avenue and construct a MUP to Woodroffe High School.
 - (ii) DB Co shall retain the MUP on the west side of the Pinecrest Creek corridor, from Lincoln Fields under Highway 417 to Iris Street throughout construction. The MUP alignment may vary to accommodate the construction requirements of the alignment.
- (c) Pedestrian Bridge at Woodroffe High School
 - (i) The existing Pedestrian Bridge, and connecting MUPs shall be replaced due to the requirements of the alignment. Refer to Schedule 17 – Environmental Obligations for approval requirements.
 - (ii) The new Pedestrian Bridge and MUPs shall be constructed to connect to:
 - A. Existing pathway Sackville Connaught Avenue intersection;

- B. Woodroffe High School.
- (iii) The new Pedestrian Bridge shall be constructed within 50m of the existing alignment at the west end, and 80m of the east end of the alignment.
- (iv) The new Pedestrian Bridge and connections to the MUPs shall be constructed and in service prior to the decommissioning of the existing Pedestrian Bridge. All the adjacent Site works shall be completed including the installation of the MUP connections, to provide an uninterrupted service between the communities to the east and west of the Pinecrest Creek corridor.
- (v) Connections to be retained throughout construction include:
 - A. Pathway to Woodroffe High School; and,
 - B. MUP to Connaught Avenue.
- (d) Pinecrest Creek Corridor, Highway 417 to Baseline Station
 - (i) DB Co shall retain the MUP connection from Baseline Station, and the NCC Pinecrest Creek Pathway from Woodroffe Avenue, through to Lincoln Fields throughout construction. The alignment may vary to accommodate the construction requirements of the alignment. Refer to Article 3 – Connectivity Requirements, of this Part 6, for temporary construction requirements.
 - (ii) The existing alignment of the MUP, and the unsignalized crossing of the Transitway, south of Iris Station shall remain operational until the proposed MUP on the west side of the alignment, between Iris and Baseline, is complete and in service.
- (e) Bayshore Station
 - (i) DB Co shall be permitted to close the pathway on the north side of the transit corridor, between Holly Acres Drive and Bayshore Station as required to construct the alignment.
 - (ii) Temporary closure signage shall be placed at each end of the pathway closure, at Woodridge Avenue, and with additional signage through the parking lot to the MUP connection, and Bayshore Station, clearly delineating the alternate route.
- (f) Byron Avenue
 - (i) Prior to the closure of Byron Linear Park, DB Co shall install a raised 2m wide concrete sidewalk, with a curb, on the south side of Byron Avenue, throughout the total length of the park closure.

- (ii) On the east side of Woodroffe Avenue, DB Co shall:
 - A. Install the concrete sidewalk on the north side of the existing concrete curb to minimize any impacts on the existing landscape behind the curb; and,
 - B. Remove the existing concrete curb and relocate the existing catch basins as required to accommodate the new sidewalk.
 - (iii) On the west side of Woodroffe Avenue, DB Co shall install a concrete sidewalk north of the existing swale. Refer to Schedule 15-2, Part 2, Clause 5.7 (n).
- (g) TransCanada Trail/Corkstown Road
- (i) DB Co shall maintain the TransCanada Trail west of Holly Acres Drive throughout construction.

APPENDIX A

Sample Road Modification Approval Report

PLANNING AND GROWTH MANAGEMENT

ROAD MODIFICATIONS APPROVAL (RMA)
REPORTS UNDER DELEGATED AUTHORITY

INTERNAL ROUTING CHECKLIST

| | |
|--|-------------------------------|
| UNIT: Design Review and Implementation | FILE NUMBER: RMA-2015-DRI-001 |
| SUBJECT: Modifications to St. Joseph Boulevard, 270 metres west of Tenth Line Road to accommodate a proposed sales center (developer- [REDACTED]). | |
| LOCATION: St. Joseph Boulevard, 270 metres west of Tenth Line Road. | |

Preliminary/Technical Review and Approval

| | Office | <i>Revised</i> | | <i>Approval</i> | |
|----|---------------|----------------|------|-----------------|------------|
| | | Yes | Date | Initials | Date |
| 1. | Report Author | | | [REDACTED] | [REDACTED] |
| 2. | Specialist | | | [REDACTED] | [REDACTED] |

Councillor Concurrence

| | Ward/Name | <i>Revised</i> | | <i>Concurrence</i> | |
|----|-------------------------------|----------------|------|--------------------|------------|
| | | Yes | Date | Verified By | Date |
| 1. | Ward 1 (Orleans) – [REDACTED] | | | [REDACTED] | [REDACTED] |

Final Review and Approval

| | Office | <i>Revised</i> | | <i>Approval</i> | |
|----|--------------------|----------------|------|-----------------|------------|
| | | Yes | Date | Initials | Date |
| 1. | Financial Services | | | [REDACTED] | [REDACTED] |
| 2. | Manager | | | [REDACTED] | [REDACTED] |

CITY OF OTTAWA
ROAD MODIFICATION
APPROVAL UNDER DELEGATED AUTHORITY

DATE: 10 March 2015

RMA-2015-DRI-001

SUBJECT

- Modifications to St. Joseph Boulevard, 270 metres west of Tenth Line Road to accommodate a proposed sales center (developer- [REDACTED]).

LOCATION

- St. Joseph Boulevard, 270 metres west of Tenth Line Road, Ward 1, see Attachment 1.

PURPOSE

- The purpose of the proposed modifications is to accommodate traffic generated by a proposed sales center.

BACKGROUND

- The proposed sales center is bounded by undeveloped land to the north, residential lands to the east and west and St. Joseph Boulevard to the south.
- The proposed development is a sales center for a future [REDACTED] subdivision. The proposed subdivision will be located in the same general area as the sales center.
- The road modifications are for the sole purpose of the sales center and will be modified to accommodate the future subdivision.

EXISTING CONDITIONS

- **Road Cross-Sections**

St. Joseph Boulevard – 4-lane, urban, divided arterial road.

- **Street Lighting**

St. Joseph Boulevard – Both sides along center median.

- **Traffic Control**

The closest major intersection of St. Joseph Boulevard and Tenth Line Road is signalized.

- **Speed Limits**

St. Joseph Boulevard – posted at 60 kph.

- **Pedestrians**

There are asphalt sidewalks present on both sides of St. Joseph Boulevard. During an 8-hour period on Friday, 20 July 2012 at the intersection of St. Joseph Boulevard and Tenth Line

Road, 39 pedestrians crossed in the north-south direction on Tenth Line Road and 63 pedestrians crossed in the east-west direction on St. Joseph Boulevard.

- **Cycling**

There are no dedicated cycling lanes on St. Joseph Boulevard. During the same 8-hour survey mentioned above, 35 cyclists were observed travelling in the north-south direction and 24 cyclists travelling in the east-west direction.

- **Transit**

OC Transpo routes 120 and 136 (regular) serve St. Joseph Boulevard in this area.

- **Highest Hourly Volume**

During the same 8-hour survey mentioned above, between 4:00 pm and 5:00 pm, 421 eastbound and 395 westbound vehicles were recorded on St. Joseph Boulevard in proximity of the proposed development, respectively.

- **Heavy Vehicles**

St. Joseph Boulevard is designated as an unrestricted truck route. Heavy vehicles comprised 2.5% and 5.8% of the total traffic in the eastbound and westbound directions, respectively, during the same 8-hour survey mentioned above.

- **Collision History**

Collisions for the period from 1 January 2009 to 1 January 2014 (5 years):

St. Joseph Boulevard from Prestone Drive to Tenth Line Road: 2 collisions- 1 single vehicle and 1 sideswipe.

PROJECTED VOLUMES

- Not applicable.

PROPOSED ROAD MODIFICATIONS

- It must be emphasized that the following road modifications (see Attachment 2) are conceptual and intended only to illustrate the proposed function. The approval of any detailed design of the road modifications stemming from this report will be subject to the City's detailed design review process.
- The detailed design review process will include requirements for roadside safety provisions, center medians, utility relocations, street lighting and other needs as deemed appropriate by the City.
- Any required easements or property requirements identified to implement the project as a result of the approved design review process will be the responsibility of the applicant to secure at their cost, to the satisfaction of the City of Ottawa.

Proposed road modifications:

- Proposed access on St. Joseph Boulevard.
- Modifications to the center median on St. Joseph Boulevard to restrict left-turn movements out of the site.

MODIFICATION OUTCOMES – BENEFIT AND IMPACTS

- **Pedestrians**
No additional sidewalk infrastructure on St. Joseph Boulevard.
- **Cyclists**
No changes to the existing cycling infrastructure on St. Joseph Boulevard.
- **Transit**
No changes to the existing transit infrastructure on St. Joseph Boulevard.
- **Vehicles**
The modifications to the center median will prevent vehicles from turning left out of the sales center access.
- **Adjacent Land Uses**
No negative impacts are anticipated for the lands adjacent to the proposed road modifications.

PROJECTED IMPLEMENTATION DATES

- This is a privately funded project in which the property owner will establish the construction schedule.

TOTAL ESTIMATED CONSTRUCTION COSTS

- The total estimated cost for the proposed road modifications, which includes construction, engineering and contingencies, is [REDACTED].

FINANCIAL COMMENTS

- There is no cost to the City for the proposed modifications listed in the previous sections estimated at [REDACTED] (construction, engineering, and contingencies).
- [REDACTED] must provide financial guarantees acceptable to the City of Ottawa to cover the above-noted roadwork.
- [REDACTED] will be required to enter into a Road Modification Agreement with the City of Ottawa, which will include but not be limited to, [REDACTED] funding all costs associated with the design and construction of the above-noted road modifications.
- Total additional annual operating costs are estimated to be [REDACTED] (surface operations at [REDACTED], signs and pavement markings at [REDACTED]) and will be requested in the year following completion of construction.

COMPLIANCE WITH TRANSPORTATION MASTER PLAN

- The proposed roadway modifications comply with 7.3 (Maximize Road Network Efficiency) and 7.4 (Maximize Road Safety for All Users) of the Transportation Master Plan (2013).

CONSULTATIONS

- Via e-mail on 20 February 2015, [REDACTED] was given notice of the intention to advertise the proposed road modifications.
- The proposed road modifications were advertised on the City's website from 20 February 2015 until 6 March 2015 with a deadline for public input on 13 March 2015.

- Preliminary/technical approval was granted by the Program Manager of Design Review and Implementation on 5 March 2015.
- Via e-mail on 6 March 2015, [REDACTED] was given five business days to advise of his concurrence or non-concurrence with the Manager of Development Review (Suburban Services) having delegated authority to approve the proposed roadway modifications.
- Via e-mail on 6 March 2015, [REDACTED] provided his concurrence with the Manager of Development Review (Suburban Services) having delegated authority to approve the proposed roadway modifications.

RESULTS OF ADVERTISING

- No comments were received as a result of the online advertisement.

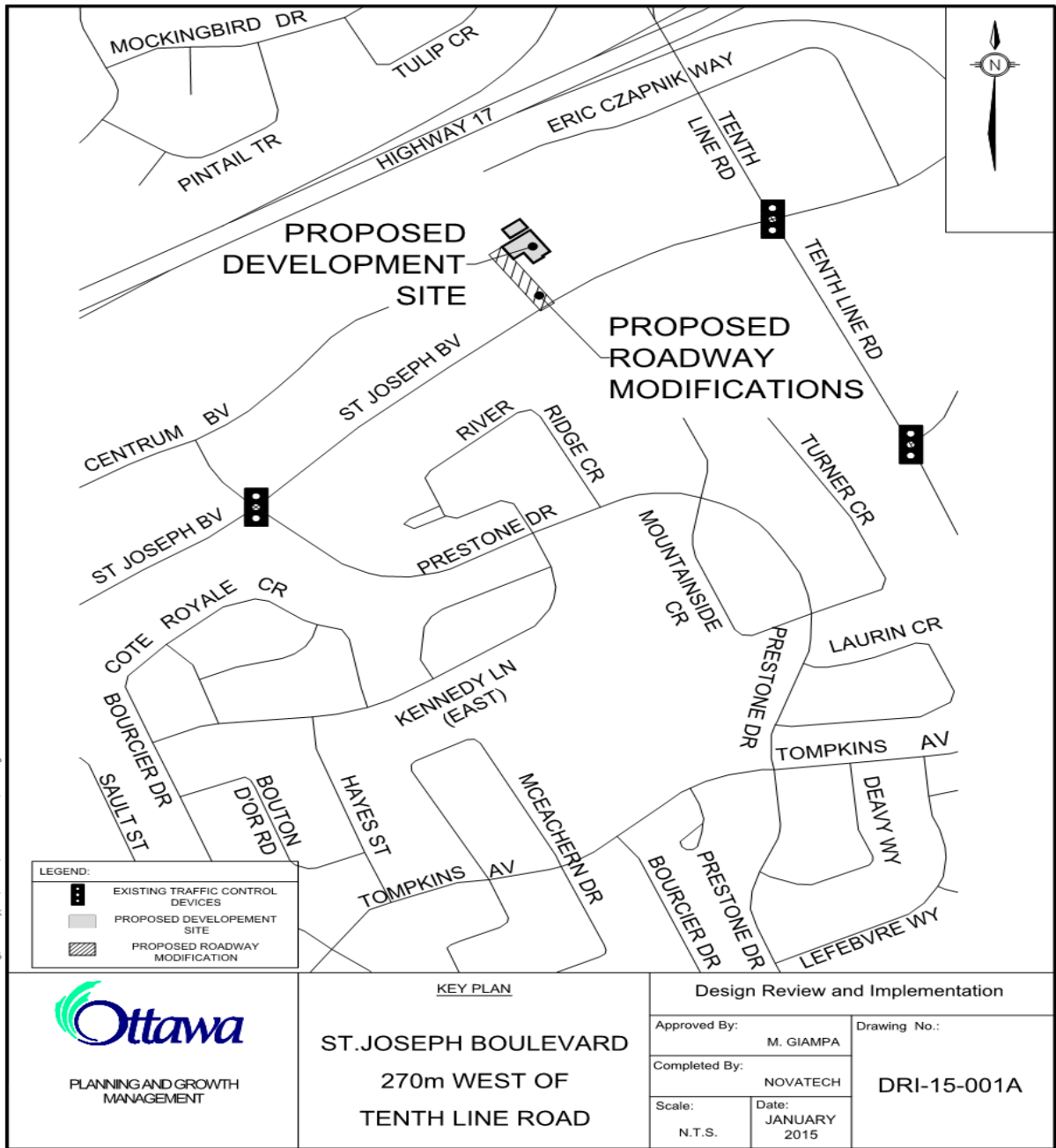
CURRENT STATUS

- Final approval was granted by the Manager of Development Review (Suburban Services) on 9 March 2015.

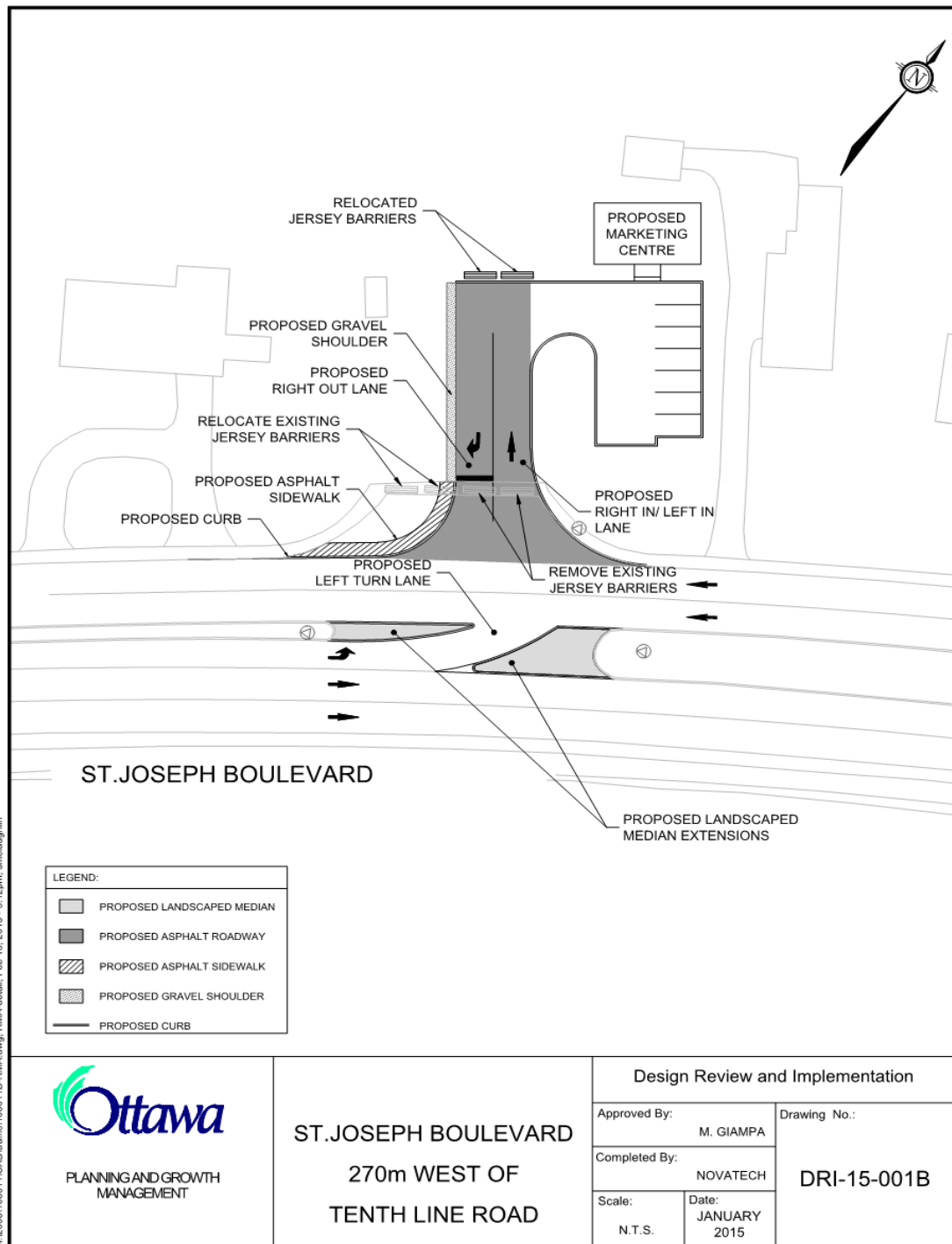
ATTACHMENTS

- Attachment 1 – Key Plan DRI-2015-001A
- Attachment 2 – Proposed Road Modifications DRI-2015-001B

Attachment 1



ATTACHMENT 2



APPENDIX B

Daily Traffic Management Site Record

- (a) DB Co shall create a Daily Traffic Management Site Record to document the status of the traffic control measures for the Project. The header of the document shall include but not be limited to headings for the Project Segment and number, date, day of week, location, time of the observations, name of observer and the signature of the observer. The Daily Traffic Management Site Record may be either a hard copy document or an electronic form in a format compatible with City systems.
- (b) Each day (weekdays and weekends, and statutory and civic holidays), DB Co shall carry out at least one site inspection with a focus on the efficacy of the Traffic and Transit Management Plan for the entire Project. The observations shall be recorded on the Daily Traffic Management Site Record, the original of which shall be retained by DB Co until the Project warranty period is complete.
- (c) In instances where traffic control measures change during the day (or night), such as but not limited to temporary lane closures, diversions, etc, DB Co shall carry out site inspection of all of the traffic controls relevant to the changes at the start of each change-over of the traffic control measures and record the inspection on the Daily Traffic Management Site Record.
- (d) Each day, DB Co shall review the information on the Daily Traffic Management Site Record, and assess the functionality of the traffic control measures, noting instances where the measures are not meeting the expectations of the TTMP and TTMP sub-plans, and identify the remedial action required such that the expectations for traffic control as set out in the TTMP and TTMP sub-plans shall be met.
- (e) DB Co shall take immediate action to effect the requisite remedial measures needed in order to attend to the noted matters. DB Co shall document in the Daily Traffic Management Site Record the issue, the remedy and the action taken.
- (f) DB Co shall continue to inspect a matter of traffic management concern until the issue is resolved.
- (g) Within 48 hours of the preparation of the Daily Traffic Management Site Record, copies of the Site Record shall be forwarded to the City, and to the Lead Traffic and Mobility.
- (h) DB Co shall produce a Monthly Summary of the Daily Traffic Management Site Records, noting the number of issues identified, the location and nature of the issues, the remedies for the issues, the actions taken and the results achieved. Trends in issues shall be identified, remedies for the trends ascertained, and remedial action implemented. All of this information shall be documented in a Monthly Summary of the Daily Traffic Management site Records, and a copy of the summary shall be brought to the weekly Traffic Management Committee meeting for review and discussion, with copy to the City and the Lead Traffic and Mobility.

- (i) The site visits and Daily Traffic Management Site Records, shall include, but not be limited to observations taken by a DB Co designated Traffic Control Supervisor, with respect to each of the following topics of traffic control information as relates to and in accordance with the current accepted TTMP and current accepted TTMP sub-plans. Note that where requirements of this section can be fulfilled by the provision of a video recording, the video can be referenced as proof that the requirements have been fulfilled:
- There are accepted TTMP and all of the TTMP sub-plans in place for the portion of the Project site under review;
 - All requirements, site locations, situations, conditions or other circumstances which are identified in the accepted TTMP and in each of the accepted TTMP sub-plans as potentially impacting traffic flow of any kind as may be related to/caused by the Project. DB Co shall prepare checklists of the identified items for consideration from the TTMP and from each of the TTMP sub-plans, and attach them to the Daily Traffic Management Site Record, thence to be reviewed on site and recorded as an integral part of the Daily Traffic Management Site Record;
 - Works listed in the Traffic and Transit Schedule of the TTMP are progressing in accordance with the start and finish dates set out therein for each work element;
 - Upon City request: Transit service travel time and frequency between existing or temporary BRT stations and/or and stops;
 - Prohibitions to any part of the traveling public;
 - Upon City request: Diverted traffic volumes, speeds and travel times for all modes of travel on all roads effected by the Project;
 - Impacts on residential streets and associated temporary and permanent traffic calming measures;
 - Upon City request: Traffic detour follow-up study data for traffic volumes, speeds and travel times for all modes of travel using a detour route, as well as the queue lengths for vehicle traffic;
 - Third party works in the vicinity of the Project;
 - The placement of all traffic control devices;
 - Equipment or material which constitutes a hazard to traffic, pedestrians and cyclists;
 - Storage of equipment or materials external to identified storage areas;
 - Dirt and debris on paved and concrete surfaces;
 - Closure periods;
 - Vehicle queues related to Construction activities, closure, detours, lane shifts and diversions, exceeding the length predicted by the analysis of the TCP for the work;

- Multiple construction zones such that traffic encounters multiple disruptions and/or discontinuity in lane geometrics;
- Construction activity and access points or traffic detour/diversion on private roads or lands;
- Construction activity and access points or traffic detour/diversion on public use lands or roadways controlled by an agency
- Access for transit users to all adjacent existing Transitway facilities, BRT lanes, and Transit Priority lanes and non-transitway routes;
- Open excavations adjacent to traffic lanes (including cyclist) during darkness or non-working days;
- Sight distance obstructions;
- Haul routes identified, and, clean and free of Construction dust and debris;
- Access by buses, pedestrians and cyclists to all existing bus stops;
- Passenger facilities are provided at relocated or temporary bus stops;
- Closures and minimization of traffic disruptions on Holidays and during Special Events;
- Detour routes, lane shifts and diversions paved, with pavement markings and signs in place;
- Milled surfaces, if present, are uniform in texture, not raveled, no standing water on the surface, and have been in place for less than three days;
- Detour routes, lane shifts and diversions drained such that there is no standing water or water flow across the roadway, busway, cycling and pedestrian facilities;
- Closure, detour, lane shift or diversion identified in Schedule 37 Mobility Matters;
- All signs are bilingual English/ French;
- Temporary barriers at required locations, with appropriate flare offsets, end treatments, crash cushions, reflectors and anti-glare screens, and, provision for drainage, and removal of snow, ice and debris;
- Pavement drop-offs exposed to traffic, pedestrians and cyclists are to specifications per height, protection, ramping, etc;
- All Work meets AODA requirements;
- Redundant pavement markings are eradicated as specified;
- Lane widths and clearance offset to specifications in reduced speed zones;
- Floodlighting adjusted so as not to interfere with driver's vision, nor directed toward residences or businesses;

- Streetlighting in accordance with Schedule 15-2, Part 2 – Civil and Guideway;
- All closures, detours, diversions, lane shifts, pathways and sidewalks being maintained and repaired to City and industry standards;
- School crossings appropriately addressed in order to maintain safe and efficient operation;
- Temporary closure and/or re-routing of pedestrian and cycling routes conform to Pedestrian Access Plan and Construction Site Pedestrian Control Plan
- Directional signing for pedestrians and cyclists;
- Sidewalk detours conforms to accepted TCP;
- Lighting provided for pedestrian and cyclist users is functional;
- OPS on duty for Work within 20m of traffic control signal:
- Alternate parking or designated usage zones provided to replace those impacted by Construction;
- Temporary traffic control signal installations;
- Date, time and content of the PVMS message changes;
- Date and time of lane closures;
- Successive intersections on either side of a closed intersection open to two-way traffic;
- Transit given priority on the road system via temporary busways or bus-only lanes;
- Transit priority measures operational at key intersections on detour routes;
- When BRT lane closures are in place during the permitted hours, an alternative is made available for transit;
- Interference or interruption of operations of BRT, Bus Only Lanes or BRT detours by Project transport vehicles;
- All traffic controls are operational before commencing Works affecting operation of BRT, Bus Only Lanes or BRT detour operations;
- Barrier free pedestrian and cycling access to active Stations and across all pedestrian bridges maintained at all times;
- Pedestrian and cycling access maintained across the local bus route lanes at all times;
- A new or relocated alternate route pathway, sidewalk or MUP leading to a station connection is provided in place of a closed pathway, sidewalk or MUP;
- Way-finding signage including maps showing routes and destinations is provided at all times for pathways, sidewalks and MUP closures and detours at all access

points and intersections and on pathways or MUPs 50 m in advance of closure or relocation points;

- Generally, public traffic, transit, and construction traffic is managed in accordance with the TTMP;
- Pedestrian facilities are in accordance with the Pedestrian Access Plan and Construction Site Pedestrian Control Plan;
- All traffic control and protective devices identified in the approved TTMP are provided, installed and are being maintained;
- Traffic Control Supervisor on the Project site full time when Construction activities are underway;

APPENDIX C

Daily Traffic Monitoring Report

- (a) DB Co shall create a Daily Traffic Monitoring Report to document the status of all of the various traffic conditions for all modes of transportation throughout the Project. The Daily Traffic Monitoring Report may be either a hard copy document or an electronic form in a format compatible with City systems.
- (a) The Traffic Monitoring Report shall be a field sheet format. The header of the document shall include but not be limited to headings for the Project Segment and number, date, day of week, location, time of the observations, name of observer and the signature of the observer. There shall be columns on the form for observation number, item of observation with explanation, an indication of compliance – yes, no, not applicable -, notes/comments, action taken, and follow up.
- (b) Each day (weekdays and weekends, and statutory and civic holidays), DB Co shall carry out at least one site inspection with a focus on the traffic conditions observed throughout the entire Project. The observations shall be recorded on the Daily Traffic Monitoring Report, the original of which shall be retained by DB Co until the Project warranty period is complete.
- (c) In instances where traffic control measures change during the day (or night), such as but not limited to temporary lane closures, diversions, etc, DB Co shall carry out site inspection of all of the traffic conditions relevant to the changes at the start of each change-over of the traffic control measures and record the inspection on the Daily Traffic Monitoring Report.
- (d) Each day, DB Co shall review the information on the Daily Traffic Monitoring Report, and assess the functionality of the traffic control measures, noting instances where the traffic flow is not meeting the expectations of the TTMP and TTMP sub-plans, and identify the remedial action required such that the expectations for traffic flow as set out in the TTMP and TTMP sub-plans shall be met.
- (e) DB Co shall take immediate action to effect the requisite remedial measures needed in order to attend to the noted matters. DB Co shall document in the Daily Traffic Monitoring Report the issue, the remedy and the action taken.
- (f) DB Co shall continue to inspect a matter of traffic management concern until the issue is resolved.
- (g) Each day, copies of the current Daily Traffic Monitoring Report shall be forwarded to the City, and to the Lead Traffic and Mobility.
- (h) DB Co shall produce a Monthly Summary of the Daily Traffic Monitoring Reports, noting the number of issues identified, the location and nature of the issues, the remedies for the issues, the actions taken and the results achieved. Trends in issues shall be

identified, remedies for the trends ascertained, and remedial action implemented. All of this information shall be documented in a Monthly Summary of the Daily Traffic Monitoring Reports, and a copy of the summary shall be brought to the weekly Traffic Management Committee meeting for review and discussion, with copy to the City and the Lead Traffic and Mobility.

(i) The Daily Traffic Monitoring Report shall include, but not be limited to, observations taken during personal site visits and/or via electronic/camera surveillance by a DB Co designated Traffic Control Supervisor, with respect to each of the following topics of traffic flow information as relates to and in accordance with the current accepted TTMP and current accepted TTMP sub-plans:

- Duration of temporary Lane (traffic, BRT, bike) closures in place;
- Long duration full lane (traffic, BRT, bike) closures in place;
- Sidewalk, pathway, MUP temporary closures in place;
- Sidewalk, pathway, MUP long duration closures in place;
- Detours, Lane shifts, diversions in place;
- Traffic delays observed (vehicles, buses, duration, likely cause?);
- Traffic queues observed (vehicles, buses, duration, likely cause?);
- Apparent LOS for critical movements at intersections;
- Quality of service for transit passengers;
- Pedestrian service (behavior, issues?)
- Unauthorized Construction loading/unloading;
- Parking and special use zones issues;
- Cyclist service (behavior, issues?);
- Pedestrian and vehicular access to adjacent properties and businesses;
- Vehicle travel times;
- Transit travel times, headways;
- Transit operational issues;
- Transit route continuity;
- Flag personnel on site;
- Site security presence;
- Major incident;
- Traffic Incident Management Group activated;
- Police point duty;

- TCPs and ETPs as per OTM Book 7;
 - All traffic signs and features in place;
 - Traffic issues noted by field Engineer, flag person;
 - Comments from OC Transpo Supervisor; and
 - Other traffic items as applicable from any requirements from any other Schedules which pertain to or affect traffic management.
- (j) If traffic issues are noted, or if the monitoring effort is specifically undertaken following implementation of, or alteration of the TTMP or a TTMP sub-plan, then additional data collection shall be required in terms of traffic volumes, queue lengths, and/or other measurements commensurate with the issue at hand in order to calculate performance indicators such as level of service or other applicable evaluation measures.

APPENDIX D

Daily Lane Closure Report

- (a) DB Co shall create a Daily Lane Closure Report for each lane closure on the Project. The purpose is to document the status of all of the various lane closures for all modes of transportation throughout the Project. The Daily Lane Closure Report may be either a hard copy document or an electronic form in a format compatible with City systems.
- (b) The Daily Lane Closure Report shall be a field sheet format. The header of the document shall include but not be limited to headings for the Project Segment and number, date, day of week, location, time of the observations, name of observer, the signature of the observer, and whether the lane closure is a General Traffic Lane Closure, or a BRT Lane Closure.
- (c) Each day (weekdays and weekends, and statutory and civic holidays), DB Co shall carry out site inspections, in person or via electronic surveillance, with a focus on both the temporary and long term lane closures in effect for both general traffic and BRT vehicles throughout the entire Project. The data shall be recorded on the Daily Lane Closure Report, the original of which shall be retained by DB Co until the Project warranty period is complete.
- (d) In instances where lane closures change during the day (or night), DB Co shall carry out site confirmation of the lane closures relevant to the changes at the start and end of each change-over of the lane closures and record the inspection on a Daily Lane Closure Report. The observations shall be taken at a frequency so as to confirm with an accuracy of + - [REDACTED], the actual start and end times for each of the temporary lane closures.
- (e) Each day, DB Co shall review the information recorded on the Daily Lane Closure Reports, and assess the execution of the lane closures, noting instances where the timing of the lane closure implementation/removal is not meeting the expectations of the TTMP and TTMP sub-plans, and identify the remedial action required such that the expectations for lane closures as set out in the TTMP and TTMP sub-plans shall be met.
- (f) DB Co shall take immediate action to effect the requisite remedial measures needed in order to attend to the noted matters. DB Co shall document in the Daily Lane Closure Report the issue, the remedy and the action taken.
- (g) DB Co shall continue to inspect a matter of traffic management concern until the issue is resolved.
- (h) Each day, copies of the current Daily Lane Closure Report shall be forwarded by DB Co to the City, and to the Lead Traffic and Mobility.

- (i) DB Co shall produce a Monthly Summary of the Daily Lane Closure Reports, noting the number of issues identified, the location and nature of the issues, the remedies for the issues, the actions taken and the results achieved. Trends in issues shall be identified, remedies for the trends ascertained, and remedial action implemented. All of this information shall be documented in the Monthly Summary of the Daily Lane Closure Reports, and a copy of the summary shall be brought to the weekly Traffic Management Committee meeting for review and discussion, with copy to the City and the Lead Traffic and Mobility.
- (j) The Daily Lane Closure Reports shall include, but not be limited to, observations taken during personal site visits and/or via electronic/camera surveillance, carried out by a DB Co designated Traffic Control Supervisor, with respect to each of the following topics of lane closure information as relates to and in accordance with the current accepted TTMP and current accepted TTMP sub-plans.
- Lane closure required (Yes/no);
 - Planned lane closure (yes/no);
 - Scheduled lane closure time (Military Time – 24 hr clock);
 - Scheduled lane opening time (Military Time);
 - Actual lane closure time (Military Time);
 - Actual lane opening time (Military Time);
 - Period of the day (peak, off-peak, night, weekend, holiday);
 - Lane description:
 - A. Street name;
 - B. Direction of traffic flow
 - C. Name of upstream cross street
 - D. Name of downstream cross street;
 - E. Number of lanes closed;
 - F. No of blocks lane(s) is closed; and
 - G. Lanes closed – Right turn, Through and right turn, Right through, Left through, through and left turn, left turn
 - Comments/other observations;
 - Equivalent lane closure hours for current observation;
 - Location Map to scale showing relevant lane configuration with closed lane(s) shown as hatched area;
 - Checked by (print name then signature); and
 - Signed off by (print name then signature).

APPENDIX E

Temporary Bus Terminal Requirements

| Station | Description | Location | Temporary Bus Terminal Requirements | | | | | | | | | | | | | | | | | |
|----------------|--|--|-------------------------------------|------------------------------|---------------------|----------|-----------------|---------------|-----------|---|------------|------------|---------|------------------|--------------|------------------------------|-----------------------|--|-----------------|------------|
| | | | Platforms (length) | Shelters (type) ¹ | Sidewalk/curb type | Lighting | Station signage | Route signage | Map Frame | Passenger Information Displays ² | Bike Racks | Waste bins | Benches | Emergency phones | CCTV cameras | Operator Washroom Facilities | Supervisor Facilities | Sales and Ticket Office, including Washrooms | Retail Facility | Bus Lay-up |
| Westboro | Temporary eastbound Transitway Platform | On Scott St, west of Athlone Ave | 55m | ✓ | Note ³ | ✓ | ✓ | ✓ | ✓ | x | ✓ | ✓ | ✓ | ✓ | ✓ | x | x | x | x | x |
| Lincoln Fields | Temporary local bus Platforms | In temporary local Station and lay-up area, west of existing Transitway Station | 140m | ✓ | Note ³ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Queensway | Temporary eastbound Platform | On Highway 417 / Woodroffe Ave W-N/S ramp, east of existing Platform | 20m | ✓ | SC11 | ✓ | ✓ | ✓ | ✓ | x | x | ✓ | ✓ | ✓ | ✓ | x | x | x | x | x |
| | Temporary westbound Platform | On Highway 417 / Transitway N-W ramp, west of existing Platform, south of MUP crossing | 20m | ✓ | SC11 | ✓ | ✓ | ✓ | ✓ | x | ✓ | ✓ | ✓ | ✓ | ✓ | x | x | x | x | x |
| Iris | Temporary northbound Platform | On east side of Transitway, no more than 70m north of Iris St | 20m | ✓ | Note ³ | ✓ | ✓ | ✓ | ✓ | x | ✓ | ✓ | ✓ | x | x | x | x | x | x | x |
| | Temporary southbound Platform | On west side of Transitway, no more than 70m north of Iris St | 20m | ✓ | Note ³ | ✓ | ✓ | ✓ | ✓ | x | x | ✓ | ✓ | x | x | x | x | x | x | x |
| | Temporary westbound Platform | On north side of Iris St, between the Transitway and Parkway Dr | 15m | ✓ | SC11.3 ⁴ | ✓ | x | ✓ | ✓ | x | x | ✓ | ✓ | x | x | x | x | x | x | x |
| Pinecrest | Temporary eastbound stop | On Highway 417 / Greenbank Rd S-E ramp | 15m | ✓ | SC11 | ✓ | ✓ | ✓ | ✓ | x | ✓ | ✓ | ✓ | x | x | x | x | x | x | x |
| Bayshore | Temporary eastbound local Platforms | In local Station, west of the existing westbound local Platform | 45m | ✓ | Note ³ | ✓ | ✓ | ✓ | ✓ | x | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | x | x | ✓ |
| | Temporary eastbound Transitway Platforms | In local Station, west of the existing eastbound local Platform | 35m | ✓ | Note ³ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Temporary westbound Transitway Platforms | In local Station, west of the existing westbound local Platform | 35m | ✓ | Note ³ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Trim | Temporary westbound Station Platforms | East of existing eastbound Platforms and existing Park and Ride access | 50m | ✓ | Note ³ | ✓ | ✓ | ✓ | ✓ | x | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | x | x | ✓ |
| Moodie | Temporary Transitway Station | In the ultimate bus lay-by area for Moodie LRT Station | 55m | ✓ | Note ³ | ✓ | ✓ | ✓ | ✓ | x | ✓ | ✓ | ✓ | ✓ | ✓ | x | x | x | x | ✓ |
| | Temporary local Station | | 20m | ✓ | Note ³ | ✓ | ✓ | ✓ | ✓ | x | ✓ | ✓ | ✓ | ✓ | ✓ | x | x | x | x | ✓ |

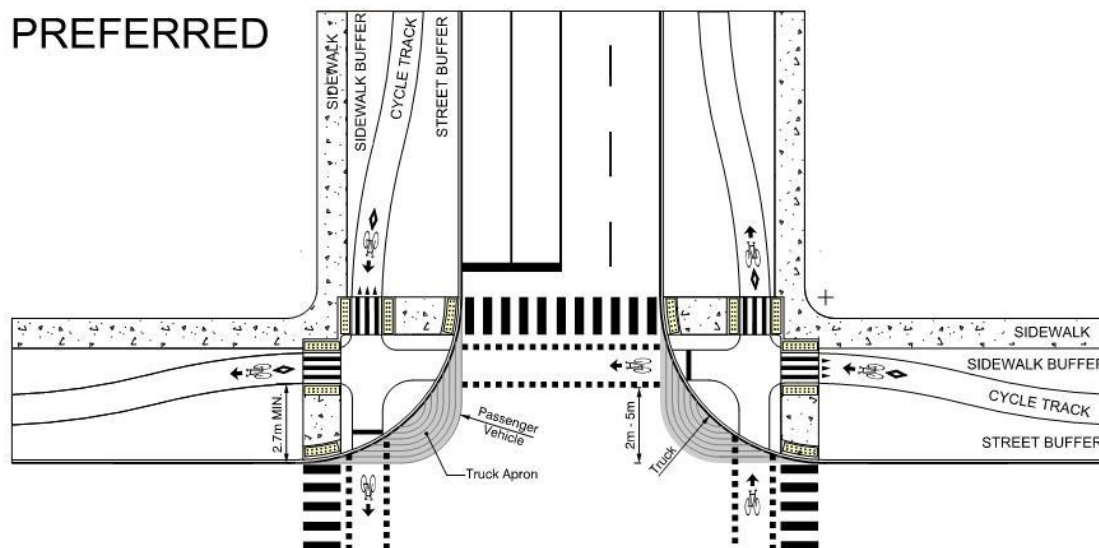
¹ All Temporary Transitway bus stops (i.e. those replacing the functionality of a Transitway stop) shall be provided with a Transitway style shelter (i.e. 8’ x 20’). For temporary on-street bus stops, a standard flat roof 5’ x 10’ shelter shall be provided.
² Passenger Information Display infrastructure shall be moved by OC Transpo at no cost to DB Co, however DB Co shall provide the ducts/feeds to the bus stops at cost to DB Co
³ As per OC Transpo Transitway and Station Design Guidelines
⁴ Sidewalk between platform and shelter

APPENDIX F

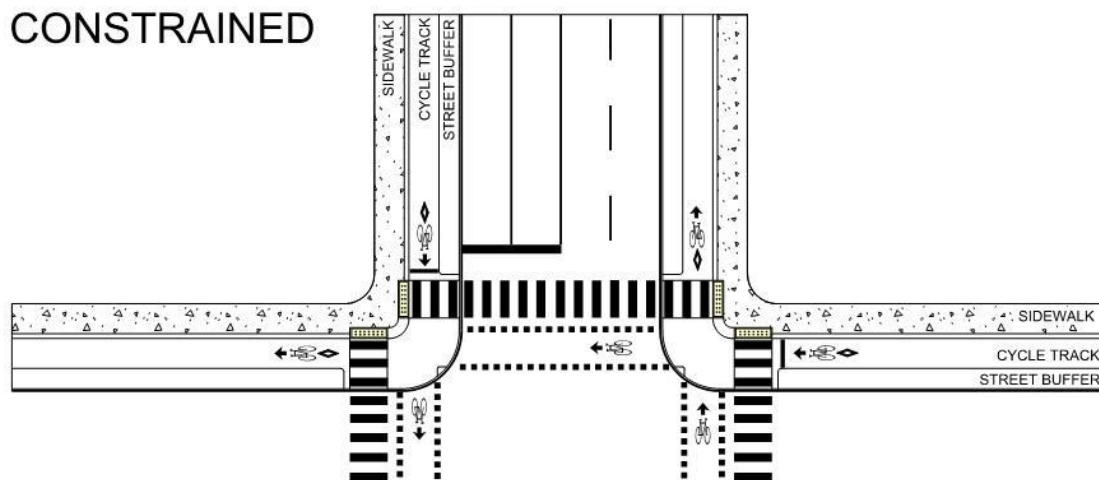
Protected Intersection Plan

DRAFT CONCEPT FOR DISCUSSION

PREFERRED



CONSTRAINED



NOTES:

1. Pedestrian crossing of cycling facility to be designed in accordance with relevant pedestrian crossing guidance (OTM and local practices). Typically, crossings are a minimum of 2.5m wide with a concrete or asphalt surface.
2. The decision to include truck aprons should consider potential noise impacts in residential areas.

APPENDIX G

Reference Material for Cyclist-Pedestrian Counters

APPENDIX G

[REDACTED]

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**SCHEDULE 15-2
DESIGN AND CONSTRUCTION REQUIREMENTS**

**PART 7
TRAFFIC AND TRANSIT MANAGEMENT AND CONSTRUCTION ACCESS**

**ARTICLE 1 GENERAL TRAFFIC AND TRANSIT MANAGEMENT
REQUIREMENTS**

1.1 Order of Precedence

- (a) DB Co's TTMP and traffic control operations shall comply with the criteria contained in this Part 7, and all standards, regulations, policies, Applicable Law, guidelines or practices applicable to the Project, including but not limited to each of the following Reference Documents. In the event of a conflict between the criteria, commitments or requirements contained within one document when compared with another, the more stringent shall apply:
- (i) OC Transpo Transitway and Station Design Guidelines;
 - (ii) City of Ottawa Transportation Master Plan;
 - (iii) City of Ottawa Road Corridor Planning & Design Guidelines, Urban & Village Collectors / Rural Arterials & Collectors;
 - (iv) Region of Ottawa-Carleton Regional Road Corridor Design Guidelines, July 2000, Region of Ottawa-Carleton;
 - (v) City of Ottawa Right of way Lighting Policy;
 - (vi) City of Ottawa Pedestrian Plan;
 - (vii) City of Ottawa Cycling Plan;
 - (viii) City of Ottawa Traffic and Parking By-Laws;
 - (ix) The City of Ottawa, Department of Public Works and Environmental Services, Infrastructure Services Branch, Standard tender documents for Unit Price Contracts (Volume No.1- Construction Specifications; Volume No. 2 - Materials Specifications & Standard Detail Drawings);
 - (x) City of Ottawa Area Traffic Management Principles and Guidelines;
 - (xi) City of Ottawa Emergency Management Plan;
 - (xii) City of Ottawa Maintenance and Quality Standards for Roads, Sidewalks and Pathways

- (xiii) Geometric Design Guide for Canadian Roads (TAC);
- (xiv) Urban Supplement to the Geometric Design Guidelines for Canadian Roadways (TAC);
- (xv) Guidelines for the Design of Roadway Lighting (TAC);
- (xvi) Turning Vehicle Templates (TAC);
- (xvii) Geometric Design Standards for Ontario Highways (MTO);
- (xviii) City of Ottawa Transportation Impact Assessment Guidelines;
- (xix) City of Ottawa Delivery Standards for CADD Drawing Files
- (xx) Roadside Safety Manual (MTO);
- (xxi) Ontario Traffic Manuals;
- (xxii) Sign Sheeting Memorandum, February 21, 2008 (MTO)
- (xxiii) Contract Design, Estimating and Documentation Manual (MTO)
- (xxiv) [REDACTED];
- (xxv) Electrical Engineering Manual (MTO)
- (xxvi) Policy – Municipal Work on MTO Traffic Signals, September 2008;
- (xxvii) MTO Policy – Roadway Lighting on Municipal Crossroads, October 24, 2003;
- (xxviii) Portable Variable Message Signs – Best Practices Manual (MTO)
- (xxix) Bikeways Design Manual;
- (xxx) Guidelines for Reducing Speed Limits in Construction Work Zones
- (xxxi) Ontario Provincial Standards Specifications and Standard Drawings (OPSS and OPSD);
- (xxxii) Ministry of Transportation Ontario Drawings (MTOD's)
- (xxxiii) Other relevant MTO Policy, Procedures and Guidelines;
- (xxxiv) Accessibility for Ontarians with Disabilities Act (AODA):
- (xxxv) Ottawa Accessibility Design Standards;
- (xxxvi) City of Ottawa Operation Policy, Procedures and Guidelines;

- (xxxvii) City Operating Policy and Procedures;
- (xxxviii) City of Ottawa Park and Pathway Development Manual;
- (xxxix) Multi-Modal Level of Service (MMLOS) Guidelines; and,
- (xl) NCC Standard Sign System Manual.

1.2 General Requirements

- (a) DB Co shall manage the traffic and transit impacts of the Project and shall develop a TTMP for the Project work to meet the requirements of this Part 7. DB Co shall manage and coordinate the TTMP developed under this Part 7 with DB Co's requirement to manage and develop the TTMP required for the Highway Works as prescribed in Schedule 15-2, Part 9, Part C – Traffic Management and Construction Access. The management and development of the TTMPs shall complement the requirements of the other respective TTMP and for further certainty neither TTMP shall diminish the other nor the requirements prescribed in this Part 7 and Schedule 15-2, Part 9 – Highway 417 Works.
 - (i) The TTMP for the Highway 417/416 MTO Work shall be applicable to the construction of the Highway Works only. The TTMP for the Confederation Line Extension and the TTMP for the Highway 417/416 MTO Work shall be complementary to one another.
- (b) DB Co shall develop and submit a traffic and transit management strategy and TTMP in accordance with Schedule 10 – Review Procedure that is acceptable to the City. DB Co shall cooperate with the City and OC Transpo with respect to the development of the traffic management strategy.
- (c) Further to the requirements of Schedule 15-2, Part 1, Article 10 – Construction Safety Management, DB Co shall identify in each Site Specific Safety Plan, the safety concerns and mitigation measures associated with each Work Site as pertains to the health and safety of the traveling public, from the perspectives of pedestrians, cyclists, general vehicle traffic, transit traffic, and transit customers. DB Co shall include a copy of each relevant Site Specific Safety Plan as an Annex to the TCP submission in accordance with Schedule 10 – Review Procedure. DB Co shall keep the Site Specific Safety Plan and the TCP current to the changes on Site, and resubmit the TCP accordingly. DB Co shall not proceed with any Work on Site without an accepted TCP which is current to the present-day Site Conditions.
- (d) DB Co shall work collaboratively and diligently in a reasonable manner with the City and OC Transpo, Stakeholders, ESP, other City service providers and the Relevant Authorities so that transit service is maintained during the performance of the construction in terms of travel time and frequency.

- (e) Construction shall be scheduled so that the duration and extent of the proposed Work and traffic control measures minimize the impact to all modes of transportation and adjacent land owners, and shall not prohibit any part of the traveling public access prior to receiving the required authorization to do so.
- (f) DB Co shall collect, record, document and file with the City, the travel times between existing Transitway Stations and stops for all bus routes and Facilities, prior to the commencement of any Work activity which would alter bus travel times. DB Co is advised to coordinate their collection of this data in advance with OC Transpo, as OC Transpo may be able to facilitate the collection of the data using their bus tracking system. This information shall be used by DB Co as the baseline travel times for comparison/evaluation of alternate/temporary bus routes. Baseline data shall be validated by the City to ensure that it is representative of normal operations and not affected by other road works.
- (g) All traffic data used for analysis for traffic management purposes shall be based on the most current data and shall be no older than two years. The information to be collected shall include, but not be limited to, all of the hourly traffic volumes and AADTs for all modes of travel on all Roadways, bus Facilities, bike facilities and pedestrian facilities which will be affected by the Project, including any potential detour routes. DB Co shall be responsible for obtaining or collecting all traffic data necessary for its traffic analysis, if traffic data less than two years old is not relevant to the traffic management analysis due to temporary conditions that existed at the time the data was collected. DB Co shall confirm with the City that the data is appropriate prior to conducting an analysis using said data.
- (h) DB Co shall undertake a traffic management study, where road capacity or LOS is reduced, to determine the impact of the construction on other routes and to determine appropriate mitigation measures. The traffic management study shall involve area wide traffic modeling to determine impacts to all modes of transportation including adjacent corridors impacted by the construction. The study shall include DB Co's forecast for, but not limited to, routes, diverted traffic volumes, speeds and travel times for all modes of travel on all routes subject to the study. The traffic management study shall be submitted as a part of the TTMP document in accordance with Schedule 10 – Review Procedure.
- (i) The traffic management strategy shall address the impact on residential streets of any diverted traffic through appropriate temporary and permanent traffic calming measures in accordance with City of Ottawa Area Traffic Management Principles and Guidelines and in consultation with OC Transpo along any detoured bus routes.
- (j) The OTM supersedes all reference in this contract document to the MTO MUTCD. The supply and placement of all necessary temporary TCDs shall be performed under the sole direction of DB Co and in accordance with DB Co's submitted/reviewed TTMP and associated TCP, prior to commencing any construction on or adjacent to a City street or Provincial Highway/freeway. The TCP shall be developed in accordance with guidelines established by the most recent version of the OTM, the OHSa and this Part 7 which details the required contents and submission of the TTMP and associated TCPs.

- (k) Vehicular and pedestrian/cyclist traffic control within the Project shall remain the sole responsibility of DB Co as the City delegates this authority to DB Co in accordance with the submitted/reviewed TTMP. Notwithstanding the foregoing, DB Co shall, at its own expense, remove any equipment or material, which in the City's opinion, constitute a Hazard to traffic, pedestrians and cyclists.
- (l) DB Co shall be fully and solely responsible to ensure the development and implementation of a submitted/reviewed TTMP as required in this Part 7. The TTMP, its sub-plans, and all required TCDs shall be designed/installed, monitored, operated/maintained and removed, utilizing only competent persons and workers as defined under the OHSA. DB Co shall be responsible for coordination of this Work with the City.
- (m) DB Co shall not store any equipment or materials on a federal, provincial or municipal road or the Roadway shoulders, Transitway, Park and Rides or boulevards, unless the storage areas are identified in the TCP and appropriate TCDs have been implemented to protect the equipment or materials. The City shall review and approve any storage of equipment and/or materials within the Lands. DB Co shall be permitted to use temporary closed lanes as a construction laydown and staging area, where temporary lane closures are permitted and approved by the City. Construction shall be scheduled so that the duration and extent of the proposed Work and traffic control measures minimize the impact on the traveling public. DB Co shall remove all dirt and debris from all paved or concrete surfaces outside of the staging area at the close of each workday, and shall be responsible for any repairs or maintenance associated with the construction activity, to the City standards.
- (n) The Permitted Periods for Closures outlined in this Part 7 shall be the basis for the development of the TTMP. Variations to the applicable Permitted Periods for Closures, at specific locations, may be permitted for such specific locations, but only if substantiated through a plan by DB Co that addresses, at a minimum, traffic requirements, analyses and Stakeholder consultation, where applicable, and such plan is submitted to and accepted by the City in accordance with Schedule 10 – Review Procedure.
- (o) All vehicle, transit, transit customer activity, pedestrian and cycling data used for analysis for traffic management purposes shall be based on the most current data, and no older than two years with growth factors acceptable to the City. DB Co shall be responsible for obtaining any vehicle, pedestrian and cycling data necessary for its traffic management analysis, where the City does not already have the data or cannot provide the data within DB Co's required timelines.
- (p) Implementation and removal of any closure, full closures, detour routes, Lane Shifts, and diversions and/or other changes in traffic patterns shall not be permitted outside of the applicable Permitted Periods for Closures as defined in this Part 7 and elsewhere in this Project Agreement. The City may, acting in a reasonable manner, temporarily adjust the applicable permitted periods for any closure in circumstances considered appropriate by the City including but not limited to, holidays, as further addressed in Clause 1.4 - Holidays and Special Events of this Part 7, incidents, and maintenance.

- (q) The City may direct DB Co, on 7 Business Days advance notice, to eliminate or modify any or all closures and restore free-flow traffic for a 24-hour period on the day of any event other than a holiday, as per this Part 7.
- (r) DB Co shall temporarily cease any relevant construction activities that are affecting traffic and make all the necessary travel lanes available to traffic as quickly as possible if the City determines that vehicular queues related to closure, full closures, detour routes, Lane Shifts and/or diversions are excessive. For example, where the extent of vehicular queues affect traffic operations such as at intersections or interchanges or the ability of vehicles on a highway mainline to exit at upstream interchange ramps.
- (s) At any time during the Project, the City Representative may, acting in a reasonable manner, temporarily adjust the applicable Permitted Periods for Closures identified in this Part 7, including but not limited to holidays (as further addressed in Clause 1.4 of this Part 7), incidents, and maintenance.
- (t) Any proposed DB Co initiated closure, full closures, detour routes, Lane Shifts, and diversions, not included in DB Co's accepted TCP, shall be submitted to the City in an updated TCP in accordance with Schedule 10 - Review Procedure. DB Co shall not proceed with implementation of the closure, full closure, detour, Lane Shift or diversion without an accepted TCP. DB Co shall not commence any Work on Site without an applicable current accepted TCP.
- (u) All Transitway, bus lanes, Roadway (excluding Highway 417 and Highway 416 with associated ramps), cycle and pedestrian facility permanent modifications not specifically described or depicted in the EA for the Project, or specifically referenced or shown in the Project Agreement, require Council approval prior to their construction. DB Co shall provide to the City a RMA report for the proposed modifications in accordance with requirements of the City's Transportation Impact Assessment Guidelines. A sample RMA report has been provided in Appendix A of this Part 7. The RMA shall be submitted to the City in accordance with Schedule 10 - Review Procedure. DB Co shall attend committee and Council meetings with the City, and provide assistance to the City in preparing a presentation for committee and Council, and assisting the City in answering any questions which arise at the meetings. Given that modifications vary in size and complexity, and that committee and Council agendas may become full, DB Co shall confirm with the City regarding the lead time required to have each particular item prepared and placed on a committee agenda for consideration, thence, forwarded to Council agenda for approval and final disposition, and allow for this time in their scheduling of the Project Work.
- (v) Multiple Work zones that impact each other along existing Provincial Highways, existing Major Municipal Roads, existing Minor Municipal Roads, existing Transitway, and other affected municipal or federal Roadways or routes between them, such that traffic encounters multiple disruptions and/or discontinuity in the lane geometries, shall not be permitted.

- (w) Access to/from Work zones along existing Provincial Highways, existing Transitway, and existing Major Municipal Roads shall not be permitted outside of the applicable Permitted Periods for Closures, unless separate acceleration and deceleration lanes are provided to/from such construction zones. Acceleration and deceleration lanes shall be designed in accordance with the Reference Documents and Applicable Codes and design standards taking into account all construction vehicle/equipment types.
- (x) Construction vehicles/equipment shall only use accesses to/from Work zones in the same direction of traffic thereby diverging/merging with the flow of traffic, in order to avoid crossing opposing traffic. The City reserves the right to close any access to/from any Work zone that it deems to be unsafe or which constitutes a Hazard to the public.
- (y) There shall be no open excavation adjacent to a lane carrying traffic including cyclists at any time, except where a barrier designed to restrain errant vehicles or cyclists is located between the traffic and the excavation.
- (z) DB Co shall remove materials and construction vehicles/equipment which, in the opinion of the City, constitute a Hazard or sight distance obstruction.
- (aa) DB Co shall be responsible for identifying to the City in advance all Roadways being utilized for haul routes. DB Co shall be responsible for ensuring haul routes are kept clean and free of construction dust and debris. DB Co shall submit a plan for the cleaning of haul routes in accordance with Schedule 10 – Review Procedure. Haul routes shall comply with City’s by-laws for goods movement and use of truck routes.
 - (i) DB Co shall be responsible for the cleaning and maintenance of any and all haul routes used to complete the Highway Work to the satisfaction of the City and MTO.
 - (ii) DB Co shall inventory and photograph road conditions before and after construction for the following locations:
 - A. SJAM Parkway;
 - B. Richmond Road;
 - C. OR174; and,
 - D. Any road which may be impacted due to debris from the Parkway Tunnel.
 - (iii) Road condition shall be restored to original or better condition than prior to construction, and to the satisfaction of the City.
 - (iv) DB Co shall determine the haul route and applicable load restrictions after consultation with the City, and shall comply with their requirements.
 - (v) DB Co shall submit a construction Haul Route Plan a minimum of 90 days prior to start of any construction activities. The Haul Route Plan shall be reviewed by

the City under the Review Procedure. The Haul Route Plan shall include the inventoried road conditions and photographs taken by DB Co prior to construction.

- (vi) The Haul Route Plan shall include, at a minimum, the following:
- A. Existing condition of municipal roads that will be used as haul routes;
 - B. A schematic of the general construction haul routes undertaken immediately adjacent to the Work;
 - C. A description of the construction equipment or vehicles, including type and quantities, as applicable that will be travelling on the identified haul routes;
 - D. DB Co's plan and approach to maintaining municipal haul routes as per requirements in this Article.

(bb) Seasonal Load Restriction Period

- (i) DB Co shall abide by the City's SLR period. If DB Co's schedule requires that an ODV exceeding the half-load limit be used on a non-full load truck route during the SLR period, DB Co shall conduct non-destructive Pavement deflection testing (such as falling weight deflectometer) during the summer prior to the SLR period, and again during the SLR period, and submit the results to the City a minimum of five calendar days prior to the required vehicle movement. The City will not issue an ODV permit during the SLR period without receipt of this data demonstrating that the road can accommodate vehicle loads exceeding the half-load limit.
- (cc) The City shall be granted access to the Work zone to install portable cameras or other devices required for monitoring, audit, public communication, data collection or other purposes.
- (dd) DB Co shall be responsible for providing, installing and maintaining all TCDs and protective devices identified in the approved TTMP.

1.3 Accommodation of Transit Services

- (a) DB Co shall be responsible for liaising and coordinating with all applicable municipal transit agencies for any modifications to bus routes and/or bus stops that may be required due to closures, full closures, detour routes, Lane Shifts and diversions and/or other changes in traffic patterns.
- (b) DB Co shall maintain access for transit customers to all adjacent existing and temporary Transitway and transit facilities, bus lanes, Transit Priority Lanes and non-Transitway routes through detours or otherwise as detailed elsewhere in this Part 7 and elsewhere in this Project Agreement, unless exceptions have been approved.

- (c) DB Co shall provide the City and OC Transpo at least 35 calendar days' notice to coordinate adjustments required to their facilities as a result of construction. Access by buses, pedestrians and cyclists to all existing bus stops or Platforms located within the Work zone shall be maintained at all times, except where otherwise stated in this Part 7, elsewhere in this Project Agreement, or as agreed upon by the City and OC Transpo. Where access cannot be maintained and temporary facilities are required, these facilities shall be comparable to the existing facilities in form/function, to the satisfaction of OC Transpo.
- (d) Proposed modifications to bus routes and/or bus stops shall be submitted in accordance with Schedule 10 – Review Procedure.
- (e) Any relocation of bus stops or shelters shall be preceded with signage prepared and posted by DB Co at the existing bus stops, Station or Platform indicating the location of the re-located bus stops, Station or Platforms with advance notification to the public of at least 35 calendar days subsequent to the review and acceptance of the relocation proposal by the applicable authority. Any relocation of bus stops shall include the provision of appropriate customer or operational facilities or infrastructure including but not limited to the requirements in Part 7, Appendix E of this Part 7, to City and OC Transpo standards and specifications. DB Co shall be responsible for liaising and coordinating with all applicable municipal transit agencies.
- (f) DB Co shall contact OC Transpo Transit Planning Staff at least 5 Business Days prior to starting construction where the TTMP has indicated that the proposed Work will interfere with bus or pedestrian access to/from a transit stop, in order to coordinate the temporary relocation of the affected transit stop(s) as may be required.
 - (i) DB Co shall contact OC Transpo Transit Planning Staff at least 20 Business Days prior to the relocation or removal of a bus shelter.
 - (ii) A temporary concrete shelter pad shall be required for the relocation of a bus shelter if the planned duration of Work is longer than 30 calendar days, unless otherwise indicated by OC Transpo staff.

1.4 Holidays and Special Events

- (a) DB Co shall comply with the following requirements when scheduling hours of Work or DB Co initiated closures during the holidays identified in Tables 7-1.1 and 7-1.2:
 - (i) DB Co shall not commence the implementation of any closures on any of the holidays, after 12:00 hrs on Fridays or a day proceeding a holiday weekend, and before 12:00 hrs on a day following a holiday or on the first Business Day following a holiday weekend.

TABLE 7-1.1 – ONTARIO STATUTORY HOLIDAYS

| | |
|----------------|------------------|
| New Year's Day | Civic Holiday |
| Family Day | Labour Day |
| Good Friday | Thanksgiving Day |
| Victoria Day | Christmas Day |
| Canada Day | Boxing Day |

TABLE 7-1.2 –OTHER HOLIDAYS

| | |
|--------------------------------------|-----------------|
| Easter Monday | Remembrance Day |
| St. Jean Baptiste (Highway 417 only) | |

- (b) DB Co shall minimize traffic disruptions on existing Provincial Highways, existing Major Municipal Roads, existing or detoured Transitway, bus detour routes and federal roads, existing Minor Municipal Roads and other affected Municipal and federal Roadways during special events. DB Co shall be responsible for obtaining a listing of planned special events on an as required basis from the City of Ottawa Events Central Office, the Traffic Management Special Events office, and the NCC, recognizing that the special events calendar is updated by the City and the NCC on a regular basis.

1.5 Detour Route, Lane Shift, Diversion, Closure and Construction Requirements

- (a) General
- (i) DB Co shall not implement any closure, detour, Lane Shift or diversion without an applicable current accepted TTMP and TTMP sub-plans.
 - (ii) DB Co shall pave all detour routes, Lane Shifts and diversions and have appropriate Pavement Markings and signs placed in accordance with the OTM, King's Highway Guide Signing Policy Manual (MTO Roadways) and City of Ottawa Operation Policies, Procedures and Transitway and Station Design Guidelines.
 - (iii) DB Co shall be responsible for all Pavement markings and non-regulatory signage on all detour routes, in preparation for the detour and during detour operations.
 - (iv) DB Co shall ensure that the Pavement structure and condition of any new, existing or temporary Roadway, bus lanes, bus detours routes, cycling facility and pedestrian facility used for all detour routes, Lane Shifts and diversions, including detour routes prescribed by the City, is designed and constructed for its intended

purpose in accordance with the requirements set out in Schedule 15-2, Part 2, Clause 6.10, and Schedule 15-2, Part 9, Part B, Clause 3.3, and does not adversely impact the safety and intended function of such detour routes, Lane Shifts and diversions for all road users of the facilities.

- (v) DB Co shall schedule construction activities such that no milled surface shall remain for more than five calendar days or over weekends. Each milled surface shall have a uniform texture, not be raveled, and not allow standing water on the surface.
- (vi) DB Co shall prepare an engineered design for each detour route, Lane Shift and diversion that shall conform to the Design Criteria requirements in the Reference Documents identified in Clause 1.1 of this Part 7.
- (vii) DB Co shall provide detour routes, Lane Shifts and diversions with Drainage facilities to prevent standing water and flow of water across the Roadway, bus lanes, cycling facilities and pedestrian facilities, including bus stops and Platforms.
- (viii) DB Co shall replace all on-street catch basins with curb inlet catch basins, in accordance with City standards, on transit detour routes where buses will be travelling in the curbside lane.
- (ix) Implementation and removal of any closure, full closures, detour routes, Lane Shifts and diversions and/or other changes in traffic patterns shall not be permitted outside of the applicable Permitted Periods for Closures.
- (x) Lane closure duration shall be limited to the time required to execute the necessary construction activities. DB Co shall not close a lane for purposes other than actual construction activities, such as, but not limited to, material and equipment storage, and staff parking, unless approved by the City.
- (xi) DB Co shall maintain access to all adjacent properties through all partial closures, full closures, detour routes, Lane Shifts and diversions.
- (xii) Detour routes, Lane Shifts and diversion requirements and any modifications thereto, shall be submitted in accordance with Schedule 10 – Review Procedure. The Work Submittal shall in addition include modifications to the various TTMP sub-plans as applicable.
- (xiii) All Project related closures associated with traffic of any kind shall be the responsibility of DB Co, as well as any associated requirements for traffic control (such as but not limited to signage, temporary Pavement markings, line painting, TCD, barriers, flag persons, point duty police, etc.). Closures and their ancillary requirements shall be submitted in accordance with Schedule 10 – Review Procedure.

- (xiv) DB Co shall prepare and submit Record Drawings to the City in accordance with the requirements of Schedule 15-2, Part 1, Article 16 – Record Drawings where new traffic signals, temporary traffic signals or modifications are being made to existing traffic signals, within 30 calendar days of signal activation.
 - (xv) All closures, detour routes, Lane Shifts and diversions shall be identified and included in Schedule 34 – Mobility Matters
 - (xvi) DB Co shall have independent Road Safety Audits and Road Safety Design Reviews completed for any temporary or permanent Roadway, Roadway detour, Transitway or Transitway detour, in accordance with the criteria set out in Schedule 15-2, Part 2, Article 6 – Roadways, Bus Terminals and Lay-Bys.
 - (xvii) DB Co shall reinstate to original condition, unless otherwise indicated elsewhere in the documents, and at DB Co expense, all Lands, Roadways, MUPs and assets affected by the implementation of the Confederation Line Extension.
- (b) Traffic Control Devices
- (i) DB Co shall supply, install and maintain PVMS as required to supplement the TCP and shall use the same to provide advance notification and advance warning of traffic pattern changes and other operational changes for traffic and/or transit. Sign locations and messages shall be as shown in the TTMP which shall be submitted to the City in accordance with Schedule 10 – Review Procedure. The City retains the right to require DB Co to provide additional PVMS in support of the TCP.
 - (ii) DB Co shall provide PVMS(s) to provide advance notification and advance warning of incidents as deemed necessary by the Emergency Traffic Plan. Sign messages and the duration that the PVMS is deployed and displayed shall be submitted to the City for acceptance prior to being implemented, and the TTMP shall be updated to record the messages which were used.
 - (iii) PVMS signs shall meet the following requirements:
 - A. Be capable of displaying a sequence of up to 6 panels;
 - B. Each display panel shall be capable of displaying up to three lines;
 - C. Each line of text shall accommodate up to 12 characters; and,
 - D. Messages shall be legible from 50 to 300 m.
 - (iv) DB Co shall utilize bilingual messages on all PVMS signs and message boards.
- (c) Traffic Counting Equipment

- (i) DB Co shall be responsible for the replacement of any counting loops or any other traffic counting equipment negatively impacted or damaged by the construction Work.
- (d) Temporary Barrier Requirements
 - (i) DB Co shall supply and install temporary barriers based on the requirements of the OTM, OHSA and the Roadside Safety Manual.
 - (ii) DB Co shall show the temporary barriers in the TCP which shall be submitted in accordance with Schedule 10 – Review Procedure.
 - (iii) Temporary barriers used for closures, full closures, detour routes, Lane Shifts and diversions, including those along the Transitway, shall meet the OPSS and have appropriate flare offsets, end treatments and crash cushions. Temporary barriers shall have reflectors installed. DB Co shall make adequate provision for Drainage and removal of snow, ice and debris where temporary barriers are used.
 - (iv) DB Co shall install anti-glare screens, on or adjacent to barriers, in order to avoid driver distraction and headlight glare in locations adjacent to existing Provincial Highways, existing Major Municipal Roads, existing Transitway, existing Minor Municipal Roads and other affected municipal, provincial and federal Roadways. Anti-glare screen requirements shall also be applicable during construction in these areas and driver protection shall be provided. DB Co shall submit the documentation and product samples proposed for anti-glare screens in accordance with Schedule 10 – Review Procedure.
- (e) Signage
 - (i) DB Co shall be responsible for the design, supply, installation, relocation, maintenance and removal of all temporary signage and Pavement markings, including warning, guide, advisory and directional signs in accordance with this Part 7, Schedule 15-2, Part 2 – Civil and Guideway, and City Special Provision D-005.
 - (ii) DB Co shall provide all temporary signage in accordance with the City of Ottawa, OTM and MTO standards. The location, size and type of each sign shall be indicated on the TCP.
 - (iii) DB Co shall supply and install bilingual signs, with translations accepted by the City and MTO for Highway 417/416.
 - (iv) There shall be no temporary signage placed between the bullnose of an off-ramp and the bullnose of a downstream on-ramp with the exceptions noted below:
 - A. Wa-33LR Object Marker Sign;
 - B. Wa-132 Ramp Speed km/h Sign;

- C. Wa-109 Chevron;
 - D. Post-mounted Delineators;
 - E. Wa-175 Truck Overturning Sign & Wa-32t km/h Sign; and
 - F. G.f-104 Ground Mounted Exit Sign.
- (v) DB Co shall prepare and submit as a part of the TTMP sub-plans a temporary signing plan and a temporary signing table a minimum of 30 calendar days prior to the implementation of the plan. The temporary signing table shall include, but, not be limited to information detailing sign location (station of final location, removal location and on which side of the road to be installed in relation to the direction of travel), height to bottom of sign, lateral offset to post #1, support type with dimensions, alpha-numeric sign code with dimensions and the message/description. The temporary signing plan for Highway 417/416 shall be combined into one drawing at a scale of 1:1000.
- (vi) DB Co shall be responsible during construction to identify to the City any requirements to remove, install or modify any necessary regulatory signage due to the requirements of the TCP sub-plans (except for Highway 417/416). DB Co shall notify the City 14 calendar days prior to requiring any modifications of signage. DB Co and the City shall provide and install regulatory signage in accordance with their respective responsibilities per this Part 7, Schedule 15-2, Part 2 – Civil and Guideway, and City Special Provision D-005.
- (vii) DB Co shall be responsible to install and remove all necessary construction signage for any proposed detour routes. DB Co shall notify the City a minimum of 14 calendar days in advance of the requirement for the detour.
- A. 20 Business Days shall be required where a detour requires bus shelter relocation.
- (viii) After the completion of construction, the City will provide and install all required regulatory signage (except for the Highway 417/416 corridor including crossing roads).
- (ix) Project information signage will be provided by the City. DB Co shall install project information signage at locations designated by the City.
- (x) DB Co shall be responsible for contacting the appropriate City representative to confirm, in writing, the official municipal road names as well as Civic Address Signs (911 Identification Numbers and signing) requirements and incorporate such signs in the permanent and temporary Pavement and signing design drawings. The location, size, and type of each sign shall be also indicated on DB Co's TCP.

- A. DB Co shall ensure that the above noted signs are in place at all times.
 - B. Temporary relocation due to construction operations shall be permitted but the address numbers shall be in the proximity of the entrance and be made visible throughout the duration of construction.
 - C. DB Co shall replace any damaged signs immediately.
- (xi) The temporary signing plan and temporary signing table shall be submitted to the City in accordance with Schedule 10 - Review Procedure, 30 calendar days prior to implementation of the plan.
- (f) Temporary lighting during construction (except Highway 417/416)
- (i) DB Co shall be responsible for all temporary street light relocation.
 - (ii) All existing lighting in each staging phase shall be maintained in operational order to applicable standards during construction on the relevant construction phase until such time as replacement temporary or permanent lighting is energized.
 - (iii) Temporary illumination shall be provided to applicable standards for the roads to accommodate traffic detours and diversions in accordance with City of Ottawa's Right of Way Lighting Policy Guidelines and standards, the OPSS 601.
 - (iv) DB Co shall ensure existing street light levels are maintained at all times. Where existing lighting needs to be removed as part of the Work DB Co shall install replacement temporary lighting until such time as the new permanent lighting is energized.
- (g) Pavement Drop-Offs
- (i) DB Co shall perform all construction activities so as to minimize any drop-offs (abrupt changes in Roadway elevation) left exposed to traffic, pedestrians and cyclists during non-working hours. Work shall be performed in accordance with Schedule 15-2, Part 2 – Civil and Guideway. Drop-offs left exposed to traffic, pedestrians and cyclists during non-working hours shall be delineated as follows:
 - A. Drop-offs up to 40mm may remain exposed with appropriate TCDs alerting motorists of the condition. However, no drop-offs shall be allowed between adjacent lanes of traffic;
 - B. Drop-offs greater than 40mm that are in the Roadway or shoulder shall be delineated with appropriate TCDs and further delineated as described in Clauses C and D below;
 - C. Drop-offs greater than 40mm shall be protected based on the OHS/CCOHS requirements;

- D. Ramping shall be provided for vehicular traffic at a slope of 10:1 if the elevation difference, where unavoidable.
 - i. The provisions for temporary ramping shall also meet the requirements of OPSS 313.
 - ii. DB Co shall ensure that adequate and positive Drainage is maintained along and across the Roadway at all times and during all construction stages.
 - iii. Temporary ramp downs of the longitudinal joint shall not be permitted between travel lanes in the same direction. Transverse and longitudinal ramp downs shall not form part of the permanent Pavement, and shall be cut back to its full depth and width on a straight line to expose a vertical face prior to placing the adjacent lane.
- E. All transverse edge drops located on roads utilized by transit shall be ramped at a slope of 10:1.
- (ii) All areas of excavation near areas of traffic and their proposed safety measures shall be shown in the TTMP.
- (iii) All Work shall meet AODA requirements at all times.
- (h) Pavement markings, symbols and devices
 - (i) DB Co shall be responsible for the execution of all Pavement markings and symbols in accordance with this Part 7 and Schedule 15-2, Part 2 – Civil and Guideway.
 - (ii) DB Co shall be responsible for the installation, application, maintenance and removal of all temporary Pavement markings, symbols, Roadway Pavement markers, channelizing devices, barricades, reflective devices, etc., in accordance with the OTM, and all of which shall be specified and detailed in the TTMP which shall be submitted to the City in accordance with Schedule 10 – Review Procedure.
 - (iii) DB Co shall eradicate all redundant temporary or permanent Pavement Markings that are not required for the intended traffic pattern when traffic lanes will be redefined for a duration of more than an Intermittent Period.
- A. Eradication of Pavement markings shall be in accordance with City of Ottawa Special Provision D-005, such that removal of Pavement markings, when necessary, shall be by means of asphalt grinding, sandblasting, soda blasting or some other form of mechanical removal and not by the use of black paint.

- B. On arterial roads or on OR174, the City may specify that soda blasting be the means of Pavement marking eradication, in the event that clear Pavement marking visibility is seen to be essential to the safe operation of the roadway.
- C. DB Co shall resurface all locations where scarring of Pavement occurs due to the removal of Pavement Markings for construction staging. Resurfacing requirement shall apply to all locations where more than one Lane Shift or diversion occurs. DB Co shall provide full width paving throughout the limits of the scarring prior to the application of permanent Pavement Markings
- (iv) Temporary Pavement markings materials shall be in accordance with OPSS 710, and shall be specified and detailed in the TTMP.
- (v) DB Co shall apply all temporary Pavement markings in accordance with OPSS 710 and the accepted Signing and Pavement Markings drawings and the closure, detour route, Lane Shift and diversion drawings as submitted to the City in accordance with Schedule 10 – Review Procedure.
- (i) Speed limits and safe passage through Work zones
 - (i) The City reserves the right to determine speed limits through the Work zones. Unless specified in this Part 7 or agreed to in writing by the City, the existing regulatory speed limits shall be maintained.
 - (ii) Speed limits on all existing Provincial Highways, existing Major Municipal Roads, existing Transitway, Minor Municipal Roads and other affected municipal, provincial and federal Roadways shall remain unchanged outside of construction zones. DB Co shall prepare the necessary designation of MTO construction zone forms, (PH-M-101), if Work occurs on a Provincial Highway, and submit them to the Governmental Authority.
 - (iii) Construction activities on all existing Provincial Highways, existing Major Municipal Roads, existing Transitway, Minor Municipal Roads, and other affected municipal and federal Roadways shall maintain the following lane widths at all times during construction activities, unless specified elsewhere in this Part 7 or in Schedule 15-2, Part 2 – Civil and Guideway:

Table 7-1.3

| | Speed Limit = 50 km/h or less | | Speed Limit = greater than 50 km/h | |
|-----------------|-------------------------------|--------------|------------------------------------|--------------|
| | Not Shared | Shared Lane* | Not Shared | Shared Lane* |
| General Traffic | 3.0 m | 3.75 m | 3.2 m | 3.75 m |

| | | | | |
|--|---|--------|--------|--------|
| Truck Route | 3.2 m | 3.75 m | 3.5 m | 3.75 m |
| Transit Operating in Lane** | 3.5 m | 4.0 m | 3.5 m | 4.0 m |
| Lanes Adjacent to Transit Platforms | As per Transitway and Station Design Guidelines | - | - | - |
| Lateral Offsets between Traffic and Temporary Barriers | 0.25 m | | 0.50 m | |

** Shared lanes are all right-most traffic lanes that are not adjacent to an on-road cycling facility.*

***Where BOL are constructed and physically separated from other roadways (i.e. Transitway), a 1m wide maintenance strip shall be provided on the outside of each lane, in addition to the standard minimum lane width.*

- (iv) Floodlighting used to illuminate areas of the Work during construction, shall be adjusted so as to not interfere with the vision of drivers on the affected or opposing lane and also so as to not be directed towards residences or businesses near the construction zone. DB Co shall design floodlighting in accordance with Schedule 15-2, Part 2, Article 6 – Roadways, Bus Terminals and Lay-bys.
- (v) All street lighting design and performance shall be in accordance with Schedule 15-2, Part 2, Article 6 – Roadways, Bus Terminals and Lay-bys.
- (j) Maintenance of closures, detours, diversions, Lane Shifts, pathways and sidewalks
 - (i) DB Co shall keep existing Roadways open to traffic, and DB Co shall be responsible for providing and maintaining a road through the Work for the duration of the Work, whether along an existing Roadway, including the road under construction, or on detours, diversions or Lane Shifts.
 - (ii) DB Co shall maintain and repair closures, detours, diversions, Lane Shifts, pathways and sidewalks and their appurtenances, which are built as permanent infrastructure, as per the maintenance provisions set out in this Part 7 for temporary infrastructure until such time as they are turned over to the City and accepted by the City.
 - (iii) DB Co shall be responsible for all aspects of maintenance and repair for all temporary closures, detours, diversions, Lane Shifts, pathways and sidewalks and their appurtenances throughout their duration of use.
 - (iv) DB Co shall execute the maintenance on temporary infrastructure, including Platforms, pathways and sidewalks, throughout its duration of use:
 - A. in accordance with Applicable Law and Good Industry Practice;

- B. in accordance with the accepted TTMP;
 - C. to ensure that the condition of the DB Co temporary infrastructure is sufficient to meet the design, construction and operational requirements for the intended use; and
 - D. in coordination with the City, so as to permit the City to operate City infrastructure, while minimizing any adverse impact on third parties.
- (v) DB Co shall convene a meeting with the City, including but not limited to, City Road Services Department and City Traffic Services Department, in order to coordinate maintenance activities at the interface between existing City infrastructure and the DB Co temporary or permanent infrastructure, prior to putting a piece of temporary or permanent transportation infrastructure into service. DB Co shall take minutes of the meeting and, distribute the documented proceedings and conclusions to the participants.
- (vi) On the first Monday after Thanksgiving each year, DB Co shall convene a meeting with the City, including but not limited to, City Road Services Department and City Traffic Services Department, to discuss “winter readiness”, so that all parties know their respective roles prior to a sudden onset of winter weather. DB Co shall take minutes of the meeting and distribute the documented proceedings and conclusions to the participants.
- A. The City shall be responsible for winter maintenance on all public roads, including bus detour routes, as per the City of Ottawa Maintenance and Quality Standards for Roads, Sidewalks and Pathways. DB Co shall be responsible for winter maintenance at locations where construction conditions do not allow for the City to provide this maintenance without changing their means/methods.
 - B. DB Co shall be responsible for the winter maintenance of any construction Roadways or accesses to construction Sites.
 - C. DB Co shall provide to the City a map indicating the DB Co contact person for each construction Site.

1.6 Accommodation of Pedestrians and Cyclists During Construction

- (a) DB Co shall not close or relocate any pedestrian walkway without a TTMP that has been accepted by the City. The TTMP and TCP sub-plans shall identify any pedestrian walkway closure, relocation and alternate route in accordance with Schedule 10 - Review Procedure, complete with a detailed explanation of why the Pedestrian Walkway is required to be closed or relocated and the signs which shall be installed as a part of the closure or relocation.

- (b) All pedestrian and cyclist accommodations during construction shall be in accordance with Schedule 15-2, Part 6 – Urban Design, Landscape Architecture and Connectivity Requirements.
- (c) DB Co shall identify all school crossings within a detour route, Lane Shift or diversion, and determine appropriate measures to maintain safe and efficient operation of the crossings as may be affected by increased vehicle traffic on the detour, Lane Shift or diversion.
- (d) DB Co shall ensure that pedestrian access at and approaching intersections is maintained at all times at least on one side to accommodate the north-south and east-west crossings, and extending to the adjacent intersections.
- (e) DB Co shall ensure that pedestrian access at least on one side across any Bridge Structures is maintained at all times, and extend to the nearest intersection.
- (f) DB Co shall install a TC-68 “Bike Lane Closed” at a location where cyclists can safely merge with traffic, and provide the following signage should it be necessary to close a bike lane or cycle track:
 - (i) For lane widths greater than 4m: a WC-19 and WC-19S “Car and Bike Share the Road”; and
 - (ii) For lane widths 4m or less: a WC- 24 and WC-24T “Shared Use Lane Single File”.
- (g) DB Co shall post advanced on-Site notification for any closures or relocation of pedestrian and cycling routes at least 15 Business Days prior to the closure, subsequent to the review and acceptance of the proposed closure by the Governmental Authority. Signage shall indicate the dates and duration of any closure as well as a map of alternative routes available.
- (h) DB Co shall undertake a safety study for situations where a construction access must cross a sidewalk, pathway, MUP or cycling facility, in order to evaluate the potential conflict between pedestrian/cyclist versus construction traffic, and develop appropriate safety measures in order to maintain a safe and efficient crossing at all times. DB Co shall incorporate the safety study and measures into the TTMP, TCPs and the Site Pedestrian Control Plan.
- (i) Detour routes for pedestrians and cyclists shall be designed in accordance with City standards including but not limited to those set out below;
 - (i) The detour route shall be illuminated to at least the level of lighting either direct or indirect, which was in existence on the original sidewalk, pathway, cycling facility, or MUP;

- (ii) The vertical and horizontal separation from vehicle traffic shall be as per the original sidewalk.

1.7 Working within Vicinity of a Traffic Control Signal

- (a) DB Co shall notify and be responsible for all costs associated with OPS being on duty to control traffic, when DB Co is required to work within 30m of a traffic control signal, and there is a need to control traffic within this area that would contradict the traffic control display. Advanced notice of 48 hours shall be provided to OPS. No traffic control person shall be permitted to direct traffic in this area, nor may they direct traffic from more than one direction at any time. DB Co shall notify the City of this situation prior to OPS contact.
 - (i) DB Co shall provide OPS if the visibility of the signal display will be blocked by equipment, lanes are skewed through the intersection or traffic control persons are required within 30m of a signalized intersection.

1.8 Parking and Designated Use Zones

- (a) Parking regulations on City streets in the vicinity of the construction zone will be enforced and shall be subject to the City's Parking By-Law.
- (b) DB Co shall designate safe parking areas suitably located so as to facilitate practical Site inspections related to traffic monitoring, and attendance at Project meetings, in the TTMP. These areas shall be for the use of the City for the duration of the construction. Each parking area shall accommodate a minimum of two vehicles and be reserved for City staff.
- (c) DB Co shall be responsible for identifying in their TCPs any locations where existing parking or designated usage zones will be impacted by its construction activities. DB Co shall develop and submit in conjunction with their TCP submittals, a plan to provide alternative parking location(s) and usage zones, in accordance with Schedule 10 – Review Procedure, for review and acceptance a minimum of 30 calendar days in advance of impacting any parking locations.

1.9 Temporary Traffic Control Signals

- (a) All traffic signal design and performance requirements shall be in accordance with Schedule 15-2, Part 2, Article 6 – Roadways, Bus Terminals and Lay-bys.
- (b) Where required to complete the Work, the City will supply temporary traffic control signals, for existing and new locations identified in DB Co's approved TTMP. Following the completion and acceptance of civil and traffic signal designs, DB Co shall contact the City's designated traffic control signal contact person at least 30 calendar days in advance to arrange for a mutually acceptable date and time to have City forces available to perform the installation, relocation, modification, and connection of the traffic control signal.

- (c) DB Co shall complete the related civil Work at least 14 calendar days prior to the date when City forces are available in order for appropriate inspections to occur. Prior to the crew arriving on Site, DB Co shall provide adequate space and time for the Work to be completed.
- (d) Where there is active ongoing construction Work and DB Co personnel are present within an intersection where there are existing traffic control signals to be temporarily modified, or new temporary traffic control signals to be installed, DB Co shall arrange and pay for OPS paid-duty officers to provide point duty within an intersection while the City modifies or installs the traffic control signals.
- (e) At an intersection where there are existing traffic control signals to be modified temporarily, or there are temporary traffic control signals to be installed, and only City forces will be working at the intersection, then the City will arrange for the OPS services and charge the costs back to the DB Co as part of the costs for the signal modifications/installation where DB Co personnel are not present.

1.10 Record Keeping of Traffic Control Devices/Collisions

- (a) DB Co shall maintain accurate records of the traffic controls that are in place within DB Co's construction Work areas.
- (b) DB Co shall maintain an accurate daily record of the inspection of the traffic accommodations, and provide copies of the information to the City immediately upon request. The daily record shall include the following:
 - (i) A semiweekly video (hand held, dash-cam, etc.) in both or all directions as applicable, such that all portions of the Work are recorded in sufficient detail to accurately see and distinguish/read all of the TCDs in place on Site;
 - A. On Highway 417 and the OR174, these videos shall be twice daily.
 - (ii) Condition and placement including changes, additions and removals of all TCDs;
 - (iii) Confirmation of compliance with the TTMP and its sub-plans;
 - (iv) All traffic collisions;
 - (v) The dates, times and content of all messages on all PVMS;
 - (vi) The date and time of lane closures; and
 - (vii) All other information required for accurate reconciliation of the lane closures adjustments pursuant to Schedule 34 - Mobility Matters.

1.11 Traffic Systems Management Provisions

- (a) DB Co shall be responsible for costs related to City forces supplying and installing traffic camera monitoring systems for the Project corridors and Stations, and also any temporary facilities/infrastructure operated during construction. The City shall procure the equipment and provide labour, however, for clarity, DB Co shall reimburse the City for these costs. DB Co shall be responsible for providing power and system connectivity to the specific locations selected by the City. Traffic cameras shall be required within the Project corridors, Stations and temporary facilities/infrastructure at the City's discretion, for the purposes of observing traffic flow with the capability of zooming in for more specific detail where required to monitor a specific incident. The cameras shall be linked into the City of Ottawa Traffic Control Centre for monitoring purposes. Cameras shall comply with City specifications.
- (b) DB Co shall develop and execute a monitoring plan, as per the TTMP, that utilizes new and existing City traffic camera systems that provides full coverage of the Project corridors, Stations and temporary facilities/infrastructure. DB Co's plan shall include strategically located cameras to achieve this goal. The City will provide DB Co with an inventory of existing City traffic camera coverage within the Project corridors.
- (c) New traffic camera locations shall include, but not be limited to, the following signalized intersections: St. Joseph Boulevard at Bearbrook Road, Trim Road at the Trim Road Park and Ride Entrance, Scott Street at Churchill Avenue, SJAM Parkway at Remic Rapids, SJAM at Dominion Station, Iris Street at Transitway, Bayshore Drive at Woodridge Crescent, Holly Acres Road at Bayshore Station Entrance / Highway 417 ramps, Woodroffe Avenue at Highway 417 E-N ramp, Scott Street at Goldenrod Driveway/Tunney's Pasture Station entrance, Carling Avenue at Richmond Road, Richmond Road at Edgeworth Avenue.
- (d) DB Co shall consult with the City to prepare an inventory of the location of existing traffic cameras and ITS devices that will be impacted by road construction. DB Co shall provide the City with 30 calendar days' notice prior to the impact on the devices and shall work with the City to relocate the devices.
 - (i) DB Co shall be responsible for providing a new location and utility hook ups where required.
 - (ii) The City shall be responsible for equipment relocation and connections.

1.12 Communications

- (a) DB Co shall ensure that all communications and Stakeholder engagements in relation to the TTMP are in accordance with Schedule 18 – Communications and Stakeholder Engagement Obligations and as further detailed in this Clause 1.12 of this Part 7.
- (b) DB Co shall be responsible for providing road closure and detour information to the City for the purposes of public notification.

- (c) DB Co shall schedule and attend TTMP meetings and workshops with the City in order to obtain TTMP approvals and with key Stakeholders prior to implementation. The frequency of the meetings shall vary at the City's discretion. DB Co shall record and distribute minutes for these meetings to the City within five Business Days of the meeting, including but not limited to attendance sheets, agenda, record copy of material presented, comments received, issues raised, and the follow up action proposed by DB Co to resolve each issue. Resolution of the issues shall be raised and recorded by DB Co at the regularly scheduled TTMP meetings.
- (d) DB Co shall attend any public meetings that are held prior to detour implementation, and shall be responsible for addressing issues raised at the public meetings in the forum of the technical TTMP meetings.
- (e) DB Co shall provide the City with a process as part of the Communication and Stakeholder Engagement Plan detailed in Schedule 18 – Communications and Stakeholder Engagement Obligations, and a contact person to whom the City can rely on to respond to any Stakeholder relations obligations pertaining to traffic management. Issues and the resolutions thereto shall be raised and recorded by DB Co at the regularly scheduled Traffic Management Committee meetings.
- (f) DB Co shall assist the City and attend Stakeholder events and Stakeholder outreach meetings in relation to the TTMP in accordance with Schedule 18, Part 4 Communications and Stakeholder Engagement Activities. At these events and meetings, DB Co shall explain in terms easily communicated to the public, the process of how the specific segment of the Project will be built, with a focus on an overview of the proposed traffic closures and detours/alternate routes for pedestrians, cyclists and vehicles, and how the related traffic/transit management staging is proposed to be performed.
- (g) DB Co shall provide design illustrations, display boards and narratives to the City for the traffic related information such as traffic volumes, traffic detours/alternate routes, traffic Emergency/contingency plans, collision data, truck routes, construction traffic routes, etc. All material provided shall be dated and include a contact name and contact coordinates (DB Co & City jointly). All materials shall be provided in quantity for distribution in both hard copy and electronically, in both official languages.
- (h) DB Co shall provide timely e-mail content for the City's distribution regarding traffic/transit updates, including major cycling route impacts.
- (i) DB Co shall provide to the City, content for weekly traffic/transit information/forecast updates, for release to the City's website.
- (j) DB Co shall provide a quarterly newsletter reflecting key traffic milestones and forecast traffic events to the City for release to the public.
- (k) DB Co shall provide timely content for social media updates to the City for release on the City's social media accounts so as to inform followers as to quick updates about on-the-ground traffic control implementation.

- (l) DB Co's Director of Communications and Stakeholder Engagement shall be the spokesperson whom the City will contact to address all Project related complaints pertaining to traffic/transit management issues which are reported to the City, unless an alternate spokesperson has been agreed to by the City. The spokesperson shall provide pertinent and timely information to the City in response to the complaint.

ARTICLE 2 EXISTING MUNICIPAL ROADWAYS

2.1 General Requirements - Municipal Roadways

- (a) DB Co shall not perform any Work on Municipal Roadways during the following Peak Periods unless noted as an exception in this Part 7:
 - (i) Monday to Friday inclusive: 06:30 to 09:30 hrs and 15:00 to 18:30 hrs
- (b) DB Co shall not close the reserved transit priority lanes from 06:00 to 18:30 hrs, Monday to Friday.
- (c) DB Co shall be permitted to partially close portions of Municipal arterial and collector Roadways due to construction activities while always maintaining local traffic access. There shall be at least one lane per direction (or two lanes per direction for segments with three existing lanes in each direction) and sufficient lane widths to accommodate bus travel.
- (d) DB Co shall schedule intersection disruptions during Off Peak Periods, Night Periods or Weekend Periods only. During those periods, there shall be at least one lane of traffic per street permitted at all times. Flagging shall be required if a single lane of traffic is in operation during construction activities. No active Work shall be performed in an intersection during Peak Periods.
- (e) DB Co shall develop a sequencing plan to minimize the length of the Municipal Roadway that is closed at any one time.

2.2 Conditions of Work on Municipal Roadways

- (a) DB Co shall provide at least 28 Business Days advance notice in the form of an e-mail to the designated City representative for all closures, detours and diversions.
- (b) DB Co shall only be permitted to close any existing Municipal Roadways for purposes of carrying out Work under this Project after all other safe and reasonable methods of construction have been investigated by DB Co and deemed not to be feasible or practicable.
- (c) DB Co shall maintain two-way traffic at successive intersections on either side of a closed intersection at times of the closure.
- (d) DB Co shall maintain a pedestrian sidewalk in accordance with City Design standards at all times during the construction. DB Co shall be responsible for all design, approvals, construction and maintenance of the sidewalk for the duration of the detour.
- (e) DB Co shall not use accesses to/from Work zones, shoulder closures, and the loading and unloading of materials and construction vehicles/equipment to/from the travelled portion of existing Municipal Roadways during Peak Periods on any weekday. Exceptions to this shall be made for the delivery of concrete.

- (f) DB Co shall accommodate all turning movements at intersections at all times, unless specified elsewhere in this Schedule 15-2 – Design and Construction Requirements. This includes all protected auxiliary turn lanes.
- (g) DB Co shall make all travel lanes available during non-work times unless construction activities has rendered them temporarily unsuitable for traffic use, or unless a closure was approved by the City.

2.3 Permits from the City of Ottawa

- (a) DB Co shall follow the approach, with regards to obtaining the relevant permits and approvals, outlined in the City of Ottawa Permits, Business Licenses and Applications – Right of Way.
- (b) Road Cut Permit
 - (i) DB Co shall obtain a Road Cut Permit prior to the start of Work on any municipal Roadway. The requirements of the Road Cut Permit are outlined in City of Ottawa By-Law — Road Activity By-Law No. 2003-445.
 - (ii) DB Co shall ensure that an application for a Road Cut Permit contains a reference to the Project and shall include the TCP sub-plan (as submitted to and accepted by the City in accordance with Schedule 10 – Review Procedure) with their application. If as a result of the Road Cut Permit approval process the TCP is revised, DB Co shall submit the revised TCP to the City in accordance with Schedule 10 - Review Procedure for re-acceptance, and, shall update and resubmit the TCP sub-plans to reflect the changes found in the approved Road Cut Permit version of the TCP.
- (c) Road Close Permit
 - (i) DB Co is required to obtain Road Close Permits prior to closing municipal Roadways as specified elsewhere. DB Co shall submit the road closure request forms no later than 4 weeks prior to each closure event.
 - (ii) DB Co shall ensure that an application for Road Close Permit contains a reference to the Project and shall include in their application, the relevant portion of the TTMP as submitted to and accepted by the City in accordance with Schedule 10 – Review Procedure. If as a result of the Road Close Permit approval process the TCP is revised, DB Co shall submit the revised TCP to the City in accordance with Schedule 10 – Review Procedure for re-acceptance. It shall include the updated TCP and sub-plans to reflect the changes found in the approved Road Close Permit version of the TCP.
- (d) Private Approach Permit

- (i) DB Co shall obtain a Private Approach Permit for any Site access from municipal Roadways.
 - (ii) DB Co shall ensure that an application for a Private Approach Permit contains a reference to the Project and shall include in their application, the relevant portion of the TTMP as submitted to and accepted by the City in accordance with Schedule 10 – Review Procedure. If as a result of the Private Approach Permit approval process the TTMP is revised, DB Co shall submit the revised TTMP to the City in accordance with Schedule 10 – Review Procedure, for re-acceptance. It shall include the updated TTMP and sub-plans to reflect the changes found in the approved Private Approach Permit version of the TTMP.
- (e) OC Transpo Permits
 - (i) DB Co shall not carry out any Work on bus-only lanes, the Transitway, or any bus facilities, without completing the Transitway Access Permits and receiving approval from the City and OC Transpo.
 - (ii) When an application for an OC Transpo Permit is made for the Project or any portion thereof, DB Co shall ensure that an application for an OC Transpo Permit contains a reference to the Project and shall include in their application, the TCP as submitted to and accepted by the City in accordance with Schedule 10 – Review Procedure. If as a result of the OC Transpo approval process the TCP is revised, the DB Co shall submit the revised TCP to City in accordance with Schedule 10 - Review Procedure for re-acceptance, and, shall update and resubmit the TTMP and sub-plans to reflect the changes found in the approved OC Transpo version of the TCP.
 - A. The TCP shall be approved by the City at least 14 calendar days prior to any detour or construction activity that has operational impacts on transit service. If the action is an extended detour or requires a shelter relocation, notification shall be provided as otherwise specified in this Part 7.
 - B. The submission of a TCP does not constitute advance notice, which does not include timelines for potential revisions to the TCP.
- (f) Noise Bylaw Exemption
 - (i) DB Co shall apply and obtain an exemption to the City Noise Bylaw if required for evening/night Work. Note: a Noise Bylaw exemption is not required for Work conducted Monday through Saturday between 07:00 and 22:00 hrs and Sunday between 09:00 and 22:00 hrs.

2.4 Richmond Road (Arterial)

- (a) Within the Richmond Road corridor, from Pinecrest Road to Churchill Avenue, the following constraints shall be followed:

- (i) DB Co shall be permitted to perform partial closures of Richmond Road (or portions thereof while always maintaining local traffic access). Access shall be maintained for local vehicle, ESP, garbage removal and pedestrians to buildings and loading areas/docks/bays. Provisions for on street loading for local businesses on each block shall be maintained at all times during the closure. DB Co shall develop a sequencing plan to minimize the length of Richmond Road that is closed at any one time.
- (ii) DB Co shall be permitted to utilize single lane closures as construction access and/or staging areas during Station and Tunnel construction activities within the Richmond Road ROW from Cleary Avenue to McEwen Avenue, provided that two-way traffic is maintained on Richmond Road.
 - A. The lane closures on Richmond Road shall not be permitted at intersections within the Richmond Road ROW.
 - B. DB Co shall be permitted to use decking where required to maintain two-way traffic on Richmond Road, however every effort should be made to reduce the amount of decking used.
 - C. The use of the temporary closed lane for construction access and staging is subject to satisfying all of the transit, traffic, private access and pedestrian requirements identified elsewhere in this Part 7.
 - D. The construction access and staging area shall be protected and separated from transit, traffic and pedestrians by a physical barrier.
 - E. DB Co shall identify all proposed construction access and staging areas and incorporate them into the TTMP.
 - F. The construction lay-by and staging areas shall be removed and lanes restored for traffic purposes when there are no active construction activities.
- (iii) DB Co shall maintain a continuous east to west pedestrian sidewalk, that is a minimum 1.8m clear width, at all times during the construction along the north side of the Richmond Road corridor from Cleary Avenue to McEwen Avenue. DB Co shall be responsible for all maintenance of the sidewalk for the duration of time the detour is in service, with the exclusion of winter maintenance, which will be the responsibility of the City.
- (iv) The full closure of the intersections of Woodroffe Avenue/Richmond Road and Cleary Avenue/Richmond Road shall not be permitted at any time. Work at these locations shall be decked to maintain full traffic and pedestrian movements in all directions at all times.

- (v) The partial closure of the Richmond Road/Woodroffe Avenue intersection shall be scheduled during Off Peak Periods only. All movements must be maintained during partial closures of the Richmond Road/Woodroffe Avenue intersection. Pedestrian access at, and approaching, the intersection shall be maintained on a minimum one side, at all times to accommodate the north-south and east-west crossings.
 - (vi) Transit vehicle and Emergency vehicle access shall be maintained within Richmond Road at all times; and
 - (vii) Customer access to existing and/or temporarily relocated bus stops or transit facilities shall be maintained at all times.
 - (viii) Closures of Richmond Road within the jurisdiction (ROW) of MTO shall be as detailed in Article 5 - Existing Provincial Highways and Municipal Roadways Within MTO ROW, of this Part 7.
- (b) Within the Richmond Road corridor, from Pinecrest Road to Holly Acres Road, the following constraints shall be followed:
- (i) DB Co shall ensure all lanes on Richmond Road are open and available for vehicles, transit services, Emergency services, pedestrians, cyclists during the following times:
 - A. weekdays between 6:00 and 20:00 hrs; and,
 - B. weekends between 10:00 and 20:00 hrs.
 - (ii) DB Co shall ensure that a minimum of one lane in each direction on Richmond Road shall remain open at all times.
 - (iii) Access across Highway 417 on Richmond Road shall be maintained at all times for vehicles, transit services, Emergency services, pedestrians, and cyclists.
 - (iv) Uninterrupted access to all MTO Highway 417 ramps shall be maintained at all times, except for MTO authorized ramp closure times obtained in accordance with the provisions of this Part 7.
 - A. DB Co shall temporarily close the N-E Richmond Road on-ramp to the eastbound Highway 417 to the satisfaction of the City and MTO upon the opening of the new temporary N/S-E bus-only on-ramp at Holly Acres. Upon West Substantial Completion and upon notice by the City, DB Co shall re-open the N-E ramp at this location

2.5 Cleary Avenue (Local)

- (a) DB Co shall follow the following constraints within the Cleary Avenue corridor:

- (i) DB Co shall provide full pedestrian access to Cleary Avenue at all times during construction.
- (ii) DB Co shall maintain two-way traffic for the full extent of Cleary Avenue at all times during construction

2.6 Scott Street (Arterial)

- (a) Within the Scott Street corridor, the following constraints shall be followed:
 - (i) DB Co shall maintain a single general traffic lane in each direction at all times for vehicles, Emergency services, and cyclists. DB Co shall maintain a pedestrian sidewalk at all times.
 - (ii) Intersection disruptions shall be scheduled during Off Peak Periods only. Pedestrian and cyclist access at and approaching intersections shall be maintained such that all four quadrants of each intersection remain accessible at all times.
 - (iii) DB Co shall identify a location acceptable to the City for relocated bus stops, if required. DB Co shall be responsible for the design and construction of the relocated bus stop to OC Transpo design and construction standards.

2.7 Iris Street (Major Collector)

- (a) Within the Iris Street corridor, the following constraints shall be followed:
 - (i) DB Co shall maintain a single traffic lane in each direction at all times for vehicles, bus service, emergency services, pedestrians, and cyclists.
 - (ii) The full closure of the intersection of Iris Street and the Transitway shall not be permitted at any time. Iris Street shall be detoured to a location outside the limits of the construction to maintain traffic lanes in both directions on Iris Street as well at the Transitway prior to the full closure of the Iris Street/Transitway to construct the new Iris Street/LRT grade separation Bridge. The detour shall include a temporary signalized Transitway intersection.
 - (iii) Intersection disruptions shall be scheduled during Off Peak Periods only. Pedestrian and cyclist access at and approaching the intersection shall be maintained, at least on one side, at all times to accommodate the north-south and east-west crossings. DB Co shall ensure that transit vehicles approaching this intersection during the Peak Periods from all directions maintain a frequency of transit service matching that of the 2018 Post-LRT Stage 1 Transit Service Plan. Transit priority measures shall be considered in order to ensure that this frequency of transit service is maintained. DB Co is responsible for contacting OC Transpo prior to the service change dates identified in Table 7-3.1 to identify any changes to the transit service plans and how they may impact the frequency of service for transit.

- (iv) DB Co shall relocate the Station Platforms to the satisfaction of the City prior to closing the Station platforms. The temporary Station shall be designed and constructed to OC Transpo standards for Transitway Stations, as per Transitway and Station Design Guidelines. The temporary Platforms shall be connected to local pathways and sidewalks for pedestrian access and reduce any negative impacts for customers, such as walking distance.
- (v) DB Co shall identify a location acceptable to the City for the relocated bus stops. DB Co shall be responsible for the design and construction of the relocated bus stop to OC Transpo design and construction standards.

2.8 Pinecrest Road (Arterial)

- (a) The following constraints shall be followed within the Pinecrest Road corridor:
 - (i) DB Co shall ensure all lanes on Pinecrest Road are open and available for vehicles, transit services, Emergency services, pedestrians, cyclists during the following times:
 - A. weekdays between 6:00 and 20:00 hrs; and,
 - B. weekends between 10:00 and 20:00 hrs.
 - (ii) DB Co shall ensure that a minimum of one lane in each direction on Pinecrest Road shall remain open at all times.
 - (iii) Access across Highway 417 on Pinecrest Road shall be maintained at all times for vehicles, transit services, emergency services, pedestrians and cyclists, with the exception of Clause (v) below. All existing travel lanes on Pinecrest Road shall be maintained at all times during the Peak Periods throughout construction.
 - (iv) Uninterrupted access to all MTO Highway 417 ramps shall be maintained at all times, except for MTO authorized ramp closures obtained in accordance with the provisions of this Part 7.
 - (v) The Pinecrest Road LRT Bridge shall be constructed without any reduction in the number and capacity of traffic lanes on Pinecrest Road during Peak Periods with the exception of following scheduled full closures:
 - A. Three day weekend closure to install Roadway decking (from 20:00 hrs on a Friday to 06:00 hrs on a Monday).
 - B. Overnight closure to install Bridge deck waterproofing and base course asphalt.
 - (vi) Notice of the scheduled dates of the above noted full closures shall be identified to the City and MTO a minimum 30 Business Days in advance of each of the

schedule closures for approval. The closure dates shall not be scheduled during events identified in Clause 1.4 of this Part 7.

- (vii) The modifications to the S-W ramp described in Schedule 15-2, Part 9, Part B shall be constructed and connected to the existing ramp prior to the closure and decommissioning of the existing S-W ramp terminal, as well as the decommissioning of the existing N-W ramp, to the satisfaction of the City. DB Co shall restrict public access to the reconstructed ramp during construction. DB Co shall Commission the new ramp with the City prior to being put into service.
- (viii) The N-W ramp shall be constructed and Commissioned to the satisfaction of the City prior to being put into service. DB Co shall restrict public access to the new ramp during construction. The existing ramp if it is open at the point in time that the new ramp is put into service, shall be taken out of service immediately upon putting the new ramp into service by placing temporary concrete barriers at each end of the decommissioned ramp.
 - A. DB Co shall be permitted to stage construction such that the existing N-W ramp is closed, with the traffic demand accommodated via the S-W ramp, provided that traffic analysis demonstrates that this is operationally feasible. Any closure of the existing N-W ramp shall be subject to approval from MTO and the City, and shall be minimized in terms of duration.
- (ix) Intersection disruptions to the Pinecrest Road/Transitway/Highway 417 North terminal intersection shall be scheduled during Off Peak Periods only. Pedestrian and cyclist access at and approaching the intersection shall be maintained, at least on one side, at all times to accommodate the north-south and east-west crossings. Transit services (vehicles and stops) approaching this intersection from the east-west and north-south shall maintain OC Transpo's services levels at all times.

2.9 Woodroffe Avenue (Arterial)

- (a) The following constraints shall be followed within the Woodroffe Avenue corridor:
 - (i) DB Co shall ensure all lanes on Woodroffe Avenue are open and available for vehicles, transit services, Emergency services, pedestrians, cyclists during the following times:
 - A. weekdays between 6:00 and 20:00 hrs; and,
 - B. weekends between 10:00 and 20:00 hrs.
 - (ii) DB Co shall ensure that a minimum of one lane in each direction on Woodroffe Avenue shall remain open at all times.

- (iii) Access across Highway 417 on Woodroffe Avenue shall be maintained at all times for vehicles, transit services, Emergency services, pedestrians, and cyclists.
- (iv) Uninterrupted access to all MTO Highway 417 ramps shall be maintained at all times, except for MTO authorized ramp closure times obtained in accordance with the provisions of this Part 7.

2.10 Holly Acres Road (Arterial)

- (a) The following constraints shall be followed within the Holly Acres Road corridor:
 - (i) DB Co shall ensure all northbound lanes on Holly Acres Road are open and available for vehicles, transit services, Emergency services, pedestrians and cyclists during the following times:
 - A. Weekdays between 6:00 and 20:00 hrs; and,
 - B. Weekends between 10:00 and 20:00 hrs.
 - (ii) DB Co shall ensure that a minimum of one lane in the northbound direction shall remain open at all times, in addition to any auxiliary lanes at intersections on Holly Acres Road.
 - (iii) DB Co shall ensure that at least one southbound lane on Holly Acres Road is open and available for vehicles, transit services, Emergency services, pedestrians and cyclists at all times.
 - (iv) Uninterrupted access to and from all Highway 417 and 416 ramps shall be maintained at all times, except for MTO authorized ramp closure times obtained in accordance with the provisions of this Part 7.

2.11 Moodie Drive (Arterial)

- (a) The following constraints shall be followed within the Moodie Drive corridor:
 - (i) DB Co shall ensure all northbound lanes on Moodie Drive are open and available for vehicles, transit services, Emergency services, pedestrians, cyclists during the following times:
 - A. weekdays between 6:00 and 9:30 hrs.
 - (ii) DB Co shall ensure all southbound lanes on Moodie Drive are open and available for vehicles, transit services, Emergency services, pedestrians, cyclists during the following times:
 - A. weekdays between 15:00 and 18:30 hrs; and,

- (iii) DB Co shall ensure that a minimum of one lane in each direction on Moodie Drive shall remain open at all times, in addition to any auxiliary lanes at intersections
- (iv) Uninterrupted access to and from all Highway 417 ramps shall be maintained at all times, except for MTO authorized ramp closure times obtained in accordance with the provisions of this Part 7.
 - A. DB Co shall be permitted to close the S-W ramp for the purposes of constructing the grade separation for the Confederation Line for a period not exceeding one construction season. This closure shall require public notification in accordance with Article 5 of this Part 7, and shall be supported by a traffic analysis. Detour signage shall be provided as required.
- (v) The conditions in items (i) and (ii) above permit that DB use a three-lane cross section, with a center lane that changes direction. Should it not be possible to achieve this staging concept while remaining compliant with OTM Book 7, DB Co shall use decking to maintain a four-lane cross section.

2.12 Corkstown Road (Collector)

- (a) The following constraints shall be followed within the Corkstown Road corridor:
 - (i) DB Co shall ensure all westbound lanes on Corkstown Road are open and available for vehicles, transit services, Emergency services, pedestrians, cyclists during weekday Peak Periods, and a minimum of one lane during all other times, except for the periods noted below:
 - A. DB Co shall be permitted to fully close all westbound lanes on Corkstown Road on two consecutive Weekend Periods in order to tie the re-aligned westbound Corkstown Road into the existing Corkstown Road alignment.
 - (ii) DB Co shall ensure all eastbound lanes on Corkstown Road are open and available for vehicles, transit services, Emergency services, pedestrians, cyclists during weekday Peak Periods, and a minimum of one lane during all other times.
 - A. DB Co shall be permitted to permanently close all eastbound lanes on Corkstown Road to general traffic at the same time that Transitway Segment W-9 (Holly Acres Road to Moodie Station) is permanently closed.
 - B. Notwithstanding Schedule 34, Part B, Section 1.11 (f), Mobility Matters lane closures for the eastbound lane of Corkstown Road shall cease to apply upon the re-opening of the eastbound lane between Moodie Drive and the newly constructed bus loop.

2.13 Blair Road (Arterial)

- (a) The following constraints shall be followed within the Blair Road corridor:
- (i) DB Co shall ensure all lanes on Blair Road over OR174 are open and available for vehicles, transit services, Emergency services, pedestrians, cyclists during the following times:
 - A. weekdays between 6:00 and 20:00 hrs; and,
 - B. weekends between 10:00 and 18:00 hrs.
 - (ii) DB Co shall ensure that a minimum of one lane in each direction on Blair Road shall remain open at all times
 - (iii) DB Co shall maintain uninterrupted access to all OR174 ramps at all times, except for City authorized ramp closure times obtained in accordance with the provisions of this Part 7.
 - (iv) DB Co shall maintain full operation of the Blair Road/OR174 EB intersection during construction. DB Co shall stage all Works at this intersection in a manner that maintains all intersection movements at all times.
 - (v) DB Co shall stage construction of modifications to the Blair Road/Gloucester Centre intersection in a manner that maintains full traffic and transit operations of this intersection during construction.

2.14 Montreal Road (Arterial)

- (a) Within the Montreal Road corridor, the following constraints shall be followed:
- (i) DB Co shall ensure all lanes on Montreal Road under OR174 are open and available for vehicles, transit services, Emergency services, pedestrians, cyclists during the following times:
 - A. weekdays from 06:00 to 09:30 hrs and 15:00 to 18:30 hrs; and,
 - B. weekends between 10:00 and 18:00 hrs; and,
 - (ii) DB Co shall ensure that a minimum of one lane in each direction on Montreal Road shall remain open at all times.
 - (iii) During the following construction operations, DB Co shall be permitted to reduce Montreal Road under the OR174 to one lane in each direction for all time periods, from June 1st until Labour Day of a given year:
 - A. Demolition of existing bridge piers; and,

- B. Construction of new bridge piers.
- (iv) During the following construction operations, DB Co shall be permitted to reduce Montreal Road under the OR174 to one lane in each direction for an entire weekend period:
 - A. Demolition of existing bridge piers; and,
 - B. Construction of new bridge piers.
- (v) DB Co shall maintain uninterrupted access to all OR174 ramps at all times except for City authorized ramp closure times obtained in accordance with the provisions of this Part 7.
- (vi) DB Co shall maintain full operation of the Montreal Road/OR174 ramp intersections during construction. DB Co shall stage the Work in a manner that maintains all intersection movements at all times.
 - A. Where two left turn lanes are provided at a Montreal Road / OR174 intersection ramp, DB Co may close one of the two lanes when only one lane on Montreal Road is available to receive turning traffic.
- (vii) DB Co shall stage the Work for the modification to bus only ramp accesses to and from OR174 including bus Platforms so that full transit operations of the bus only ramps and Platforms including pedestrian facilities accessing the Platforms is maintained.
- (viii) Transit priority measures on the on/off ramps shall be maintained, including the demand for service indicator signal, through construction, to provide a consistent frequency of service as per construction conditions.

2.15 Jeanne d'Arc Boulevard (Arterial)

- (a) The following constraints shall be followed within the Jeanne d'Arc Boulevard corridor:
 - (i) DB Co shall maintain all existing transit operations including but not limited to access and functionality of all bus stops, including shelters and benches.
 - (ii) DB Co shall maintain uninterrupted access to all OR174 ramps at all times except for City authorized ramp closure times obtained in accordance with the provisions of this Part 7.
 - (iii) DB Co shall stage the Work for the modifications to the Jeanne d'Arc Boulevard/OR174 ramp north of OR174 in a manner that maintains the full operation of this intersection.

2.16 Orleans Boulevard (Major Collector)

- (a) The following constraints shall be followed within the Orleans Boulevard corridor:
 - (i) DB Co shall maintain all existing transit operations including but not limited to access and functionality of all bus stops, including shelters and benches.

2.17 Champlain Street (Major Collector)

- (a) The following constraints shall be followed within the Champlain Street corridor:
 - (i) DB Co shall maintain all existing transit operations including but not limited to access and functionality of all bus stops, including shelters and benches.
 - (ii) DB Co shall maintain uninterrupted access to all OR174 ramps at all times except for City authorized ramp closure times obtained in accordance with the provisions of this Part 7.

2.18 Trim Road (Major Collector / Arterial)

- (a) DB Co shall maintain the intersection of Trim Road and OR174 fully open and operational until such time as the replacement intersection located to the east (as described in Schedule 15-2, Part 2, Article 6 – Roadways, Bus Terminals and Lay-Bys) has been opened.
 - (i) DB Co shall design, construct and Commission the ultimate W-S ramp from OR174 to Trim Road prior to the closure of the existing Trim Road and OR174 intersection.
 - A. The W-S ramp shall remain open to general traffic upon completion. DB Co shall maintain Trim Road open between the W-S ramp and the intersection of Trim Road at Dairy Drive / Taylor Creek Boulevard.
 - (ii) DB Co shall maintain Trim Road open between the intersections of Trim Road at Dairy Drive / Taylor Creek Boulevard and Trim Road / South Frontage.

2.19 OR174 (City Freeway)

- (a) The following restrictions on construction operations shall be followed within the OR174 Freeway corridor:
 - (i) DB Co shall not use construction access/egress, shoulder closures and the loading and unloading of materials and construction equipment onto and from the traveled portion of OR174 and OR174 interchange ramps on days identified as holidays and Special Events in Clause 1.4 of this Part 7, or during Peak Periods.

- (ii) Construction operations shall not be carried out during the four hours preceding or three hours after any scheduled events at the [REDACTED]. DB Co shall obtain the schedule of events from the [REDACTED] and schedule Work accordingly.
 - A. Events with fewer than 10,000 attendees, or “all-day” events that do not have a specific peak traffic demand period associated with them are exempt from this requirement.
- (iii) Construction operations shall not be carried out during the two hours preceding or two hours after any [REDACTED], or other major events at [REDACTED], as identified by the City. DB Co shall obtain the schedule of [REDACTED] and schedule Work accordingly.
- (iv) DB Co shall provide 15 Business Days’ notice prior to construction requiring OR174 lane encroachments. DB Co shall provide any assistance required by the City to enact the lane encroachments.
- (v) The following requirements shall apply to Work on the outside of OR174 platform that requires construction access across bus only lanes on OR174:
 - A. At least a 1km separation between access point crossings shall be maintained between Montreal Road and Jeanne d’Arc Boulevard;
 - B. In the direction of travel conflicting with the crossing point, warning of each crossing point shall be provided using PVMS signs and fixed signage. Fixed signage shall include a flashing amber light shall be used when the crossing is in operation;
 - C. Crossings shall be permitted during the periods outlined in Table 7-2.1A and Table 7-2.1B, for the EB and WB directions, respectively;
 - D. Construction traffic shall be controlled via flag persons, Bus traffic shall have priority over construction traffic during flagging operations; and,
 - E. Notification to OC Transpo shall be provided.
- (vi) Open Excavations
 - A. There shall be no open excavations adjacent to a lane carrying traffic at any time, except where a traffic control barrier designed to restrain errant vehicles is located between the traffic and the excavation. Excavations within 4m of lanes carrying traffic shall be backfilled with the specified material up to profile grade and compacted prior to the completion of Work each day.
- (vii) Location and Storage of Materials and Equipment
 - A. Materials and equipment shall be stored as per Clause 1.2 of this Part 7.

- B. Notwithstanding the foregoing, DB Co shall, at its own expense, remove any vehicle, equipment or material which, in the opinion of the City, constitutes a Hazard or obstruction to maintenance operations.

(viii) Delivery and Trucking

- A. DB Co shall plan and schedule the routes of vehicles transporting all materials so that vehicular movements are accomplished with minimum interference and interruptions to traffic according to the Clause 5.2 related to Restrictions on Construction Operations and Permitted Times for Lane and Ramp Closures. This shall necessitate vehicles to merge via exits and entrances (“slip-off” or “slip-on”) in the direction of traffic, in order to merge with and thereby avoid crossing traffic lanes.
- B. Access to and from the highway ROW shall be restricted to ramps at the interchanges unless otherwise provided for in this Project Agreement.
- C. Median cross-overs shall not be used except where single axle vehicles are entering a passing lane that is closed to traffic.
- D. DB Co shall obtain the City’s prior approval for the location of any exit and entrance (“slip-off” or “slip-on”) locations. The City reserves the right to alter, reject or close same as considered necessary. DB Co shall notify suppliers of materials and equipment of the above requirements.
- E. Construction vehicles/equipment shall only use accesses to/from construction zones in the same direction of traffic thereby diverging/merging with the flow of traffic, in order to avoid crossing opposing traffic. Minimum 1,000m shall be maintained between construction egress and access locations. The City acting reasonably reserves the right to close any access to/from any construction zone.

(b) Lane Closures on OR174:

- (i) DB Co shall ensure all bus only lanes remain in service at all times on OR174 unless otherwise noted in the Part 7, until after East Substantial Completion and upon notice by the City. The final configuration of OR174 shall be considered Remaining Works.
- (ii) During the Permitted Periods for Closure, as outlined in Tables 7-2.1A through D below, DB Co shall be permitted to close bus lanes in lieu of a general traffic lane. During this period transit shall operate in the remaining general traffic lanes on the OR174. DB Co shall coordinate the closure of the bus lane with the City.
 - A. When DB Co closes a single general traffic lane in either direction, the City may require that DB Co use temporary signage and/or PVMS to convert the bus lane in the same direction of travel to a general traffic

lane, such that two general traffic lanes are maintained through the work zone, with transit operating in mixed general traffic.

- B. When the bus lane is converted to a general traffic lane, it shall be considered a BRT Lane Closure for the purposes of Schedule 34 Mobility Matters.
- (iii) DB Co shall coordinate all general traffic lane closures with the City Traffic Management Inspector assigned to the affected zone.
- (iv) Construction zones shall have a minimum separation of 1,000m.
- (v) The Permitted Periods for Closures outlined in this 2.20 (b) shall be the basis for the development of the TTMP and TCP sub-plans. Variations to the applicable Permitted Periods for Closures, at specific locations, may be permitted for such specific locations, but only if substantiated through a plan by DB Co that addresses, at a minimum, traffic requirements, analyses and Stakeholder consultation, where applicable, and such plan is submitted to the City Representative in accordance with the Review Procedure.
- (vi) Permitted Periods for Closures on OR174
 - A. Long Term Lane Closures
 - i. Lane closures shall only be permitted where required to facilitate Work or worker/driver safety.
 - ii. All lane closures shall be managed by qualified Traffic Control Personnel.
 - iii. The minimum lane width open to traffic shall be 3.5m.
 - iv. DB Co shall ensure that all traffic controls according to OTM Book 7 are operational before commencing Work affecting OR174 traffic.
 - v. Permitted lane closure periods for OR174 are included in Tables 7-2.1A-D and are subject to the additional restrictions covered in this Part 7.

Table 7-2.1A - Section Description: Existing OR174 EB from Blair Road to Jeanne d'Arc Boulevard including all interchange ramps

| Closure | Monday to Thursday* | Friday* | Saturday | Holiday or Sunday |
|---------------------|---------------------|-------------------|-------------------|-------------------|
| One Lane Closure or | 00:00 - 06:00 hrs | 00:00 - 06:00 hrs | 00:00 - 10:00 hrs | 00:00 - 10:00 hrs |

| | | | | |
|--|--|--|--|--|
| Bus Only Lane Closure** | 19:00 - 23:59 hrs | 19:00 - 23:59 hrs | 17:00 - 23:59 hrs | 17:00 - 23:59 hrs |
| Ramp Closure*** Or Two Lane Closure**** | 00:00 - 05:00 hrs 22:00 - 23:59 hrs | 00:00 - 05:00 hrs 23:00 - 23:59 hrs | 0:00 - 7:00 hrs 23:00 - 23:59 hrs | 0:00 - 7:00 hrs 21:00 - 23:59 hrs |
| Full Closure***** | 01:00 - 04:00 hrs | 01:00 - 04:00 hrs | 01:00 - 04:00 hrs | 01:00 - 04:00 hrs |

Table 7-2.1B - Section Description: Existing OR174 EB from Jeanne d'Arc Boulevard to Trim Road including all interchange ramps

| Closure | Monday to Thursday | Friday | Saturday | Holiday or Sunday |
|--|---|---|--|--|
| One Lane Closure or Bus Only Lane Closure** | 00:00 - 06:00 hrs 09:00 - 14:00 hrs 19:00 - 23:59 hrs | 00:00 - 06:00 hrs 09:00 - 14:00 hrs 19:00 - 23:59 hrs | 00:00 - 10:00 hrs 17:00 - 23:59 hrs | 00:00 - 10:00 hrs 17:00 - 23:59 hrs |
| Ramp Closure*** or Two Lane Closure**** | 00:00 - 05:00 hrs 22:00 - 23:59 hrs | 00:00 - 05:00 hrs 23:00 - 23:59 hrs | 0:00 - 7:00 hrs 23:00 - 23:59 hrs | 0:00 - 7:00 hrs 21:00 - 23:59 hrs |
| Full Closure***** | 01:00 - 04:00 hrs | 01:00 - 04:00 hrs | 01:00 - 04:00 hrs | 01:00 - 04:00 hrs |

Table 7-2.1C - Section Description: Existing OR174 WB from Jeanne d'Arc Boulevard to Blair Road including all interchange ramps

| Closure | Monday to Thursday* | Friday* | Saturday | Holiday or Sunday |
|------------------------------|--|--|--|--|
| One Lane Closure or Bus Only | 00:00 - 05:00 hrs 19:00 - 23:59 hrs | 00:00 - 05:00 hrs 19:00 - 23:59 hrs | 00:00 - 10:00 hrs 17:00 - 23:59 hrs | 00:00 - 10:00 hrs 17:00 - 23:59 hrs |

| | | | | |
|-------------------------|-------------------|-------------------|-------------------|-------------------|
| Lane Closure** | | | | |
| Ramp Closure*** | 00:00 - 05:00 hrs | 00:00 - 05:00 hrs | 0:00 - 7:00 hrs | 0:00 - 7:00 hrs |
| or Two Lane Closure**** | 22:00 - 23:59 hrs | 23:00 - 23:59 hrs | 23:00 - 23:59 hrs | 21:00 - 23:59 hrs |
| Full Closure***** | 01:00 - 04:00 hrs | 01:00 - 04:00 hrs | 01:00 - 04:00 hrs | 01:00 - 04:00 hrs |

Table 7-2.1D - Section Description: Existing OR174 WB from Trim Road to Jeanne d’Arc Boulevard including all interchange ramps

| Closure | Monday to Thursday | Friday | Saturday | Holiday or Sunday |
|---|---|---|--|--|
| One Lane Closure or Bus Only Lane Closure** | 00:00 - 05:00 hrs 10:00 – 15:00 hrs 18:00 - 23:59 hrs | 00:00 - 05:00 hrs 10:00 – 15:00 hrs 19:00 - 23:59 hrs | 00:00 - 10:00 hrs 17:00 - 23:59 hrs | 00:00 - 10:00 hrs 17:00 - 23:59 hrs |
| Ramp Closure*** or Two Lane Closure**** | 00:00 - 05:00 hrs 22:00 - 23:59 hrs | 00:00 - 05:00 hrs 23:00 - 23:59 hrs | 0:00 - 7:00 hrs 23:00 - 23:59 hrs | 0:00 - 7:00 hrs 21:00 - 23:59 hrs |
| Full Closure***** | 01:00 - 04:00 hrs | 01:00 - 04:00 hrs | 01:00 - 04:00 hrs | 01:00 - 04:00 hrs |

* With exceptions from June OC Transpo service change to September OC Transpo service change (as outlined in Table 7-3.1), when lane closure times from Blair Road to Jeanne d’Arc Boulevard are the same as Table 7-2.1B (for EB) and Table 7-2.1D (for WB).

** With exceptions as noted in Clause 2.19(d) of this Part 7. These times for single lane closures are applicable only to sections of OR 174 where there are a minimum of two general traffic lanes and a bus-only lane. Where there is no bus lane, and only two general traffic lanes, the hours indicated for “two lane closures” apply to a single lane closure.

*** No two successive on or off ramps shall be closed at the same time. Ramp closures require the mandatory use of PVMS.

**** Two lane closures are only permitted on sections of the OR 174 where two general traffic lanes and a bus lane are present. Where there are only two general traffic lanes and no bus lane, the hours indicated for “two lane closures” apply to a single lane closure.

***** Applications for full closures are subject to acceptance by the City in accordance with Schedule 10 – Review Procedure.

(vii) Lane and Ramp Closures - General

A. The following shall apply to all times other than those for the permitted closures:

i. Full mainline closures shall be permitted for installation of overhead sign structures, bridge girders, hydro wire installations/modifications and removal of concrete panels during Bridge demolition by saw cutting methods only. Closure of a full set of lanes shall only be performed as follows:

- 1 OPS shall be employed to perform the full closures;
- 2 Lane closures and ramp closures for construction shall only be permitted between 01:00 and 04:00 hrs, subject to the additional restrictions covered under Clause 1.4 of this Part 7; and
- 3 The duration of the closures are restricted to 15 minutes per any 1 hour period or until the end of the traffic queue passes.

(viii) Lane and Ramp Closures – Rapid Removal Operations

A. Lane and ramp closures associated with the closures permitted for Bridge rapid removal are subject to the additional restrictions covered under Clause 1.4 of this Part 7 and the following.

i. Lane Closures:

Table 7-2.2

| Closure | Saturday | Sunday | Monday |
|----------------------------|--|--|--|
| One Lane Closure | 00:00 - 10:00 hrs 17:00 - 23:59 hrs | 00:00 - 23:59 hrs | 00:00 - 05:00 hrs 20:00 - 23:59 hrs |
| Two Lane Closure | 17:00 - 23:59 hrs | 00:00 - 12:00 hrs 22:00 - 23:59 hrs | 00:00 - 05:00 hrs 22:00 - 23:59 hrs |
| Three Lane or Full Closure | 18:00 - 23:59 hrs | 00:00 - 11:00 hrs | N/A |

ii. Ramp Closures:

- 1 Ramp closures shall be in effect from Saturday 17:00 hrs to Sunday 12:00 hrs for Bridge rapid removal only.

(ix) General Notes – Lane and Ramp Closures

- A. DB Co shall use the lane and ramp closure notification process as per the MTO guideline titled "Steps for Ottawa Area Lane and Ramp Closure Notification Process".
- B. DB Co shall arrange closure times as outlined in this Part 7 and the accepted TTMP .
- C. The City reserves the right to deny permission for lane closures due to incomplete or late application, inclement weather, statutory holidays, or conflict with events identified in Clause 1.4 of this Part 7.

(c) Closure Notification

(i) DB Co shall perform the following prior to closing lanes and/or shoulders:

- A. DB Co shall provide 5 Business Days advance notice for lane closures or 28 Business Days advance notice where a detour is required;
- B. DB Co shall contact the City Traffic Management Inspector, a minimum of 72 hours prior to commencing construction to coordinate Work zone location, review the associated TTMP, and coordinate PVMS as may be required;
- C. DB Co shall contact the OC Transpo Control Centre half an hour prior to setup each day that they are working in or adjacent to a bus lane;
- D. Inform the City of any closure lasting more than one week, at least 2 weeks prior to the start date of the closure;
- E. Inform the City of Emergency closures as soon as any details are known;
- F. Obtain a closure notification number from the City for each closure;
- G. Inform the City of any closure that is being cancelled subsequent to A. and B. above;
- H. Notify the City Traffic Communications Centre by phone immediately prior to the set-up of any closure stating the closure notification number and details of the closure;

- I. Notify the City Traffic Communications Centre immediately of any changes to the closure or anticipated problems that may delay the opening time, stating the closure notification number and details of the changes to and/or problems with the closure; and
- J. Notify the City Traffic Communications Centre immediately upon removing the closure stating the closure notification number and details of the closure.

(d) Construction Sequencing

- (i) DB Co shall install TCBs on the median side of the OR174 during Night Periods or Weekend Periods only.
- (ii) DB Co shall widen the OR174 into the median prior to any other construction that takes place in the median.
- (iii) DB Co shall conduct a micro-simulation evaluation for construction sequencing and staging alternatives on the OR174. The limit of the micro-simulation model shall be discussed and agreed upon at the start of the Project, but shall extend as a minimum one interchange on both sides from the study limit.
 - A. DB Co shall include additional analysis of the area road network to assess impact of potential traffic diversion to other local routes due to construction staging, if required;
 - B. DB Co shall model traffic for the Off Peak Period. The model shall provide a reliable estimate of the entire study area operation. DB Co shall simulate the staging approach, and demonstrate that it maintains an acceptable LOS by City Standards;
 - C. DB Co shall provide the simulation model input and output files, assumptions used in the models, calibration results, documentation of any model limitation, snapshots (with road name labels) and traffic operation summaries of key simulation findings under various scenarios; and,
 - D. DB Co shall include in the traffic operation summaries at a minimum, documentation of the average vehicle speed along various sections of the network, travel time, average delay, levels of service, weaving, queuing or slow moving vehicles (due to difficult lane changes) that are observed on the network, etc. under the various scenarios.

(e) TC-54 on OR174

- (i) All TC-54s used shall be equipped with 2 sets of rubber tire ballast rings.
- (ii) DB Co shall remove all TC-54s from OR174, within the limits of the Project, at the conclusion of any traffic control requiring their use.

- (iii) TC-54s can remain in place when the Work is completed over the duration of a weekend. At the end of the weekend the TC-54s shall be removed from OR174.
- (f) Work on or Adjacent to [REDACTED] ROW
 - (i) DB Co shall not be permitted to access the [REDACTED] properties adjacent to the south side of the OR174 fenced ROW.
- (g) OR174 Full Closure
 - (i) Interim Fixed Completion Time
 - A. Full closure of OR174 for the Transitway Bridge demolition and removal shall be scheduled on a weekend by DB Co. Notice of the scheduled dates of the full closure shall be identified to the City a minimum 30 Business Days in advance the schedule closures for approval. The closure dates shall not be scheduled during events identified in Clause 1.4 of this Part 7.
 - B. DB Co shall not commence closing down lanes, in excess of the allowable closures specified elsewhere, until 17:00 hrs on the Saturday of the closure event, with full closure at 18:00 hrs. All EB and WB vehicles shall exit and re-enter the highway as identified in the TTMP and TCP sub-plan. Early full closure shall not be permitted.
 - C. The median lane and the exterior bus only lane in each direction shall be re-opened by 11:00 hrs on the Sunday of the closure event and the lane adjacent to the median or exterior lane shall re-open by noon on the Sunday of the closure event.
 - D. The remaining lane, median or exterior, shall be open by 06:00 hrs on the Monday following the closure event.
 - E. Ramps shall be opened in-conjunction-with the adjoining lanes or by 06:00 hrs on the Monday following the closure event.
- (h) Winter Shutdown
 - (i) DB Co shall perform all maintenance Work during the Winter Season except for snow, ice, and frost control as defined elsewhere.
 - (ii) DB Co shall submit a Winter Season Plan for each year to the City for review and approval by the first Monday in October each year. The plan shall detail any and all construction Work to continue during the Winter Season, as well as any changes to the current TTMP during the Winter Season, including the signing and Pavement marking changes, and document the shoulder widths available for snow storage during the Winter Season.

- (iii) All permanent OR174 and sideroad lanes, shoulders, Pavement markings, signs, structures and interchange ramps that were in place prior to the start of construction, or their reconstructed counterparts, shall be paved, and/or reinstated prior to the Winter Season. All lanes (highway and sideroad) and interchange ramps shall be opened to traffic and shall remain unrestricted at all times to public traffic during the Winter Season.
- (iv) DB Co shall complete all of the following Work, prior to Winter Season, in areas where the Work was initiated in the same year:
 - A. Construction of all Drainage courses, Culverts and storm sewers/catch basin grates (temporary and/or permanent) to elevations and provision of positive Drainage of the Roadway, sub-base, ditches and ROW in any areas where the existing road/median ditches or Drainage system has been altered from its pre-contract state;
 - B. Installation of new barriers or temporary barriers, with appropriate end treatments, in locations where existing roadside barriers have been removed;
 - C. Installation of all erosion and sedimentation control measures as required;
 - D. Completion of all permanent and/or temporary Pavement markings, Pavement marking obliterating and installation of all guiderail systems;
 - E. All construction related signs and supports that may impede winter plowing shall be removed from the Site and permanent signing shall be reinstated;
 - F. All of DB Co's equipment and material shall be removed from within the Project limits consistent with the DB Co's Winter Season Plan;
 - G. All Temporary Flexible Guide Posts shall be removed prior to Winter Season;
 - H. All median construction access locations shall be closed off using temporary concrete barrier in accordance with DB Co's Winter Season Plan deflected at 40:1;
 - I. Temporary Pavement markings shall be painted and receive a second application of paint each calendar year if they will be left in place during the Winter Season;
 - J. All Pavement marking obliterating that is required to remove temporary Pavement markings that are not part of DB Co's Winter Season Plan Pavement marking scheme and were placed for Work during the construction season shall be completed using approved removal methods;

- K. All new guiderail systems installed prior to Winter Season shall be installed to the grades required for the final top of Pavement elevation; and
 - L. Shoulder widths/offsets to barriers shall be provided on OR174 on the right side and the left hand side of the lanes (in the direction of traffic) during Winter Season.
- (v) DB Co shall be responsible for preparing the Site each spring including, but not limited to:
- A. Re-instatement of all necessary construction related signs;
 - B. Re-instatement to the design cross-fall all granular shoulders on the contract, including any material that is required; and
 - C. Carrying out a detailed inspection of the binder course, identification of any deficiencies, and carrying out repairs as required to the satisfaction of the City.
- (vi) Winter Season requirements, as contained in this Article 2, shall not relieve DB Co of any other requirements. All hot mix paving Work performed by DB Co to meet Winter Shutdown requirements, that do not meet the full requirements as specified elsewhere, shall be considered temporary paving and DB Co shall be responsible for the placement and subsequent removal of the temporary Pavement.
- (vii) DB Co's Critical Path Schedule shall at all times reflect the Winter Season contract requirements as defined in this Article 2.
- (i) Daily Backfilling to Subgrade Level
- (i) At locations where temporary concrete barrier is present, excavation for the roadworks, placement of granulars, and any other operation which will result in an excavation greater than 300mm in depth measured from the original ground, shall only be completed to within 0.5m of the backface of the barriers when the barriers are positioned in their temporary configuration. The remainder of the excavation, granulars and asphalt Pavement shall be completed by shifting the barrier and implementing a lane closure in accordance with the timing constraints specified elsewhere in this Article 2. The barrier shall then be returned to its un-shifted position.
 - (ii) DB Co shall ensure that prior to completion of Work each day, areas that are excavated below a subgrade level are backfilled to the subgrade level in accordance with methods specified elsewhere within the Contract.
 - (iii) DB Co shall ensure measures are taken against undermining of the adjacent Pavement structure at open excavations throughout the contract limits, where

traffic is protected by temporary concrete barrier. This shall be done by backfilling with the specified material up to profile grade within 2m of the back of barrier prior to ceasing operations each weekend.

(j) Guide Rail Construction Operations

- (i) DB Co shall ensure that the existing guide rail system or an approved barrier system shall remain in place at all times or the removed guide rail is replaced with the new guide rail or an approved barrier system within the same working day at all locations of existing guiderail or barrier system.

(k) Ramp and Side Street Closures

- (i) DB Co shall provide notice of one-time ramp and side street closures consistent with requirements detailed elsewhere.

(ii) Ramp and Side Street Closures – Short Duration

- A. DB Co shall comply with conditions covered elsewhere in the Project Agreement for all nightly closures of ramps and/or lane closures on side streets. Ramps shall only be closed if Work is directly located on the ramp or on OR174 or side street at the ramp junction, or if closure is required to implement other lane closures in accordance with OTM Book 7. Short term ramp closures are restricted to one ramp at a time per interchange per direction.

(iii) Ramp and Side Street Closures – Long Duration

- A. DB Co shall only close ramps if Work is directly located on the ramp, or on the highway or side street at the ramp junction, or if closure is required to implement other lane closures in accordance with OTM Book 7.

| RAMP / SIDE STREET | DURATION |
|--------------------------|---|
| Montreal Road N-E Ramp | To be closed in conjunction with the OR174 Bridge replacement and OR174 realignment in this area. The ramp shall be closed from 23:00 hrs Friday and shall re-open no later than Monday at 05:00 hrs of the same weekend. |
| Montreal Road S-W Ramp | To be closed in conjunction with the OR174 Bridge replacement and OR174 realignment in this area. The ramp shall be closed from 23:00 hrs Friday and shall re-open no later than Monday at 05:00 hrs of the same weekend. |
| Montreal Road W-N/S Ramp | To be closed in conjunction with the OR174 Bridge replacement and OR174 realignment in this area. The ramp shall be closed from 23:00 hrs Friday and shall re-open no later than Monday at 05:00 hrs of the same weekend. |

| RAMP / SIDE STREET | DURATION |
|---------------------------------------|--|
| Montreal Road E-N/S Ramp | To be closed in conjunction with the OR174 Bridge replacement and OR174 realignment in this area. The ramp shall be closed from 23:00 hrs Friday and shall re-open no later than Monday at 05:00 hrs of the same weekend. |
| Jeanne d'Arc Boulevard S-W Ramp | To be closed in conjunction with OR174 widening and ramp realignment in this area. The ramp shall be closed from 23:00 hrs Friday and shall re-open no later than Monday at 05:00 hrs of the same weekend. |
| Jeanne d'Arc Boulevard N-W Ramp | To be closed in conjunction with OR174 widening and ramp realignment in this area. The ramp shall be closed from 23:00 hrs Friday and shall re-open no later than Monday at 05:00 hrs of the same weekend. |
| OR174/Trim Road At Grade Intersection | To be closed in conjunction with the construction and replacement intersection to the east of the Park and Ride/Trim Road LRT Station construction in this area. The intersection shall remain fully open and operational until such time as the replacement OR174 Access to Trim Road is constructed. |

(l) OR174 Illumination

- (i) Refer to Schedule 15-2, Part 2, Article 10 – OR174 Street Lighting for requirements for street lighting on OR174.

(m) Existing Roadway Illumination

- (i) DB Co shall ensure all existing Roadway illumination remains fully operational during the hours of darkness until such time as a temporary and/or permanent lighting system is installed and operational during hours of darkness. For instances where the Roadway is closed to traffic to accommodate construction, the existing Roadway illumination may be turned off within the limits of the road closure only. Any temporary and/or permanent lighting system must have equivalent lighting levels to the existing lighting levels.

(n) Underpass Illumination

- (i) DB Co shall ensure that existing underpass illumination is fully operational at all times during the hours of darkness until such time as the temporary or permanent underpass lighting is installed and operational during the hours of darkness. Any temporary and/or permanent lighting system must have equivalent lighting levels to the existing lighting levels.

- (o) Rapid Structure Removal Operations – OR174 Transitway Overpass Structure/OR174/Montreal Road Bridges
 - (i) DB Co shall be responsible for all additional protection systems, traffic control, and temporary Works required to suit DB Co's selected construction sequencing.
 - (ii) The above noted Rapid Structure Removals shall be sequenced and scheduled to meet the OR174 Roadway Works and associated operational constraints as specified elsewhere in the Contract. The removal of the OR174 Transitway Bridge shall not commence until the Transitway detour from Blair Station to the Transitway Bridge is Commissioned, operational and OC Transpo has diverted the Transitway onto the detour route.
- (p) Taylor Creek Culvert Crossing
 - (i) DB Co shall develop detour staging plans in order to maintain uninterrupted bus service lanes at all times, and uninterrupted general traffic lanes during Peak Periods, during repairs to the Taylor Creek Culvert under OR174,

ARTICLE 3 EXISTING TRANSITWAY SYSTEM

3.1 General Requirements

- (a) The requirements in this Article 3 are applicable to the following Transitway sections of the relevant phase of the Project:
 - (i) West Transitway-Tunney's Pasture Station to Moodie Station
 - A. West Transitway Segment W-1 (Tunney's Pasture Station to Dominion Station)
 - B. SJAM Parkway Segment W-2 (Dominion Station to SJAM Parkway 400m west of Dominion Station)
 - C. SJAM Parkway Segment W-3 (400m west of Dominion Station to SJAM Parkway 550m north of Lincoln Fields Station)
 - D. SJAM Parkway Segment W-4 (SJAM Parkway 550m north of Lincoln Fields Station to Lincoln Fields Station)
 - E. West Transitway Segment W-5 (Lincoln Fields Station to Queensway Station)
 - F. Highway 417 Segment W-6 (Queensway Station to Pinecrest Station)
 - G. West Transitway Segment W-7 (Pinecrest Station to Bayshore Station)
 - H. West Transitway Segment W-8 (Bayshore Station to Holly Acres Road)
 - I. West Transitway Segment W-9 (Holly Acres Road to Moodie Station)
 - (ii) Southwest Transitway-Lincoln Fields Station to Baseline Station
 - A. Southwest Transitway Segment SW-2 (Lincoln Fields Station to Iris Station)
 - B. Southwest Transitway Segment SW-1 (Iris Station to Baseline Station)
 - (iii) East Transitway - Blair Station to Trim Station
 - A. East Transitway Segment E-1 (Blair Station to OR174 500m east of Transitway Overpass)
 - B. OR174 Segment E-2 (500m east of Transitway Overpass to 800m east of Montreal Road)

- C. OR174 Segment E-3 (800m east of Montreal Road to 800m east of Jeanne d'Arc Boulevard)
 - D. OR174 Segment E-4 (800m east of Jeanne d'Arc Blvd to Place d'Orleans Station)
 - E. OR174 Segment E-5 (Place d'Orleans Station to Trim Road)
- (b) DB Co shall maintain all bus services by utilizing staging and detouring of transit services and other traffic away from the various Sites under construction. DB Co shall include the Transitway detouring and staging in the TTMP to the satisfaction of the City and in accordance with the provisions of this Part 7, Schedule 34 - Mobility Matters, Schedule 17 – Environmental Obligations, Schedule 15-2, Part 1, Article 5 – Implementation Constraints and Schedule 15-2, Part 2, Article 6 – Roadways, Bus Terminals and Lay-bys.
- (c) DB Co shall reimburse the City for any additional operational or maintenance costs incurred by the City occasioned as a result of any changes required to City operations, due to changes or revisions to the TTMP made by DB Co after the TTMP has been reviewed and accepted by the City.
- (d) DB Co shall apply the following key Transit performance principles to the TTMP:
- (i) Safety of all users of the Work shall be the paramount principle;
 - (ii) Maintain existing local and rapid transit services as closely as possible to the frequency of service of the 2018 Post-LRT Stage 1 Transit Service Plan. DB Co shall be responsible for contacting the City prior to the service change dates identified in Table 7-3.1 to identify any changes to the transit service plans and how they may impact the frequency of service for transit;
 - (iii) Maximize the continued transit services use of the existing Transitway and Stations during construction;
 - (iv) Minimize the travel time variability on transit routes;
 - (v) Minimize additional transit customer travel times, including walking distances to and from bus stops, Stations and Platforms;
 - (vi) Minimize additional transfers points for transit customers;
 - (vii) Minimize additional OC Transpo resources required (buses, kms travelled, lay-bys, disruption of services, service changes, temporary Fitups);
 - (viii) Minimize redundancies;
 - (ix) Minimize disruption to other road users;

- (x) Minimize and mitigate impact on adjacent lands and occupants thereof; and
- (xi) Minimize additional bus traffic in residential areas.
- (e) DB Co shall develop Transitway staging and detour plans subject to the requirements in this Part 7. DB Co's Transitway staging and detour plans shall be submitted in accordance with Schedule 10 – Review Procedure and subject to evaluation and acceptance by the City.
- (f) DB Co may schedule Work within the existing Transitway utilizing one lane closures during Off Peak Periods and Night Periods as detailed elsewhere in this Article 3. DB Co shall be responsible for obtaining the required City approvals and permits to undertake this Work. A suitable alternative location shall be required if the closure of one lane impacts a bus stop or Platform or access thereto.
- (g) DB Co shall provide 35 calendar days' notice to the City for construction access to any component of the existing Transitway. Notice shall be provided in the form of a document explaining the request for construction access to the relevant component of the existing Transitway, submitted by DB Co to the City in accordance with Schedule 10 – Review Procedure, and, the simultaneous transmission of an electronic message sent to the City's Lead Traffic and Mobility and the designated OC Transpo representative, informing them that the request Notice has been submitted.
- (h) DB Co shall be responsible for minimizing the overall duration required for the closure of any parts of the existing Transitway.
- (i) DB Co's TTMP Transitway staging and detour plans shall be founded upon the following key principles and constraints:
 - (i) Safety of all users shall be the primary principle;
 - (ii) Transit shall be given priority on the road system to the greatest extent possible (e.g. temporary bus-only lanes shall be provided);
 - (iii) Transit priority measures shall be implemented at key intersections on transit detour routes to reduce transit delays;
 - (iv) Construction Work shall be staged and phased to minimize disruption to public transit and general traffic throughout design, construction and implementation;
 - (v) DB Co's Transitway staging and detours for the Transitway Sections identified in Clause 3.1 of this Part 7 shall be designed, constructed, monitored, and maintained in accordance with the requirements of Clauses 3.6 through 3.14, of this Part 7, and be in compliance with all requirements of this Part 7, including the transit performance principles outlined in Clause 3.1(d) of this Part 7 and the design provisions set out in Schedule 15-2, Part 2, Article 6 – Roadways, Bus Terminals and Lay-bys.

- (vi) DB Co's approved Transitway staging and detour plans for any segment of the existing Transitway shall be Commissioned and operational to the satisfaction of the City prior to full closure of any portion of the Transitway.
- (vii) DB Co's Transitway staging and detour plans shall be developed to ensure continuity of transit route origins and destinations and Station locations for all transit services that utilize either portions of the Transitway or Stations in the context of access for buses and pedestrians and network coverage;
- (viii) Bus only lanes on OR174 (East Transitway) and Highway 417 (West Transitway) shall remain in service at all times, until after West Substantial Completion and upon notice by the City;
- (ix) DB Co shall not close any component of the Transitway prior to Commissioning the detour route for the corresponding Transitway closure, and when Transitway lane closures are in place during the permitted hours, an alternative shall be made available for transit.
- (j) DB Co shall provide at least six months advance notice to the City for all closures, detour routes and diversions impacting the existing Transitway, including any impacts to local service affecting service to Transitway Stations.
- (k) Implementation of full closure of any segment of Transitway and or Station shall be restricted to occur at one of the regularly scheduled OC Transpo service change dates, which occur four times per year, which are forecasted to occur at the times in the table below.

Table 7-3.1–Tentative Transit Route Schedule Change Dates

| Year | April | June | September | December |
|-------------|--------------|-------------|------------------|-----------------|
| 2018 | 22 | 24 | 2 | 23 |
| 2019 | 21 | 23 | 1 | 22 |
| 2020 | 19 | 21 | 6 | 20 |
| 2021 | 18 | 20 | 5 | 19 |
| 2022 | 17 | 26 | 4 | 25 |
| 2023 | 23 | 25 | 3 | 24 |

Note: The dates in Table 7-3.1 are subject to change by the City. DB Co shall confirm the dates with the City prior to using the data for the purpose of preparing construction schedules.

- (i) If DB Co fails to execute a segment closure on one of the annual transit route schedule change dates, DB Co shall reimburse the City for costs incurred by OC

Transpo relating to OC Transpo scheduling/booking requirements as a result of the DB Co non-compliance with this Clause 3.1 (k) of this Part 7.

- (ii) DB Co shall coordinate with OC Transpo to ensure that all TTMP and TCP submissions and updates to those submissions reflect the most current OC Transpo transit operations.
- (iii) DB Co shall coordinate the proposed closure, and timing of the closure, of each segment, or segments, with the City including OC Transpo, and to the satisfaction of the City and OC Transpo, such that OC Transpo may adequately administer the closure.
- (iv) DB Co shall design and construct all Transitway staging and detour routes according to the Reference Documents listed in Clause 1.1 of this Part 7.
- (l) For all infrastructure changes, including those associated with a service change, DB Co shall provide access for OC Transpo staff to all facilities after West Substantial Completion and upon notice by the City, in order to conduct all necessary reviews, tours, walk-throughs, and operational tests.
- (m) DB Co shall design and construct all permanent and temporary bus stops during all the construction staging, including safe and secure pedestrian access to and from bus stops, and all shelters and COADS requirements that meet the requirements of the City and OC Transpo's standard drawings and specifications as per Appendix E of this Part 7. DB Co shall coordinate the design and locations of the temporary bus stops and shall obtain approval from the City and OC Transpo prior to implementation.

3.2 Construction On or Adjacent To the Existing Transitway

- (a) DB Co shall provide 35 calendar days' notice to the City for access to the Transitway. DB Co shall obtain all required approvals and permits from the City and OC Transpo. DB Co shall complete the required submissions in accordance with Schedule 10 – Review Procedure and subject to evaluation and acceptance by the City, prior to submitting permit applications.
- (b) All required traffic control and protection systems identified in the approved TTMP shall be installed, operated, maintained and removed by DB Co to the satisfaction of the City .
- (c) DB Co shall perform the required traffic control for the lane closure(s) identified in the approved TTMP to the satisfaction of the City, where construction requires Transitway lane closure(s).
 - (i) DB Co shall provide the temporary Station/stop and the temporary Station/stop facilities in kind, such as shelters or benches, as well as the accesses to/from the Station/stop, operational features such as bike racks, lighting, supervisor's office, etc., and including traffic camera/OC Transpo security camera coverage of the temporary Station/stop and its surrounds, where construction shall require any

change to, or relocation of an existing Transitway Station or bus stop, to the satisfaction of the City. This shall include staff washrooms equipped with key access system to the satisfaction of the City.

- (ii) DB Co shall include all alterations to existing Stations or bus stops, and all temporary Station or bus stop designs in the TTMP submission to the City in accordance with Schedule 10 - Review Procedure.
- (d) DB Co shall provide 15 Business Days' notice to the City prior to the day on which any changes to existing signage or new sign placement required for construction shall be required.
- (e) Loading or unloading of materials or construction equipment that will adversely affect the existing Transitway, bus only lanes or Transitway detour traffic, shall not be performed during the following periods:
 - (i) On Transitway bus only lanes or Transitway detour:
 - A. 06:00 to 18:30 hrs
 - (ii) Adjacent to Transitway:
 - A. 06:00 to 09:30 hrs
 - B. 15:00 to 18:30 hrs
- (f) Where loading or unloading of materials is done by means of lifting overhead, overhead protection shall be provided to all impacted pathways, sidewalks, and Platforms.
- (g) DB Co shall not store any equipment or materials on the travelled portion of the Transitway, bus only lanes or Transitway detour, or its shoulders or boulevards, unless the equipment or materials are protected by traffic control and protection systems previously approved by the City and OC Transpo.
- (h) DB Co shall ensure that vehicles transporting materials to, from, or on the Transitway, bus only lanes or Transitway detours do not interfere with or interrupt Transitway, bus only lanes, or Transitway detour operations. Where the transportation of materials to or from construction Sites cannot be accomplished without interfering or interrupting Transitway operations, a separate dedicated construction access shall be established at DB Co's cost.
- (i) DB Co shall require construction vehicles to enter and/or exit in the same direction as buses so that vehicles merge with the bus traffic without crossing traffic lanes, unless specified otherwise.
- (j) DB Co shall ensure that vehicles shall at all times use the access point on the Transitway, bus only lanes, or Transitway detour operations, that is closest to the Work Site.

- (k) DB Co shall ensure that all traffic controls are operational before commencing Works affecting Transitway, bus only lanes, or Transitway detour operations.
- (l) DB Co shall contact the OC Transpo Control Centre 30 minutes prior to setup each day that they are working in or adjacent to a Transitway lane.

3.3 Pedestrian and Cycling Access to the Transitway During Construction

- (a) DB Co shall maintain barrier free pedestrian and cycling access, associated with active and temporary Stations and across all pedestrian Bridges, at all times.
- (b) DB Co shall maintain pedestrian and cycling access across the local route lanes at all times.
- (c) DB Co shall provide a new alternate route pathway, sidewalk or MUP of equivalent length, or within 20% additional length, to current City standards in the event that a pathway, sidewalk or MUP leading to a Station connection is to be closed or relocated due to construction, unless prescribed otherwise by the City.
- (d) Any disruption of a pathway, sidewalk, or MUP that impacts the accessibility to a Transitway Station shall be done in accordance with the provisions of Schedule 15-2, Part 6 – Urban Design, Landscape Architecture and Connectivity Requirements.

3.4 Transitway Lane Closures

- (a) Permitted lane closure periods for Transitway Segments shall be as follows:

Table 7-3.2

| Closure | Monday to Friday | Saturday | Holiday or Sunday |
|--|--|--|--|
| One Lane Closure (All Transitway Segments) | 18:30 - 06:00 hrs 9:30 - 15:00 hrs | 00:01 - 24:00 hrs | 00:01 - 24:00 hrs |
| Full Closure* (All Transitway Segments exclusive of OR174 and Highway 417 bus only lanes) | Not permitted until Transitway Detour Commissioned and in Transpo services are operational | Not permitted until Transitway Detour Commissioned and in Transpo services are operational | Not permitted until Transitway Detour Commissioned and in Transpo services are operational |
| OR174 EB and WB bus only lanes** | Not Permitted | Not Permitted | Not Permitted |

| | | | |
|--------------------------------------|---------------|---------------|---------------|
| Highway 417 EB and WB bus only lanes | Not Permitted | Not Permitted | Not Permitted |
|--------------------------------------|---------------|---------------|---------------|

** Applications for full closures shall be submitted as part of the Works Submittals in accordance with Schedule 10 – Review Procedure.*

**Transitway Detour requirements as defined for each Segment of Transitway to be closed are completed and accepted by the City and OC TranspoBus*

*** Exceptions shall be permitted as per Clause 2.17 of this Part 7.*

3.5 Circulation Roadway Closures within Transitway Stations

- (a) DB Co shall maintain the continuance of all of the operational functions of the existing Transitway Stations throughout the construction and commissioning period. DB Co shall develop a TCP identifying all changes to operational functions and submit to the City in accordance with Schedule 10 – Review Procedure for areas where construction requires lane closures to bus circulation Roadways, Platforms, or bus lay-by areas within Transitway Stations. DB Co shall provide 35 calendar days’ notice prior to the day on which the closures shall be required.
 - (i) DB Co shall perform all modifications required for the temporary bus terminal with no interruption to the regular bus service.
 - (ii) Where changes to the operational function of a Transitway Station results in a routing for buses that causes additional travel time to be incurred, six months’ notice shall be provided.
- (b) DB Co shall ensure the continuance of all operational functions of detoured transit services throughout construction and Commissioning periods.
- (c) DB Co shall coordinate all closures with the City. The following conditions shall apply:
 - (i) Monday to Friday inclusive:
 - A. 06:00 to 09:30 hrs and 15:00 to 18:30 hrs: Bus circulation Roadways shall be fully operational; and,
 - B. 09:30 to 15:00 hrs and 18:30 to 06:00 hrs: One-way bus circulation Roadways may be reduced to one lane. Two-way bus circulation Roadways may be reduced to one lane only in each direction providing that all appropriate approvals and plans are in place.
 - (ii) Saturday, Sunday and holiday:

- A. 00:01 to 24:00 hrs: One-way bus circulation Roadways may be reduced to one lane. Two-way bus circulation Roadways may be reduced to one lane only in each direction
- (d) DB Co shall simulate the operation of the Station, including but not limited to VISSIM modeling, to demonstrate to the City and OC Transpo that any modified Stations will function in an acceptable manner. This information shall be included in the TTMP submissions in accordance with Schedule 10 - Review Procedure. DB Co shall monitor and make adjustments to the Station if the switchover is not performing in accordance with that forecast in the TTMP and sub-plans as reviewed and accepted by the City.

3.6 West Transitway Segment W-1 - Tunney's Pasture Station to Dominion Station

- (a) DB Co shall design and implement a Transitway detour alignment along Scott Street from Tunney's Pasture Station to Dominion Station. The alignment shall utilize the existing Scott Street from Goldenrod Driveway to Churchill Avenue with localized Roadway improvements as described below. DB Co shall design and construct an extension of Scott Street for bus services only, west of Churchill Avenue to Roosevelt Avenue. At Roosevelt Avenue, DB Co shall design and construct the Transitway detour alignment shall cross over the existing West Transitway utilizing a temporary Bridge structure and continue westerly adjacent to the West Transitway and connect to the existing Transitway at Dominion Station.
- (b) DB Co shall be responsible for the design, construction and implementation of the W-1 Transitway staging and detour prior to full closure of any component of the existing W-1 Transitway Segment.
- (c) DB Co shall design and construct the W-1 Transitway detour within the prescribed Scott Street ROW including the detour extension to SJAM Parkway. DB Co shall not implement the W-1 detour until the following are designed and constructed:
 - (i) Widen Scott Street between Clifton Road and Oakdale Avenue as follows:
 - A. DB Co shall widen EB Scott Street from Clifton Road through the Lanark Ave/Scott Street intersection to accommodate a 3.2m left turn lane, 3.5m general purpose through lane and a 3.5m bus only lane. The EB bus only lane shall be shared with right turning general purpose traffic. DB Co shall undertake a traffic operational analysis to design the bus only/right turn lane storage and taper length requirements. DB Co shall remove and reconstruct the existing sidewalk from a point approximately 47m west of Clifton Road to Lanark Avenue to include a 2.0m sidewalk and 1.5m raised EB cycle track.
 - B. DB Co shall widen EB Scott Street from Lanark Avenue to east of Island Park Drive to accommodate a 3.5m general traffic lane, 3.5m bus only lane, and 1.5m EB cycling lane. For clarity, the cycling lane only needs to be provided where a cycle track is not provided. The existing EB left turn

lane at Island Park Drive shall be maintained. The EB right turn lane at Island Park Drive shall be shared with the bus only lane within the limits of the existing right turn lane. DB Co shall undertake a traffic operational analysis for the EB bus only lane to design the required lane length east of Island Park Drive, including taper. DB Co shall remove and reconstruct sidewalk to the limits necessary as required to accommodate Roadway widenings. DB Co shall build a raised EB cycle track from the Lanark Avenue intersection to a point approximately 60m east of Lanark Avenue. DB Co shall build a raised EB cycle track from a point approximately 65m west of Island Park Drive to a point approximately 65m east of Island Park Drive.

- i. DB Co shall relocate the existing Scott Street EB bus stop from west of Island Park Drive to east of Island Park Drive. The relocated bus stop shall maintain all features of the existing bus stop, and be in accordance with the features required in Schedule 15-2, Part 4, Appendix E.
 - C. DB Co shall widen WB Scott Street at Island Park Drive to accommodate at 3.3m left turn lane, a 3.5m general purpose through lane and a 3.3m right turn lane. DB Co shall undertake a traffic operational analysis for the design of the right turn lane storage and taper.
 - D. DB Co shall modify the traffic signal infrastructure at Lanark Avenue and Island Park Drive as required to accommodate Protected Intersection design, including Crossrides on all four legs of the intersections as per the description in Schedule 15-2, Part 2, Clause 6.6, and the conceptual images in Appendix F of this Part 7.
 - E. When the Transitway detour is no longer in service, DB Co shall reinstate the general traffic lanes on Scott Street to existing conditions, including the removal of the EB bus lane and the WB right turn lane. DB Co shall realign the cycle tracks at Lanark Avenue and Island Park Drive with the new permanent Protected Intersection configuration. This work shall be completed after West Substantial Completion and upon notice by the City, and shall be considered Remaining Works.
- (ii) Modifications to the cycling and pedestrian facilities as follows:
- A. DB Co shall relocate the WB cycling lane on Scott Street from Smirle Avenue to Churchill Avenue to the MUP north of Scott Street. At unsignalized intersections, painted Crossrides shall be provided for the MUP.
 - B. DB Co shall reconstruct and widen the existing MUP on the north side of Scott Street between Smirle Avenue and Churchill Avenue. The new MUP

shall be 4.0m wide, and the space shall be allocated as a 2.0m WB-only cycling facility with a 2.0m pedestrian space.

- i. At the signalized intersections of Scott Street and Smirle Avenue, Island Park Drive, Lanark Avenue and Churchill Avenue, the 4.0m wide north side MUP shall be split into a 2.0m wide asphalt surface for cyclists and a 2.0m wide concrete surface for pedestrians at a distance of approximately 25m from the north-east and north-west corners of the intersections.
- C. A painted on-road eastbound cycling lane, with a minimum width of 1.8m, with a minimum width 0.2m buffer, shall be provided on Scott Street from Smirle Avenue to Churchill Avenue at all locations where an eastbound cycle track has not been prescribed.
 - i. DB Co shall provide and install flex-post delineators along the on-road eastbound cycling lane where curbside land uses do not prevent such installations (i.e. driveways, parking spaces, etc.). The initial installation of these flex-posts shall be the responsibility of DB Co. The City shall be responsibility for the seasonal removal and reinstallation of the flex-posts.
 - ii. Where adjacent to on-street parking, the cycling lane may be reduced in width to 1.5m. In such locations, the minimum buffer on the left side of the cycling lane shall be increased to 0.5m, and a 0.5m buffer on the right side of the cycling lane shall also be provided.
 - iii. Appropriate transitions between the cycling facilities to the east of Smirle Avenue and to the west of Churchill Avenue shall be provided.
- D. DB Co shall construct the following infrastructure to facilitate the installation of two cyclist-pedestrian counters on Scott Street, one approximately 100m east of Lanark Avenue, and one 20m west of Grange Avenue:
 - i. Two custom hand holes at each location: one on each of the north and south sides of the road. Hand holes and lids shall be procured by DB Co from [REDACTED] as per the specifications provided in Appendix G of this Part 7;
 - ii. A 50mm rigid PVC conduit under the road connecting the hand holes at each location. DB Co shall leave a fish rope in place in the conduit between the two hand holes;

- iii. DB Co shall install pre-formed loops on the MUP (before paving) to the BC2 specification provided in Appendix G of this Part 7. These loops shall be procured by DB Co from Eco-Counter as per the specification provided in Appendix G of this Part 7;
 - iv. DB Co shall cut a bicycle lane loop in the eastbound bicycle lane to the BC3 specification provided in Appendix G of this Part 7, with the loop cable connected to the nearest hand hole via a 25mm flexible conduit;
 - v. DB Co shall install a wooden post in a concrete foundation suitable to support the pole on the north side of Scott Street. This wooden post shall be procured by DB Co from [REDACTED] as per the specification provided in Appendix G of this Part 7. A 25mm flexible conduit shall connect the north side hand hole to the wooden post's foundation. DB Co shall leave a fish rope in place in this conduit;
 - vi. Specific locations of each of these elements will be provided to DB Co by the City prior to the PFDD design;
 - vii. DB Co's scope shall not include providing operating counter stations, but rather to provide the civil infrastructure required for the City to be able to install the remaining equipment needed to operate the counter stations. DB Co's responsibility shall be limited to: the provision and installation of 50mm rigid PVC conduit, 25mm flexible conduit, hand holes and lids, the loop in the eastbound bicycle lane, the wooden post and concrete foundation, and the pre-formed loops on the MUP.
- (iii) Scott Street extension from Churchill Avenue to Roosevelt Avenue as follows:
- i. DB Co shall design and construct a new bus only detour from the terminus cul-de-sac west of Churchill Avenue to Roosevelt Avenue. The bus detour shall consist of 4.0m EB and WB lanes with 1.0m paved shoulders. The Pavement shall be superelevated as outlined in Schedule 15-2, Part 2 – Civil and Guideway;
 - B. DB Co shall relocate the existing 3.0m MUP from the north side of the detour to the south side. Connect the relocated MUP to the existing MUP at Roosevelt Avenue;
 - C. DB Co shall supply and install continuous temporary concrete barriers on both sides of the entire length of the bus detour, with a 1.2m high chain link fence mounted on top of the temporary concrete barrier on the south side of the bus detour;

- D. DB Co shall modify the intersection of Scott Street/Churchill Avenue as follows;
- i. DB Co shall design and construct a new, permanent, traffic signal in accordance with the requirements of Schedule 15-2 Part 2, Article 6 – Roadways, Bus Terminals and Lay-bys, at the intersection. DB Co shall be responsible for providing a Protected Intersection design, including Crossrides on all four legs of the intersection.
 - ii. DB Co shall undertake a traffic operational analysis for the design and construction of a new WB left turn lane to determine the storage lane length, plus taper. DB Co shall undertake a traffic operational analysis to determine the storage lane length required after the commissioning of the Confederation Line, and implement any changes recommended from the analysis. The implementation of the changes shall be completed after West Substantial Completion and upon notice by the City, and shall be considered Remaining Works.
 - iii. DB Co shall not impact on-street parking on the north side of Scott Street. Removal of on-street parking on the south side of Scott Street between Churchill Avenue and Athlone Avenue shall be permitted during the W-1 detour, but shall be reinstated after West Substantial Completion and upon notice by the City, and shall be considered Remaining Works.
 - iv. DB Co shall undertake a traffic operational analysis for the design and construction of a new northbound right turn lane to determine the storage lane length, plus taper. Construction of the new lane shall not impact any existing curb, however the removal of existing on-street parking on the west side of Churchill Avenue to the limits necessary to accommodate the new turn lane are acceptable. DB Co shall prepare a traffic operational analysis report to determine if this lane is required after the commissioning of the Confederation Line, and implement any changes recommended from said analysis. Modifications to the east curb in order to incorporate elements of the Protected Intersection are acceptable. The implementation of the changes shall be completed after West Substantial Completion and upon notice by the City and shall be considered Remaining Works.
 - v. DB Co shall remove the existing sidewalk on the south side of Scott Street from Churchill Avenue to a point approximately 30m east of Churchill Avenue, and reinstate with a 1.5m raised cycle track and a 2.0m pedestrian sidewalk.

- E. DB Co shall maintain uninterrupted access to existing properties within the cul-de-sac at all times, including but not limited to: [REDACTED];
 - F. DB Co shall maintain on-street parking between Churchill Avenue and the cul-de-sac throughout construction and W-1 Transitway detour implementation period, including temporarily reconfiguring the existing five perpendicular parking spaces on the north side of the cul-de-sac with five parallel parking spaces and maintaining the two parallel parking spaces on the south side; and
 - G. DB Co shall remove the detour and reinstate the Scott Street extension west of Churchill Avenue to existing conditions after the detour is out of service, including restoration of MUP to its existing general alignment with the exception that the Pavement shall end no closer than 1.0m from the near face of the guideway parapet wall. This shall be completed after West Substantial Completion and upon notice by the City and shall be considered Remaining Works.
- (iv) DB Co shall design, supply and install a temporary Bridge over the Transitway and construct the Transitway detour west of the temporary Bridge to connect the Transitway detour to the existing Transitway at Dominion Station as follows:
- A. DB Co shall remove the existing pedestrian Bridge over the Transitway. DB Co shall delay removal of the pedestrian Bridge as long as possible in order to maintain pedestrian connectivity for the community. The Bridge shall be replaced when the Transitway detour service is complete in accordance with Schedule 15-2, Part 2 – Civil and Guideway. DB Co shall provide the City and OC Transpo with 35 calendar days' notice of the schedule for the removal. The removal over the traveled portion of the Transitway shall require the stoppage of transit vehicles across the full width of the affected Transitway lanes. Closure of all lanes shall only be performed as follows:
 - i. If the full closure is scheduled between Victoria Day and Labour Day, the full closure shall take place during the NCC's Sunday Bikedays closure of the SJAM Parkway.
 - ii. If the full closure is scheduled between Labour Day and Victoria Day, the closure shall take place between 02:00 and 05:00 hrs:
 - 1. Nightly closures of the Transitway during this period shall be restricted to 15 consecutive minutes, after which time DB Co shall reopen the Transitway until such a time as the end of the transit vehicle queue passes. After the transit vehicle queue has cleared, DB Co may close the Transitway again for a further 15 minute period, repeating

this process until the job is complete or it is 05:00 hrs and the Transitway shall be reopened.

- B. DB Co shall construct the bus only detour from temporary Bridge to Dominion Station. The bus detour shall consist of 4.0m EB and WB lanes with 1.0m paved shoulders. The Pavement shall be superelevated as outlined in Schedule 15-2, Part 2 – Civil and Guideway;
- C. DB Co shall construct a temporary portable prefabricated Bridge over the existing Transitway to accommodate two 4.0m wide bus lanes. The temporary Bridge shall be a minimum width of 9.1m. DB Co shall submit a detailed Bridge erection plan to the City 60 calendar days in advance of undertaking the installation. The plan shall identify any requirements for installing Bridge components over the Transitway during transit services. DB Co shall be permitted to perform full closures for installation of Bridge girders, prefabricated Bridge components, falsework and overhead electrical wiring installations. The installation of the traveled portion of the Transitway shall require the stoppage of transit vehicles across the full width of the affected Transitway lanes. Closure of all lanes shall only be performed as follows:
 - i. If the full closure is scheduled between Victoria Day and Labour Day, the full closure shall take place during the NCC's Sunday Bikedays closure of the SJAM Parkway
 - ii. If the full closure is scheduled between Labour Day and Victoria Day, the closure shall take place between 02:00 and 05:00 hrs:
 - 1 Nightly closures of the Transitway during this period shall be restricted to 15 consecutive minutes, after which time DB Co shall reopen the Transitway until such a time as the end of the transit vehicle queue passes. After the transit vehicle queue has cleared, DB Co may close the Transitway again for a further 15 minute period, repeating this process until the job is complete or it is 05:00 hrs and the Transitway shall reopen.
- D. DB Co shall supply and install temporary concrete barriers on the south side of the entire length of the detour;
- E. DB Co shall ensure the existing Dominion Transitway Station services remain in service at all times during the construction of the detour and while the detour is in service, including all pedestrian connections; and,
- F. DB Co shall remove the detour and Bridge and reinstate to existing conditions including restoration of Roosevelt Avenue pedestrian Bridge crossing when the Transitway detour is no longer in service. The new

pedestrian Bridge shall include the installation of a cyclist/pedestrian counter, as approved by the City. DB Co shall submit a detailed Bridge removal and erection plan to the City 60 calendar days in advance of undertaking the removal of the temporary detour Bridge and reinstatement of the pedestrian Bridge. The plan shall identify any requirements for installing Bridge components for the Guideway during transit services. This work shall be completed after West Substantial Completion and upon notice by the City and shall be considered Remaining Works.

- (v) When the W-1 detour is in operation, OC Transpo will be routing their deadhead buses between Dominion and Tunney's Station on SJAM Parkway and Goldenrod Driveway (within Tunney's Pasture campus) and access the SJAM Parkway at the existing signalized intersections at Goldenrod Driveway/SJAM Parkway.
 - A. DB Co shall design and construct a temporary detour for deadhead buses from Tunney's Pasture Station to Goldenrod Driveway as part of the W-1 Transitway detour.
 - B. DB Co shall undertake a structural analysis of existing structures under the SJAM Parkway as outlined in Schedule 15-2, Part 2, Article 4 – Structural Design Criteria and Requirements.
- (vi) DB Co shall resurface Scott Street, from Churchill Avenue to Goldenrod Driveway / Smirle Avenue, prior to the implementation of the W-1 detour.
- (d) DB Co shall ensure that the existing Tunney's Pasture Station bus service facilities including Platforms, Roadways, lay-bys and Bus Operator's facilities are available for OC Transpo services at all times including the following requirements:
 - (i) The existing Tunney's Pasture Station bus facility shall remain in full service until after West Substantial Completion and upon notice by the City.
 - (ii) DB Co shall stage the decommissioning of existing Tunney's Station bus platforms, bus lay-by and Operator's building facilities in a manner that maintains OC Transpo transit bus services at all times. Work that is required after the OC Transpo bus service is removed shall be completed after West Substantial Completion and upon notice by the City, and shall be considered Remaining Works.
 - (iii) DB Co shall ensure any required temporary bus lay-by areas shall be equivalent in capacity to the existing bus lay-by area and be fully integrated to the Station access roads. The bus lay-by area shall maintain the Operator's building facilities with all services.
 - (iv) DB Co shall ensure that the existing temporary bus only connection from the Tunney's Pasture bus facility to Scott Street shall remain in full service until such time as the new Goldenrod Driveway Bridge and signalized Protected Intersection

at Scott Street are constructed and Commissioned for service. The following sequence of Work shall be followed:

- A. The W-1 detour shall not be implemented until the new Goldenrod Driveway Bridge is constructed, Commissioned and operational.
 - B. No work on the Tunney's Pasture bus facility shall begin until the new Goldenrod Driveway Bridge and Scott Street at Goldenrod Driveway Protected Intersection are constructed, Commissioned, and operational.
 - C. Transfer of Transit services to the Goldenrod Driveway Bridge shall be scheduled during a non-Peak Period subject to review and approval by the City.
 - D. The existing temporary bus connection and intersection to Scott Street shall be removed immediately after the Goldenrod Driveway Bridge is Commissioned including the realignment of the MUP to the new intersection crossing.
- (e) DB Co shall maintain transit services at Westboro Station at all times. DB Co shall complete the following prior to Commissioning the W-1 Transitway detour:
- (i) DB Co shall construct temporary Transitway Station facilities on Scott Street for EB transit services. The temporary facilities shall include all transit service facilities features currently present at Westboro Station, including but not limited to the requirements in Appendix E of this Part 7. The temporary Station facilities shall be within 200 metres of the existing Station to maintain existing transit user connectivity. The temporary Station facilities shall be designed and constructed to safely accommodate the EB cycling facility passing through the Station.
 - (ii) DB Co shall construct temporary Transitway Station facilities at the southern platform at Westboro Station for WB transit services. The temporary facilities shall include any features currently present at Westboro Station, including but not limited to the requirements in Appendix E of this Part 7. DB Co shall maintain safe pedestrian access from the north side of Westboro Station to the temporary Transitway facilities on Scott Street at all times, including but not limited to the two pathways connecting to Lanark Avenue. Pedestrian access shall be separated from construction activities and construction accesses in a safe manner. DB Co shall construct the temporary Transitway Station facilities so as to accommodate the safe passage of WB cyclists through the Station.
 - (iii) DB Co shall, during design, investigate with the City and OC Transpo to determine if it is beneficial to modify the two pedestrian signals at Athlone Avenue and Tweedsmuir Avenue to provide Transit Priority. This investigation shall also consider the addition of Crossrides for cyclists.

- (iv) DB Co shall maintain the connection from Westboro Station to the Transitway trench until such a time that construction begins on the Westboro bus lay-up loop. Until that time, the Transitway trench access shall be left open to be used as a potential construction access.
- (f) DB Co shall not construct the pedestrian plaza on the south side of Westboro Station until the W-1 Transitway detour is no longer in use, since this area shall be used as the WB Platform for detoured Transitway buses.
- (g) DB Co shall ensure any construction activity undertaken by DB Co at intersections in the Scott St corridor shall not impact the W-1 Transitway detour, or shall take place as Remaining Works (completed after West Substantial Completion and upon notice by the City) so as to not impact the W-1 Transitway detour.
- (h) DB Co shall not allow lighting to spill into wooded areas around W-1 construction zones between May 15th and July 15th construction periods.

3.7 SJAM Parkway Segments W-2, W-3 & W-4 – Dominion Station to Lincoln Fields Station

- (a) OC Transpo bus services within Segments W-2, W-3 & W-4 are located on the SJAM Parkway from Dominion Station to Lincoln Fields Station. The bus services on SJAM shall remain in service at all times during construction.
- (b) A section of the SJAM Parkway shall be reconstructed in this contract. DB Co shall be responsible for undertaking traffic staging and construction sequencing of the SJAM Parkway road reconstruction in a manner that maintains uninterrupted general traffic services and bus services.

3.8 Southwest Transitway Segment SW-2 - Lincoln Fields Station to Iris Station

- (a) OC Transpo bus services within Segment SW-2 are located on the Southwest Transitway from Lincoln Fields Station to Iris Station. The bus services on the Southwest Transitway including the Transitway ramps to and from Highway 417 and the dedicated bus access roads to and from Lincoln Fields Station shall remain in service at all times until after West Substantial Completion and upon notice by the City, unless specified otherwise. Any work required after this date shall be considered Remaining Works.
- (b) DB Co shall maintain a minimum of two traffic lanes in each direction on Carling Avenue at all times between Lincoln Fields Station and the existing Transitway Bridge during construction of the new Carling Avenue Bridge.
- (c) DB Co shall maintain the pedestrian Bridge connection from Lincoln Fields Station to Carling Avenue for as long as possible. DB Co shall not decommission the pedestrian Bridge until the temporary ramp, MUP and signalized intersection, as described in Clause 3.8(d) of this Part 7, are constructed and Commissioned.

- (d) DB Co shall maintain transit services at Lincoln Fields Station at all times. Prior to decommissioning any component of the existing Lincoln Fields Transitway Station, DB Co shall provide the following:
- (i) DB Co shall be responsible for the design, construction and maintenance of temporary facilities to the City and OC Transpo standards and specifications, including but not limited to the requirements in Appendix E of this Part 7.
 - (ii) DB Co shall ensure dedicated bus access roads are available to and from Lincoln Fields Station temporary facilities. Where required, DB Co shall provide detours to the City and OC Transpo standards and specifications.
 - (iii) DB Co shall provide a temporary bus-only ramp on the south side of Carling Avenue connecting to the existing Transitway:
 - A. The temporary bus-only ramp shall connect with Carling Avenue at a signalized intersection, located west of the new Carling Avenue Bridge and east of the existing Carling Avenue Bridge;
 - B. The ramp shall be constructed prior to the closure of direct vehicular access from Carling Avenue to Lincoln Fields Station and prior to the closure of the pedestrian Bridge from Carling Avenue to Lincoln Fields Station; and
 - C. DB Co shall provide a MUP on the west side of the bus ramp, connecting to the existing MUP on the east side of the Transitway. The MUP shall meet all standards as outlined in Schedule 15-2, Part 6 – Urban Design, Landscape Architecture and Connectivity Requirements.
 - D. The ramp shall connect to the Transitway south of Carling Avenue, at a three leg intersection, with a stop control on the approach from the ramp.
 - E. The provision of this temporary bus-only ramp shall not increase the number of blocks on this segment of Carling Avenue for the purposes of Schedule 34 Mobility Matters calculations.
 - (iv) DB Co shall be responsible to provide bus lay-by areas to facilitate Lincoln Fields Station operations at all times. The lay-up areas shall be equivalent in capacity to the existing bus lay-up area (minimum 10 articulated buses) and be fully integrated into access roads and to the satisfaction of the City and OC Transpo. The existing bus lay-up areas consist of six articulated bus spaces (4.5m x 30m marked spaces) in the lay-up area east of the station, and approximately four articulated bus spaces on the perimeter of the main Platform area. In the event that the Lincoln Fields lay-up area cannot fully serve the OC Transpo route(s) scheduled start times of the 2018 Post-LRT Stage 1 Transit Service Plan when the new Lincoln Fields Station is being constructed, a temporary lay-up in closer proximity to the Transitway shall be provided by DB Co. Such a lay-up shall be

established to enable buses to start their route on time and on schedule. This temporary lay-up area will be required, in a location to be determined by DB Co, in consultation with the City and OC Transpo, and be in close proximity to temporary platforms and bus bays. The temporary lay-up area is considered to be a component of DB Co's Transitway detour requirements, and all Station facilities shall be as required in Appendix E of this Part 7.

- (v) Temporary bus facilities shall remain in service at all times until after West Substantial Completion and upon notice by the City.
- (vi) DB Co shall be responsible for the decommissioning and removal of the temporary bus facilities in accordance with Schedule 15-2, Part 1 – General. This work shall be completed after West Substantial Completion and upon notice by the City, and shall be considered Remaining Works.
- (e) DB Co shall provide a signalized pedestrian crossing of Carling Avenue in close proximity to Lincoln Fields Station, east of the temporary signalized intersection prior to decommissioning the temporary bus ramp and signalized intersection.
- (f) DB Co shall maintain the pedestrian and cycling access from the Lincoln Fields Station or any temporary Lincoln Fields Station facilities to the signalized pedestrian crossing of the SJAM Parkway northwest of Lincoln Fields Station throughout construction.
- (g) Within the Segment SW-2 the Transitway services shall remain in service at all times until West Substantial Completion and upon notice by the City. South of Lincoln Fields Station, DB Co shall, as required to accommodate both the Guideway and the Transitway, design, construct and commission the realignment of the existing Transitway facility to Iris Station. The realigned sections of the Transitway shall match the existing Transitway by maintaining one lane in each direction at all times. The realignment of the Transitway shall also connect to the existing N-W and W-N/S Transitway ramps at Highway 417. The construction of the realignments shall be staged in a manner that maintains uninterrupted Transit services at all times.

3.9 Southwest Transitway Segment SW-1 - Iris Station to Baseline Station

- (a) DB Co's approved Transitway staging and detour plans for SW-1 from Iris Station to Baseline Station shall be commissioned and in operation prior to full closure of any component of the SW-1 Transitway from Iris Station to Baseline Station
- (b) Prior to the closure of Iris Street to construct the Iris Street overpass, DB Co shall design, construct and commission the following:
 - (i) DB Co shall construct an Iris Street detour to the extents required to construct the Iris Street Bridge structure. The Iris Street detour shall be located north of the existing Iris Street. The Iris Street detour shall connect to the Transitway north of Iris Street at a three-leg signalized intersection. DB Co shall provide crosswalks on the north and east legs of this intersection;

- (ii) DB Co shall design and construct a second Transitway/Iris Street detour intersection to facilitate the continuation of the Transitway bus services south of Iris Street to the Baseline Station. DB Co shall provide a crosswalk on the west leg of this intersection. The Iris Street to Baseline Station Transitway connection shall remain in service until such time as the SW-1 detour is not required;
- (iii) DB Co shall design the temporary Iris Street detour and Transitway connections in such a manner that the footprint of these facilities does not impact the ultimate alignment of the realigned Pinecrest Creek low-flow channel, as per the Pinecrest Creek details in Schedule 15-2, Part 2, Article 5 – Drainage and Stormwater Management Design Criteria.
- (iv) DB Co shall maintain transit services at the Iris Station at all times until West Substantial Completion and upon notice by the City. Prior to decommissioning any component of the existing Iris Transitway Station, DB Co shall provide the following:
 - A. DB Co shall relocate the existing Iris Station Transitway facilities in a location that is approved by OC Transpo and the City. DB Co's temporary facilities shall include any features currently present at the Iris Station, including but not limited to: the requirements in Appendix E of this Part 7. The temporary Station facilities shall be located within 100 metres of the Iris Street detour/Transitway intersection to maintain existing transit user connectivity. The temporary Station shall meet the following requirements:
 - B. DB Co shall consolidate the existing bus stop on the west side of the Transitway, and the bus stop on the south side of Iris Street, locate the consolidated bus stop on the west side of the Transitway, north of Iris Street.
 - C. DB Co shall relocate the bus stop on the north side of Iris Street further to the west and remain on the north side of Iris Street.
 - D. DB Co shall relocate the bus stop on the east side of the Transitway further north and remain on the east side of the Transitway.
- (v) DB Co shall construct a temporary MUP along the south side of the Iris Street detour in order to maintain connectivity of the Pinecrest Creek Pathway.
- (c) After completion and commissioning of the Iris Street Bridge, DB Co shall not close the Iris Street detour or Transitway connections and facilities until the following are designed, constructed and commissioned:
 - (i) DB Co shall construct a temporary Transitway/Iris Street intersection from north of Iris Street to a location west of the Iris Street Bridge. The Transitway intersection shall include a connection to Iris Street at a temporary signalized

intersection, with one lane in each direction at each approach and crosswalks on all three legs of the intersection.

- (ii) DB Co shall relocate the Iris Station Transitway facilities in a location that is approved by OC Transpo and the City. DB Co's temporary facilities shall include any features currently present at the Iris Station, including but not limited to the requirements in Appendix E of this Part 7. The temporary Station facilities shall be located within 100 metres of the Iris Street/Transitway intersection to maintain existing transit user connectivity. The temporary Station shall meet the following requirements:
 - A. DB Co shall consolidate the existing bus stop on the west side of the Transitway, and the bus stop on the south side of Iris Street, locate the consolidated bus stop on the west side of the Transitway, north of Iris Street.
 - B. DB Co shall relocate the bus stop on the north side of Iris Street further to the west and remain on the north side of Iris Street.
 - C. DB Co shall relocate the bus stop on the east side of the Transitway further north and remain on the east side of the Transitway.
- (iii) DB Co shall decommission the temporary Iris Station facilities after West Substantial Completion and upon notice by the City, and shall be considered Remaining Works
- (iv) DB Co's SW-1 transit detour shall be located on Iris Street and Woodroffe Avenue. DB Co shall be responsible for design and implementation of the detour requirements, which shall include the addition of a northbound bus only lane on Woodroffe Avenue, between Baseline Road and Iris Street. DB Co's design shall widen Woodroffe Avenue on the east side and shall maintain sidewalks on both sides of Woodroffe Avenue throughout construction. DB Co's design shall also address the following:
 - A. Provide for a 3.5m wide northbound bus lane located adjacent to the center median/centre line. Two northbound general traffic lanes shall also be provided, with the curbside lane being 3.5m wide and the adjacent lane being 3.25m wide. The bus lane shall begin at the Baseline Road/Woodroffe Ave intersection and continue north and connect to the existing northbound left turn lane at Iris Street, which shall be widened to 3.4m. The northbound left turn movement at Woodroffe Avenue and Iris Street shall be shared between buses and general traffic.
 - i. To accommodate the above lane widths, lane widths in the southbound direction on Woodroffe Avenue between Iris Street and Baseline Road shall be 3.5m for the curb lane and 3.25m for the median lane.

- B. Provide for a 3.5m wide southbound queue jump lane for buses at the intersection of Woodroffe Avenue and Baseline Road. The queue jump lane shall replace one of the existing southbound general traffic lanes, adjacent to the southbound right turn lane. DB Co shall construct the lane so that it does not impact the ability of southbound vehicles to make a right turn onto Baseline Road.
 - C. Provide for a southbound cycle track and boulevard on the west side of Woodroffe Avenue, from north of Iris Street to south of the signalized intersection with the Pinecrest Creek Pathway, as per Schedule 15-2, Part 2, Clause 6.19. At the signalized intersection, DB Co shall ensure that the cycle track ties into the existing Pinecrest Creek Pathway in an acceptable manner to the City.
 - D. Provide for a northbound cycle track and boulevard on the east side of Woodroffe Avenue, beginning at a point 35m south of Iris Street, and transitioning back to on-road cycling lanes in front of [REDACTED], as per Schedule 15-2, Part 2, Clause 6.19.
 - E. Provide for crossrides in the northbound and southbound directions at the intersection of Woodroffe Avenue and Iris Street.
 - F. Provide minimum sidewalk, boulevard and buffer widths as per Schedule 15-2, Part 2, Article 6 – Roadways, Bus Terminals and Lay-bys.
 - G. Reinstate Woodroffe Avenue after West Substantial Completion as per Schedule 15-2, Part 2, Article 6 – Roadways, Bus Terminals and Lay-bys.
- (v) DB Co shall analyze the traffic operations on the prescribed detour route and recommend any modifications to traffic controls along that route that would serve to improve the operations of the transit detour as part of the TCP sub-plan submitted for this detour, including but not limited to, the intersection of Iris Street and Adirondack Drive.
- (d) DB Co's approved Transitway staging and detour plans for the West Transitway from Lincoln Fields Station to Queensway Station shall be Commissioned and in operation prior to full closure of any component of the West Transitway from Lincoln Fields Station to Queensway Station.
- (e) Transit Access and Circulation Roadway Closures – Baseline Station:
- (i) DB Co shall only allow construction vehicles to enter Baseline Station via the southernmost access on Woodroffe Avenue. DB Co shall restrict construction vehicles to a right-in, right-out movement only at this access during Peak Periods. In Baseline Station, construction vehicles shall only be permitted to drive between Woodroffe Avenue and the construction access point. This access shall be subject to monitoring and review and may be further restricted to Off Peak Periods only if

operations are not conducive to maintain transit operations to OC Transpo's satisfaction.

- (ii) DB Co shall not decommission any of the existing lay-up berths or transit operator facilities at Baseline Station until the new, permanent lay-up berths and transit operator facilities are designed, constructed and Commissioned.
- (iii) DB Co shall not close any of the existing platforms or roadways at Baseline Station, or the existing northern lay-up area, until the new, permanent Baseline Transitway Station has been designed, constructed, and Commissioned.
- (iv) DB Co shall maintain use of the existing Transitway from Baseline Station to Iris Station as long as possible.
- (v) DB Co shall develop a TCP identifying all changes to operational functions and submit to the City as part of the Works Submittals in accordance with Schedule 10 – Review Procedure for review, where construction pursuant to this Project requires lane closures to bus circulation Roadways within Baseline Station. DB Co shall provide 35 calendar days' notice prior to the day on which the closures shall be required.
- (vi) DB Co shall decommission the existing Baseline Station after West Substantial Completion and upon notice by the City, as per Schedule 15-2, Part 1, Article 14 - Demolition, Removals and Disposal.
 - A. DB Co shall maintain two lanes at the existing Baseline Station after West Substantial Completion.
- (vii) College Avenue and Navaho Drive west of Woodroffe Avenue shall be considered bus circulation Roadways within Baseline Station and shall be subject to Clause 3.5 of this Part 7.

3.10 West Transitway Segment W-5 – Lincoln Fields Station to Queensway Station

- (a) OC Transpo bus services within Segment W-5 are located on the Southwest Transitway from Lincoln Fields Station to Queensway Station. The bus services on the Southwest Transitway including the Transitway ramps to and from Highway 417 and the dedicated bus access roads to and from Lincoln Fields Station shall remain in services at all times until West Substantial Completion and upon notice by the City, unless specified otherwise.
 - (i) DB Co shall be permitted to close the W-N/S ramp between Highway 417 and the Southwest Transitway once construction of the Track alignment eliminates the feasibility of this connection. The connection is to be maintained as long as possible prior to closure. Upon closure, Transitway services shall be re-routed via Woodroffe Avenue and Iris Street to rejoin the Southwest Transitway. Advance

notification and restrictions shall apply as described in Article 3.1 – General Requirements, of this Part 7.

3.11 West Transitway Segment W-6 - Queensway Station to Pinecrest Station

- (a) OC Transpo bus services within Segment W-6 are located on Highway 417 from Queensway Station to Pinecrest Station. Access to Highway 417 from the SW-2 Transitway is via dedicated bus only ramps that are to remain in service at all times during construction.
- (b) Bus Circulation, Pedestrian Circulation and Roadway Closures – Queensway Station:
 - (i) DB Co shall maintain all stairways and access to all stairways from upper to lower level platforms and MUPs at Queensway Station at all times throughout construction to ensure pedestrian connectivity, with the following exception:
 - A. The east side stairways shall remain open until construction has advanced to the point that pedestrian access to the east side of the Transitway is no longer possible. DB Co shall provide a minimum of 90 days advance notice of this closure. Once the east side stairways have closed, DB Co shall implement a controlled crossing of the Transitway between the stops to the satisfaction of the City. The City shall confirm with DB Co the type of crossing to be implemented (e.g., PXO Type C, temporary pedestrian signal, etc.) a minimum of 75 days prior to the closure of the east side stairways.
 - (ii) DB Co shall ensure the N-W ramp from the Southwest Transitway to Highway 417 remains open throughout the duration of construction.
 - (iii) DB Co shall ensure the W-N/S ramp from Highway 417 to the Southwest Transitway remains open until after implementation of the SW-2 detour, at such a time that the construction of the LRT Track inhibits buses on the ramp from accessing the Transitway.
 - (iv) DB Co shall decommission the N-W ramp from the Southwest Transitway to Highway 417, the W-N/S ramp from Highway 417 to the Southwest Transitway, and the remainder of Queensway Station after West Substantial Completion and upon notice by the City, and shall be considered Remaining Works. DB Co shall submit their design for the removal of these ramps and the Station in accordance with Schedule 10 – Review Procedure. The design shall require the approval of the City and MTO.
 - (v) DB Co shall maintain the bus-only lane on the 417 E-N/S off ramp at Pinecrest Road until after West Substantial Completion and upon notice by the City. Removal of this lane shall be considered Remaining Works.

3.12 West Transitway Segment W-7 - Pinecrest Station to Bayshore Station

- (a) DB Co's approved Transitway staging and detour plans for W-7 from Pinecrest Station to Bayshore Station shall be commissioned and in operation prior to full closure of any component of the W-7 Transitway from Pinecrest Station to Bayshore Station.
- (b) DB Co shall implement a W-7 Transitway detour along Highway 417 from Pinecrest Station to Bayshore Station.
 - (i) DB Co's W-7 Transitway detour route is to remain in operation until after West Substantial Completion and upon notice by the City.
 - (ii) DB Co's WB W-7 Transitway detour shall utilize a route from Pinecrest Station, southbound on Pinecrest Road westerly on the new Highway 417 N-W ramp, WB Highway 417 shared lanes from Pinecrest Road to Bayshore Drive, WB on Woodridge Crescent via Bayshore Drive to the westernmost Bayshore Shopping Centre entrance southbound into Bayshore Station.
 - (iii) DB Co's EB W-7 Transitway detour shall utilize a route from Bayshore Station westerly on the Bayshore Station access road to Holly Acres Road, southbound on Holly Acres Road to the new temporary Highway 417 N/S-E bus-only ramp, EB on Highway 417 shared lanes from Holly Acres Road to Greenbank Road EB off ramp, where buses will travel through the intersection of Greenbank Road/Iris Street to access the temporary station on Greenbank Road/Highway 417 S-E ramp, then continue EB on Highway 417.
- (c) The prescribed detour route, in Clause 3.12 (b) (iii), of this Part 7, requires Roadway modifications and access modification that are described in Clause 3.12 (d), of this Part 7. DB Co shall conduct a PIC, in accordance with the provisions of Schedule 18 – Communication and Stakeholder Engagement Obligations, at least 90 calendar days prior to the start of the W-7 Transitway detour to inform and consult with the public on the details of the detour. In addition to general information regarding the traffic and transit management measures to be used and the timelines associated with the detour, the PIC shall provide specific information concerning: the temporary closure of the Richmond Road N-E ramp, the opening of the temporary Holly Acres N/S-E bus-only ramp, the potential addition of a third eastbound left turn lane to the Highway 417 W-N/S ramp terminal at Greenbank, and the closure of the Ashley Street connection to the Highway 417 W-N/S ramp terminal at Greenbank. DB Co shall prepare a report following the PIC, to be submitted to the City and MTO, summarizing the feedback received from the public, as well as any resultant recommended revisions to DB Co's detour plan.
- (d) Transit Access and Circulation Roadway Closures – Pinecrest Station:
 - (i) DB Co shall maintain the full use of both Station platforms at Pinecrest Station for the full duration of construction until the following are designed, constructed and commissioned or unless approval from the City and OC Transpo is otherwise obtained.

- A. DB Co shall design and construct the new N-W ramp from Pinecrest Road to Highway 417, as part of the Pinecrest interchange project outlined in Schedule 15-2, Part 9 – Highway Works;
- B. DB Co shall design and construct a bus loop west of Pinecrest Station to be used for a bus turnaround when the West Transitway from Pinecrest Station to Bayshore Station is closed. The bus loop shall accommodate the turnaround radius for all bus types used by OC Transpo;
- C. DB Co shall design and construct a temporary bus platform on the S-E ramp from Greenbank Road to Highway 417, to accommodate detoured EB Transitway buses. The temporary facilities shall include any features currently present at Pinecrest Station, including but not limited to the requirements in Appendix E of this Part 7;
 - i. DB Co shall decommission the temporary Pinecrest Station facilities at the S-E ramp from Greenbank Road to Highway 417 after West Substantial Completion and upon notice by the City, and shall be considered Remaining Works.
 - ii. DB Co shall evaluate whether modifying the W-N/S ramp terminal intersection at Greenbank Road/Iris Street to include a third eastbound left turn lane (transit-only) on the outside of the existing dual left turn lanes would provide a travel time benefit to eastbound OC Transpo buses while on detour. If the study finds this to be beneficial, DB Co shall modify the intersection to provide such a third eastbound left turn lane with maximized storage length, to the satisfaction of the City and MTO. DB Co shall include this analysis in their TTMP submission. The modification shall be temporary in nature, and DB Co shall restore the intersection to its pre-existing condition as Remaining Works.
- D. DB Co shall design and construct a widening of the west side of the intersection of Greenbank Road and Lisa Avenue to accommodate two EB lanes;
 - i. Upon completion of the widening, DB Co shall coordinate the temporary closure of Ashley Street to the W-N/S ramp with MTO and the City of Ottawa. The closure shall not impact the northernmost access to the property at [REDACTED].
- E. DB Co shall design and construct the new temporary N/S-E bus-only ramp from Holly Acres Road onto Highway 417, as part of the MTO Highway 417 widening project, in accordance with the provisions of Schedule 15-2, Part 9 – Highway Works. The design of this on-ramp shall be to the satisfaction of MTO and shall include:

- i. An on-ramp that is a single lane at the intersection with Holly Acres Road, allowing transit traffic only. The temporary on-ramp shall allow for the following traffic movements: southbound left turn, northbound right turn, eastbound through (from the S/W-N/S off-ramp).
 - ii. An eastbound lane on the existing Highway 417/Highway 416 off-ramp that shall terminate at a point 160m west of Holly Acres Road. DB Co shall conduct a traffic analysis of the intersection with Holly Acres Road to determine the recommended eastbound lane configuration at this intersection. This analysis shall consider that OC Transpo buses must be able to make both the eastbound left turn and eastbound through movements at this intersection, in addition to the southbound left turn movement; and,
 - iii. The existing median southbound through lane shall be temporarily converted into a southbound left turn lane.
 - iv. The existing Richmond Road N-E on-ramp shall be temporarily closed upon the opening of the Holly Acres N/S-E ramp and the commencement of the W-7 Transitway detour.
 - v. The temporary Holly Acres N/S-E on-ramp shall be closed and the Richmond N-E on-ramp shall be re-opened upon notice by the City as part of the Remaining Works.
- (ii) Construction vehicles shall not be permitted on the West Transitway west of Pinecrest Road, until such a time that the N-W ramp from Pinecrest Road to Highway 417 has been closed. When permitted on the Transitway, construction vehicles shall be restricted to travel between Pinecrest Road and the construction access point.
 - A. Construction vehicles shall not be permitted in Pinecrest Station during Peak Periods.
- (e) Transit Access, Pedestrian Circulation and Roadway Closures – Bayshore Station:
 - (i) Construction vehicles shall enter the Bayshore Station area directly from Holly Acres Road into the construction staging area, located at the southeast corner of Holly Acres Road / Highway 417 N/S-W ramp.
 - A. If access further east into Bayshore Station is required, it shall be made directly from the construction staging area.
 - B. Construction vehicles shall exit from the Bayshore Station area via the signalized intersection of Holly Acres Road / Highway 417 N/S-W ramp. Permitted hours of access shall be established based on a review by OC

Transpo and may be limited to Off Peak Periods in order to maintain an acceptable frequency of service to the Transitway detour operation in peak hours.

- C. The construction access onto the Bayshore Station access road shall be provided as far west as possible to avoid potential conflicts with Bayshore Station operations.
- (ii) DB Co shall maintain the full use of all Station platforms at Bayshore Station for the full duration of construction until the following are designed, constructed and Commissioned or unless approval from the City and OC Transpo is otherwise obtained.
 - A. Construction of the LRT bridge over Holly Acres Road. DB Co shall stage construction of the bridge in the following order:
 - i. Required construction west of Holly Acres Road, including but not limited to the west bridge abutment and the new N/S-W on-ramp from Holly Acres Road to Highway 417. DB Co shall not be permitted to close the existing N/S-W on-ramp until the new N/S-W on-ramp is constructed.
 - ii. Required construction in the median of Holly Acres Road, including but not limited to the median pier. Prior to construction in the median on Holly Acres Road, DB Co shall ensure the new S-W on-ramp is open and operational. This will permit DB Co to use the available space of the former northbound left turn lane and hatched northbound lane on Holly Acres Road as part of its construction zone.
 - 1 DB Co shall undertake a traffic study for the temporary and ultimate intersection of Holly Acres Road at Bayshore Station access, including the new N/S-W on-ramp, to ensure the intersection operates acceptably, and that vehicles can safely make the northbound left turn from Holly Acres Road onto the N/S-W ramp.
 - iii. Required construction east of Holly Acres Road, including but not limited to the east bridge abutment.
 - B. Construction within Bayshore Station to accommodate the temporary Bayshore Station arrangement, including:
 - i. A separate two-way access to the Transitway east of the existing Bayshore Station. This access shall be located far enough east that it will not be impacted by construction on the ultimate Bayshore Station;

- ii. A temporary lay-up and temporary bus Platform area west of the existing local bus Platforms. The lay-up area shall match the capacity of the existing lay-up area at Bayshore Station, and the Transitway Platforms shall match the lengths provided today for the existing Transitway Platforms;
- (f) DB Co shall complete the following as Remaining Works:
 - (i) Designate the additional eastbound lane on the Highway 416/Highway 417 off-ramp at Holly Acres Road as a general traffic left turn lane. Re-assign the lanes on the eastbound approach to accommodate two left turn and two right turn lanes;
 - (ii) Construct the ultimate alignment for the intersection of Holly Acres Road at Bayshore Station, as outlined in Schedule 15-2, Part 2, Article 6 - Roadways, Bus Terminals and Lay-bys;
 - (iii) Construct the ultimate layout for Bayshore Station, and reinstate the temporary lay-up and Transitway platform area of Bayshore Station to existing conditions.
 - (iv) Re-open the temporarily closed Richmond Road N-E ramp and close the Holly Acres N/S-E bus-only on-ramp.

3.13 West Transitway Segments W-8 & W-9 - Bayshore Station to Moodie Station

- (a) DB Co's approved Transitway staging and detour plans for W-8 (from Bayshore Station to Holly Acres Road) and W-9 (from Holly Acres Road to Moodie Station) shall be commissioned and in operation prior to full closure of any component of the Transitway from Bayshore Station to Moodie Station.
- (b) DB Co shall stage the construction of the LRT from Bayshore Station to Moodie Station in such a manner that minimizes the duration of the closure of the Transitway between Bayshore Station and Moodie Station.
- (c) Upon closure of the Transitway between Bayshore Station and Moodie Station, DB Co shall implement a transit detour along Highway 417 from Bayshore Station to Moodie Station.
 - (i) DB Co's W-8 and W-9 transit detour routes shall remain in operation until after West Substantial Completion.
 - (ii) DB Co's WB W-8 and W-9 transit detour shall utilize a route from Bayshore Station, WB along the Bayshore Station access road to Holly Acres, WB onto the Highway 417 N/S-W ramp at Holly Acres Road, WB Highway 417 shared lanes from Holly Acres Road to Moodie Drive, WB through the intersection of Moodie Drive at Highway 417 E-N/S ramp, and continue WB on its standard route.
 - (iii) DB Co's EB W-8 and W-9 transit detour shall utilize a route from Highway 417 EB, EB on the Highway 417 W-N/S ramp at Moodie Drive, EB through the

intersection of Moodie Drive at Highway 417 W-N/S ramp, EB on Highway 417, EB on the Highway 417 W/S-N/S ramp at Holly Acres Road, and then across Holly Acres Road onto the Highway 417 N/S-E ramp or NB on Holly Acres Road and EB into Bayshore Station via the Bayshore Station Access Road.

- A. DB Co shall work with OC Transpo to ensure at least one EB bus route from Kanata serves the intersection of Moodie Drive and Corkstown Road.
 - B. DB Co shall ensure that the EB detour provides for both access to Bayshore Station, as well as bypassing of Bayshore Station.
- (iv) DB Co shall maintain the existing OC Transpo stops located on the W-N/S and E-N/S off-ramps at Moodie Drive, to be used by Transitway buses during the detour period.
- (d) DB Co shall maintain the full use of the West Transitway Extension from Bayshore Station to Moodie Station, the full use of both Station platforms at the existing Corkstown BRT Station, the existing PPUDO, as well as the EB transit-only ramp from Moodie Drive, until the following are designed, constructed and commissioned unless approval from the City is otherwise obtained:
- (i) The N/S-E ramp from Holly Acres Road onto Highway 417, as part of the Highway Work, in accordance with the provisions of Schedule 15-2, Part 9 – Highway Works, and as described in Clause 3.12 of this Part 7.
 - (ii) Bus shelter pads and bus shelters are installed on:
 - A. The east side of Moodie Drive, immediately north of the Highway 417 E-S ramp signalized intersection; and,
 - B. The south side of the Highway 417 W-N ramp, immediately west of the Moodie Drive signalized intersection.
- (e) Construction vehicles shall not be permitted in the Corkstown BRT Station or on the Transitway in the vicinity of Corkstown BRT Station, until such a time that the West Transitway Extension is fully closed for construction.
- (f) DB Co shall stage construction of the Highway 417 N-W ramp at Moodie Drive so that it remains open at all times to accommodate OC Transpo service westbound to Kanata.

3.14 East Transitway Segment E-1 - Blair Station to OR174 Transitway Bridge

- (a) DB Co's approved Transitway staging and detour plans for E-1 from Blair Station to OR174 Transitway Bridge shall be commissioned and in operation prior to full closure of any component of the E-1 Transitway from Blair Station to OR174 Transitway Bridge

- (b) Prior to any partial closure of the WB bus lanes from OR174 Transitway Bridge to Blair Station, DB Co shall design, construct and commission the following:
 - (i) Reconstruct the east side of the intersection of Blair Road / OR174 E-N/S ramp to accommodate a WB through bus-only lane, and replace the existing northeast island and channelized WB right-turn lane with a right-turn lane at the traffic signal, as well as any modifications required to the intersection (including the north median) to accommodate the noted changes;
 - (ii) Repurpose the southernmost lane on the west side of the intersection of Blair Road / OR174 E-N/S ramp to accommodate an EB right turn bus-only curbside lane. The existing general traffic lanes on the west side of the intersection shall be maintained;
 - (iii) Implementation of a transit signal priority for the EB right turn movement at the intersection of Blair Road / OR174 E-N/S ramp; and
 - (iv) Extend the WB OR174 bus-only lane to the start of the E-N/S ramp.
 - (v) Undertake a traffic study including a detailed intersection operation and level of service analysis, considering vehicular and non-vehicular road user needs at the intersection of Blair Road and OR174 E-N/S ramps. DB Co shall demonstrate that the traffic and transit operations and associated levels of service are acceptable and feasible using projected traffic volumes and expected transit operations for 2031 horizon year, including pedestrian and cyclist movements.
 - A. DB Co shall submit to the City the results of the above-noted traffic analysis report and seek approval from the City at least 20 calendar days prior to initiating the development of geometric design.
 - (vi) No reinstatement is required to the Roadway at this location after East Substantial Completion.
- (c) Prior to the full closure of the Transitway from Blair Station to OR174 Transitway Bridge, DB Co shall design, construct and Commission the following:
 - (i) Widen Blair Road at the intersection with OR174 W-N/S to accommodate a dedicated southbound left turn lane for general traffic. Southbound lane configuration at this intersection shall be two southbound through lanes and a southbound left turn lane, with all lanes having a 3.5m width;
 - A. The widening of Blair Road shall preserve a 4m space on the west side of Blair Road, between the edge of the southbound lane and the guard rail, to accommodate a future cycling facility; and,

- B. Widening shall take place on the east side of Blair Road, as required to accommodate all lanes, and will require the relocation of two streetlights and adjustment of traffic signal poles.
- (ii) Repurpose the existing WB bus-only right turn lane at the Blair Road / OR174 W-N/S intersection to accommodate a WB general purpose left turn lane;
- (iii) Widen the OR174 N/S-E ramp at Blair Road to accommodate two lanes at a point 180m east of Blair Road. At this point, the southernmost lane shall be a bus-only lane. This bus-only lane shall continue onto OR174 EB, and connect with the existing OR174 EB bus-only lane further east;
- (iv) Remove the crosswalk on the southern leg of the intersection of Blair Road at OR174 N/S-E Ramp.
- (v) Undertake a traffic study including a detailed intersection operation and level of service analysis, considering vehicular and non-vehicular road user needs at the intersection of Blair Road and OR174 W-N/S ramps. DB Co shall demonstrate that the traffic and transit operations and associated levels of service are acceptable and feasible using projected traffic volumes and expected transit operations for 2031 horizon year, including pedestrian and cyclist movements;
- A. DB Co shall submit to the City the results of the above-noted traffic analysis report and seek approval from the City at least 20 calendar days prior to initiating the development of geometric design; and,
- (vi) No reinstatement shall be required to intersection of Blair Road at OR174 W-N/S ramps, however the EB bus lane located on the N/S-E ramp shall be removed as Remaining Works.

3.15 East Transitway Segment E-2 to E-5 - OR174 Transitway Bridge to Trim Road Station

- (a) OC Transpo bus services within Segments E-2 to E-5 are currently located on OR174 bus only lanes from OR174 Transitway Bridge to Trim Road Station. These shall remain in service at all times during construction, unless otherwise permitted in this Part 7.
- (b) Transit Access and Circulation Roadway Closures – Montreal Station:
 - (i) DB Co shall maintain access to bus stops, Platforms and Stations for pedestrians and buses at all times. Provisions for access to transit shall be demonstrated in all TCPs prior to any sidewalk and/or pathway closures.
- (c) Transit Access and Circulation Roadway Closures – Jeanne d’Arc / OR174 interchange:
 - (i) Where construction pursuant to this Project requires lane closures within the vicinity of the Jeanne d’Arc / OR174 interchange, DB Co shall provide 35

calendar days' notice prior to the day on which the lane closures will be required. DB Co shall coordinate all lane closures with the City and OC Transpo.

- (ii) One sidewalk on Jeanne d'Arc Boulevard shall remain accessible to the public at all times during construction.
 - (iii) DB Co shall maintain access to bus stops, platforms and Stations for pedestrians and buses at all times. Provisions for access to transit shall be demonstrated in all TCPs prior to any sidewalk and/or pathway closures.
- (d) Orleans Boulevard
 - (i) Both sidewalks on Orléans Boulevard shall remain accessible to the public at all times during construction.
 - (ii) DB Co shall maintain access to bus stops, platforms and Stations for pedestrians and buses at all times. Provisions for access to transit shall be demonstrated in all TCPs prior to any sidewalk and/or pathway closures.
- (e) Transit Access and Circulation Roadway Closures – Place d'Orléans Station:
 - (i) Except as specified below, DB Co shall maintain public access between the Place d'Orléans bus terminals and the Park & Ride (north of OR174) via the pedestrian Bridge at all times during construction, as well as maintain public access to the bus terminal at ground level from the shopping center. Provisions for access to transit facilities shall be demonstrated in all TCPs prior to any sidewalk/pathway closures.
 - (ii) Access via the pedestrian Bridge may be interrupted during two 48-hour Weekend Periods to enable construction of interfaces between new Station facilities and the existing Bridge. Any hoarding required within the pedestrian Bridge to protect from construction zones shall not take up more than one metre of width inside the pedestrian Bridge. Provisions for access to transit facilities shall be demonstrated in all TCP sub-plans prior to any sidewalk/pathway closures.
 - (iii) The west sidewalk on Champlain Street shall remain accessible to the public at all times during construction both on the overpass and into the shopping center, with the exception of one 1-week permissible interruption to enable construction of interfaces between new Station facilities and the existing Bridge. This Work cannot occur simultaneously with the closure of the pedestrian Bridge described in (ii) above. The east sidewalk shall remain accessible to the public at all times.
 - (iv) DB Co shall design and construct three temporary lay-by spaces in the curbside lane of Place d'Orleans Drive during staged construction, and prior to any reduction in lay-up capacity at Place d'Orléans Station. DB Co shall confirm the location of the temporary lay-by spaces with the City and submit the design in accordance with Schedule 10 – Review Procedure.

- A. DB Co shall provide an unobstructed opening in the concrete barrier wall between Place d'Orleans Drive and Place d'Orleans Station to provide bus operators with access to the Station. The location of the opening shall provide unobstructed sightlines and be visible to vehicles approaching west of the opening. DB Co shall confirm the location of the opening with the City.
 - B. DB Co shall design and construct an energy attenuator crash cushion system at the downstream edge of the opening in the concrete barrier.
 - C. Following the staged construction of Place d'Orleans Station, DB Co shall reinstate a continuous concrete barrier wall. This shall be completed as Remaining Works.
- (f) Transit Access and Circulation Roadway Closures – Trim Road Station:
- (i) DB Co shall maintain the existing quantity of parking stalls at the Trim Road Park and Ride (1067) throughout all stages of construction on the Trim Road Park and Ride and the intersection of realigned Trim Road at OR174 interchange. Notwithstanding the above, any request for a reduction of available stalls during a particular stage of construction shall be submitted to the City for approval. Any requests to reduce the number of stalls to fewer than 900 will not be granted.
 - (ii) DB Co shall construct the new bus loop, Station platforms, bus operator facilities and PPUDO prior to decommissioning the existing bus lay-up, Platform area, and bus operator facilities.

ARTICLE 4 EXISTING FEDERAL ROADWAYS

4.1 Permitted Periods of Closures on Federal Roadways

- (a) Construction on federal Roadways shall not be performed during the following Peak Periods unless noted as an exception in this Part 7:
 - (i) Monday to Friday inclusive: 06:30 to 09:30 hrs and 15:00 to 18:30 hrs.
- (b) DB Co shall develop a sequencing plan to minimize the length of the federal Roadway that is closed at any one time.

4.2 Restrictions on Construction Operations on Federal Roadways

- (a) DB Co shall liaise with the City, and the Governmental Authority that has governance over the subject federal Roadway and arrange all Work on the federal Roadway to the written satisfaction of said Governmental Authority, and, DB Co shall include in their Work submission of the TTMP and TTMP sub-plans in accordance with Schedule 10 – Review Procedure, all of the documentation and drawings relevant to traffic management prepared in accordance with this Article 4, as accepted by the Governmental Authority, and include as well a copy of Governmental Authority acceptance of all of the Work proposed on the federal Roadway.
- (b) DB Co shall not proceed with any Work on federal Roadways without an accepted TTMP and TTMP sub-plans applicable to said Work.
- (c) Protection of Public Traffic
 - (i) DB Co shall comply with requirements of Acts, Regulations and By-Laws in force for regulation of traffic or use of Roadways upon or over which it is necessary to carry out Work or haul materials or equipment.
 - (ii) When working on traveled way, DB Co shall:
 - A. Place equipment in position to present minimum of interference and Hazard to traveling public.
 - B. Keep equipment units as close together as working conditions permit and preferably on same side of traveled way.
 - C. Not leave equipment on traveled way overnight.
 - (iii) DB Co shall erect suitable signs and devices in accordance with instructions contained in the OTM before re-routing traffic.
 - (iv) DB Co shall keep the traveled way graded, free of pot holes, and of sufficient width for required number of lanes of traffic. DB Co shall provide a minimum

Roadway width of 7.0m in each direction of travel through the Work and on detours.

- (v) DB Co shall provide and maintain road access and egress to properties fronting along Work and in other areas as indicated, unless other means of road access exist that meet approval of the City and the applicable Governmental Authority. Access to and from the Transitway shall be maintained during the construction of the SJAM Parkway.
- (d) Informational and Warning Devices
 - (i) DB Co shall provide and maintain signs, flashing warning lights, temporary signals, and other devices required to indicate construction activities or other temporary and unusual conditions resulting from Project Work which requires road user response.
 - (ii) DB Co shall supply and erect signs, delineators, barricades, and miscellaneous warning devices as specified in the OTM. All signs shall be bilingual.
 - (iii) DB Co shall arrange and attend a meeting with the City and the Governmental Authority at least five working days prior to commencement of Work to review list of signs and other devices required for the Project. If the situation on Site changes, DB Co shall revise the list to the approval of the City and Governmental Authority, and, resubmit the TTMP and applicable TTMP sub-plan Work Submittals in accordance with Schedule 10- Review Procedure.
 - (iv) DB Co shall continually maintain TCDs in use by:
 - A. Checking signs daily for legibility, damage, suitability, and location. Clean, repair, or replace to ensure clarity and reflectance.
 - B. Removing or covering signs which do not apply to conditions existing from day to day.
- (e) Control of Public Traffic
 - (i) DB Co shall provide flag persons, trained in accordance with, and properly equipped as specified in the OTM in the following situations:
 - A. When public traffic is required to pass working vehicles or equipment which block all or part of traveled Roadway.
 - B. When it is necessary to institute one-way traffic system through a construction area or other blockage where traffic volumes are heavy, approach speeds are high, and traffic signal system is not in use. Flag persons shall be provided (one at each access point to the Site) during Peak Periods when one-way traffic is operational.

- C. When workmen or equipment are employed on traveled way over brow of hills, around sharp curves, or at other locations where oncoming traffic would not otherwise have adequate warning.
 - D. Where temporary protection is required while other TCDs are being erected or taken down.
 - E. For emergency protection when other TCDs are not readily available.
 - F. In situations where complete protection for workmen, working equipment, and public traffic is not provided by other TCDs.
- (ii) DB Co shall submit a proposal in writing to the City four weeks before the anticipated date of construction, should DB Co plan to proceed with Work between November 15th of any calendar year and May 15th of the subsequent year. The proposal will be evaluated against such issues as, but not limited to, road maintenance activities and impacts on public traffic.
 - (iii) DB Co shall not be entitled to claim for any costs (direct or indirect) or extensions of time if the Governmental Authority refuses to allow Work between November 15th of any calendar year and May 15th of the subsequent year. The Governmental Authority reserves the right to restrict DB Co from working on days when inclement weather conditions are forecasted that will impact road conditions. The Governmental Authority will provide DB Co with 24 hours' notice to vacate the Work area and no Work shall commence until the Governmental Authority provides written notice for Work to resume.
 - (iv) DB Co shall keep the City informed of all ongoing Work related discussions with Governmental Authority, and shall via Work submittals made in accordance with Schedule 10 - Review Procedure, maintain all applicable TTMP and TTMP sub-plans current with respect to the Work as accepted by the federal Governmental Authority.

4.3 Construction on or Adjacent to Federal Roadways

- (a) The SJAM Parkway may be reduced to one lane of traffic in each direction using partial lane closures in accordance with the OTM for short duration Work during Off Peak Periods, Night Periods, and/or as detailed in this Part 7.
- (b) All short duration Works shall be re-opened to two general traffic travel lanes in each direction c prior to the Peak Periods each Work day.
- (c) DB Co shall maintain positive Drainage along SJAM Parkway during all staged construction at all times.
- (d) DB Co shall schedule its operations such that vehicles shall not travel on a gravel or milled surface for more than three days.

- (e) DB Co shall retain the City's Street Light Maintenance Provider for the supply, installation and maintenance of all temporary lighting as required to maintain the existing illumination levels during the construction, and for the removal of temporary lighting upon completion of the work, at their cost. DB Co shall be responsible for coordinating the scheduling of the disconnections and reconnections with the Utility Company.
- (f) DB Co shall maintain the existing or provide appropriate temporary vehicular, pedestrian and cycling accesses to and from the parking lots that serve the Kitchissippi Lookout and Westboro Beach at all times, until such a time that DB Co has provided adequate replacement facilities, as per Schedule 15-2, Part 2, Clause 6.21, that have been approved by the City.

4.4 Transitway, Detours, and Stations

- (a) Transitway services from Dominion Station to Lincoln Fields Station shall remain on the SJAM Parkway, and the bus-only lanes shall remain in service at all times, until after West Substantial Completion and upon notice by the City.

4.5 Accommodation of Pedestrians and Cyclists

- (a) Pedestrian and cycling access and egress to the existing sidewalks, pedestrian pathways, and MUPs shall be as outlined in Schedule 15-2, Part 6 – Urban Design, Landscape Architecture and Connectivity Requirements.

4.6 Ground Mounted Signs

- (a) DB Co shall provide bilingual information signs as follows:
 - (i) Along the SJAM Parkway, 0.5km east of Dominion Station, 0.5km West of the Cleary Underpass, and on Island Park Drive north and south of SJAM Parkway; 120 x 240cm sign with message "Lane Closure on Parkway, Expect Delays" together with the pertinent dates and times.
 - (ii) The locations of all signage shall be shown on the DB Co's TCP. The text to appear on the signs shall be approved by the City and the federal Authority prior to fabrication of the signs.
 - (iii) The locations of all signage shall be shown on the DB Co's TCP. The text to appear on the signs shall be submitted to the City for approval prior to fabrication of the signs.
- (b) Signs shall remain in place for the duration of the construction period in the area affected by the Work.

4.7 Portable Variable Message Signs

- (a) DB Co shall provide 35 calendar days advanced notice to the City of Roadway closures.

- (b) DB Co shall use lighted, changeable, bilingual message signs, and shall be used in accordance with Clause 1.5(b) of this Part 7.
- (c) DB Co shall provide two signs located along SJAM Parkway at locations to be approved by the City.
- (d) These signs shall be removed at the start of construction.

4.8 Traffic Control Plan Sub-Plan

- (a) DB Co shall prepare a specific TCP sub-plan for SJAM in accordance with the requirements of this Part 7.

**ARTICLE 5 EXISTING PROVINCIAL HIGHWAYS AND MUNICIPAL
ROADWAYS WITHIN MTO ROW**

5.1 General Requirements

- (a) The requirements in this Article 5 are applicable to the following Roadways:
- (i) Existing Provincial Highway 417 and Highway 416 including all interchange ramps; and
 - (ii) Existing Municipal Roadways connecting or spanning over Highway 417 within MTO's designated jurisdiction, including but not limited to:
 - A. Holly Acres Road;
 - B. Richmond Road;
 - C. Pinecrest Road / Greenbank Road;
 - D. Moodie Drive.
- (b) DB Co shall liaise with the City and the MTO, which has governance over the subject Provincial Highway, and arrange all Work on the Provincial Highway to the written satisfaction of the MTO, and, DB Co shall include in their Work submission of the TTMP and TTMP sub-plans in accordance with Schedule 10 – Review Procedure, all of the documentation and drawings prepared in accordance with this Article 5, as accepted by the MTO.
- (c) DB Co shall not proceed with any construction activities on Provincial Highways without an accepted TTMP and TTMP sub-plans applicable to said construction activities.
- (d) DB Co shall ensure that there is coordination between the TTMP required for the West Works and the Highway Works as per Schedule 15-2, Part 1, Article 5 – Implementation Constraints.
- (e) DB Co shall provide and use PVMS for all closures, detour routes and diversions including ramps. PVMS shall be placed at strategic upstream locations to allow motorists the opportunity to divert prior to reaching the closure, detour route or diversion location. The PVMS location shall be submitted to and approved by the City in accordance with Schedule 10 – Review Procedure, as well as accepted by the MTO. PVMS placed in support of Highway Works shall be controlled by the OTOC.
- (f) PVMS shall be equipped with modems active on the MTO communications network to allow OTOC to operate. DB Co shall be responsible for modem procurement and activation from the modem supplier at least two weeks prior to requiring the signs. DB Co shall be responsible for all fees associated with the procurement of the modem including but not limited to activation of service, modem rental and monthly data communication fees.

- (g) DB Co shall provide at least 35 calendar days advance notice to the City and MTO for all closures, detour routes, and diversions.
- (h) Transit facilities on Highway 417 (West Transitway) shall remain in service until after West Substantial Completion and upon notice by the City.
- (i) DB Co failure to abide by the requirements set out in this Article 5 shall result in shutdown of the relevant Works until the requirements have been met.

5.2 Restrictions on Construction Operations on Provincial Highways

- (a) DB Co shall not use construction access/egress, shoulder closures or load and unload materials and construction equipment onto and from the traveled portion of Highway 417, Highway 416 and Highway 417 or Highway 416 interchange ramps on days identified under Clause 1.4 of this Part 7, or outside of the Permitted Periods for Closures as detailed in Tables 7-5.1A and 7-5.1B:
- (b) Construction operations shall not be carried out during the four hours preceding or three hours after any scheduled events at the [REDACTED]. DB Co shall obtain the schedule of events from the [REDACTED] website ([REDACTED]) and schedule Work accordingly.
 - (i) Events with fewer than 10,000 attendees, or “all-day” events that do not have a specific peak traffic demand period associated with them are exempted from this requirement.
- (c) Construction operations shall not be carried out during the two hours preceding or two hours after any [REDACTED], or other major events at [REDACTED], as identified by the City. DB Co shall obtain the schedule of [REDACTED] and be aware of other major events at [REDACTED] ([REDACTED]) and schedule Work accordingly.

5.3 Permitted Periods for Closures on Provincial Highways

- (a) Lane Closures and ramp closures for construction will only be allowed during the following times, subject to the additional restrictions covered under Clause 1.4 of this Part 7. Any Closures proposed by DB Co outside of the times indicated in Tables 5-1A and 5-1B shall be subject to review and approval by the City in accordance with Schedule 10 – Review Procedure. Applications by DB Co shall be supported by a traffic analysis.
- (b) Weekend Lane Closures
 - (i) All weekend lane closures shall be subject to the following conditions:
 - A. DB Co shall adhere to all traffic timing restrictions identified elsewhere in the PA, including holiday restrictions and [REDACTED] Events and [REDACTED].

- B. The exact weekend lane closure dates shall be subject to approval by the City and MTO.
- C. DB Co shall notify the Stakeholders and ESP of the Closure(s), as specified elsewhere in the PA.
- (c) Permitted lane closure periods for Provincial Highways included in Table 7-5.1A and 7-5.1B:

Table 7-5.1A – Section Description: Existing Highway 417 EB from Moodie Drive to Woodroffe Avenue

| Closure | Monday to Wednesday | Thursday | Friday | Saturday | Holiday or Sunday |
|---|--|---|---|--|--|
| One Lane Closure/ Construction access/egress; shoulder closures; load and unload of materials and construction equipment | 00:00 – 05:00 hrs 10:00 - 14:30 hrs 21:00 - 23:59 hrs | 00:00 – 05:00 hrs 10:00 - 14:30 hrs 22:00 - 23:59 hrs | 00:00 – 05:00 hrs 10:00 - 14:00 hrs 22:00 - 23:59 hrs | 00:00 – 10:00 hrs 22:00 - 23:59 hrs | 00:00 – 10:00 hrs 21:00 - 23:59 hrs |
| Two Lane Closure | 00:00 – 05:00 hrs 22:00 – 23:59 hrs | 00:00 – 05:00 hrs 23:00 – 23:59 hrs | 00:00 – 05:00 hrs 23:00 – 23:59 hrs | 00:00 – 08:00 hrs 23:00 – 23:59 hrs | 00:00 – 08:00 hrs 22:00 – 23:59 hrs |
| Three Lane or Full Closure** | 1:00 – 4:00 hrs for a max of 15 minutes each hour with mandatory use of OPP and PVMS | | | | |

Table 7-5.1B – Section Description: Existing Highway 417 WB from Woodroffe Avenue to Moodie Drive

| Closure | Monday to Wednesday | Thursday | Friday | Saturday | Holiday or Sunday |
|---|--|------------------------------|------------------------------|------------------------------------|------------------------------------|
| One Lane Closure/ Construction access/egress; shoulder | 00:00 – 06:00 hrs 10:00 - 14:30 hrs | 00:00 – 05:00 hrs 10:00 - | 00:00 – 05:00 hrs 10:00 - | 00:00 – 10:00 hrs 22:00 - 23:59 | 00:00 – 10:00 hrs 22:00 - 23:59 |

| | | | | | |
|---|--|--|--|--|--|
| closures; load and unload of materials and construction equipment | 21:00 - 23:59 hrs | 14:30 hrs 22:00 - 23:59 hrs | 14:00 hrs 22:00 - 23:59 hrs | hrs | hrs |
| Two Lane Closure | 00:00 – 06:00 hrs 22:00 – 23:59 hrs | 00:00 – 06:00 hrs 23:00 – 23:59 hrs | 00:00 – 06:00 hrs 23:00 – 23:59 hrs | 00:00 – 08:00 hrs 23:00 – 23:59 hrs | 00:00 – 08:00 hrs 22:00 – 23:59 hrs |
| Three Lane or Full Closure** | 1:00 – 4:00 hrs for a max of 15 minutes each hour with mandatory use of OPP and PVMS | | | | |

Applications for full closures are subject to acceptance by the City as part of the Works Submittals in accordance with Schedule 10 – Review Procedure and the MTO. *No two successive on or off ramps shall be closed at the same time.

(d) Construction Period Quality Failures deductions shall be applied as detailed in Schedule 21, Part B - Construction Period Failures.

(e) Closure Notification

(i) DB Co shall perform the following prior to lane, ramp and/or shoulder closures:

- A. Inform the City and MTO of any closure one week prior to the start date of the closure;
- B. Inform the City and MTO of any closure lasting more than one week at least two weeks prior to the start date of the closure;
- C. Inform the City and MTO of Emergency closures as soon as any details are known;
- D. Obtain a closure notification number from City and MTO for each closure;
- E. Inform the City and MTO of any closure that is being cancelled subsequent to A. and B. above;
- F. Notify the MTO Ottawa Area Communications Centre by phone (613-742-5319) immediately prior to the set-up of any closure stating the closure notification number and details of the closure;
- G. Notify the MTO Ottawa Area Communications Centre immediately of any changes to the closure or anticipated problems that may delay the opening time, stating the closure notification number and details of the changes to and/or problems with the closure; and

- H. Notify the MTO Ottawa Area Communications Centre immediately upon removing the closure stating the closure notification number and details of the closure.
- (f) Lane and Ramp Closures by OPP Officers (Paid Duty)
 - (i) DB Co shall incorporate OPP assistance into all lane and ramp closures. DB Co shall be responsible arrange for the OPP-assisted lane closures.
 - (ii) Lane/ramp closures on Highway 417 shall be subject to MTO's lane/ramp closure protocol restrictions.
- (g) Lane Closures and Full Closures for Queensview Pedestrian Bridge
 - (i) DB Co shall be permitted to fully close all lanes of Highway 417 between Pinecrest Road / Greenbank Road and Woodroffe Avenue on a weekend for 17 consecutive hours, from 18:00 hrs on the Saturday until 11:00 hours on the Sunday.
 - (ii) Lane reductions on Highway 417 associated with the full closure shall be permitted to commence at 16:00 hrs on the Saturday.
 - (iii) During the full closure period noted above, the following Highway 417 ramps shall be exempt from the restrictions of Clause 5.4 of this Part 7:
 - A. Pinecrest Road at Highway 417 E-N/S ramp;
 - B. Greenbank Road at Highway 417 S-E ramp;
 - C. Greenbank Road at Highway 417 N-E ramp;
 - D. Woodroffe Avenue at Highway 417 W-N/S ramp; and,
 - E. Woodroffe Avenue at Highway 417 N/S-W ramp.
 - (iv) DB Co shall provide advanced notice to the City and MTO as early as possible, or a minimum of 30 Business Days in advance of the scheduled closure. The dates scheduled by DB Co shall be subject to approval by the City and MTO. These closure dates shall not be scheduled during events identified in Clause 5.2 of this Part 7.

5.4 Ramp Closures

- (a) DB Co shall keep all ramps on Highway 417 fully open at all times, with exceptions noted in Table 7-5.2 below. Where a ramp has a single lane, only the shoulder may be closed. Where a ramp has more than one lane, only a single lane may be closed.

- (i) Any ramp closures proposed by DB Co outside of the times indicated in Table 7-5.2 shall be subject to review and approval by the City and MTO. Applications by DB Co shall be supported by a traffic analysis. DB Co shall be required to provide notification to the public a minimum of 30 business days prior to the closure.

Table 7-5.2

| CLOSURE | Monday to Wednesday | Thursday | Friday | Saturday | Holiday or Sunday |
|------------------------------|--|--|--|--|--|
| One Lane/Shoulder Closure | 00:00 - 6:00 hrs 10:00 - 14:30 hrs 22:00 - 23:59 hrs | 00:00 - 6:00 hrs 10:00 - 14:30 hrs 23:00 - 23:59 hrs | 00:00 - 6:00 hrs 10:00 - 14:00 hrs 23:00 - 23:59 hrs | 00:00 - 10:00 hrs 23:00 - 23:59 hrs | 00:00 - 10:00 hrs 22:00 - 23:59 hrs |
| Full Closure | 23:00 – 5:00 hrs (with mandatory use of PVMSs) | | | | |

- (b) DB Co shall not close two successive on and / or off ramps at the same time.
- (c) Temporary short term closure shall be permitted for one ramp at a time per interchange per direction.
- (d) DB Co shall utilize PVMS for all full ramp closures.
- (e) DB Co may utilize existing MTO PVMS for full closure of ramps, subject to approval of the City and MTO.

5.5 Construction on or Adjacent to Highway 417

- (a) The supply and placement of all traffic control required by the MTO shall be performed by DB Co in accordance with the Ontario Traffic Manual Book 7, “Temporary Conditions Manual”, latest edition, where construction is being carried out on or adjacent to Highway 417 or its ramps. This requirement is in addition to the MTO’s requirement for deployment of PVMS.
- (b) DB Co shall follow the requirements of the City’s Special Provision – General D-001, in addition to MTO requirements for construction on or adjacent to Highway 417.
- (c) Traffic Signal construction Start-Up Meeting

- (i) DB Co shall arrange a start-up meeting to confirm the protocol for the traffic signals at all affected intersections. The meeting shall also be used to confirm communication protocols with the MTO, DB Co, and the City of Ottawa Traffic Operations for dealing with traffic signal timing changes if required during construction. DB Co shall create a contact list and distribute it to all parties involved for any non-routine and/or emergency repairs to the traffic signals.
 - (ii) DB Co shall invite MTO Regional Traffic Office, MTO Electrical Coordinator, and City of Ottawa Traffic Operations to attend this meeting.
- (d) Advanced Notice of Work
 - (i) DB Co shall provide a minimum of 30 Business days advance notice to City and MTO of all Work that may impact the traffic signals, unless a signal design is required, in which case DB Co shall abide by the requirements set out in Schedule 15-2, Part 2, Clause 6.14.
- (e) Access to the Traffic Signal Controller Cabinets
 - (i) For any Emergency Work at any of the impacted traffic control signals, DB Co shall coordinate with the City of Ottawa Traffic Operations:
 - City of Ottawa
 - Transportation Services Department
 - Program Manager,
 - Signal Installation and Field Program (or the individual responsible for this function)
- (f) Construction Access to Moodie LMSF
 - (i) DB Co shall not be permitted to have a construction access to the LMSF site directly from Highway 417.

5.6 Transitway Detours

- (a) The City, in consultation with MTO, has developed a preliminary Transitway detour that utilizes Highway 417 from Southwest Transitway interchange to the Moodie Drive interchange when the Western Transitway from Pinecrest Station to Moodie Station are taken out of service during this contract. The following MTO constraints shall apply to DB Co's TTMP:
 - (i) DB Co shall be responsible for the design, coordination of the Highway 417 transit detour segments to the satisfaction and acceptance of MTO and the City.

5.7 MTO Encroachment Permits

- (a) DB Co shall obtain MTO Encroachment Permits prior to working within the Highway 417 ROW or on any Roadways adjacent to Highway 417 within MTO's designated

jurisdiction. DB Co shall provide the City with copies of the approved MTO Encroachment Permits immediately upon receipt of same.

5.8 Delivery and Trucking

- (a) DB Co shall plan and schedule the routes of vehicles transporting all Materials to, from or within the Site, so that vehicular movements are accomplished with minimum interference and interruptions to traffic according to Clauses 5.2, 5.4 and 5.5. This will necessitate vehicles to “slip-off” or “slip-on” in the direction of traffic, in order to merge with and thereby avoid crossing traffic lanes.
- (b) Access to and from the Highway ROW shall be restricted to ramps at the interchanges unless otherwise provided for in the Project Agreement.
- (c) Median cross-overs shall not be used except where single axle vehicles are entering a passing lane that is closed to traffic.
- (d) DB Co shall obtain the City's prior approval for the location of any "slip-off" or "slip-ons". The City reserves the right to alter, reject or close same as considered necessary. DB Co shall notify suppliers of materials and equipment of the above requirements.

ARTICLE 6 TRAFFIC AND TRANSIT MANAGEMENT PLAN

6.1 General Requirements

- (a) DB Co shall submit an initial TTMP to the City in accordance with Schedule 10 – Review Procedure no later than 60 calendar days following Commercial Close, and at least 30 calendar days in advance of the start of any construction activity, and in accordance with the requirements of this Part 7. Following the acceptance of the initial TTMP by the City, DB Co shall submit all subsequent proposed updates and changes to the TTMP to the City in accordance with Schedule 10 – Review Procedure. As a minimum, the initial TTMP shall be updated and submitted on an annual basis in accordance with Schedule 10 – Review Procedure. The initial TTMP is required to demonstrate DB Co's:
 - (i) general plan for achieving specific TTMP and TTMP sub-plan requirements for all construction elements having significant traffic impacts, as well as all transit detours, in coordination with DB Co's planned Project Schedule; and,
 - (ii) specific plan for managing traffic during the Initial Works.
- (b) The TTMP shall outline how public traffic, transit, transit customers, pedestrians, and cyclists as well as the traffic generated by construction activities, are to be managed. It shall include all aspects of traffic management as set out in this Part 7, as well as any traffic management related matters which may arise as a result of the execution of any aspect of the Work.
- (c) The TTMP and all updates thereto shall be consistent with and comply with all of the requirements set forth in this Part 7 and all other relevant provisions of this Project Agreement, the OTM, and City of Ottawa Operation Policies, Procedures and Guidelines.
- (d) The final submission of the TTMP or TTMP sub-plans shall be stamped by DB Co's designated Traffic Engineer, and signed off by DB Co's designated Traffic Manager, both of whom shall be as identified in Article 6.3 – DB Co Responsibilities, of this Part 7.
- (e) The TTMP and all updates thereto shall include a traffic and transit schedule which shall be adapted from the Project Schedule. The traffic and transit schedule shall show start and finish dates for all the information pertinent to traffic management for the Project, such as but not limited to, segment and Station closures, detours and diversions, and relevant submissions.
- (f) The TTMP shall show proof of constructability in terms of schedule (traffic and transit schedule versus Project schedule), and, in terms of on Site construction activities and physical Work area requirements versus spatial accommodations for TTMP and TTMP sub-plan traffic management requirements.
- (g) DB Co's TTMP shall consider all direct and indirect impacts relating to the construction that pertain to the existing operations of the City and the street network within, and

include impacts on all road users, pedestrians, cyclists, transit vehicles, and private vehicles of all types.

- (h) DB Co's TTMP shall reference and interface with DB Co's Traffic QMP as described in Schedule 11 – Integrated Management System, DB Co's Emergency Traffic Plan as described in this Part 7, the OTM, and City of Ottawa Operation Policy and Procedures.
- (i) DB Co's updates to the TTMP shall be prepared and submitted in accordance with Schedule 10 – Review Procedure for any and all Project activities which may result in changes to the traffic management strategies set out in the TTMP. The initial TTMP shall be updated and submitted on an annual basis in accordance with Schedule 10 – Review Procedure.
- (j) DB Co shall not conduct any construction activity that affects traffic without a signed and sealed TTMP that is current to the activities on Site, and has been accepted by the City.
- (k) DB Co's TTMP shall comply with the definitions and guidelines provided in the OTM and City of Ottawa Operation Policy, Procedures and Guidelines.
- (l) DB Co's TTMP shall include the Pedestrian Access Plan as outlined in Schedule 15-2, Part 1, Article 5 – Implementation Constraints, the construction Site Pedestrian Control Plan as required by City of Ottawa Special Provision D-005, the specific requirements as identified in Schedule 15-2, Part 6 – Urban Design, Landscape Architecture and Connectivity Requirements, and as documented in COADS.
- (m) DB Co shall prepare detailed TCPs complete with traffic control layout drawings and fully integrated with the approved Project Schedule, outlining the provision of all forms of traffic control required throughout the duration of the Project. The plans shall be consistent with the TTMP and submitted in accordance with Schedule 10 – Review Procedure.
- (n) DB Co shall prepare drawings that address stage-specific activities and requirements for each stage of the Work that affects traffic. These drawings shall accompany the TTMP submissions in accordance with Schedule 10 – Review Procedure.
- (o) Any lane closure shall be approved in writing by the Governmental Authority and the City, and, that closure and the Governmental Authority shall be identified in the approved TTMP.
- (p) DB Co shall not perform any Work on Site without a TTMP and TTMP sub-plans which are current to the activities on Site, and, are accepted by the City.
- (q) The TTMP shall provide detailed drawings for Project-related designated truck access and egress points, the applicable haul and heavy vehicle routes through the City and applicable staging areas. The drawings shall be consistent with the TTMP and submitted in accordance with Schedule 10 – Review Procedure. As a minimum the designated truck route drawings shall be updated and submitted on an annual basis in accordance with

Schedule 10 – Review Procedure. The City may, at its discretion, require that DB Co’s Lands, where contiguous with an active construction Site, be utilized for haul and heavy vehicle routes in order to reach the City’s truck route network in a manner acceptable to the City.

- (r) The following TTMP sub-plans for DB Co’s TTMP are required and shall be submitted in accordance with Schedule 10 – Review Procedure. There shall be two distinct parts for each sub-plan – Confederation Line east and Confederation Line west – corresponding with the two geographic portions of the Project. The TTMP sub-plans shall be:
- (i) Traffic Control Plan;
 - (ii) Emergency Traffic Plan;
 - (iii) Traffic Incident Management Plan;
 - (iv) Traffic Management Implementation Plan;
 - (v) Transit Management Plan;
 - (vi) Traffic Advisory Temporary Signage Plan;
 - (vii) Traffic Risk Assessment Plan;
 - (viii) Traffic and Transit Management Communications Plan;
 - (ix) Traffic and Transit Management Monitoring Plan;
 - (x) Lane Closure Measurement and Verification Plan;
 - (xi) Transitway Lane Closure Measurement and Verification Plan; and,
 - (xii) Property Access and Business Continuity Plan.

6.2 Traffic and Transit Management Sub-Plans

- (a) Traffic Control Plans
- (i) DB Co shall prepare and submit Project specific TCPs in accordance with Schedule 10 – Review Procedure. The TCPs shall be prepared in accordance with the OTM, City of Ottawa Policies, Procedures and Guidelines and other Reference Documents for all activities that affect traffic operations, and shall include the following:
 - A. start and completion dates of Work;

- B. hours of Work and also indicate if there is a requirement to Work during peak hours;
- C. Work zone locations and direction and distance to nearest landmarks and survey stations;
- D. size of the Work zone;
- E. lanes affected by the Works;
- F. lane configuration in the Work zone;
- G. confirmation of whether accesses or intersections will be affected by the Work zone or by TCD;
- H. traffic volume capacity during the Project;
- I. proposed delays or closure times;
- J. show that local traffic access is maintained;
- K. scale drawing(s) in CADD identifying:
 - i. the location of the Work zone using landmarks and LKI where applicable;
 - ii. accesses or intersections affected by the Work zone or by TCDs;
 - iii. traveled lanes affected;
 - iv. resultant lane configuration including widths;
 - v. location of restricted width lanes;
 - vi. required closures;
 - vii. lane use requirements;
 - viii. posted speeds;
 - ix. requirements for road closure;
 - x. on-street parking spaces and parking meters/paystation affected by the Work;
 - xi. replacement strategy for affected on-street parking spaces;
 - xii. requirement for temporary no stopping signs;

- xiii. handicap, bus, taxi, loading, hotel, diplomat, tour bus or other zones affected by the Work, and the replacement strategy for each zone;
 - xiv. any bus routes and bus stops affected by Work activity;
 - xv. traffic and transit routing and detour requirements;
 - xvi. location of hazardous areas created by road geometry or local geography;
 - xvii. the location of vehicle storage areas if delays are anticipated;
 - xviii. any local roads used for a detour route;
 - xix. the design speed and the design vehicle for each road used as a detour route;
 - xx. any traffic signal changes required by the detour route or Project Works;
 - xxi. any signing impacted by the Work;
 - xxii. location of construction accesses, and safety provisions applied in instances where a construction access crosses a sidewalk, pathway, MUP or cycling facility;
 - xxiii. pedestrian and cyclist facilities, which shall be in conformance with the requirements of the Pedestrian Access Plan as required in Schedule 15-2, Part 1, Article 5 – Implementation Constraints, the construction Site Pedestrian Control Plan as required by City of Ottawa Special Provision D-005, and the requirements set out elsewhere in this Part 7.
- L. Should DB Co adopt a traffic control layout exactly as shown in OTM Book 7 with no changes, DB Co shall provide a reference to the OTM Book 7 layout. For any deviations to OTM Book 7, DB Co shall submit a custom traffic control layout as described in (ii) below;
- M. include scale custom traffic control layouts showing the placement of all TCD and Traffic Control Persons;
- N. be sealed by a Professional Engineer; and,
- O. include a summary description of the public notification undertaken wherein the subject matter of this specific TCP is mentioned.

- (ii) Custom traffic control layouts shall:

- A. be in CADD format and submitted to the City in PDF format;
 - B. be signed and sealed custom traffic control layouts;
 - C. show schematically the placement of all TCDs;
 - D. place all TCDs in accordance with the standards contained in the OTM;
 - E. follow symbol conventions for identifying TCDs as per the OTM;
 - F. show on the drawings the locations and details of all signs, PVMS, Pavement markings, barriers, and protective Works;
 - G. have all dimensions and explanatory notes on the drawing; and
 - H. show traffic operations at all phases of the Project.
- (iii) DB Co shall document any proposed DB Co-initiated closures, full closures, detour routes, Lane Shifts and diversions in the TCP. The TCP shall be updated and amended as required such that it is current at all times with respect to the existing and proposed traffic control measures in the field.
- (iv) DB Co shall conduct traffic analysis including modelling on the TCP for each construction stage and construction within each phase where traffic operations are affected. The traffic analysis shall determine the effect of each TCP on the capacity and operation, including the resulting vehicle delays, queue lengths, and traffic signal timing. The traffic analysis shall be conducted for the representative hour(s) and day(s) that each TCP is in operation. The analysis and the results and recommendations shall be provided to the City in accordance with Schedule 10 – Review Procedure.
- (v) DB Co shall be responsible for including construction generated traffic in the TCP and any associated analysis such as but not limited to the potential for conflict between construction generated traffic and pedestrian and cyclist movements.
- (vi) DB Co shall continuously measure the effectiveness of TCPs and, if those measurements indicate a TCP is non-compliant with the OTM, accepted TCPs and other Reference Documents, DB Co shall immediately adjust the TCP to bring it into compliance.
- (vii) Auxiliary lane lengths at existing signalized intersections shall not be reduced unless analysis confirms operation is acceptable to the City.
- (viii) DB Co shall implement the accepted TCPs and accepted revisions thereto.
- (b) Emergency Traffic Plan

- (i) DB Co shall prepare and submit an Emergency Traffic Plan in accordance with Schedule 10 – Review Procedure. The Emergency Traffic Plan shall specify how DB Co shall facilitate access for Emergency vehicles to and through affected Sites. DB Co shall consult with local municipalities and ESP in developing the Emergency Traffic Plan, and liaise closely with them throughout the design and construction as it evaluates and updates the plan on an annual basis, or, whenever there is a change in the Site conditions which materially alters the ability to execute the accepted Emergency Traffic Plan.
 - (ii) DB Co shall provide specific scenarios for Emergency vehicle access to and through the Site for each of the cases identified in the Traffic Incident Management Plan and the Traffic Risk Assessment Plan.
 - (iii) DB Co shall implement the accepted Emergency Traffic Plan and accepted revisions thereto.
 - (iv) DB Co shall update the plan such that the information therein is kept current with the upcoming and ongoing construction activities. DB Co shall submit the updated plan for review/acceptance in accordance with Schedule 10 – Review Procedure.
 - (v) DB Co shall not commence any Work on Site without an applicable current accepted Emergency Traffic Plan.
- (c) Traffic Incident Management Plan
 - (i) DB Co shall prepare and submit a TIMP in accordance with Schedule 10 – Review Procedure. It shall be in accordance with the City of Ottawa Emergency Management Plan. The TIMP shall include a process flow chart which covers but is not limited to occurrence of the incident, nature and timing of notifications to partner agencies, names and coordinates of contacts, actions to address the incident, post incident review of process, and revisions thereto to the TIMP as appropriate. The primary objectives are to support the City in facilitating incident response and moving traffic safely and expeditiously around the incident. The plan shall specify how DB Co will provide access for Emergency vehicles and assistance to ESP, and how DB Co shall work with the City’s Traffic Incident Management Group in responding to the incident.
 - (ii) A traffic incident includes, but is not limited to, any of the following occurrences on or adjacent to a construction Site or detour route:
 - A. motor vehicle accidents;
 - B. pedestrian and cycling accidents;
 - C. Emergency road repairs;

- D. Emergency utility repairs;
 - E. Emergency road closures for fire, gas leak, etc.;
 - F. disabled vehicles; and
 - G. debris on the road.
- (iii) DB Co's TIMP shall:
- A. Work closely and effectively deal with major incidents with partner agencies including City, OPS, OC Transpo, STO, RCMP, OPP, MTO, City of Gatineau, Sureté du Québec, and the Ministry of Transportation of Québec;
 - i. These efforts shall include the provision of temporary TCDs and/or OPS in the vicinity of DB Co's construction Sites or detour routes as requested by the City's Traffic Incident Management Group.
 - B. Coordinate with the City of Ottawa Office of Emergency Management the communications to the public regarding the impacts to the road network of the incident, via the City, media, and VMSs, and in accordance with established communication protocols; and
 - C. Define a process to review incidents and propose modifications to the Project that shall reduce the severity and frequency of incidents.
- (iv) DB Co shall document all incidents, including but not limited to, date location, details of the incident, comments of the incident reporter, actions taken, partner agency and agency representatives contacted, follow-up action recommended to be taken and by whom, signed and dated. A copy of the document shall be given to the City within 48 hours of the occurrence of the incident.
- (v) DB Co shall implement the accepted TIMP and accepted revisions thereto.
- (vi) DB Co shall update the plan such that the information therein is kept current with the upcoming and ongoing construction activities. DB Co shall submit the updated plan for review/acceptance in accordance with Schedule 10 – Review Procedure.
- (vii) DB Co shall not commence any Work on Site without an applicable current accepted TIMP.
- (d) Traffic Management Implementation Plan
- (i) DB Co shall prepare and submit a TMIP in accordance with Schedule 10 – Review Procedure. The TMIP shall identify the Traffic Control Supervisor, Traffic Engineer, and Traffic Manager, along with the qualifications and

experience of those named individuals demonstrating they meet the qualifications and experience identified in this Part 7.

- (ii) The TMIP shall define processes to ensure that the TTMP and each of the individual TTMP sub-plans are developed and implemented efficiently and appropriately, and that they are kept up-to-date with necessary modifications during the Project. In addition, the processes shall be set out in flow charts, one for the TTMP and one for each of the sub-plans, with an accompanying explanation provided to describe the activities represented by each box in each of the flow charts.
 - (iii) DB Co shall implement the accepted TMIP and accepted revisions thereto.
 - (iv) DB Co shall update the plan such that the information therein is kept current with the upcoming and ongoing construction activities. DB Co shall submit the updated plan for review/acceptance in accordance with Schedule 10 – Review Procedure.
 - (v) DB Co shall not commence any Work on Site without an applicable current accepted TMIP.
- (e) Transit Management Plan
- (i) DB Co shall develop a Transit Management Plan that is integrated with the TTMP.
 - (ii) DB Co shall prepare and submit the Transit Management Plan in accordance with Schedule 10 – Review Procedure. It shall outline how the quality of transit services shall be maintained during all phases of construction. The Transit Management Plan shall contain the following information with respect to how DB Co intends to maintain transit service routes and comply with the requirements:
 - A. Accommodation of transit service routes as detailed in this Part 7;
 - B. Accommodation of the requirements in Article 3 – Existing Transitway System, of this Part 7;
 - C. Overall strategy and approach that DB Co intends to implement to maintain the quality of transit service routes throughout the construction period and minimize disruption to the Passengers;
 - D. Identify DB Co’s scheduled construction activities, closures, detour routes, Lane Shifts and diversions that have an impact on the existing transit service;
 - E. Overall strategy for administering the Transit Management Plan with the City that as a minimum demonstrates how DB Co will manage the notice requirements, reviews and approvals, Permits, and Commissioning that

shall be completed prior to implementing lane closures, diversions, or detours; and,

- F. Minimize the travel time for the pedestrians to access the existing Transit facilities.
- (iii) DB Co shall implement the accepted Transit Management Plan and accepted revisions thereto.
- (iv) DB Co shall update the plan such that the information therein is kept current with the upcoming and ongoing construction activities. DB Co shall submit the updated plan for review/acceptance in accordance with Schedule 10 – Review Procedure.
- (v) DB Co shall not commence any Work on Site without an applicable current accepted Transit Management Plan.
- (f) Traffic Advisory Temporary Signage Plan
 - (i) DB Co shall prepare and submit a Traffic Advisory Temporary Signage Plan in accordance with Schedule 10 – Review Procedure. The primary objective of the Plan is to notify the City and other Stakeholders in advance of scheduled construction activities, closures, full closures, detour routes, Lane Shifts, and diversions.
 - (ii) The Traffic Advisory Temporary Signage Plan shall be prepared in accordance with the requirements set out in Schedule 15-2, Part 2, Article 6 – Roadways, Bus Terminals and Lay-bys.
 - (iii) The DB Co shall update the plan such that the information therein is kept current with the upcoming and ongoing construction activities. DB Co shall submit the updated plan for review/acceptance in accordance with Schedule 10 – Review Procedure.
 - (iv) DB Co shall implement the accepted Traffic Advisory Temporary Signage Plan and accepted revisions thereto.
 - (v) DB Co shall not commence any Work on Site without an applicable current accepted Traffic Advisory Temporary Signage Plan.
- (g) Traffic Risk Assessment Plan
 - (i) DB Co shall prepare and submit a Traffic Risk Assessment Plan in accordance with Schedule 10- Review Procedure. DB Co shall identify all risks which may have an impact on traffic and state the measures to be implemented to manage, reduce, or eliminate the risks.

- (ii) DB Co shall perform an independent assessment to identify any risks that could have an impact on traffic management or special conditions that shall be addressed through DB Co's Traffic Risk Assessment Plan.
 - (iii) DB Co shall update the plan such that the information therein is kept current with the upcoming and ongoing construction activities. DB Co shall submit the updated plan for review/acceptance in accordance with Schedule 10 – Review Procedure.
 - (iv) DB Co shall implement the accepted Traffic Risk Assessment Plan and accepted revisions thereto.
 - (v) DB Co shall not commence any Work on Site without an applicable current accepted Traffic Risk Assessment Plan.
- (h) Traffic and Transit Management Communications Plan
 - (i) DB Co shall prepare and submit a Traffic and Transit Management Communications Plan in accordance with Schedule 10 – Review Procedure. It shall describe clearly how DB Co shall communicate to the City and other Stakeholders about all matters relating to traffic flow, including specifically, how it shall provide timely notice of construction related delays, closures, detours, traffic incidents, and emergencies.
 - (ii) DB Co shall craft the Traffic and Transit Management Communications Plan to show how DB Co shall incorporate and carry out each of the requirements set out in Clause 1.12 of this Part 7.
 - (iii) DB Co shall implement the Traffic and Transit Management Communications Plan to apply throughout the Project Term.
 - (iv) DB Co shall ensure that the plan is maintained current as related to the activities on Site. DB Co shall submit the updated plan for review/acceptance in accordance with Schedule 10 – Review Procedure.
 - (v) DB Co shall not commence any Work or Site preparations for same without an accepted Traffic and Transit Management Communications Plan.
 - (vi) DB Co shall consult with the City to identify the major user groups affected by the Project. Major user groups may include, but are not limited to, the following:
 - A. emergency and police services;
 - B. transit operating companies;
 - C. motorists;
 - D. cyclists;

- E. pedestrians;
 - F. transport and tour bus companies;
 - G. taxi and limousine companies;
 - H. MTO;
 - I. NCC;
 - J. PSPC;
 - K. property owners and businesses;
 - L. community organizers; and
 - M. special event organizers.
- (vii) DB Co shall develop and document a process which shall be integrated with the City's communication procedures for traffic management (such as the City Traffic Report and Public Service Announcements) to keep major user groups informed of planned traffic pattern changes, including, but not limited to the following: hauling and truck routes, transit impacts, detours, Lane Shifts, lane closures, sidewalk/MUP closures, access restrictions, schedule changes, and other traffic control procedures. Procedures for disseminating information related to unplanned traffic pattern changes shall be addressed in the Traffic Incident Management Plan. DB Co shall ensure that this process is acceptable to the Relevant Authorities.
- (viii) All public inquiries or complaints that DB Co receives shall be documented and handled immediately in the field and forwarded simultaneously to the City, 24-hours a day, seven days a week.
- (i) Traffic and Transit Management Monitoring Plan
- (i) DB Co shall prepare and submit a Traffic and Transit Management Monitoring Plan in accordance with Schedule 10 – Review Procedure. DB Co shall demonstrate how they will ascertain whether or not the TTMP Plan and the TTMP sub-plans are working as forecast. In cases where the forecasts are not being met, DB Co shall describe the means to adjust the plans such that the forecasts are met or exceeded.
 - (ii) Within each TTMP sub-plan submission, DB Co shall identify performance indicators tailored to the specifics of the sub-plan including but not limited to traffic volumes, travel times, and peak hour queue lengths. Upon acceptance of the sub-plan by the City, DB Co shall use those indicators on an ongoing basis to assess the effectiveness of the subject sub-plan. DB Co shall review the parameters of performance indication, and adjust the indicators accordingly in the

event that a sub-plan undergoes an update due to changes in Project as a result of any and all Project activities which may result in changes to the traffic management strategies set out in the TTMP.

- (iii) DB Co shall identify in their TTMP and their TTMP sub-plans, the acceptable level of performance achievable for each of the performance indicators, based on the calculations used in support of the accepted TTMP and TTMP sub-plans.
- (iv) The performance of the TTMP or TTMP sub-plan shall be deemed to be acceptable from each of a) a general traffic perspective, b) a transit perspective, c) a cycling perspective, and d) a pedestrian perspective, if the level of performance measured in the field during the execution of the TTMP traffic management measures meets or exceeds the level forecast in the TTMP for each of the respective perspectives. If the performance of any one or more of the perspectives is less than that forecast in the TTMP, then DB Co shall immediately formulate mitigation measures to bring the performance of that perspective up to the forecast standard.
- (v) DB Co shall perform field monitoring in advance of and during each stage or closure.
- (vi) DB Co shall be responsible for all means, methods and techniques used to undertake the monitoring services and shall provide all aspects necessary for the performance of the monitoring services, including labour, supervision, management, plant, equipment, tools, and materials.
- (vii) The field monitoring shall include as a minimum, Peak Period traffic volumes, travel time surveys, queue and delays and intersection operational performance within the impacted Roadway network. The monitoring plan shall include travel time and delay data specific to transit vehicles, if impacts to transit routes are anticipated.
- (viii) Field monitoring shall occur five Business Days after stage, detour implementation, or closure implementation, and every 20 Business Days thereafter for the duration of the Work. The frequency of monitoring post-implementation may be increased at the request of the City should issues be noted as a result of the field monitoring or the daily Site reviews.
- (ix) Within five Business Days of conducting the field monitoring, DB Co shall evaluate the data and submit a report summarizing the monitoring results and evaluating the performance of the stage, detour implementation, or closure implementation compared to DB Co's current TTMP and TTMP sub-plan.
- (x) Where applicable, the data collected shall include, but not be limited to:
 - A. General Traffic

- i. Traffic volumes – Peak Periods and AM and PM peak hour, at major intersections and other locations representative of the Roadway network impacted by the execution of the Project;
 - ii. Travel times – AM and PM peak hour along major Roadways or Project Segments, and other streets representative of the Roadway network impacted by the execution of the Project; and,
 - iii. AM and PM queue lengths for traffic movements at signalized intersections and other intersections representative of the Roadway network impacted by the execution of the Project;
 - B. Transit
 - i. Travel times - AM and PM peak hour travel times, as determined from OC Transpo GPS data, to be provided to DB Co upon request
 - C. Cyclists
 - i. Volumes – AM and PM Peak Periods; and,
 - ii. Condition of surface of cycling lanes and MUPs.
 - D. Pedestrians
 - i. Volumes – AM and PM Peak Periods; and,
 - ii. Surface condition of sidewalks.
- (xi) DB Co shall ensure that the plan is maintained current as related to the activities on Site. DB Co shall submit the updated plan for review/acceptance in accordance with Schedule 10 – Review Procedure.
- (xii) DB Co shall create and execute a Daily Traffic Management Site Record as set out in Appendix B of this Part 7.
- (xiii) DB Co shall create and execute a Daily Traffic Monitoring Report as set out in Appendix C of this Part 7.
- (xiv) DB Co shall create and execute a Daily Lane Closure Report as set out in Appendix D of this Part 7.
- (j) Lane Closure Measurement and Verification Plan
 - (i) DB Co shall prepare and implement a Lane Closure Measurement and Verification Plan prior to implementation of any planned lane closures. The Lane Closure Measurement and Verification Plan shall describe how DB Co will evaluate their performance on lane closure progress in relation to the lane closure

plan it has submitted based on the requirements in Schedule 34 – Mobility Matters. This plan shall also describe the verification process through which the City can audit DB Co’s lane closure performance.

(k) Transitway Lane Closure Measurement and Verification Plan

- (i) DB Co shall prepare and implement a Transitway Lane Closure Measurement and Verification Plan prior to implementation of any planned lane closures. The Transitway Lane Closure Measurement and Verification Plan shall describe how DB Co will evaluate their performance on lane closure progress in relation to the lane closure plan it has submitted based on the requirements in Schedule 34 – Mobility Matters. This plan shall also describe the verification process through which the City can audit DB Co’s lane closure performance.

(l) Property Access and Business Continuity Plan

- (i) DB Co shall prepare and submit a Property Access and Business Continuity Plan, in accordance with Schedule 10 - Review Procedure. The goal of the plan is to support the business community in the construction Work zone and to maintain existing or equivalent vehicle and pedestrian access to all buildings and properties. This plan shall address elements of ensuring accessibility to business (for customers as well as deliveries) as well as promotion of the businesses in the affected corridors to assist them during the construction period.
- (ii) The Property Access and Business Continuity Plan shall address the following elements:
 - A. Maintaining effective access for all relevant modes currently available to all properties, including but not limited to, vehicles, deliveries, pedestrians and cyclists;
 - B. To the extent possible, maintain visual sight lines and facilitate maintenance of a clean and attractive environment despite construction;
 - C. A strategy for implementing temporary replacement of parking which is unavailable during construction. This strategy shall address provision of temporary parking lots and changes to on-street parking regimes; and
 - D. City and DB Co responsibilities for communication and Stakeholder engagement shall be defined in Schedule 18 – Communications and Stakeholder Engagement Obligations.
- (iii) The plan shall demonstrate how DB Co shall achieve the following property access requirements;
 - A. Maintain front door pedestrian access to all properties;

- B. When front door pedestrian access cannot be maintained, provide a minimum of 60 calendar days' notice to the affected property owner and tenants;
 - C. Maintain existing or provide equivalent vehicle access (i.e. maintain existing driveway location and width, maintain rear laneway width and configuration);
 - D. Identify when OPS traffic assistance shall be provided in accordance with City requirements;
 - E. Minimize delay for vehicles and pedestrians accessing retail stores; and
 - F. Provide Traffic Control Personnel where appropriate to maintain safe and adequate vehicle and pedestrian access.
- (iv) The plan shall demonstrate how DB Co shall achieve the following wayfinding and visibility requirements:
- A. Maximize the visibility of business frontages, including front doors;
 - B. Maintain locations and visibility of current business signage;
 - C. Where locations and/or visibility of current business signage cannot be maintained, relocate or design, supply and install new signs at locations which continue to provide high visibility and clear sightlines. These shall be conducted in consultation with the affected businesses;
 - D. Design, supply, and install additional signs to direct pedestrians and vehicles to business access routes; and
 - E. Maintain all signage as described above throughout the construction period.
- (v) The plan shall demonstrate how DB Co shall achieve the following communications requirements:
- A. Conduct ongoing community liaison during construction;
 - B. Provide adequate and specific notice to affected property owners and tenants for each stage of construction, including anticipated impacts and durations;
 - C. Provide sufficient notice and description of impacts to allow businesses to take actions to offset and/or mitigate business loss;
 - D. Maintain records of all notices;

- E. Provide prompt, formal written responses to complaints and provide document specific follow-up actions; and
 - F. Provide contacts for construction or a Community Liaison staff member outside normal business hours.
- (vi) DB Co shall support the City in accordance with Schedule 18 – Communications and Stakeholder Engagement Obligations, to engage with property owners and tenants throughout the corridor and BIAs throughout the Project, to inform them of upcoming changes in construction activity, facilitate mitigation of any construction-related access or parking issues between the properties and DB Co, and assist in ensuring that DB Co maintains access for each relevant mode and keeps the street clean to the extent possible.
 - (vii) DB Co shall update the plan such that the information therein is kept current with the upcoming and ongoing construction activities. DB Co shall submit the updated plan for review/acceptance in accordance with Schedule 10 – Review Procedure.
 - (viii) DB Co shall implement the accepted Property Access and Business Continuity Plan and accepted revisions thereto.
 - (ix) DB Co shall not commence any Work on Site without an applicable current accepted Property Access and Business Continuity Plan.

6.3 DB Co Responsibilities

- (a) DB Co shall accept full responsibility for quality control and quality assurance of all activities affecting the TTMP. The TTMP quality control process shall be included in the TTMP. DB Co shall ensure that all personnel identified in the TTMP are suitably qualified and licensed.
- (b) Traffic Manager
 - (i) DB Co shall designate a Traffic Manager, with the qualifications identified in Schedule 9 – Key Individuals, who shall be responsible for the following:
 - A. development, implementation, and management of the TTMP;
 - B. ensuring the City is kept informed of all upcoming traffic activities and any revisions to the TTMP;
 - C. ensuring that appropriate modifications are made to the TTMP if the specified traffic control measures are not achieving the requirements;
 - D. coordinating with persons carrying out Work in areas adjacent to the Project;

- E. co-chairing with the City the Traffic Management Committee;
- F. ensuring the timing and organized delivery of public and Stakeholder communication information;
- G. participating as DB Co's representative in coordinating with the City's Traffic Demand Management program and the Traffic Incident Management Group;
- H. sign-off of each and every TTMP and TTMP sub-plan prior to their submission to the City;
- I. review and sign off the Lane Closure Analysis Report required in Schedule 34 – Mobility Matters; and,
- J. Attend the Mobility Matters Review Meetings described in Schedule 34 – Mobility Matters.

(c) Traffic Engineer

- (i) DB Co shall designate a Traffic Engineer who is a Professional Engineer and has DB Co's authority to review, and shall seal, the TTMP and associated sub-plans and take responsibility for ensuring that all traffic engineering issues and requirements are taken into account.
 - (ii) The Traffic Engineer shall attend the Project's regularly scheduled Traffic Management Committee meetings and be DB Co's representative at the City's Traffic Control Centre when required.
 - (iii) The Traffic Engineer shall have the following qualifications:
 - A. 15 years of experience overall in the traffic engineering field
 - B. 10 years of experience specifically related to traffic modeling, intersection design, construction staging, and traffic signal infrastructure; and,
 - C. Experience in design/build type projects where Roadways and/or highways were constructed within an existing urban area.
 - D. Ensures all traffic signal notifications timelines as detailed in this Part 7 are met.
- (i) The Traffic Engineer shall oversee and direct record keeping, reporting and accounting of temporary and permanent traffic signal installations.

- (ii) The Traffic Engineer shall ensure all traffic signal notification timelines as detailed in Schedule 15-2, Part 2 – Civil and Guideway, and this Part 7 are met.
- (d) Traffic Control Supervisors
 - (i) DB Co shall designate Traffic Control Supervisors, each of whom shall have DB Co's authority to respond to traffic control requirements, and each of whom shall personally perform all the duties of the Traffic Control Supervisor, in accordance with this Part 7.
 - (ii) A Traffic Control Supervisor shall be on the Site full-time when construction activities are underway.
 - (iii) The duties of the Traffic Control Supervisor shall include but not be limited to the following:
 - A. Directing all traffic control operations for construction;
 - B. The Traffic Control Supervisor shall have direct line authority over all of DB Co's Traffic Control Personnel and procedures on the Site;
 - C. Liaising with the City, OC Transpo, and MTO, as required;
 - D. Recording the actual duration of lane closures, full closures, detours, Lane Shifts, and unauthorized traffic delays, and forwarding this information, on a daily basis, to the City's Lead Traffic and Mobility for information and appropriate action;
 - E. Monitoring queue lengths in active Work zones and implementing appropriate measures when such queues affect the operation and safety of provincial Roadways, Transitway, Major and Minor Municipal Roads, and other federal and municipal Roadways, and providing the City with documentation outlining the date, location, queue lengths, and measures taken;
 - F. Monitoring, and recording on a daily basis, the transit travel times through Work zones and detour routes, at a frequency and duration sufficient to identify operational performance issues. Coordinate with OC Transpo ahead of time to establish "geofence" points in the system before measurements are to take place in order to facilitate the collection of accurate date, route, time, and location data. Document and evaluate the transit travel times versus the forecast times established in the TTMP submissions. Identify operational performance issues and the DB Co recommended mitigation measures immediately to the City. Provide a copy of the record, issues, and mitigation measures to the City daily.

Prepare and submit to the City on a monthly basis, a monthly summary report of the daily reports. Report the operational performance issues and their resolution at the next Traffic Management Committee meeting and record the same in the notes of the meeting;

- G. Respond to traffic related incidents resulting from construction and traffic management activities. All major incidents shall be documented within 48 hours of the incident and provided to the City per Clause 6.2(c) of this Part 7;
- H. H. Documenting traffic control measures and activities in accordance with this Part 7, and producing a Daily Traffic Monitoring Report and Daily Lane Closure Report as set out in Appendices C and D of this Part 7, respectively;
- I. Documenting site instructions and items noted on daily (site) reports which pertain to or affect traffic control, and updating the Traffic Control Plans immediately to reflect the changes on Site, and then promptly submitting the revised plans to the City in accordance with Schedule 10 - Review Procedure, as updates to the TTMP and applicable TTMP sub-plans;
- J. Overseeing all requirements that contribute to the safety, convenience, and orderly movement of vehicular, cycling and pedestrian traffic;
- K. Attending the Project's regularly scheduled traffic management meetings; and
- L. Traffic control supervision shall be provided by Traffic Control Supervisors on the Site on a 24 hour per day basis when construction activities are underway. During non-Work periods, the Traffic Control Supervisor or accepted alternate shall be on the Site within 30 minutes of being notified. The Traffic Control Supervisors shall have appropriate personnel and equipment available on call, at all times.
- M. Perform daily drive-by inspections as detailed in Appendix G of this Part 7.

(e) Traffic Control Personnel

- (i) All Traffic Control Personnel shall be qualified in accordance with the OHSA/CCOHS and the regulations thereunder.

(f) Traffic Management Committee

- (i) DB Co shall be responsible for forming a Traffic Management Committee that shall be comprised of DB Co, City, OC Transpo, and representatives of Relevant

Authorities that shall meet on a weekly basis. The purpose of this committee shall be to coordinate, plan, and take action with respect to current and future traffic and transit impacts that may be caused by the design and construction Works.

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**SCHEDULE 15-2
DESIGN AND CONSTRUCTION REQUIREMENTS**

**PART 8
UNDERGROUND STRUCTURES**

ARTICLE 1 INTRODUCTION

1.1 General

- (a) This Article 1 describes the design and construction requirements related to Underground Structures.
- (b) The scope comprises all underground construction required within the Project limits primarily consisting of Tunnels, Underground Station Boxes, shafts, portals and any Underground Structure work required for the completion of, headwalls, sumps and pumping stations. Refer to Schedule 15-2, Part 1, Article 2 – Physical Layout for a description of the underground sections of the alignment.
- (c) The scope includes temporary decking and support of excavations for Underground Structures, shafts, and retaining walls.
- (d) The scope includes installation of Track, walkways, lighting, fire protection, OCS, Tunnel ventilation and all other systems necessary within Tunnels for operation of the system.
- (e) The requirements of Schedule 15-2, Part 4 – Stations shall apply to Underground Station Boxes.
- (f) DB Co shall determine the specific means and methods for construction of Underground Structures using Cut-and-Cover methods consistent with the design and construction criteria specified herein.
- (g) DB Co shall perform excavations and install temporary excavation support and initial support in a manner consistent with the requirements of Schedule 15-2, Part 2, Article 9 – Protection of Existing Adjacent Structures to minimize ground and Structure movement and deformation. Soil excavation and backfill shall be sequenced such that unbalanced soil loading on EAS will not exceed 1m.

1.2 Scope

- (a) DB Co shall integrate the design and construction requirements of this Part 8 with other contract requirements including the following:
 - (i) Operational performance requirements for determination of the interior Tunnel space to accommodate Track alignment and Tunnel opening size relative to minimum clearance envelopes and required infrastructure - refer to Schedule 15-2 – Design and Construction Requirements:

- A. Part 1 – General Requirements;
 - B. Part 2 –Civil and Guideway;
 - C. Part 3 –Systems; and
 - D. Part 4 –Stations.
- (ii) Permanent retained earth structures other than Underground Structures – Schedule 15-2, Part 2, Article 7 – Geotechnical Design Criteria and Requirements;
 - (iii) Protection of EAS during construction – refer to Schedule 15-2, Part 2, Article 9 – Protection of Existing Adjacent Structures;
 - (iv) Structural design requirements for structural elements located underground but not meeting the definition of Underground Structures such as retaining walls, building and bridge foundations– refer to Schedule 15-2, Part 2, Article 4 – Structural Design Criteria and Requirements;
 - (v) Corrosion control and stray current protection - refer to Schedule 15-2, Part 3, Article 12 – Corrosion Control;
 - (vi) Geotechnical requirements – refer to Schedule 15-2, Part 2, Article 7 – Geotechnical Design Criteria and Requirements; and
 - (vii) Environmental requirements – refer to Schedule 17 – Environmental Obligations.
- (b) DB Co shall sequence construction to mitigate impacts to the surrounding infrastructure, including vehicular and pedestrian circulation, access to and egress from adjacent structures, and disruption to existing Utilities. Such construction sequencing shall consider the order of execution of the work, including the need for multiple shifts, night-time or weekend work and material deliveries and removal of excavated materials. Refer to Schedule 15-2, Part 1 Article 5 – Implementation Constraints, and Schedule 15-2, Part 7 – Traffic and Transit Management and Construction Access.
 - (c) DB Co shall perform a detailed geo-referenced 3D survey of the “as-built” Tunnel alignment and all Underground Structures using digital mapping and laser scanning technology. The survey shall provide the actual “as-built” condition of the Underground Structures including but not limited to documentation of the condition of the interior face of the structural concrete. Scanning shall be performed before installation of the Underground Structure systems and finishes. Submit a digital copy of the survey to the City for record in accordance with Schedule 10 – Review Procedure. The scanning system and digital imagery shall be capable of meeting the following minimum technical requirements:
 - (i) Measurement range accuracy: +/- 10mm
 - (ii) Angular accuracy: 0.002 degrees

- (iii) Recording distance: 2m to 300m, with the capability of recording at ranges less than 2m and more than 300m
- (iv) Field of View: Full 360 degrees without gaps.
- (v) Scan precision: 5mm
- (vi) Point cloud spacing: 5mm
- (vii) Colour image resolution: three - 36 megapixel cameras, series of photos taken a minimum of every 3m along the underground structure axis
- (viii) Pixel size: distance dependent (2mm to 5mm depending on profile size)
- (d) Where exterior waterproofing of Existing Adjacent Structures adjacent to Cut-and-Cover excavations is required to be removed to facilitate construction or is otherwise damaged during construction, it shall be repaired or replaced in-kind by DB Co to ensure future leakage into Existing Adjacent Structures is less than or equal to pre-construction conditions.
- (e) Means of Egress
 - (i) DB Co shall provide means of egress for Emergency evacuation of a Train at any point within the Tunnels and open cut sections in conformance with NFPA 130 and the Safety Management System. Emergency evacuation to the surface from Underground Structures shall be through the Underground Stations and the Tunnel Portals. No EEBs shall be located within the Tunnel sections.
 - (ii) Emergency Egress including but not limited to routes, cross passages, walkways and egress components shall conform with the requirements of NFPA 130.
 - (iii) Where continuity of the egress route requires walking down to the Track level to reach the evacuation point at an Underground Station Platform, handrails and guards shall be provided at the stairs leading down from the walkway to the Track.
 - (iv) At locations where trains are expected to reverse direction, a walkway, equal to the length of the train, shall be provided to allow the driver to safely exit the cab at one end of the train, walk to the cab at the other end of the train, and reboard. This walkway shall avoid encroachment into the dynamic envelope of a Revenue Vehicle on an adjacent Track.
 - (v) DB Co shall provide a storage facility room exclusively for the use of ESP with internal dimensions of 2.0m x 3.0m x 2.8m height. The room shall be located along the portal sidewall and accessed from the emergency walkway, located no more than 2m from the Tunnel opening.

1.3 Codes, Standards and Regulations

- (a) The design and construction of the Works shall comply with the criteria contained in this Article 1, and all standards, regulations, policies, Applicable Law, guidelines or practices applicable to the Project. The codes, standards, and references indicated in this Clause 1.3 shall be utilized for the design and construction of the Underground Structures indicated in this Article 1, except as explicitly indicated in other Articles. The structural design shall conform to the most current edition of the following codes and standards.
- (i) CAN/CSA-S6 Canadian Highway Bridge Design Code
 - (ii) CAN/CSA A23.3 Design of Concrete Structures
 - (iii) CAN/CSA A23.1/A23.2 - Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete;
 - (iv) CAN/CSA S16 - Design of Steel Structures
 - (v) CAN/CSA O86 - Engineering Design in Wood
 - (vi) AREMA Manual for Railway Engineering

ARTICLE 2 TEMPORARY SUPPORT OF EXCAVATION

2.1 Scope

- (a) This Article 2 specifies structural design and performance criteria for the temporary SOE for Cut-and-Cover Structures including but not limited to:
 - (i) temporary excavation support and underpinning systems; and
 - (ii) temporary traffic support, including pedestrian, vehicular and rail traffic, as applicable.
- (b) If any SOE components are incorporated into the permanent Works, the SOE components shall also meet all requirements for permanent Works including, but not limited to Design Life, durability and waterproofing.
- (c) Existing temporary SOE
 - (i) Where the SOE systems used for the construction of existing buildings adjacent to the alignment interfere with the construction of the Underground Structures, DB Co shall ensure these SOE systems are not part of the existing building's permanent foundation and can be removed without impact to the building.

2.2 General Structural Design Criteria

- (a) DB Co shall design for temporary excavation support, underpinning, and temporary traffic support, including pedestrian, vehicular and rail traffic systems that, in conjunction with the selected sequencing, means and methods for excavation and construction of the Cut-and-Cover Structures, is in compliance with the requirements of this Project and Relevant Authorities.
- (b) Design and construction of all temporary SOE work including decking and retaining walls shall be in conformance with the requirements of CAN/CSA-S6 and Schedule 15-2, Part 2, Article 7 – Geotechnical Design Criteria and Requirements, as applicable and the additional requirements herein.

2.3 Materials

- (a) DB Co shall select materials for strength, geometry, initial set, toughness, and other qualities required for the means and methods selected to perform the Works and in accordance with requirements, standards, specifications and information specified herein.
- (b) Temporary works constructed of reinforced concrete shall meet the minimum design requirements of Table 8-2.1; as defined by CSA A23.1 Concrete materials and methods of concrete construction;

Table 8-2.1: Temporary Works Minimum Design Criteria

| Application | Exposure | Minimum Required Compressive Strength f'_c (MPa) | Acceptance Age of Required Compressive Strength (days) | Nominal Maximum Aggregate Size (mm^2) | Cement Type |
|--|----------|--|--|--|-------------|
| Shotcrete | C-2 | 40 | 28 | 28 | GU or GUb |
| Precast Concrete for Temporary Road Deck | C-1 | 55 | 28 | 20 | GU or GUb |

- (c) Temporary ground anchoring systems used for temporary excavation support or initial support shall consider the location of utilities and comply with right of way restrictions, all requirements of Article 2.5 of Schedule 15-2, Part 1 – General Requirements, and Schedule 20 – Lands.
- (d) Traffic decking surfaces shall provide a static coefficient of friction not less than 0.5 as determined by ASTM D2047, F609. Timber decking, if used, shall be surfaced with asphalt or other uniform covering that will provide a coefficient of friction of at least 0.5. Uncovered timber will not be permitted.

2.4 Loads

- (a) Temporary works shall be designed using the applicable loads and load combinations from Schedule 15-2, Part 2, Article 4 – Structural Design Criteria and Requirements, as required per CAN/CSA-S6 for construction loads and loads on temporary structures.
- (b) The potential for unsymmetrical vertical loads or unbalanced horizontal loads due to variations in ground conditions or properties and construction sequencing shall be accounted for as follows:
 - (i) Lateral soil loading on temporary excavation support for Underground Structures shall be based on the soil properties as determined by DB Co, the type of support proposed and the means and methods for construction. This shall also apply to temporary excavation support that is incorporated into the permanent Underground Structure.
 - (ii) Rock loading on temporary excavation support for Underground Structures: Lateral rock loading and the type of support proposed and the means and methods for construction shall be determined by DB Co. This shall also apply to temporary excavation support that is incorporated into the permanent Underground Structure.

- (c) Seismic loads need not be considered for the design of temporary excavation support.

2.5 Monitoring Requirements:

- (a) DB Co shall integrate the following monitoring requirements with the monitoring requirements in Schedule 15-2, Part 2, Article 7 – Geotechnical Design Criteria and Requirements.
- (b) Where applicable the City will turn over existing instrumentation installed by other contractors in Existing Third Party Infrastructure prior to any excavation within the ZOI of the EAS as defined in Schedule 15-2, Part 2, Article 7 – Geotechnical Design Criteria and Requirements, to DB Co who shall:
 - (i) incorporate the instrumentation into the GIMP;
 - (ii) continue to read the instruments at the frequencies specified in the GIMP; and
 - (iii) decommission instrumentation when not required per the GIMP and restore the Site, surfaces or area disturbed by the instrumentation installation.
- (c) Temporary excavation support and initial support shall be monitored using a management system incorporating Review Levels and Alert Levels, as outlined in Schedule 15-2, Part 2, Article 9 – Protection of Existing Adjacent Structures.
- (d) DB Co shall develop review procedures to ensure that the excavation and support for Underground Structures are proceeding as planned, and shall consider all relevant factors when evaluating the performance of the temporary excavation support and initial support.
- (e) DB Co shall develop contingency plans and mitigation measures to address temporary or initial support that fails to meet the performance requirements developed by DB Co in accordance with the requirements of Schedule 15-2, Part 2, Article 9 – Protection of Existing Adjacent Structures.

2.6 Crossing and Underpinning of Existing Facilities

- (a) This section applies to Temporary SOE for:
 - (i) Underground Structures that cross over and pass within close proximity of the WNC combined sewer.
 - (ii) Locations where the Underground Structures pass within close proximity of Existing Adjacent Structures within the Project ZOI and the analysis requirements of Schedule 15-2 Part 2 Article 9 - Protection of Existing Adjacent Structures indicate mitigation measures are necessary.
- (b) DB Co shall develop and submit in accordance with Schedule 10 – Review Procedure SOE plans for the construction of Underground Structures crossing over and in close

proximity to the existing facilities. The plans shall include methods for installing and maintaining the SOE without damaging and imposing loads on the existing facilities.

- (c) Protection of Existing Utilities within the limits of the Cut-and-Cover construction shall be in accordance with Schedule 15-2, Part 2, Article 8 – Utility Infrastructure Design Criteria.
- (d) DB Co shall install and monitor instruments on temporary SOE and EAS in accordance with the GIMP requirements of Schedule 15-2, Part 2, Article 7 – Geotechnical Design Criteria and Requirements, to monitor any settlement or deformations of the EAS resulting from Cut-and-Cover construction activities.

ARTICLE 3 CUT-AND-COVER STRUCTURES

3.1 Scope

- (a) The scope of work includes designing, furnishing, and constructing permanent Cut-and-Cover Structures.

3.2 Durability Criteria

- (a) DB Co shall design Cut-and-Cover Structures that are durable and structurally sound to achieve the Design Life specified in Schedule 15-2, Part 1, Article 4 – Design and Construction, and durability requirements specified herein.
- (b) Durability – DB Co shall prepare and submit a durability report for the Underground Structures that incorporates the design recommendations of CSA S478-95 (R2007) Guidelines on Durability in Buildings with consideration of the corrosive properties of the soil and groundwater in contact with the Underground Structures. The report shall include the results of durability modelling to demonstrate that the design of Underground Structures meets the Project specified Design Life. Develop and submit results from a durability model of the concrete Structure using a widely accepted software package such as Life365 or Stadium. The model shall be used to demonstrate expected life cycle performance consistent with the Project requirements. Refer to ACI 201.2R Guide to Durable Concrete for information regarding causes of concrete deterioration and recommended methods to prevent such deterioration.
- (c) Cut-and-Cover Structures shall be constructed of reinforced concrete meeting the minimum design requirements of Table 8-3.1 as defined by CSA A23.1 Concrete materials and methods of concrete construction;

Table 8-3.1: Permanent Underground Structures Minimum Design Criteria

| Application | Exposure | Minimum Required Compressive Strength f'_c (MPa) | Acceptance Age of Required Compressive Strength (days) | Nominal Maximum Aggregate Size (mm ²) | Cement Type |
|--|----------|--|--|---|-------------|
| Permanent Concrete Structure | C-3 | 40 | 28 | 28 | GU or GUb |
| Permanent Concrete Structure <2m from top of roadway | C-XL | 50 | 56 | 28 | GU or GUb |

| | | | | | |
|-----------|-----|----|----|----|--------------|
| Shotcrete | C-2 | 32 | 28 | 28 | GU or GUb |
|-----------|-----|----|----|----|--------------|

- (d) Cast-in-place concrete and constituent materials shall comply with CSA A23.1
- (e) Concrete reinforcement shall conform to the requirements of the applicable Standards listed in CSA A23.1. The use of steel fibers as the sole and primary source of concrete reinforcement shall not be permitted.
- (f) Permanent ground anchoring systems used in the Tunnel and Underground Station Boxes shall consist of steel bars, wires or strands and be corrosion protected.
- (g) Structural steel shall meet the material requirements specified in Clause 4.11 of Schedule 15-2, Part 4 – Stations. Structural steel in Underground Structures shall not be permanently exposed to earth or in contact with the ground.
- (h) Cast in place and post installed concrete anchoring systems shall meet the design requirements of CSA 23.3 Annex D and be corrosion resistant. The use of adhesive anchoring systems to support overhead components in Underground Structures shall not be permitted.
- (i) DB Co shall develop and implement a quality control program for the construction of Cut-and-Cover reinforced concrete structures and submit the program quality control plan in accordance with Schedule 10 – Review Procedure. At a minimum the quality control plan shall address the procedures for proportioning, producing, mixing and placing concrete per the standards of CSA A23.1. All records and quality documentation included in the quality control plan shall be made available to the City upon their request.

3.3 Structural Design Criteria

- (a) The structural design of Underground Structures shall comply with the requirements of CAN/CSA-S6 for the ultimate limit states and serviceability limit states for structural concrete and the criteria specified herein, whichever is more stringent. Underground Structures with components designed using structural steel shall comply with the requirements of Schedule 15-2, Part 4, Article 4 – Structural Design Criteria.
- (b) DB Co shall determine the appropriate level and scope of analysis for the Underground Structures based on criteria such as ground conditions, loading conditions and Cut-and-Cover construction methods unless otherwise noted herein.
- (c) DB Co shall develop and apply loads and load combinations in accordance with the following requirements:
 - (i) The Underground Structures shall be designed using the applicable design loads defined in Clause 4.5 of Schedule 15-2, Part 2 – Civil and Guideway, except for seismic loads which shall follow the criteria herein.

- (ii) Seismic Loads and Design Criteria
- A. Site Classification shall be determined per the requirements in Clause 7.12 of Schedule 15-2, Part 2 – Civil and Guideway.
 - B. Design levels for MDE and ODE are defined in Clause 7.12 of Schedule 15-2, Part 2 – Civil and Guideway.
 - C. The general procedure for seismic design of Underground Structures shall be based on the ground deformation approach. Underground Structures shall be designed to accommodate the deformations imposed by the ground before, during and after the seismic event. Seismic design of Underground Structures shall consider two loading components: (1) the racking deformations due to the vertically propagating shear waves and (2) inertial forces due to vertical seismic motions. Determine both ODE and MDE level design considering soil-structure interaction effects.
 - D. Estimates of displacement capacity for Underground Structures shall not exceed the material strain limits of Table 8-3.2:

Table 8-3.2: Material Strain Limits for Earthquake Design Levels

| EQ | Material | Strain Limit |
|-----|----------|--------------|
| ODE | Steel | 0.0010 |
| | Concrete | 0.002 |
| MDE | Steel | 0.0020 |
| | Concrete | 0.0033 |

- (iii) The Underground Structures shall be designed using the modified load factors of Table 8-3.3. For loads not included in Table 8-3.3 refer to CAN/CSA S-6 and Schedule 15-2, Part 2, Article 4 – Structural Design Criteria and Requirements for load factors.

Table 8-3.3: Load Factors for Underground Structures

| Load | α_{\max} | α_{\min} |
|-----------------------|-----------------|-----------------|
| Dead (self weight) | 1.25 | 0.9 |
| Dead (earth backfill) | 1.25 | 0.9 |

| | | |
|-----------------------------------|------|-----|
| At rest and Active Earth Pressure | 1.5 | 0.9 |
| Hydrostatic (normal elevation) | 1.25 | 0.9 |
| Hydrostatic (flood elevation) | 1.0 | 0 |
| Live | 1.5 | 0 |

- (iv) The Underground Structures shall be designed using the applicable load combinations for ultimate (ULS) and serviceability (SLS) limit states of CAN/CSA-S6. Load combinations for ultimate strength design shall satisfy the minimum requirements of CAN/CSA-S6 for reinforced concrete buried structures. The additional load combinations of Table 8-3.4 shall also be used for the design,

Table 8-3.4: Additional Load Combinations for Underground Structures

| Load Combination | Notes |
|--|---|
| SLS 1 = D | |
| SLS 2 = D + E | Buoyancy, consider with and without backfill, use 100 year flood elevation |
| SLS 3 = D + E + L | Construction, surcharge without backfill cover, use normal hydrostatic elevations |
| SLS 4 = D + E + L + K | Service check for cracking of concrete |
| ULS 1 = 1.4D(self weight)+1.5D(backfill) | |
| ULS 2 = $\alpha D + \alpha E$ | |
| ULS 3 = $\alpha D + \alpha E + \alpha L + 1.25K$ | |
| ULS 4 = $\alpha D + \alpha E + \alpha L$ | Use 100 year flood elevation for Hydrostatic, consider with and without L |
| ULS 5 = $\alpha D + \alpha E + 0.5L + EQ$ | Consider with and without backfill and L |

- (v) Vent shaft damper supports, ancillary walls and doors located within or adjacent to the Tunnel and Underground Stations, any divider walls and any equipment installed within the Underground Structures shall be designed to withstand the air pressures and cyclic loading generated by moving trains and mechanical

ventilation systems. Pressures shall be determined based on Revenue Vehicle and ventilation system design and performance data provided by the manufacturers.

- (vi) Underground Structures shall be designed to resist temporary construction loading developed from the Cut-and-Cover construction means, methods and sequencing selected by DB Co.
- (vii) DB Co shall engage with the City during design to determine if future development plans that will potentially load Underground Structures are available for inclusion in the design. Refer to Clause 9.6 of Schedule 15-2, Part 2 – Civil and Guideway, for future adjacent construction requirements and protection of Project Infrastructure for DB Co design role as it pertains to future development within the Underground Structure ZOI. Refer to Clause 2.10 of Schedule 15-2, Part 1 – General for future works in the design and construction of the Project that shall be protected for and included in the design and construction of Underground Structures.
- (d) Hydrostatic loading shall consider the 100 year flood elevation for the determination of Underground Structure buoyancy. Uplift resistance for Underground Structures due to buoyancy loads shall follow the requirements for Cut-and-Cover Structures in Schedule 15-2, Part 2, Article 7 – Geotechnical Design Criteria and Requirements.
- (e) Temporary excavation support and initial support shall not be used as measures to relieve the design loads on a permanent structural lining unless the initial support can achieve the required design life. Underground Structures that incorporate temporary excavation support into the permanent work shall include the unsymmetrical vertical and unbalanced horizontal loads of Clause 2.4(b), of this Part 8 in addition to the long term loads of Clause 3.3(c) of this Part 8.
- (f) Structures shall be designed to prevent collapse and minimize damage from derailment. Where safety guard rails are not provided, or are ineffective in preventing impact, columns and walls situated within 7.5m as measured perpendicular from the centerline of a Track and not protected by reinforced concrete benches, platforms or crash barriers, shall be designed to withstand derailment forces.
- (g) DB Co shall comply with the following design requirements for fire resistance of Underground Structures:
 - (i) The structural integrity and Design Life of the Underground Structures subjected to the design fire outlined in Article 7– Tunnel and Station Ventilation Design Criteria, of this Part 8, shall not be compromised during the fire event.
 - (ii) Explosive spalling of concrete shall be mitigated by methods such as the inclusion of micro polypropylene fibres to the concrete mix for permanent linings or by providing a fire resistant interior lining.

- (iii) The development of gas temperature shall correspond to recognized temperature versus time curves per ITA Fire Guidelines Figure 2.4 unless Project-specific curves are developed by DB Co.
- (iv) DB Co shall design the Underground Structures following exposure to a fire by incorporating degradation in material properties due to temperature to ensure that Underground Structures shall not collapse following exposure to a fire.
- (v) All structural steel members shall be protected from direct fire exposure based on the specified fire intensity outlined in Article 7 – Tunnel and Station Ventilation Design Criteria, of this Part 8.

3.4 Waterproofing

- (a) DB Co shall design and construct Underground Structures located in regions of sensitive clays susceptible to stress increase and potential settlement from groundwater drawdown as undrained structures. Refer to Schedule 15-2, Part 2, Article 7 – Geotechnical Design Criteria and Requirements, identifying regions of the alignment subject to groundwater drawdown restrictions. Undrained structures are defined as structures that do not employ a drainage system that actively lowers the groundwater level to relieve hydrostatic pressure on the structure.
- (b) DB Co shall apply permanent concrete treatments such as sealers and coatings to ensure that any water present on internal surfaces does not affect the safety, durability and function of the Underground Structures.
- (c) DB Co shall meet the following criteria for water-tightness throughout the design life for new Underground Structures and new portions of existing Underground Structures:
 - (i) A maximum overall water infiltration rate 0.2L/m^2 of Underground Structures perimeter per day measured over any 1000m length of Underground Structure not to exceed 0.4L/m^2 of Underground Structures perimeter per day measured over any 10m length of Underground Structure.
 - (ii) Underground Structures shall have:
 - A. no identifiable or visible flow of water into the structure; and
 - B. no drips or seepage of water:
 - i. on walkways or egress passageways; or
 - ii. over the rail surfaces; or
 - iii. over the OCS; or
 - iv. where water has the potential to freeze on surfaces of Underground Structures; or

- v. where the dripping of water has the potential to cause damage to equipment or the malfunctioning of any electrical power, signaling, lighting, control or communication equipment, or to compromise electrical clearances;
 - C. no water penetration into embedded conduits and pull boxes; and
 - D. soil particles shall not enter into the structure through water ingress.
 - (iii) Public areas of stations, corridors and passageways and all electrical rooms including communications and signal rooms, shall be watertight. Where cavities are provided behind finishes, the cavities shall be:
 - A. drained and vented and
 - B. include cleanouts or other access points to allow inspection for compliance with the maximum overall water infiltration rate.
- (d) DB Co shall comply with the following additional provisions for new Underground Structures and new portions of existing Underground Structures:
 - (i) Underground Station Boxes shall be designed and constructed with a permanent waterproofing system around the entire perimeter of the Underground Station Box. If the Underground Station Box incorporates the SOE systems into the permanent structure meeting the requirement of Clause 2.1(b) of this Part 8, the Underground Station Box shall be designed and constructed with a permanent waterproofing system applied to the exterior of the invert and roof slabs with a 100 mm minimum drained and vented wall cavity for drainage behind finishes in exterior station walls and exterior walls of electrical and equipment rooms. The waterproofing systems shall include terminations as required to ensure the Station water tightness criteria is achieved and incorporate the groundwater drawdown restrictions of Clause 3.4(a) of this Part 8, and as determined by evaluation of geotechnical conditions.
 - (ii) Provide waterstops in all slab and wall construction joints of Underground Structures, including joints and transitions between existing and new Underground Structures.
 - (iii) The number of construction joints in Underground Structures shall be the minimum necessary to facilitate construction without inducing shrinkage stresses that result in shrinkage cracks exceeding the crack limits specified herein.
 - (iv) Design concrete to limit the crack width on the exterior face of exterior walls to 0.25 mm and the interior face of exterior walls to 0.35mm.
 - (v) Design shall prevent the freezing of any water in the Tunnels, Underground Station Boxes and portals from groundwater infiltration and surface drainage.

The design shall ensure there is no buildup of ice and snow over the top of rails, walking surfaces and in drainage structures.

- (e) DB Co shall prepare and submit in accordance with Schedule 10 – Review Procedure a report detailing the waterproofing plan that includes at a minimum:
 - (i) proposed methods and details for meeting the specified maximum water infiltration rate;
 - (ii) DB Co's previous experience with similar waterproofing systems, effectiveness of those systems and lessons learned that will be implemented on the Project;
 - (iii) remedial measures to achieve and maintain the water tightness criteria beyond construction and throughout the Design Life; and
 - (iv) measures to facilitate inspection of the Underground Structures at potential leaks and any remedial measures proposed to protect and/or restore the structure to achieve the required Design Life.
- (f) The existing Underground Structure at Baseline Station is required to meet all of the water tightness criteria of Article 3.4.(c) except as modified herein:
 - (i) A maximum overall water infiltration rate of 0.75L/m^2 of Underground Structures perimeter per day measured over any 300m length of Underground Structure not to exceed 1.5L/m^2 of Underground Structures perimeter per day measured over any 10m length of Underground Structure;
 - (ii) Existing leaks documented in the reference documents and any additional water infiltration noted during design and construction that results in the exceedance of the infiltration rate requirements in Clause 3.4(f)(i) of this Part, and does not meet the criteria of Clause 3.4(c)(ii) of this Part, shall require leak remediation. DB Co shall design and construct leak remediation solutions which at a minimum shall consist of but not be limited to the following:
 - A. Concrete repairs of cracks, spalls and other defects where water is infiltrating the structure;
 - B. Remedial grouting using chemical or cement grouting methods based on available Baseline Station structure, subsurface geotechnical, and adjacent structure information;
 - C. Water infiltration management designs that collect and divert water away from the elements and Station Box locations identified in Clause 3.4(c) of this Part and discharge into the existing Station Box drainage system. Modifications to the existing Station Box to accommodate a water infiltration management system shall comply with the clearance

requirements of Article 2.12 of Schedule 15-2, Part 2 – Civil and Guideway; and,

- D. Sealing around the perimeter of concrete penetrations and openings.

3.5 Crossing of West Nepean Collector

- (a) DB Co shall develop and submit plans in accordance with Schedule 10 – Review Procedure for the section of Tunnel crossing over the existing WNC. The submittal shall include at a minimum:
- (i) Structural drawings for the Tunnel crossing including details showing the means of isolating the Tunnel structure from the WNC. A minimum clear separation distance of 150mm shall be maintained between the outside face of the WNC lining and the outside face of the Tunnel structure through construction and the Design Life of the Tunnel.
 - (ii) Detailed analysis presented in a CLAR-2 report per Schedule 15-2, Part 2, Article 9 – Protection of Existing Structures, including all stages of construction using 2D and/or 3D finite element and finite difference simulation methods demonstrating that the Tunnel crossing design does not impose load on the WNC during construction and operation of the Tunnel. The analysis shall include the possibility of future settlement of the Tunnel and the transmission of Vehicle vibrations into the surrounding ground focusing on the impact to the WNC structure at the Tunnel crossing. The Tunnel crossing design shall include mitigative measures for the control of both Tunnel crossing and WNC ground settlements and Vehicle vibrations.
 - (iii) Physical alterations to the existing WNC may be considered if the design and construction of the Tunnel crossing cannot provide the minimum separation distance of 150mm, providing the following design and construction criteria are followed,
 - A. A detailed physical condition assessment presented in a CLAR-2 report shall be performed for the section of WNC requiring physical alterations to verify the integrity of the WNC and establish the WNC structural properties. The results of the physical condition assessment shall be used to determine the extent of WNC that can be removed and replaced without reducing the existing structural load capacity and hydraulic performance of the WNC.
 - B. WNC removals and replacement shall be subject to approval from the City. DB Co shall submit a WNC removal and replacement plan including at a minimum;
 - i. Results of the physical condition survey including as-built dimensions and structural properties,

- ii. A Work plan with drawings showing the extent of removals including the sequencing of removals, means and methods of removals, temporary liner support if necessary and replacement section if necessary.
- iii. Schedule identifying the calendar months and duration of WNC removals and replacement work. The schedule shall be coordinated with the City taking into consideration maximum seasonal volumes of storm and sanitary water conveyed by the WNC.

ARTICLE 4 MECHANICAL DESIGN CRITERIA

4.1 Scope

- (a) This Article 4 contains mechanical criteria developed for the Underground Structures, and where applicable the Stations. These criteria govern the functional requirements for Track drainage and sub drainage facilities, and fire protection systems.

4.2 Codes, Standards and Regulations

- (a) DB Co shall ensure that the design and construction of the Works complies with the criteria contained in this Article 4, and all standards, regulations, policies, Applicable Law, guidelines or practices applicable to the Project. Mechanical systems design shall apply, but not be limited to, all Applicable Codes & Standards as referenced in Schedule 15-2, Part 4 – Stations. In the event of a conflict between criteria, commitments or requirements contained within one document when compared with another, refer to Schedule 15-2, Part 4, Article 5 – Mechanical Design Criteria for order of precedence.

4.3 General Requirements

- (a) The requirements include mechanical systems located in the Underground Structures. Mechanical systems will consist of Track drainage, sub drainage, Tunnel ventilation and Tunnel fire protection systems.
 - (i) All equipment, pipes, supports, accessories, and their connections to the Structure, shall be designed to resist seismic force and to accommodate seismic deflection in accordance with OBC 4.1.8.18.
 - (ii) Any anchorages into Tunnel concrete shall not compromise the water tightness of the Tunnel.

4.4 Track Drainage System

- (a) DB Co shall design and construct the Track drainage system to collect water from all underground Track sections utilising a gravity flow system into pumping stations, consisting of, but not limited to Tunnel invert slab drainage troughs, catch basins, maintenance holes and drainage pipework.
 - (i) Track drainage troughs shall be designed to contain the design flow and prevent any overflow from occurring,
 - (ii) The system shall be designed such that flow blockages can be located by maintenance personnel, the design shall provide access for maintenance personnel to remove the blockage.
 - (iii) The pumping stations shall discharge the Track drainage water as permitted by the City. DB Co shall be responsible for obtaining any required discharge permits.

Refer to Schedule 15-2 Part 2, Article 5 – Drainage and Stormwater Management Design Criteria, for Track Drainage and SWM design criteria.

- (iv) Drainage system components including drainage troughs subject to near and below freezing temperatures shall be heat traced.
- (b) Water entering the Track areas is expected to be from, but not limited to, the following sources:
 - (i) Rain water entering the Tunnels from the portals
 - (ii) Rain water entering the Tunnels from ventilation shafts
 - (iii) Water discharged during fire-fighting operations within the Tunnels and/or stations
 - (iv) Water discharged during Tunnel wash-down
 - (v) sub-drainage
- (c) DB Co shall design and construct the drainage pump stations as per the following:
 - (i) Pumping stations shall be provided at low points in the Tunnel alignment and portals. Tunnel pumping stations shall be accessed through the tunnel and shall remain completely below grade with no pump station structures at or above grade.
 - (ii) Pumping stations shall be designed to support the same loads used in the Tunnel design as specified in Clause 3.3 of this Part 8.
 - (iii) Pumping stations shall include a concrete sump pit, submersible pumps, water level controllers, and pumps control panel, and discharge to an oil and grit separator
 - (iv) Pump selection and number of pumps shall be designed to accommodate the design flow rates and incorporate redundancy, so that drainage of the Underground Structure and emergency egress routes is maintained at all times. Pumping stations shall include a minimum of two pumps providing duplex pump systems with a back-up power source. The pumps shall be designed with sufficient capacity to meet the underground drainage requirements while one pump is not in operation. Pump sets shall be either the submersible or self-priming type with proven reliability and be capable of handling grit through interception and pumping.
 - (v) Pumping stations shall be configured to allow pumps and accessories to be retrieved for servicing without requiring confined space entry.
 - (vi) Pumping stations shall be equipped with monorail lifts, stainless steel ladders in pits, stainless gas-tight sump covers, and grease sensors

- (d) DB Co shall design and construct the pumping station control panels as per the following:
 - (i) Control panels and all accessories located in the pumping station, including cable connectors, fittings, indicating lights, push buttons, supporting mountings, etc. shall be constructed of materials to suit the environment of an Underground Structure, exposed to dust dirt and moisture.
 - (ii) Control panels shall operate the pumps in stages based on pre-determined water levels monitored by the sump water level monitoring system
 - (iii) Control panels shall facilitate the placement of local indicating lights & warning lights and provide alarm(s) back to the TOCC via. the SCADA system

4.5 Tunnel Dry Standpipe System

- (a) DB Co shall provide a manual, dry, Class I, standpipe system conforming to OBC, NFPA 14 and NFPA 130 throughout each Underground Structures section.
- (b) DB Co shall ensure that the dry standpipe system including fire valves is located over and along the egress walkway side of the Tunnel.
- (c) DB Co shall include the following components in the standpipe system:
 - (i) Fire department connections at station fire-fighter's access points;
 - (ii) Automatic air release valve assemblies to accelerate the charging of the standpipe lines; and
 - (iii) Fire valves located at 60m intervals along each Tunnel walkway of the Underground Structure.
 - (iv) Manual drain valves, heat traced drum drips.
- (d) DB Co shall ensure that fire hydrants are located unobstructed and not more than 45m from the Tunnel cross passages or dry standpipe fire department connections.
- (e) DB Co shall design and construct fire shut-off valves with signage to allow diversion of the system feed points from either end of the looped system at stations and/or cross passages as applicable to serve each full section of the dry fire line.
- (f) DB Co shall design and construct fire valve sites to incorporate a 65mm fire hose valve positioned to discharge perpendicular to the Track.
- (g) DB Co shall ensure that piping shall be steel pipe minimum Schedule 40 and meet NFPA standards.

- (h) DB Co shall ensure that pipe sleeves shall be galvanized steel, minimum two sizes larger than carry pipe. Where pipe penetrates exterior structures, pipe sleeve shall be provided with water-proof seal.

ARTICLE 5 ELECTRICAL DESIGN CRITERIA

5.1 Introduction

- (a) DB Co shall be responsible for the design, construction, testing and Commissioning of electrical distribution and lighting within the Underground Structures. This work shall be coordinated with electrical work within and adjacent to Stations specified in Schedule 15-2, Part 4 – Stations.
- (b) DB Co shall ensure that electrical spaces are properly located and sized to facilitate the operation, installation and maintenance of equipment. Electrical system for the Underground Structures shall be designed to accommodate at least 25% spare capacity to protect for future growth and expansion of the power distribution systems.
- (c) DB Co shall provide accessibility to permit removal and replacement of major equipment. Installation and removal routes of such equipment shall be clearly identified and dimensioned and included on submissions outlined in Schedule 10 – Review Procedure.
- (d) DB Co shall ensure that electrical power distribution equipment is heavy duty construction selected to provide equipment longevity and shall be designed to provide lower arc flash potential during maintenance, high arc flash energy dispersion. Refer to Clause 6.1(i) of Schedule 15-2, Part 4 – Stations, for existing equipment and electrical distribution requirements for the existing Underground Structure at Baseline Station.
- (e) DB Co shall design and construct all electrical equipment to be individually identified by a unique number matching the equipment schedule identification developed for the existing Confederation Line. The label shape, letter size, color coding and background color shall be standardized to match labels used on existing Confederation Line equipment. Identifying labels shall be designated for: cable trays, conduits, pull/junction boxes, cables/wires lighting fixtures including blue lights, maintenance receptacles and all electrical and electronic equipment (mini-substations, control cabinets, switches, etc). In addition to identification labels, approval labels shall be provided as required per either CSA or ULC.
- (f) DB Co shall ensure that anchorages into Tunnel concrete shall not compromise the water tightness and structural integrity of the Tunnel.
- (g) DB Co shall provide fixtures, equipment and raceways that are watertight and will not be damaged under Tunnel pressure washing operations.

5.2 Codes, Standards and Manuals

- (a) DB Co shall design and construct the Works to comply with the criteria contained in this Article 5, and all standards, regulations, policies, Applicable Law, guidelines or practices applicable to the Project, including but not limited to each of the following Reference Documents. In the event of a conflict between criteria, commitments or requirements

contained within one document when compared with another, refer to Schedule 15-2, Part 4, Article 6 – Electrical Design Criteria for order of precedence:

- (i) Refer to Schedule 15-2, Part 4, Article 6 – Electrical Design Criteria, for Design Codes, Standards, Regulations, and Guidelines.

5.3 Basis for Design

- (a) DB Co shall design and construct the Work in accordance with the Electrical Load Classification as follows:
 - (i) Refer to the Clause 6.3(a) of Schedule 15-2, Part 4 – Stations, for Electrical Load Classification.
- (b) DB Co shall perform calculations as per the following:
 - (i) Refer to Clause 6.3(b) of Schedule 15-2, Part 4 – Stations, for descriptions of the calculation requirements for the following:
 - A. short-circuit study;
 - B. protective device coordination study;
 - C. voltage drop including cables and motors;
 - D. grounding system study; and
 - E. lighting illumination calculations.
 - (ii) Arc flash Hazard calculations shall be extended to the high energy low voltage equipment with expected high arc fault current and/or protected by instantaneous only or time delayed protection settings.
- (c) DB Co shall design and construct the Work in accordance with the electrical safety provisions as follows:
 - (i) Equipment ground fault “annunciation only” shall be provided where equipment ground fault protection is required by code or standard engineering practice for equipment or feeders serving Level 2 Emergency Systems.
 - (ii) Personnel ground fault protection shall be provided on branch circuits that have equipment or outlets for which personal protection is required either by code or standard engineering practice.
 - (iii) Arc flash Hazard warning labels shall be provided on the equipment as per required code. Flash boundary and incident energy values shall be displayed

5.4 Functional Requirements

- (a) DB Co shall design and construct the electrical service as per the following:
 - (i) All Underground Structures electrical distribution shall comply with all Applicable Codes and standards including NFPA 130 and all other relevant standards referenced by NFPA 130,
 - (ii) For Underground Station feeder requirements for emergency systems, refer to Clause 6.4 of Schedule 15-2, Part 4 – Stations.
- (b) DB Co shall design and construct system duct banks and pull-boxes as per the following:
 - (i) Duct banks and handholes shall be designed in accordance with the seismic criteria defined for the Project. Duct banks shall be designed to include at least 25% spare capacity to protect for future growth and expansion of each system accommodated in the duct bank. All ducts shall be roped.
 - (ii) Provide segregation between system within the duct-bank and pull-boxes. Provide dedicated pull-boxes for systems. Size pulls boxes accordingly to accommodate the manufacturer recommended cable bending radius. In addition to identification labels, approval labels shall be provided as required per either CSA or ULC.
 - (iii) Provide minimum two hour fire rating for the rooms within Underground Structures accommodating the equipment providing the power distribution inside the Underground Structures. Rate the equipment and distribution (conduits, wires) in accordance with the NFPA-130.
- (c) DB Co shall design and construct Grounding and Bonding as per the following:
 - (i) All non-current-carrying metal enclosures and all alternating current equipment enclosures shall be securely connected/bonded to the grounding system. Provide local grounding for each major distribution system within the Underground Structures.
- (d) DB Co shall design and construct Emergency and standby power sources as per the following:
 - (i) Refer to Schedule 15-2, Part 4, Article 6 – Electrical Design Criteria for emergency and standby power services.
- (e) DB Co shall design and construct maintenance receptacles as per the following:
 - (i) Provide 120V/20A maintenance duplex GFI receptacles complete with water-resistant enclosure and cover spaced every 100m. Refer to Schedule 15-2, Part 4, Article 6 – Electrical Design Criteria for receptacle functional requirements. No more than two outlets shall be connected to a branch circuit.

- (f) DB Co shall design and construct lighting as per the following:
- (i) Lighting design shall be consistent across all Underground Structures. Provide sufficient illumination to provide safety and security for:
 - A. Passenger Emergency egress as per NFPA-130;
 - B. Blue lighting within the Underground Structure and portals as per NFPA-130; and,
 - C. Maintenance accesses as per Schedule 15-2, Part 4 – Stations.
 - (ii) Emergency power for lighting in the Underground Structure shall comply in terms of back-up time with the requirements of NFPA-130.
 - (iii) In the addition to the requirements highlighted in Schedule 15-2, Part 4 – Stations, for design, calculation, and validation of the results, lighting in the Underground Structures shall be selected, located, and/or aimed to accomplish their primary purpose while producing a minimum glare and interference with task accuracy for the Operators.
 - (iv) Lighting system shall be designed so that the failure of any single luminaire or lighting circuit shall not result in less than 2.7 lux.
 - (v) DB Co shall design and construct transitional lighting from underground to surface sections of the Project. The length of threshold/transition lighting shall be based on operating speeds and the corresponding safe stopping distance. DB Co shall review and take into account the given criteria in the American National Standard Practice for Tunnel Lighting – ANSI/IESNA RP-22 and TC – RTD 10 Transport Canada Road/Railway Grade Crossing Technical Manual: Guide for the Design of Roadway Lighting Transportation Association of Canada.
 - A. Lighting control systems shall be monitored and controlled through the facility BAS system. Where facility remote control system is not provided, a central-key/timer control system including override switches for controls in service areas shall be provided.
 - (vi) Lighting for exterior access to Underground Structures areas shall be designed to consider security, CPTED and CCTV requirements as per Guideline for Security Lighting for People, Property, and Public Spaces, IESNA G-1-03;
 - (vii) A TVA has been completed for the Confederation Line, as outlined in Schedule 15-2, Part 1, Article 7 – System Safety and Security Certification. DB Co shall update the TVA as per the requirements of Schedule 15-2, Part 1, Article 7 – System Safety and Security Certification, and shall ensure that the determination of the appropriate type of lighting is included.
 - (viii) Minimum illumination levels are outlined in Table 8-5.1

Table 8-5.1: Underground Structures

| Location | Average Minimum Lux | Emergency |
|--|---------------------|-----------|
| Passenger Emergency Egress (Tunnel Walkway) | 15 | 15 |
| Tracks, Cross-Overs and Catwalks | 20 | 10 |
| Track Switches | 50 | 10 |
| Tunnel Interior Zone | 20 | 10 |
| Tunnel Transition Zone (day) | 50 | N/A |
| Tunnel Threshold Zone (day) | 500 | N/A |
| Tunnel Portals (night) | 20 | 10 |

**Note: 1.) All lighting, including, but not limited to Normal and Emergency lighting illumination levels, shall be designed to meet or exceed OBC, accessibility requirements, and security requirements including but not limited to, AODA, COADS, CPTED, CCTV and CAN/CSA B651 requirements. 2.) Illuminated areas and values not listed in this table shall be per 5.4 (f)(v) above.*

- (g) DB Co shall design and construct power distribution within Underground Structures and portals as per the following:
- (i) Provide power distribution within Underground Structures for each system requiring a power supply (voltage level, type of load (normal, essential or critical) to be coordinated with Schedule 15-2, Part 4 – Stations.
 - (ii) Primary switching rooms for incoming services including any underground TPSS shall be:
 - A. Designed in coordination with [REDACTED] and in accordance to [REDACTED] specification GSC002: Primary Voltage Service Specification.
 - B. Coordinated with [REDACTED] in terms of switchgear location and placement within rooms.
 - C. Designed for a 3 hour fire envelope.
- (h) DB Co shall design and construct metering and monitoring as per the following:
- (i) Remote monitoring shall be provided to:
 - A. Underground Structures main panelboard breaker position; and
 - B. Voltage availability at the main buses.

ARTICLE 6 SYSTEMS INTERFACE

6.1 Scope

- (a) DB Co shall develop all system and infrastructure requirements within the Underground Structures as detailed in Schedule 15-2, Part 3 - Systems.

6.2 Systems to Tunnel Infrastructure Interface

- (a) DB Co shall develop designs to integrate with the Underground Structures including but not limited to the following elements:
 - (i) Tunnel invert design; and
 - (ii) FLS; and
 - (iii) Tunnel and Station Ventilation; and
 - (iv) OCS design; and
 - (v) Communication systems design; and
 - (vi) Tunnel portal intrusion detection system design; and
 - (vii) conduit provisions; and
 - (viii) Emergency egress requirements.

6.3 General Interface Requirements

- (a) DB Co shall be responsible for designing the Tunnel interface to provide the required clearance for the Revenue Vehicle to maintain for safe operation.
 - (i) DB Co shall develop and provide a swept path analysis along the length of the ROW to confirm that all elements including safety walkway and all system elements and equipment are clear of the required envelope of the train as defined in Schedule 15-2, Part 2, Article 2 – Geometric Design Criteria, for Track alignment.
 - (ii) DB Co shall analyze impact to clearance envelopes based on Track form and invert design.
 - (iii) DB Co shall ensure that all Electric Traction installations as defined in Schedule 15-2, Part 3, Article 13 – Traction Power System can be accessed when standing on the safety walkway.
- (b) DB Co shall design the OCS to adhere to the vehicle manufacturer requirements for:

- (i) nominal operating height as per Schedule 15-2, Part 3 – Systems;
 - (ii) maximum rate of change of the pantograph as per Schedule 15-2, Part 3 – Systems;
 - (iii) electrical clearances as per AREMA, OESC and CSA standards; and,
 - (iv) any additional considerations to ensure safe operation of the Vehicle.
- (c) DB Co shall ensure that equipment and raceways are appropriately designed and sealed to prevent water and material infiltration during Tunnel cleaning operations.

6.4 Interface with Tunnel

- (a) Anchorages into Tunnel concrete shall not compromise the water tightness of the Tunnel.
- (b) DB Co shall ensure that all system interfaces with the Tunnel structure conform to the limits set out by the existing Tunnel liner. Limitations include the following:
- (i) drill depth limitations into the liner;
 - (ii) drill point locations;
 - (iii) loading considerations;
- (c) DB Co shall be responsible for determining loads from the OCS in accordance with the requirements of Schedule 15-2, Part 3, Article 14 – Overhead Contact System.

6.5 Invert and Cabling Requirements

- (a) DB Co shall determine all cabling requirements within the Underground Structures;
- (b) DB Co shall maximize the use of embedded conduits, or cable raceways as applicable, within Underground Structures;
- (c) DB Co shall ensure that pull boxes are provided at a maximum spacing of 120m or a total cumulative bend radius of 270 degrees;
- (d) DB Co shall ensure that pull boxes are adequately grounded and bonded in accordance with OESC;
- (e) DB Co shall ensure that there are sufficient cross conduit connections within the invert to support system installation as well as future system requirements. Cross conduit connections shall consist of the following as a minimum:
- (i) location requirements: Within 10m of the start of a Tunnel segment (Cut-and-Cover section boundary) and a maximum spacing of 300m; and

- (ii) minimum cross conduit requirements: 2-50mm I.D. Schedule 40 PVC conduits if embedded, RGS if exposed.
- (f) DB Co shall ensure that cable provisions along the Underground Structures include a minimum spare capacity for future system expansion;
 - (i) a minimum of 25% spare capacity to support future system installation; and
 - (ii) provision along the Tunnel walls to allow for surface mounted cable installation running the length of the Tunnel

ARTICLE 7 TUNNEL AND STATION VENTILATION DESIGN CRITERIA

7.1 Scope

- (a) The scope includes the requirements for the design, installation, testing and Commissioning of the Emergency ventilation systems for the Tunnels and for the Underground Stations.

7.2 Codes, Standards and Manuals

- (a) The design and construction of the Works shall comply with the criteria contained in this Article 7, and all standards, regulations, policies, Applicable Law, guidelines or practices applicable to the Project, including but not limited to each of the following Reference Documents, In the event of a conflict between criteria, commitments or requirements contained within one document when compared with another, refer to Schedule 15-2, Part 1, Article 1 – Reference Documents for order of precedence:
 - (i) OBC;
 - (ii) OFC;
 - (iii) OESC;
 - (iv) CSA;
 - (v) CEC;
 - (vi) OHSA;
 - (vii) ANSI/AMCA Standard 210-07 | ANSI/ASHRAE 51-07, "Laboratory Methods of Testing Fans for Certified Aerodynamic Performance Rating"
 - (viii) ANSI/AMCA 250-12, "Laboratory Methods of Testing Jet Tunnel Fans for Performance"
 - (ix) AMCA Standard 300, Test Code for Sound Rating Air Moving Devices;
 - (x) AMCA Standard 301, Methods for Calculating Fan Sound Ratings from Laboratory Test Data;
 - (xi) ANSI;
 - (xii) ASHRAE Handbooks; Particular references shall be made to the following sections of ASHRAE:
 - A. ANSI/ASHRAE Standard 62.1-2010;
 - (xiii) MNECB;

- (xiv) ASME;
- (xv) ASTM;
- (xvi) APTA, Rail Transit Committee, Guidelines for Design of Rapid Transit Facilities;
- (xvii) DOT Recommended Emergency Preparedness Guidelines for Rail Transit Systems;
- (xviii) NEMA;
- (xix) SMACNA;
- (xx) ULC; and
- (xxi) NFPA - Particular references shall be made to the following sections of NFPA:
 - A. NFPA Standard 70, National Electrical Code;
 - B. NFPA Standard 90A, Installation of Air-conditioning and Ventilating Systems;
 - C. NFPA Standard 130, Fixed Guideway Transit and Passenger Rail Systems;
 - D. NFPA Standard 204, Smoke and Heat Venting; and
 - E. NFPA Standard 502, Standard for Road Tunnels, Bridges and Other Limited Access Highways.

7.3 Emergency Ventilation

- (a) General Requirements
 - (i) DB Co shall design and construct all Underground Structures including Underground Station Boxes in accordance with the ventilation requirements of NFPA 130.
 - (ii) Ventilation system(s) shall be provided for the control of heat and smoke in an emergency as required by NFPA 130.
 - (iii) DB Co, with City involvement for SCADA integration as stated in Schedule 15-2 Part 3 – Systems and the requirements of this Part 8, shall design and provide an Emergency ventilation system including all Emergency fans, dampers, controls, and accessories of the Emergency ventilation system as required by NFPA 130.
 - (iv) The design shall include provisions for the installation, removal and replacement of the ventilation system equipment.

- (v) Manufacturers recommended clearances shall be provided around ventilation system equipment to facilitate maintenance, repair, installation, removal and replacement.
- (vi) All ventilation system's equipment and controls shall be of similar appearance and functionality at all stations to minimize training requirements, and to provide easier operations and facilitate use.
- (vii) DB Co shall perform SES analyses and CFD analyses of the ventilation system to validate the design.
- (viii) DB Co shall conduct SES and CFD analyses for fire cases at the Station Platform, storage Tracks, running Tunnels and other areas including concourse areas to demonstrate that the design of the Underground Stations and Tunnels can provide the required tenability criteria based on NFPA 130. DB Co shall implement necessary modifications to the design (such as smoke baffles, barriers and additional fan capacity) to meet the tenability criteria based on the SES and CFD study results.
- (ix) DB Co shall develop the SES and CFD modelling criteria. The criteria shall address and include the following sections at a minimum and shall be submitted in accordance with Schedule 10 – Review Procedure before the analyses are performed:
 - A. Applicable Codes and standards;
 - B. Tenability criteria and time of tenability calculations for Stations, and Tunnel;
 - C. Fire scenario development;
 - D. Fire detection time and ventilation system start up time;
 - E. Modelling input data and assumptions.
 - F. Acceptable limits and other constraints; and
 - G. Methodology.
- (x) The ventilation zones shall be coordinated with the signaling system, Traction Power blocks, Train operation plans, and the Emergency response plans. Refer to Article 6 – Systems Interface, of this Part 8.
- (xi) Ventilation zones shall be designed for one Train per ventilation zone in the Tunnel segments. More than one Train per ventilation zone shall be permitted if the following condition is met:

- A. The Train control system shall be capable of removing non-incident Trains in the same time frame as the activation of the ventilation response and prior to the de-energization of the Traction Power. Refer to 7.2.5 and A.7.2.5 of NFPA 130 for additional information.
- (b) System Operational Requirements
 - (i) DB Co shall ensure that the following operational requirements are met or exceeded by the Tunnel ventilation system.
 - A. System Operation
 - i. DB Co shall develop requirements for ventilation scenarios.
 - ii. DB Co shall develop ventilation modes to be implemented through the SCADA system as per Schedule 15-2, Part 3, Article 8 – SCADA System.
 - iii. The ventilation system’s modes of operation shall be initiated from the TOCC or BCC through the SCADA system.
 - iv. The SCADA system shall include a schematic display of the Tunnel ventilation system indicating all the ventilation elements to be activated and their modes of operation.
 - v. All fans, dampers and modes of operation shall be monitored and controlled through SCADA system.
 - vi. All exit doors and cross passage doors shall be monitored and controlled through SCADA system.
 - vii. A ventilation control panel for local control of the Tunnel ventilation system shall be provided at each Underground Station/Facility that has an active controllable Tunnel ventilation system.
 - viii. The local ventilation control panels shall be capable of overriding the TOCC or BCC.
 - ix. Ventilation control panels shall be used in accordance with the operational and safety procedures and controls, to be developed to mitigate the Emergency scenarios developed in the system hazard analysis
 - x. The ventilation control panel shall be secured or located in a secure area of the Station.

- (c) DB Co shall design and construct the Emergency ventilation systems to meet the following performance requirements:
- (i) Emergency ventilation fans for Stations and Tunnels
 - A. Axial-flow fans - Station Emergency ventilation fans
 - i. Fans shall be of the axial-flow type, with internally mounted, directly driven motor and shall be reversible.
 - ii. Fans shall have adjustable-pitch blades, fitted to permit changes in fan-operating characteristics for future system modification.
 - iii. Fan motors shall be operated by variable frequency drives for commonality with existing City ventilation fans.
 - iv. The flow capacity in either direction (exhaust and supply) shall be equal to or greater than the rated capacity.
 - v. Fans shall be selected to have a total efficiency of not less than 60 percent in the forward (exhaust) flow mode.
 - vi. Each fan shall be provided with modular sound attenuators on both the inlet and discharge sides of the fan. Additional sound lining shall be provided as required so that maximum noise levels from ventilation systems do not exceed allowable limits. Any additional sound lining shall be accounted for in determining the pressure of the fan.
 - B. Jet fans – Tunnel Emergency ventilation fans
 - i. Jet fans shall be of the vane-axial type, and shall be equal or greater than the rated static thrust in either direction (forward and reverse mode).
 - ii. Jet fans shall be provided with appropriate sound attenuators.
 - iii. Fan power curve shall not exceed 100 percent of the motor rating at any point. The brake horsepower for reverse (supply) flow shall not exceed the brake horsepower for (exhaust) flow.
 - iv. There shall be no OCS supports installed within the length of the jet fan assembly including the attenuators. The first set of OCS supports shall not be less than 0.3m or more than 0.5m past the inlet or outlet of the jet fan assembly. The next set of supports, in either direction, shall be the maximum allowable distance per criteria in Article 6 – Systems Interface of this Part 8. OCS supports shall not be installed in the high velocity jet of the fans.

- v. The design and layout of the fans shall provide maintenance access with the option to lower and raise the fans at the Track level from overhead supports without requiring removal of the OCS.
 - vi. A local disconnect switch shall be provided at each jet fan location.
 - C. Emergency ventilation dampers
 - i. Dampers shall be parallel-blade, industrial, heavy-duty type, weatherproof design. Two limit switches shall be provided in each damper actuator for remote monitoring of damper position, one for open and the other for closed position. Damper leakage at shutoff shall be less than or equal to UL555 Class1 Extended.
 - ii. By-pass dampers shall be specified to fail-close while fan dampers will be specified to fail in the position determined by the ventilation design.
 - iii. Where supported by an engineering analysis, the use of bypass dampers may be removed from the design.
- (d) Equipment requirements
 - (i) DB Co shall design and construct the Emergency ventilation fans for Stations and Tunnels per the following equipment requirements:
 - A. Axial-flow fans - Station Emergency ventilation fans
 - i. Axial flow fans shall be suitable for operation individually or in parallel with other fans as applicable. Fan components shall meet the following minimum design criteria or otherwise approved equal;
 - 1 Impeller;
 - 1. Hub and blades of aluminum-alloy casting suitable for the specified performance and Underground Structure environment.
 - 2 Fan housing including motor mounts and supports;
 - 1. Hot-rolled steel.
 - 2. Minimum gage 3.
 - 3. Flange thickness shall be not less than fan housing thickness.

- 3 Support bolts, nuts, and washers;
 1. Bolts shall be not less than 1/2 inch minimum in diameter. All bolts shall be Type 316 stainless steel conforming to ASTM A 193, Grade B8M on B8MA.
 2. Nuts compatible for use with the above bolts shall be alloy steel conforming to ASTM A 194, Grade 2H.
 3. Washers and lock washers used on the fans and components shall be of Type 316 stainless steel.
- 4 Motors;
 1. Squirrel cage induction motors
 2. Service Factor: 1.15
 3. Minimum NEMA insulation Class H
 4. Minimum NEMA temperature rise Class F
 5. Motor bearings: Minimum L-10 rating equal to 40,000 hours at maximum capacity and maximum speed based on the bearing load imposed by the driven equipment.
- 5 Monitoring and instrumentation;
 1. Fan/motor bearing vibration monitoring
 2. Motor speed
 3. Flow switches
 4. Bearing temperatures
 5. Minimum two 100 ohm, three wire platinum resistance type temperature RTD sensing detectors for each stator (phase) winding.
- 6 Encasements, enclosures, terminal boxes, junction boxes;
 1. NEMA 4X stainless steel

- ii. Sound attenuators for axial-flow fans shall consist of components that meet the following criteria or otherwise approved equal;
 - 1 Shells;
 - 1. Minimum 10 gage
 - 2. ASTM A240, Type 304 stainless steel
 - 2 Flanges and stiffeners;
 - 1. Minimum gage 3 Type 304 stainless steel bent plate or ASTM A276 stainless steel angles
 - 3 Splitters including the nose and tail and the face sheets;
 - 1. Minimum 18 gage
 - 2. ASTM A293 or ASTM A240, Type 304 stainless steel
 - 4 Filler;
 - 1. Inorganic mineral or glass fiber, inert, vermin-proof and resistant to high humidity conditions.
 - 2. The filler material shall be protected with glass fiber cloth and stainless steel screen.

B. Jet fans – tunnel emergency ventilation fans

- i. Jet fan components shall meet the following minimum criteria or otherwise approved equal;
 - 1 Motor;
 - 1. Service Factor: 1.15
 - 2. Minimum NEMA insulation Class H
 - 3. Minimum NEMA temperature rise Class F
 - 4. Bearings: Minimum L-10 life rating equal to 40,000 hours at maximum capacity and maximum speed based on the bearing load imposed by the driven equipment
 - 2 Impeller;

1. Hub and blades of aluminum-alloy casting suitable for the specified performance and environment
- 3 Fan housing including motor mounts and motor supports;
 1. Hot-rolled steel
 2. Minimum gage 3
 3. Flange thickness shall be not less than fan housing thickness.
- 4 Support bolts, nuts, and washers;
 1. Bolts and studs shall be not less than 5/8 inches in diameter with a nut, 2 plain washers and a lock washer.
 2. All bolts and studs shall be of galvanized steel conforming to ASTM A 193, Grade B8M or B8MA.
 3. Nuts compatible for use with the above bolts shall be alloy steel conforming to ASTM A 194, Grade 2H.
 4. Washers and lock washers used on the fans and components shall be of galvanized steel.
- 5 Monitoring and instrumentation;
 1. Fan/motor bearing vibration monitoring
 2. Motor speed
 3. Flow switches
 4. Bearing temperatures
 5. Minimum two 100 ohm, three wire platinum resistance type temperature RTD sensing detectors for each stator (phase) winding.
- 6 Encasements, enclosures, terminal boxes, junction boxes;
 1. NEMA 4X stainless steel
- 7 Sound attenuators

1. Exterior casing: Minimum gage 18 hot dipped galvanized steel
 2. Perforated sheets: Minimum gage 22 stainless steel
 3. In fill material: Vermin free and moisture resistant inorganic mineral wool or glass fiber acoustic
- 8 Mesh screen: Hot dipped galvanized steel
- C. Emergency ventilation dampers shall meet the following minimum criteria or otherwise approved equal;
- i. Damper type: Parallel or opposed acting, multiple blade tunnel ventilation dampers
 - ii. Minimum net free area: 80%
 - iii. Frames;
 - 1 Minimum gage 7 AISI Type 304 stainless steel
 - 2 Minimum 152mm web
 - iv. Blades;
 - 1 Blade positions: Fully open and fully closed
 - 2 Minimum AISI Type 304 stainless steel
 - 3 Minimum gage 14
 - v. Blade shafts;
 - 1 Minimum 19mm diameter
 - 2 Stainless steel rounds conforming to the requirements of ASTM A276, Type 304 or 303, Condition A, Class C conditioning
 - vi. Linkage
 - 1 Minimum AISI Type 304 stainless steel
 - vii. Mullions
 - 1 Minimum AISI Type 304 stainless steel
 - viii. Actuator;

- 1 Furnish with internal position limit switches
- 2 Motor;
- 3 Minimum NEMA insulation Class F
- 4 Minimum NEMA temperature rise Class B

D. Equipment nameplates shall be fabricated from AISI Type 304 or 316 stainless steel or otherwise approved equal.

(e) Smoke Dispersion/Recirculation Study

(i) DB Co shall undertake smoke dispersion analyses for Emergency ventilation systems to demonstrate the following:

- A. Smoke discharged from Emergency ventilation shafts, Tunnel portals and Station openings to atmosphere is not drawn into the Station entrances or other Station air intakes;
- B. Smoke discharged from Emergency ventilation shafts, Tunnel portals and Station openings to atmosphere is not drawn into Non-Station Entrances or air intake shafts of adjacent buildings including known future buildings;
- C. Smoke re-circulation studies shall confirm that a minimum total smoke dilution ratio of 35:1 is reached at all air intakes to achieve a potential 10m visibility of make-up air; and,
- D. Smoke re-circulation studies shall account for all wind conditions (wind speed, wind direction and frequency of occurrence).

(ii) Based on the study, the location of the Station facilities shall be adjusted to minimize recirculation impacts or other mitigating measures shall be identified and implemented.

(f) FLS Protocols

(i) DB Co shall be responsible for reviewing and if necessary updating the current FLS protocols based on the final design of the Emergency ventilation systems in compliance with Schedule 15-2, Part 1, Article 7 – System Safety Certification, and the following:

- A. The development of the protocols shall involve a collaborative process involving DB Co, the City and the AHJ over FLS issues. This process shall be led and managed by DB Co;

- B. The protocols shall include fan ventilation scenarios for the Emergency evacuation and ventilation of Stations and Tunnels in response to all potential FLS risks including but not limited to risks identified as a result of risk analysis;
- C. Fan ventilation scenarios to outline the responsibilities of, the Operator, the City and ESP;
- D. The role of the fire alarm annunciator panels in Stations is to be defined as part of the overall FLS system;
- E. SOP shall be developed and agreed upon by all parties; and
- F. The development of SOPs and FLS protocols shall be in full compliance with Schedule 15-2, Part 1, Article 7 – System Safety Certification, and this Article 7.

(g) Design Criteria

- (i) DB Co shall apply the Design Criteria outlined in Tables 8-7.1, 8-7.2, and 8-7.3 to the Tunnel and Underground Station Emergency ventilation systems for Emergency ventilation including the associated Tunnel ventilation shaft structures and equipment.

Table 8-7.1: Design Fire Heat Release Rate

| Location | Maximum Fire Size | Minimum Growth Rate |
|---|-------------------|--------------------------|
| Guideway/Stations (Vehicle Fire) | 13.2 MW | 11.72 W/s ² * |
| Station Platform/Concourse (Trash Fire at station) | 1.0 MW | 46.89 W/s ² |

* The growth rate of the Vehicle design fire shall be, at a minimum, the value listed in this table and can be adjusted for characteristics of the Vehicle.

Table 8-7.2: Air Velocity Criteria

| Location | Description | Velocity |
|-----------|--------------------------------|---|
| Guideway | Emergency Operation Maximum | 11.0 m/s in areas where passengers may be present |
| Emergency | Emergency Operation | 9.14 m/s max |

| Location | Description | Velocity |
|------------------------------|-------------|----------|
| ventilation shafts and ducts | | |

(h) Noise Criteria

- (i) Noise criteria shall comply with the Guidelines for Design of Rapid Transit Facilities as listed by the Rail Transit Committee, APTA and as required in Table 8-7.3.

Table 8-7.3: Ventilation Equipment Noise Limits

| Scenario | Target Noise Level (NC) |
|---------------------|-------------------------|
| Emergency Operation | 70 |

- (ii) During Emergency operations, the Tunnel ventilation noise shall not exceed Lmax 85 dB(A) within the Tunnel, and combined with the ventilation noise shall not exceed NC 70 as measured within the Station.
- (iii) Refer to Schedule 17, Part 9 – Noise and Vibration, for information on external noise level restrictions.
- (i) Smoke ventilation shaft locations
- (i) Ventilation shafts shall not be located in the Tunnel sections between the East Portal and Cleary Station, Cleary Station and New Orchard Station, New Orchard Station and the West Portal.
- (ii) The design shall account for air recirculation between exhaust shafts, intake shafts, portals and open Station openings. Openings for Emergency smoke ventilation shafts on the surface shall be separated by a minimum stretched string distance not less than the recommended distance determined by a detailed smoke dispersion/recirculation study in accordance with Clause 7.3 of this Part 8, from the closest Station entrance or exit and air intakes operating in supply mode serving the Station.
- (iii) Openings for Emergency smoke ventilation on the surface shall be separated by a minimum horizontal distance of 12m from unprotected outside air intake or other openings of all other adjacent structures;

- (iv) Where the above distance is not practical, the minimum distance shall be 4.5m if the closest shaft opening is raised a minimum of 2.5m above the Station entrance or exit, unprotected outside air intake or other openings. The final configuration and separation distances shall be supported by a detailed smoke dispersion/recirculation study in accordance with Clause 7.3 of this Part 8;
- (v) The minimum distance at grade between the edges of adjacent openings for outside air intakes, protected by smoke dampers, and openings for Emergency smoke ventilation shall be as follows:
 - A. $d = 0.25 \times (L1 + L2)$
 - i. Where: d = minimum distance between the edges of the adjacent openings, in meters,
 - ii. $L1 + L2$ = lengths of the adjacent parallel sides of the openings, in meters
- (vi) Ventilation shaft openings on the surface shall be located to provide as direct a route to atmosphere as possible, to facilitate ease of airflow to and from the underground sections; Shaft openings shall include design features that mitigate the vulnerabilities identified in the TVA of Schedule 15-2, Part 1, Article 8 – Security and Emergency Management.
- (vii) Ventilation shafts shall not terminate in driveway surfaces at parking garage entrances or other surfaces utilized for daily vehicular access;
- (viii) Where not located in a sidewalk, vent shafts shall terminate a minimum 150 mm higher than any adjacent surface to exclude run-off drainage into the shaft; and
- (ix) Gratings and louvers shall be of high security and tamper proof construction.

7.4 Normal Operation Requirements

- (a) DB Co shall design the Underground Structures such that ventilation during normal operation is provided by the “piston effect” of the Trains moving through the Tunnels.
- (b) DB Co shall design the Emergency ventilation fans to be capable of being used to maintain Tunnel air temperatures.
- (c) Design Criteria
 - (i) DB Co shall apply the Design Criteria outlined in Tables 8-7.4, 8-7.5, 8-7.6 and 8-7.7 to the Tunnel and Station Emergency ventilation systems for normal operation including the associated Tunnel ventilation shaft structures and equipment.

Table 8-7.4: Outside Ambient Design Conditions (Ottawa, ON)

| Description | Data | Source | Comment |
|------------------------------------|---------|---------------------|--------------------|
| Summer dry bulb design temperature | 28.9°C | ASHRAE Fundamentals | 1% occurrence |
| Summer wet bulb design temperature | 20.8°C | ASHRAE Fundamentals | 1% occurrence |
| Winter dry bulb design temperature | -24.2°C | ASHRAE Fundamentals | 99.6% design value |

Table 8-7.5: Air Temperature Design Criteria

| Guideway – Normal Operation | |
|--|---------------|
| Maximum Average Temperature at Peak System Headway | Ambient + 3°C |

Table 8-7.6: Air Velocity Criteria

| Location | Description | Velocity |
|-----------------------------|----------------------------------|---|
| Public Areas of Station | Maximum velocity | 5.10 m/s |
| Exterior inlets and outlets | Normal Operation/at sidewalk | 2.5 m/s based on net free area of terminal gratings Maximum velocity to be determined by site specific requirements. |
| | Normal Operation/not at sidewalk | |

(ii) Noise Criteria

- A. Noise due to fan operation shall not exceed the allowable limits in areas accessible to the public. Noise criteria shall comply with the Guidelines for Design of Rapid Transit Facilities as listed by the Rail Transit Committee, APTA and as required in Table 8-7.7.

Table 8-7.7: Ventilation Equipment Noise Limits

| Area | Target Noise Level (NC) |
|------|-------------------------|
|------|-------------------------|

| | |
|----------------|----|
| Platforms | 45 |
| Mezzanines | 45 |
| Station Booths | 40 |
| Retail | 45 |

- B. Refer to Schedule 17, Part 9 – Noise and Vibration, for information on external noise level restrictions.

(iii) Pressure Wave Criteria

- A. DB Co shall ensure the design accounts for total changes in pressure greater than 0.69 kPa, in areas normally occupied by the public and employees, the maximum rate of pressure change shall be limited to 414 Pa/s.
- B. DB Co shall design doors, support systems, and equipment exposed to changes in air pressure due to Train movement to withstand the expected repetitive pressure transient loading and pressure reversals.

7.5 Congested/Maintenance Operation Requirements

- (a) DB Co shall design and construct the Tunnel ventilation system to be used to maintain temperatures, exhaust the fumes, and provide required fresh air to the Vehicles and patrons during a non-fire Emergency case, maintenance operation and non-Revenue Vehicle operation.
- (b) DB Co shall design and construct the Tunnel ventilation system to be capable of diluting diesel fumes to acceptable concentrations during maintenance operations with the use of diesel stock or equipment.
- (c) DB Co shall design and construct sliding doors located in the walls separating the Revenue Service and maintenance/Vehicle Storage Tracks at the Baseline Station LMSF with spacing coinciding with the length of the rolling stock to be used at the Station.
- (d) Design Criteria
- (i) DB Co shall apply the Design Criteria outlined in Table 8-7.8 to the Tunnel and Station Emergency ventilation systems including the associated Tunnel ventilation shaft structures and equipment.

Table 8-7.8: Air Temperature Design Criteria

| Guideway – Congested Operation | |
|--|------|
| Maximum Temperature for Train A/C and electrical equipment | 45°C |
| Maximum 5 min Local Peak Temperature | 45°C |

- (ii) Refer to normal operation Design Criteria in Clause 7.4(c)(ii) of this Part 8 for ventilation equipment noise limits.

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HIGHWAY WORKS

PART A – GENERAL PROVISIONS

ARTICLE 1 REFERENCE DOCUMENTS

1.1 Application of Ontario Provincial Standards for Roads and Public Works and MTO Technical Manuals

- (a) DB Co shall perform the Highway Works in accordance with Ontario Provincial Standards for Roads and Public Works and other applicable Reference Documents, including MTO Technical Manuals, subject to Clause 1.3 of Part A of this Schedule 15-2, Part 9 and with the following amendments to OPS and MTO Technical Manuals:
- (i) In the event OPS and MTO Technical Manual design and submission requirements, with respect to both temporary and permanent works, and quality requirements, are in conflict with this Project Agreement then this Project Agreement shall apply;
 - (ii) OPS and MTO Technical Manual requirements and specifications related to Equipment for performing the Highway Works do not apply; for greater clarity specified Equipment restrictions under the “Construction” Section do apply;
 - (iii) Sections and requirements of OPS and MTO Technical Manuals that are not applicable to this Project Agreement, such as payment terms, do not apply;
 - (iv) Any and all references to “approval by the Contract Administrator”, “submitted to the Contract Administrator”, or other such reference in OPS and MTO Technical Manuals, in terms of acceptance of Materials, permission to proceed, work methodology or end product, shall be construed as being the responsibility of DB Co (IQAF Project Manager as detailed in Schedule 11) to undertake all required reviews, confirm compliance with this Schedule 15-2 and make submissions to the City with the full acceptance and approval by the Engineers on their Design Team, unless otherwise requested by the City Representative in writing or as outlined in the Project Agreement;
 - (v) Any and all references in OPS and MTO Technical Manuals to submission of documentation to the Contract Administrator “for approval”, “for acceptance”, “to be submitted to”, or other qualifying phrase with similar connotation not identified in (iv) above, is to be construed as the City Representative retaining the right to object to the submission as set out in Schedule 10 – Review Procedure, if the submission is required to undergo the Review Procedure upon consultation with the City Representative;
 - (vi) Any and all references to the “Owner” or “Authority”, or other words or phrases with similar connotation in OPS and MTO Technical Manuals shall have the same meaning as the City Representative or its assigned authority, unless otherwise stated by the City Representative in writing;

- (vii) DB Co shall, when required to submit for approval by the City Representative samples of any products proposed by DB Co that are not included in the Designated Sources for Material List, submit such samples with supporting documentation to the City Representative in accordance with Schedule 10 – Review Procedure;
- (viii) DB Co may seek relief from any parts or portions of OPS and MTO Technical Manual, by articulating in writing the aspects that do not apply and demonstrate by clauses or sections in the Project Agreement how such aspects are not appropriate in the context of this Agreement, and submit this written request to the City Representative under the Review Procedure. For clarity, DB Co relief from any parts or portions of OPS and MTO Technical Manual requires the prior written approval of the City Representative; and,
- (ix) OPS and MTO Special Provisions refers to the current version at Commercial Close; only the Common and Provincial versions shall be used.

1.2 Reference Documents

- (a) Without limiting any other provision in the Project Agreement, the Reference Documents shall apply to the Highway Works as described in this Schedule 15-2, Part 9.

1.3 Order of Precedence

- (a) Unless otherwise expressly provided in this Schedule 15-2, Part 9, if there is any conflict between any of the provisions of the Project Agreement and any of the Reference Documents, the following shall apply in descending order of precedence:
 - (i) The provisions of the Project Agreement;
 - (ii) MTO Special Provisions
 - (iii) OPS; and,
 - (iv) Any other applicable Reference Documents.

1.4 Acceptable Products

- (a) DB Co shall use products and proprietary systems on the Highway Works which meet applicable Project Agreement requirements and shall be in accordance with the Designated Sources of Materials List. Without limiting Section 11.20 of the Project Agreement, the use of products that are not on the Designated Sources of Materials List requires the prior written approval of the City, in its sole discretion, and acceptance shall be subject to DB Co demonstrating in its submission sufficient knowledge, understanding and experience with the proposed product and proprietary system and acceptable performance for the proposed product and proprietary systems under conditions and applications similar to those existing for this Project.

1.5 Reference Concept

- (a) Any use by DB Co of any or all aspects of the Reference Concept or Preliminary Design Report in performing the Highway Works shall be entirely at DB Co's own risk. Use of the Preliminary Design Report as a basis for DB Co's design for any part of the Highway Works does not constitute City's acceptance of DB Co's design, unless use of the Preliminary Design Report is specifically required under the Project Agreement.

1.6 Definitions

- (a) Capitalized terms used in this Schedule 15-2, Part 9, including all Appendices hereto, are defined in the following and/or in Schedule 1 - Definitions and Interpretations of the Project Agreement and/or in Schedule 15-1 – Technical Terms and Reference Documents. In the event of conflict between terms defined in this Schedule 15-2, Part 9 and Schedule 15-1 and/or Schedule 1, the definitions in this Part 9 shall govern.

AASHTOWare means the enterprise AASHTOWare Pavement ME Design software suite designed by transportation professionals to help transportation professionals comply with AASHTO standards.

Acceptable Products means the products that meet the Project requirements as described in Clause 1.4 of Part A of Schedule 15-2, Part 9.

Accurate means the information provided is a true representation of an actual situation, accomplishment or occurrence.

Address or Addressed means the initiation of an activity that will reduce or remove a condition or Construction Defect.

Advance Notification refers to an **Advance Notification Sign**. It is a temporary sign (a version of a TC-64, 4'X 8', static sign) which message is temporal or time-oriented in nature. It aims to create awareness of a future work activity before the time (usually 7-14 days in advance) that it occurs in order to forewarn of future work activities liable to impact upon traffic operations and to effectively communicate the location, time, duration, extent and potential impact of the future work activity. It should provide information to motorists for route selection and travel planning.

Advance Warning refers to an **Advance Warning Sign**. It is a temporary sign (a version of a TC-64, 4'X 8', static sign) which message is situational or location-oriented in nature. It aims to create awareness of an ongoing work activity during the time that it occurs in order to warn of ongoing work activities that impact upon traffic operations, and therefore it needs to be located in advance of potential queues and to effectively communicate the location, time, duration, extent and potential impact of the ongoing work activity. It should provide information to motorists for route selection using a formal, signed detour route or an informal, un-signed alternative route.

Advanced Traffic Controller or ATC means an expandable, flexible, microprocessor-based traffic controller designed to run the owner's application software, which has been developed for the Intel x86 family of microprocessors, running QNX 6.3 real-time operating system.

Advanced Traffic Management System or ATMS means a system or series of systems that encompass a broad range of wireless and wire line communications-based information and electronics technologies integrated into the transportation system's infrastructure, and into vehicles themselves, to develop and improve transportation systems.

Arc Flash Study Report has the meaning given in Clause 6.3 of Part B of this Schedule 15-2, Part 9.

Ball Bank Indicator Report has the meaning given in Clause 2.3(b) of Part B of this Schedule 15-2, Part 9.

Barrier means physical barriers set along the road, including cable guide rail, steel beam guide rail, temporary and permanent concrete barriers, safety items such as energy-attenuating systems and crash cushions, box beams and anti-glare screens, which are intended to provide additional protection to motorists when vehicles leave the Roadway, that protect vehicle occupants from a more severe hazard and thereby reduce the degree of injury and damage.

Bearing means the superstructure support elements between the Bridge seats and the Bridge superstructure composed of steel, rubber or other materials and separated into two general categories as follows:

- (a) Fixed, allowing only rotational movements; and,
- (b) Expansion, allowing longitudinal as well as rotational movements, referring to drawings for specific Bridges.

Bikeways Design Manual means the Ontario Bikeways Planning and Design Guideline, as published by MTO.

Bluetooth Reader has the meaning given in Clause 11.3(f)(i) of Part B of this Schedule 15-2, Part 9.

Bluetooth Server has the meaning given in Clause 11.3(f)(ii) of Part B of this Schedule 15-2, Part 9.

Bluetooth Travel Time Monitoring Service has the meaning given in Clause 11.3(g)(i) of Part B of this Schedule 15-2, Part 9.

Borrow means earth or rock material acquired from outside of the right of way to complete the Works.

Bridge Deck means the structural element under the Deck wearing surface system that transfers loads from the Deck surface to the Bridge's superstructure or substructure components.

Bridge Deck Drainage means a system designed to remove water from the Deck as completely and quickly as possible and to discharge the runoff harmlessly.

Bridge Surface means the wearing surface used by vehicles, pedestrians, cyclists and others to travel over a Structure and includes curbs and gutters and approach slabs.

Bullnose means the location where the edge of a highway and the edge of ramp meet each other. Bullnose geometry is defined in the Geometric Design Standards for Ontario Highways (MTO) Figures FA-1 to FA-7.

Catch Basin means a drainage structure that collects stormwater surface runoff and transports it into a Culvert or storm sewer system. They may be located in paved areas or unpaved drainage ditches.

CCTV System/Subsystem means a video surveillance system/subsystem used to monitor Roadway conditions.

Certificate of Authorization has the meaning given in the Ontario *Professional Engineers Act*, R.R.O. 1990, c. P.28, as amended from time to time.

CHBDC means Canadian Highway Bridge Design Code (CHBDC) CAN/CSA-S6.

Checking Team has the meaning given in Clause 4.2(b)(i) of Part B of Schedule 15-2, Part 9.

Chromaticity means the colour of the line by reference to Commission Internationale de l'Eclairage (CIE) chromaticity diagram to define the area within which the colour must fall, as measured in accordance with ASTM E-1347.

Clearance Certificate means a form that demonstrates registration with and the existence of an account in good standing with the Workplace Safety and Insurance Board of Ontario.

Closure means any partial or total closure, obstruction, blockage or other restriction or interference (howsoever arising) impeding the flow of traffic on or affecting the ability of the public to pass and re-pass over a traffic lane of whatever duration including, without limitation, any such partial or total closure, obstruction, blockage, restriction or interference:

- (a) That is effected by DB Co;
- (b) That is required for any works by a Governmental Authority or for any inspection, investigation or survey (whether carried out by DB Co, City, any other Governmental Authority or any other person);
- (c) That results from an Incident or a vehicle breakdown;
- (d) That is effected by an Emergency Service Provider;
- (e) That materially affects the ability of Highway users to use that traffic lane in a safe manner due to the build-up of snow, ice or water resulting from a failure to meet the requirements defined in the Output Specifications; or,
- (f) From any other natural event physically affecting the Roads.

For purposes of this definition, traffic congestion or slowing of the flow of traffic in a traffic lane or traffic lanes within the Roads will not by itself be considered to be a Closure (including where the same results from speed restrictions properly imposed from time to time as a direct result of adverse weather conditions or seasonal restrictions for the time being affecting the Roads, but excluding where the standard of construction and/or condition of the Roads has contributed to the need for such speed restrictions).

Closure Notification Number means a reference number provided by OTOC to identify Road Closures in respect of pre-approved Road Closures.

Communications System/Subsystem means the system or subsystem used to interconnect the various ATMS devices (VMS, CCTV, VDS, etc.) with the OTOC. It can be wireless and/or wire-line, as applicable.

COMPASS means the centralized software and hardware that controls and monitors remote ATMS devices and that is used to reduce travel delay and travel time uncertainty, to enhance safety, to improve incident response and to improve traffic flow.

Complete means that all required services and relevant information has been provided.

Concrete Barrier, Temporary and Permanent means pre-cast and cast-in-place concrete barrier walls in the median and edge of pavement; commonly installed in highway medians to separate traffic.

Context Sensitive Design or CSD means a series of concept design recommendation (Context Sensitive Design (CSD) to promote a consistent treatment of the major elements of the Queensway infrastructure such as Bridges, Retaining Walls, Noise Barriers, landscaping and architectural lighting.

Context Sensitive Design Concept has the meaning given in Appendix F of this Schedule 15-2, Part 9.

Continuous Illumination means a lighting system on an essentially straight and linear section of Roadway designed to provide a specific lighting level and uniformity of light over the traveled portion of the Roadway.

Council Resolution means a resolution passed by a municipal council under the *Municipal Act, 2001* (Ontario).

Counting Stations and Loops means a system consisting of electronic detecting and recording units installed at the side of the Roadway and connected to actuation devices, such as loop detectors, imbedded in the Roadway Pavement to measure traffic volumes, speeds and axle counts.

Crossing Road has the meaning given in Clause 4.1 of Part C of this Schedule 15-2, Part 9.

Culvert means a drainage structure designed to allow the passage of surface water, livestock or pedestrians under a roadway, railway or roadside entrance. For the purposes of these

Performance Requirements, culverts are less than three metre span and may be a concrete Culvert, corrugated steel Culvert (CSP), timber Culvert or plastic Culvert.

Data Room means the secure website established by City for the Project prior to the date of this Project Agreement containing or referring to materials, documents, information and data in respect of the Project.

Debris means objectionable items including damaged City/MTO inventory, sand, gravel, roadside garbage, litter, dead animals, unlawful signs, fallen trees, loose brush and fallen rocks.

Deck means the portion of an Bridge that supports the highway, from the top of the major structural members to the wearing surface, and is designed to distribute loads evenly across the Bridge.

Deck Area means the plan area of a bridge Deck: Total length (centre-line of bearing to centre-line of bearing x width (outside of barrier to outside of barrier).

Demolition, Removals, and Disposal Plan has the meaning given in Clause 12.1 of Part B of Schedule 15-2, Part 9.

Design Bulletins or Highway Design Bulletins or Bridge Office Memo's mean updated interim recommendations, directives and/or policies on select Highway design subjects.

Design Integration means a coordination process undertaken by DB Co to consider and ensure that all necessary disciplines (e.g. roadway, traffic, geotechnical/foundations, drainage, structural, environmental, etc.) that have an impact or may be impacted by a design have reviewed the design and have had their input incorporated and coordinated to ensure completeness of the design.

Design Life means the period of time specified by the Owner during which an asset is intended to remain in service.

Design Manager means the manager of the Design Team.

Design Safety Review means design safety reviews that are to be carried out in accordance with Article 10 of Part B of Schedule 15-2, Part 9.

Designated Construction Zone means one or more highway work zones located on or near the Roadway. A Designated Construction Zone must be designated through a Designation of Construction Zone and signed in order to have enforceable maximum speed limits.

Designated Sources of Materials List or DSM means materials and sources of materials that have been approved by MTO for use on an MTO construction contract.

Designation of Construction Zone means the Designation of Construction Zone Form PH-M-101, to be prepared and submitted by DB Co to MTO and through which an official of MTO may, by signing the Designation of Construction Zone Form, designate part of a King's Highway

as a Designated Construction Zone, thereby authorizing the posting of a lower regulatory rate of speed than is otherwise provided through the existing regulatory speed limit.

Detour Route means a route that takes traffic off of the regular route and, using existing or newly made temporary Roadways within the work zone, guides traffic around the work zone.

Ditch means an open drainage facility constructed to carry water to an outlet.

Diversions means traffic diversions by means of a lane shift or an on-site Detour Route.

Drainage and Stormwater Management Report has the meaning given in Clause 7.2 of Part B of this Schedule 15-2, Part 9.

Drop-off means the drop from the surface of the edge of asphalt pavement or concrete pavement to the gravel Shoulder as measured vertically from the underside of a 1.3 m rigid straight edge, placed on the asphalt pavement or concrete pavement and on the gravel Shoulder, to the deepest portion of the rut.

Durability means the percentage of marking remaining on the Roadway, as assessed in accordance with the MTO Durability Classification Guidelines.

EB means eastbound.

Electrical Safety Authority means the Electrical Safety Authority of Ontario.

Electrical System/Subsystem means the system composed of all infrastructure for electrical work relating to the Highway Works.

Emergency Repairs means any activity required to bring the Subsystem to full functionality in accordance with the specifications other than routine maintenance activities.

Enhanced Grading means the implementation of landscape berms to blend the extension with adjacent landscapes.

Engineer means a professional engineer licensed by the Professional Engineers of Ontario to practice in the Province of Ontario.

Engineer's Report means an Engineer's report containing the information specified in Section 8 of the *Drainage Act* (Ontario)

Environmental Approvals has the meaning given in Schedule 17 – Environmental Obligations.

Equipment means all machinery and equipment used for preparing, fabricating, conveying or erecting the Works and normally referred to as construction and maintenance machinery and equipment.

Explicit Safety Analysis has the meaning given in Clause 1.7 of Part B of this Schedule 15-2, Part 9.

Flasher Beacons means electrically operated warning devices that intermittently flash a red or amber light.

Flexible Pavement means Pavement consisting of asphalt concrete layers on supporting courses such as granular base and granular sub base, placed over the sub grade.

Floodplain Mapping means mapping approved by the Ministry of Natural Resources or local Conservation Authority that illustrates the limits of flooding associated with the Regulatory Storm.

Friction means the force that resists the relative motion between a vehicle tire and a pavement surface and is measured according to the MTO Friction Testing and Reporting Format, October 2009.

Friday Night has the meaning given in Clause 11.3(l)(iii) of Part B of Schedule 15-2, Part 9.

Full Closure means a Closure affecting all of the lanes in one or both travelling directions within the Roads.

Full Depth Paved Shoulder means Shoulder pavement depth that is designed to accommodate detour traffic for a period of one year minimum.

Full Illumination means a consistent lighting system covering a defined area such as an interchange or intersection, designed to provide a specific lighting level and uniformity of light over the traveled portion of the Roadway.

General Arrangement Drawing has the meaning given in Clause 4.4(b)(iii) of Part B of this Schedule 15-2, Part 9.

Geotechnical Report has the meaning given in Clause 5.11 of Part B of this Schedule 15-2, Part 9.

Granular Base means a set of requirements for dense graded aggregates intended for use as granular base within the Pavement structure, granular shouldering and backfill.

Granular Subbase means a set of requirements for well-graded aggregates intended for use as granular subbase within the Pavement structure and granular backfill. Granular B shall be Type II.

Granular Material means coarse-grained soils from which base and subbase aggregates can be produced.

Handrail means the rail mounted on top of the barrier or Parapet Wall, and all associated hardware to secure it to the wall.

Haul Route Plan has the meaning given in Clause 13.1 of Part B of this Schedule 15-2, Part 9.

Hazard(s) or Hazardous means a condition or Defect within the Highway Works causing an unsafe condition to the Highway users.

High Mast Lighting means illumination of a large area by means of a group of luminaires that are designed to be mounted in fixed orientation at the top of a high mast, generally 20 metres (65 feet) or higher.

Highway means a common and public thoroughfare any part of which is intended for or used by the general public for the passage of vehicles and includes the area between the lateral property lines thereof. This includes a street, bridge and any other structure incidental thereto and any part thereof.

Highway Emergency Traffic Plan has the meaning given in Clause 5.2(b) of Part C of Schedule 15-2, Part 9.

Highway Erosion and Sediment Control Plan has the meaning given in Clause 7.4 of Part B of this Schedule 15-2, Part 9.

Highway Lighting System means a system of luminaires, poles, sign luminaires, Underpass illumination, navigation lighting, cables, power supply equipment, control system and all associated materials required to provide illumination on a Highway or associated appurtenances.

Highway Traffic and Transit Management Communications Plan has the meaning given in Clause 5.2(g) of Part C of Schedule 15-2, Part 9.

Highway Traffic and Transit Management Plan or Highway TTMP means the plan to be prepared, submitted and implemented by DB Co in accordance with Clause 5 of Part C of Schedule 15-2, Part 9.

Highway Traffic Control Plan(s) or Highway TCP means the sub-plan or sub-plans of the Highway Traffic and Transit Management Plan prepared by the DB Co in accordance with Clause 5.2(a) of Part C of Schedule 15-2, Part 9.

Highway Traffic Incident Management Plan has the meaning given in Clause 5.2(c) of Part C of Schedule 15-2, Part 9.

Highway Traffic Management Implementation Plan or Highway TMIP means the sub-plan of the Highway Traffic and Transit Management Plan described in Clause 5.2(d) of Part C of Schedule 15-2, Part 9.

Highway Traffic Monitoring Plan has the meaning given in Clause 5.2(h) of Part C of Schedule 15-2, Part 9.

Highway Traffic Risk Assessment Plan means the sub-plan of the Highway Traffic and Transit Management Plan described in Clause 5.2(f) of Part C of Schedule 15-2, Part 9.

Highway Works Manager means the representative of the Lead Design Engineer on the Design Team.

Highway Works Traffic Management Communications Plan has the meaning given in Clause 1.13 of Part C of this Schedule 15-2, Part 9.

Holiday has the meaning given in Clause 1.4 of Part C of Schedule 15-2, Part 9.

Incident means events including traffic accidents, emergency situations, spills (Hazardous and non-Hazardous), flooding, Water Ponding, Highway deficiencies, Debris, and tree removal or other incidents off the ROW, which affect the Highway.

Incident Response Equipment (Freeway) means, at a minimum, a Crash Truck as defined in OTM Book 7 with operator and a vehicle with operator responding together with emergency response equipment including, but not limited to the following: a cutting torch, concrete saw, hand shovels, brooms, camera and film or digital camera, pick axe, chain saw, bolt cutters and other hand tools, emergency flares, cellular phone, sand or absorbent material for minor spills and traffic control equipment including cones, TC-54s and markers.

Incident Site means the location within the Highway Corridor Lands where an Incident has occurred and Response is required.

Independent Checking Team means a separate or independent design team of Professional Engineers engaged to conduct design checks, and are independent from the company of the design team performing the original design without any conflicts of interest.

Information Signage means signs that are used for directing motorists; identifying intersecting routes; identifying geographical locations and distances; and directing motorists to towns, cities, and other important destinations.

Integrated Management Plan has the meaning given in Schedule 11 - Integrated Management System.

Intelligent Transportation Systems or ITS has the same meaning as Advanced Traffic Management System.

Interconnection means a communication link between traffic signal controllers at adjacent intersections to optimize traffic flow by adjusting phasing and timing sequence in response to varying offset.

International Roughness Index or IRI means the measure of the Pavement smoothness based on the longitudinal profile of the Pavement surface as defined in the World Bank Paper 46.

Invasive Species or Invasive Exotics means plant species whose introduction or spread negatively impacts upon native biodiversity, the economy and/or society, including human health. Invasive plant species may out-compete desirable native plant species, destroy wildlife habitat and overtake landscape plantings and natural areas. Examples of invasive plant species include Phragmites, dog strangling vine, and giant hogweed.

Landscape Design Element(s) means an individual component which make up the designed landscape (i.e. stormwater management facility, visual screen, landscape berm).

Landscape Plan means design drawings, presentation graphics, specifications and narrative that cover all aspects of the landscape design to be prepared, submitted and implemented by DB Co in accordance with Article 9 of Part B of Schedule 15-2, Part 9.

Landscape Screening means a combination of one or more screening methods (sound barrier, vegetation, berming, fence), depending on the Site characteristics and safety and engineering requirements.

Lane Closure means any Closure affecting a lane or lanes (including ramps), but excludes a Full Closure.

Lead Design Engineer means the DB Co Party within the Design Team that is responsible for leading the overall design of the Highway Works.

LiDAR means Light Detection and Ranging.

Linear Highway Referencing System or LHRS means a link/node referencing system that is used to locate road sections and points on the Ontario Highway Network. Each Highway is divided into consecutive sections that have unique reference numbers assigned in ascending order. The starting point of any section is defined as the point where two Highways intersect, any other suitable points such as county/regional road intersections, structures and railway grade crossings and interchanges.

Light Trespass means the effects of light that strays from the intended purpose and becomes an annoyance, a nuisance, or a detriment to visual performance. As such, light trespass should always be considered negative, unlike spill light, which can have positive or negative attributes.

Lightweight Fill means a fill material with a unit weight less than conventional soil or rock fill. Examples include EPS (expanded polystyrene), blast furnace slag, cellular concrete, tire chips/shreds, saw dust/wood chips and expanded clay.

LLF means light loss factor.

Luminance means the luminous flux in a light ray emanating from a surface or falling on a surface in a given direction per unit of projected area of the surface viewed from that direction per unit of solid angle (reflective light) as measured in accordance with ASTM E-1347.

Made Aware means when DB Co has been advised by any party or upon detection.

Main Line means the freeway within the Highway Corridor Lands located:

- a. In a north-south direction that consists of the existing Highway 416 from south of Hunt Club Road to Highway 417, including all associated widened and improved infrastructure; and,
- b. In an east-west direction that consists of the existing Highway 417 from east of Maitland Avenue to west of Moodie Drive, including all associated widened and improved infrastructure.

Maintenance Operations means the activities performed to maintain the Highway in a safe and passable condition, to prolong the life of the asset, and other activities prescribed in Appendix G.

Material(s) means material and fixtures forming part of the infrastructure relating to Highway Works.

Ministry Directives means the official method of disseminating policy within the Ministry of Transportation Ontario.

Modular Expansion Joints means prefabricated deck joints consisting of multiple joint openings filled with seals.

MOE Notice of Approval has the meaning given in Schedule 17 – Environmental Obligations.

MOL means the Ministry of Labour (Ontario).

Moving of Utility has the meaning given in the Utility Relocation Guidelines (MTO), January 28, 2010.

MTO General Conditions of Contract means OPSS PROV 100.

MTOD means Ministry of Transportation Ontario Drawing.

MTO RAQS means the MTO Registry, Appraisal and Qualification System.

MTO Technical Manuals means manuals, guides, guidelines or standards published by MTO and listed in the Reference Documents.

Municipal Roadways means those Roads listed in Clause 4.1(a)(ii) of Part C of Schedule 15-2, Part 9.

NB means northbound.

Noise Barrier means a barrier designed to attenuate noise generated by vehicles traveling on a Highway.

Non-Structural Culvert means any Culvert that has a span of less than three metres.

NSSP means the Non Standard Special Provision, as published by MTO.

Office Space has the meaning given in Clause 6.1(a) of Part A of Schedule 15-2, Part 9.

Openness Ratio means the ratio of a Culvert's cross-sectional area divided by its length.

OPS means the Ontario Provincial Standards for Roads and Public Works.

OSIM means the Ontario Structure Inspection Manual, as published by MTO.

Other Affected Municipal Roadways means Roads affected by the Highway Works or Roads within the Highway Corridor Lands that are not Existing Provincial Highways, or Existing Municipal Roadways.

Ottawa Traffic Operations Centre (OTOC) means the MTO's traffic operations centre (TOC) for coordinated highway management systems. It is at this TOC that the data from the highway system is collected and processed, fused with other operational and control data, synthesized to produce "information", and distributed to stakeholders such as the media, other agencies, and the traveling public.

Overhead Sign Support Structure means a permanent structure with a Foundation used to support an over-head sign over a Roadway.

Overpass means a grade separated Structure carrying a Highway over a road, a Highway, a railway or a watercourse.

Parapet Wall means a barrier fastened to the edge of a Bridge Deck to prevent vehicles or other road users from running over the side of the Bridge.

Pavement means all structural elements or layers above the subgrade of a road, including granular driving surfaces and Shoulders.

Pavement Condition means the condition of the Pavement based on roughness and distresses.

Pavement Design Report has the meaning given in Clause 3.2 of Part B of this Schedule 15-2, Part 9.

Pavement Markings means directional dividing lines, lane lines, edge lines, transitional and continuity lines, interchange ramps and channelization lines, barrier lines, intersection markings, reserved facility markings and parking markings, including words, letters and symbols on Pavements, used to delineate vehicle operating limits on Highways conforming to the size and shape as specified in OTM Book 11.

Permanent Pavement Marking Plan has the meaning given in Clause 8.6(a) of Part B of Schedule 15-2, Part 9.

Permanent Signing Plan has the meaning given in Clause 8.4(e) of Part B of Schedule 15-2, Part 9.

Permanent Signing Table has the meaning given in Clause 8.4(e) of Part B of Schedule 15-2, Part 9.

Permitted Periods for Closures means the periods during which DB Co may implement Closures, Full Closures, Detour Routes, Lane Shifts and Diversions in respect of the various Roads, as set forth in Part C of Schedule 15-2, Part 9.

PIT Test Plan has the meaning given in Clause 11.3(m) of Part B of this Schedule 15-2, Part 9.

Poor Weather means any weather situation at any time of year, which requires DB Co to perform Maintenance Operations to Address the weather or the resulting impacts, including high winds and heavy rains.

Pothole means dents or hollow depressions in the Roadway surface.

Preliminary Design Report or PDR means the preliminary design report associated with [REDACTED], and any updates or any additional design to the above as shown on preliminary design drawings from the MTO designer. The PDR forms part of the Reference Concept.

Preliminary Lighting Design has the meaning given in Clause 6.4 of Part B of this Schedule 15-2, Part 9.

Priority Basis means completing the work in order of importance with respect to the public's safety.

Provincial Highways means those Highways listed in Clause 4.1(a)(i) of Part C of Schedule 15-2, Part 9.

Portable Variable Message Sign or PVMS means a Variable Message Sign that may be moved from place to place to provide drivers with information on conditions, usually work zone conditions, at the time and place where needed.

Preventative Maintenance means the proactive care and servicing by DB Co for the purpose of maintaining the New MTO Infrastructure and New Municipal Infrastructure in satisfactory operating condition by providing for systematic inspection, detection and correction of incipient failures either before they occur or before they develop into major Defects.

Professional Engineer means an engineer licensed by Professional Engineers Ontario to practice in the Province of Ontario.

Qualified Person or Qualified Personnel means staff having the licences, training and experience appropriate for the equipment or facilities they are working on.

Rapid Bridge Replacement (RBR) means replacement of the existing structure with an on-site constructed structure using SPMT's in the same location.

Registry, Appraisal and Qualifications System or RAQS means a system used by MTO for the registration, appraisal, and qualification of contractors and consultants for contracts with MTO.

Regulatory Sign means a sign that informs Highway users of traffic laws or regulations and indicates the legal requirements that would otherwise not be apparent, such as "stop" and "speed limit" signs.

Regulatory Storm means a design flow adopted by the Ministry of Natural Resources for floodplain management purposes. Figure 1 in the MTO Drainage Design Standards (January 2008) illustrates the three Flood Hazard Zones in Ontario. Depending on the zone, the

Regulatory Storm is either the 100-year flow or the greater of the 100-year design flow and the peak generated by the regional storm (Timmins Storm or Hurricane Hazel).

Response means the arrival of appropriate qualified staff and an appropriate amount of material and equipment to the Site of an Incident or situation requiring attention.

Restricted Period(s) means those periods of time, as set out in Part C of Schedule 15-2, Part 9, during any Construction Activity for an identified location within the work zone during which there are restrictions on DB Co's available traffic management measures.

Retained Soil System or RSS means a proprietary system that uses mechanical soil stabilization to retain horizontal loads in excess of 2 m in height for applications, such as true and false abutment structures, Retaining Walls and steep slopes, or to retain vertical loads for applications, such as embankments over soft ground.

Retaining Wall means a structure that holds back soils and is not a wingwall connected to a Bridge or Culvert.

Road Safety Audit means an audit carried out in accordance with Article 10 of Part B of Schedule 15-2, Part.

Road Safety Audit Certificate has the meaning given in Clause 10.8(a) of Part B of Schedule 15-2, Part 9.

Road Safety Audit Report has the meaning given in Clause 10.6(b) of Part B of this Schedule 15-2, Part 9.

Road Safety Audit Team means the team engaged by DB Co to undertake the Road Safety Audit.

Roads means, at any time, the Provincial Highways, Municipal Roadways, ramps and all other roads and Highways, including Shoulders, forming part of the Highway Works at that time.

Roadside means the area between the outside edge of the Shoulder rounding and the ROW limits and features within the Roadway that do not form an integral part of the driving surface, such as drainage features and guiderails.

Roadside Landscape(s) means geometrically strong plantings and structural elements that provide a green, aesthetic driving experience for users of Highway 417.

Roadway means that part of the Highway designed or intended for use by vehicular traffic and includes the Shoulders.

SB means southbound.

Select Subgrade Materials (SSM) means a set of requirements in accordance with OPSS 1010 for well-graded non-plastic aggregates used to replace poor subgrade materials and as swamp backfill.

Service Life means the period of time during which the structural component safely performs its design function without significant repairs, rehabilitation or replacement.

Shop Drawings means drawings that are prepared by DB Co and/or DB Co Parties based on the Construction Document Submittals for the detailing or further resolution of the assembly or execution aspects of the Highway Works.

Shoulder means that portion of the Roadway between the edge of the travelled surface and the top inside edge of the ditch or fill slope.

Side Clearance means that portion of the Roadway between the edge of the travelled surface and the edge of the adjacent curb or Barrier on a Structure.

Sign means, for the purposes of the Output Specifications, a lettered board, message or other display that includes all regulatory, warning, guide or informational, advisory, construction and maintenance, route markers and all special or other messages/displays under provincial jurisdiction as defined by MTO but excludes electronically controlled messages/displays, but includes the sign face overlay.

Significant and Complex Structures means Structures, including but not limited to the following:

- (a) Single span bridges of spans greater than 60 m;
- (b) Multi-span bridges of span(s) greater than 60 m or where the overall length of the bridge is more than 250 m;
- (c) Bridges which cannot be analysed by the Simplified Method of Analysis as CAN/CSA-S6-14 Clause 5.7 and that need to be analysed using refined methods of analysis as per CAN/CSA-S6-14 Clause 5.9 and Clause 5.10;
- (d) Curved bridges that exceeds the criteria of CAN/CSA-S6-14 A5.1.3.2 where dead and live loads twisting moments and associated effects of torsional and distortional warping need to be considered;
- (e) Bridges with complex boundary conditions, articulation and idealization;
- (f) Tunnels;
- (g) Bridges built in locations with complex Foundation conditions;

Sign Truss means a truss used as part of overhead static sign support structures.

Simplified Methods of Analysis means the method of analysis referred to as 'Simplified Methods of Analysis' in CAN/CSA-S6-14, Section 5.

SPMT's means Self-Propelled Modular Transporters.

Stage 1 Road Safety Audit means a Pre-Final Design Road Safety Audit as described in Clause 10.6(c)(i) of Part B of Schedule 15-2, Part 9.

Stage 2 Road Safety Audit means a Final Design Road Safety Audit as described in Clause 10.6(c)(ii) of Part B of Schedule 15-2, Part 9.

Stage 3a Road Safety Audit means a Temporary Traffic Control On-Site Road Safety Audit as described in Clause 10.6(c)(iii) of Part B of Schedule 15-2, Part 9.

Stage 3b Road Safety Audit means a Construction Road Safety Audit as described in Clause 10.6(c)(iv) of Part B of Schedule 15-2, Part 9.

Stage 4 Road Safety Audit means a Post Construction Road Safety Audit as described in Clause 10.6(c)(v) of Part B of Schedule 15-2, Part 9.

Structural Culvert means (i) a structure that forms an opening through soil with a span greater than or equal to 3 metres; (ii) Multi-cell culverts separated by a structural wall, with the total of the individual spans greater than or equal to 3 metres; and (iii) Multi-cell culverts separated by fill, the maximum fill spacing must be one times the minimum span of the individual cells, and the minimum individual cell span must be 2 metres. The total span is the total of the spans of the individual cells.

Structural Manual means the Structural Manual, as published by MTO.

Structure means any Bridge, Tunnel, Structural Culvert, Retaining Wall or Overhead Sign Support Structure.

Structure Rehabilitation means a modification, alteration or improvement to the existing condition of a Structure or Bridge subsystem that is designed to correct deficiencies for a particular design life or live load level.

Structure Survey Report has the meaning given in Clause 4.3(c) of Part B of this Schedule 15-2, Part 9.

Substructure means abutments, piers, their Foundations and protective works that form the Bridge substructure supporting the Superstructure above.

Subsystem means a grouping of like components with similar functionality and for the purposes of the Output Specifications, includes the following subsystems: CCTV, VMS, PVMS, VDS and communications. These are also referred to as Systems. These include structures (if applicable), electronic display elements (if applicable), controllers (if applicable), cabinets, electronic equipment and all other mechanisms and equipment.

Superpave means a hot mixed asphalt pavement technology designed and constructed in accordance with OPSS PROV 1151.

Superstructure means an upward extension of an existing Structure above a baseline.

System Integration Plan has the meaning given in Clause 11.3(m) of Part B of this Schedule 15-2, Part 9.

Temporary Pavement Marking Plan means the Pavement Marking plan to be prepared, submitted and implemented by DB Co in accordance with Clause 8.5(a) of Part B of Schedule 15-2, Part 9.

Temporary Signing Plan has the meaning given in Clause 8.3(c) of Part C of Schedule 15-2, Part 9.

Temporary Signing Table has the meaning given in Clause 8.3(c) of Part C of Schedule 15-2, Part 9.

Temporary Highway Works means Works that are performed to serve a specific temporary function in the execution of the Highway Works and in respect of which any resulting infrastructure is removed at such time when its temporary use is no longer required.

Temporary Works means Works that are performed to serve a specific temporary function in the execution of the Works and in respect of which any resulting infrastructure is removed at such time when its temporary use is no longer required.

Timely means that all required information is provided within the prescribed timeframe or, if not prescribed, a commercially reasonable timeframe.

Highway Traffic Advisory Temporary Signage Plan has the meaning given in Clause 5.2(e) of Part C of Schedule 15-2, Part 9.

Traffic Analysis Report has the meaning given in Clause 1.4 of Part B of Schedule 15-2, Part 9.

Traffic Control means the placement or erection of Signs, signals, Pavement Markings or other installations, and the use of flaggers and other personnel, for the purpose of regulating, warning or guiding traffic.

Traffic Control Device(s) or TCD is a term used to describe any person, Sign, signal, marking or device placed upon, over or adjacent to a roadway by or at the direction of a Relevant Authority or their designate, for the purpose of regulating, warning, guiding or informing a vehicle operator or pedestrian of an existing condition or hazard.

Traffic Control Supervisor or TCS means a person appointed by DB Co in accordance with Clause 5.3 (d) of Part C of Schedule 15-2, Part 9.

Traffic Engineer means the person appointed by DB Co in accordance with Clause 5.3 (c) of Part C of Schedule 15-2, Part 9.

Traffic Management Study has the meaning given in Clause 1.2(g) of Part C of this Schedule 15-2, Part 9.

Traffic Manager means the person appointed by DB Co in accordance with Clause 5.3 (b) of Part C of Schedule 15-2, Part 9.

Traffic Paint means a water-borne or organic solvent based paint specifically formulated for use in application of Pavement Markings.

Traffic Management Auditing has the meaning given in Schedule 11 – Integrated Management Systems.

Traffic Signal System means a system of traffic signal equipment, poles, traffic signal controllers, traffic signal actuation and interconnection equipment and all associated materials required to regulate vehicular and pedestrian traffic.

Underpass(es) means a grade separation (Bridge) in which the major road passes under an intersecting road or railway.

Variable Message Sign(s) or VMS means a system that includes sign structure, electronic display elements, sign case, photocell sensor, Variable Message Sign controller and all other mechanisms and equipment.

Vehicle Detector Stations/System/Subsystem or VDS means a system used to detect the presence of vehicles in one or more traffic lanes. Data is provided on speed, volume, occupancy and, frequently, classification of vehicles over timed intervals.

Warning Sign means a sign that indicates conditions on or adjacent to a Highway or street that are actually or potentially hazardous to traffic operations, such as a curve Sign.

Washout means the loss of aggregate, earth fill or any other type of soil from the edge of Pavement to the ROW limits.

Water Ponding means the collection of water on the travelled portion of the Highway.

WB means westbound.

Wildlife means animals such as fox, wolf or larger animals such as deer, elk, bear and moose and excludes smaller animals such as groundhogs, skunks, raccoons and domestic animals.

Winter Period means the period from December 1 in any calendar year, until April 14 the following calendar year, inclusive of these dates.

Winter Season Plan has the meaning given in Clause 1.14 of Part C of this Schedule 15-2, Part 9.

ARTICLE 2 DESIGN AND CONSTRUCTION

2.1 Responsibility for Design and Construction

- (a) DB Co shall be responsible for the design and construction of the Highway Works and all other Construction Activities, Highway DB Co Commissioning, and testing of the Highway Works, which shall be carried out in strict accordance with this Schedule 15-2, Part 9 and in such a manner as to comply with all applicable Project Agreement requirements.
- (b) DB Co shall implement a methodology to verify compliance of the construction with the Works Submittals. Tolerances for all work will be based on the requirements outlined in the Output Specifications. Changes made to the design during construction shall be dated, stamped and signed by the responsible Engineer from the Design Team and where applicable by a member of the Checking Team as per Clause 4.2 of Part B of this Schedule 15-2, Part 9 and submitted for review under Appendix B of Schedule 10 – Review Procedure.
- (c) DB Co shall ensure that the Construction Contractor has arrangements with the Design Team for the checking of the layout and verification of the specification, location, line grade and elevation of all as constructed works that is documented in the mark ups to As Built Drawings.
- (d) DB Co shall ensure that the materials incorporated into the Works meet the specified parameters. Materials that are not rejectable but do not meet the specified parameters may remain in place with a Construction Period Quality Failure applied in accordance with Schedule 21 and at the Construction Period Quality Failure Deduction detailed in Appendix I of this Schedule 15-2, Part 9.
- (e) DB Co shall ensure that at every stage of DB Co's design, and for all design that is submitted to the City in accordance with Appendix B of Schedule 10 – Review Procedure, that all necessary Design Integration has been undertaken prior to submission for City review.
- (f) MTO has developed a series of concept design recommendations (Context Sensitive Design) to promote a consistent treatment of the major elements of the freeway infrastructure such as Bridges, Retaining Walls, Noise Barriers, landscaping and architectural lighting. DB Co shall implement the applicable MTO CSD recommendations as per the Reference Documents indicated in Schedule 15-2, Part 9, Appendix F. DB Co shall employ the services of a professional with demonstrated experience in the implementation of CSD's as defined by FHWA. This individual shall be responsible to coordinate with the coordinating Engineers and the Design Team as necessary to ensure Design Integration requirements pertaining to CSD are met.
- (g) DB Co shall ensure that the Lead Design Engineer is engaged in all aspects of the development of the design and Design Integration through to Highway DB Co

Commissioning of the Project and acceptance and Highway DB Co Commissioning of the infrastructure. The Lead Design Engineer shall:

- (i) Have a Certificate of Authorization from the Professional Engineers Ontario;
- (ii) Be registered in the relevant Registry, Appraisal and Qualification System ("RAQS") certification for Highway Engineering (Multi-lane Arterial & Expressway - Major Reconstruction and/or Widening), Bridge Engineering (Design & Evaluation - Complex Structures (multi-span)) and other specialties as needed, and be directly and contractually responsible for coordinating the companies that are RAQS registered in other categories relevant to the Project including RAQS qualified individuals;
- (iii) Be represented on the Design Team by a lead individual, the Highway Works Manager, who is a Professional Engineer and possesses the qualifications specified in Schedule 9;
- (iv) Have the following minimum responsibilities:
 - A. Prepare and stamp engineering drawings and ensure stamping by the checking engineer for structural drawings;
 - B. Oversee the construction work as required to certify the work in the field is completed in accordance with the design;
 - C. Have adequate resources in the field with delegated responsibilities acting on behalf of the Lead Design Engineer to make certifications under the Professional Engineer's seal and signature, without qualification; and,
 - D. Review all As-built Drawings and Record Drawings, including shop drawings, and if there are material changes made between City's latest reviewed drawings with the As-built Drawings or Record Drawings, DB Co shall identify, justify, and provide supporting document through a revised submittal to City and describe how such material changes are compliant with the Project Agreement.
- (v) Appoint a coordinating Engineer(s). The coordinating Engineer role should be undertaken by different individuals, depending on the nature of work being undertaken, and the expertise required to carry out the responsibilities noted below. The coordinating Engineer shall:
 - A. Be satisfied that the Design Integration requirements have been met;
 - B. Communicate all Design Criteria to all respective disciplines;
 - C. Coordinate the various disciplines involved to ensure that the work as a whole substantially conforms to all applicable design and construction

- codes, guidelines, standards, and this Schedule 15-2 and the design performs as intended;
- D. Ensure that all documents within a particular engineering discipline are signed and sealed by the Professional Engineer taking responsibility for work within that discipline;
 - E. Become knowledgeable in any proprietary system, component or element that is not on the Designated Sources of Materials List or is being utilized for a purpose that differs from its original intended use as contemplated by DSM; ensure that such proprietary system, component or element is appropriately integrated; and ensure that the overall design will function as intended when that proprietary system, component or element is used;
 - F. Review all elements of a design that includes multiple disciplines, identify gaps and omissions in the design, and have those gaps and omissions rectified; and,
 - G. Apply a seal indicating that the work of the various disciplines has been coordinated.
- (h) DB Co shall prepare and submit for approval any necessary addenda to the MTO Design Criteria (as described in MTO Directive PHM-B-021) based on DB Co's design. The timing of these submissions is indicated in Schedule 10 – Review Procedure.
- (i) Where the new Confederation Line alignment and design requirements directly interface with the MTO's future Highway 417 widening as contemplated by the MTO's TESR, DB Co shall consider the interfaces and in particular the spacial constraints when protecting for the future MTO expansion. For certainty, where the Confederation Line infrastructure may preclude the MTO's future widening from both a design and constructability perspective, DB Co shall design and construct the New MTO Infrastructure within the Highway Corridor Lands as to eliminate the design and or construction conflict. DB Co shall provide the analysis of the interface between the LRT and future MTO infrastructure at PFDD, FDD and CDS of the Review Procedure, and where DB Co deems necessary to construct New MTO Infrastructure, DB Co shall submit to the City for MTO approval in accordance with Appendix B of Schedule 10 - Review Procedure.

2.2 Record Drawings and As Built Drawings

- (a) The Design Team shall track and document all changes from the IFC Drawings up to and including the preparation of the Record Drawings.
- (b) Design Team shall keep a record of the as-built condition and the reasons for any changes from the IFC documents including any necessary authorizations. Where the as-built condition deviates from the IFC documents but continues to meet the Output Specifications such that any changes fall within the design and specification tolerances and do not require engineering sign off by the responsible Engineer, the Design Team

shall ensure that drawings are marked up with the relevant information required to represent the as-built condition, highlighting the difference from the IFC documents. Before Highway DB Co Commissioning, the Design Team shall sign and seal the Record Drawings as required in Schedule 14 – Commissioning.

- (c) Where changes in the as-built condition mean that the constructed Highway Works would no longer meet the Output Specifications or would require further Design Data to demonstrate compliance with the Output Specification then the responsible Engineer shall revise the IFC documents and submit the Design Data as a Construction Document Submittal, in accordance to Appendix B of Schedule 10 – Review Procedure and shall be subject to the conditions of Clause 2.2 (a) and (b) in this Part A.

2.3 Post Construction Geospatial Data Collection

- (a) DB Co shall be responsible for the creation of geospatial data and inspection data as well as associated attribute information for each existing and newly installed drainage pipe within the limits of the Highway Works. Photographs shall be taken at every location. Inspections shall follow the MTO Eastern Region Culvert Condition Rating Guide as well as the MTO Drainage Asset Fields document.
- (b) The collection of geospatial data must be completed using a GPS device capable of achieving a horizontal positional accuracy of three metres or less. Coordinates shall record each invert and if necessary any bends or turns in the components alignment.
- (c) All spatial information must be coordinated horizontally to North American Datum 1983, using either the “NAD83 (Original)” or the “NAD83 (CSRS)” adjustment with a specified version, and supplied as 3-degree Modified Transverse Mercator (MTM) grid system co-ordinates.
- (d) All co-ordinate and attribute data shall be populated feature classes within a geodatabase suitable for integration into ESRI ArcGIS 10.4. An empty geodatabase set with all the necessary fields and domains will be provided by the City. There shall be a minimum of two feature classes delivered by DB Co:
 - (i) Culvert and Sewer Feature Class: This will be a line feature class with the asset attributes as defined below.
 - (ii) Culvert and Sewer Inspection Table: This is a table feature class with the specific information related to the inspection. Attributes are defined below.
- (e) Attribute Information:

DB Co shall collect attributes as defined below. Several of these will be supplied from the existing Eastern Region Drainage Inventory.

 - (i) Culvert and Sewer Feature Class:
 - A. Drainage Asset ID (DAID);

- B. Highway;
- C. Township;
- D. Location;
- E. Chainage;
- F. Pipe type;
- G. Pipe status;
- H. Material type;
- I. Pipe code;
- J. Diameter / span;
- K. Rise;
- L. Length;
- M. Cover depth;
- N. Construction year;
- O. Historic contracts (enter current contract);
- P. Inlet Structure ID (DAID of inlet CB/MH/DI, etc.);
- Q. Outlet Structure ID (DAID of outlet CB/MH/DI, etc.);
- R. Extensions (left, right, both, none);
- S. Notes;
- T. Upstream latitude;
- U. Upstream longitude;
- V. Downstream latitude;
- W. Downstream longitude;
- X. Source of spatial data;
- Y. Presence of animal grates;
- Z. Presence of end treatments; and

- AA. Presence of headwall / endwall / retaining wall.
- (ii) Inspection Table (Linked via DAID to Culvert and Sewer Feature Class):
 - A. Drainage Asset ID (DAID) – must match the DAID of pipe in the Culvert and Sewer Feature Class above;
 - B. Inspection date;
 - C. Evaluator (DB Co Party undertaking inspection)
 - D. Fish present at time of inspection;
 - E. Purpose of inspection (post-construction);
 - F. Barrel material rating;
 - G. Joint rating;
 - H. Shape rating;
 - I. Capacity rating;
 - J. Embankment rating;
 - K. Channel rating;
 - L. Roadway settling rating;
 - M. Scour/footings rating;
 - N. Head/endwall rating;
 - O. Recommended actions;
 - P. Beaver activity in area; and,
 - Q. Comments.
- (f) To ensure proper condition evaluation and worthwhile photos, GPS data collection and digital photos shall be completed with no ice / snow cover. A minimum of five digital photos of each location showing:
 - (i) The inlet and its surrounding environments;
 - (ii) The outlet and its surrounding environments;
 - (iii) Interior condition of the pipe from inlet end towards the middle;

- (iv) Interior condition of the pipe from outlet end towards the middle;
 - (v) Pavement condition directly above the pipe; and,
 - (vi) Any other pictures that help to demonstrate any unique aspects of the culvert.
- (g) All documents shall be placed into a digital folder with the following structure (a sample of the desired folder structure will be supplied by the City), and submitted to the City in accordance with Schedule 10 – Review Procedure:
- (i) Asset ID (e.g. CV-0417-001876).
 - A. Date of Inspection (e.g. 2018-09-18).

2.4 Shop Drawings

- (a) The Design Team shall review Shop Drawings and where no further comment is required shall treat Shop Drawings as IFC. Where the designer in the Design Team, who previously signed and sealed the drawings, is required to carry out further checking or design work in relation to the Shop Drawings the designer and a member of the Checking Team where applicable shall sign and seal the drawings and submit as Construction Document Submittal under Appendix B of Schedule 10 – Review Procedure.

2.5 Coordinate System

- (a) All Highway Works shall be designed and surveyed using the horizontal coordinate system MTM grid co-ordinate system, MTM Zone 9, NAD83 (original), metres, and the vertical datum CGVD28 – 1978 adjustment.
- (b) In addition to the project specific geodetic requirements, DB Co shall adhere to MTO survey requirements for New MTO Infrastructure and New Municipal Infrastructure which are as follows:
- (i) MTO Geodetic Reference System (“MTO CSRS GRS”):
 - A. Horizontal Datum: North American Datum of 1983, Canadian Spatial Reference System Version 6 (“**NAD83 CSRSv6**”), also referred to as “**NAD83 epoch 2010.0**”)
 - B. Vertical Datum: Canadian Geodetic Vertical Datum of 1928, 1978 adjustment (“CGVD28:78adj”); and,
 - C. Map projection: MTM, Zone 9.
 - (ii) MTO Geodetic Reference System (“**MTO ORG GRS**”):
 - A. Horizontal Datum: North American Datum of 1983, Original (“**NAD83 Original**”); and,

- B. Vertical Datum: Canadian Geodetic Vertical Datum of 1928, 1978 adjustment (“CGVD28:78adj”).

- (iii) Map projection: MTM, Zone 9.

2.6 Coordination with Ongoing Contracts

- (a) There will be adjacent Additional Works that will have impacts within the construction limits of the Highway Works and will require formal re-designation of the Designated Construction Zone limits. DB Co shall coordinate their Construction Activities with other construction work within and/or adjacent to the Highway Works to avoid performing work in the same Designated Construction Zone, or that may adversely affect operations of either party. DB Co is required to maintain a separate and distinct Designated Construction Zone for this Project at all times and shall ensure that separation by time, space or by physical barrier is maintained between the operations included in this Project and work within and/or adjacent to this Project by others. Any Designated Construction Zone adjustments made for the purpose of facilitating Lane Closures shall consider the requirements of OTM Book 7. No additional compensation shall be made for requirements associated with the adjustments to DB Co’s Designated Construction Zone.
- (b) DB Co is required to adjust all appropriate Project documentation to re-designate the Designated Construction Zone limits during the times when the adjacent projects require the use of DB Co’s Designated Construction Zone or part thereof. Revised Designated Construction Zone limits and Designation of Construction Zone shall be submitted to the City for approval in accordance with Schedule 10 – Review Procedure. DB Co shall not resume Construction Activities in any adjusted work zones until such time that the area has been re-established as the Designated Construction Zone for this Project.
- (c) DB Co shall identify on the Works Schedule and associated written narrative how the adjacent projects will be coordinated and staged with DB Co’s work.
- (d) DB Co shall coordinate with Third Party Contractors and Additional Contractors who may be performing Third Party Works or Additional Works which may connect, complement, interfere, or in any manner impact Highway Works. It is the responsibility of DB Co to work with these Third Party Contractors and Additional Contractors to fully coordinate interfaces and resolve any disputes or coordination problems that may arise, including, but not limited to, design and construction staging considerations. DB Co shall be responsible to be aware of and obtain information related to all Third Party Contractors and Additional Contractors and their projects.
- (e) For the purposes of establishing seniority of contractors with regards to coordination, DB Co shall retain seniority over Third Party Contractors or Additional Contractors whose works are initiated after the start of DB Co’s Construction Activities.
- (f) DB Co shall be aware of the following partial list of projects which may be undertaken within the Highway Corridor Lands prior to, concurrent with, or following Highway Works Construction Activities:

- (i) City of Ottawa Projects: Contact Senior Engineer, Infrastructure Projects, Design and Construction (Municipal) Branch (or the individual responsible for this function at the time). [REDACTED].
- (ii) MTO Contract 2017-4031. Contact MTO Contract Administrator (or the individual responsible for this function at the time). [REDACTED].
- (iii) GWP 4042-12-00 for ATMS work at the Highway 416 Hunt Club Road interchange. Contact MTO Planning and Design Office. [REDACTED].
- (iv) MTO projects: Contact MTO Planning and Design Office. [REDACTED].
- (v) [REDACTED] underground installation crossing Highway 417 at the Pinecrest Road interchange.
- (vi) [REDACTED] tower installation in the NW quadrant of the Woodroffe Avenue interchange.
- (vii) MTO planned electrical work on existing high mast poles in the vicinity of the Holly Acres Road interchange in 2019.
- (viii) GWP 4097-12-00, Crystal Beach Noise Barrier, Highway 417. Contact MTO Planning and Design Office. [REDACTED].

2.7 Graffiti Removal

- (a) Requirements shall be as per Appendix G to this Part 9.

2.8 Temporary Conditions and Access

- (a) Temporary conditions shall be removed/relocated prior to the Winter Period each year of construction. Refer to Clause 1.14 of Schedule 15-2, Part 9, Part C – Traffic Management and Construction Access.
- (b) DB Co shall adhere to the following:
 - (i) Maintain the security of all construction areas/routes with construction fence, including gates, to suit DB Co's operations;
 - (ii) All entrances into construction areas/routes shall be secured at all times outside of working hours;
 - (iii) Existing Utilities within the construction areas/routes are to be protected from any damage resulting from Construction Activities of or use of the construction staging area and/or construction access routes. It is DB Co's responsibility to locate and protect all Utilities within DB Co's construction areas and access routes;

- (iv) Removal of fencing/gates as necessary for deliveries and/or movement of equipment, preparation of access/egress for Closure events, shall be DB Co's responsibility;
- (v) All parking of DB Co vehicles, and storage of equipment and Materials shall be within the construction staging areas. At no time shall parking or storage of equipment and Materials be permitted on privately owned property if not required for on-going operations in the immediate area unless written permission from the property owner and the City has been provided; and,
- (vi) All areas where equipment is operated, Materials are stored and/or construction efforts have occurred shall be scarified as required prior to final site reinstatement.

2.9 Maintenance During Construction

- (a) Maintenance during construction shall be conducted by DB Co in accordance with Appendix G.

2.10 Checking

- (a) DB Co shall at its own cost and expense, engage a consultant to conduct activities as set forth in Clause 4.2 of Part B of this Schedule 15-2, Part 9 and in Appendix B of Schedule 10 – Review Procedure (the “Checking Team”).
- (b) The following expertise shall be included in the expertise of the Checking Team:
 - (i) Recognized expertise in:
 - A. The disciplines of highway, drainage, traffic, geotechnical, foundations, structural, electrical, ATMS engineering;
 - B. The analysis and design of all aspects of Significant and Complex Structures;
 - C. The use of state-of-the-art geotechnical, structural and soil-structure interaction modelling and software used for design and analysis of Foundations; and,
 - D. The review of designs to ensure compliance with all Applicable Law pertaining to the environment, and other environmental requirements.
 - (ii) Individuals who are registered or qualified to be registered as Professional Engineers in Ontario.
 - (iii) Be registered in the relevant Registry, Appraisal and Qualification System ("RAQS") certification for Highway Engineering (Multi-lane Arterial & Expressway - Major Reconstruction and/or Widening), Bridge Engineering

(Design & Evaluation - Complex Structures (multi-span)), and other specialties as needed.

2.11 Designated Construction Zone

- (a) Subject to Clause 2.6 of this Part A, DB Co shall be required to hold a Designated Construction Zone throughout the duration of Highway Works.

ARTICLE 3 NEW MUNICIPAL INFRASTRUCTURE

3.1 Responsibility for New Municipal Infrastructure

- (a) DB Co is responsible for the Highway Works including, the design and construction, Highway DB Co Commissioning and testing, and the New Municipal Infrastructure, as described in Schedule 15-2, Part 1, Article 19 - Description of Confederation Line West, Confederation Line East and Highway Works, which shall be carried out in strict accordance with this Schedule 15-2, Part 9 and all other applicable Project Agreement requirements.
- (b) The Highway Works, in connection with the New Municipal Infrastructure to be constructed by DB Co, shall incorporate the applicable design standards of the City of Ottawa.

3.2 Commissioning New Municipal Infrastructure

- (a) DB Co shall commission the New Municipal Infrastructure in accordance with Schedule 14 – Commissioning.

ARTICLE 4 UTILITIES

4.1 General Provisions for Utility Work on Provincial Highways

- (a) DB Co shall comply with Schedule 15-2, Part 2, Article 8 – Utility Infrastructure Design Criteria, as it pertains to Highway Works Utility Work, and additional requirements of this Schedule 15-2, Part 9, Part A, Article 4. This Article 4 shall take precedence if there are any conflicting requirements between the sections.
- (b) All submittals that pertain to Highway Works indicated in Schedule 15-2, Part 2, Article 8 - Utility Infrastructure Design Criteria, shall be provided under separate cover. DB Co shall submit separate Utility Infrastructure Relocation Plans specific to Highway Works, in accordance with Schedule 10 – Review Procedure.
- (c) DB Co shall comply with applicable MTO Standards.
- (d) DB Co shall apply for and obtain MTO Encroachment Permits in coordination with, and in favour of utility owners, where Utilities are required to be relocated, or newly located within the Highway Corridor Lands.
- (e) Refer to Schedule 15, Part 9, Part B, Clause 12.5 for requirements pertaining to the removal of existing Utilities.

4.2 Utility Design and Construction Requirements

- (a) DB Co shall not construct new maintenance holes, water valve box assemblies or locate valve chamber frame(s) and cover(s) on Highway 416 and 417 paved surfaces, including Shoulders, median or interchange ramps, except:
 - (i) Catchbasin maintenance holes dedicated to highway drainage shall be permitted on the median and outside Shoulders of the Highway.
- (b) For all Utilities, DB Co shall relocate outside of the median, Shoulders and paved surfaces of the Roadway (including Highway 417 and 416 Main Line and ramps), any existing maintenance holes, water valve box assemblies, valve chamber frame(s) and cover(s) where impacted by Construction Activities. Existing maintenance holes, water valve box assemblies, valve chamber frame(s) and cover(s) in the median Shoulder, outside Shoulder or median of the Highway that are not reconstructed shall be permitted to remain in the median Shoulder or outside Shoulder.
- (c) DB Co shall use trenchless methods where constructing new or relocating Utilities beneath the paved surfaces, Shoulders, or interchange ramps of Highway 416 and 417 that are otherwise only to be resurfaced. Open cut may be permitted for longitudinal installations beyond the outside Shoulder subject to adequate available space. Subject to other Utility placement requirements, as identified in this Article 4, open cut methods shall not be permitted within 3.0 m of the travelled portion of the Roadway, unless DB Co implements an engineered roadway protection system, and the excavation is separated by a Barrier.

- (d) New or relocated Utilities shall not be installed longitudinally along Highway 417 beneath paved surfaces, nor in front of the ditch line. Longitudinal utility plant shall be confined within 2.0 m of the ROW limits.
- (e) Utility plant shall not be located at a depth less than 1.2 m below the lowest portion of the Roadway cross-section for longitudinal underground installations.
- (f) New aerial pole crossings shall not be permitted over Highway 417 and Highway 416. New aerial crossings over Highway 416 and Highway 417 shall be permitted on towers. Existing pole crossings may remain if the poles are not impacted by the Highway Works and the Utility Work is limited to same place modifications on the existing poles.
- (g) DB Co shall not construct or relocate Utilities within new or existing MTO Bridge Structures, subject to the following exceptions:
 - (i) Lighting Utilities that provide lighting on or adjacent to the Bridge Structure shall be permitted; and,
- (h) Existing Utilities that are not otherwise impacted or modified by Highway Works need not be relocated for the sole purpose of meeting the design standards contained in this Article 4.
- (i) DB Co shall follow the MTO Eastern Region Utility Locates Protocol for the identification of MTO owned Utilities. Note that MTO owned Utilities are not covered under Ontario One Call.
- (j) DB Co shall invite the MTO Electrical Coordinator and City of Ottawa Street Lighting to be present during the hydro service layouts by [REDACTED] to ensure that the account billing information with regards to Customer and Service Descriptions are set up appropriately. DB Co shall provide a minimum of five Business Days advanced notice to the City Representative prior to arranging the service layout meeting. DB Co shall also make arrangements as early as possible with [REDACTED] for service layouts and connections for the proposed power supply locations. Current contact information is as follows:

[REDACTED]
- (k) DB Co shall design and construct all Utility Infrastructure located on the Highway Corridor Lands to the accommodate the ultimate build of the Highway 417 expansion as per Clause 5.1(b) of this Part A.

4.3 Trenchless Crossings

- (a) Trenchless crossing design shall be in accordance with CSA S250, the MTO Guidelines for Foundation Engineering – Tunnelling Specialty for Corridor Encroachment Permit Application, and Appendix H – Pipe Installation by Trenchless Methods, of this Schedule 15-2, Part 9.

- (b) DB Co shall provide rationale and justification for any new crossing of Highway 417 that is proposed, as an attachment to its Utility Infrastructure Relocation Plan submittals. The attachment shall demonstrate that DB Co has undertaken a review of Utility placement options, and that the option presented is technically preferred.
- (c) DB Co shall provide joint Utility crossings to minimize the number of crossings of Highway 417 and ramps, where possible.
- (d) Utilities crossing the Main Line shall be installed at a minimum depth of 5.0 m from the centreline of the Roadway surface. Utilities crossing ramps shall be installed at a minimum depth of 3.0 m from the centreline of the Roadway surface and 1.5 m below ramp ditch lines. DB Co shall increase these depths as needed to account for other considerations, including, but not limited to, superelevation and/or ditches, frost penetration, Utility work around requirements. This minimum depth does not apply to gravity systems if a shallower installation is required to tie into longitudinal systems. Crossings shall be as level as possible.
- (e) Perpendicular crossings of the Highway shall be offset a minimum of 20 m from any Bridge Structure. Longitudinal Utilities shall be offset a minimum of 10 m from the end of the approach slab of any Bridge Structure.
- (f) DB Co shall perform a minimum of two boreholes and shall include discussion in the Geotechnical Report for all proposed crossings equal to or greater than 300 mm in diameter. The Geotechnical Report shall indicate the preferred trenchless crossing method for each location and a settlement monitoring plan and shall be referenced in the Utility Infrastructure Relocation Plan.
 - (i) DB Co shall evaluate all reasonable alternatives for construction of trenchless crossings, including pipe jacking, pipe ramming, micro-tunneling, tunnel boring, and horizontal directional drilling.
- (g) The use of the pneumatic piercing method, including torpedoes or similar devices, is not permitted.
- (h) Open cuts of paved surfaces are not permitted to recover stuck drill bits.
- (i) Jacking pits or sending/receiving pits shall be located at the bottom of the ditch line or on the back slope, and shall not encroach onto the front slopes, the Shoulder or within 3.0 m of the travelled portion of the Roadway.
- (j) For watermains, casing pipes shall extend to 14 m past the edge of shoulder where feasible, or to the ROW limit at minimum.

4.4 Utility Relocation Process

- (a) DB Co shall engage each Utility Company whose facilities are impacted by Highway Works, and shall develop Utility Infrastructure Relocation Plans, which shall detail designs that meet the applicable standards of the Utility Company and applicable MTO

Standards. The Utility Relocation Plans shall be submitted in accordance with Schedule 10 – Review Procedure.

- (b) Separate Encroachment Permits from MTO are required for each Utility relocation.
- (c) For all Utility Work within DB Co's responsibility for construction, DB Co shall prepare and submit applications for Encroachment Permits from MTO. For Utility Work within a third party Utility Company's responsibility for construction, the Utility Company shall submit applications for Encroachment Permits from MTO. Encroachment Permits applications shall be submitted following return of the draft Final Design Development Submittal or Construction Document Submittal with "no comment" or "minor comments" assigned by the City. The MTO may instruct DB Co or Utility Companies to resubmit applications made prior to the Construction Document Submittal if it determines, at its sole discretion, that insufficient information is available on the Highway Works design to grant an Encroachment Permit prior to review of the Construction Document Submittal.
 - (i) Application for an MTO Encroachment Permit shall be done online through the following link (as may be updated in the future):

<https://www.hcms.mto.gov.on.ca/>
 - (ii) Once a complete application is submitted, DB Co shall allow 35 days for processing of an Encroachment Permit application.
- (d) Encroachment Permit applications shall contain the following minimum requirements, in addition to any other requirements contained in this Article 4:
 - (i) Key plan with scale of 1:100,000 (or as necessary for orientation).
 - (ii) Detail plan drawing including the following:
 - A. Level of detail and accuracy as per CSA S250;
 - B. Scale of 1:500;
 - C. GPS coordination;
 - D. Highway number, municipality, geographical township, lot, concession;
 - E. Scale, dimensions, north arrow, legend, date of plan preparation, name and address of designer or encroaching party;
 - F. Key plan depicting the location of work with GPS coordinates (to six decimal places);
 - G. Property and ROW limits;

- H. Highway infrastructure, including edge of pavement, shoulder, ditch line, centreline;
 - I. Location of poles and anchors (if applicable);
 - J. Existing Utilities, signs, sidewalks, drainage structures, entrances and other features;
 - K. Highway and Municipal Roadway names;
 - L. Proposed Utility plant, including details on type and size, and any associated infrastructure;
 - M. Proposed method of construction; and,
 - N. Dimensions and location of bore pits (if applicable).
- (iii) Relocation profile drawing including the following:
- A. Level of detail and accuracy as per CSA S250;
 - B. Cross-section of Roadway (if applicable), with scale of 1:500 (horizontal) and 1:50 (vertical);
 - C. Roadway width, ROW limits, depth and offset of Utility plant;
 - D. Dimension and location of bore pits;
 - E. Depth of cover at various locations; and,
 - F. Proposed casing, including material type, length, diameter.

ARTICLE 5 COMMITMENTS AND COMPLIANCE REQUIREMENTS

5.1 General Requirements

- (a) DB Co shall ensure that the design and construction of the Highway Works comply with Schedule 17 – Environmental Obligations of the Project Agreement, including all obligations and commitments arising from the Environmental Approvals.
- (b) DB Co's design shall consider and protect for the future implementation of works contemplated within the limits of [REDACTED] by others, with minimal modification to the infrastructure constructed by DB Co

5.2 Additional Compliance Requirements

- (a) DB Co shall not convert Highway 417 lanes and ramps to transit only lanes or ramps, unless otherwise specified in this Schedule 15-2, Part 9.
- (b) DB Co shall accommodate access to the construction site following any request by the City or City Parties to carry out winter maintenance, traffic signal work as detailed in Part B, Clause 6.6, work relating to Encroachment Permits in the Highway Corridor Lands, Bridge inspections, or any similar activities.
- (c) DB Co is not permitted to engage in blasting as part of Highway Works within or immediately adjacent to the Highway Corridor Lands. For greater clarity, this restriction includes blasting of rock. The use of explosives shall not be permitted as part of Highway Works.
- (d) The ATMS power plant shall be protected and reinstated within the Highway Works and if required to ensure that the field equipment can operate continuously, DB Co shall design and construct temporary power facilities.

ARTICLE 6 REGISTRY, APPRAISAL, AND QUALIFICATION SYSTEM

6.1 General Requirements

- (a) In addition to the requirements of Section 11.4 of the Project Agreement, no later than 60 days after Financial Close, all engineering and contract administration pertaining to Highway Engineering (Multi-lane Arterial & Expressway - Major Reconstruction and/or Widening), Bridge Engineering (Design & Evaluation - Complex Structures (multi-span)) and other specialties as necessary shall be performed or reviewed by consultant(s) listed as “accepted” under the MTO electronic Registry, Appraisal and Qualifications System (MTO RAQS) for providing services meeting the applicable “specialties criteria” identified on RAQS.
- (b) Consultants performing engineering or review on Highway Works shall be approved in the relevant “high complexity”, “major”, or “complex” specialties where different levels are identified in the RAQS “specialties listing”.
- (c) Consultants performing quality assurance and oversight on Highway Works shall be approved in the “high complexity” category in the RAQS “specialties listing”.
- (d) The Construction Contractor(s) performing the Highway Works shall be appropriately registered under the MTO’s RAQS, and shall possess a Necessary Available Financial Rating of [REDACTED] and a Necessary Available Maximum Workload Rating of [REDACTED] (as such terms are applied in RAQS).

PART B – DESIGN AND CONSTRUCTION REQUIREMENTS

ARTICLE 1 LANING AND PHYSICAL LAYOUT

1.1 Order of Precedence

- (a) The geometric design for all Provincial Highways and Roads shall be designed in accordance with the criteria contained in this Article 1, and standards and manuals included in Reference Documents, and if there is any conflict between the criteria contained in this Article 1 and standards and manuals included in Reference Documents, the following shall apply in descending order of precedence:
- (i) The criteria contained in this Article 1;
 - (ii) MTO Special Provisions;
 - (iii) The applicable MTO Directives, MTO Policy Memorandums, and MTO Design Bulletins;
 - (iv) OPSS;
 - (v) MTO Contract Design, Estimating and Documentation (CDED) Manual;
 - (vi) Ontario Traffic Manual, MTO;
 - (vii) Highway Standards Bulletin HSB-DCSO-2016-05 Implementation of the Capacity Analysis Manual Memo, MTO;
 - (viii) Highway Capacity Manual, Transportation Research Board;
 - (ix) Accessibility for Ontarians with Disabilities Act (AODA) and Ontario Regulation 413/12;
 - (x) MTO Design Supplement for TAC Geometric Design Guide for Canadian Roads, June 2017;
 - (xi) Geometric Design Guide for Canadian Roads, TAC;
 - (xii) MTO Standard Drawings;
 - (xiii) OPSD;
 - (xiv) Roadside Safety Manual, MTO;
 - (xv) Bikeways Design Manual; and,
 - (xvi) The applicable standards of the City of Ottawa.

1.2 General Requirements

- (a) The Highway Works shall include the following:
 - (i) Modifications to interchanges and ramps at Pinecrest Road, Richmond Road, Holly Acres Road and Moodie Drive, including construction of a new eastbound and westbound Highway 417 on-ramps from Holly Acres Road;
 - (ii) Extension of Graham Creek Culvert and other new Structures to carry Roadways over the Guideway;
 - (iii) Roadside safety, drainage and illumination, utility relocations as required, Overhead Sign Support Structures, , landscaping and Context Sensitive Design;

1.3 Roadway Requirements

- (a) Freeway
 - (i) The area between the LRT and the WB Highway 417 east of Pinecrest Road to Queensway Station shall be treated as a median for the purpose of safety, as such DB Co shall provide an AASHTO Manual for Assessing Safety Hardware (MASH) TL-5 system in this location. The system shall be designed such that relocation is not required upon future widening of Highway 417 (by others). For further clarity, TL-5 system where required shall be entirely within the Lands except where the Confederation Line crosses the Highway Corridor Lands at the Highway 471/Pinecrest Road /Greenbank Road interchange. Refer to Clause 7.2 (m) of Part B – Design and Construction Requirements of this Part 9 for drainage requirements.
- (b) Freeway to Freeway Interchanges
 - (i) Highway 417 and Highway 416
 - A. DB Co shall ensure the fully directional interchange for the Highway 417 connection with Highway 416 is maintained to be operational at all times.
- (c) Crossing Roads and Interchanges
 - (i) Re-configured interchanges shall be designed and constructed at the following Crossing Roads. For site-specific improvements required to enhance pedestrian and cyclist connectivity at each interchange location refer to Schedule 15-2, Part 6 - Urban Design, Landscape Architecture and Connectivity Requirements, in addition to this Clause 1.3. Conceptual intersection minimum lane configuration diagrams are provided in Appendix E. All cross-sectional elements specified on all new grade separated shall be extended beyond the Structure as applicable to tie into existing infrastructure or New MTO Infrastructure, to maintain connectivity for all Roadway users, and to comply with applicable Reference Documents and Good Industry Practices.

- A. Highway 417 and Richmond Road / Holly Acres Road
- i. Note: Due to the orientation of Richmond Road relative to Highway 417 and previously adopted conventions, references to Richmond Road NB and EB may be used interchangeably, and references to Richmond Road SB and WB may be used interchangeably. Similarly, references to Holly Acres NB and WB may be used interchangeably, and references to Holly Acres SB and EB may be used interchangeably.
 - ii. Richmond Road North Side: DB Co shall modify the north ramp terminal and the Road and ramp layout as needed to accommodate the Works, and the design shall adhere to the following:
 1. Maintain the existing general layout of the Road and intersection between the Highway 417 / Richmond Underpass and Bayshore Drive.
 2. Extend the MUP to approx. 25 m west of the the E-N/S ramp terminal. A sidewalk (2.0 m width) shall be provided to connect the MUP to the southeast corner of the intersection. Include a MUP connection from the northwest corner of the Richmond/Bayshore intersection to Elstree Avenue. The MUP shall also connect to the existing road network on both sides of Richmond Road north of Bayshore Drive. DB Co's design shall include a future connection to a MUP (by others) at the northeast corner of the intersection. Connection of the MUP to Bayshore Station shall be in accordance with Schedule 15-2, Part 6 - Urban Design, Landscape Architecture and Connectivity Requirements.
 3. Crosswalks shall be provided at all intersection approaches that currently include a crosswalk. Separated bi-directional cross-rides shall be provided across the approach from the E-N/S ramp to the northeast corner of the intersection and across Richmond Road at the north approach to the northwest corner of the intersection. Existing crosswalks shall be maintained or replaced at all intersection approaches currently featuring a crosswalk. The crosswalks and cross-rides across the right turn channel from WB Richmond Road to WB Bayshore Drive shall be raised.
 4. Richmond Road EB at the approach to the E-N/S ramp terminal shall feature two left turn lanes and two through lanes. The through lanes shall each have a width of 3.5 m. The existing raised concrete median shall be retained. A

sidewalk shall be provided between the travelled lanes and the existing Parapet Wall of SN116110. The Parapet Wall shall be modified as needed to accommodate users of the Road and pedestrian facilities.

- iii. Holly Acres Road: DB Co shall modify the Road and ramp layout as needed to accommodate the Works, and the design shall adhere to the following:
 - 1. Per Schedule 15-2, Part 7 - Traffic and Transit Management and Construction Access, and this Part 9, Part C, DB Co shall provide a new temporary EB bus-only on-ramp from Holly Acres Road to Highway 417. The new temporary OC Transpo bus only access on-ramp shall intersect Holly Acres Road at the intersection with the existing Highway 416 S/Highway 417 W – Holly Acres N/S ramp and shall utilize the existing speed change lane of the Richmond N-E ramp.
 - 2. DB Co shall provide an additional eastbound lane on the existing Highway 416 S/Highway 417 W – Holly Acres N/S ramp that shall terminate at a point 160 m west of Holly Acres Road. DB Co shall conduct a traffic analysis of the intersection with Holly Acres Road to determine the recommended eastbound lane configuration on the off-ramp at this intersection. This analysis shall consider that OC Transpo buses shall be able to make both the eastbound left turn and eastbound through movements at this intersection, in addition to the southbound left turn movement.
 - 3. DB Co shall convert the existing median southbound through lane into a southbound left turn lane, leading to the new Highway 417 N/S-E on-ramp.
 - 4. DB Co shall design and construct all the necessary temporary improvements on Holly Acres Road, associated intersection(s) and interchange ramp(s) as required to accommodate pedestrian and cyclist access, uninterrupted traffic and transit operations during staged construction, and temporary conditions to meet the requirements of Schedule 15-2, Part 7- Traffic and Transit Management and Construction Access and Schedule 15-2, Part 9, Part C.
 - 5. DB Co shall undertake a TIA study including a detailed intersection operations and level of service analysis considering vehicular and non-vehicular road users needs on all new and existing intersections and interchange ramps

on Holly Acres Road that are impacted or required as the result of Works. DB Co shall demonstrate that the traffic and transit operations and associated levels of service are acceptable and feasible using projected traffic volumes and expected transit operations for a 2031 horizon year, including pedestrian and cyclist movements.

- i. DB Co shall submit to the City the results of above-noted traffic analysis report and seek approval from the City in accordance with Schedule 10 – Review Procedure.
6. DB Co shall design and construct all the necessary permanent improvements on Holly Acres Road and associated interchange ramp(s) and intersection(s) impacted as the result of Works according to the requirements of Article 2 of this Part 9, Part B.
7. DB Co shall design and construct all the permanent improvements required at the intersection of the Holly Acres Road and the Transitway bus access at Bayshore Station to meet the requirements of the lane configuration diagram specified in Appendix E of this Part 9 and Schedule 15-2, Part 6 - Urban Design, Landscape Architecture and Connectivity Requirements and Article 9 of this Part 9, Part B.
 - i. DB Co shall design and construct separate crosswalk and bi-directional crossride facilities on the north, east and west legs of the intersection as per OTM Book 15 and Book 18 and the MTO Bikeways Design Manual.
 - ii. DB Co shall be responsible for the design and construction of all such improvements if DB Co's traffic and transit assessment, modelling and analysis determine that additional traffic lanes and improvements are required in addition to the information shown in Appendix E of this Part 9.
 - iii. All temporary and permanent improvements associated with the design and construction of these ramps noted above, within the limits of construction, shall meet the requirements of the City and MTO.

8. DB Co shall design and construct Pavements for any ramps affected by the Works, in accordance to the Pavement requirements of Article 3 of this Part 9, Part B, except where Pavements are prescribed in Article 3 of this Part 9, Part B DB Co shall not be required to design while DB Co shall be required to construct the Pavements as prescribed.
 9. DB Co shall design and construct the proposed improvements for the Holly Acres Drive/Bayshore access intersection, the Guideway Structure over Holly Acres Drive and the adjacent Highway 417 N/S-W ramp geometry, such that all necessary general traffic and bus traffic movements at this intersection can feasibly be accommodated to meet the requirements of the City. DB Co's design shall accommodate all necessary vehicular movements, including all through movements, the NB left and NB right turning movements and the WB movement of a transit vehicle departing from Bayshore Station and entering the above-noted Highway 417 N/S-W ramp.
 - i. DB Co shall design and construct the proposed Highway 417 N/S-W ramp south of the Track alignment, as well as accommodate the northbound left turn movement, per the requirements of this Article 6.
- B. Highway 417 and Pinecrest Road / Greenbank Road.
- i. DB Co shall design and construct interchange ramps and associated intersection modifications per the Design Criteria.
 - ii. SN015180: The lane configuration of the Pinecrest Road Bridge Structure (over the LRT alignment) shall include the following minimum requirements, and shall accommodate the lane configuration specified for the north ramp terminal. Design of this Structure shall be in accordance with Article 4 – Structural Design Criteria and Requirements, of Schedule 15-2, Part 2.
 1. Two NB lanes (3.5 m width) and an outside Side Clearance (1.0 m width);
 2. Two SB through lanes (3.5 m width), one SB right turn lane (3.5 m width) and an outside Side Clearance (1.0 m width);

3. Provide for a future bi-directional cycle track (3.6 m width) west of the SB lanes, separated from the SB lanes by a TL-4 crash Barrier wall (to be constructed by others);
 4. Sidewalks (2.0 m width) along the extreme east and west sides of the Structure; and;
 5. TL-4 Parapet Walls with railings (as applicable to accommodate users of the Road and pedestrian and cyclist facilities) along the outsides of the Structure;
 6. A raised concrete median, connecting between the intersection of Pinecrest Road and the Highway 417 E-N/S ramp and the existing median on the Highway 417 Underpass.
- iii. North Side: DB Co shall modify the north ramp terminal and ramp layout as needed to accommodate the Works, and the design shall adhere to the following:
1. DB Co shall design and construct a realigned N-W ramp such that the new ramp alignment intersects Pinecrest Road south of the Pinecrest Station layout, while maintaining the vertical and horizontal alignment requirements specified in this Schedule 15-2, Part 9. The infrastructure required to support the horizontal and vertical alignment shall be designed by DB Co to accommodate future up to a 500mm grade raise of Pinecrest Road as further detailed in Part B Clause 4.11 (a)(iii) without impacting the LRT Operations. DB Co shall demonstrate in the PFDD submission how this future grade raise and modification of NW ramp can be designed and constructed without impacting the LRT operation during the construction. DB Co shall repurpose the existing SB curb lane as the auxiliary right turn lane, and shall minimize the curb corner radius leading to the realigned N-W ramp to enhance pedestrian safety. The existing N-W on-ramp shall be closed, removed and regraded.
 2. DB Co shall retain the free flow configuration of the existing S-W loop on-ramp off of Greenbank Road.
- iv. A bus loop shall be constructed at the west leg of the north ramp terminal. The bus loop shall include two ingress and two egress lanes (one right turn and one left turn). A bus only left turn lane from NB Pinecrest to the bus loop shall be provided with capacity for one articulated bus. Buses shall also be able to access the bus

loop from SB Pinecrest Road. The bus loop shall be in accordance with the requirements of Schedule 15-2, Part 4 – Stations and Part 7 - Traffic and Transit Management and Construction Access.

1. DB Co shall provide three lanes in each direction on Pinecrest Road between the north ramp terminal and Queensview Drive.
 2. DB Co shall provide crosswalks on the east, west and north legs of the intersection.
 3. DB Co shall design and construct all necessary improvements required on the existing Highway 417 E-N/S ramp in order to accommodate the Confederation Line / E-N/S ramp grade separation. All the associated improvements required for the Highway 417 E-N/S including ramp and shoulder geometry, TL-5 barrier, vertical supports, overhead signs that are subject to relocation, and associated drainage elements as required, shall be designed and constructed at their ultimate location and configuration. DB Co's design of the above-noted improvements shall not preclude the efficient construction of MTO's planned Highway 417 widening so that if / when the Highway widening is implemented by others in the future, the above-noted improvements constructed by DB Co will require no modifications with the exception of ramp and taper transitions at tie-in locations, some relocation of gore points and bull nose treatments to meet MTO standards, as necessary.
- v. South Side: DB Co shall modify the south ramp terminal and ramp layout as needed to accommodate the Works, and the design shall adhere to the following:
1. The existing general purpose N-E ramp shall be retained. Upstream of the tie-in point with the general purpose ramp, the existing N-E bus only ramp shall be closed, removed and regraded.
 2. Maintain the Ashley Street connection with the W-N/S off-ramp. The Ashley Street connection is to be temporarily closed in accordance with Schedule 15-2, Part 7 - Traffic and Transit Management and Construction Access. The existing lane configuration at the intersection with Greenbank Road shall be maintained, except where geometric adjustments are required.

3. In accordance with Schedule 15-2, Part 7 - Traffic and Transit Management and Construction Access, DB Co shall evaluate by undertaking traffic analysis to determine whether the provision of a third left turn lane on the W-N/S off ramp (reserved for buses only) would provide a travel time benefit to eastbound OC Transpo buses when they are on detour. If the traffic study finds this to be feasible and improves the transit service operation, DB Co shall modify the intersection so as to temporarily provide this third left turn lane with appropriate storage. This lane, if provided is to be removed as a Remaining Work, and the intersection restored to its pre-existing condition.

C. Highway 417 and Moodie Drive

- i. DB Co shall design and construct all the necessary temporary improvements on Moodie Drive, associated intersections and interchange ramps as required to accommodate the pedestrians' accesses, uninterrupted traffic, and transit operations during staged construction and temporary conditions and meet the requirements of Schedule 15-2, Part 7 – Traffic and Transit Management and Construction Access and Schedule 15-2, Part 9, Part C.
- ii. DB Co shall also design and construct the necessary permanent improvements on Moodie Drive, associated interchange ramps, and existing and new intersections that are impacted as the result of the Works in accordance with the Reference Documents and according to the applicable clauses of Article 2 of this Part 9, Part B.
- iii. DB Co shall design and construct all the necessary permanent improvements for the S-W and N-W ramp Overhead Structures over the Track alignment to meet the appropriate requirements of Article 4 – Structural Design Criteria and Requirements, of this Part 9, Part B. All temporary and permanent improvements associated with the design and construction of these ramps noted above, within the limits of construction, shall meet the requirements of the City and MTO.
 1. DB Co shall design and construct Pavements for any ramps affected by the Works, in accordance to the Pavement requirements of Article 3 of this Part 9, Part B. As a minimum requirement, DB Co shall resurface all ramps affected by the Works.
- iv. DB Co shall design and construct modifications to the free-flow bus access ramp from the NB lane of Moodie Drive to Moodie Station that accommodates a direct inbound bus traffic movement

to service the Transitway bus operations as required to tie into the proposed Moodie Station bus loop.

1. For any modifications or improvements to the bus access ramp noted above, DB Co shall protect and avoid any impacts to adjacent Structures, including but not limited to foundations, footings, piers or abutments.
- v. DB Co shall design and construct a sidewalk on the west side of Moodie Drive, as described in Schedule 15-2, Part 6 - Urban Design, Landscape Architecture and Connectivity Requirements and Article 9 of this Part 9, Part B.
1. DB Co shall repurpose the existing cross section on the Underpass Structure to provide the sidewalk, such that no widening of the Structure is required.
 2. DB Co shall relocate the existing guiderails, street lights and signage, as necessary north and south of the Structure in order to accommodate the above-noted sidewalk facility.
 3. DB Co shall maintain the existing SB lane widths for the two SB general traffic lanes and the SB on-road bicycle lane.
 4. DB Co shall locate the sidewalk west of the existing edge of roadway, south of the Structure, to maximize the storage length possible for the SB auxiliary traffic lane leading to the N-E ramp. The proposed ramp realignment geometry shall meet the Reference Documents.
 5. For the details of the proposed Bridge Structure requirements refer to Article 4 – Structural Design Criteria and Requirements of this Part 9, Part B.
- vi. For the design and construction of the Moodie MSF facilities associated with the Track Works, DB Co shall protect for and not preclude the necessary provisions for a future widening of the Highway 417 in the WB direction, west of Moodie Drive. The future Highway 417 widening in the WB direction shall account for an additional 3.75 m general traffic lane, a 3.0 m shoulder, roadside barriers and associated grading, drainage and signage requirements beyond the existing edge of outside lane, as minimum.

(d) Crossing Roads

- (i) Where pavement-level bike lanes are constructed adjacent to the curb, side inlet Catch Basins shall be used such that grates for Catch Basins / maintenance holes are not within the cyclist wheel paths.
 - (ii) In all locations where active transportation facilities are specified, DB Co shall provide adequate storage space for pedestrians and cyclists to safely maneuver within the network without obstructing other Roadway users, and shall abide by accessibility requirements at signalized intersections. The design of pedestrian and cycling facilities shall meet the requirements of OTM Book 15, OTM Book 18, and the MTO Bikeways Design Manual.
 - (iii) The Crossing Road Underpass Structures shall include the number of lanes specified in this Clause 1.3 of Part B.
- (e) Design vehicle requirements:
 - (i) DB Co shall use the appropriate design vehicles to design the intersection layout geometry, and to accommodate the applicable sight distances and horizontal and vertical Road clearance requirements. WB-20.5 shall govern the design for all Roads within the scope of Highway Works.
 - (ii) All Roads that are a designated transit bus routes shall accommodate the turning movement requirements of the City's B-12 standard bus, articulated bus, double decker bus, and Para Transpo vehicles.
 - (iii) Clearance requirements for opposing left-turn design: In design of intersections with multiple left-turn lanes, especially where simultaneous opposing left turns exist, DB Co shall ensure that the design vehicle is appropriately selected. In the design of intersection layouts with double turn left lanes, the design shall accommodate the simultaneously turning manoeuvres of the WB 20.5 with a second Light Single Unit truck.
 - (iv) Minimum turning speed of a design vehicle shall not be assumed less than 15 km/hr.
 - (v) The design of OC Transpo bus turning paths shall satisfy the requirements of the OC Transpo - Transitway and Station Design Guidelines. Bus design turning speeds at intersection corners and curb returns shall not be less than 15 km/hr.
- (f) DB Co shall engage the City Representative to coordinate its layout and design of interchanges and Crossing Roads with future projects.
- (g) DB Co shall design and construct the Highway Works such that no maintenance holes are located within the travelled lanes of any Roads.
- (h) DB Co shall be responsible for ensuring proper surface drainage at all times. Surface drainage shall be properly controlled and directed to a suitable outlet without causing any disturbance or damage to existing infrastructure and structures. No flow of water shall be

directed across or over pavements except through approved pipes or properly constructed troughs. Run-off from un-stabilized areas shall be intercepted and diverted to a suitable outlet.

- (i) DB Co shall be responsible to manage water so that it is not injurious to public health or safety, to property or to any part of the Works completed or under construction.
- (j) DB Co shall submit roadway design drawings as part of its Design Development Submittals, in accordance with Schedule 10 – Review Procedure. Drawings shall depict elements of the Highway Works design, including but not limited to those listed below.
 - (i) Plan drawings
 - A. The proposed horizontal alignment including standard dimensioning of all horizontal alignment elements;
 - B. Locations of widening, reconstruction and paving;
 - C. Locations of structural elements, including Bridges, Retaining Walls, Noise Barriers, Culverts, sign structures, guiderail;
 - D. Location of all drainage elements including sewers, culverts and stormwater management ponds;
 - E. Location of Utility corridors;
 - F. Limits of grading; and,
 - G. Property limits.
 - (ii) Profile drawings
 - A. The proposed vertical profile including standard dimensioning for all vertical alignment elements;
 - B. Original ground line, ditching, sewers, top of pavement;
 - C. Location of structural elements, including Bridges, and Culverts;
 - D. Location of drainage elements including sewers, culverts, and stormwater management ponds; and,
 - E. Location of Utility crossings.
 - (iii) Typical cross-section drawings
 - (iv) Typical detail drawings

1.4 Traffic Engineering Requirements

- (a) Traffic engineering requirements for design of the Highway Works:
- (i) DB Co's design shall meet the traffic engineering requirements specified in this Clause 1.4.
 - (ii) MTO's Capacity Analysis Manual 2016 and MTO's Traffic Impact Assessment Guidelines (most current version) shall be applied to MTO's network unless otherwise noted. Synchro and SimTraffic (Version 10 or newer) suites shall be utilized, where appropriate, by DB Co for assessment of other roadway elements.
 - (iii) The Synchro parameters utilized by DB Co in undertaking the traffic analysis shall be as per the requirements laid out in Appendix C of the City of Ottawa's Transportation Impact Assessment Guidelines, and as per the MTO Traffic Impact Assessment Guidelines. The more conservative standard shall govern, except for Provincial Highway and ramp analysis, where the MTO Traffic Impact Assessment Guidelines shall apply.
 - (iv) The SimTraffic parameters utilized by DB Co in undertaking the analysis shall reflect actual local conditions. DB Co shall undertake field analysis in order to accurately identify the SimTraffic parameters. The performance measures from SimTraffic shall be obtained by:
 - A. Averaging 5 different speed values;
 - B. Seeding for 15 minutes followed by four 15 minutes recording intervals; and,
 - C. Applying peaking and anti-peaking (i.e. peaking is to be applied to the second 15 minute recording interval).
 - (v) DB Co shall undertake the necessary traffic engineering analysis to demonstrate that the geometric design and configuration of the ramp terminals shall accommodate the weekday AM and PM peak hour demand consistent with MTO and City of Ottawa performance standards. The analysis shall be undertaken as per the requirements of the City of Ottawa Multi-Modal Level of Service Guidelines, the MTO Capacity Analysis Manual 2016, and as per the MTO Traffic Impact Assessment Guidelines. The more conservative standard for vehicular traffic shall govern.
 - (vi) If the performance criteria in Clause 1.4(v) cannot be achieved through optimal geometric design or other improvements, DB Co shall submit a request to the City Representative to receive exemption on this performance criteria and acceptance of the intersection design, at the City's sole discretion.
 - (vii) DB Co shall undertake the necessary traffic engineering analysis consistent with appropriate MTO and City of Ottawa procedures to demonstrate that the

geometric design and configuration of weave sections shall accommodate the AM and PM peak hour traffic volumes at an acceptable level of performance. All modes of travel shall be considered in the analysis.

- (viii) If performance criteria in Clause 1.4(vii) cannot be achieved through optimal geometric design or other improvements, DB Co shall submit a request to the City to receive exemption on this performance criteria and acceptance of the intersections design, in the City's sole discretion.
 - (ix) DB Co shall submit a Traffic Analysis Report (the "Traffic Analysis Report") summarizing all traffic engineering analysis undertaken as per this Clause 1.4. The report shall demonstrate and identify required operational improvements of all affected Roads based on traffic analysis. The traffic engineering analysis shall identify and utilize projected volumes for 5, 10 and 20 year horizons for both morning and afternoon peak hours when analyzing any roadway configuration intended to be permanent. Traffic growth rates shall be determined from historical and current count data and future volumes shall be applied to the analysis of all Roads within the scope of Highway Works, including ramps, ramp terminal intersections and other intersections, and shall be included in the Traffic Analysis Report. Seasonal variations shall be addressed in the development of future traffic volumes. DB Co shall provide defensible recommendations for identified operational improvements in the report including a review and evaluation of any alternatives developed by DB Co. The Traffic Analysis Report shall be provided to the City Representative for review and acceptance a maximum of 16 weeks after Financial Close, prior to geometric design being further advanced, in accordance with Schedule 10 – Review Procedure.
 - (x) DB Co shall ensure that the Traffic Analysis Report summarizes in tabular form, parameters including but not limited to, overall intersection performance (V/C and LOS), individual movements V/C and LOS, movement delays and 95th percentile queue lengths. All modes of travel shall be considered in the analysis.
 - (xi) DB Co shall ensure that the Traffic Analysis Report shall include an appendix that includes all supporting documentation, modelling information, and calculations both in paper and electronic formats.
 - (xii) Traffic Signal Systems design and construction shall be as per Clause 6.6 of Part B of this Schedule 15-2, Part 9.
 - (xiii) DB Co shall design the intersection configuration, as a minimum, according to the layouts specified in Clause 1.3 of Part B of this Part 9, unless an alternative layout is analyzed by DB Co according to this Clause 1.4 and accepted by the City at its sole discretion.
- (b) Traffic engineering requirements during construction

- (i) DB Co shall meet the traffic engineering requirements specified in this section applicable to the construction period prior to Final Completion.
- (ii) Highway Capacity Manual 2016 methodology, and HSB-DCSO-2016-05 shall be utilized by DB Co, unless otherwise noted. Synchro and SimTraffic (Version 10 or newer) and/or Vissim transportation analysis software suites shall be utilized by DB Co for assessment.
- (iii) The Synchro and/or Vissim parameters utilized by DB Co in undertaking the analysis shall be as per the requirements laid out in Appendix C of the City of Ottawa's Transportation Impact Assessment Guidelines, and as per the MTO General Guidelines for the Preparation of Traffic Impact Studies. The more conservative standard shall govern, except for Provincial Highway and ramp analysis, where the MTO General Guidelines for the Preparation of Traffic Impact Studies shall apply.
- (iv) The default SimTraffic and/or Vissim parameters shall be utilized by DB Co in undertaking the analysis. DB Co shall undertake field analysis and appropriate Highway Capacity Manual analysis in order to alter the SimTraffic parameters to accurately reflect existing conditions. The performance measures from SimTraffic shall be obtained by:
 - A. Averaging five different speed values;
 - B. Seeding for 15 minutes followed by four 15 minutes recording intervals; and,
 - C. Applying peaking and anti-peaking (i.e. peaking is to be applied to the second 15 minute recording interval).
- (v) All traffic data used for analysis for traffic management purposes shall be based on the most current data and no older than two years. DB Co shall be responsible for obtaining or collecting all traffic data necessary for its traffic analysis, if traffic data less than two years old is not relevant to the traffic management analysis due to temporary conditions that existed at the time the data was collected. DB Co shall confirm with the City that the data is appropriate prior to conducting an analysis using said data.
- (vi) DB Co shall undertake an analysis of existing (pre-construction) traffic operations and establish current roadway/freeway performance including travel times/delays, vehicle queues, LOS and V/C and other parameters.
- (vii) DB Co shall undertake the necessary traffic engineering analysis to identify the impacts of all construction staging including closures and detours on all Provincial Highways, Municipal Roadways and Other Affected Municipal Roadways. The LOS analysis shall be undertaken as per the requirements of Chapter 6 of the City of Ottawa Multi-Modal Level of Service Guidelines, the

MTO Capacity Analysis Manual (2016), and as per the Highway Capacity Manual 2016. The more conservative standard shall govern.

- (viii) The performance of all Roads during each stage of construction shall be assessed and compared with existing (pre-construction) conditions. Existing pre-construction performance shall be maintained at all impacted intersections and freeway elements for weekday AM and PM peak hour demands.
- (ix) DB Co shall identify and provide necessary temporary improvements to achieve the pre-construction operational performance.
- (x) If intersection performance criteria cannot be achieved through adjusted signal timings, geometric improvements or other intersection improvements, DB Co shall submit a request to the City Representative to receive exemption on this performance criteria and acceptance intersection performance, in the City's sole discretion. The request for exemption shall include recommended mitigation to minimize the impacts to traffic.
- (xi) DB Co shall complete a detailed traffic engineering analysis and submit a Traffic Analysis Report for all works. DB Co shall review the study area and provide defensible recommendations.
- (xii) DB Co shall ensure that there is sufficient turn lane storage to accommodate temporary traffic conditions. DB Co shall provide additional storage as required.
- (xiii) DB Co shall ensure that within the Traffic Analysis Report, the intersection performance shall be summarized in tables which shall include overall V/C, movement V/C ratio, movement LOS, movement delay and 95th percentile queue lengths by movements, storage lengths (available and required storage lengths).
- (xiv) DB Co shall ensure that the Traffic Analysis Report includes an appendix with all supporting documentation, model data and calculations both in paper and electronic formats.

1.5 Structure Requirements

- (a) At locations where Highway 417 is proposed to cross over the Municipal Roadway, the Overpasses shall accommodate the ultimate cross-section of the Crossing Roads.
- (b) At locations where Highway 417 is proposed to cross under the Municipal Roadway, the Underpass shall accommodate the ultimate cross-section of Highway 417.
- (c) A minimum vertical clearance of 5.0 m shall be provided at all Underpasses. Laning for Crossing Roads shall be designed and constructed as per Clause 1.3 of this Part B. Appropriate horizontal clearance with the inclusion of the sidewalk and MUP, where indicated in the table, shall be provided.

- (d) For water crossings, Bridge Foundations shall be constructed as per Table 1.5b for the number of lanes required on Highway DB Co Commissioning. The Structure and Foundations shall be able to accommodate for future widening to the ultimate condition. DB Co shall provide any additional laning requirements such as acceleration, deceleration, or turning lanes, in its final design.

Table 1.5 b – Water Crossing Requirements ⁽¹⁾

| Creek | Location | Recommended Structure Type in PDR | Ultimate No. of Lanes on Structure (Through + Auxiliary) | No. of Through-Lanes required on Highway Substantial Completion | No. Auxiliary lanes required on Highway Substantial Completion | Notes |
|--------------|------------------------|--|---|--|---|--|
| Graham Creek | Holly Acres N/S-E Ramp | Cast-in-place box Culvert | 1 | 0 | 1 | Extension and rehabilitation of existing Culvert |

Notes:

- (1) Shoulder widths on freeway structures shall be consistent with the road section or as per the MTO Standard, whichever is greater. No reduction to Shoulder widths (Side Clearances) will be permitted for Structures greater than 50 m in length. On ramps, structures shall have Shoulders consistent with the ramp Shoulders. Shoulder widths on structures shall be adjusted to accommodate appropriate sight distances where applicable. Side Clearances on structures shall comply with the MTO Standards.

(e) Retaining Structures

- (i) DB Co shall confirm the location and shall design and construct retaining structures at and any locations where required to accommodate DB Co's design.
- (ii) DB Co shall design and construct the retaining structures at the Pinecrest Road N-W ramp to accommodate a future grade raise by others as described in Part B, Clause 4.11 (a)(iii) of this Part 9.

(f) Noise Barrier Walls

- (i) At any locations identified in this Clause 1.5(f) where existing Noise Barrier is being replaced as part of Highway Works, DB Co shall install the new Noise Barrier walls at the same offset from the Roadway, unless an adjustment is required due to spatial constraints.
- (ii) Existing Noise Barriers that are removed by DB Co shall be replaced within seven days. In instances where Noise Barrier is not being replaced in the same location,

the requirement for replacement within seven days applies to the section of new Noise Barrier that provides equivalent noise mitigation.

- (iii) Noise Barriers shall be opaque except where otherwise noted in this Clause 1.5(f).
 - (iv) DB Co is advised that translucent window panels along the top 1.0 m of the Noise Barriers may be requested by residential property owners through the consultation process along all segments of the Highway where Noise Barrier is specified to be installed. DB Co shall incorporate the translucent panels if a request by the property owners is made and approved by MTO.
 - (v) Transparent Noise Barriers shall include black stripes to reduce the likelihood of bird collisions.
- (g) Other Structures
- (i) Subject to the requirements of this Schedule 15-2, Part 9 as they pertain to the applicable Highway ramps and Crossing Roads, the following Structures shall be designed in accordance with Schedule 15-2, Part 2, Article 4 – Structural Design Criteria and Requirements.
 - A. SN116420; and,
 - B. SN116430.

1.6 Fencing and Ramp Closure Gate Requirements

- (a) Fencing Requirements
- (i) Where New City Infrastructure, and New MTO Infrastructure conflicts with the existing chain link fence, and for further certainty the existing chain link fence located at the limits of the Highway Corridor Lands, a new continuous fencing fully securing Highway 417 shall be provided on the outermost boundaries of the Highway Corridor Lands. When in conflict, the existing chain link fencing shall be removed in order to complete the required widening, New City Infrastructure, and New MTO Infrastructure. New chain link fencing shall be reinstated along the limits removed for construction, with adjustments required in areas where there are changes in ROW limits.
 - (ii) Chain link security fencing shall be provided and shall be in accordance with OPSS 772, OPSD 972.130 and MTO Directive PHY B-209, with the following exceptions:
 - A. The tension top wire design shall be used for all chain link and antiglare screen installations.
 - B. Fencing gates shall be provided for maintenance purposes, such as structural maintenance. For example, for Structures over water crossings, a

minimum of two maintenance access gates shall be required, at least one on either side of the water course.

C. The fencing shall be in accordance with the MTO Context Sensitive Design requirements as detailed in Appendix F of this Part 9.

(iii) Farm or rural fencing shall not be used for security fencing.

(iv) Temporary fencing shall be installed during construction as required to secure the highway and construction areas.

(v) Final fencing plan and design shall be submitted to the City Representative in accordance with Schedule 10 - Review Procedure a minimum of 90 days prior to installation.

(b) Ramp Closure Gate Requirements

(i) DB Co shall install ramp closure gates at all new or reconstructed ramps entering Highway 417.

(ii) Ramp closure gates shall be designed in accordance with applicable MTOD-960 series 1 drawings.

(iii) Ramp gate location plan and design shall be submitted to the City Representative in accordance with Schedule 10 – Review Procedure a minimum of 90 days prior to installation.

1.7 Explicit Safety Analysis

(a) DB Co shall perform an Explicit Safety Analysis (the “Explicit Safety Analysis”) on Hazards within the enhanced clear zone by calculating the potential future collision frequency, severity and societal costs, and also analyzing human factors, to determine if the Hazard should be relocated, shielded with Roadside Barrier, or otherwise safely mitigated in DB Co’s design.

(b) DB Co shall review Highway and intersection safety elements within the Highway Works limits to identify, diagnose, and develop alternative countermeasures to be evaluated within the context of the project. A summary and recommendations of the review shall be provided.

(c) DB Co’s Explicit Safety Analysis shall be conducted with safety as a paramount, and that cost saving shall not take precedence over safety.

(d) DB Co’s analysis and calculation shall be carried out in accordance with the methodology from Appendix A of the 1996 AASHTO Roadside Design Guide, Reference Documents identified in this Schedule 15-2, Part 9, and in consultation with the City.

- (e) The Explicit Safety Analysis shall be carried out by Qualified Personnel who are highway or traffic engineering professionals with safety engineering training, and who have demonstrated experience and familiarity in carrying out such safety analyses (minimum 10 year experience).
- (f) DB Co shall conduct Explicit Safety Analysis early in its design, and shall submit an Explicit Safety Analysis Report in accordance with the Review Procedure as part of the Pre-Final Design Development Submittals. Updated analyses shall be submitted in subsequent submittals if the relevant design changes.
- (g) When the Explicit Safety Analysis is conducted to assess different safety improvement options, options that increase collision costs shall not be carried forward even if they have better benefit-cost ratios.
- (h) Notwithstanding the requirements in Clause 1.7(a) to (f) in this Part B, DB Co's design shall promote open, Barrier free Roadway, to achieve safety goals, and shall submit an Explicit Safety Analysis Report whenever a Hazard warrants Barrier protections.

1.8 MTO Underground Plant Layout

- (a) DB Co shall be responsible for the determination of the exact physical location and protection of all MTO underground plant including, but not limited to, electrical / Permanent Data Counting Stations ducts and cables, ATMS, storm sewers, subdrains, culverts, and all external agency underground utilities (i.e. gas, water etc.).
- (b) Requests for stake-out services by the MTO shall be co-ordinated through the City Representative. Locates shall be the responsibility of DB Co. DB Co shall be responsible for locates at all times, including during the Winter Period, within the Highway Works limits.
- (c) The MTO does not subscribe to the Ontario One Call System.

ARTICLE 2 HIGHWAY GEOMETRICS DESIGN CRITERIA

2.1 Order of Precedence

- (a) The geometric design for all Roads shall be in accordance with the criteria contained in this Article 2, and the standards and manuals included in Reference Documents, and if there is any conflict between the criteria contained in this Article 2 and standards and manuals included in the Reference Documents, the following shall apply in descending order of precedence:
 - (i) The criteria contained in this Article 2;
 - (ii) MTO Special Provisions;
 - (iii) The applicable MTO Directives, MTO Policy Memorandums, and MTO Design Bulletins;
 - (iv) OPSS;
 - (v) MTO Contract Design, Estimating and Documentation (CDED) Manual;
 - (vi) Accessibility for Ontarians with Disabilities Act (AODA) and Ontario Regulation 413/12;
 - (vii) MTO Design Supplement for TAC Geometric Design Guide for Canadian Roads, June 2017;
 - (viii) Geometric Design Guide for Canadian Roads, TAC;
 - (ix) MTO Standard Drawings;
 - (x) OPSD;
 - (xi) Roadside Safety Manual, MTO; and,
 - (xii) The applicable standards of the City of Ottawa.

2.2 General Requirements

- (a) DB Co shall be responsible for all Roads within the Highway Works. In addition to the requirements in Clause 2.1(a) of Part B of this Schedule 15-2, Part 9, DB Co's design for the Roads shall be based on Good Industry Practices generally and in particular, with respect to good engineering practices, which shall consider safety and comfort of all Roadway users as paramount.
- (b) If DB Co is unable to meet any of the geometric Design Criteria contained in this Article 2, it shall propose to the City Design Criteria that comply with the Project Agreement, and applicable Reference Documents to the fullest extent possible. DB Co shall demonstrate that the proposed Design Criteria maximize the level of performance of the

Road, relative to the applicable MTO Standards. The Design Criteria proposed by DB Co are subject to acceptance by the City, at its sole discretion.

- (c) DB Co shall design the geometric elements of Highway Works according to the Design Criteria included in this Part 9. In all cases where a specific Design Criteria is not provided for a Road and/or interchange in this Article 2 of Part 9, DB Co shall undertake a detailed survey and review of the existing conditions, confirm the Road and/or interchange ramps geometric Design Criteria by referencing the existing conditions, appropriate standard and proposed Design Criteria, in order to address the necessary improvements as specified elsewhere in this Part 9. In all cases, DB Co shall consider safety and comfort of all Roadway users as paramount in development of geometric design.
 - (i) Notwithstanding the Design Criteria contained in this Article 2, under the circumstances whereby an existing interchange ramp, impacted by the Highway Works, does not meet current MTO Standards, DB Co shall design and construct the necessary ramp improvements to maximize radii, sight distances and speed change lane lengths used so that the impacted ramp will be upgraded to meet MTO Standards. Under circumstances where upgrading the ramps to standards is not feasible within the Lands available, DB Co shall demonstrate that its design has achieved the maximum level of performance relative to the standard as possible.
 - (ii) In all cases, geometric Design Criteria that correspond with DB Co's design for Highway Works that do not meet MTO Standards shall correspond to a value that is at minimum equivalent to existing conditions.
- (d) Granular foreslopes shall be designed never to be steeper than 4:1 on divided roads and 3:1 on undivided roads.
- (e) Shoulder widths shall be designed and constructed as noted in Clause 2.3 of this Part B.
- (f) In consideration of the Design Criteria contained in this Article 2 and the existing layout of Roads that are not reconstructed under Highway Works, DB Co shall design and construct transitions to tie into the adjacent road network. The design shall be based on Good Industry Practices and shall consider safety and comfort of all Roadway users as paramount.

2.3 Corridor Laning and Geometric Criteria

- (a) Freeway Geometrics
 - (i) General Requirements
 - A. In the case that the interchange ramp needs to be modified or new ramps required, DB Co shall design and construct the ramps to accommodate future highway widening such that in the future the ramps will require

minimal modifications to the extent possible. The following mainline geometric design can be referenced.

1. The geometric Design Criteria for the Highway 417 Main Line are summarized in Table 2.3a.

| Table 2.3a – Highway 417 Main Line Geometric Design Criteria | |
|---|---|
| | Hwy 417 Main Line Widening |
| HIGHWAY CLASSIFICATION | UFD 120 ^(a) |
| MINIMUM STOPPING SIGHT DISTANCE (M) | 120 |
| EQUIVALENT MINIMUM ‘K’ FACTOR (M) (CREST/SAG) | 120 / 60 ^(c) |
| MINIMUM RADIUS (M) | 650 |
| LANE PAVEMENT WIDTH (M) | 4 x 3.50 ^(d) |
| SHOULDER WIDTH (M) (OUTSIDE/MEDIAN) | 3.00 ^(e) / 2.50 ^(b) |
| SHOULDER ROUNDING (M) | 1.0 |
| MEDIAN WIDTH (M) | 5.8 – 11.5 ^(b) |
| POSTED SPEED (KM/H) | 100 |

Notes

- a) Existing alignment shall be retained.
- b) The median shoulder may vary to accommodate asymmetric tall wall barrier. The shoulder may be reduced to 2.25 m at overhead sign locations and to accommodate structure piers as determined by structural requirements. The WB median shoulder width beneath the Maitland Underpass Structure shall be improved by DB Co from the existing condition and shall meet the applicable shoulder width MTO Standards to the fullest extent possible.
- c) Alterations to the Highway 417 Main Line vertical alignment are not required for the sole purpose of correcting existing substandard alignments.
- d) Lane pavement width includes through lanes only. Any required interchange auxiliary lanes are in addition to this requirement.
- e) The Main Line outside Shoulder width also applies to continuous speed change lanes.

(ii) Roadside Safety

- A. Bridge abutments that are located at or outside the normal clear zone (10.0 m in the case of freeways) and have a slope not steeper than 2:1 in front of the abutment shall not require Roadside protection; provided, that the slope is free of obstacles, is traversable, and the approach grading is contoured to steer vehicles away from the abutment as detailed in Figure 2.7.3 of the MTO Structural Manual, where applicable.

(b) Crossing Roads with Interchanges Geometrics

(i) Specific Requirements

A. Geometric Design Criteria

- i. Tables 2.3b, 2.3c, 2.3d and 2.3e provide geometric Design Criteria for the interchange ramps.

| | HOLLY ACRES EB ON-RAMP |
|--|------------------------|
| EQUIVALENT MINIMUM "K" (M) (CREST/SAG) | |
| GRADES MAXIMUM (%) | |
| MINIMUM RADIUS (M) | |
| LANE PAVEMENT WIDTH (M) | |
| SHOULDER WIDTH (M) LEFT/RIGHT | |
| SHOULDER ROUNDING (M) | |
| MINIMUM SIGHT DISTANCE AT EXIT TERMINAL (M) | N/A |
| MINIMUM EXIT TERMINAL SPEED-CHANGE LANE LENGTH (M) | N/A |
| MINIMUM SIGHT DISTANCE AT ENTRANCE TERMINAL (M) | |
| MINIMUM ENTRANCE TERMINAL SPEED-CHANGE LANE LENGTH (M) | |

| Table 2.3c - On/Off Ramps at Highway 417 and Pinecrest / Greenbank | | | | | | |
|--|--|-------------|--|-------------|--|-------------------------------------|
| | | N-W ON-RAMP | | S-W ON-RAMP | | E-N/S OFF-RAMP |
| EQUIVALENT MINIMUM "K" (M) (CREST/SAG) | | | | | | |
| MINIMUM RADIUS (M) | | | | 55 | | 130 right 90 left ^(f) |
| LANE PAVEMENT WIDTH (M) | | 4.75 | | 4.75 | | 2 x 3.75 |
| SHOULDER WIDTH (M) LEFT/RIGHT | | 1.0 / 2.5 | | 1.0 / 2.5 | | 1.0 / 2.5 |

| Table 2.3c - On/Off Ramps at Highway 417 and Pinecrest / Greenbank | | | | | | |
|--|--|------------|--|-----|--|-----|
| SHOULDER ROUNDING (M) | | 1.0 | | 1.0 | | 1.0 |
| MINIMUM SIGHT DISTANCE AT EXIT TERMINAL (M) | | N/A | | N/A | | |
| MINIMUM EXIT TERMINAL SPEED- CHANGE LANE LENGTH (M) | | N/A | | N/A | | 535 |
| MINIMUM SIGHT DISTANCE AT ENTRANCE TERMINAL (M) | | N/A | | 370 | | N/A |
| MINIMUM ENTRANCE TERMINAL SPEED- CHANGE LANE LENGTH (M) | | Continuous | | 345 | | N/A |

Notes

- ii. DB Co shall complete a Ball Bank Indicator Report (the “Ball Bank Indicator Report”) for all ramps impacted by the Highway Works, to determine the posted advisory speed. The reports shall be submitted to the City for review and acceptance in accordance with Schedule 10 – Review Procedure. Advisory speed signs shall be posted prior to ramps being opened to traffic.
- iii. Table 2.3f provides the geometric Design Criteria for the Crossing Roads.

Table 2.3f – Interchange Crossing Road Geometric Design Criteria ^{(a)(b)(c)(d)}

| | RICHMOND NB AND SB | HOLLY ACRES | PINECREST GREENBANK | | |
|---|-------------------------------|--------------------|--------------------------------|--|--|
| DESIGN SPEED (KM/H) | 80 | 60 ^(d) | 60 | | |
| EQUIVALENT MINIMUM 'K' FACTOR (M) (CREST/SAG) | N/A | N/A | 11 / 18 | | |
| GRADES MAXIMUM (%) | N/A | N/A | N/A | | |
| LANE PAVEMENT WIDTH (M) | See Notes | See Notes | See Notes | | |
| SHOULDER WIDTH (M) | See Notes | See Notes | N/A | | |
| SHOULDER ROUNDING (M) | N/A | N/A | N/A | | |
| MEDIAN WIDTH (M) | See Notes | See Notes | See Notes | | |
| ROW WIDTH (M) | N/A | N/A | N/A | | |
| POSTED SPEED (KM/H) | 60 | 60 | 50 | | |
| MISCELLANEOUS – SIDEWALK (M) | See Notes | See Notes | See Notes | | |

Notes

- Approach grades on intersection roads with ramp terminals shall not exceed 3.0%.
- The cross-sectional geometry of the Crossing Roads shall comply with Article 1 of Part B of this Schedule 15-2, Part 9.
- Full Depth Paved Shoulders shall be provided where Shoulders are required.
- Holly Acres posted speed shall be reduced to 60 km/h to increase safety and consistency between Richmond Road and the current 60 km/h zone just to the north.
- Alterations to the Richmond Road vertical alignment south of Holly Acres Road are not required for the sole purpose of correcting existing substandard alignments.
- Existing ramp alignment shall be retained downstream of the bullnose with modifications only to accommodate the widening of Highway 417, the West Works and specified modification to the ramp terminal.

ARTICLE 3 PAVEMENT DESIGN CRITERIA

3.1 Order of Precedence

- (a) DB Co shall design and construct Pavements in accordance with the criteria contained in this Article 3 and the following Reference Documents, and if there is any conflict between the criteria contained in this Article 3 and any Reference Document(s), the following shall apply in descending order of precedence for design and construction of Pavements:
- (i) The criteria contained in this Article 3;
 - (ii) MTO Special Provisions;
 - (iii) The applicable MTO Directives, MTO Policy Memorandums, and MTO Design Bulletins;
 - (iv) OPSS;
 - (v) MTO Contract Design, Estimating and Documentation (CDED) Manual;
 - (vi) DSM;
 - (vii) Procedures for Estimating Traffic Loads for Pavement Design, 1995, MTO;
 - (viii) MTO Materials Information Report MI-183 “Adaptation and Verification of AASHTO Pavement Design Parameters for Ontario Conditions”;
 - (ix) MTO Ontario’s Default Parameters for AASHTOWare Pavement ME Design Interim Report, 2014;
 - (x) 1993 AASHTO Guide for the Design of Pavement Structures;
 - (xi) Canadian Portland Cement Association – Thickness Design for Streets and Highways;
 - (xii) MTO Pavement Design and Rehabilitation Manual, Second Edition, 2013;
 - (xiii) Embankment Settlement Criteria for Design, July 2, 2010, MTO;
 - (xiv) Ontario Traffic Manual, MTO;
 - (xv) MTO Directive PHM-C-001 The Use of Surface Course Types on Provincial Highways;
 - (xvi) Manual for Condition Assessment of Flexible Pavements – Pavement Performance Monitoring using Automated Pavement Distress Data, November 2015, MTO;

- (xvii) The Formulations to Calculate Pavement Condition Indices, September 2009, MTO;
- (xviii) MTO Standard Drawings;
- (xix) OPSD;
- (xx) American Society for Testing and Materials (ASTM) Standards;
- (xxi) MTO Laboratory Testing Manual; and,
- (xxii) AASHTO Materials Specifications and Standards.

3.2 General Requirements

- (a) DB Co's Pavement structure design requirements for widened, milled or reconstructed components of the Highway Works are provided in this Article 3. The Highway Works paving scope is summarized below:
 - (i) Widened, reconstructed and realigned sections of all Roads within the scope of Highway Works shall be paved by DB Co.
 - (ii) Select ramps shall be reconstructed by DB Co to accommodate the Highway 417 widening.
 - (iii) Any other Roads that are widened, reconstructed or realigned under DB Co's design for Highway Works shall be paved by DB Co.
 - (iv) DB Co shall design all required transitions.
- (b) Acceptable Products
 - (i) All products used on the Highway Works shall meet applicable Project Agreement requirements and, where specified in this Schedule 15-2, Part 9, shall be in accordance with the Designated Sources of Materials List. Without limiting Section 11.20 of the Project Agreement, the use of products that are not on the Designated Sources of Materials List requires the prior written approval of the City, in its sole discretion, and acceptance shall be subject to DB Co demonstrating in its submission sufficient experience with the proposed product and acceptable performance for the proposed product under conditions and applications similar to those existing for this Project.
- (c) DB Co shall be responsible for the construction of all Pavements. A Pavement design has been developed and is detailed below. Without relieving DB Co of its responsibilities to achieve Design Integration, DB Co is required to adopt and incorporate all applicable aspects of the Pavement design specified in this Article 3 into its Highway Works design. DB Co shall design tie-ins (or adapt those detailed herein) to ensure compatibility between the Pavement design and DB Co's geometric design. If deviations to this

Pavement design are required by DB Co, it shall submit an alternative proposed Pavement design to the City in accordance with Schedule 10 – Review Procedure, accompanied by a narrative justifying why a deviation is necessary and how the proposed Pavement will perform relative to the Pavement design detailed herein. These aspects of DB Co’s Pavement design shall be subject to acceptance by the City, at its sole discretion.

- (i) Highway 417 widening, speed change lane widening and shoulder overbuilding:
 - A. Excavate from the existing speed change lane edge of pavement, within the asphalt, towards the shoulder.
 - B. Provide the following courses: 40 mm Superpave 12.5 FC2, 260 mm (50+70+70+70) Superpave 19, 150 mm Granular A, 550 mm Granular B Type II (150 mm on rock subgrades).
 - C. Provide a 50 mm deep by 300 mm wide longitudinal step joint in the upper binder course.
- (ii) Paved Shoulders on ramps and Municipal Roadways:
 - A. Fully paved Shoulders: DB Co shall design and construct fully paved Shoulders by extending the surface course, with the upper binder course extended across the full shoulder width (each side).
- (iii) For location specific Design Criteria for ramp and Municipal Roadway widening, realignment, and new construction, refer to Table 3.2a. Aspects of the paving scope not identified in Table 3.2a shall be in accordance with the general requirements outlined in this Article 3.

| Table 3.2a – Pavement Design Criteria – Ramps and Crossroads | | | | |
|---|---|---|--|--|
| RAMP | EXCAVATION REQUIREMENTS | PAVEMENT COURSES | BASE COURSES | JOINTING |
| MOODIE N-W RAMP (REALIGNMENT OR RECONSTRUCTION) | <ul style="list-style-type: none"> Excavate from the existing edge of pavement | <ul style="list-style-type: none"> 40 mm Superpave 12.5 FC2 140 mm (70+70) Superpave 19.0 | <ul style="list-style-type: none"> 150 mm Granular A 450 mm Granular B Type II | 300 x 70 mm longitudinal step joint in upper binder course |
| MOODIE S-W RAMP (REALIGNMENT OR RECONSTRUCTION) | <ul style="list-style-type: none"> Excavate from the existing edge of pavement | <ul style="list-style-type: none"> 40 mm Superpave 12.5 FC2 140 mm (70+70) Superpave 19.0 | <ul style="list-style-type: none"> 150 mm Granular A 450 mm Granular B Type II | 300 x 70 mm longitudinal step joint in upper binder course |
| HOLLY ACRES ENTRANCE RAMP (NEW CONSTRUCTION) (B) | <ul style="list-style-type: none"> Excavate/fill to subgrade | <ul style="list-style-type: none"> 40 mm Superpave 12.5 FC2 | <ul style="list-style-type: none"> 150 mm Granular A 500 mm | |

| | | | | |
|--|---|---|--|--|
| | | <ul style="list-style-type: none"> • 100 (50 + 50) mm Superpave 19.0 | Granular B Type II | |
| HOLLY ACRES S-W RAMP (REALIGNMENT OR RECONSTRUCTION) | <ul style="list-style-type: none"> • Excavate from the existing edge of pavement | <ul style="list-style-type: none"> • 40 mm Superpave 12.5 FC2 • 140 mm (70+70) Superpave 19.0 | <ul style="list-style-type: none"> • 150 mm Granular A • 450 mm Granular B Type II | 300 x 70 mm longitudinal step joint in upper binder course |
| PINECREST/GREENBANK S-W RAMP (RECONSTRUCTION AS REQUIRED) ^(B) | <ul style="list-style-type: none"> • Remove existing asphalt full depth • For grade raises over existing pavement, provide Granular A to make up profile difference | <ul style="list-style-type: none"> • 40 mm Superpave 12.5 FC2 • 140 (70 + 70) mm Superpave 19.0 | <ul style="list-style-type: none"> • 150 mm Granular A • 450 mm Granular B Type II | <ul style="list-style-type: none"> • 300 x 70 mm longitudinal step joint in upper binder course |
| PINECREST/GREENBANK S-W RAMP (RESURFACING AS REQUIRED) ^(B) | <ul style="list-style-type: none"> • Cold mill 50 mm full width | <ul style="list-style-type: none"> • 50 mm Superpave 12.5 FC2 | | |
| PINECREST/GREENBANK N-W RAMP (RECONSTRUCTION) ^(B) | <ul style="list-style-type: none"> • Remove existing asphalt full depth • For grade raises over existing pavement, provide Granular A to make up profile difference | <ul style="list-style-type: none"> • 40 mm Superpave 12.5 FC2 • 140 (70 + 70) mm Superpave 19.0 | <ul style="list-style-type: none"> • 150 mm Granular A • 450 mm Granular B Type II | <ul style="list-style-type: none"> • 300 x 70 mm longitudinal step joint in upper binder course |
| PINECREST/GREENBANK E-N/S RAMP (RECONSTRUCTION AS REQUIRED) ^(B) | <ul style="list-style-type: none"> • Remove existing asphalt full depth • For grade raises over existing pavement, provide Granular A to make up profile difference | <ul style="list-style-type: none"> • 40 mm Superpave 12.5 FC2 • 140 (70 + 70) mm Superpave 19.0 | <ul style="list-style-type: none"> • 150 mm Granular A • 450 mm Granular B Type II | <ul style="list-style-type: none"> • 300 x 70 mm longitudinal step joint in upper binder course |
| PINECREST/GREENBANK E-N/S RAMP (RESURFACING AS REQUIRED) ^(B) | <ul style="list-style-type: none"> • Cold mill 50 mm full with | <ul style="list-style-type: none"> • 50 mm Superpave 12.5 FC2 | | |
| PINECREST/GREENBANK W-N/S RAMP (INCLUDING ASHLEY STREET FROM BULLNOSE TO GREENBANK) (RESURFACING) ^(B) | <ul style="list-style-type: none"> • Cold mill 90 mm full width | <ul style="list-style-type: none"> • 40 mm Superpave 12.5 FC2 • 50 mm Superpave 19.0 | | |
| HWY 417 FULLY PAVED OUTSIDE SHOULDERS (IF NOT OVERBUILT) | | <ul style="list-style-type: none"> • 40 mm Superpave 12.5 FC2 • 50 mm Superpave 19.0 | | |
| HWY 417 DETOURS AND SHOULDERS USED FOR CONSTRUCTION STAGING (NOT MORE THAN ONE CONSTRUCTION SEASON) (IF | | <ul style="list-style-type: none"> • 40 mm Superpave 12.5 • 140 (70+70) mm Superpave 19.0 | <ul style="list-style-type: none"> • 150 mm Granular A • 450 mm Granular B Type II | |

| | | | | |
|-----------|--|--|--|--|
| REQUIRED) | | | | |
|-----------|--|--|--|--|

Notes:

- A)
 - B) Paving of ramp shoulders shall be in accordance with Clause 3.2(c)(iii) of this Part B.
 - C) New pavement shall tie into existing pavement (constructed under MTO Contract 2017-4031) at Sta. 640+100 or further upstream.
- (iv) DB Co shall undertake the Pavement design and construction for all ramps (or portions thereof), within the scope of Highway Works, including those not otherwise noted in this Article 3, in accordance with the requirements of this Article 3. The design, performance, durability and life span of any Pavement shall be generally consistent with those of other Road segments with preliminary Pavement designs specified herein.
- (d) DB Co shall ensure that milling will not disturb the binder course or extend within 40 mm of waterproofing including, but not limited to, Overpass and Underpass Structures and approach slabs. DB Co shall clean any asphalt debris such that it is not left in the expansion joints or seals.
- (e) Upon review of DB Co's geometric design, the City may, at its sole discretion, instruct DB Co to undertake its own design for any segment of Pavement. DB Co's Pavement design would be in accordance with the requirements of this Article 3, including but not limited to the requirements of Clause 3.2(c).
- (f) DB Co shall ensure that design of new Pavement structures be in accordance with the "1993 AASHTO Guide for the design of Pavement Structures" and AASHTOWare Pavement ME Design software. The AASHTO 93 method will provide structural Pavement thickness design based on traffic volumes. DB Co shall use the ME Design method to assess the suitability of the chosen AASHTO Design for meeting Pavement performance parameters described elsewhere in this Part 9. DB Co shall select AASHTO Pavement Design parameters as described in the MTO Materials Information Report MI-183 "Adaptation and Verification of AASHTO Pavement Design Parameters for Ontario Conditions". DB Co shall implement calibrated models for the AASHTOWare Pavement ME design software or default parameters for any non-calibrated models as described in MTO Ontario's Default Parameters for AASHTOWare Pavement ME Design Interim Report, 2014. DB Co shall submit the use of alternate design methods and parameters in accordance with Schedule 10 – Review Procedure.
- (g) The soil boreholes advanced by DB Co shall be in accordance with the requirements of Ontario Regulation 903 (wells) and its amendments, made under the Ontario Water Resources Act (R.S.O 1990).
- (h) DB Co shall be responsible for designing all proposed slopes in cut and fill areas, including slope geometry, drainage treatments and erosion control measures for embankments and Ditches.

- (i) DB Co shall be responsible for effective subsurface drainage and frost protection, including the provision of subdrains or any other drainage treatments.
- (j) In areas where standard ditching is not feasible, nonstandard ditching shall be utilized to drain the pavement structure. In such cases, DB Co shall provide for the following:
 - (i) The subdrain shall be 150 mm diameter perforated pipe wrapped with geotextile and backfilled with SP 19 stone.
 - (ii) The geotextile shall be Class 1, non-woven with a minimum thickness of 1 mm.
 - (iii) The subdrain shall be placed under the Roadway Shoulder at the start of rounding and to a reasonable depth below the subgrade line.
- (k) A list of locations containing frost susceptible soils known to the Sponsor is provided below. These soils shall be treated as indicated if impacted by Highway Works. DB Co shall ensure positive drainage at each location. DB Co shall re-evaluate the frost susceptibility of the soils at these locations and the suitability of the treatment indicated. DB Co shall determine and use the most appropriate treatment as required such as excavating deeper, longer, and/or wider sections than indicated. DB Co shall not use less stringent treatment than indicated. DB Co shall be responsible to identify any additional locations containing frost susceptible soils, and shall design appropriate treatment.
 - (i) Station 18+990, 22.0 m Lt (WB): Excavate starting at the existing edge of pavement to a depth of 1.2 m between Station 18+825 and Station 19+075 per OPSD 205.060 Transverse Section With Ditch. Backfill with SSM.
- (l) DB Co shall be responsible for including type of backfill, bedding, and requirements for rock excavation for storm sewer design, if necessary.
- (m) Final travelled surfaces within the boundaries of the Highway Works following completion of the Highway Works shall meet the requirements specified in this Article 3.
- (n) DB Co shall ensure that any roads or sections of roads with unfinished pavement including, but not limited to, milled pavement or pavement without surface course that are opened to traffic, including but not limited to public or construction traffic, are designed to carry the expected traffic and to prevent water penetration. DB Co shall maintain and ensure all unfinished pavement opened to traffic are in compliance with the MTO Standards prior to final paving and that adequate surface friction is provided such as diamond grinding. Traffic shall not be on a Superpave 19.0 surface for more than one Winter Period. If construction staging operations result in pavement surfaces that cannot meet this restriction, Superpave 12.5 FC1 shall be substituted for Superpave 19.0 as the hot mix material for that surface. Steel plates shall not be used on the Provincial Highway or ramps as a travelled surface at any time. For milled pavement surfaces, DB Co shall follow the requirements of Part C – Traffic Management and Construction Access of this Part 9.

- (o) DB Co shall ensure that the Pavement surface course is in accordance with MTO's Directive PHM-C-001. This shall be applicable to all flexible Pavements including existing, rehabilitated and new sections of Pavement.
- (p) Pavement Design Report(s) (the "Pavement Design Report(s)") shall be prepared and submitted according to Schedule 10 – Review Procedure. The Pavement Design Report shall include the following minimum requirements:
 - (i) Results of a comprehensive pavement evaluation, field investigation, soils sampling and laboratory testing program;
 - (ii) Rationale for the design parameters selected in adopting or developing the Pavement design;
 - (iii) The methodology (i.e. AASHTO 93 method or AASHTOWare Pavement ME Design software) used for design of pavements, and how the selected layer thicknesses satisfy the minimum thickness based on the layer elastic analysis; and,
 - (iv) Geotechnical design recommendations for Pavements.
- (q) DB Co shall design and construct the Pavement thickness to be uniform throughout all traffic lanes.
- (r) DB Co shall resurface all locations (of permanent surface course asphalt) where scarring of pavement occurs due to the removal of Pavement Markings.
- (s) Pavement design for Shoulder shall comply with Long Combination Vehicle requirements as set out in Clause 2.2(d) of Part B of this Schedule 15-2, Part 9.
- (t) All Pavements that are outside of the Main Line and ramps shall meet City requirements.
- (u) The Design Life of all new flexible Pavement designed by DB Co shall be 40 years starting at the West Works Substantial Completion Date including intervene rehabilitation with initial Design Life of minimum 20 years.
- (v) Crossfall corrections shall be undertaken with Superpave 19.0 hot mix.
 - (i) Padding thickness less than 25 mm shall be placed with the binder course.
 - (ii) Padding thickness greater than 25 mm shall be placed in a separate lift.
 - (iii) The maximum lift thickness shall not exceed 70 mm.
- (w) The following pavement transitions shall be provided at tie-in locations:
 - (i) Highway Works limits: Partial depth remove 40 mm to key-in the new surface course flush with the existing pavement surface over a 15 m length.

- (ii) Highway 417 Ramps: Partial depth remove 40 mm to key-in new surface course flush with existing pavement surface over a 10 m length.
- (iii) Underpass Structures (Pinecrest/Greenbank Road, and Moodie Drive): Provide for a transverse butt joint in the binder course at the Highway Works limits. Partial depth remove 40 mm to key-in new surface course flush with existing pavement surface over a 5 m length per OPSS 313.07.07.03.
- (x) Widening of existing embankments shall be in accordance with OPSD 208.01.
- (y) All topsoil and other post primary consolidation settlement prone soil types shall be removed prior to constructing any embankments and widenings.
- (z) Transition points, where required, shall be carried out as per OPSD 205 series and in accordance to Clause 3.2(x) of this Part 9, Part B.
- (aa) A frost treatment depth of 1.8 m (from top of pavement) shall be utilized when designing frost tapers in accordance with OPSD 205 and OPSD 803 series.
- (bb) DB Co shall submit a list of all Special Provisions applicable to Highway Works Pavements with filled-in inputs in accordance with Schedule 10 – Review Procedure.

3.3 Pavement Structures

- (a) DB Co shall be solely responsible for selecting all Materials except as otherwise specified in this Article 3.
- (b) Granular Materials shall consist of OPSS 1010 Granular A for base course requirements and OPSS 1010 Granular B, Type II for subbase course requirements. All Granular Materials shall be in accordance with OPSS PROV 1010, April 2013. They shall be placed over the full width of the widened road, in accordance with the OPSD 200 series.
- (c) Performance graded PG 64-34 or 70-34 asphalt cement with an Ontario Traffic Category E shall be used for hot mix asphalt on Main Line and ramps. Performance graded PG 64-34 or 70-34 asphalt cement with an Ontario Traffic Category D shall be used for hot mix asphalt on Municipal Roadways.
 - (i) The Superpave 12.5 FC2 and Superpave 12.5 FC1 asphaltic concrete mix (Fine Grade mix specification under SP111F11 is required for 40 mm lift thickness) shall be designed for Traffic Category E.
 - (ii) The asphalt cement content for the Superpave 12.5 FC2 and Superpave 12.5 FC1 mixes shall be minimum 5.0%. The asphalt cement content for the Superpave 19 mix shall be minimum 4.7%.
- (d) Materials containing contaminants that may discharge into the environment and that could have an adverse effect on the natural environment (including air, land or water, and human plant or animal life) shall not be used. Granular Materials shall conform to the

- requirements of Ontario Provincial Standards Specifications OPSS PROV 1010 except that reclaimed hydraulic cement concrete shall not be used.
- (e) Asphaltic concrete shall conform to the requirements of OPSS PROV 1151 – Material Specification for Superpave and Stone Mastic Asphalt Mixtures.
 - (f) Grading and compaction shall conform to the requirements of OPSS PROV 206 – Construction Specification for Grading, and OPSS PROV 501 – Construction Specification for Compacting. Granular Base and Subbase shall be according to OPSS PROV 314.
 - (g) Drainage of the Pavement structure shall be constructed in accordance with the OPSD 300 series.

ARTICLE 4 STRUCTURAL DESIGN CRITERIA

4.1 Order of Precedence

- (a) The design and construction of Structures shall be in accordance with the criteria contained in this Article 4 and the following Reference Documents, and if there is any conflict between the criteria contained in this Article 4 and any Reference Document(s), the following shall apply in descending order of precedence for design and construction of Structures:
- (i) The criteria contained in this Article 4;
 - (ii) CAN/CSA-S6 Canadian Highway Bridge Design Code; including Exceptions to the Canadian Highway Bridge Design Code CAN/CSA-S6 for Ontario;
 - (iii) The applicable MTO Directives;
 - (iv) MTO Policy Memorandums;
 - (v) MTO Design Bulletins;
 - (vi) MTO Special Provisions;
 - (vii) MTO Standard Drawings;
 - (viii) OPSS;
 - (ix) OPSD;
 - (x) MTO Structural Manual;
 - (xi) MTO Design Supplement for TAC Geometric Design Guide for Canadian Roads;
 - (xii) Geometric Design Guide for Canadian Roads (TAC);
 - (xiii) MTO Contract Design, Estimating and Documentation (CDED) Manual;
 - (xiv) Structure Rehabilitation Manual;
 - (xv) Structural Steel Coating Manual;
 - (xvi) Retrofitting of Existing Bridges with Joints to Semi-Integral Abutments, MTO;
 - (xvii) Ontario Structure Inspection Manual;
 - (xviii) Structural Financial Analysis Manual;
 - (xix) Roadside Safety Manual, MTO;

- (xx) Sign Support Manual;
- (xxi) NFPA502;
- (xxii) DSM; and,
- (xxiii) CSA and ASTM Standards.

4.2 General Requirements

(a) Structure Identification Number

- (i) Structure identification numbers as assigned by the City Representative shall be incorporated into the Structures in accordance with MTO standard practices. DB Co shall supply Bridge numeral forms and imprint identification numbers on Structures.

(b) Checking of Structural Design

- (i) DB Co shall engage a Checking Team, the qualifications of which are described in Clause 2.10 of Part A of this Schedule 15-2, Part 9, to perform design checks of Structures. The design checks shall be performed by a designer in the Checking Team that is independent of the Design Team.
- (ii) DB Co shall engage an Independent Checking Team responsible for certifying the design of Significant and Complex Structures in accordance with Attachment 1 of Schedule 10 – Review Procedure. The following expertise shall be included in the expertise of the Independent Checking Team:
 - A. Recognized expertise in the disciplines of geotechnical, foundation and structural engineering;
 - B. Recognized expertise in the analysis and design of all aspects of Significant and Complex Structures;
 - C. Recognized expertise in the review of designs to ensure compliance with all Applicable Law pertaining to the environment, and other environmental requirements; and,
- (iii) The Checking Team shall be responsible for:
 - A. Conducting design checks to ensure that the design of Structures meets performance expectations outlined in the Project Agreement and that such design is carried out according to accepted industry standards and MTO Standards;
 - B. Verifying that ‘use of engineering judgement’ is validated by appropriate experience. The independent check Engineer shall confirm, in each

- instance, that the use of the Simplified Methods of Analysis is applicable as per CAN/CSA-S6;
- C. Undertaking supplementary analyses to independently verify and confirm the appropriateness of design methodologies and assumptions used; and,
 - D. Identifying deficiencies in the design and analyses, and notifying DB Co and the City Representative of unresolved deficiencies.
- (iv) All structural drawings shall be signed and sealed by a member of the Checking Team and a member of the Design Team, in accordance with the requirements of this Project Agreement.
- (c) Existing and As-Built Structure LiDAR Scans
- (i) Work under this item includes the acquisition and processing of 3D point cloud data for all existing and new Structures constructed as part of Highway Works. Point cloud data shall be collected using a high density stationary terrestrial scanner for the following:
 - A. Existing Structures within the Highway Works limits (in situ prior to removal);
 - B. New fully constructed Bridge Structures on their temporary supports in the staging area (within three weeks prior to move); and,
 - C. New fully constructed Bridge Structures in design location (after move).
 - (ii) LiDAR system equipment shall be used to acquire all existing and as-built data. Scans shall be performed using a stationary terrestrial scanner capable of achieving requested point specifications in accordance with the following:
 - A. Point Spacing < 5.1mm
 - B. Point relative accuracy of < 5.1 mm
 - C. Absolute relative accuracy of < 10.1 mm
 - (iii) Scans should be of sufficient point density to accurately measure and analyze from the point cloud the following features:
 - A. Bridge girders, bearing seats, abutment walls, barrier walls and deck; and,
 - B. Visible cracking or deformation on the Structure components.
 - (iv) Terrestrial scans shall be conducted from a scanner mounted on a tripod or other stationary mount.

- (v) Scans shall be spatially located using established registration points or targets which meet absolute accuracy specification.
- (vi) Scan range shall not exceed 30 m.
- (vii) Scans shall be conducted in locations where shadowing and obstacle interference is eliminated or minimized.
- (viii) Scans shall be conducted during optimal environmental conditions to ensure high quality returns of data.
- (ix) Quality Control surveys shall be conducted to validate scan accuracy.
- (x) DB Co shall provide fully processed registered point cloud in LAS format version 1.4 to requested specifications for each Structure. Point cloud shall include positional, intensity and RGB data.
- (xi) DB Co shall provide Quality Control documents validating scan accuracy requirements are met.
- (xii) DB Co shall submit Structure Survey Reports to the City in accordance with Schedule 10 – Review Procedure. A separate survey report shall be submitted for each Structure scan and shall include:
 - A. Survey and scan details including field and office methodology; and,
 - B. A statement of certification, signed by a Professional Engineer or Land Surveyor registered in the province of Ontario, verifying the submitted deliverables are to requested accuracy tolerances and specifications.

4.3 Structures

- (a) This Article 4 includes the structural design and construction requirements for all new Structures and rehabilitation, widening, lengthening, strengthening and/or replacement of existing Structures, including but not limited to Bridges (which include Underpasses, Overpasses, railway grade separations, and Retaining Walls), Noise Barriers, single cell Culverts with spans equal to or greater than 3.0 m, multi-cell or twin Culverts with combined spans equal to or greater than 3.0 m, Overhead Sign Support Structures and mid-size VMS Signs and high mast pole footings.
- (b) For each Structure to be designed, or rehabilitated as detailed in Clause 4.10 of this Part B, DB Co shall submit to the City Representative individual Structure Survey Reports. The Structure Survey Reports shall be signed and sealed by structural Engineers who are members of the Design Team, and shall include the following minimum requirements.
 - (i) DB Co shall detail the construction, or rehabilitation methodology, identifying activities to be completed at each stage of construction.

- (ii) DB Co shall identify the standards and codes consulted in its design and shall detail how its design adheres to the requirements presented in this Schedule 15-2.
 - (iii) DB Co shall include a General Arrangement Drawing, which shall also be submitted in CAD format. The General Arrangement Drawings shall be prepared according to the MTO Structural Manual, and shall include the following additional minimum requirements (as applicable):
 - A. Embankment cone configuration;
 - B. Rehabilitation details;
 - C. Widening/lengthening requirements;
 - D. Identification of components to be removed or replaced;
 - E. Location and value of the minimum horizontal and vertical clearances;
 - F. Interface with existing Structure(s);
 - G. Interface with utilities;
 - H. Attached or supported utilities; and
 - I. Deep foundation type, size and design criteria.
 - (iv) DB Co shall include a future rehabilitation methodology for new Structures and supporting calculations/analysis that demonstrates that no temporary support would be required.
 - (v) Design drawings and calculations shall be appended to the Structure Survey Reports.
 - (vi) References to applicable section(s) of the Geotechnical Report shall be included.
 - (vii) For proprietary precast Culverts, the responsible Professional Engineer shall certify the design and construction of the precast Culverts.
 - (viii) DB Co shall include an evaluation of the capacity of the piles to satisfy a 75 year Service Life, considering the present condition and future corrosion losses. This section shall provide the methodology and results associated with the Foundation engineering assessments undertaken by DB Co in accordance with Clause 5.2 of this Part B.
- (c) Design Criteria
- (i) Design Loads

- A. Design loads shall be as specified in CAN/CSA-S6 and the MTO Structural Manual. The design of Overheads shall also consider loads due to system-wide elements such as electrification, signalization and communication equipment.
 - B. DB Co shall assume the design lanes as per CAN/CSA-S6 to extend across each Bridge deck between the two most exterior Barrier walls.
- (ii) Design and Service Life
 - A. All new and rehabilitated Structures and components thereof in the Highway Works shall have a minimum Design Life of 75 year starting at the Highway Substantial Completion Date.
 - B. The Service Life of all main structural components of new Structures (including but not limited to Foundations, piers, abutments, Superstructures, Decks, wingwalls, Retaining Walls including wall components such as wall facings and anchorages) shall be 75 year starting at the Highway Substantial Completion Date.
 - C. The Service Life of all existing and rehabilitated substructure components (including but not limited to Foundations, pier and abutments) shall be 40 year starting at the Highway Substantial Completion Date.
 - D. Time dependent design calculations shall use a Service Life of 75 year.
- (iii) Clearances
 - A. Horizontal and vertical clearances for new Overpass/Underpass Structures shall be provided and maintained in accordance the MTO Design Supplement for TAC Geometric Design Guide for Canadian Roads.
 - B. New Overhead Structures and existing Overpass/Underpass Structures being modified to Overhead Structures that span the alignment shall meet the minimum horizontal clearance requirements for the Vehicle, in accordance with Clause 2.12 of Schedule 15-2, Part 2.
 - C. New Overhead Bridge Structures which span the alignment shall be designed to ensure they achieve a minimum vertical clearance of 4.5 m from the TOR to the underside of the Structure.
 - D. Existing Overpass/Underpass Bridge Structures being modified to Overhead structures shall achieve a minimum vertical clearance of 4.5 m from the TOR to the underside of the Structure.
- (iv) Aesthetics

- A. Bridges shall be designed in accordance with the Aesthetic Guidelines for Bridges using a “Level 1” classification, with the following clarifications:
 - i. Aesthetic improvements to the abutments and pier columns shall be per the MTO Context Sensitive Design requirements as detailed in Appendix F of this Part 9.
 - ii. The following Overhead Structures shall be designed using a “Level 3” classification:
 - i. Highway 417 Westbound Off-Ramp at Pinecrest Road (SN015160);
 - ii. Highway 417 Westbound On-Ramp at Pinecrest Road (SN015170);
 - iii. Pinecrest Road Bridge (SN015180);
 - iv. Highway 417 S-W On-Ramp at Moodie Drive (SN116370); and,
 - v. Highway 417 N-W On-Ramp at Moodie Drive (SN116330).
 - B. Retained Soil Systems shall be designed in accordance with the performance and appearance categories of Retained Soil Systems as defined in the MTO document “RSS Design Guidelines”.
 - C. Aesthetics for Retaining Walls, Noise Barriers, and other structural components shall be in accordance with Article 9 of Part B of this Schedule 15-2, Part 9 and the MTO Context Sensitive Design requirements as detailed in Appendix F of this Part 9.
- (v) Corrosion Protection
- A. DB Co shall provide corrosion protection according to CAN/CSA S6 and the Structural Manual. Where there are conflicts in the clearance requirements where premium reinforcement is to be used, Table 2.8.2 of the Structural Manual shall apply.
 - B. The grade for Superstructure members shall be 350 AT Category 3 for plate and 350 A Category 2 for rolled sections. Miscellaneous steelwork (including railings, Deck joints, restrainers bolts, anchor bolts, drains, embedment in concrete, fence) shall be hot-dipped galvanized in accordance with CAN/CSA-G164-M92. All non-structural steel shall be hot-dipped galvanized.

- C. GFRP is only to be used in Barrier walls on structures that meet the following criteria:
 - i. Is an Overpass Structure; and,
 - ii. Has an AADT of less than or equal to 2000.
 - D. Any reference to Grade I GFRP shall be deleted in its entirety, including anything listed in Reference Documents.
 - E. Stray current corrosion control for all Overheads shall be in accordance with Schedule 15-2, Part 3, Article 12 – Corrosion Control.
- (vi) Deck Wearing Surface Systems
- A. The Deck wearing surface systems are defined as the replaceable surfaces and waterproofing elements that protect the Bridge Decks, from abrasion and the ingress of water and chlorides.
 - B. Deck wearing surface systems shall be provided on all Bridges.
 - C. Deck wearing surface systems shall be designed to prohibit water penetration into the structural Deck over the Service Life of the Deck wearing surface system.
 - D. The wearing surface for all Bridge Decks shall consist of a hot applied rubberized asphalt waterproofing system with protection board and asphalt Pavement in accordance with OPSS PROV 914.
 - E. For Deck wearing surface systems where the Deck wearing surface cannot be rehabilitated without damaging the waterproofing elements, the Deck wearing surface and waterproofing and the drainage elements of the Deck wearing surface system shall have the same Service Life and shall be repaired as per OPSS PROV 914.
- (vii) Bridge Decks
- A. DB Co shall ensure that the Bridge Deck systems, including the interaction of Deck concrete, concrete cover, reinforcement, Deck wearing surface system, joints and Deck drainage details, are such that the Bridge Decks meet the Service Life requirements of Highway Works.
 - B. Cantilevered Structures or steel grated systems are prohibited for new repurposed Underpass Bridges.
 - C. Parapet Walls shall be integral with the Bridge Deck.
- (viii) Bridge Deck Joints

- A. Bridge Decks shall be designed to minimize the occurrence of joints.
 - B. Integral and semi-integral abutments shall make provision for movement at the interface between the approach slab and the approach Road Pavement construction.
 - C. All components of Modular Expansion Joints shall be designed such that they can be individually replaced without damaging the joints.
 - D. In-span and mid-span expansion joints shall not be used.
 - E. Where Deck sections flare to accommodate more or fewer lanes, expansion joints shall be carried across the full width of the Deck.
- (ix) Deck Drainage
- A. Bridge Deck Drainage shall be designed in accordance with the Highway Drainage Design Standards. A Deck drainage discharge system consisting of downpipes shall be provided where the discharge cannot meet the conditions of Structural Manual, Clause 9.2.1. Runoff water from the Road surface of Bridges shall be discharged in accordance with the drainage and environmental requirements of Highway Works.
- (x) Approach Slabs
- A. Approach slabs shall be provided at all Bridge abutments and shall be designed to mitigate anticipated settlements.
 - B. Sleeper slabs shall be considered as defined in MTO Structure Manual.
- (xi) Slope Protection
- A. Concrete slope protection in accordance with MTO Structure Manual shall be provided on the sloped embankments in front of the abutments under all Bridges.
- (xii) Piers
- A. Pier design protection shall be in compliance with the [REDACTED].
- (xiii) Water Ingress
- A. Water ingress into or onto the Substructure or abutment wall backfill from the Superstructure above shall be prevented.
- (xiv) Barriers
- B. Structures shall be provided with Barriers as required by CAN/CSA-S6.

(xv) Bearings

- A. Sufficient space shall be allowed at the Bearings for inspection, maintenance, and replacement of the Bearings including provisions for jacking.
- B. Bearings shall be restrained from unintended movement.
- C. Elastomeric plain and steel laminated Bearings shall be tested according to OPSS PROV 1202, as amended by Special Provision 922F01.

(xvi) Pre-stressed and Post-tensioned Concrete

- A. Un-bonded pre-stressing cables are not permitted except at the ends of pre-stressed girders. Un-bonded post-tensioned cables are not permitted.

(xvii) Hydraulic Design

- A. DB Co shall undertake all hydrology/hydraulic analyses and design for Structures. This shall include all hydrotechnical modeling, analyses, and design to ensure that all Foundations, adjacent facilities, Utilities, and water course banks are protected from scour.
- B. DB Co shall identify, design, and construct all scour protection, erosion control, and stabilization necessary to prevent damage to Structures, Roads, or property affected by the Highway Works.

(xviii) Steel Girder Bridges

- A. Steel girders are not permitted for the Superstructure of the Highway 417 Bridges.

(xix) Precast Deck Panels

- A. Full depth and partial depth Deck panels may only be considered for use at the following Structure locations:
 - i. Pinecrest Road Structure (SN015180);
 - ii. Holly Acres Road Bridge (SN115230);
 - iii. Moodie Drive Bridge (SN116350);
 - iv. Highway 417 Westbound Off-Ramp at Pinecrest Road (SN015160);
 - v. Highway 417 Westbound On-Ramp at Pinecrest Road (SN015170);

- vi. Highway 417 S-W On-Ramp at Moodie Drive (SN116370); and,
 - vii. Highway 417 N-W On-Ramp at Moodie Drive (SN116330).
- (xx) Traffic Staging for Future Bridge Deck Rehabilitation
- A. Bridges shall be designed and detailed such that they can be rehabilitated without major disruption to traffic.
 - B. DB Co shall demonstrate that rehabilitation can be carried out with no more than one lane in each direction being taken out of service.
- (xxi) Provision for Illumination, Electrical, and ATMS
- A. The Bridges shall include the embedded conduit, lighting pole anchorage, pole bases and junction boxes meeting MTO or the local municipal lighting standards as required. DB Co shall coordinate the lighting design with the local municipality.
 - B. The Bridges shall include provisions for ducting, conduits and PVC junction boxes to accommodate future Underpass illumination where required by the Electrical Design Manual.
 - C. Ducting, conduits and junction boxes on Bridge Decks are only permitted in the Barrier walls. A maximum of two ducts per Barrier wall are permitted.
 - D. Surface mounted conduits are only permitted on existing Structures in accordance with the MTO Structural Manual Division 2, Section 16.3.1 where no additional widening or new Barrier walls are being constructed. Conduits shall be embedded for all new Structures or widened portion of Structures. If there is insufficient space to embed all conduits in new and existing Structures, the conduits shall be provided underground.
- (xxii) Structures listed below shall be classified as follows for the purpose of assigning an Importance Category under the CAN/CSA-S6:
- A. Overpasses: Major Route Bridges
 - B. Underpasses and Overheads: Other Bridges
- (xxiii) Concrete materials shall be in accordance with OPSS PROV 1350 and concrete construction shall be in accordance with OPSS PROV 904.
- (xxiv) Collision Protection
- A. Piers supporting new and existing Bridges over the alignment and with a clear distance of less than 6m from the centerline of a Track shall be of

heavy construction or shall be protected by a reinforced concrete crash wall.

- i. Crash walls shall have a minimum height of 1200mm above the top of rail. The crash wall shall be at least 600mm thick and at least 3.5m long. When two or more columns compose a pier, the crash wall shall connect the columns and extend at least 900mm beyond the outermost columns parallel to the Track. The crash wall shall be anchored to the footings and columns, if applicable, with adequate reinforcing steel and shall extend to at least 1200mm below the lowest surrounding grade.
- ii. Piers shall be considered of heavy construction if they have a cross-sectional area equal to or greater than that required for the crash wall and the larger of its dimensions is parallel to the Track.

(xxv) The OCS foundation and structural design shall include, but not be limited to, consideration of wind, ice accretion, wire tensioning forces, upward force to the contact wire or contact rail, and the effect of wire break. The OCS foundation shall be designed in conjunction with the requirements in Schedule 15-2, Part 3, Clause 14.4.

4.4 New Retaining Walls

- (a) See Article 5 – Geotechnical/Foundation Design Criteria of Part B of this Schedule 15-2, Part 9 for additional requirements for Retaining Walls.

4.5 Sign, Traffic Signal and Lighting Structures

- (a) DB Co shall design, fabricate and install Structures for Signs, traffic signals, and lighting in accordance with CAN/CSA-S6 and applicable Reference Documents.
- (b) Camera support structures shall have a maximum sway of 25 mm at 65 km/h wind speed.
- (c) Sign support Structures shall be designed according to MTO Sign Support Manual.

4.6 Noise Barriers

- (a) Noise Barriers shall be designed and constructed in accordance with CAN/CSA-S6, SP 760F01 and Design Criteria specified in this Section. Noise Barrier aesthetics requirements are governed by Article 9 of Part B of this Schedule 15-2, Part 9 and the MTO Context Sensitive Design requirements as detailed in Appendix F of this Part 9.

4.7 Culverts

- (a) Culverts shall be designed to ensure accessibility for inspection and maintenance. For clarity, accessibility includes accessibility for personnel to enter a Culvert to conduct inspection and maintenance activities.

- (b) Wire mesh shall not be substituted as reinforcement for new Culverts or extension of existing Culverts.

4.8 Openness Ratio

- (a) For the smaller watercourse crossings, a minimum height of 1.2 m and a minimum Openness Ratio of 0.05 shall be provided for the Culverts in order to facilitate movement of small and medium sized mammals.
- (b) The Openness Ratio for the above shall be based on the structural dimensions relative to dry ground/structural surface/platform beside the watercourse that can be traversed by wildlife during the 2 year flood flow level. Culvert dimensions shall be confirmed during the design stage in Coordination with DB Co's terrestrial specialist.

4.9 Structural Widening and Rehabilitation

- (a) DB Co shall perform structural widening and rehabilitation as part of the Highway Works such that all Structures meet and/or exceed the recommendations set out in the Project Agreement.
- (b) A general outline of the rehabilitation and widening work to be done for the key Structures is given below:

- (ii) Graham Creek Culvert (Site 3-537/C), Lat:45.345120, Long: 075.813220

- A. DB Co's comprehensive rehabilitation and extension of Graham Creek Culvert shall accommodate a new Highway 417 on-ramp and include repairs of deteriorated concrete on exposed surfaces of the existing Culvert barrel. The Culvert extension will be a cast-in-place box Culvert with the same hydraulic opening as the existing box Culvert and will utilize environmental protection measures and temporary flow passage system during construction. The Culvert extension shall be doveled into the existing Structure. The top slab of the Culvert extension is to be waterproofed and the waterproofing shall extend 1 m onto the existing Culvert such that the construction joint between the new and existing Culverts is covered. DB Co shall perform concrete repairs on all delaminated and spalled areas on all exposed concrete surfaces on the existing Culvert barrel and outlet header walls and wingwalls.
- B. The culvert extension shall have a minimum Design Life of 75 years starting at the Highway Substantial Completion Date. The rehabilitated components of the existing culvert shall have a minimum Service Life of 25 years starting at the Highway Substantial Completion Date.

- (iii) Stillwater Creek Culvert at LMSF (SN 110180)

- A. DB Co shall review the limits of this existing Culvert, which crosses Highway 417 at the site of the proposed LMSF. Any extensions required

for this Structure shall be designed and constructed by DB Co. Guideway structures crossing Stillwater Creek shall exhibit at minimum the light filtering characteristics of an open deck Bridge Structure. Culverts of any type are not acceptable.

4.10 Description of New Overhead Structures

- (a) DB Co shall design and construct the following overhead structures as part of the Highway Works.
 - (i) Highway 417 Westbound Off-Ramp at Pinecrest Road (SN015160)
 - A. Design and construct a new Overhead Bridge to carry the Westbound Off-Ramp at Pinecrest Road over the alignment. The new Bridge shall accommodate the following:
 - iii. The proposed Off-Ramp roadway cross section in accordance with Schedule 15-2, Part 9, Clause 1.3 on the Structure; and,
 - iv. EB and WB alignment, including Emergency walkways, under the Structure.
 - (ii) Highway 417 Westbound On-Ramp at Pinecrest Road (SN015170)
 - A. Design and construct a new Overhead Bridge to carry the Westbound On-Ramp at Pinecrest Road over the alignment. The new Bridge shall accommodate the following:
 - i. The proposed On-Ramp roadway cross section in accordance with Schedule 15-2, Part 9, Clause 1.3 on the Structure; and,
 - ii. EB and WB alignment, including Emergency walkways, under the Structure.
 - (iii) Pinecrest Road Structure (SN015180)
 - A. Design and construct a new Overhead structure to carry Pinecrest Road over the alignment. The new Structure shall accommodate the following:
 - i. The proposed Pinecrest Road roadway cross section in accordance with Schedule 15-2, Part 9, Clause 1.3 on the Structure; and,
 - ii. The EB and WB alignment, including Emergency walkways.
 - iii. The design of the Structure shall protect for and accommodate a future grade raise of up to 500 mm at the adjacent Pinecrest Road Highway 417 bridge location.

1. Buried structures, abutments and retaining walls shall, as a minimum, be designed to support an additional 500mm of granular material above the structure.
 2. Bridge girders and bridge deck shall be detailed to accommodate future lifting and reuse as part of the future elevated Pinecrest Road Structure (SN015180). Integral bridges shall not be used at this location. This lifting and reuse, along with modifications to the abutments and retaining walls, will have to be completed concurrently during a rapid bridge replacement of the Pinecrest Road Highway 417 bridge location. DB Co shall demonstrate in the PFDD submission how this future grade raise and modification of the bridge can be designed and constructed without impacting the LRT operation during the construction.
 3. Foundation design loading shall include appropriate allowances for the future elevated Pinecrest Road Structure (SN015180).
- B. Design of the Structure shall be coordinated with the design of Pinecrest Station. Refer to Schedule 15-2, Part 4, Article 3 – Station Specific Architectural Design Criteria.
- C. Provide pedestrian access to Pinecrest Station in accordance with the requirements in Schedule 15-2, Part 6, Article 4 – Site Specific Desired Outcomes.
- D. Construction of the new Structure shall be staged in accordance with the requirements of Schedule 15-2, Part 7, Article 2 – Existing Municipal Roadways.
- (iv) Highway 417 S-W On-Ramp at Moodie Drive (SN116370)
- A. Design and construct a new Overhead Bridge to carry Highway 417 S-W On-Ramp at Moodie Drive over the alignment. The new Bridge shall accommodate the following:
- i. The proposed On-Ramp cross-section in accordance with Clause 6.19 of Schedule 15-2 Part 2 on the Structure.
 - ii. The proposed EB and WB LRT alignment including an Emergency walkway and an allowance for a future MUP on the north side of the alignment under the Structure.
- (v) Highway 417 N-W On-Ramp at Moodie Drive (SN116330)

- A. Design and construct a new Overhead Bridge to carry Highway 417 N-W On-Ramp at Moodie Drive over the alignment. The new Bridge shall accommodate the following:
 - i. The proposed On-Ramp cross-section in accordance with Clause 6.19 of Schedule 15-2 Part 2 on the Structure.
 - ii. The proposed EB and WB LRT alignment including Emergency walkway and an allowance for a future MUP on the north side of the alignment under the Structure.
- (vi) Holly Acres Road Bridge (SN115230)
 - A. Design and construct a new Overhead Bridge to carry the alignment over Holly Acres Road. The new Bridge shall accommodate the following:
 - i. The proposed EB and WB alignments, including an Emergency walkway on the Structure.
 - ii. The proposed Holly Acres Road roadway cross section in accordance with Clause 6.19 of Schedule 15-2, Part 2, pedestrian facilities and Transitway access to the Highway 417 on-ramp under the Structure.
- (vii) Moodie Drive Bridge (SN116350)
 - A. Design and construct a new Overhead Bridge to carry Moodie Drive over the proposed alignment. The new Bridge shall accommodate the following:
 - i. The proposed Moodie Drive cross-section in accordance with Clause 6.19 of Schedule 15-2, Part 2 on the Structure.
 - ii. The proposed EB and WB alignment including an Emergency walkway and an allowance for a future MUP on the north side of the alignment under the Structure.
 - B. The proposed Moodie Drive overpass shall have a raised concrete sidewalk on the West side of the Moodie Drive, in accordance with Article 6 - Roadways, Bus Terminals and Lay-Bys, of Schedule 15-2, Part 2.
 - C. Install Bridge Structure fencing in accordance with Schedule 15-2, Part 6, Article 2 – Design Criteria.

ARTICLE 5 GEOTECHNICAL/FOUNDATION DESIGN CRITERIA

5.1 Order of Precedence

- (a) DB Co's design and construction of all Foundation work shall be in accordance with the criteria contained in this Article 5 and the Reference Documents identified below. If there is any conflict between the criteria contained in this Article 5 and any the Reference Documents below, the following shall apply in descending order of precedence:
- (i) The criteria contained in this Article 5;
 - (ii) MTO Special Provisions;
 - (iii) The applicable MTO Directives, MTO Policy Memorandums, and MTO Design Bulletins;
 - (iv) OPSS;
 - (v) MTO Contract Design, Estimating and Documentation (CDED) Manual;
 - (vi) Guidelines for Foundation Engineering – Tunneling Specialty for Corridor Encroachment Permit Application;
 - (vii) MTO Laboratory Testing Manual, February 2016;
 - (viii) RSS Design Guidelines, MTO, September 2008;
 - (ix) Embankment Settlement Criteria for Design, July 2, 2010, MTO;
 - (x) MTO Guidelines for Rock Fill Settlement and Rock Fill Quantity Estimates, September 2010;
 - (xi) MTO Sign Support Manual, April 2015;
 - (xii) MTO Guidelines for the Design of High Mast Pole Foundations, 4th Edition, May 2004;
 - (xiii) Integral Abutment Guidelines and Semi-Integral Abutment Guidelines, MTO;
 - (xiv) MTO Standard Drawings;
 - (xv) OPSD;
 - (xvi) DSM;
 - (xvii) CHBDC, for Highway applications;
 - (xviii) Canadian Foundation Engineering Manual;

- (xix) Guideline for Professional Engineers Providing Geotechnical Engineering Services, published by Professional Engineers of Ontario;
- (xx) ASTM Standards; and,
- (xxi) Geotechnical Resistance Factors – Highway 417 Widening and Rehabilitation, Thurber Engineering, June 28, 2017.

5.2 Subsurface Investigations and Testing Prior to Construction

- (a) DB Co shall, notwithstanding the requirements specified in this Clause 5.2 of Part B of Schedule 15-2, Part 9, be responsible for undertaking sufficient additional subsurface investigations to permit the detail design and construction of Highway Works. Results of investigations shall be provided to the City for information purposes promptly upon receipt of same and shall include a Geocres number for the MTO Foundation Database.
- (b) Boreholes shall extend to refusal or to a competent stratum that will provide sufficient axial resistance or bearing resistance for the design of structure foundations or sufficient bearing resistance to settlements and/or instability for the design of embankment to meet the design requirements.
- (c) For Temporary Protection System and Temporary Cofferdam, boreholes shall be extended to depth to provide sufficient tip resistance, lateral resistance and resistance to basal heave.
- (d) Refusal is defined by material for which the resistance measured by the Standard Penetration Test (SPT) exceeds 100 blows per 0.3 m of penetration.
- (e) Where possible, explorations shall be located to minimize disruption to traffic, environmentally sensitive areas and not to interfere with private property.
- (f) For re-use of existing Foundation, a minimum of one borehole is required at each final Bridge pier and abutment location, advancing to a minimum of 3 m below refusal. If bedrock is encountered, the borehole shall be cored for a minimum depth of 3 m. Additional boreholes, sufficient in number to permit the detail design and construction of Structure Foundations shall be carried out as required and, shall also be located as needed at such locations and at retaining Structure locations, within Bridge approaches, and in cut/fill sections.
- (g) For design of new or replacement Foundation, a minimum of two boreholes are required at each Foundation element advancing to a minimum of 3 m below refusal. If bedrock is encountered, a minimum of 50% of explorations shall be cored for a minimum depth of 3 m.
- (h) A minimum of one borehole within 20 m of the abutment shall be advanced at each Bridge approach location. The borehole shall be advanced to 3 m into a competent stratum.

- (i) A minimum of two boreholes shall be advanced at each Structural Culvert, one at the inlet and one at the outlet location. For greater clarity, at locations where separate Structural Culverts are designed along the same waterway, such as under each carriageway, each of those Structural Culverts requires a minimum of two boreholes. If bedrock is encountered, bedrock shall be cored for a minimum depth of 3 m.
- (j) Minimum borehole spacing along retaining wall shall not exceed 50 m and one borehole at each end of the retaining structure shall be drilled. The boreholes shall be advanced to 3 m into a competent stratum.
- (k) A minimum of one borehole shall be advanced for each Overhead Sign Support Structure Foundation and for each High Mast Lighting Foundation. The borehole shall be advanced to 3 m into a competent stratum. If bedrock is encountered, the rock shall be cored for a minimum depth of 3 m.
- (l) Minimum borehole requirements for the drainage crossing installation by trenchless method are:
 - (i) One borehole at each end (entry and exit portal);
 - (ii) A minimum of one borehole shall be placed between the embankment crest and the ends of the culvert (or sewer);
 - (iii) Borehole spacing along the tunnel alignment shall not exceed 50 m;
 - (iv) All boreholes shall be located outside but within 2 m of the drainage crossing's alignment;
 - (v) Boreholes shall be advanced to a depth of triple the drainage crossing diameter below invert; and,
 - (vi) If bedrock is encountered, bedrock shall be cored for a minimum depth of 3 m below the invert of the drainage crossing.
- (m) Minimum borehole spacing along the alignment of Noise Barrier shall not exceed 50 m. The borehole shall be advanced 3 m below competent stratum. If bedrock is encountered, the rock shall be cored for a minimum depth of 3 m.
- (n) Boreholes shall be advanced at 50 m spacing in high fill and deep cut sections when fill height and cut depths exceed 4.5 m. The boreholes shall be advanced 3 m into a competent stratum or 10 m below the base of the fill or 6 m below the base of the cut, whichever is less. If bedrock is encountered coring is not required.
- (o) All field and laboratory testing shall be carried out in accordance with applicable MTO Standards.
- (p) Field testing locations shall be consistent with the Coordinate system identified in Part A of this Schedule 15-2, Part 9.

- (q) All aspects of implementation of geotechnical test holes (including, but not limited to, planning, licensing, construction, maintenance, abandonment, and reporting) shall be in accordance with Ontario Regulation 903 (Wells) and its amendments made under the Ontario Water Resources Act (R.S.O. 1990).
- (r) Fieldwork shall be carried out in accordance with the OHSA and MTO Occupational Health and Safety Field Guide for Engineering Functions.

5.3 Structure and Utility Protection

- (a) DB Co shall be responsible for the protection of all structures and Utilities that may be affected by the Project Operations and the repair of any structures and Utilities damaged by the Project Operations. DB Co shall follow and satisfy the requirements identified in Part 2, Article 9 – Protection of Existing Adjacent Structures.

5.4 Foundation Design and Construction

- (a) Foundation engineering design shall be carried out in accordance with the most recent edition of the CHBDC and Canadian Foundation Engineering Manual, as applicable, and the Reference Documents in Clause 5.1 of Part B of this Schedule 15-2, Part 9.
- (b) Foundations for the integral abutments shall be designed in accordance with Integral Abutment Guidelines, MTO.
- (c) Foundations for High Mast Lighting shall be designed in accordance with the latest edition of the CHBDC, Canadian Foundation Engineering Manual and Guidelines for the Design of High Mast Pole Foundations.
- (d) Foundations for sign support structures shall be designed in accordance with the latest edition of the CHBDC, Canadian Foundation Engineering Manual and MTO Sign Support Manual,
- (e) Foundation design and construction shall consider existing Utilities or buildings. Excessive settlement that can compromise the performance and serviceability of existing Utilities or buildings shall be prevented.
- (f) DB Co shall carry out a detailed site specific seismic Hazard assessment for Sites where the subsoil has been screened and flagged as potentially liquefiable. Detailed seismic Hazard assessment shall be performed per CHBDC using a rigorous dynamic Site response analysis.
- (g) Physical and mechanical properties and erodibility of Soil/Rock shall be provided to the Drainage/Hydrology Engineer for scour analysis. The Geotechnical Engineer shall review the Drainage/Hydrology Report and confirm that the proposed countermeasures for scour protection are sufficient to ensure the performance of the Structure Foundations.

5.5 Permanent Retaining Walls/Structures

- (a) Reinforced soil slopes shall be considered as Retaining Walls in accordance with the “RSS Design Guidelines, MTO”, CHBDC and Canadian Foundation Engineering Manual.
- (b) Both the proprietary retained soil system and conventional retaining structures shall be designed for durability and shall satisfy sliding, bearing resistance, overturning and global stability with appropriate factors of safety, in accordance with CHBDC and Canadian Foundation Engineering Manual, and RSS Design Guidelines, MTO. The internal stability of the proprietary retained soil system shall also be checked.
- (c) Proprietary Retained Soil Systems not prequalified on the DSM shall be approved by the MTO RSS Committee on a project specific basis. DB Co shall allow six weeks for each iteration of review.
- (d) Proprietary Retained Soil Systems, if used, shall be designed and constructed in accordance with the “RSS Design Guidelines, MTO” and applicable Special Provisions. Walls required to retain Bridge embankments adjacent to Bridge Foundations are considered abutment walls. RSS walls shall not be used as True Abutments where True Abutments are defined by “RSS Design Guidelines, MTO”.
- (e) Gabion baskets shall not be utilized as retaining structures within the MTO ROW.
- (f) Design of all permanent retaining structures and Barriers shall allow for full-depth replacement of Pavements.
- (g) Design of all permanent retaining structures shall eliminate pressures generated by frost action.
- (h) At each side where construction of a Retained Soil System is considered, DB Co shall engage a Geotechnical Engineer to evaluate the suitability of the site for use of the Retained Soil System that satisfies the intended purposes and to consider the anticipated ground movement or settlement and global stability. Based on the findings of this evaluation, DB Co shall provide design details of the ground improvement method, to accelerate the consolidation settlement and limit the secondary compression and/or to strengthen the existing soils.

5.6 Permanent Cut and Fill Slopes

- (a) Permanent cut and fill slopes shall be designed to:
 - (i) Be compliant with the CHBDC;
 - (ii) Provide an applicable factor of safety against global slope failure according to the Canadian Foundation Engineering Manual;
 - (iii) Be protected against surficial erosion and shallow surface failures;

- (iv) Control discharge of surface water and subsurface seepage;
 - (v) Allow for regular maintenance of the slope surface;
 - (vi) Satisfy short-term stability during construction using appropriate undrained strength parameters;
 - (vii) Satisfy long-term stability using effective strength parameters; and,
 - (viii) Satisfy embankment settlement performance requirements as specified in the Embankment Settlement Criteria for Design (MTO).
- (b) An applicable factor of safety shall be used for slopes adjacent to, abutting, or surrounding Bridge abutments that considers the risk and consequences of slope failure adjacent to the Bridge.
- (c) In accordance with OPSD 202.010, independent of stability analyses, for embankment earth fills equal to or greater than 8 m in height, fill slopes shall incorporate horizontal benches for surficial stability at maximum 8 m intervals. For rock fills equal to or greater than 10 m in height, rock fill slopes shall incorporate horizontal benches at maximum 10 m intervals. Slopes shall be constructed in accordance with OPSS PROV 206 and OPSS PROV 804.
- (d) Horizontal benches shall be provided for surficial stability for cut slopes higher than 6 m and shall be provided at maximum 6 m intervals.
- (e) Permanent cut and fill slopes shall be designed and constructed to avoid tension cracks, toe bulging, slumping, or sloughing of embankment or cut slope.

5.7 Temporary Slopes and Retaining Structures

- (a) The performance of each Temporary Works shall be sufficient for its expected Service Life. All Temporary Highway Works must comply with the OHSA, MOL requirements and the applicable construction projects regulation thereunder current at the time of excavation and the additional criteria identified below:
- (i) Temporary retaining structures shall be designed and constructed to meet OPSS PROV 539 Construction Specification for Protection Systems and this Article 5.

5.8 Earthwork and Geo-Environmental

- (a) Earthwork shall be constructed to meet the applicable requirements of OPSS PROV 501 Construction Specification for Compaction, and as modified by SP 105S22, OPSS PROV 401 Construction Specification for Trenching, Backfilling, and Compacting, OPSS PROV 206 Construction Specification for Grading, OPSS PROV 212 Construction Specification for Earth Borrow, and OPSS PROV 1010 Aggregates – Base, Subbase, Selected Subgrade and Backfill Material.

- (b) All Lightweight Fills shall be adequately protected from wheel load, groundwater, road salts, weather, fire, flotation under flood conditions, and fuel spills.
- (c) Geo-Environmental requirements are specified in Schedule 17, Part 4 – Contamination and Excavated Material Management.

5.9 Instrumentation and Monitoring

- (a) DB Co shall develop and submit plans and procedures to the City for instrumentation and monitoring at least three months prior to commencement of monitoring of the Highway Works.
- (b) DB Co shall determine and install geotechnical instrumentation in the key and critical areas described as follows where special attention or continued monitoring is required before, during, and after Highway Works construction to check the safety of the work; assess the effects of construction on the surrounding ground and existing facilities including Structure abutments and footings; identify likely causes and distribution of ground movements; evaluate design assumptions and refine estimates of future performance; and check compliance with performance specifications. As needed, the monitoring shall address, frequency and duration of monitoring for construction-induced noise and vibration, groundwater elevation and pressure, loads and strains in the ground, on adjacent facilities and structures, and vertical and horizontal movements including displacement and strains for fill embankments and Ground Movements adjacent to deep excavations, temporary retaining structures (including piles, struts and tiebacks), permanent retaining structures, Utilities Infrastructure, hydro towers, Roadways and pathways, existing buildings, Bridges or other Structures that shall remain in service on temporary and permanent works. DB Co shall be responsible for designing and implementing the program, obtaining baseline survey data, organizing, evaluating and preserving the data, submitting it to the City for information, and undertaking corrective actions if and as needed.
- (c) Design of the geotechnical instrumentation and monitoring program shall be under the direct supervision of a Professional Engineer.
- (d) Staff for the design and implementation of the geotechnical instrumentation and monitoring program shall include personnel who have verifiable design and construction experience with similar programs.
- (e) DB Co shall decommission and dispose of all geotechnical, hydrogeological, and/or geo-environmental instrumentation installed by DB Co or MTO for the purposes of this Project, at the end of construction or after the instrumentation is no longer required for Project activities. DB Co shall decommission and dispose of any existing geotechnical, hydrogeological, and/or geo-environmental instrumentation, that is documented in the Background Information or that may not be documented and otherwise encountered by DB Co during construction, used for monitoring/not used for monitoring, on, in, or under the Lands. DB Co shall obtain acceptance from the City prior to decommissioning and disposal of any existing geotechnical, hydrogeological, and/or geo-environmental

instrumentation, that is documented in the Background Information or that may not be documented and otherwise encountered by DB Co during construction, used for monitoring/not used for monitoring, on, in, or under the temporary Lands as defined in Schedule 20 - Lands. DB Co shall provide decommissioning records to the City.

- (f) GIMP: DB Co shall prepare a comprehensive GIMP and submit to the City for review in accordance with Schedule 10 - Review Procedure. The GIMP shall be applicable for the duration of construction, testing, and Commissioning. As a minimum, the GIMP shall include the following:
- (i) A DMP for monitoring the impacts on Existing Adjacent Structures including in areas where the underlying soil is clay, dewatering of the excavation could lead to impacts on Existing Adjacent Structures, and excavations are across existing Roadway Structures. The DMP shall be a GIS-based and web-based system using a secure internet connection capable of receiving and visualizing near real time monitoring data. The DMP shall be used to create and send alarm reports/notifications and create monitoring reports including batch reports if Response Levels defined by DB Co and indicated in Schedule 15-2, Part 2, Article 9 – Protection of Existing Adjacent Structures, are exceeded. DB Co shall provide access credentials to the City for simultaneous users for the DMP. DB Co shall set up the DMP such that the City is immediately notified of exceedances.
 - (ii) For Existing Adjacent Structures located in areas where underlying clay soil is not present, dewatering for the excavation would not impact Existing Adjacent Structures, and excavations are not across existing Roadway Structures, conventional survey monitoring using benchmarks may be used..
 - (iii) All instruments including existing instruments turned over to DB Co by the City or MTO and instruments to be installed by DB Co.
 - (iv) Typical installation details and location of additional instruments.
 - (v) Schedule for installation, taking baseline readings, frequency and duration of monitoring for each phase of construction.
 - (vi) Construction-induced noise and vibration control and monitoring plan.
 - (vii) The plan and schedule for decommissioning and disposing of all additional instruments installed by DB Co as well as all existing instruments turned over to DB Co. DB Co shall notify the City of the intention to decommission instruments.
 - (viii) All Response Levels (refer to Part 2, Article 9 – Protection of Existing Adjacent Structures), as specified and defined by DB Co.
 - (ix) A Response Action Plan, which shall consist of methods and means to respond to various Review and Alert Level scenarios as outlined in Part 2, Article 9 – Protection of Existing Adjacent Structures, based on types of geotechnical instruments that indicate Review and Alert Levels. DB Co shall inform the City of

subsequent response actions in accordance with the Response Action Plan. At a minimum, a Response Action Plan shall include the following:

- A. Names, telephone numbers, and locations of persons responsible for implementation of contingency plans.
 - B. Materials and equipment required to implement contingency plans.
 - C. Location on Site of all required materials and equipment to implement contingency plans.
 - D. Step-by-step procedure for performing works involved in implementation of the contingency plans.
 - E. Specific actions related to the Alert Level values for all instruments, including means of reducing or eliminating movements and rates of movements.
 - F. Inspection of affected facilities, structures and utilities and performance of acceptable corrective and restorative measures.
 - G. Clear identification of objectives of contingency plans and methods to measure plan success.
- (x) All measures and specific instrumentation and monitoring requirements to protect Existing Adjacent Structures in accordance with Part 2, Article 9 – Protection of Existing Adjacent Structures.
- (xi) All measures and specific instrumentation and monitoring requirements for protecting heritage buildings, if any, identified in the Project Assessment Study Environmental Project Report and relevant updated revisions which are within the Project ZOI as defined in Part 2, Article 9 – Protection of Existing Adjacent Structures.
- (xii) For all Underground Structures, DB Co shall supply, install, maintain, and monitor for the duration of construction, testing, and Commissioning a system of instruments that will indicate the pressures and deformations imparted to the permanent Structures. The instrumentation shall include:
- A. Two arrays of pressure cells with one array on each long side of the Station. Each array shall consist of three cells installed at three different elevations (top, middle and bottom levels along the vertical side walls and away from end walls). Pressure cells shall be installed behind the water proofing system on the overburden side, including soil and rock, prior to start of concrete pouring for the walls.
 - B. Install a minimum of three equally spaced surface settlement monitoring points on both sides of the excavation along a line perpendicular to the

excavation, with the first monitoring point located at the edge of the excavation, the second monitoring point located at the farthest point no further away than the limits of the Project ZOI outlined in Part 2, Article 9 – Protection of Existing Adjacent Structures, and the third monitoring point located equally between the first and second monitoring points. These lines of monitoring points shall be spaced a maximum of every 30 m running parallel to the excavation.

- C. Install In-Place-Inclinometers on both sides of the excavation spaced a maximum of 50 m running parallel to the alignment. Inclinometers to be placed a maximum allowable distance of 1 m from the edge of excavation.
 - D. Install piezometers on both sides of the excavation spaced a maximum of every 50 m. DB Co to locate and monitor piezometers to ensure the groundwater drawdown restrictions of Clause 5.10 of this Part 9, Part B are followed.
 - E. All the above instruments shall be connected to permanent data loggers.
 - F. All of the above instruments shall have a minimum daily reading frequency when located less than or equal to 30 m from the edge of excavation and a weekly reading frequency (a minimum of once per week) when located greater than 30 m from the edge of excavation.
 - G. DB Co shall submit an updated monitoring report in electronic format, in accordance with requirements of Schedule 10 – Review Procedure every week.
- (g) Stable benchmarks shall be established along the length of the alignment. Coordinates and elevations shall be established at least three months prior to monitoring with repeat baseline survey readings taken during this time. The number of reference benchmarks established shall be sufficient to provide adequate sight distances to permit monitoring as specified in this Article 5. Benchmark coordinates and elevations shall thereafter be resurveyed annually. Data shall be submitted to the City for information.
- (h) Measurements of differential settlements between abutments and abutment approaches must be taken at the end of years 1 and 2 of the Highway Warranty Period. Measurement data shall be provided to the City.
- (i) Immediately following paving, elevations at the centreline of each lane shall be measured at all Bridge abutments and at distances of 20 m, 50 m, 75 m, and 100 m from the abutments.
- (j) DB Co shall validate and demonstrate the effectiveness of ground improvement when it is carried out to mitigate seismic Hazards, by appropriate insitu and laboratory testing.

- (k) DB Co shall carry out settlement monitoring for the drainage crossings installed by subsurface methods and shall satisfy the requirements of the Tunneling Guidelines including adherence to Review and Alert Level protocol.
- (l) Provide a demonstration of the features of the instrumentation DMP to the City prior to the start of construction and afterwards as modifications are made to the website.
- (m) Meet with the City as needed to discuss instrumentation levels and necessary actions to protect EAS.
- (n) Replace damaged or malfunctioning instrumentation. The City may order a temporary work stoppage in areas where there is insufficient working instruments to ensure the protection of EAS.
- (o) Accommodate the City in inspecting the installation of geotechnical instrumentation, related hardware, and in verifying the proper functioning of the instrumentation monitoring system including, but not limited to the collection, transmission, storage, backup, and reduction of data.
- (p) DB Co shall indicate locations where, due to contractual interfaces or changes in the extent of the Project ZOI outlined in Part 2, Article 9 – Protection of Existing Adjacent Structures, re-baselining of instrumentation readings shall be conducted.

5.10 Groundwater Control – Dewatering/Unwatering

- (a) For the purposes of this Clause 5.10, unwatering is defined as the removal of water that has accumulated in an excavation and is an element of groundwater control. Groundwater control is defined as dewatering/unwatering and/or aquifer depressurization.
- (b) DB Co shall develop and submit plans and procedures for groundwater control (including effluent discharge), in accordance with Schedule 10 – Review Procedure. The plans and procedure shall include, but not be limited to the following items:
 - (i) Detailed shop drawings of the entire dewatering system(s) that bear the seal and signature of a Professional Engineer, and include, but not be limited to, details, and calculations of proposed type of dewatering system(s), showing arrangement, location, and depths of components of system including details of screens and filter media, complete description of equipment and materials to be used, procedure to be followed, standby equipment, standby power supply, and proposed location(s) of points of discharge of water and abandonment of dewatering system(s), a description of any permits and approvals that pertain to the groundwater control activities;
 - (ii) A discharge plan that includes: discharge location(s) including methods; procedures and equipment to convey water to discharge locations; location and dimensions of treatment equipment; procedures for water testing; water quality laboratory analyses procedures, test results or analyses, and water treatment

methods; location and construction details of monitoring observation wells, and a description of any permits and approvals that pertain to the discharge activities.

- (c) DB Co shall apply for Permits, Licences and Approvals, including PTTW and/or Environmental Activity and Sector Registry, and discharge permits (e.g., Municipal, conservation authority and/or ECA).
- (d) Design, construction, and operation of groundwater control measures shall not induce detrimental short- and/or long-term movements of surrounding Structures, infrastructure and ground surface. Evaluation of detrimental movements shall follow provisions included in Part 2, Article 9 – Protection of Existing Adjacent Structures.
- (e) DB Co shall develop plans and procedures for groundwater control (including effluent discharge), establish monitoring requirements, and perform a hydrogeological impact assessment and associated risk assessment and submit to the City. This process shall consider all required project Permits and Approvals. DB Co shall ensure that any groundwater control, effluent discharge, and subsequent effects during construction or during the Design Life shall have no adverse impact on the following features within the Project ZOI: properties, adjacent Structures, infrastructure, active groundwater supply wells, and environmental features. Specifically, the following potential impacts shall be managed/mitigated such that they are not/do not become adverse:
 - (i) Groundwater drawdown effects including impacts on the quantity and quality of groundwater available for groundwater dependent ecosystems and existing groundwater users;
 - (ii) Groundwater drawdown effects which may cause settlement of existing Structures or Utilities within the Project ZOI as required in Part 2, Article 9 – Protection of Existing Adjacent Structures; and,
 - (iii) Appropriate quantity and quality of dewatering effluent with respect to the receiver (e.g., municipal sewer, natural environment, off-site receiver, etc.), in accordance with all applicable Project permits and approvals.
- (f) Any activity within RVCA regulated area shall be performed in agreement with the applicable requirements and regulations and will require RVCA review and approval.
- (g) DB Co shall design, install, operate, monitor, maintain, and decommission (as required) the project-specific groundwater control systems, as necessary to meet Project requirements and shall continue proper discharging of effluent according to the relevant City's Sewers Use By-law, as well as any other applicable regulatory (e.g., conservation authority and MOECC) approvals without any interruption or negative impact on existing Structures. It shall be the sole responsibility of DB Co to verify the condition of the groundwater control systems and operate them as required.
- (h) DB Co shall submit, on a quarterly basis, the data obtained from all instrumentation utilized for monitoring including hydrogeological and geotechnical instrumentation to the City for review in accordance with Schedule 10 – Review Procedure.

- (i) DB Co shall conduct all monitoring required by the obtained permits and approvals (including daily pumping volumes).
- (j) DB Co shall submit the monitoring results to the applicable agencies as stated in the obtained permits and approvals.
- (k) DB Co shall respond to/address any complaints received that are potentially related to groundwater control activities.
- (l) Dewatering shall be carried out in accordance with OPSS PROV 517 and SSP 517F01.
- (m) Extraction of groundwater for the purposes of construction dewatering and/or depressurization is subject to the following provincial regulatory requirements:
 - (i) Environmental Protection Act (R.S.O. 1990) and Ontario Regulation 63/16 thereunder that requires registration on the Environmental Activity and Sector Registry (EASR) for extracting greater than a total of 50,000 litres per day but no more than 400,000 litres per day (cumulative from all sumps, wells, well points, educators, etc.).
 - (ii) Ontario Water Resources Act (R.S.O. 1990) and the Water Taking regulation thereunder that requires a Permit to Take Water (PTTW), Category 3, for extracting more than a total of 400,000 litres per day (cumulative from all sumps, wells, well points, educators, etc.).
 - (iii) DB Co shall obtain any required PTTW or complete EASR registration as applicable, for construction dewatering or groundwater pressure reduction activities. Refer to Part B, Clause 7.4 of this Part 9.
- (n) Discharge of water extracted during dewatering and/or groundwater pressure control activities shall be completed by DB Co in compliance with all applicable federal, provincial, and municipal requirements for water quality and flow rates. DB Co shall obtain any required Permits or Authorizations, as applicable, for the discharge of water extracted for construction dewatering and/or groundwater pressure reduction activities.

5.11 Submission Requirements

- (a) DB Co shall prepare a comprehensive Geotechnical Report (the “Geotechnical Report”) for Highway Works that covers existing geotechnical information and known site conditions, new investigations performed for the Project, geotechnical engineering analysis, geotechnical design assumptions and design parameters (and the basis for these) and geotechnical design recommendations for all Structures. The report shall be submitted in accordance with Schedule 10 – Review Procedure, and shall include, as a minimum, the following items:
 - (i) A summary of any additional work and subsurface investigations that have been completed by DB Co, including drafted drill summary logs in a format acceptable to the City;

- (ii) Final recommendations for Foundation systems, allowable loads and estimates of total and differential settlements at 2, 5, 10, 20, 40 and 75 years following construction;
- (iii) Geotechnical design recommendations for retaining structures;
- (iv) Design of trenchless crossings;
- (v) Design of high fill embankments, including fill stages and consolidation period between each fill stage;
- (vi) Design details to time-rate-of-settlement control measures such as prefabricated vertical drains, lightweight fills, and preload/surcharge;
- (vii) Estimates of total and differential settlement of embankments and roadways at 2, 5, 10, 20, 40 and 75 years following construction;
- (viii) A settlement monitoring and instrumentation plan along with details of instrumentation to be installed, monitoring requirements, and instrumentation reading threshold values at which construction is halted or resumed;
- (ix) Requirements for ground improvement measures necessary to meet the static and seismic performance requirements for Foundations, cut and fill slopes, embankments and retaining structures;
- (x) An assessment of the stability of approach embankments, road embankments, cut slopes and fill slopes under static and seismic loading conditions and the ability of these to meet the seismic performance requirements;
- (xi) Reduced size (11" x 17") drawings showing the road alignment in plan and profile with drill hole locations shown on the plan and simplified summary logs shown on the profile (design notes are to be shown along the bottom of the drawings);
- (xii) A final geotechnical progress report for the Structures with reduced size (11" x 17") drawings showing the general arrangements for Structures, including Bridge, pedestrian bridge, Culvert, Retaining Wall, and Overhead Sign Support Structure in plan and profile, with drill locations shown in plan and simplified summary logs shown in profile (with Overhead Sign Support exempt from the simplified summary log requirement); and
- (xiii) Geotechnical design recommendations for stormwater management ponds, including identification of subsurface conditions, borehole data, and inclusion of stratigraphic information.

ARTICLE 6 ELECTRICAL, SIGNALS AND LIGHTING DESIGN CRITERIA

6.1 Order of Precedence

- (a) DB Co's design for all electrical, lighting, and Traffic Signal Systems shall be in accordance with the criteria contained in this Article 6 and the following Reference Documents, and if there is any conflict between criteria contained in this Article 6 and any of the Reference Documents, the following shall apply in descending order of precedence:
- (i) The criteria contained in this Article 6;
 - (ii) MTO Special Provisions;
 - (iii) The applicable MTO Directives, MTO Policy Memorandums, and MTO Design Bulletins;
 - (iv) OPSS;
 - (v) MTO Contract Design, Estimating and Documentation (CDED) Manual;
 - (vi) Ontario Electrical Safety Code, Electrical Safety Authority;
 - (vii) MTO – Electrical Engineering Bulletin;
 - (viii) Electrical Engineering Manual, MTO;
 - (ix) Roundabout Lighting Policy;
 - (x) Illumination Warrant Policies PLNG –B-05 & PLNG – B- 06;
 - (xi) MTO accepted luminaire Photometric list;
 - (xii) Policy for spill light beyond MTO Right-of-way and for Light Trespass onto the MTO Right-of-way, (September 2007);
 - (xiii) MTO Electrical Engineering Bulletin 2018-01;
 - (xiv) AODA and Ontario Regulation 413/12;
 - (xv) Ontario Traffic Manual, MTO;
 - (xvi) Traffic Signal Bulletin 2009-01;
 - (xvii) Roadside Safety Manual, MTO;
 - (xviii) MTO Design Supplement for TAC Geometric Design Guide for Canadian Roads, June 2017;

- (xix) Geometric Design Guide for Canadian Roads (TAC);
- (xx) MTO Standard Drawing;
- (xxi) OPSD;
- (xxii) DSM;
- (xxiii) NCHRP Report 498: Illumination Guidelines For Highway Nighttime Work;
and,
- (xxiv) The applicable standards of the City of Ottawa.

6.2 General Requirements

- (a) There are existing chambers such as maintenance holes and handholes within the Highway Works limits that may be utilized as part of Highway Works. DB Co is advised that some of the chambers may require cleaning prior to using/entering the chambers. Cleaning shall include, but not be limited to, pumping water, mud and sludge that may have accumulated within and legally disposing of removed materials.
- (b) Maintenance holes and handholes metallic components shall be bonded and grounded per item specific requirements. There are existing chambers utilized by Highway Works, and some such chambers may require bonding connectors accordingly. Subsection 609.07.07 of OPSS 609 is amended by the addition of the following:
 - (i) Ground wires passing through new or existing electrical chambers, the ground wire shall be connected to the chamber's ground lugs (attached to ladder and/or frame and cover) with an appropriate ground wire connector. Where chambers found without bonded lugs, issue shall be raised with the City. At all locations where a new or existing ground electrode is present in the electrical chamber and/or enclosure, the ground wire shall be connected to the ground electrode with an appropriate ground wire connector.

6.3 Power Distribution

- (a) When the work in this Article 6 requires communication and Coordination with Utility Companies, the requirements of Article 4 of Part A of this Schedule 15-2, Part 9 and Section 11.30 of the Project Agreement shall be followed.
- (b) The power distribution system shall provide power to the Highway Works including illumination, ATMS, traffic signal control systems, and all other systems and components that require electrical power.
- (c) DB Co shall undertake all Coordination with power Utility Companies for all required servicing and shall provide a list of all electrical loads to the power Utility Companies, as required. DB Co shall coordinate preparation and submittal of service applications on behalf of the City.

- (d) DB Co shall provide power installations and connections to all components of the Highway Works that require electrical power and shall be metered.
- (e) DB Co shall provide an Arc Flash Study Report (the “Arc Flash Study Report”), including a coordination study and short circuit study, and warning labels for arc flash Hazard for all power supply equipment.

6.4 Lighting

- (a) All permanent lighting poles shall be base mounted with underground ducts and wiring.
- (b) Lighting shall meet the MTO Context Sensitive Design requirements as detailed in Appendix F of this Part 9.
- (c) All permanent Roadway lighting Design Criteria shall meet the appropriate standard for the Roadway classification and shall comply with MTO Directives and MTO Standards. DB Co shall use LED luminaires for all high mast, conventional, and underpass illumination design. Luminaires shall be selected from the most current MTO Accepted Photometric List. Rotatable high mast luminaires shall be used for all high mast illumination design. DB Co shall be responsible to verify product availability. DB Co shall use a manufacturer that provides IES files with independent lab tests.
- (d) DB Co shall provide a Preliminary Lighting Design (the “Preliminary Lighting Design”) consisting of:
 - (i) Assessment of existing Highway Lighting System within Highway Works limits.
- (e) DB Co shall provide, at a minimum, the following illumination:
 - (i) Upgrade of the existing illumination (not requiring removal) to current standard LED luminaires and reinstate illumination impacted by Highway Works:
 - A. Greenbank Road/Pinecrest Road interchange and impacted ramps;
 - B. New power supply at Greenbank Road/Pinecrest Road to feed interchange (if required);
 - (ii) Ensure adequate illumination for new Holly Acres N/S-E on-ramp.
- (f) DB Co shall provide municipal lighting to City of Ottawa standards and shall coordinate and liaise design and installation with the City in accordance with Schedule 15-2, Part 2, Clause 6.16, on the following Crossing Roads. In each case, DB Co’s lighting design shall include provisions for lighting on the Underpass Structures (i.e. pole bases on the Deck and associated ductwork).
 - (i) Pinecrest Road/Greenbank Road;

- (g) DB Co shall determine the need for and provide any additional illumination within the Highway Works, interchanges, Crossing Roads and adjacent Highways including Underpasses.
- (h) All permanent Roadway illumination Design Criteria shall meet the appropriate standard for the Roadway classification and shall comply with MTO Directives. All lighting calculations shall be carried out utilizing MTO approved software. Illumination Design Criteria shall be met within the Highway Works limits.
- (i) Where the Highway lighting system is specified to be a full High Mast Lighting system, in-fill conventional lighting shall not be permitted.
- (j) The lighting design shall accommodate more than one high mast luminaire manufacturer (i.e. the selection of high mast pole placements shall accommodate alternate luminaires, both of which must satisfy the MTO's lighting criteria).
- (k) DB Co shall replace high mast luminaire support components to install additional luminaires. Mixing of new and old luminaires on a high mast pole is not permitted. Modification of existing high mast luminaire support components is not permitted. All high mast poles that are taken down shall have their raising and lowering devices and luminaire support assemblies replaced.
- (l) DB Co shall not modify existing high mast pole footings.
- (m) DB Co shall relocate or replace associated underground lighting power cables and wiring, conduit, and maintenance holes. Permanent underground cable splices are not permitted. Disruptions to electrical cables will require the installation of new continuous cables.
- (n) All high mast poles that are taken down shall be inspected to ensure that their condition is suitable for reinstallation, if damaged or found to be not suitable for reinstallation, new high mast poles shall be installed.
- (o) Only external raising/lowering drives shall be used for high mast poles. A minimum of two drills shall be provided for each type of raising/lowering device. Granular maintenance access shall be provided for each high mast pole.
- (p) DB Co shall provide a minimum of one spare conduit for each under pavement crossing. Hand holes shall be minimum 600 x 600 mm.
- (q) DB Co shall coordinate all under pavement crossing operations with the installation of Noise Barriers, retaining walls and Barrier walls adjacent to the auguring pits for the subsurface installation of ducts and steel encasements.
- (r) Electrical ducts behind concrete barrier on the outside Shoulders shall be offset a minimum of 1.2 m.
- (s) The following total light loss factor (LLF) shall be used when completing lighting calculations: Total LLF of 0.70 for LED conventional, total LLF of 0.74 for LED high

mast, and total LLF of 0.55 for LED underpass. When completing lighting calculations for trespass levels, total LLF of 1.0 shall be used.

6.5 Temporary Lighting during Construction

- (a) All existing lighting shall be maintained in operational order during performance of the Highway Works until such time as replacement temporary or permanent lighting is energized.
- (b) DB Co shall review the need for temporary lighting for each construction stage and provide lighting where required.
- (c) Temporary illumination shall be provided for the Roads to accommodate traffic Detour Routes and Diversions in accordance with the OPSS 106 and Electrical Engineering Manual (MTO).
- (d) All temporary Roadway illumination Design Criteria shall meet the appropriate standard for the Roadway classification and shall comply with MTO Directives. All lighting calculations shall be carried out utilizing MTO approved software. Illumination Design Criteria shall be met within the Highway Works limits.

6.6 Traffic Signals

- (a) Traffic signals shall be constructed at the following locations:
 - (i) Holly Acres Road at Highway 417 N/S-E and N/S-W on-ramps;
 - (ii) Richmond Road at Bayshore Drive/Highway 417 E-N/S ramp (as required);
 - (iii) Pinecrest Road at Highway 417 north ramp terminal;
 - (iv) Greenbank Road/Iris Street at Highway 417 south ramp terminal;
 - (v) Holly Acres Road at Highway 417 N/S-W on-ramp;
- (b) General Requirements
 - (i) DB Co shall coordinate the design, approvals and construction requirements for temporary and permanent traffic signals with the City.
 - (ii) In accordance with the requirements of this Schedule 15-2, Part 9, DB Co shall be responsible for all aspects of the design of the signalized intersections listed in this Clause 6.6, with the following exception:
 - A. Upon review and approval of DB Co's geometric design of each signalized intersection, the City shall design traffic signals (including below and above ground plant) in accordance with AODA and Ontario Regulation 413/12 and applicable MTO guidelines. Where the location

selected for a traffic signal pole is not suitable for a pole foundation as per City of Ottawa Standard Detail Drawings (e.g., where the pole is designed to go on top of pre-existing utilities), DB Co shall be responsible for the design of the non-standard foundation, in addition to the construction requirement.

- (iii) For temporary and permanent traffic signals, DB Co shall prepare PHM-125 drawings, and shall coordinate review and approval by MTO prior to commencing construction.
- (iv) Interconnection shall be provided only where the signal is part of an existing municipal Interconnection network.
- (v) DB Co shall be responsible for providing communication to the traffic signals in coordination with the City.
- (vi) DB Co shall be responsible for liaising with the City and providing emergency pre-emption upon consultation with these municipalities and emergency services.
- (vii) Following the receipt of completed traffic signal designs from the City, DB Co shall contact the City's designated traffic control signal contact person at least 30 calendar days in advance to arrange for a mutually acceptable date and time to have City forces available to perform the installation, relocation, modification, and connection of the traffic control signal.
- (viii) DB Co shall complete the related civil Works at least 14 calendar days prior to the date when City forces are available in order for appropriate inspections to occur. Prior to the crew arriving on Site, DB Co shall provide adequate space and time for the Works to be completed.
- (ix) The City or a City Party shall have an inspection role during the construction and activation of the permanent and temporary traffic signals for both the above and below ground work. The City shall also be present for all traffic signal activations and deactivations of any traffic signal system, permanent or temporary within the Highway Works limits.
- (x) Access to the Traffic Signal controller cabinets:
 - A. The traffic signal controller cabinets will be locked at all times by the City. DB Co shall maintain access at all times to the traffic signal controller cabinet for all work inside the cabinet including for routine maintenance and/or emergency repair for the City of Ottawa Traffic Signal Department.
 - B. Should DB Co require access to the traffic signal controller cabinet, they shall request access from the City Representative.

- C. DB Co shall have both IMSA Traffic Signal Level II (Bench & Field) & Traffic Signal Level III (Bench & Field) certification in order to perform work inside of the traffic signal controller cabinet.
- D. A representative from the City of Ottawa Traffic Signal Department shall be allowed to inspect any work being done inside the traffic signal controller cabinet including for routine maintenance and/or emergency repair.

(c) MTO Permanent Traffic Signals

- (i) For permanent new traffic and transit signal facilities, or new permanent configurations at existing signalized intersections, the City shall supply and install all above ground traffic signal equipment as required by the governing road authority including but not limited to controller, poles, pedestrian and traffic signal heads with push buttons, audible displays, etc. The City shall supply, install and make all required terminations for the traffic signal wiring. The City shall provide all equipment and labour associated with the installation of permanent above-ground traffic signal infrastructure.
- (ii) DB Co shall coordinate with the City the design of electrical power feeds for all alterations to existing traffic signals, and new traffic signals; the cost of obtaining new electrical power feeds shall be a City responsibility.
- (iii) DB Co shall construct all permanent underground traffic infrastructure, including the supply and construction of concrete encased ducts, direct buried ducts, pole foundations, maintenance holes, maintenance hole frames & covers, vehicle loop detection and concrete pads.
- (iv) All traffic signal poles shall be base mounted poles with underground ducts and wiring.
- (v) The traffic signal controller unit shall be provided by the City.
- (vi) The City shall design and implement signal timing plans to accommodate traffic at Highway Substantial Completion.
- (vii) DB Co shall be responsible for obtaining all traffic data that may be required for analysis and signal timing design purposes. Traffic data shall be no older than two years.
- (viii) All traffic signal controllers shall be equipped with uninterruptable power supplies and emergency pre-emption, based on municipal standard.
- (ix) DB Co shall coordinate type of Detection with the City Representative.

(d) Municipal Traffic Signals

- (i) DB Co shall be responsible for liaising and Coordinating with the City of Ottawa with regard to all modifications that may be required at municipal traffic signals both during and after Highway Substantial Completion of the Highway Works. Proposed modifications shall be supported by traffic engineering analysis.
- (e) MTO PHM-125 Legal Drawings
 - (i) DB Co shall prepare and submit temporary PHM-125 legal drawings to the City Representative in accordance with Schedule 10 – Review Procedure and to MTO for review and approval following return of the Construction Document Submittal, and a minimum of 15 Business Days prior to implementation of each stage of construction where physical changes occur (i.e., geometric changes, signals hardware modification, etc.).
 - (ii) DB Co shall prepare and submit permanent PHM-125 legal drawings to the City Representative in accordance with Schedule 10 – Review Procedure and to MTO for review and approval following return of the Construction Document Submittal, and a minimum of 90 Business Days prior to implementation.
 - (iii) All permanent and temporary MTO PHM-125 legal drawings on an MTO PHM-125 drawing template for the permanent and temporary traffic control signals must be approved by the MTO prior to the construction of the signal or implementation of physical changes.
 - (iv) All permanent and temporary PHM-125 drawings shall identify all Regulatory Signs that impact operations.
 - (v) DB Co shall use and submit the current MTO PHM-125 drawing check list.
 - (vi) DB Co shall obtain the existing PHM-125 drawings from the City and shall update them based on the final conditions.
- (f) MTO Temporary Traffic Signals during Construction
 - (i) For temporary traffic and transit signals, or temporary modifications to existing signalized intersections, the City shall supply and install all above ground traffic signal equipment as required by the governing road authority including but not limited to controller, poles (with the exception of wood poles), pedestrian and traffic signal heads with push buttons, audible signals, etc. The City shall also supply and install and make all required terminations for the traffic signal wiring. The City shall provide all equipment and labour associated with the installation of temporary above-ground traffic signal infrastructure.
 - (ii) DB Co shall coordinate with the City the design of electrical power feeds for all temporary traffic signals or temporary modifications to existing signalized intersections; the cost of obtaining new electrical power feeds shall be a City responsibility.

- (iii) DB Co shall construct all temporary underground traffic infrastructure, including the supply and construction of concrete encase ducts, direct buried ducts, pole foundations, maintenance holes, maintenance hole frames & covers, vehicle loop detection and concrete pads. DB Co shall undertake all above ground infrastructure Work, including but not limited to installation, removals and reinstatement of wood poles, double span and anchors, along with any required underground civil Works including conduit, foundations, manholes/hand holes, frames & covers etc., as required to accommodate the staged construction of Work, with the exception of traffic signal equipment as described above, which shall remain the responsibility of the City.
 - (iv) All existing traffic signals shall be maintained in operational order during performance of the Highway Works until such time as replacement temporary or permanent traffic signal is energized.
 - (v) DB Co shall determine the need for temporary traffic signals to facilitate construction staging and provide where required including auxiliary heads, Advance Warning Signing, advance Flasher Beacons and down lights.
 - (vi) The City shall design and implement temporary signal timings during the Highway Works.
 - (vii) Integration with existing permanent traffic signals and temporary traffic signals is to be provided where needed.
 - (viii) The City shall operate and maintain the temporary traffic signals.
 - (ix) The City shall design and construct the traffic signal controllers.
 - (x) Where a temporary signal infrastructure requires the use of wood poles and/or span wire, the City shall be responsible for the design of signal head placement only. DB Co shall design the location of the wood poles, guy wires, and span wires based on the City's signal head placement.
- (g) Notification Requirements and Timelines
- (i) DB Co shall provide advanced notification in relation to traffic signal work to the City, in accordance with Table 6.5a. In any instances where the timelines of Table 6.5a may conflict with review periods specified elsewhere within this Schedule 15-2, Part 9, the longer duration shall apply.

| Table 6.5a – Traffic Signal Notification Requirements | | | | | |
|--|--------------------|---|-----------------|---|--|
| Item | Description | Notification (Calendar Days) | Prior to | Information to be supplied to City | Information to be supplied to DB Co |
| | | | | | |

| | | | | | |
|---|--|----|------------------------------------|--|--|
| 1 | Design | 30 | Desired receipt of signal design | 1:250 CADD for the intersection, including pavement markings on all approaches | City provides traffic signal design within 30 calendar days |
| 2 | Commencement of civil works (prerequisite – signal design completed) | 30 | construction of civil works | Date when works are to begin, schedule of work | None |
| 3 | Electrical work involving the City (prerequisite – signal design completed) | 30 | construction of civil works | Meeting date regarding electrical works, schedule of work | Contact names and telephone numbers of relevant staff |
| 4 | Scheduling of installation date by City forces (prerequisite – signal design completed) | 30 | Desired signal installation date | Desired installation date by City forces | Scheduled date for installation to be provided to DB Co within eight calendar days of the notification. Scheduled date shall be within 10 calendar days of DB Co's request |
| 5 | City Inspection of civil work completed by DB Co (pre-requisite – signal installation date) | 14 | Scheduled signal installation date | Confirmation of work being completed | Confirmation that the work was completed to City satisfaction, within 7 calendar days of DB Co's notification |

| | | | | | |
|--|------------|--|--|--|-------------------------|
| | scheduled) | | | | that work was completed |
|--|------------|--|--|--|-------------------------|

6.7 Counting Stations and Loops

- (a) DB Co shall identify the actual locations of Counting Stations and Loops (traffic data collection stations) along the Highway 417 and ramps. DB Co shall provide Counting Station and Loops at the locations identified below.
- (i) Traffic count Counting Stations and Loops:
- A. Greenbank W-N/S ramp (if existing plant is impacted by DB Co design);
 - B. Pinecrest N-W ramp;
 - C. Pinecrest E-N/S ramp;
 - D. Holly Acres N/S-W ramp;
 - E. Moodie S-W ramp;
 - F. Moodie N-W ramp; and
 - G. Pinecrest S-W ramp (if existing plant is impacted by DB Co design).
- (ii) Permanent data collection Counting Stations and Loops (approx. locations):
- (b) Counting Stations and Loops shall be installed within the milled surface or binder course of the Roadway.

6.8 Embedded Work in Structure

- (a) DB Co shall provide embedded work in new and rehabilitated structures.
- (b) DB Co shall provide new conventional pole bases throughout the core Continuous Illuminations.

ARTICLE 7 DRAINAGE AND EROSION CONTROL DESIGN CRITERIA

7.1 Order of Precedence

- (a) DB Co's Drainage design and construction shall be in accordance with the criteria contained in this Article 7 and the following Reference Documents and, if there is any conflict between the criteria contained in this Article 7 and any of the Reference Documents, the following shall apply in descending order of precedence:
 - (i) The criteria contained in this Article 7;
 - (ii) Federal and Provincial Codes, Acts, and Regulations;
 - A. Fisheries Act (Canada)
 - B. CHBDC
 - C. MTO Special Provisions
 - D. MTO Standard Drawings
 - E. MTO Drainage Directives
 - F. Ontario Water Resources Act
 - G. Drainage Act (Ontario)
 - H. Ontario Building Code
 - (iii) MTO Publications;
 - A. The applicable MTO Directives, MTO Policy Memorandums, and MTO Design Bulletins
 - B. MTO Highway Drainage Design Standards
 - C. MTO Drainage Management Manual
 - D. MTO Special Provisions
 - E. MTO Standard Drawings
 - F. MTO Drainage Directives
 - G. MTO Intensity-Duration-Frequency Curves
 - H. MTO Contract Design, Estimating and Documentation (CDED) Manual

- I. MTO Gravity Pipe Design Guidelines for Circular Culverts and Storm Sewers
- J. MTO Environmental Guide for Erosion and Sediment Control During Construction of Highway Projects
- K. MTO Evaluation of Drainage Management Software
- L. Guide for Preparing Hydrology Reports for Water Crossings (MTO)
- (iv) OPS;
- (v) MOECC Publications;
 - A. MOECC Stormwater Management Planning and Design Manual
 - B. MOECC Stormwater Pollution Prevention Handbook
 - C. Environmental Activity and Sector Registry information
<https://www.ontario.ca/page/environmental-activity-and-sector-registry>
 - D. Permit To Take Water Manual
- (vi) Conservation Authority Publications;
 - A. Conservation Authority Subwatersheds Studies and Criteria (RVCA)
 - B. RVCA: Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses (Ontario Regulation 174/06)
 - C. TRCA/CVC: Low Impact Development Stormwater Management Planning and Design Guideline
 - D. CVC: Low Impact Development Construction Guide
- (vii) City of Ottawa Sewer Design Guidelines, including Technical Bulletins; and,
- (viii) Environment Canada Stormwater Best Management Practice Handbook: Construction.

7.2 General Criteria

- (a) DB Co shall develop and implement a drainage strategy in accordance with the Reference Documents listed above, in consultation with applicable Stakeholders, and prepare a Drainage and Stormwater Management Report (the “Drainage and Stormwater Management Report”) to comply with the criteria and design parameters as outlined in this Project Agreement.

- (b) The Drainage and Stormwater Management Report shall present the drainage and stormwater management strategy taking into consideration all upstream and downstream impacts. The report shall describe the required measures to meet City of Ottawa, MOECC, and RVCA requirements for the management of stormwater runoff. The report shall identify hydrologic reference points downstream of Highway 417, and demonstrate how post development discharge shall be controlled to pre-development (existing) peak flow rates.
- (c) The Drainage and Stormwater Management Report shall be submitted within 120 days following Financial Close in accordance with Schedule 10 – Review Procedure.
- (d) DB Co shall secure all permits and approvals, where necessary for the implementation of the Drainage and SWM systems for the Project, and shall be responsible for preparing and submitting all necessary drawings and supporting documentation associated with obtaining those permits and approvals in accordance with Schedule 10 – Review Procedure.
- (e) DB Co shall be responsible for all costs associated with obtaining the required permits and approvals, and those associated with providing the Drainage and SWM systems.
- (f) DB Co shall obtain sewer discharge permits and approvals in accordance with the City, MOECC, and RVCA requirements. Sewer discharge permits and approvals shall be obtained a minimum of two weeks prior to the anticipated discharge date.
- (g) DB Co shall obtain all PTTWs and/or Environmental Activity and Sector Registry (EASR) registrations, in accordance with current MOECC requirements, for the Works.
- (h) All drainage from new or widened ramps and roadways shall be captured and managed within the Highway 417 or City ROW, as applicable, with SWMPs that provide water quality protection that meets MOECC’s ‘Enhanced’ standard before discharging to outlet locations.
- (i) All additions or modifications to existing sewers and related appurtenances will require municipal approval and shall conform to the requirements of the City.
- (j) All proposed changes to existing crossings of watercourses shall be analyzed to determine the impact of the proposed design on flood levels. The available Floodplain Mapping for all existing crossings shall be obtained from the RVCA. Existing Floodplain Mapping shall be updated with the proposed design.
- (k) DB Co shall assess the drainage impacts of the Highway 417 runoff where such runoff directly interfaces with the LRT trench. DB Co shall modify or replace the existing drainage system within Highway 417 to the extents required to accommodate the Highway Works, while protecting the LRT trench from infiltration, seepage, and flooding due to the existing Highway 417 runoff. Notwithstanding, any such drainage system provided by DB Co shall not preclude the future Highway 417 widening plan to install a closed drainage system.

- (l) Highway drainage is to discharge to existing outlets unless otherwise approved by the City at its sole discretion. Upstream of these outlets, the Highway 417 storm sewer system shall be a standalone gravity system and shall not be integrated with the municipal system or New Municipal Infrastructure.
 - (i) DB Co shall adjust, modify, or replace the drainage features along the south side of the Guideway to the existing rural ditch drainage system that may be impacted by construction of the West Works and/or TL-5 adjacent to the Guideway, as described in Clause 1.3 (a) of Part B – Design and Construction Requirements of this Part 9.
 - (ii) If DB Co's drainage design includes new or modified outlet locations, DB Co shall demonstrate to the City through hydrologic/hydraulic modeling that the cumulative impacts of the Highway Works will not increase peak flow rates or the peak hydraulic grade line of the City storm sewer for all rain events up to the 100-Year Storm. This analysis shall be submitted in accordance with Schedule 10 – Review Procedure. This analysis shall be presented in the Drainage and Stormwater Management Report. The available outlet constraints shall be obtained from the City.
- (m) The new storm sewer system shall be designed to accommodate a 1 in 10 year return period storm.
- (n) Storm sewers shall have longitudinal slopes of 0.3% or greater, to avoid constructability issues.
- (o) Post-construction discharge shall be controlled to pre-construction (existing) peak flow rates. Where capacity is insufficient for pre-construction peak flows, DB Co shall design the drainage system to control peak flows to within existing capacity.
- (p) DB Co shall ensure that the Roadway is adequately drained to meet MTO Standards during all stages of construction.
- (q) For any Municipal Roadway affected by the Highway Works, DB Co shall:
 - (i) Include insulation for sewers that have less than the minimum standard cover;
 - (ii) Design the drainage system to leave at least one lane free of water in each direction for emergency vehicle traffic during the 1:100 year return period event;
 - (iii) Ensure that existing maintenance hole top sections, frames, and covers are upgraded to current standards including water tight covers on sanitary manholes in ponding areas;
 - (iv) Conduct pre and post construction video inspection of existing sewers to remain as part of DB Co's design; and,

- (v) Assess adjacent properties for surface drainage impacts as a result of the Highway Works, and ensure no adverse impacts as a result of the design.

7.3 Highway Drainage Criteria

- (a) The design and construction of all Provincial Highway drainage features shall meet or exceed the requirements of MTO Highway Drainage Design Standards, 2008. Project specific criteria are listed below.
 - (i) The minor system associated with the new Roadways shall be designed to capture and convey the 10-year storm event. Major system (overland) flows are to be directed to an outlet with sufficient capacity. In the case where no outlet is available, major system flows are to be conveyed to storage areas within the Highway 417 ROW.
 - (ii) Watercourse crossings with upstream drainage areas that exceed the limit established by the RVCA, the crossing shall be designed to convey the Regulatory Storm, defined as the 100-year design storm event, without any increase in water surface elevations outside of the Highway 417 ROW.
 - (iii) All watercourse crossings shall be designed to convey the 50-year storm for the span less than 6.0 m and the 100-year storm event for the total span more than 6.0 m (MTO HDDS WC-1, 2008) with a minimum 1.0 m freeboard from the water surface elevation to the edge of pavement, without requiring a change to the existing Roadway profile.
 - (iv) All watercourse crossings shall be designed as per the criteria set out in Schedule 17 – Environmental Obligations.
 - (v) All discharge to municipal storm sewers shall be in accordance with City of Ottawa Sewer Design Guidelines.
 - (vi) Following construction, DB Co shall prepare a CCTV assessment of all storm sewers forming part of the Highway Works drainage system as per OPSS 409. The CCTV footage shall be submitted to the City in accordance with Schedule 10 – Review Procedure.
 - (vii) There shall be no flow spread onto travelled lanes.

7.4 Stormwater Management Criteria

- (a) DB Co shall implement a stormwater management design:
 - (i) That provides “*Enhanced*” quality treatment to all Highway Works runoff (as described in Chapter 3 “Environmental Design Criteria” of the “Stormwater Management Planning and Design Manual”, MOECC), including mitigation of thermal impacts on cold water streams;

- (ii) That addresses the downstream impacts on conveyance and erosion for all watercourse crossings; and
 - (iii) That includes necessary mitigation measures in compliance with requirements of the RVCA.
- (b) With reference to Schedule 17 – Environmental Obligations, DB Co shall maintain base flows in all watercourses during construction.
- (c) In-watercourse works will only be conducted during appropriate construction windows as set by the RVCA and DFO. DB Co shall prepare a Highway Erosion and Sediment Control Plan (the “Highway Erosion and Sediment Control Plan”), as a component plan of the Environmental Management Plan described in Schedule 17 – Environmental Obligations, and submitted to the City Representative, in accordance with Schedule 10 – Review Procedure, 30 days prior to the commencement of any Highway Works Construction Activities. This plan shall:
 - (i) Meet all requirements in this Article 7;
 - (ii) Meet all requirements of the Schedule 17 – Environmental Obligations;
 - (iii) Be developed in accordance with the MTO Environmental Guide for Erosion and Sediment Control during Construction of Highway Projects;
 - (iv) Include a contingency plan in the event the erosion and sediment control measures fail;
 - (v) Detail the temporary works during construction as described in the MTO Highway Drainage Design Standards TW-1 and TW-2 (2008);
 - (vi) Include provisions for maintaining the site, providing adequate over-winter protection and controlling erosion on all exposed earth surfaces and temporary fill embankments until conditions permit application of the final specified seed and cover; and,
 - (vii) Include the following, at a minimum:
 - A. Work area requirements, including equipment access, operation and storage, and material supply, utilization and storage;
 - B. Surface drainage from outside, through or around the work;
 - C. Areas of disturbed soil and soil stockpiles;
 - D. Means of access to erosion and sediment control measures requiring maintenance;
 - E. Protection of completed portions of the work; and,

- F. All vegetated cover not specified for removal shall be preserved in order to minimize erosion and sedimentation.
- (d) Watercourses shall not be diverted, intercepted or blocked unless specifically approved by the RVCA.
- (e) Temporary erosion and sediment control measures shall be maintained and kept in place until all work has been completed. Temporary control measures shall be removed at the completion of the work provided that permanent erosion control measures, have been established.
- (f) DB Co shall inspect erosion and sediment control measures within 24 hours after a significant rainfall event.
- (g) Unless otherwise specified, the time interval between commencement and completion of any Construction Activity that disturbs earth surfaces shall be a maximum of 45 calendar days. Commencement of such work shall be considered to have occurred when the original stabilizing ground cover has been removed, including grubbing, or has been covered with fill material. Completion of such work shall be considered to have occurred when the specified cover material (seed and mulch, seed and erosion control blanket, sod, riprap, etc.) has been applied.
- (h) Where interceptor ditches or subsurface drains are specified, they shall be constructed before commencement of any related cut or fill.
- (i) Run-off from construction materials and any stockpiles shall be contained and discharged so as to prevent entry of sediment to watercourses.
- (j) Where dewatering is required or where culverts are cleaned by hydraulic means, effluent shall be discharged so as to prevent discharge of sediment to watercourses.
- (k) Erosion and sedimentation control measures shall not be placed in watercourses unless specifically approved by the RVCA and the City.
- (l) A 200 m stand-by supply of prefabricated silt fence barrier, in addition to silt fence barrier which may be specified elsewhere, shall be maintained at any site where Construction Activities are underway prior to commencement of grading operations and throughout the duration of the Highway Works.
- (m) Oil-grit separators shall not be permitted to treat MTO Highway 417 runoff.

7.5 Numerical Computational Procedures and Models

- (a) All numerical computation procedures shall comply with the principles outlined in the MTO Drainage Management Manual (1997). Computer models used shall comply with the computer model selection criteria identified in the MTO Drainage Management Manual (1997).

- (b) Rational method will be limited to areas less than 40 ha.
- (c) For areas greater than 40 ha and for the purpose of designing stormwater facilities, an MTO approved computer model shall be utilized.
- (d) Modelling output files shall be included in the deliverables. Final deliverable shall include the hydrologic and hydraulic digital model files.

7.6 Deliverables

- (a) In addition to those listed elsewhere in this Article 7, the following deliverables shall be submitted in accordance with Schedule 10 – Review Procedure:
 - (i) If applicable, stormwater management facility design drawings showing details of inlet and outlet structures, pipe sizes, pond layout plan and section, with details of overflow weir, outlet structure, access road, and elevations. For water within the pond, surface elevations shall be shown for permanent pool, 25 mm event, 100-year events on the pond section view;
 - (ii) Where existing Floodplain Mapping exists, updated floodplain drawings showing changes to 100-year storm event water level delineation;
 - (iii) Details of water course realignments such as:
 - A. Proposed plan and profiles
 - B. Erosion protection and environmental rehabilitation design
 - C. Fluvial Geomorphological report as per RVCA
 - (iv) Proposed storm sewer design sheets;
 - (v) Design drawings showing the proposed drainage conveyance system (swales, storm sewers, culverts, ditches, ditch inlets, spillways). These drawings will include summary tables of all components of the drainage conveyance system, such as structures ID's (for Catch Basins and manholes), structure inverts, Ditch slopes, typical Ditch cross-sections and Ditch elevations.

ARTICLE 8 SIGNING AND PAVEMENT MARKING DESIGN CRITERIA

8.1 Order of Precedence

- (a) Signing and Pavement Marking shall be designed, applied and installed in accordance with the criteria contained in this Article 8 and the following Reference Documents, and if there is any conflict between the criteria contained in this Article 8 and any of the Reference Documents, the following shall apply in descending order of precedence:
- (i) The criteria contained in this Article 8;
 - (ii) MTO Special Provisions;
 - (iii) The applicable MTO Directives, MTO Policy Memorandums, and MTO Design Bulletins;
 - (iv) OPSS;
 - (v) MTO Contract Design, Estimating and Documentation (CDED) Manual;
 - (vi) Ontario Traffic Manual, MTO;
 - (vii) Highways Standards Bulletin Memorandum 2014-04 – Guidelines for Reducing Speed Limits in Construction Workzones;
 - (viii) Highways Standards Bulletin HSB-DSCO-2017-01 Permanent Ground Mounted Sign Support Systems – Small and Intermediate Sign Assemblies;
 - (ix) HSBM #2011-01, Fluorescent Orange Temporary Pavement Markings, MTO Highway Standards Branch Provincial Engineering Memorandum;
 - (x) DSM;
 - (xi) Temporary Conditions Traffic Management: Advanced Notification, Advanced Warning, and Alternate Route Signing Manual (April 2001), MTO Central Region Traffic Office;
 - (xii) Portable Variable Message Signs (PVMS) Best Practices Manual, May 2009, MTO;
 - (xiii) Ramp Closure Gate Sign Installation Drawing, December 2009, MTO;
 - (xiv) Sign Sheeting Memorandum for Ground Mounted Regulatory Warning, and Temporary Condition Signs, October 4, 2013, MTO;
 - (xv) Sign Support Manual, MTO;
 - (xvi) MTO Design Supplement for TAC Geometric Design Guide for Canadian Roads, June 2017;

- (xvii) Geometric Design Guide for Canadian Roads, TAC;
- (xviii) MTO Standard Drawings;
- (xix) OPSD;
- (xx) King's Highway Guide Signing Policy Manual, MTO;
- (xxi) Manual of Uniform Traffic Control Devices; and,
- (xxii) OPP Aircraft Enforcement Area Policy, MTO.

8.2 Materials

- (a) Except as noted in Clause 8.3(g) and Clause 8.4(n) of Part B of this Schedule 15-2, Part 9, DB Co shall supply all Signing and Pavement Markings Materials specified in the Reference Documents noted in Clause 8.1 of Part B of this Schedule 15-2, Part 9.

8.3 Temporary Signing

- (a) DB Co shall be responsible for the design, supply, installation, relocation, reinstatement, maintenance, and removal of all temporary Signs and Pavement Markings, including Regulatory, Warning, guide, advisory and directional Signs with the exception of temporary advance and turn (non-standard) ground-mounted Signs which will be designed and fabricated by MTO and supplied to DB Co for installation.
- (b) DB Co shall provide signing requirements for all temporary conditions, including Advance Notification, Advance Warning and Alternative Route signing, all as defined in the MTO Central Region Temporary Conditions Traffic Management: Advanced Notification, Advanced Warning, and Alternate Route Signing Manual and the Ontario Traffic Manual. All temporary signing shall be in accordance with the Ontario Traffic Manual, and MTO standards. The location, size and type of each Sign shall be indicated on the Highway Traffic Control Plans.
- (c) DB Co shall prepare a Temporary Signing Plan (the "Temporary Signing Plan") and a Temporary Signing Table (the "Temporary Signing Table"). The Temporary Signing Plan shall depict the location of all Signs, and shall include staging drawings, which indicate the timing for installation and removal of temporary signage. The Temporary Signing Table shall include, but, not be limited to information detailing Sign location (station of final location, removal location and on which side of the road to be installed in relation to the direction of travel), height to bottom of Sign, lateral offset to post #1, support type with dimensions, alpha-numeric Sign code with dimensions, timing for installation and removal, and the message/description.
- (d) Temporary Signs shall be in French and English or bilingual and MTO Standards and guidelines shall be used.

- (e) The Temporary Signing Plan shall be combined into one drawing at a scale of 1:1000 with the Temporary Pavement Marking Plan.
- (f) The Temporary Signing Plan and Temporary Signing Table shall be submitted to the City Representative for review and acceptance in accordance with Schedule 10 – Review Procedure, and a minimum of 60 days prior to implementation of the plan.
- (g) MTO, through the City, will prepare and supply the temporary advance and turn ground-mounted Sign designs (guide Signs only) to DB Co, and will supply these fabricated Signs to DB Co for the locations where overhead Signs will be removed for a period greater than short duration (per DB Co's Temporary Signing Plan). When the temporary ground-mounted Sign locations have been confirmed, MTO will create the Sign design details to include in DB Co's design. MTO, through the City, must provide these Sign design details and fabricated boards for MTO's jurisdiction. Sign boards shall be fabricated and supplied by MTO's Provincial Sign Shop. MTO's Provincial Sign Shop will not accept Sign designs from DB Co. DB Co will not be charged for signs from MTO's Provincial Sign Shop. The Signs ordered through the MTO Provincial Sign Shop will be delivered to a location identified by DB Co. The list of temporary Signs and shop drawings shall be submitted by DB Co to the City a minimum of 12 weeks prior to the pickup date.

8.4 Permanent Signing

- (a) DB Co shall provide Main Line overhead signing at the locations, and in accordance with the requirements identified in Table 8.4a. The exact locations of the signs shall be determined by DB Co in accordance with its final design. In all cases DB Co shall provide new Overhead Sign Support Structures and footings, and install new sign boards (supplied by MTO), subject to Clause 8.4(b).

| Table 8.4a – Highway 417 Main Line Overhead Signing | |
|---|---|
| Station (approx.) | Notes |
| WB Upstream of Pinecrest E-N/S Ramp | - Exact location station to be determined by DB Co as per OTM |
| WB Upstream of Pinecrest E-N/S Ramp | - Exact location station to be determined by DB Co as per OTM |

- (b) Where it is indicated in Table 8.4a that DB Co may salvage a component of an existing Overhead Sign Support Structure, or use existing footings, DB Co may do so, only if it verifies that these options are feasible, meet current MTO Standards, and are compatible with its final design. DB Co shall be responsible to provide new Overhead Sign Support Structures or footings in all instances where existing infrastructure cannot be re-used.
- (c) DB Co shall engage a structural Engineer to verify and certify that the sign boards provided by MTO are compatible with the Overhead Sign Support Structures designed by DB Co prior to installation. In any instances where DB Co proposes to salvage an existing Overhead Sign Support Structure (or component thereof), an Engineer shall

inspect and certify whether the entire Structure is suitable for re-use. If as a result of the inspection, DB Co determines that the Structure cannot be salvaged, DB Co shall be responsible to provide a new Overhead Sign Support Structure.

- (d) For all other locations within the Highway Corridor Lands, DB Co shall determine all required permanent ground-mounted and overhead signing, in accordance with the Reference Documents noted in Clause 8.1 of Part B of this Schedule 15-2, Part 9. DB Co shall contact the City to confirm, in writing, the official Municipal Roadway names as well as '911' signing requirements. If the information received indicates a road name change, DB Co shall obtain the municipal bylaw, Council Resolution or written direction in this regard and provide a copy to the City Representative for their records. The location, size, and type of each Sign shall be indicated on the Highway Traffic Control Plan.
 - (i) DB Co shall install signage to identify Emergency Detour Routes (as defined in OTM Book 8) established by the City and MTO. DB Co shall confirm the routes with the City. Sign locations shall be established in consultation with the City.
 - (ii) DB Co shall install a new overhead tri-chord sign structure on the Pinecrest E-N/S ramp if the existing structure is impacted by the Highway Works design.
- (e) DB Co shall prepare a Permanent Signing Plan (the "Permanent Signing Plan") and a Permanent Signing Table (the "Permanent Signing Table"). The Permanent Signing Plan shall depict the location of all Signs, and shall include staging drawings, which indicate the timing for installation of permanent signage. The plan shall also include Overhead Sign section drawings depicting the position of sign boards on Overhead Sign structures overtop of travelled lanes. The Permanent Signing Table shall include, but not be limited to, information detailing Sign location (station of final location, removal location and on which side of the road to be installed in relation to the direction of travel), height to bottom of Sign, lateral offset to post #1, support type with dimensions, alpha-numeric Sign code with dimensions, timing for installation, and the message/description.
- (f) The Permanent Signing Plan shall be combined into drawings at a scale of 1:1000 with the Permanent Pavement Marking Plan.
- (g) Permanent Signs shall be in French and English or bilingual and MTO Standards and guidelines shall be used.
- (h) DB Co shall design and supply all Overhead Sign support Structures, ground-mounted Sign break-away steel supports and associated Sign footings. Sign support Structures shall conform to the MTO Context Sensitive Design requirements as detailed in Appendix F to this Part 9.
- (i) The Permanent Signing Plan (combined with the Permanent Pavement Marking Plan), Permanent Signing Table, Sign details and shop drawings for all support structures and footings shall be submitted to the City Representative for review and acceptance in

accordance with Schedule 10 – Review Procedure, and a minimum of 60 days prior to the implementation of the plan.

- (j) DB Co shall include in the Permanent Signing Plan any changes to existing Signs.
- (k) All overhead Signs shall be provided on a separate structure. Overhead Sign boards may be mounted on existing support structures where applicable. In general, DB Co shall construct Sign support Structures per the following criteria:
 - (i) Main Line static Signs shall be provided on a tri-chord or cantilever structure; and,
 - (ii) Static lane designation Signs on ramps may be provided on a tri-chord, cantilever or monotube structure.
- (l) MTO through the City will supply all fabricated sign boards for all overhead and ground-mounted extruded Signs and non-standard Signs. Sign layouts will be provided by the City to DB Co for the design of Sign structures. DB Co shall replace existing with any new Sign boards that are supplied by MTO.
- (m) All permanent ground-mounted and overhead Sign boards shall be ordered through MTO Provincial Sign Shop and such Signs shall be supplied by the City. DB Co shall submit a list of Signs required to the City Representative for each year of construction. The list of Signs shall contain the quantity and details of the Signs, and the date for pick-up by DB Co. DB Co shall also submit to the City Representative structural shop drawings for all Sign support structures. The list of Signs and shop drawings shall be submitted a minimum of 12 weeks prior to the pickup date. The Signs ordered through the MTO Provincial Sign Shop will be delivered to a location identified by DB Co. DB Co shall within five Business Days of pickup, confirm in writing to the City Representative that all the ordered signs were received in accordance with the list of required signs. Any Signs damaged following delivery will be required to be replaced at DB Co expense.
- (n) Static Sign Structure Locations:
 - (i) DB Co shall install Sign structures in accordance with the Reference Documents noted in Clause 8.1 of Part B of this Schedule 15-2, Part 9.

8.5 Pavement, Hazard and Delineation Markings (Temporary)

- (a) DB Co shall provide all temporary Pavement Markings (including temporary Roadway Pavement Markings) in accordance with the Reference Documents noted in Clause 8.1 of Part B of this Schedule 15-2, Part 9. DB Co shall prepare a Temporary Pavement Marking Plan (the “Temporary Pavement Marking Plan”), which shall be submitted to the City Representative in accordance with Schedule 10 – Review Procedure, a minimum of 30 days prior to the implementation of the plan. The Temporary Pavement Marking Plan shall include scale drawings of the proposed Pavement Marking layout.

- (b) All temporary Pavement Markings shall have a minimum of two applications of Traffic Paint. Glass beads shall be applied for reflectivity and shall conform to the requirements of OPSS 710 and OPSS 1750.
- (c) DB Co shall paint or reinstate this same day any Pavement Markings that are removed that day.

8.6 Pavement, Hazard and Delineation Markings (Permanent)

- (a) DB Co shall provide all permanent Pavement Markings in accordance with the Reference Documents noted in Clause 8.1 of Part B of this Schedule 15-2, Part 9. DB Co shall prepare a Permanent Pavement Marking Plan (the “Permanent Pavement Marking Plan”), which shall be submitted to the City Representative in accordance with the requirements of the Review Procedure, a minimum of 60 days prior to implementation of the plan.
- (b) All painted permanent Pavement Markings shall have a minimum of two applications. Glass beads shall be applied for reflectivity and shall conform to the requirements of OPSS 710 and OPSS 1750.
- (c) All permanent Pavement Markings on Main Line and interchange ramps shall be durable type.
- (d) DB Co shall paint or reinstate this same day any Pavement Markings that are removed that day.

8.7 Ramp Closure Gates

- (a) Ramp closure gate signage shall be in accordance with the Reference Documents noted in Clause 8.1 of Part B of this Schedule 15-2, Part 9.

ARTICLE 9 LANDSCAPE ARCHITECTURE AND ECOLOGICAL RESTORATION

9.1 Order of Precedence

- (a) DB Co's landscape architecture and ecological restoration shall be in accordance with the criteria contained in this Article 9 and the following Reference Documents, and if there is any conflict between the criteria contained in this Article 9 and any Reference Document(s), the following shall apply in descending order of precedence:
 - (i) The criteria contained in this Article 9;
 - (ii) MTO Special Provisions;
 - (iii) The applicable MTO Directives, MTO Policy Memorandums, and MTO Design Bulletins;
 - (iv) OPSS;
 - (v) MTO Contract Design, Estimating and Documentation (CDED) Manual;
 - (vi) MTO Standard Drawings; and,
 - (vii) OPSD.

9.2 General Requirements

- (a) DB Co's landscape architecture and ecological restoration requirements for Highway Works shall be in accordance with Schedule 15-2, Part 6 – Urban Design, Landscape Architecture and Connectivity Requirements.
- (b) DB Co shall adhere to MTO Context Sensitive Design requirements as detailed in Appendix F of this Part 9.
- (c) DB Co shall submit plan drawings depicting proposed tree removals and mitigations within the Highway Corridor Lands in accordance with Schedule 10 – Review Procedure, within 60 days following Financial Close.

ARTICLE 10 ROAD SAFETY REVIEW AND AUDIT

10.1 Order of Precedence

- (a) DB Co shall have independent Design Safety Review and Road Safety Audits completed in accordance with the criteria set out in this Article 10 and the following Reference Documents, and if there is any conflict between the criteria contained in this Article 10 and any of the Reference Documents, the following shall apply in descending order of precedence:
- (i) The criteria contained in this Article 10;
 - (ii) MTO Special Provisions;
 - (iii) The applicable MTO Directives, MTO Policy Memorandums, and MTO Design Bulletins;
 - (iv) OPSS;
 - (v) MTO Contract Design, Estimating and Documentation (CDED) Manual;
 - (vi) Roadside Safety Manual, MTO;
 - (vii) MTO Design Supplement for TAC Geometric Design Guide for Canadian Roads, June 2017;
 - (viii) Geometric Design Guide for Canadian Roads, TAC;
 - (ix) The Canadian Road Safety Audit Guide, TAC;
 - (x) MTO Standard Drawings;
 - (xi) OPSD;
 - (xii) Ontario Traffic Manual, MTO;
 - (xiii) King's Highway Guide Signing Policy Manual, MTO;
 - (xiv) MTO General Conditions of Contract;
 - (xv) MTO Contract Design, Estimating and Documentation Manual;
 - (xvi) NCHRP Report 280 Work Zone Practices – Table 3: GENERAL GUIDELINES ON VEHICLE CAPACITY THROUGH WORK ZONES;
 - (xvii) Electrical Engineering Manual, MTO;
 - (xviii) Bikeways Design Manual;

- (xix) Ontario Bikeways Planning & Design Guidelines, MTO;
- (xx) Policy – Municipal Work on MTO Traffic Signals, September 2008; and,
- (xxi) MTO Policy – Roadway Lighting on Municipal Crossroads, October 24, 2003.

10.2 Road Safety Audit Team

- (a) The Road Safety Audit Team shall perform the Road Safety Audit and shall consist of a team of auditors, with a minimum of three Qualified Personnel, who are independent of the Construction Contractor, and shall meet the following minimum criteria:
 - (i) Be Engineers trained in the area of road and public safety, with over 20 years of engineering experience and demonstrated record or resume working in the road safety field and undertaking formal road safety audits with criteria similar to the Road Safety Audits in this Project, with references from government agency;
 - (ii) Possess demonstrated experience in undertaking safety reviews and experience with TAC's Canadian Road Safety Audit Guide, and Canadian and Ontario Roadside safety standards;
 - (iii) Possess demonstrated experience in road safety, traffic engineering, geometric design, and demonstrated expertise with human factors in design and safety reviews or audits;
 - (iv) Have participated in at least two recent road safety audits with criteria similar to the Road Safety Audits in this Project, where such previous participation was on projects delivered using design build or public private partnership methods; and,
 - (v) Possess demonstrated professional independence in undertaking Road Safety Audit in this Project.

10.3 General Requirements

- (a) Road Safety Audits shall include the Road Safety Audit processes as identified in the Canadian Road Safety Audit Guide, and shall for clarity include human factor considerations.
- (b) The Road Safety Audit Team's individuals' qualifications, experience, and knowledge, and letters of reference from the relevant Governmental Authority where prior audits were performed, shall be provided to the City Representative 60 days in advance of any safety audit work and be accepted by the City in accordance with the Review Procedure prior to any safety review or audit work being initiated.
- (c) The Road Safety Audit Team's individuals shall not be an employee of any of the companies on DB Co's team and, other than being paid for services rendered to DB Co in their capacity as Road Safety Auditor, the team shall be fully independent and at arm's length from any company participating on DB Co's team.

- (d) All Road Safety Audits and safety reviews shall include a human factors expert experienced in road and Highway design and construction, who shall provide input and review of the safety and operation of the work from a human factors perspective.
- (e) Any “as constructed” element that does not conform to the design, does not meet the required safety standards, or deemed not to meet a reasonable level of safety by the Safety Auditor, shall be corrected by DB Co immediately. The rectification recommendations shall to be prepared by an individual with the requisite skill and training in the area of the work, stamped and sealed by the Engineer and the solution shall be acceptable to the Road Safety Audit Team and to the City.
- (f) DB Co shall be responsible for any existing or proposed Site conditions found not to meet a reasonable level of safety, and shall rectify the condition immediately, or otherwise construct temporary works to Address the safety concern until repairs are made.

10.4 DB Co’s Responsibility

- (a) DB Co shall undertake Road Safety Audit and Road Design Safety Reviews as per the requirements of this Article 10 of Part B of Schedule 15-2, Part 9 on all temporary and permanent elements of the Highway Works.
- (b) DB Co shall be responsible for:
 - (i) Scheduling, initiating, allowing access to the applicable Site and managing the Road Safety Audit and Design Safety Review process at the appropriate times during the course of the Highway Works;
 - (ii) Providing all necessary design drawings and supporting documentation for the Road Safety Audit Team to conduct the Road Safety Audit and Design Safety Review;
 - (iii) Ensuring that the Design Safety Review and Road Safety Audit is conducted in accordance with Good Industry Practice;
 - (iv) Receiving and reviewing the Road Safety Audit Team’s report with the City Representative;
 - (v) Responding to the Design Safety Review and Road Safety Audit Report including presenting alternatives to Address deficiencies;
 - (vi) Implementing required re-design as a result of the corrective suggestions described in (v) above in an expeditious and Timely manner;
 - (vii) Updating changes on the required design drawings; and,
 - (viii) Providing all draft and final documentation related to the Design Safety Review and Road Safety Audit to the City Representative.

- (c) All costs associated with the Design Safety Review and Road Safety Audit, including any re-design and increased costs to the Highway Works that result from the Design Safety Review and Road Safety Audit, shall be borne by DB Co.
- (d) After each Design Safety Review and Road Safety Audit, except as otherwise expressly agreed in writing by the City Representative, DB Co shall address all recommendations made by the Road Safety Audit Team.

10.5 Design Safety Review

- (a) At the outset of the Highway Works and no later than 60 days after Commercial Close, an initial Design Safety Review shall be undertaken to assess all design elements proposed by DB Co or required in the Output Specifications that may have any bearing on public, maintenance or operational safety from the point of view of any user within the Highway Works. The initial Design Safety Review shall precede the design activity and the subsequent design shall accommodate any required recommendation or resolution of this initial Design Safety Review.
- (b) Design Safety Reviews shall be undertaken on an ongoing basis through the stages and duration of all designs and all to be constructed temporary and permanent elements that may have any bearing on public, maintenance or operational safety from the point of view of any users within the Highway Works.
- (c) Design Safety Reviews shall review, identify and resolve any safety concerns prior to design such that the design can be modified in a Timely manner to Address the safety concerns for permanent and temporary works within the Highway Works. DB Co shall plan, schedule and execute the review, together with providing a report that Addresses any safety concerns and the recommendation or resolution of each Design Safety Review.

10.6 Road Safety Audit Process

- (a) The Road Safety Audit process shall be carried out in accordance with the Canadian Road Safety Audit Guide (TAC). References to “review” or “response” from the owner agency, or other qualifying phrase with similar connotation, shall be construed as the responsibility of DB Co in accordance with the requirements in this Article 10.
- (b) The Road Safety Audit Team shall prepare a report (the “Road Safety Audit Report”) to document the audit findings. Road Safety Audit Reports shall be submitted to the Design Team for the stages identified in Clause 10.6(c) below. The Road Safety Audit Reports shall clearly identify safety Hazards that need to be Addressed by DB Co along with recommendations for remediation. DB Co shall respond to the identified Hazards and recommendations with remediation counter-measures or provide to the City Representative for approval, appropriate reasons why the safety issue may not be Addressed as recommended in the reports. Under any circumstances, DB Co’s response and remediation countermeasures shall Address the safety issue to the satisfaction of the Road Safety Audit Team.

(c) The Road Safety Audit Reports shall be provided to the City Representative in accordance with Schedule 10 – Review Procedure for review at the stages identified below:

(i) Stage 1: Pre-Final Design Road Safety Audit

A. Stage 1 Road Safety Audit shall be conducted immediately before submission of the Pre-Final Design Development Submittals in accordance with Schedule 10 – Review Procedure, and Section 11.1 of the Project Agreement. The audit shall undertake a detailed review of the Pre-Final Design Development Submittals to identify any potential safety-related enhancements that might have an impact on the New MTO Infrastructure or New Municipal Infrastructure, including Crossing Roads and local roads. Issues considered shall include but not be limited to:

- i. Design consistency;
- ii. Site conditions and visibility;
- iii. Drivers' work load and perceived road information;
- iv. Vehicular traffic speed management and associated safety risk factors;
- v. Traffic control devices
- vi. Human factors;
- vii. Horizontal and vertical alignment;
- viii. Cross section design;
- ix. Interchange/intersection configuration;
- x. Access location;
- xi. Sight distance including, but not limited, to stopping sight distance and turning sight distance, sight distances to Traffic Control Devices, Bullnoses, etc.;
- xii. Operation of public transit;
- xiii. Operational and maintenance safety;
- xiv. Traffic operations;
- xv. Environmental factors;
- xvi. Clearances to Roadside objects;

- xvii. Safety Barriers; and,
 - xviii. Provision for vulnerable road and all multimodal ROW users.
- (ii) Stage 2: Final Design Road Safety Audit
- A. Stage 2 Road Safety Audit shall be conducted immediately before submission of the Final Design Development Submittals in accordance with Schedule 10 – Review Procedure, and Section 11.1 of the Project Agreement. The audit shall undertake a detailed review of the completed Final Design Development Submittals to identify any potential safety-related enhancements that might have an impact on the operational safety of the New MTO Infrastructure or New Municipal Infrastructure, including Crossing Roads and local roads. Issues considered shall include, but not be limited to:
- i. Signing and Pavement Markings;
 - ii. All interface with adjacent design disciplines;
 - iii. Traffic signal configuration;
 - iv. Intersection details;
 - v. Drainage and storm water management elements;
 - vi. Lighting;
 - vii. Fencing;
 - viii. Clearances to Roadside objects;
 - ix. Safety Barriers;
 - x. Surface standards including treatments and structures;
 - xi. Traffic Control Devices;
 - xii. Landscaping, streetscape and road furniture;
 - xiii. Provision for vulnerable road and all multimodal ROW users;
 - xiv. Accommodation of design vehicles;
 - xv. Emergency response requirements;
 - xvi. Road maintenance;
 - xvii. Traffic staging plan; and,

- xviii. Any other Stage 1 Road Safety Audit results affected by the Final Design Development.
- (iii) Stage 3a: Temporary Traffic Control On-Site Road Safety Audit
 - A. Stage 3a Road Safety Audits shall be conducted on the applicable Site before implementation of temporary Traffic Control set-ups that meet one or more of the following criteria:
 - i. Two or more individual temporary work zones in close proximity to each other such that one would influence the traffic operation of the other. The spacing between the termination area of one work zone and the Advance Warning area of the next work zone for which one temporary Traffic Control set-up influences the traffic operations of the next temporary Traffic Control set-up is 2.0 km or less.
 - ii. Temporary staging are required within the existing Highway 417 and the duration of temporary Traffic Control set-ups is five calendar days or more. The set-up does not necessarily have to be in place for the entire time but can be one of a number of repeating set-ups that are active at different times.
 - iii. The duration of temporary Traffic Control set-ups is 10 calendar days or more on roads other than those identified above. The set-up does not necessarily have to be in place for the entire time but can be one of a number of repeating set-ups that are active at different times.
- (iv) Stage 3b: Construction Road Safety Audit
 - A. Stage 3b Road Safety Audits shall be conducted on the applicable Site during construction. These audits shall examine the field conditions of the work under construction and assess any circumstances that may have a bearing on public safety from the point of view of any user and public areas that are within the Highway Works, or are modified and constructed as a part of the Highway Works. The audits shall meet the following criteria:
 - i. Two of the Stage 3b Road Safety Audits shall be undertaken annually within the high construction season, between June and September (i.e. two audits to be performed annually between June and September) and one in the winter, annually between December and February. Only one of the audits shall be preplanned with DB Co, while the others shall be performed unannounced.
- (v) Stage 4: Post-Construction Road Safety Audit

- A. Prior to opening any portions of the Highway Works and Crossing Roads and local roads for traffic operation, a Stage 4 Road Safety Audit shall be carried out. The audit shall investigate and identify potential safety enhancements that may reduce the frequency and/or the severity of collisions. The Road Safety Audit Team shall also check for safety deficiencies that result from using particular combinations of design elements not previously detected or any synergistic effects of using minimum Design Criteria for multiple design elements that may compromise users' safety;
- B. Stage 4 Road Safety Audits shall take place prior to and as a condition of the issuance of the Highway Construction Certificate (Completion); and,
- C. For the purposes of completing a Stage 4 Road Safety Audit required pursuant to paragraphs A and B above, the Road Safety Audit Team must fully examine the Highway Works by:
 - i. Meeting with DB Co to review any issues relating to the Highway Works, in particular design changes that may affect the safety of the New MTO Infrastructure or New Municipal Infrastructure, including all Crossing Roads and local roads;
 - ii. Checking to ensure that safety issues identified in the Stage 2 Road Safety Audit are Addressed and the resulting design changes do not create further safety issues;
 - iii. Reviewing any design changes that occurred during the relevant Highway Works to ensure they do not create safety issues; and,
 - iv. Conducting field reviews of such Highway Works, under both daytime and night time conditions.

10.7 City Requested Safety Audit

- (a) Road Safety Audits shall be undertaken by the Road Safety Audit Team at any time upon City request, in addition to the audits required in Clause 10.6 of this Part B. Such request may be for any Site condition, design element, design concern or constructed element of work that is of concern to the City. The City written request will outline the safety concern and the issue required to be investigated and Addressed by DB Co.
- (b) DB Co shall be responsible to demonstrate that the design and proposed constructed Highway Works meets a reasonable level of safety for all users. DB Co shall provide supporting research or engineering rationale and analysis for the design decisions, and for the support of the proposed design and constructed Highway Works that are subject to investigation.

- (c) DB Co shall Address the concerns and/or modify the proposed design and construction works accordingly and provide all available technical information to the Road Safety Audit Team for consideration.
- (d) The Road Safety Audit Team will render an opinion with the safety issue, and DB Co shall Address the safety issue to the satisfaction of the Road Safety Audit Team and City. The disposition and rectification of the safety concern is DB Co's full responsibility and obligation based on full and due consideration of input from the City and the Safety Audit Team.

10.8 Certificates

- (a) DB Co shall submit to the City Representative a certificate (a "Road Safety Audit Certificate") in the form attached as Appendix A - Form of Road Safety Audit Certificates to this Schedule 15-2, Part 9 in respect of the Stage 1, Stage 2 and Stage 4 Road Safety Audits respectively. Each Road Safety Audit Certificate shall be signed by the Design Manager, the Road Safety Audit Team, the Construction Contractor, and the DB Co Representative.
- (b) The Stage 4 Road Safety Audit Certificate shall be provided to the Independent Certifier and the Highway Substantial Completion Certificate shall not be issued unless a Stage 4 Road Safety Audit Certificate has been submitted and signed by the Design Manager, the Road Safety Audit Team, the Construction Contractor and DB Co's Representative.

10.9 Random Audits

- (a) The City and/or MTO retains the right to perform any additional independent audits on any part of design and construction Works at any time.

ARTICLE 11 DEMOLITION, REMOVALS AND DISPOSAL

12.1 General Requirements

- (a) DB Co's demolition, disassembly, removals and disposal of infrastructure and other buildings, improvements and amenities from the Site prior to Highway Substantial Completion shall be carried out in accordance with this Article 12, Schedule 17 – Environmental Obligations, and shall satisfy all Applicable Law and requirements of Governmental Authorities, Railway Companies and Utility Companies.
- (b) DB Co shall prepare and submit a Demolition, Removals, and Disposal Plan (the “Demolition, Removals, and Disposal Plan”) to the City Representative in accordance with Schedule 10 – Review Procedure a minimum of 60 days in advance of implementation of the plan.
- (c) The Demolitions, Removals, and Disposal Plan shall include, at a minimum, the following:
 - (i) Overall plan and schedule for demolition, removals and disposal within the Highway Works;
 - (ii) Procedures for demolition, removals and disposal of any special structures or Infrastructure;
 - (iii) Waste management and recycling plans and procedures;
 - (iv) Identification and definition of contaminated material, including contaminated soils, and any other dangerous or deleterious material, and DB Co's plan in managing them; and,
 - (v) DB Co's steps in complying with all Applicable Law, including the OHSA, Schedule 17 – Environmental Obligations, and the requirements in this Article 12.

12.2 Demolition

- (a) Demolition in accordance with this Article 12 shall be completed before DB Co submits a Notice to City in respect of West Final Completion, pursuant to Section 25.14 of the Project Agreement, with the following clarification:
 - (i) DB Co shall provide access to salvage works and shall comply with other environmental works as identified in Schedule 17 – Environmental Obligations prior to demolition of a structure.
- (b) Demolition shall include backfilling all excavations, grading and site stabilization/erosion control of demolition site upon completion of the demolition work.
- (c) Demolition of Structures shall be carried out as necessary to avoid effects on the Main Line or other Roads, or as specified elsewhere in the Project Agreement.

- (d) Portions of existing roads that are not retained as part of the New MTO Infrastructure or New Municipal Infrastructure, including any abandoned roads and driveways, shall be removed and restored to match conditions of adjacent, undisturbed areas in a clean and tidy condition, and in accordance with this Article 12. Re-vegetation shall be in accordance with DB Co's Final Vegetation Restoration Plan as required in Schedule 17.
- (e) Provisions must be made by DB Co to minimize the creation of dust generated during any demolition activities in accordance with the requirements of Schedule 17 – Environmental Obligations and in compliance with the air quality mitigation plan.
- (f) DB Co shall comply with noise and vibration requirements of Schedule 17 – Environmental Obligations.
- (g) Conduct demolition operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
- (h) DB Co shall install temporary security fencing around any excavations, should the site remain open overnight and during those times DB Co is not on site.
- (i) DB Co shall be responsible to make the area secure if any contaminated soil and deleterious material are encountered. DB Co shall install fencing if necessary.
- (j) Excavations are to be backfilled and levelled with clean fill and graded to promote positive drainage (i.e., no ponding).
- (k) DB Co shall not use explosives in any demolition operations.
- (l) A Designated Substances Survey report has been prepared for Structures that have been identified for replacement or rehabilitation. Refer to Schedule 17 – Environmental Obligations.

12.3 Waste Management

- (a) DB Co shall train applicable DB Co Parties and ensure all suppliers are trained on proper waste management procedures, as appropriate for the Highway Works.
- (b) DB Co shall, prior to Highway Substantial Completion, remove from the Site and dispose of all Materials and installations not incorporated in the Highway Works. Such removal and disposal shall include any abandoned vehicles, equipment, or waste material.
- (c) DB Co shall recycle construction waste to the maximum extent possible and, at a minimum, in accordance with Good Industry Practice.
- (d) All contaminated or dangerous material, including, but not limited to, elements of Infrastructure and buildings to be removed from the Site that contain designated substances and excess excavated material containing contaminants, shall be disposed of in accordance with the regulations of relevant Governmental Authorities.

- (e) Burning of waste is not permitted.

12.4 Removal of Existing Electrical Equipment

- (a) DB Co shall, prior to Highway Substantial Completion, remove from the Site and dispose of all existing electrical equipment, including underground boxes, Foundations and wiring, not incorporated into the Highway Works.

12.5 Removal of Existing Utilities

- (a) DB Co shall:
 - (i) Obtain approvals from Utility Companies, as required, prior to the start of demolition/removal work;
 - (ii) Grout or remove from the Highway Corridor Lands and dispose of, in its entirety, all Utility structures that are abandoned through the Project, situated beneath permanent travelled lanes or where it may otherwise affect the New MTO Infrastructure, subject to the additional requirements below;
 - A. Any facilities that contain hazardous material shall be removed.
 - (iii) Where required, cut, flush, and cap any municipal sewer lines in accordance with the requirements of the applicable municipality; and,
 - (iv) Ensure that prior to demolitions/removals, all Utilities are appropriately disconnected and all Utility meters and Utility rentals are returned to the appropriate Utility Company.

ARTICLE 12 CONSTRUCTION HAUL ROUTE

13.1 General Requirements

- (a) DB Co shall be responsible for the cleaning and maintenance of any and all haul roads used to complete the Highway Works to the satisfaction of the City or the local municipality. Haul routes shall be kept clean and free of construction dust and Debris.
- (b) Road conditions shall be inventoried and photographed by DB Co before construction and after.
- (c) Road condition shall be restored to original or better condition than prior to construction and to the satisfaction of the City or the local municipality.
- (d) DB Co shall determine the haul route and applicable load restrictions after consultation with the City and applicable local municipalities, and shall comply with their requirements. Haul routes shall comply with the City's by-laws for goods movement and use of truck routes.
- (e) DB Co shall be required to submit a construction Haul Route Plan (the "Haul Route Plan") a minimum of 90 days prior to start of any construction activities, in accordance with Schedule 10 – Review Procedure. The Haul Route Plan shall be reviewed by the City under the Review Procedure. The Haul Route Plan shall include the inventoried road conditions and photographs taken by DB Co before construction.
- (f) The Haul Route Plan shall include, at a minimum, the following:
 - (i) Existing condition of Municipal Roadways that will be used as haul routes;
 - (ii) A schematic of the general construction haul routes undertaken in each of the municipalities at or immediately adjacent to the Highway Works;
 - (iii) A description of the construction equipment or vehicles, including type and quantities, as applicable that will be traveling on the identified haul routes.
 - (iv) DB Co's plan and approach to cleaning and maintaining municipal haul roads as per requirements in this Article.

PART C
TRAFFIC MANAGEMENT AND CONSTRUCTION ACCESS

ARTICLE 1 GENERAL TRAFFIC MANAGEMENT REQUIREMENTS

1.1 Order of Precedence

- (a) DB Co's Traffic Management Plan and Traffic Control operations shall comply with the criteria contained in this Part C, and all standards, regulations, policies, Applicable Law, guidelines or practices applicable to the Project, including but not limited to each of the following Reference Documents. In the event of a conflict between the criteria and any of the Reference Documents, the following shall apply in descending order of precedence:
- (i) The criteria contained in this Part C;
 - (ii) MTO Special Provisions;
 - (iii) The applicable MTO Directives, MTO Policy Memorandums, and MTO Design Bulletins;
 - (iv) OPSS;
 - (v) MTO Contract Design, Estimating and Documentation (CDED) Manual;
 - (vi) Ontario Traffic Manuals;
 - (vii) MTO Design Supplement for TAC Geometric Design Guide for Canadian Roads, June 2017;
 - (viii) Urban Supplement to the Geometric Design Guidelines for Canadian Roadways, TAC;
 - (ix) Geometric Design Guide for Canadian Roads, TAC;
 - (x) Roadside Safety Manual, MTO;
 - (xi) MTO Standard Drawings;
 - (xii) OPSD;
 - (xiii) Fluorescent Orange Temporary Pavement Markings Policy #2011-11;
 - (xiv) MTO Policy 2011-02 – Full Road Closures;
 - (xv) Manual of Uniform Traffic Control Devices;
 - (xvi) Sign Sheeting Memorandum, February 21, 2008, MTO;

- (xvii) NCHRP Report 280 Work Zone Practices - Table 3: General Guidelines on Vehicle Capacity Through Work Zones;
- (xviii) Electrical Engineering Manual, MTO;
- (xix) Policy – Municipal Work on MTO Traffic Signals, September 2008;
- (xx) MTO Policy – Roadway Lighting on Municipal Crossroads, October 24, 2003;
- (xxi) Portable Variable Message Signs – Best Practices Manual, MTO;
- (xxii) Bikeways Design Manual; and,
- (xxiii) Guidelines for Reducing Speed Limits in Construction Work Zones.

1.2 General Requirements

- (a) DB Co shall manage the traffic and transit impacts of the Project and shall develop a Highway Traffic and Transit Management Plan (TTMP) for the Highway Works to meet the requirements of this Part C. DB Co shall manage and coordinate the Highway TTMP developed under this Part C with DB Co's requirement to manage and develop the TTMP required for the Confederation Line Extension Works as prescribed in Schedule 15-2, Part 7 – Traffic and Transit Management and Construction Access. The management and development of the Highway TTMP shall complement the requirements of the other respective TTMP and for further certainty neither the Highway TTMP nor the TTMP shall diminish the other nor the requirements prescribed in this Part 9 and Schedule 15-2, Part 7 – Traffic and Transit Management and Construction Access.
 - (i) The Highway TTMP shall be applicable to the Highway Works Construction Activities only.
- (b) DB Co shall coordinate the Permitted Periods for Closures and shall work collaboratively with adjacent MTO Contract 2017-4031 and the ATMS work at the Highway 416 / Hunt Club Road interchange, as outlined in Clause 2.6 of Part A. The Highway TTMP shall include how DB Co will manage this coordination. DB Co may reasonably be required to plan the Works with recognition of periodic Closures required by MTO Contract 2017-4031, which shall be given priority. DB Co shall expect to temporarily revise Designated Construction Zone limits to accommodate these Closures, when necessary. Designated Construction Zone revision shall allow Closures necessitated by DB Co and MTO Contract 2017-4031 to maintain compliance with OTM Book 7. Coordination requirements with other work are further detailed in Clause 2.5 of Part A of this Schedule 15-2, Part 9.
- (c) The Permitted Periods for Closures outlined in this Part C shall be the basis for the development of the Highway TTMP. Variations to the applicable Permitted Periods for Closures, at specific locations, may be permitted for such specific locations, but only if substantiated through a plan by DB Co that addresses, at a minimum, traffic

- requirements, analyses and Stakeholder consultation, where applicable, and such plan is submitted to the City for approval in accordance with Schedule 10 – Review Procedure.
- (d) DB Co shall work collaboratively and diligently, in a reasonable manner with the City and OC Transpo, Stakeholders, MTO, EMS organizations and other City service providers and Governmental Authorities so that transit service is maintained during construction in terms of travel time and frequency.
 - (e) Construction shall be scheduled so that the duration and extent of the proposed Highway Works and traffic control measures minimize the impact to all modes of transportation and adjacent land owners, and shall not prohibit any part of the traveling public access prior to receiving the required authorization to do so.
 - (f) All traffic data used for analysis for traffic management purposes shall be based on the most current data, no older than two years. The information to be collected shall include, but not be limited to, typical hourly traffic volumes in each direction for a 24 hour period for each season, considering all modes of travel on all Roads, bus Facilities, bike facilities and pedestrian facilities which will be affected by the Project, including any potential Detour Routes. DB Co shall be responsible for obtaining or collecting all traffic data necessary for its traffic analysis; the data shall reflect typical conditions of the roadway. DB Co shall confirm with the City that the data is appropriate prior to conducting an analysis using said data.
 - (g) DB Co shall undertake a Traffic Management Study (the “Traffic Management Study”), where road capacity is reduced, to determine the impact of the construction on possible diverted traffic and to determine appropriate mitigation measures. The Traffic Management Study shall extend along the entire extent of projected impacts and address all modes of transportation including adjacent corridors impacted by the construction. The study shall include DB Co’s forecast for, but not limited to, routes, diverted traffic volumes, speeds and travel times, for all modes of travel on all routes subject to the study. The Traffic Management Study shall be submitted as a part of the Highway TTMP document in accordance with Schedule 10 – Review Procedure.
 - (h) The OTM supersedes all reference in this Schedule 15-2, Part 9 to the MTO MUTCD. The supply and placement of all necessary temporary TCDs shall be performed under the sole direction of DB Co and in accordance with DB Co’s submitted/reviewed Highway TTMP and associated Highway TCP, prior to commencing any construction, on or adjacent to any Provincial Highways, Municipal Roadways or Other Affected Municipal Roadways. The Highway TCP shall be developed in accordance with guidelines established by the most recent version of the OTM, the OHSA and this Part C which details the required contents and submission of the Highway TTMP and associated Highway TCPs.
 - (i) Vehicular and pedestrian/cyclist traffic control within the Highway Works limits shall remain the sole responsibility of DB Co. The City delegate this authority to DB Co in accordance with the submitted/reviewed Highway TTMP. Notwithstanding the foregoing,

DB Co shall, at its own expense, remove any equipment or Material, which in the City's opinion, constitute a Hazard to traffic, pedestrians and cyclists.

- (j) DB Co shall be fully and solely responsible to ensure the development and implementation of a submitted/reviewed Highway TTMP as required in this Part C. The Highway TTMP and its sub-plans, and all required TCDs shall be designed/installed, monitored, operated/maintained and removed, utilizing only competent persons and workers as defined under the OHSA. DB Co shall be responsible for coordination of this work with the City.
- (k) DB Co shall not store any equipment or materials on a provincial or municipal road or the Roadway shoulders, the Transitway, Park and Rides, or boulevards, unless the storage areas are identified in the Highway TCP and appropriate TCDs have been implemented to protect the equipment or materials. The City shall review and approve any storage of equipment and/or materials within the Highway Corridor Lands. Construction shall be scheduled so that the duration and extent of the proposed Highway Works and traffic control measures minimize the impact on the traveling public. DB Co shall remove all dirt and Debris from all paved or concrete surfaces outside of the staging area at the close of each workday, and are responsible for any repairs or maintenance associated with the construction activity, to City and MTO Standards.
- (l) Implementation and removal of any Closure, Full Closures, Detour Routes, Lane Shifts, and Diversions and/or other changes in traffic patterns shall not be permitted outside of the applicable Permitted Periods for Closures as defined in this Part C and elsewhere in this Project Agreement.
- (m) The City Representative may, acting in a reasonable manner, temporarily adjust the applicable Permitted Periods for Closures in circumstances considered appropriate by the City including but not limited to, Holidays, as further addressed in Clause 1.4 of this Part C – Holidays and Special Events and Clause 4.4 of this Part C – Permitted Times for Lane and Ramp Closures.
- (n) The City Representative may direct DB Co, on seven Business Days advance notice, to eliminate or modify any or all Closures and restore free-flow traffic for a 24-hour period on the day of any planned event other than a Holiday, as per this Part C.
- (o) The City Representative may direct DB Co, on short notice (within 48 hours), to remove any or all Closures and restore or maximize Road cross-section including Shoulders and maintain existing traffic flow, where practical for any unplanned / emergency events.
- (p) DB Co shall temporarily cease any relevant Construction Activities that are affecting traffic and make all the necessary travel lanes available to traffic as quickly as possible if the City Representative or DB Co Traffic Control Supervisor determines that vehicular queues related to Closure, Full Closures, Detour Routes, Lane Shifts and/or Diversions are excessive. For example, where vehicular queues at intersections or interchanges extend onto the Main Line.

- (q) If DB Co's Traffic Control Supervisor or the City Representative determine that there are significant unexpected and/ or unmitigated traffic safety or operational issues related to Closure, Full Closures, Detour Routes, Lane Shifts and/or Diversions, DB Co shall temporarily cease any relevant Construction Activities that are affecting traffic and take necessary steps to Address the safety and operational issues.
- (r) Any proposed DB Co initiated Closure, Full Closures, Detour Routes, Lane Shifts, and Diversions, not included in DB Co's accepted Highway TCP, shall be submitted to the City in an updated Highway TCP in accordance with Schedule 10 – Review Procedure. DB Co shall not proceed with implementation of the Closure, Full Closure, Detour Route, Lane Shift or Diversion without a Highway TCP accepted by the City. DB Co shall not commence any work on Highway Corridor Lands without an applicable current accepted Highway TCP.
- (s) Multiple work zones that impact each other along Provincial Highways, Municipal Roadways, and Other Affected Municipal Roadways or routes between them, such that traffic encounters multiple disruptions and/or discontinuity in the lane geometries, shall not be permitted.
- (t) Notwithstanding any Closures or Full Closures, DB Co shall maintain access to all adjacent properties through Detours or otherwise.
- (u) Access to/from work zones along existing Provincial Highways and Roads shall not be permitted outside of the applicable Permitted Periods for Closures.
- (v) Access to/from work zones on the Provincial Highways during applicable Permitted Periods for Closures shall only be permitted with a Closure of the adjacent lane to provide vehicle acceleration / deceleration.
- (w) Construction vehicles/equipment shall only use accesses to/from work zones in the same direction of traffic thereby diverging/merging with the flow of traffic. A minimum distance of 1,000 m shall be maintained between construction egress and access locations. If this minimum spacing cannot be accommodated due to spatial constraints, DB Co shall propose an alternate configuration through the Highway TTMP. The City reserves the right to close any access to/from any work zones that it deems to be unsafe or which constitutes a Hazard to the public.
- (x) DB Co shall ensure that an open excavation adjacent to a lane carrying traffic will not be present except where a Barrier designed to restrain errant vehicles is located between the traffic and the excavation.
- (y) DB Co shall ensure that Materials and / or equipment is not stored within 10 m of the traveled portion of any Roadway unless protected by a Barrier. Notwithstanding compliance by DB Co with the foregoing, DB Co shall, at its own expense, remove Materials and construction vehicles and equipment which, in the opinion of the City Representative, constitute a traffic Hazard, or obstruction to maintenance operations.

- (z) DB Co shall be responsible for identifying to the City in advance all Roads being utilized for haul routes. DB Co shall be responsible for the cleaning and maintenance of haul routes. Requirements pertaining to haul routes are identified in Article 13 of Part B of this Schedule 15-2, Part 9.
- (aa) The City shall be granted access to the work zones to install portable cameras or other devices required for monitoring, audit, public communication, data collection or other purposes.
- (bb) All TC-54s used by DB Co shall be equipped with two sets of rubber tire ballast rings. DB Co shall remove all TC 54s from Roads, within the limits of the Highway Works, immediately after the conclusion of any traffic control requiring their use.
- (cc) DB Co shall be responsible for providing, installing and maintaining all TCDs and protective devices identified in the approved Highway TTMP.

1.3 Accommodation of Transit Services

- (a) DB Co shall be responsible for liaising and coordinating with all applicable municipal transit agencies for any modifications to bus routes and/or bus stops that may be required due to Closures, Full Closures, Detour Routes, Lane Shifts and Diversions and/or other changes in traffic patterns.
- (b) DB Co shall maintain access for transit customers at all adjacent existing Transitway and transit facilities, bus lanes and Transit Priority Lanes and non Transitway routes through detours or otherwise as detailed elsewhere in Schedule 15-2, Part 7 - Traffic and Transit Management and Construction Access, and elsewhere in the Project Agreement, unless exceptions have been approved.
- (c) DB Co shall provide the City and OC Transpo at least 35 calendar days' notice to coordinate adjustments required to their facilities as a result of construction. Access by buses, pedestrians and cyclists to all existing bus stops located within the work zone shall be maintained at all times, except where otherwise stated in Schedule 15-2, Part 7 - Traffic and Transit Management and Construction Access or elsewhere in this Project Agreement or agreed upon by the City and OC Transpo.
- (d) Proposed modifications to bus routes and/or bus stops shall be submitted in accordance with Schedule 10 – Review Procedure.

1.4 Holidays and Special Events

- (a) DB Co shall comply with the following requirements when scheduling hours of work or DB Co initiated Closures during the Holidays identified in Tables 1-1.1 and 1-1.2 (the "Holidays"):
 - (i) DB Co shall not commence the implementation of any Closures on any of the Holidays, after 12:00 on Fridays or a day proceeding a Holiday weekend, and

before 12:00 on a day following a Holiday or on the first Business Day following a Holiday weekend.

- (ii) Closures required for the installation of the Pedestrian Bridge at Queensview Station shall be permitted on Holiday weekends, except the weekends of Canada Day and Thanksgiving, subject to DB Co's receipt of approval from the City according to Article 4 of this Part C.

TABLE 1-1.1 – ONTARIO STATUTORY HOLIDAYS

| | |
|----------------|------------------|
| New Year's Day | Civic Holiday |
| Family Day | Labour Day |
| Good Friday | Thanksgiving Day |
| Victoria Day | Christmas Day |
| Canada Day | Boxing Day |

TABLE 1-1.2 – OTHER HOLIDAYS

| | |
|-------------------|-----------------|
| Easter Monday | Remembrance Day |
| St. Jean Baptiste | |

- (b) DB Co shall minimize traffic disruptions on Provincial Highways, Municipal Roadways, and Other Affected Municipal Roadways during special events. DB Co shall be responsible for obtaining a listing of planned special events on an as required basis from the City of Ottawa Events Central Office, the Traffic Management Special Events office, and the NCC, recognizing that the special events calendar is updated by the City and the NCC on a regular basis.

1.5 Detour Route, Lane Shift, Diversion, Closure and Construction Requirements

- (a) General
- (i) DB Co shall not implement any Closure, Detour Route, Lane Shift or Diversion without an applicable current accepted Highway TTMP and Highway TTMP sub-plans.
 - (ii) DB Co shall pave all Detour Routes, Lane Shifts and Diversions and have appropriate Pavement Markings and Signs placed in accordance with the OTM, MTO Standards, policies, guidelines and best practices.
 - (iii) DB Co shall be responsible for all Pavement Markings and non-regulatory signage on all Detour Route, except as identified in Clause 8.3 of Part B of this Schedule 15-2, Part 9, in preparation for the detour and during detour operations.
 - (iv) DB Co shall ensure that the Pavement structure and condition of any new, existing or temporary Road, bus lanes, cycling facility and pedestrian facility used for all Detour Routes, Lane Shifts and Diversion is designed and constructed for its intended purpose in accordance with the requirements set out in Schedule 15-2,

Part 9, Part B, Clause 3.3, and does not adversely impact the safety and intended function of such Detour Routes, Lane Shifts and Diversions for all road users of the facilities.

- (v) DB Co shall schedule Construction Activities such that no milled surface shall remain for more than 10 calendar days, or over Holidays and adjoining Weekend Periods. Each milled surface shall have a uniform texture, not be raveled, and not allow standing water on the surface.
- (vi) DB Co shall prepare an engineered design for each Detour Route, Lane Shift and Diversion that shall conform to the design requirements in the Reference Documents. Detour Routes shall be designed to the same design speed of the existing Road. Where a Diversion design speed for a Crossing Road cannot match the existing design speed within the proposed ROW limits, a reduced design speed corresponding to the posted speed shall be submitted to the City Representative for acceptance in accordance with Schedule 10 – Review Procedure.
- (vii) DB Co shall provide Detour Routes, Lane Shifts and Diversions with drainage facilities to prevent standing water and flow of water across the Roads, bus lanes, cycling and pedestrian facilities.
- (viii) Implementation and removal of any Closures, Full Closures, Detour Routes, Lane Shifts and Diversions and/or other changes in traffic patterns shall not be permitted outside of the applicable Permitted Periods for Closures.
- (ix) Lane Closure duration shall be limited to the time required to execute the necessary Construction Activities. DB Co shall not close a lane for purposes other than actual Construction Activities, such as, but not limited to, Material and equipment storage, and staff parking, unless approved by the City.
- (x) Detour Routes, Lane Shifts and Diversion requirements and any modifications thereto, shall be submitted in accordance with Schedule 10 – Review Procedure. The submittal shall in addition include modifications to the various Highway TTMP sub-plans as applicable.
- (xi) All Highway Works related Closures associated with traffic of any kind shall be the responsibility of DB Co, as well as any associated requirements for traffic control (such as but not limited to signage, line painting, TCD, Barriers, flag persons, point duty police, etc.). Closures and their ancillary requirements shall be submitted as part of the submittals in accordance with Schedule 10 – Review Procedure.
- (xii) DB Co shall prepare and submit Record Drawings to the City in accordance with the requirements of Schedule 15-2, Part 1, Article 16 – Record Drawings, and Schedule 15-2, Part 9, Part A, Clause 2.2, where new traffic signals, temporary traffic signals or modifications are being made to existing traffic signals, within 30 calendar days of signal activation.

- (xiii) DB Co shall have independent Road Safety Audits and Road Design Safety Reviews completed for any temporary or permanent Road, or Road detour, in accordance with the criteria set out in Article 6 - Roadways, Bus Terminals and Lay-Bys, of Schedule 15-2, Part 2 and Article 10 of Part B of this Part 9.
- (b) Traffic Control Devices
 - (i) DB Co shall supply, install and maintain DSM approved PVMS as required to supplement the Highway TCP and shall use the same to provide advance notification and advance warning of traffic pattern changes. Sign locations and messages shall be as shown in the Highway TCP which shall be submitted to the City in accordance with Schedule 10 – Review Procedure two weeks prior to being displayed. The City retains the right to require DB Co to provide additional PVMS in support of the Highway TCP.
 - (ii) DB Co shall provide PVMS(s) to provide advance notification and advance warning of Incidents as deemed necessary by the Highway Emergency Traffic Plan. Sign messages and the duration that the PVMS is deployed and displayed shall be submitted to the City for acceptance prior to being implemented, and the Highway TCP shall be updated to record the messages which were used.
 - (iii) PVMS signs shall meet the following requirements:
 - A. Be capable of displaying a sequence of up to six panels;
 - B. Each display panel shall be capable of displaying up to three lines;
 - C. Accommodate up to 12 characters on each line of text; and,
 - D. Messages shall be legible from 50 m to 300 m.
 - (iv) DB Co shall utilize standard MTO and bilingual messages on all PVMS Signs and message boards (one Sign per approach) with translations accepted by the City.
 - (v) DB Co shall provide TC-64 Signs or PVMS for all re-occurring Lane Closures, Full Closures, detours and Diversions. Additional PVMS may be used as an option in lieu of the TC-64 Signs. PVMS are required for all Full Closures.
- (c) Temporary Barrier Requirements
 - (i) DB Co shall supply and install temporary Barriers based on the requirements of the OTM, OHSA and the Roadside Safety Manual.
 - (ii) DB Co shall show the temporary Barriers in the Highway TCP which shall be submitted in accordance with Schedule 10 – Review Procedure.
 - (iii) Temporary Barriers used for Closures, Full Closures, Detour Routes, Lane Shifts and Diversions, shall meet the OPS standards and have appropriate flare offsets,

end treatments and crash cushions. Temporary Barriers shall have reflectors installed. DB Co shall make adequate provision for drainage and removal of snow, ice and Debris where temporary Barriers are used.

- (iv) DB Co shall install anti-glare screens, on or adjacent to Barriers, in order to avoid driver distraction and headlight glare in locations adjacent to Municipal Roadways and Other Affected Municipal Roadways where Equipment is actively working. DB Co shall submit the documentation and product samples proposed for anti-glare screens in accordance with Schedule 10 – Review Procedure.
- (d) Daily Backfilling to Subgrade Level
- (i) At locations where temporary Concrete Barrier is present, excavation for the roadworks, placement of Granular Materials, and any other operation which will result in an excavation shall only be completed to within 1.0 m of the backface of the Barriers when the Barriers are positioned in their temporary configuration, in accordance with MTO Design and Contracts Standards Policy #2017-04. The remainder of the excavation, Granular Materials and asphalt pavement shall be completed by shifting the Barrier and implementing a lane Closure in accordance with the timing constraints specified elsewhere in this Part C. The Barrier shall then be returned to its un-shifted position.
 - (ii) DB Co shall ensure that prior to completion of work each day, areas that are excavated below a subgrade level are backfilled to the subgrade level in accordance with methods specified elsewhere within the Project Agreement.
 - (iii) DB Co shall ensure measures are taken against undermining of the adjacent Pavement structure at open excavations throughout the contract limits, where traffic is protected by temporary Concrete Barrier. This shall be done by backfilling with the specified Material up to profile grade within 2 m of the back of Barrier prior to ceasing operations each weekend.
- (e) Guide Rail Construction Operations
- (i) DB Co shall ensure that the existing guide rail system or an approved Barrier System shall remain in place at all times or the removed guide rail is replaced with the new guide rail or an approved Barrier System within the same working day at all locations with an existing guiderail or Barrier System.
- (f) Ramp and Side Street Closures
- (i) DB Co shall provide notice of one-time ramp and side street Closures consistent with requirements detailed elsewhere.
 - (ii) Ramp and Side Street Closures – Short Duration
 - A. DB Co shall comply with conditions covered elsewhere in the Project Agreement for all nightly Closures of ramps and/or Lane Closures on side

streets. Ramps shall only be closed if work is directly located on the ramp or on Highway 417 or side street at the ramp junction, or if Closure is required to implement other lane Closures in accordance with OTM Book 7. Short-term ramp Closures are restricted to one ramp at a time per interchange per direction.

(iii) Ramp and Side Street Closures – Long Duration

- A. DB Co shall only close ramps if work is directly located on the ramp, or on the Highway or side street at the ramp junction, if Closure is required to implement other Lane Closures in accordance with OTM Book 7, with the exception of the Long Duration temporary closure of the Richmond Road N-E ramp.

| RAMP / SIDE STREET | DURATION |
|---------------------------|---|
| Moodie Drive S-W ramp | Permitted to be closed for a single construction season to facilitate the construction of the grade separation between the S-W ramp and the LRT alignment, with associated lane reductions/traffic management measures on Moodie Drive |
| Richmond Road N-E ramp | This ramp shall be closed temporarily from the commencement of the Transitway Segment W-7 detour/opening of the temporary Holly Acres N/S-E transit only ramp until Revenue Service of the Confederation Line West Extension is achieved. |

(f) Existing Roadway Illumination

- (i) DB Co shall ensure all existing Roadway illumination remains fully operational during the hours of darkness until such time as a temporary and/or permanent Highway Lighting System is installed and operational during hours of darkness. For instances where the Roadway is closed to traffic to accommodate construction, the existing Roadway illumination may be turned off within the limits of the road Closure only. Any temporary and/or permanent Highway Lighting System must have equivalent lighting levels to the existing lighting levels.

(h) Underpass Illumination

- (i) DB Co shall ensure that existing Underpass illumination is fully operational at all times during the hours of darkness until such time as the temporary or permanent Underpass lighting is installed and operational during the hours of darkness. Any temporary and/or permanent Highway Lighting System must have equivalent lighting levels to the existing lighting levels.

- (i) Electrical Coordination
 - (i) DB Co shall coordinate the installation of guiderail with the location of any electrical work (permanent, temporary and existing) within the Highway Works limits.
- (j) Signage
 - (i) DB Co shall be responsible for the design, supply, installation, relocation, maintenance and removal of all temporary signage, including Warning Signs, guide, advisory and directional Signs in accordance with this Part C and Clause 8.3 of Part B of Schedule 15-2, Part 9.
 - (ii) All temporary signage shall be in accordance with the City of Ottawa, OTM and MTO Standards. DB Co shall provide signage requirements for all temporary conditions as per MTO's Temporary Conditions Traffic Management Manual dated April 2001, throughout the Highway Works. The location, size and type of each Sign shall be indicated on the Highway TCP.
 - (iii) DB Co shall supply and install bilingual Signs, with translations accepted by the City.
 - (iv) DB Co shall prepare and submit as part of the Highway TTMP sub-plans a Temporary Signing Plan and a Temporary Signing Table in accordance with Clause 8.3 of Part B of Schedule 15-2, Part 9.
 - (v) DB Co shall be responsible to install and remove all necessary construction signage for any proposed Detour Routes. DB Co shall notify the City a minimum of 14 calendar days in advance of the requirement for the detour.
 - (vi) Project Information Signage will be provided by the City. DB Co shall install project Information Signage at locations designated by the City.
- (k) Temporary Lighting During Construction
 - (i) DB Co shall be responsible for all temporary street light relocation.
 - (ii) All existing lighting in each staging phase shall be maintained in operational order to applicable standards during construction on the relevant construction phase until such time as replacement temporary or permanent lighting is energized.
 - (iii) DB Co shall provide temporary illumination as per Clause 6.5 of Part B of this Schedule 15-2, Part 9.
- (l) Pavement Drop-Offs
 - (i) DB Co shall perform all Construction Activities so as to minimize any Drop-offs (abrupt changes in Road elevation) left exposed to traffic, pedestrians and cyclists

during non-working hours. Drop-offs left exposed to traffic, pedestrians and cyclists during non-working hours shall be delineated as follows:

- A. Drop-offs up to 40 mm may remain exposed with appropriate TCDs alerting motorists of the condition. However, no drop-offs shall be allowed between adjacent lanes of traffic;
 - B. Drop-offs greater than 40 mm that are in the Road or Shoulder shall be delineated with appropriate TCDs and further delineated as described in Clause 1.5(c) of this Part C;
 - C. Ramping shall be provided for vehicular traffic at a slope of 10:1 if the elevation difference, where unavoidable, is more than 40mm for longitudinal edge drops.
 - i. The provisions for temporary ramping shall also meet the requirements of OPSS PROV 313.
 - ii. DB Co shall ensure that adequate and positive drainage is maintained along and across the Roadway at all times and during all construction stages.
 - D. All transverse edge drops located on roads utilized by traffic and transit shall be ramped at a slope of 120:1.
- (ii) All areas of excavation near areas of traffic and their proposed safety measures shall be shown in the Highway TCP.
 - (iii) All Highway Works shall meet AODA requirements at all times.
- (m) Temporary Pavement Markings, symbols and devices
- (i) DB Co shall be responsible for the execution of all temporary Pavement Markings and symbols in accordance with this Part C, and Clause 8.5 of Part B of Schedule 15-2, Part 9.
 - (ii) DB Co shall be responsible for the application, maintenance and removal of all Temporary Pavement Markings, symbols, Road pavement markers, channelizing devices, barricades, reflective devices, etc., in accordance with the OTM, and all of which shall be specified and detailed in the Highway TCP which shall be submitted to the City in accordance with Schedule 10 – Review Procedure. Only permanent Pavement Markings shall be applied to the final Pavement surface.
 - (iii) DB Co shall eradicate all redundant Temporary or Permanent Pavement Markings that are not required for the intended traffic pattern using DSM listed equipment.
 - A. Eradication of Pavement Markings shall be in accordance with the CDLED Manual, such that removal of Pavement Markings, when necessary, shall

- be by means of asphalt grinding, sandblasting, soda blasting, water blasting or some other form of mechanical removal and not by the use of black paint.
- B. DB Co shall resurface all locations where scarring of Pavement occurs due to the removal of Pavement Markings for construction staging. Resurfacing requirement applies to all locations where more than one Lane Shift or diversion occurs. DB Co shall provide full width paving throughout the limits of the scarring prior to the application of permanent Pavement Markings.
- (iv) Temporary Pavement Markings Materials shall be in accordance with OPSS 710, and shall be specified and detailed in the Highway TCP.
- (v) DB Co shall apply all Temporary Pavement Markings in accordance with OPSS 710 and the accepted Signing and Pavement Markings drawings and the Closure, Detour Route, Lane Shift and Diversion drawings as submitted to the City in accordance with Schedule 10 – Review Procedure.
- (vi) Fluorescent Orange Temporary Pavement Markings shall be used on all Provincial Highways where there are changes in alignment to accommodate construction staging.
- (n) Speed limits and safe passage through work zones
- (i) The City reserves the right to determine speed limits through the work zones. Unless specified in this Part C or agreed to in writing by the City, the existing regulatory speed limits shall be maintained.
- (ii) DB Co shall review the need for short- or long-term speed reduction for all staging in accordance with the Reference Documents. Proposed speed reduction shall be submitted to the City Representative through the Designation of Construction Zone forms. Proposed posted speed reductions on Provincial Highways below 80 km/h will not be accepted.
- (iii) Speed limits on all Provincial Highways, Municipal Roadways, and Other Affected Municipal Roadways shall remain unchanged outside of Designated Construction Zones. DB Co shall prepare the necessary Designation of Construction Zone forms, (PH-M-101), which shall be submitted to the City Representative for approval in accordance with Schedule 10 – Review Procedure. The City Representative will submit the forms to MTO for approval.
- (iv) Construction Activities shall be carried out in such a manner as to maximize safety and minimize disruption to Highway traffic.
- (v) Outside the Winter Period, lane widths of no less than 3.5 m and lateral offsets between the travelled lane and temporary Barriers of no less than 0.5 m must be maintained at all times during Construction Activities.

- (vi) During the Winter Period, lane widths shall be as per Clause 1.14.
- (vii) Floodlighting used to illuminate areas of the Highway Works during Construction Activities, shall be included in the Highway TCP and shall be adjusted so as to not interfere with the vision of drivers on the affected or opposing lane and also so as to not be directed towards residences or businesses near the work zone.
- (o) Maintenance of Closures, Detour Routes, Diversions, Lane Shifts, pathways and sidewalks
 - (i) DB Co shall keep existing Roads open to traffic, and DB Co shall be responsible for providing a road through the Designated Construction Zone for the duration of the Highway Works, whether along an existing Road, including the road under construction, or on Detours, Diversions or Lane Shifts.
 - (ii) DB Co shall maintain and repair Closures, Detour Routes, Diversions, Lane Shifts, pathways and sidewalks and their appurtenances, which are built as permanent infrastructure, as per the maintenance provisions set out in this Part C for temporary infrastructure.
 - (iii) DB Co shall be responsible for all aspects of maintenance and repair for all temporary Closures, Detour Routes, Diversions, Lane Shifts, pathways and sidewalks and their appurtenances throughout their duration of use.
 - (iv) DB Co shall execute the maintenance on temporary infrastructure, throughout its duration of use:
 - A. In accordance with Applicable Law and Good Industry Practice;
 - B. In accordance with the accepted Highway TTMP;
 - C. To ensure that the condition of the DB Co temporary infrastructure is sufficient to meet the design, construction and operational requirements for the intended use; and,
 - D. In coordination with the City, so as to permit the City to operate City infrastructure, while minimizing any adverse impact on third parties.
 - (v) Prior to putting part of temporary or permanent transportation infrastructure into service, DB Co shall convene a meeting with the City in order to coordinate maintenance activities at the interface between existing City or MTO infrastructure and the DB Co temporary or permanent infrastructure. DB Co shall take minutes of the meeting and, distribute the documented proceedings and conclusions to the participants.
 - (vi) On the first Monday after Thanksgiving Day each year, DB Co shall convene a meeting with the City to discuss “winter readiness”, so that all parties know their respective roles prior to a sudden onset of winter weather. DB Co shall take

minutes of the meeting and distribute the documented proceedings and conclusions to the participants.

- A. MTO shall be responsible for winter maintenance (snow plowing, winter sanding, snow clearing) on Provincial Highways and Crossing Road ramps, excluding existing Transitway lanes and ramps. No Lane Closures will be permitted if any precipitation is anticipated during the requested Lane Closure period.
- B. DB Co shall be responsible for the winter maintenance of any construction Roads or accesses to construction sites.

1.6 Accommodation of Pedestrians and Cyclists During Construction

- (a) DB Co shall not close or relocate any Pedestrian Walkway or cycle track without a Highway TTMP that has been accepted by the City. The Highway TTMP and sub-plans shall identify any Pedestrian Walkway or cycle track Closure, relocation and alternate route in accordance with Schedule 10 – Review Procedure, complete with a detailed explanation of why the Pedestrian Walkway or cycle track is required to be closed or relocated and the signs which shall be installed as a part of the Closure or relocation.

1.7 Working within Vicinity of a Traffic Control Signal

- (a) DB Co shall notify and be responsible for all costs associated with Ottawa Police Services (OPS) being on duty to control traffic, when DB Co is required to work within 200 m of a traffic control signal. Advanced notice of 48 hours shall be provided to OPS. No traffic control person shall be permitted to direct traffic in this area, nor may they direct traffic from more than one direction at any time. DB Co shall notify the City of this situation prior to OPS contact.

1.8 Temporary Traffic Control Signals

- (a) DB Co shall design and construct temporary Traffic Signal Systems in accordance with Clause 6.6 of Part B of this Schedule 15-2, Part 9.
- (b) Where there are active ongoing Construction Activities and DB Co personnel are present within an intersection where there are existing traffic control signals to be temporarily modified, or new temporary traffic control signals to be installed, DB Co shall be responsible to arrange for OPS paid-duty officers to provide point duty within an intersection while the City modifies or installs the traffic control signals.
- (c) At an intersection where as part of Highway Works, existing traffic control signals are to be modified temporarily, or temporary traffic control signals are to be installed, and only City forces will be working at the intersection, the City shall arrange for the OPS services and DB Co shall be responsible for the costs.

1.9 Traffic Engineering Requirements During Construction

- (a) DB Co shall meet the traffic engineering requirements outlined in Clause 1.4 of Part B of this Schedule 15-2, Part 9.
- (b) If DB Co demonstrates through detailed traffic analysis that pre-construction performance cannot be achieved through optimized signal timing, geometric improvements or other intersection improvements, DB Co shall submit a request to the City in accordance with Schedule 10 – Review Procedure to receive exemption on this performance and acceptance of the intersection design during construction in City’s sole discretion.

1.10 Record Keeping of Traffic Control Devices/Collisions

- (a) DB Co shall maintain Accurate records of the traffic controls which are in place within temporary infrastructure that is in service.
- (b) DB Co shall maintain an Accurate daily record of the inspection of the traffic accommodations, and provide copies of the information to the City immediately upon request. The daily record shall include the following:
 - (i) A twice daily video (hand held, dash-cam, etc.) in both or all directions as applicable, such that all portions of the Highway Works are recorded in sufficient detail to accurately see and distinguish/read all of the TCDs in place on Site;
 - (ii) Condition and placement including changes, additions and removals of all TCDs;
 - (iii) Confirmation of compliance with the Highway TTMP and its sub-plans;
 - (iv) All traffic collisions;
 - (v) The dates, times and content of all messages on all PVMS; and,
 - (vi) The date and time of Lane Closures;

1.11 Traffic Monitoring During Construction

- (a) DB Co shall undertake traffic monitoring in accordance with its Highway Traffic Monitoring Plan, as defined in Clause 5.2(h) of this Part C.

1.12 Communications

- (a) DB Co shall ensure that all communications and stakeholder engagements in relation to the Highway TTMP are in accordance with Schedule 18 – Communications and Stakeholder Engagement Obligations and as further detailed in this Clause 1.12 of Part C.
- (b) DB Co shall be responsible for providing road Closure and detour information to the City for the purposes of public notification.

- (c) DB Co shall schedule and attend Highway TTMP meetings and workshops with the City in order to obtain Highway TTMP approvals and with key Stakeholders prior to implementation. The frequency of the meetings will vary at the City's discretion. DB Co shall record and distribute minutes for these meetings to the City within five Business Days of the meeting, including but not limited to attendance sheets, agenda, record copy of material presented, comments received, issues raised, and the follow up action proposed by DB Co to resolve each issue. Resolution of the issues shall be raised and recorded by DB Co at the regularly scheduled Highway TTMP meetings.
- (d) DB Co shall attend any public meetings that are held prior to detour implementation, and shall be responsible for Addressing issues raised at the public meetings in the forum of the technical Highway TTMP meetings.
- (e) DB Co shall provide the City with a process as part of the Communication and Stakeholder Engagement Plan detailed in Schedule 18 – Communications and Stakeholder Engagement Obligations, and a contact person to whom the City can rely on to respond to any stakeholder relations obligations pertaining to traffic management. Issues and the resolutions thereto shall be raised and recorded by DB Co at the regularly scheduled Traffic Management Committee meetings.
- (f) DB Co shall assist the City and attend stakeholder events and stakeholder outreach meetings in relation to the Highway TTMP in accordance with Schedule 18, Part 4 – Communications and Stakeholder Engagement Activities. At these events and meetings, DB Co shall explain in terms easily communicated to the public, the process of how the specific segment of the Project will be built, with a focus on an overview of the proposed traffic Closures and detours/alternate routes for pedestrians, cyclists and vehicles, and how the related traffic/transit management staging is proposed to be carried out.
- (g) DB Co shall provide design illustrations, display boards and narratives to the City for the traffic related information such as traffic volumes, traffic detours/alternate routes, traffic Emergency/contingency plans, collision data, truck routes, construction traffic routes, etc. All material provided shall be dated and include a contact name and contact coordinates (DB Co & City jointly). All materials shall be provided in quantity for distribution in both hard copy and electronically, in both official languages.
- (h) DB Co shall provide Timely e-mail distribution regarding traffic/transit updates, including major cycling route impacts.
- (i) DB CO shall provide to the City, content for weekly traffic/transit information/forecast updates, for release to the City's website and the MTO website.
- (j) DB Co shall provide content for the City's quarterly technical briefing to Committee and/or Council.
- (k) DB Co shall provide Timely content for social media updates to the City for release on the City's social media accounts so as to inform followers as to quick updates about on-the-ground traffic control implementation.

- (l) DB Co's Director of Communications and Stakeholder Engagement shall be the spokesperson whom the City will contact to Address all Project related complaints pertaining to traffic/transit management issues which are reported to the City, unless an alternate spokesperson has been agreed to by the City. The spokesperson shall provide pertinent and Timely information to the City in response to the complaint.
- (m) DB Co shall be advised that in the weeks leading up to and on the weekend of the Queensview Pedestrian Bridge installation, there will be requests from media, interest groups and City and MTO staff to gain access to the site. DB Co shall co-ordinate these requests and identify to these non-construction personnel the requirements they must meet to allow them to access the site (proper clothing, footwear, hard hat, etc.). DB Co shall provide any and all training to allow the non-construction personnel access to the site to meet DB Co's requirements as the constructor.

1.13 Highway Works Traffic Management Communications Plan

- (a) DB Co shall, no later than 180 days before commencement of Construction Activities for Highway Works, submit a plan (the "Highway Works Traffic Management Communications Plan") for review by the City pursuant to Schedule 10 – Review Procedure.
- (b) Project Co shall implement the Highway Works Traffic Management Communications Plan for the period covering commencement of Highway Works Construction Activities on the Highway Corridor until Highway Works Final Completion. The Highway Works Traffic Management Communications Plan will clearly describe how DB Co will communicate to all Stakeholders on matters relating to traffic flow, including, specifically, how it will provide Timely notice of construction related delays, Closures, Full Closures, Detour Routes, Lane Shifts, Diversions, and Incidents.
- (c) For the installation of the Pedestrian Bridge at Queensview Station (in accordance with the requirements of Schedule 15-2, Part 9), DB Co shall include and employ the following communication tactics in its Highway Works Traffic Management Communications Plan:
 - (i) Advertising in City of Ottawa and surrounding municipalities local newspapers;
 - (ii) Providing content for social media and project websites;
 - (iii) Leading Stakeholder consultation meetings as required, commencing a minimum of 90 days prior to weekend Closures;
 - (iv) Drafting and issuing media releases, as required; and,
 - (v) Notification to and coordinating with the City Representative, MTO Compass Traffic Operations Centre and MTO Road Work Scheduling and Coordination Unit.
- (d) The Highway Works Traffic Management Communications Plan must include communication and outreach tactics to ensure all Stakeholders are properly notified and

provided with the appropriate information. For purposes of this Clause 1.13, Stakeholders include, but are not limited to the following:

- (i) Stakeholders (as defined in Schedule 1 – Definition and Interpretation of the Project Agreement);
- (ii) Emergency services: Police, Fire and Ambulance;
- (iii) City of Ottawa;
- (iv) OC Transpo;
- (v) School boards;
- (vi) Any and all affected transit commissions;
- (vii) Vulnerable road users such as pedestrians, cyclists and special interest groups (consider disabled/ODA requirements);
- (viii) Municipal and provincial elected officials;
- (ix) Large traffic generators, such as major employers, commercial/retail establishments, businesses, entertainment venues, places of worship, etc.;
- (x) Industries/shippers;
- (xi) Ontario Trucking Association;
- (xii) Motorists and professional drivers; and
- (xiii) General public.

1.14 Winter Period

- (a) DB Co shall perform all Maintenance Operations during the Winter Period except for snow, ice, and frost control as defined in Appendix G.
- (b) DB Co shall submit to the City for review a Winter Season Plan for each year by the first Monday in October each year in accordance with Schedule 10 – Review Procedure (the “Winter Season Plan”). The plan shall detail any and all Construction Activities to continue during the Winter Period, as well as any changes to the current Highway TTMP during the Winter Period, including the signing and Pavement Marking changes, and document the Shoulder widths available for snow storage during the Winter Period.
- (c) All permanent Highway 417 and Municipal Roadway lanes, Shoulders, Pavement Markings, Signs, Structures and interchange ramps that were in place prior to the start of construction, or their reconstructed counterparts, shall be paved, and/or reinstated prior to the Winter Period. All lanes (Provincial Highway and other Roads) and interchange

ramps shall be opened to traffic and shall remain unrestricted at all times to public traffic during the Winter Period.

- (d) DB Co shall complete all of the following work, prior to the Winter Period, in areas where the Highway Works was initiated in the same year:
- (i) Partial depth Pavement removal and paving operations (to the top of the upper binder course) on all Road lanes, including Shoulders, Structures and ramps;
 - (ii) Construction of all drainage courses, Culverts and storm sewers/Catch Basin grates (temporary and/or permanent) to elevations and provision of positive drainage of the Roadway, sub-base, Ditches and ROW in any areas where the existing road/median Ditches or drainage system has been altered from its pre-contract state;
 - (iii) Installation of new Barriers or temporary Barriers, with appropriate end treatments, in locations where existing roadside Barriers have been removed;
 - (iv) Installation of all erosion and sedimentation control measures as required;
 - (v) Completion of all permanent and/or Temporary Pavement Markings, Pavement Marking obliterating and installation of all guiderail systems;
 - (vi) If construction related Signs and supports are required during the winter, they shall not be placed on any asphalt surface or within two metres from the edge of pavement, so as to ensure winter plowing shall not be impeded;
 - (vii) DB Co's equipment and Material shall be removed from within the Highway Works limits consistent with the Winter Season Plan;
 - (viii) All Temporary Flexible Guide Posts shall be removed prior to the Winter Period;
 - (ix) All median construction access locations shall be closed off using temporary Concrete Barrier in accordance with DB Co's Winter Season Plan, deflected at 40:1;
 - (x) Temporary Pavement Markings shall be painted and receive a second application of paint each calendar year if they will be left in place during the Winter Period;
 - (xi) The removal of Temporary Pavement Markings that are not part of DB Co's Winter Season Plan and were placed for work during the construction season shall be completed using approved methods;
 - (xii) All new guiderail systems installed prior to the Winter Period shall be installed to the grades required for the final top of Pavement elevation; and,

- (xiii) Shoulder widths/offsets to Barriers shall be provided on Highway 417 on the right side and the left hand side of the lanes (in the direction of traffic) during the Winter Period; according to the following:
 - A. For the right hand side, DB Co shall provide a minimum 2.5 m Side Clearance. Where the right edge of Pavement is at the final location, DB Co shall maximize the offset but provide no less than the offset provided during construction. All Shoulders are to be paved and the concrete Barriers are to be installed on Pavement.
 - B. For the left hand side, DB Co shall maintain the existing offset during widening construction and shall provide a minimum 1.0 m Side Clearance during median construction. All Shoulders are to be paved and the concrete Barriers are to be installed on Pavement.
- (e) If the Highway Works on any Crossing Road is not completed in one season, then DB Co shall provide a paved surface with width consistent with the existing and/or to be constructed geometry, and with sidewalks as identified elsewhere in this Part 9 prior to the Winter Period.
- (f) All frames and covers of catch basins, maintenance holes and valve chambers located in the travelled portion of the Roadway shall be set flush with the pavement at the time of the Winter Period as required. All depressed curbs for entrances, cross-walks, curb ramps, uneven longitudinal/transverse joints, etc. shall be ramped with hot mix asphalt before the start of the Winter Period.
- (g) DB Co shall be responsible for preparing the Site each spring including, but not limited to:
 - (i) Re-instatement of all necessary construction related Signs;
 - (ii) Re-instatement to the design cross-fall all granular Shoulders on the contract, including any Material that is required; and,
 - (iii) Carrying out a detailed inspection of the binder course, identification of any deficiencies, and carrying out repairs as required to the satisfaction of the City.
- (h) Winter Period requirements, as contained in this Clause 1.14 of Part C, shall not relieve DB Co of any other requirements of the Project Agreement. All hot mix paving work performed by DB Co to meet Winter Period requirements, that do not meet the full requirements as specified elsewhere, shall be considered temporary paving and DB Co shall be responsible for the placement and subsequent removal of the temporary Pavement.
- (i) DB Co's Works Schedule shall at all times reflect the Winter Period requirements as defined in Clause 1.14 of this Part C.

ARTICLE 2 EXISTING MUNICIPAL ROADWAYS

2.1 General Requirements – Municipal Roadways

- (a) DB Co shall not perform any Highway Works on Municipal Roadways (Crossing Roads) or Other Affected Municipal Roadways during the following Peak Periods unless noted as an exception in this Part C:
 - (i) Monday to Friday inclusive: 06:30 to 09:30 and 15:00 to 18:30.
- (b) DB Co shall be permitted to partially close portions of Municipal Roadways due to Construction Activities while always maintaining local traffic access. There shall be at least one lane per direction (or two lanes per direction for segments with three existing lanes in each direction) and sufficient lane widths to accommodate bus travel. Exceptions to the principle of maintaining two lanes per direction in segments with three existing lanes per direction shall be defined by DB Co and presented to the City as part of the Highway Traffic Control Plans for acceptance.
- (c) DB Co shall schedule intersection disruptions during Off Peak Periods, Night Periods or Weekend Periods only. During those periods, there shall be at least one lane of traffic per street permitted at all times. Flagging shall be required if a single lane of traffic is in operation during Construction Activities. No active Construction Activities shall be performed in an intersection during Peak Periods.
- (d) DB Co shall develop a sequencing plan to minimize the length of the Municipal Roadway that is closed at any one time and include as part of the Highway Traffic Control Plans.

2.2 Conditions of Highway Works on Municipal Roadways

- (a) DB Co shall provide at least 35 Business Days advance notice in the form of an e-mail to the City Representative for all Closures, detours and Diversions.
- (b) DB Co shall only be permitted to close any existing Municipal Roadway for the purposes of carrying out Highway Works after all other safe and reasonable methods of construction have been investigated by DB Co and deemed not to be feasible or practicable.
- (c) DB Co shall maintain two-way traffic at successive intersections on either side of a closed intersection at times of the Closure.
- (d) DB Co shall maintain a pedestrian sidewalk on each Crossing Road in accordance with City design standards at all times during the construction. DB Co shall be responsible for all design, approvals, construction and Maintenance of the sidewalk for the duration of the Detour.
- (e) DB Co shall not use accesses to/from work zones, Shoulder Closures, and the loading and unloading of materials and construction vehicles/equipment to/from the travelled portion

of existing Municipal Roadways during Peak Periods on any weekday. Exceptions to this shall be made for the delivery of concrete.

- (f) DB Co shall accommodate all turning movements at intersections at all times, unless specified elsewhere in this Schedule 15-2, Part 9. This includes all protected auxiliary turn lanes.
- (g) DB Co shall make all travel lanes available during non-work times unless Construction Activities have rendered them temporarily unsuitable for traffic use, or unless a Closure was approved by the City.

2.3 Permits from the City of Ottawa

- (a) Road Cut Permit
 - (i) DB Co shall obtain a Road Cut Permit prior to the start of Highway Works on any Municipal Roadway or Other Affected Municipal Roadway. The requirements of the Road Cut Permit are outlined in City of Ottawa By-Law — Road Activity By-Law No. 2003-445.
 - (ii) When an application for a Road Cut Permit is made for Highway Works or any portion thereof, DB Co shall ensure that it contains a reference therein, that the application pertains to the Project. Furthermore, DB Co shall include in their application, the Highway TCP sub-plan as submitted to and accepted by the City in accordance with Schedule 10 – Review Procedure. If as a result of the Road Cut Permit approval process the Highway TCP is revised, DB Co shall submit the revised Highway TCP to the City in accordance with Schedule 10 – Review Procedure for re-acceptance, and, shall update and resubmit the Highway TCP sub-plans to reflect the changes found in the approved Road Cut Permit version of the Highway TCP.
- (b) Road Close Permit
 - (i) DB Co is required to obtain Road Close Permits prior to closing Municipal Roadways or Other Affected Municipal Roadways as specified elsewhere. DB Co shall submit to the City the road Closure request forms no later than four weeks prior to each Closure event.
 - (ii) DB Co shall ensure that an application for Road Close Permit contains a reference to the Project and shall include in their application, the Highway TCP sub-plan as submitted to and accepted by the City in accordance with Schedule 10 – Review Procedure. If as a result of the Road Close Permit approval process the Highway TCP is revised, DB Co shall submit the revised Highway TCP to the City in accordance with Schedule 10 – Review Procedure for re-acceptance. It shall include the updated Highway TCP and sub-plans to reflect the changes found in the approved Road Close Permit version of the Highway TCP.
- (c) Private Approach Permit Application

- (i) DB Co shall obtain a Private Approach Permit for any construction site access from Municipal Roadways or Other Affected Municipal Roadways.
 - (ii) DB Co shall ensure that an application for a Private Approach Permit contains a reference to the Project and shall include in their application, the relevant portion of the Highway TTMP as submitted to and accepted by the City in accordance with Schedule 10 – Review Procedure. If as a result of the Private Approach Permit approval process the Highway TTMP is revised, DB Co shall submit the revised Highway TTMP to the City in accordance with Schedule 10 – Review Procedure, for re-acceptance. It shall include the updated Highway TTMP and sub-plans to reflect the changes found in the approved Private Approach Permit version of the Highway TTMP.
- (d) OC Transpo Permits
 - (i) DB Co shall not carry out any work on bus-only lanes, the Transitway, or any bus facilities, without completing the Transitway Access Permits and receiving approval from the City and OC Transpo.
 - (ii) When an application for an OC Transpo Permit is made for the Project or any portion thereof, DB Co shall ensure that an application for an OC Transpo Permit contains a reference to the Project and shall include in their application, the Highway TCP as submitted to and accepted by the City in accordance with Schedule 10 – Review Procedure. If as a result of the OC Transpo approval process the Highway TCP is revised, the DB Co shall submit the revised Highway TCP to City in accordance with Schedule 10 – Review Procedure for re-acceptance, and, shall update and resubmit the Highway TTMP and sub-plans to reflect the changes found in the approved OC Transpo version of the Highway TCP.
 - A. DB Co shall ensure that the Highway TCP is approved by the City at least 14 calendar days prior to any detour or Construction Activity that has operational impacts on transit service. If the action is an extended detour or requires a shelter relocation, notification shall be provided as otherwise specified in Schedule 15-2, Part 7 - Traffic and Transit Management and Construction Access.
 - B. The submission of a Highway TCP does not constitute advance notice, which does not include timelines for potential revisions to the Highway TCP.
- (e) Noise Bylaw Exemption
 - (i) DB Co shall apply and obtain an exemption to the City Noise Bylaw if required for evening/night work.

2.4 Crossing Roads

- (a) Crossing Roads are defined as the following Municipal Roadways within the MTO ROW:
 - (i) Holly Acres Road
 - (ii) Richmond Road
 - (iii) Pinecrest Road/Greenbank Road
- (b) The following constraints shall be followed within the Crossing Roads corridor:
 - (i) DB Co shall maintain access across Highway 417 on Crossing Roads at all times for vehicles, transit services, emergency services, pedestrians and cyclists. All existing travel lanes on Crossing Roads shall be maintained at all times during the Peak Periods throughout construction.
 - (ii) DB Co shall maintain uninterrupted access to all Highway 417 ramps at all times, except for MTO authorized ramp Closures obtained in accordance with the provisions of this Part C.
 - (iii) Notice of the scheduled dates of the Full Closure for the installation of the Pedestrian Bridge at Queensview Station shall be identified to the City a minimum 35 Business Days in advance of the each of the scheduled Closures for approval. The Closure dates shall not be scheduled during events identified in Clause 4.2 of this Part C.

ARTICLE 3 WEST TRANSITWAY SEGMENT W-6, W-7 AND W-8

3.1 West Transitway Segment W-6 – Queensway Station to Pinecrest Station

- (a) The traffic management for this West Transitway Segment is covered by Clause 3.11 of Schedule 15-2, Part 7 - Traffic and Transit Management and Construction Access.
- (b) Any modification or realignment to the existing dedicated bus lanes on Highway 417 that would remove the barrier separating buses from general purpose lanes requires an approved Ontario Regulation prior to implementation. If such a modification is proposed by DB Co, it shall supply scale drawings of the proposed configuration in AutoCAD and PDF format to the City Representative for submission to MTO. The proposal may be approved or rejected by the Relevant Authority at its sole discretion. If approved, DB Co shall coordinate with the City and MTO to implement the Ontario Regulation, and shall notify the City once the Ontario Regulation is no longer required. DB Co is advised that approval of an Ontario Regulation may take in excess of six months.

3.2 West Transitway Segment W-7 – Pinecrest Station to Bayshore Station

- (a) The traffic management for this West Transitway Segment is covered by Clause 3.12 of Schedule 15-2, Part 7 Traffic and Transit Management and Construction Access.
- (b) This detour involves the design and construction of a temporary N/S-E bus-only ramp at Holly Acres Road and the temporary closure of the Richmond Road N-E ramp, as described in Schedule 15-2, Part 7 - Traffic and Transit Management and Construction Access, and this Schedule 15-2, Part 9 Part B. The Holly Acres Road N/S-E bus-only ramp shall open and the Richmond Road N-E ramp shall close upon the commencement of the W-7 BRT Detour; the closure of the Holly Acres Road N/S-E bus-only ramp and the re-opening of the Richmond Road N-E ramp shall occur following Revenue Service of the Confederation Line West Extension and shall be considered Remaining Works.

3.3 West Transitway Segments W-8 and W-9 – Bayshore Station to Moodie Station

- (a) The traffic management for this West Transitway Segment is covered by Clause 3.13 of Schedule 15-2, Part 7 - Traffic and Transit Management and Construction Access.
- (b) This detour involves the design and construction of a fourth lane on the Highway 416 S/Highway 417 W – Holly Acres N/S ramp, as described in this Schedule 15-2, Part 9, Part B.

**ARTICLE 4 EXISTING PROVINCIAL HIGHWAYS AND MUNICIPAL
ROADWAYS WITHIN MTO ROW**

4.1 General Requirements

- (a) The requirements in this Article 4 are applicable to the following Roads:
 - (i) Existing Provincial Highway 417 and Highway 416 including all interchange ramps; and,
 - (ii) Existing Municipal Roadways connecting or spanning over Highway 417 within MTO's designated jurisdiction, ("Crossing Roads") including but not limited to:
 - A. Holly Acres Road;
 - B. Richmond Road;
 - C. Pinecrest Road / Greenbank Road;
- (b) DB Co shall not proceed with any Construction Activities on Provincial Highways without an accepted Highway TTMP and Highway TTMP sub-plans applicable to said Construction Activities.
- (c) DB Co shall ensure that there is coordination between the Stage 2 LRT TTMP and the Highway TTMP, as per Article 5 – Implementation Constraints, of Schedule 15-2, Part 1.
- (d) DB Co shall use PVMS for all Closures, Detour Routes and Diversions including ramps and Crossing Roads. PVMS shall be placed at strategic upstream locations to allow motorists the opportunity to divert prior to reaching the Closure, Detour Route or diversion location. The PVMS location shall be submitted to and approved by the City in accordance with Schedule 10 – Review Procedure.
- (e) PVMS placed in support of Highway Works shall be controlled by the OTOC.
- (f) PVMS shall be equipped with modems active on the MTO communications network to allow OTOC to operate. DB Co shall be responsible for modem procurement and activation from the modem supplier at least two weeks prior to requiring the Signs. DB Co shall be responsible for all fees associated with the procurement of the modem including but not limited to activation of service, modem rental and monthly data communication fees.
- (g) DB Co shall provide at least 35 calendar days advance notice to the City for all Closures, Detour Routes, and Diversions.
- (h) Transit facilities on Highway 417 (West Transitway) and interchanges shall remain in service until after West Substantial Completion, and upon notice by the City.

- (i) DB Co failure to abide by the requirements set out in this Article 4 shall result in shutdown of the relevant Works until the requirements have been met.
- (j) DB Co shall maintain a minimum of three through lanes in each direction on Highway 417 at all times, except during Permitted Periods for Closures.

4.2 Restrictions on Construction Operations

- (a) DB Co shall not use construction access/egress, Shoulder Closures or load and unload materials and construction equipment onto and from the traveled portion of Highway 417, Highway 416 and Highway 417/416 interchange ramps on days identified under Clause 1.4 of this Part C, or outside of the Permitted Periods for Closures as detailed in this Part 9.
- (b) Construction operations shall not be carried out during the four hours preceding or three hours after any scheduled events at the [REDACTED]. DB Co shall obtain the schedule of events from the [REDACTED] and schedule work accordingly.
 - (i) Events with fewer than 10,000 attendees, or “all-day” events that do not have a specific peak traffic demand period associated with them are exempted from this requirement.
- (c) Construction operations shall not be carried out during the two hours preceding or two hours after any [REDACTED], or other major events at [REDACTED], as identified by the City. DB Co shall obtain the schedule of [REDACTED] and schedule work accordingly.

4.3 Delivery and Trucking

- (a) DB Co shall plan and schedule the routes of vehicles transporting all Materials to, from or within the Site, so that vehicular movements are accomplished with minimum interference and interruptions to traffic according to the requirements of this Part C, including but not limited to Clauses 4.2, 4.4 and 4.9. This will necessitate vehicles to “slip-off” or “slip-on” in the direction of traffic, in order to merge with and thereby avoid crossing traffic lanes.
- (b) Access to and from the Provincial Highway ROW shall be restricted to ramps at the interchanges unless otherwise provided for in the Project Agreement.
- (c) Median cross-overs shall not be used except where single axle vehicles are entering a passing lane that is closed to traffic.
- (d) DB Co shall obtain the City Representatives’ prior acceptance for the location of any “slip-off” or “slip-ons” through review of the Highway TTMP. The City Representatives reserve the right to alter, reject or close same as considered necessary. DB Co shall notify suppliers of Materials and equipment of the above requirements.

4.4 Permitted Times for Lane and Ramp Closures

- (a) Lane Closures and ramp Closures for construction will only be allowed during the following times, subject to the additional restrictions covered under Clause 1.4 of this Part C – Holidays and Special Events. Any Closures proposed by DB Co outside of the times indicated in this Part C are subject to review and approval by the City in accordance with Schedule 10 – Review Procedure. All Sunday Closures proposed by DB Co are subject to review and approval by the City. Applications for extended Closures by DB Co shall be submitted to the City for approval, supported by traffic analysis. The City may reject applications for Closures at its discretion.
- (b) Weekend Lane Closures
- (i) All weekend Lane Closures shall be subject to the following conditions:
- A. DB Co shall adhere to all traffic timing restrictions identified elsewhere in the Project Agreement, including Holiday Restrictions and Canadian Tire Centre Events and Ottawa Redblacks games.
 - B. The exact weekend Lane Closure dates shall be subject to approval by the City.
 - C. DB Co shall notify the stakeholders and ESP of the Closure(s), as specified elsewhere in the Project Agreement.
- (c) Permitted Lane Closure periods for Provincial Highways are included in Table 4-4.1. Permitted Crossing Road Closure periods for Provincial Highways are included in Table 4-4.2. Permitted ramp Closure periods for Provincial Highways are included in Table 4-4.3.

Table 4-4.1 – Section Description: Existing Highway 417 and 416

| Closure | Monday or a Day Following a Holiday | Tuesday to Wednesday Except on Days Following and Preceding Holidays | Thursday to Friday or a Day Preceding a Holiday | Saturday | Sunday** |
|---|---|--|---|--------------------------------|--------------------------------|
| One Lane Closure/ Shoulder Closure (Highway 417 EB) | 00:00 – 05:00 10:00 – 14:30 21:00 – 23:59 | 00:00 – 05:00 10:00 – 14:30 21:00 – 23:59 | 00:00 – 05:00 10:00 – 14:30 (Thurs) 10:00 – 14:00 | 00:00 – 10:00 22:00 – 23:59 | 00:00 – 10:00 21:00 – 23:59 |

| | | | | | |
|---|---|---|--|--------------------------------|--------------------------------|
| | | | (Fri) 22:00 – 23:59 | | |
| One Lane Closure/ Shoulder Closure (Highway 417 WB and Highway 416) | 00:00 – 06:00 10:00 – 14:30 21:00 – 23:59 | 00:00 – 06:00 10:00 – 14:30 21:00 – 23:59 | 00:00 – 05:00 10:00 – 14:30 (Thurs) 10:00 – 14:00 (Fri) 22:00 – 23:59 | 00:00 – 10:00 22:00 – 23:59 | 00:00 – 10:00 21:00 – 23:59 |
| Two Lane Closure (Highway 417 EB) *** | 00:00 – 05:00 22:00 – 23:59 | 00:00 – 05:00 22:00 – 23:59 | 00:00 – 05:00 23:00 – 23:59 | 00:00 – 08:00 23:00 – 23:59 | 00:00 – 08:00 22:00 – 23:59 |
| Two Lane Closure (Highway 417 WB and Highway 416) *** | 00:00 – 06:00 22:00 – 23:59 | 00:00 – 06:00 22:00 – 23:59 | 00:00 – 06:00 23:00 – 23:59 | 00:00 – 08:00 23:00 – 23:59 | 00:00 – 08:00 22:00 – 23:59 |
| Three Lane or Full Closure * | Not Permitted | Not Permitted | Not Permitted | Not Permitted | Not Permitted |

* Applications for Full Closures are subject to acceptance by the City, as further detailed in Clause 4.4(f) of Part C of this Schedule 15-2, Part 9.

** All Sunday Closures are subject to acceptance by the City.

*** Apply to sections of Provincial Highways with three or more through lanes only.

Table 4-4.2 – Section Description: Crossing Roads

| Closure | Monday or a Day Following a Holiday | Tuesday to Wednesday Except on Days Following and | Thursday to Friday or a Day Preceding a Holiday | Saturday | Sunday** |
|----------------|--|--|--|-----------------|-----------------|
| | | | | | |

| | | Preceding Holidays | | | |
|---|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|
| Richmond Road (1 lane per direction) | 20:00 - 23:59 00:00 – 06:00 | 20:00 - 23:59 00:00 – 06:00 | 20:00 - 23:59 00:00 – 06:00 | 20:00 - 23:59 00:00 - 10:00 | 20:00 - 23:59 00:00 - 10:00 |
| Pinecrest/ Greenbank Road (1 lane per direction) | 20:00 - 23:59 00:00 – 06:00 | 20:00 - 23:59 00:00 – 06:00 | 20:00 - 23:59 00:00 – 06:00 | 20:00 - 23:59 00:00 - 10:00 | 20:00 - 23:59 00:00 - 10:00 |
| Woodroffe Avenue (1 lane per direction) | 20:00 - 23:59 00:00 – 06:00 | 20:00 - 23:59 00:00 – 06:00 | 20:00 - 23:59 00:00 – 06:00 | 20:00 - 23:59 00:00 - 10:00 | 20:00 - 23:59 00:00 - 10:00 |
| Maitland Avenue (1 lane per direction) | 20:00 - 23:59 00:00 – 06:00 | 20:00 - 23:59 00:00 – 06:00 | 20:00 - 23:59 00:00 – 06:00 | 20:00 - 23:59 00:00 - 10:00 | 20:00 - 23:59 00:00 - 10:00 |
| Two Lane or Full Closure * | Not Permitted | Not Permitted | Not Permitted | Not Permitted | Not Permitted |

* Applications for Full Closures are subject to acceptance by the City, as further detailed in Clause 4.4(f) of Part C of this Schedule 15-2, Part 9.

** All Sunday Closures are subject to acceptance by the City.

Table 4-4.3 –Ramp Description: All Ramps Highway 417 416

| Closure | Monday or a Day Following a Holiday | Tuesday to Wednesday Except on Days Following and Preceding Holidays | Thursday to Friday or a Day Preceding a Holiday | Saturday | Sunday** |
|------------------------------|--|---|--|--------------------------------|--------------------------------|
| One Lane Closure ***/ | 00:00 – 06:00 10:00 – 14:30 | 00:00 – 06:00 10:00 – 14:30 | 00:00 – 06:00 10:00 – 14:30 | 00:00 – 10:00 23:00 – 23:59 | 00:00 – 10:00 22:00 – 23:59 |

| | | | | | |
|------------------|--------------------------------|--------------------------------|--|--------------------------------|--------------------------------|
| Shoulder Closure | 22:00 – 23:59 | 22:00 – 23:59 | (Thurs) 10:00 – 14:00 (Fri) 23:00 – 23:59 | | |
| Full Closure * | 00:00 – 05:00 23:00 – 23:59 | 00:00 – 05:00 23:00 – 23:59 | 00:00 – 05:00 23:00 – 23:59 | 00:00 – 05:00 23:00 – 23:59 | 00:00 – 05:00 23:00 – 23:59 |

* Applications for Full Closures are subject to acceptance by the City, as further detailed in Clause 4.4(f) of Part C of this Schedule 15-2, Part 9. No two successive on and/or off ramps shall be closed at the same time.

** All Sunday Closures are subject to acceptance by the City.

*** Apply to two lane ramps only. For single lane ramp Closures, “Full Closure” restrictions apply.

- (d) Full Closure of the ramps at the Highway 417 and Highway 416 interchange shall not be permitted.
- (e) DB Co shall use PVMS for all Closures, Detour Routes and Diversions including ramps and Crossing Roads. For Full Closure of off-ramps DB Co may utilize existing MTO permanent VMS in place of PVMS, subject to approval of the City Representative.
- (f) Applications for all Full Closures are subject to acceptance by the City Representative in accordance with Schedule 10 – Review Procedure. Full Closures may be permitted on a site-specific basis for work such as overhead Sign installation/modification and hydro wire installation/modification between 01:00 and 04:00 and be restricted to 15 consecutive minutes per any one hour period or until the end of the traffic queue passes. DB Co may also apply for an extended Full Closure period between 23:00 and 05:00. Approval for extended Full Closure period is at the sole discretion of the City Representative. Applicable Police Services must be employed to assist all Full Closures and PVMS signage is required. DB Co shall provide supporting rationale, including but not limited to a traffic analysis, as part of an application for any Full Closure, at the request of the City Representative.

4.5 Lane Closures and Full Closures for Queensview Pedestrian Bridge

- (a) DB Co shall be permitted to fully close all lanes of Highway 417 between Pinecrest Road / Greenbank Road and Woodroffe Avenue on a weekend for 17 consecutive hours, from 18:00 hours on the Saturday until 11:00 hours on the Sunday.
- (b) Lane reductions on Highway 417 associated with the full closure shall be permitted to commence at 16:00 hours on the Saturday

- (c) During the full closure period noted above, the following Highway 417 ramps shall be exempt from the restrictions of Clause 4.4 of this Part 9, Part C:
- (i) Pinecrest Road at Highway 417 E-N/S ramp;
 - (ii) Greenbank Road at Highway 417 S-E ramp;
 - (iii) Greenbank Road at Highway 417 N-E ramp;
 - (iv) Woodroffe Avenue at Highway 417 W-N/S ramp; and,
 - (v) Woodroffe Avenue at Highway 417 N/S-W ramp.
- (d) DB Co shall provide advanced notice to the City and MTO as early as possible, or a minimum of 35 Business Days in advance of the scheduled closure. The dates scheduled by DB Co shall be subject to approval by the City and MTO. These closure dates shall not be scheduled during events identified in Clause 4.2 of this Part 9, Part C.

4.6 Early and Late Opening of Lanes and Ramps

- (a) Construction Period Quality Failures deductions shall be applied as detailed in Schedule 21, Part B - Construction Period Failures.

4.7 Closure Notification

- (a) DB Co shall perform the following prior to lane and/or Shoulder Closures:
- (i) Inform the City Representative of any Closure one week prior to the start date of the Closure;
 - (ii) Inform the City Representative of any Closure lasting more than one week at least two weeks prior to the start date of the Closure;
 - (iii) Inform the City Representative and OTOC of Emergency Closures as soon as any details are known;
 - (iv) Obtain a Closure Notification Number from the MTO Representative for each Closure;
 - (v) Submit to the OTOC a completed ROW Form (MTO);
 - (vi) Inform the City Representative and OTOC of any Closure that is being cancelled subsequent to (i) and (ii) above;
 - (vii) Notify the OTOC by phone ([REDACTED]) immediately prior to the set-up of any Closure stating the Closure Notification Number and details of the Closure;

- (viii) Notify the OTOC immediately of any changes to the Closure or anticipated problems that may delay the opening time, stating the Closure Notification Number and details of the changes to and/or problems with the Closure; and,
- (ix) Notify the OTOC immediately upon removing the Closure stating the Closure Notification Number and details of the Closure.

4.8 Lane and Ramp Closures by OPP Officers (Paid Duty)

- (a) DB Co shall incorporate OPP assistance into all lane and ramp Closures. DB Co shall be responsible to arrange for the OPP-assisted Lane Closures.

4.9 Construction on or Adjacent to Highway 417 and Highway 416

- (a) The supply and placement of all traffic control required by the MTO shall be performed by DB Co in accordance with the Ontario Traffic Manual Book 7, latest edition (and enhancements to staging and traffic control where it cannot be achieved), where construction is being performed on or adjacent to Highway 417 and 416 or its ramps. This requirement is in addition to the MTO's requirement for deployment of PVMS.
- (b) DB Co shall follow the requirements of the City's Special Provision – General D-001, in addition to MTO requirements for construction on or adjacent to Highway 417 and 416.
- (c) Traffic Signal Construction Start-Up Meeting
 - (i) DB Co shall arrange a start-up meeting to confirm the protocol for the traffic signals at all affected intersections. The meeting shall also be used to confirm communication protocols with the MTO, DB Co, and the City of Ottawa Traffic Operations for dealing with traffic signal timing changes if required during construction. DB Co shall create a contact list and distribute it to all parties involved for any non-routine and/or emergency repairs to the traffic signals.
 - (ii) DB Co shall invite MTO Regional Traffic Office, MTO Electrical Coordinator, and City of Ottawa Traffic Operations to attend this meeting.
- (d) Advanced Notice of Work
 - (i) DB Co shall provide a minimum of 30 Business Days advance notice to the City of all Highway Works that may impact the traffic signals, unless a signal design is required, in which case DB Co shall abide by the requirements set out in Schedule 15-2, Part 9, Part B, Article 6.
- (e) Access to the Traffic Signal Controller Cabinets
 - (i) For any Emergency Works at any of the impacted traffic control signals, DB Co shall coordinate with the City of Ottawa Traffic Operations:

City of Ottawa
Transportation Services Department
Program Manager, Signal Installation and Field Program (or the individual responsible for this function)

4.10 Transitway Detours

- (a) As specified elsewhere in this Project Agreement, a Transitway detour will be required when the Western Transitway is taken out of service during this Project as part of the West Works. The following requirements shall apply to DB Co's Highway TTMP, and the submission in accordance with Schedule 10 – Review Procedure:
 - (i) DB Co shall be responsible for the design and coordination of the Highway 417 transit detour segments to the satisfaction and acceptance of the City.
- (b) DB Co shall not implement any new dedicated bus lanes on Highway 417.
- (c) Per Schedule 15-2, Part 9, Part B Clause 1.3 and Schedule 15-2, Part 7, Clause 3.12, DB Co shall add a third eastbound left turn lane (for transit only) to the W-N/S ramp at Greenbank, if such an added lane is found to provide a travel time benefit to eastbound buses while they are on detour. This lane, if built, shall be removed as part of the Remaining Works.
- (d) Per Schedule 15-2, Part 9, Part B Clause 1.3 and Schedule 15-2, Part 7, Clause 3.12, DB Co shall design and construct a temporary bus-only N/S-E on ramp from Holly Acres to Highway 417, in conjunction with the long term temporary closure of the Richmond Road N-E ramp. The temporary N/S-E on ramp at Holly Acres shall be closed and the Richmond Road N-E ramp shall be reopened as Remaining Works.

4.11 MTO Encroachment Permits

- (a) DB Co shall obtain MTO Encroachment Permits prior to working within the Highway 417 and Highway 416 ROW or on any Roads adjacent to Highway 417 within MTO's designated jurisdiction. DB Co shall provide the City with copies of the approved MTO Encroachment Permits immediately upon receipt of same.

4.12 Moodie Drive and Interchange Ramps Traffic Conditions

- (a) The following constraints shall be followed within the Moodie Drive corridor:
 - (i) DB Co shall ensure all northbound lanes on Moodie Drive are open and available for vehicles, transit services, Emergency services, pedestrians, cyclists during the following times:
 - A. weekdays between 6:00 and 9:30 hrs.

- (ii) DB Co shall ensure all southbound lanes on Moodie Drive are open and available for vehicles, transit services, Emergency services, pedestrians, cyclists during the following times:
 - A. weekdays between 15:00 and 18:30 hrs.
- (iii) DB Co shall ensure that a minimum of one lane in each direction on Moodie Drive shall remain open at all times, in addition to any auxiliary lanes at intersections
- (iv) Uninterrupted access to and from all Highway 417 ramps shall be maintained at all times, except for MTO authorized ramp closure times obtained in accordance with the provisions of this Part 9.
 - A. DB Co shall be permitted to close the S-W ramp for the purposes of constructing the grade separation for the Confederation Line for a period not exceeding one construction season. This closure shall require public notification in accordance with Article 5 of Schedule 15-2, Part 7 - Traffic and Transit Management and Construction Access, and shall be supported by a traffic analysis. Detour signage shall be provided as required.
- (v) The conditions in items (i) and (ii) above permit that DB Co use a three-lane cross section, with a center lane that changes direction. Should it not be possible to achieve this staging concept while remaining compliant with OTM Book 7, DB Co shall use decking to maintain a four-lane cross section.

ARTICLE 5 HIGHWAY TRAFFIC AND TRANSIT MANAGEMENT PLAN

5.1 General Requirements

- (a) DB Co shall submit a separate Highway TTMP for the Highway Works.
- (b) DB Co shall submit an initial Highway TTMP to the City in accordance with Schedule 10 – Review Procedure no later than 60 calendar days following Financial Close, and at least 45 calendar days in advance of the start of any Construction Activity, and in accordance with the requirements of this Part C. Following the acceptance of the initial Highway TTMP by the City, DB Co shall submit all subsequent proposed changes to the Highway TTMP to the City Representatives in accordance with Schedule 10 – Review Procedure. As a minimum, the initial Highway TTMP shall be updated and submitted on an annual basis in accordance with Schedule 10 – Review Procedure. The Highway TTMP shall not be considered complete for the purpose of initiating Construction Activities until all comments (as described in Article 4 of Schedule 10 – Review Procedure) have been resolved and addressed by DB Co.
- (c) The Highway TTMP shall outline how public traffic, transit, pedestrians, and cyclists as well as the traffic generated by Construction Activities, is to be managed. It shall include all aspects of traffic management as set out in this Part C, as well as any traffic management related matters which may arise as a result of the execution of any aspect of the Highway Works. The Highway TTMP shall include a Traffic Management Study, as per the requirements of Clause 1.2 of this Part C.
- (d) The Highway TTMP and all updates thereto shall be consistent with and comply with all of the requirements set forth in this Part C and all other relevant provisions of this Project Agreement (including reference and interface with DB Co Traffic Management Auditing as described in Schedule 11 – Integrated Management Systems), the OTM, and City of Ottawa and MTO Standards, Operation Policies, Procedures and Guidelines.
- (e) Each submission of the Highway TTMP or Highway TTMP sub-plans shall be stamped by DB Co's designated Traffic Engineer, and signed off by DB Co's designated Traffic Manager, both of whom shall be as identified in Clause 5.3 – DB Co Responsibilities of this Part C.
- (f) The Highway TTMP and all updates thereto shall include a traffic schedule which shall be adapted from the Project Schedule. The traffic schedule shall show start and finish dates for all the information pertinent to traffic management for the Highway Works, such as but not limited to, detours and Diversions, and relevant submissions.
- (g) The Highway TTMP shall show proof of constructability in terms of schedule (traffic schedule versus Project Schedule), and, in terms of onsite Construction Activities and physical work area requirements versus spatial accommodations for Highway TTMP and Highway TTMP sub-plan traffic management requirements.
- (h) DB Co's Highway TTMP shall consider all direct and indirect impacts relating to the construction that pertain to the existing operations of the City and the street network

within, and include impacts on all road users, pedestrians, cyclists, transit vehicles, and private vehicles of all types.

- (i) DB Co's Highway TTMP shall reference and interface with DB Co's Traffic Management Auditing as described in Schedule 11 – Integrated Management System, DB Co's Highway Emergency Traffic Plan as described in this Part C, the OTM, and City of Ottawa and MTO Standards, Operation Policy and Procedures.
- (j) DB Co's updates to the Highway TTMP shall be prepared and submitted in accordance with Schedule 10 – Review Procedure for any and all Project activities which may result in changes to the traffic management strategies set out in the Highway TTMP. The initial Highway TTMP shall be updated and submitted on an annual basis in accordance with Schedule 10 – Review Procedure
- (k) DB Co shall not conduct any Construction Activity that affects traffic without a signed and sealed Highway TTMP that is current to the activities on Site, and has been accepted by the City.
- (l) DB Co's Highway TTMP shall comply with the definitions and guidelines provided in the OTM and City of Ottawa and MTO Standards, Operation Policy, Procedures and Guidelines.
- (m) DB Co shall prepare detailed Highway TCPs complete with traffic control layout drawings and fully integrated with the approved Project Schedule, outlining the provision of all forms of traffic control required throughout the duration of the Project. The plans shall be consistent with the Highway TTMP and submitted in accordance with Schedule 10 – Review Procedure.
- (n) DB Co shall prepare drawings that address stage-specific activities and requirements for each stage of the Highway Works that affects traffic. These drawings shall accompany the Highway TTMP submissions in accordance with Schedule 10 – Review Procedure.
- (o) The Highway TTMP shall provide detailed drawings for project-related designated truck access and egress points, the applicable haul and heavy vehicle routes through the City and applicable staging areas. The drawings shall be consistent with the Highway TTMP and submitted in accordance with Schedule 10 – Review Procedure. As a minimum the designated truck route drawings shall be updated and submitted on a quarterly basis in accordance with Schedule 10 – Review Procedure. The City may, at its discretion, require that DB Co's site, where contiguous with an active construction site, be utilized for haul and heavy vehicle routes in order to reach the City's truck route network in a manner acceptable to the City.
- (p) DB Co shall be responsible for providing, installing and maintaining all TCDs and protective devices identified in the approved Highway TTMP.
- (q) The following Highway TTMP sub-plans for DB Co's Highway TTMP are required and shall be submitted in accordance with Schedule 10 – Review Procedure. The Highway TTMP sub-plans shall be:

- (i) Highway Traffic Control Plan;
- (ii) Highway Emergency Traffic Plan;
- (iii) Highway Traffic Incident Management Plan;
- (iv) Highway Traffic Management Implementation Plan;
- (v) Highway Traffic Advisory Temporary Signage Plan;
- (vi) Highway Traffic Risk Assessment Plan;
- (vii) Highway Traffic and Transit Management Communications Plan; and,
- (viii) Highway Traffic Monitoring Plan.

5.2 Highway Traffic and Transit Management Sub-Plans

(a) Highway Traffic Control Plans

- (i) DB Co shall prepare and submit Project specific Highway TCPs in accordance with Schedule 10 – Review Procedure. The Highway TCPs shall be prepared in accordance with the OTM, City of Ottawa and MTO Standards, policies, procedures and guidelines and other Reference Documents for all activities that affect traffic operations, and shall include the following:
 - A. Start and completion dates of Highway Work;
 - B. Hours of work and also indicate if there is a requirement to work during peak hours;
 - C. Work zone locations and direction and distance to nearest landmarks and survey stations;
 - D. Size of the work zone;
 - E. Lanes affected by the Highway Works;
 - F. Lane configuration in the work zone;
 - G. Confirmation of whether accesses or intersections will be affected by the work zone or by TCD;
 - H. Traffic volume capacity during Highway Works;
 - I. Proposed delays or Closure times;
 - J. Show that local traffic access is maintained;

- K. 1:500 Scale drawing(s) prepared in CADD and submitted in PDF identifying:
- i. The location of the work zone using landmarks, survey stations and LKI where applicable;
 - ii. Accesses or intersections affected by the work zone or by TCDs;
 - iii. Traveled lanes affected;
 - iv. Resultant lane configuration including widths;
 - v. Location of restricted width lanes;
 - vi. Required Closures;
 - vii. Lane use requirements;
 - viii. Posted speeds;
 - ix. Requirements for road closure;
 - x. Any bus routes and bus stops affected by work activity;
 - xi. Traffic and transit routing and detour requirements;
 - xii. Location of Hazardous areas created by road geometry or local geography;
 - xiii. Any local roads used for a Detour Route;
 - xiv. The design speed and the design vehicle for each road used as a Detour Route;
 - xv. Any traffic signal changes required by the Detour Route or Project Works;
 - xvi. Any signing impacted by the Highway Work; and,
 - xvii. Location of construction accesses, and safety provisions applied in instances where a construction access crosses a sidewalk, pathway, MUP or cycling facility.
- L. Should DB Co adopt a Traffic Control layout exactly as shown in OTM Book 7 with no changes, DB Co shall provide a reference to the OTM Book 7 layout. Where enhancements to OTM Book 7 are required and/or for any deviations to OTM Book 7, DB Co shall submit to the City for review and acceptance, in accordance with Schedule 10 – Review Procedure, a custom Traffic Control layout as described in (ii) below;

- M. Be sealed by a Professional Engineer; and,
 - N. Include a summary description of the public notification undertaken wherein the subject matter of this specific Highway TCP is mentioned.
- (ii) Custom Traffic Control layouts shall:
- A. Be designed in CADD Format AutoCAD 2015 dwg, Nad83, in a scale 1:250; composite drawings can be in 1:500 scale and also submitted in PDF;
 - B. Provide signed and sealed custom Traffic Control layouts;
 - C. Show schematically the placement of all TCDs;
 - D. Place all TCDs in accordance with the standards contained in the OTM;
 - E. Follow symbol conventions for identifying TCDs as per the OTM;
 - F. Show on the drawings the locations and details of all Signs, PVMS, Pavement Markings, Barriers, and protective works;
 - G. Have all dimensions and explanatory notes on the drawing; and,
 - H. Show traffic operations at all phases of the Project.
- (iii) DB Co shall document any proposed DB Co-initiated Closures, Full Closures, Detour Routes, Lane Shifts and Diversions in the Highway TCP. The Highway TCP shall be updated and amended as required such that it is current at all times with respect to the existing and proposed Traffic Control measures in the field.
- (iv) DB Co shall conduct traffic analysis including modelling on the Highway TCP for each construction stage and construction where traffic operations are affected. The traffic analysis shall determine the effect of each Highway TCP on the capacity and operation, including the resulting vehicle delays, queue lengths, and traffic signal timing. The analysis shall confirm that the resulting queues are expected to clear before the commencement of a Restricted Period. The traffic analysis shall be conducted for the representative hour(s) and day(s) that each Highway TCP is in operation. The analysis and the results and recommendations shall be provided to the City in accordance with Schedule 10 – Review Procedure.
- (v) DB Co shall be responsible for including construction generated traffic in the Highway TCP and any associated analysis such as but not limited to the potential for conflict between construction generated traffic and pedestrian and cyclist movements.
- (vi) DB Co shall continuously measure the effectiveness of Highway TCPs and, if those measurements indicate a Highway TCP is non-compliant with the OTM,

accepted Highway TCPs and other Reference Documents, DB Co shall immediately adjust the Highway TCP to bring it into compliance.

- (vii) Auxiliary lane lengths at existing signalized intersections shall not be reduced unless analysis confirms operation is acceptable to the City Representative.
- (viii) DB Co shall not reduce the acceleration/deceleration lane lengths unless analysis confirms operation is acceptable to the City Representative
- (ix) DB Co shall implement the accepted Highway TCPs and accepted revisions thereto.

(b) Highway Emergency Traffic Plan

- (i) DB Co shall prepare and submit a Highway Emergency Traffic Plan in accordance with Schedule 10 – Review Procedure. The Highway Emergency Traffic Plan shall specify how DB Co shall facilitate access for Emergency vehicles to and through affected sites. DB Co shall consult with local municipalities and Emergency Service Providers (ESP) in developing the Highway Emergency Traffic Plan, and liaise closely with them throughout the design and construction as it evaluates and updates the plan on an annual basis, or, whenever there is a change in the site conditions which materially alters the ability to execute the accepted Highway Emergency Traffic Plan.
- (ii) DB Co shall provide specific scenarios for Emergency vehicle access to and through the Site for each of the cases identified in the Highway Traffic Incident Management Plan and the Highway Traffic Risk Assessment Plan.
- (iii) DB Co shall implement the accepted Highway Emergency Traffic Plan and accepted revisions thereto.
- (iv) DB Co shall update the plan such that the information therein is kept current with the upcoming and ongoing Construction Activities. DB Co shall submit the updated plan for review/acceptance in accordance with Schedule 10 – Review Procedure.
- (v) DB Co shall notify Emergency Service Providers, at least two weeks in advance of the start of Highway Works construction, regarding the construction schedule, and if any changes to traffic flow are anticipated.
- (vi) DB Co shall not commence any work on Site without an applicable current accepted Highway Emergency Traffic Plan.

(c) Highway Traffic Incident Management Plan

- (i) DB Co shall prepare and submit a Highway TIMP in accordance with Schedule 10 – Review Procedure. It shall be in accordance with the MTO and City of Ottawa's Emergency Management Plan. The Highway TIMP shall include a

process flow chart which covers but is not limited to occurrence of the Incident, nature and timing of notifications to partner agencies, names and coordinates of contacts, actions to Address the Incident, post Incident review of process, and revisions thereto to the Highway TIMP as appropriate. The primary objectives are to support the City in facilitating Incident response and moving traffic safely and expeditiously around the Incident. The plan shall specify how DB Co will provide access for Emergency vehicles and assistance to Emergency Service Providers (ESP), and how DB Co shall work with the MTO and the City's Traffic Incident Management Group in responding to the Incident.

- (ii) A traffic Incident includes, but is not limited to, any of the following occurrences on or adjacent to a construction Site or Detour Route:
 - A. Motor vehicle accidents;
 - B. Pedestrian and cycling accidents;
 - C. Emergency road repairs;
 - D. Emergency utility repairs;
 - E. Emergency road closures for fire, gas leak, etc.;
 - F. Disabled vehicles; and,
 - G. Debris on the road.
- (iii) DB Co's Highway TIMP shall:
 - A. Work closely and effectively deal with major Incidents with partner agencies including City, OPS, OC Transpo, STO, RCMP, OPP, MTO, City of Gatineau, Sureté du Québec, and the Ministry of Transportation of Québec;
 - i. These efforts shall include the provision of temporary TCD and/or OPP/OPS in the vicinity of DB Co's construction sites or Detour Routes as requested by the MTO and City's Traffic Incident Management Group.
 - B. Coordinate with MTO and/or the City of Ottawa Office of Emergency Management the communications to the public regarding the impacts to the road network of the Incident, via the City, media, and VMSs, and in accordance with established communication protocols; and,
 - C. Define a process to review Incidents and propose modifications to Highway Works that shall reduce the severity and frequency of incidents.

- (iv) DB Co shall document all Incidents, including but not limited to, date location, details of the Incident, comments of the Incident reporter, actions taken, partner agency and agency representatives contacted, follow-up action recommended to be taken and by whom, signed and dated. A copy of the document shall be given to the City within one Business Day of the occurrence of the Incident.
 - (v) DB Co shall implement the accepted Highway TIMP and accepted revisions thereto.
 - (vi) DB Co shall update the plan such that the information therein is kept current with the upcoming and ongoing Construction Activities. DB Co shall submit the updated plan for review/acceptance in accordance with Schedule 10 – Review Procedure.
 - (vii) DB Co shall not commence any work on Site without an applicable current accepted Highway TIMP.
- (d) Highway Traffic Management Implementation Plan
 - (i) DB Co shall prepare and submit a Highway TMIP in accordance with Schedule 10 – Review Procedure. The Highway TMIP shall identify the Traffic Control Supervisor, Traffic Engineer, and Traffic Manager, along with the qualifications and experience of those named individuals demonstrating they meet the qualifications and experience identified in this Part C.
 - (ii) The Highway TMIP shall define processes to ensure that the Highway TTMP and each of the individual Highway TTMP sub-plans are developed and implemented efficiently and appropriately, and that they are kept up-to-date with necessary modifications during the Project. In addition, the processes shall be set out in flow charts, one for the Highway TTMP and one for each of the sub-plans, with an accompanying explanation provided to describe the activities represented by each box in each of the flow charts.
 - (iii) DB Co shall implement the accepted Highway TMIP and accepted revisions thereto.
 - (iv) DB Co shall update the plan such that the information therein is kept current with the upcoming and ongoing Construction Activities. DB Co shall submit the updated plan for review/acceptance in accordance with Schedule 10 – Review Procedure.
 - (v) DB Co shall not commence any work on Site without an applicable current accepted Highway TMIP.
- (e) Highway Traffic Advisory Temporary Signage Plan
 - (i) DB Co shall prepare and submit a Highway Traffic Advisory Temporary Signage Plan in accordance with Schedule 10 – Review Procedure. The primary objective

of the Plan is to notify the City and other stakeholders in advance of scheduled Construction Activities, Closures, Full Closures, Detour Routes, Lane Shifts, and Diversions.

- (ii) The Highway Traffic Advisory Temporary Signage Plan shall be prepared in accordance with the requirements set out in Clause 8.3 of Part B of Schedule 15-2, Part 9.
 - (iii) The DB Co shall update the plan such that the information therein is kept current with the upcoming and ongoing Construction Activities. DB Co shall submit the updated plan for review/acceptance in accordance with Schedule 10 – Review Procedure.
 - (iv) DB Co shall implement the accepted Highway Traffic Advisory Temporary Signage Plan and accepted revisions thereto.
 - (v) DB Co shall not commence any work on Site without an applicable current accepted Highway Traffic Advisory Temporary Signage Plan.
- (f) Highway Traffic Risk Assessment Plan
 - (i) DB Co shall prepare and submit a Highway Traffic Risk Assessment Plan in accordance with Schedule 10- Review Procedure. DB Co shall identify all risks which may have an impact on traffic and state the measures to be implemented to manage, reduce, or eliminate the risks.
 - (ii) DB Co shall perform an independent assessment to identify any risks that could have an impact on traffic management or special conditions that shall be Addressed through DB Co’s Highway Traffic Risk Assessment Plan.
 - (iii) DB Co shall update the plan such that the information therein is kept current with the upcoming and ongoing Construction Activities. DB Co shall submit the updated plan for review/acceptance in accordance with Schedule 10 – Review Procedure.
 - (iv) DB Co shall implement the accepted Highway Traffic Risk Assessment Plan and accepted revisions thereto.
 - (v) DB Co shall not commence any work on Site without an applicable current accepted Highway Traffic Risk Assessment Plan.
- (g) Highway Traffic and Transit Management Communications Plan
 - (i) DB Co shall prepare and submit a Highway Traffic and Transit Management Communications Plan in accordance with Schedule 10 – Review Procedure. It shall describe clearly how DB Co shall communicate to the City and other stakeholders about all matters relating to traffic flow, including specifically, how

it shall provide Timely notice of construction related delays, Closures, detours, traffic Incidents, and emergencies.

- (ii) DB Co shall craft the Highway Traffic and Transit Management Communications Plan to show how DB Co shall incorporate and carry out each of the requirements set out in Clause 1.12 of this Part C.
- (iii) DB Co shall implement the Highway Traffic and Transit Management Communications Plan to apply throughout the Project Term.
- (iv) DB Co shall ensure that the plan is maintained current as related to the activities on Site. DB Co shall submit the updated plan for review/acceptance in accordance with Schedule 10 – Review Procedure.
- (v) DB Co shall not commence any work or Site preparations for same without an accepted Highway Traffic and Transit Management Communications Plan.
- (vi) DB Co shall consult with the City to identify the major user groups affected by the Project. Major user groups may include, but are not limited to, the following:
 - A. Emergency and police services;
 - B. Transit operating companies;
 - C. Motorists;
 - D. Cyclists;
 - E. Pedestrians;
 - F. Transport and tour bus companies;
 - G. Taxi and limousine companies;
 - H. Ontario Trucking Association;
 - I. MTO;
 - J. NCC;
 - K. PSPC;
 - L. Property owners and businesses;
 - M. Community organizers; and,
 - N. Special event organizers.

- (vii) DB Co shall develop and document a process which shall be integrated with the City's communication procedures for traffic management (such as the City Traffic Report and Public Service Announcements and the MTO COMPASS) to keep major user groups informed of planned traffic pattern changes, including, but not limited to the following: hauling and truck routes, transit impacts, detours, Lane Shifts, Lane Closures, sidewalk/MUP Closures, access restrictions, schedule changes, and other Traffic Control procedures. Procedures for disseminating information related to unplanned traffic pattern changes shall be Addressed in the Highway Traffic Incident Management Plan. DB Co shall ensure that this process is acceptable to the Governmental Authorities.
 - (viii) All public inquiries or complaints that DB Co receives shall be documented and handled immediately in the field and forwarded simultaneously to the City, 24-hours a day, seven days a week.
- (h) Highway Traffic Monitoring Plan
 - (i) DB Co shall prepare and submit a Highway Traffic Monitoring Plan for any long- term Lane Closure on Municipal Roadways (Crossing Roads) and for each construction stage on Highway 417, in accordance with Schedule 10 – Review Procedure.
 - (ii) The Highway Traffic Monitoring Plan shall include as a minimum travel time surveys, queue and delays and intersection operational performance within the impacted Highway network.
 - (iii) Monitoring shall be performed in advance of and during each stage or Closure.
 - (iv) In field monitoring shall occur one week after stage or Closure implementation and every four weeks thereafter for the duration of the work.
 - (v) DB Co shall submit the monitoring results to the City in accordance with the Review Procedure and provide recommendations to minimize impacts to traffic.

5.3 DB Co Responsibilities

- (a) DB Co shall accept full responsibility for quality control and quality assurance of all activities affecting the Highway TTMP. The Highway TTMP quality control process shall be included in the Highway Traffic and Transit Management Plan. DB Co shall ensure that all personnel identified in the Highway TTMP are suitably qualified and licensed.
- (b) Traffic Manager
 - (i) DB Co shall designate a Traffic Manager who shall be responsible for the following:
 - A. Development, implementation, and management of the TTMP;

- B. Ensuring the City Representative is kept informed of all upcoming traffic activities and any revisions to the Highway TTMP;
 - C. Ensuring that appropriate modifications are made to the Highway TTMP if the specified Traffic Control measures are not achieving the requirements;
 - D. Coordinating with persons carrying out work in areas adjacent to the Project;
 - E. Co-chairing with the City the Traffic Management Committee;
 - F. Ensuring the timing and organized delivery of public and stakeholder communication information;
 - G. Participating as DB Co's representative in coordinating with the City's Traffic Demand Management program and the Traffic Incident Management Group; and,
 - H. Sign-off of each and every Highway TTMP and Highway TTMP sub-plan prior to their submission to the City.
- (ii) The Traffic Manager shall be a Professional Engineer with the following qualifications:
- A. 20 years of experience overall in the traffic engineering field;
 - B. 10 years of experience specifically related to traffic management and construction staging during construction; and,
 - C. Experience in design/build type projects where Roads and/or Highways were constructed within an existing urban area.
- (c) Traffic Engineer
- (i) DB Co shall designate a Traffic Engineer who is a Professional Engineer and has DB Co's authority to review, and shall seal, the Highway TTMP and associated sub-plans and take responsibility for ensuring that all traffic engineering issues and requirements are taken into account.
 - (ii) The Traffic Engineer shall attend the Project's regularly scheduled Traffic Management Committee meetings and be the Project's representative at the City's Traffic Control Centre when required.
 - (iii) The Traffic Engineer shall Oversee and direct record keeping, reporting and accounting of temporary and permanent traffic signal installations.
 - (iv) The Traffic Engineer shall ensure all traffic signal notification timelines as detailed in this Part C are met.

- (v) The Traffic Engineer shall have the following qualifications:
 - A. 15 years of experience overall in the traffic engineering field.
 - B. 10 years of experience specifically related to traffic modeling, intersection design, construction staging, and installation of traffic signal infrastructure.
 - C. Experience in design/build type projects where Roads and/or Highways were constructed within an existing urban area.
- (d) Traffic Control Supervisors
 - (i) DB Co shall designate Traffic Control Supervisors, each of whom shall have DB Co's authority to respond to Traffic Control requirements, and each of whom shall personally perform all the duties of the Traffic Control Supervisor, in accordance with this Part C.
 - (ii) A Traffic Control Supervisor shall be on the Site full-time when Construction Activities are underway.
 - (iii) The duties of the Traffic Control Supervisor shall include but not be limited to the following:
 - A. Directing all Traffic Control operations for construction;
 - B. The Traffic Control Supervisor shall have direct line authority over all of DB Co's Traffic Control Personnel and procedures on the Site;
 - C. Liaising with the City Representative, OC Transpo, and MTO, as required;
 - D. Monitoring queue lengths in active work zones and implementing appropriate measures when such queues affect the operation and safety of Provincial Highways, Municipal Roadways, and other municipal Roads, and providing the City with documentation outlining the date, location, queue lengths, and measures taken;
 - E. Monitoring, and recording on a daily basis, the transit travel times through work zones and Detour Routes, at a frequency and duration sufficient to identify operational performance issues. Coordinate with OC Transpo ahead of time to establish "geofence" points in the system before measurements are to take place in order to facilitate the collection of Accurate date, route, time, and location data. Document and evaluate the transit travel times versus the forecast times established in the Highway TTMP submissions. Identify operational performance issues and the DB Co recommended mitigation measures immediately to the City. Provide a copy of the record, issues, and mitigation measures to the City daily. Prepare and submit to the City on a monthly basis, in accordance with

Schedule 10 – Review Procedure, a monthly summary report of the daily reports. Report the operational performance issues and their resolution at the next Traffic Management Committee meeting and record same in the notes of the meeting;

- F. Respond to traffic related Incidents resulting from construction and traffic management activities. All major Incidents shall be documented within one Business Day of the Incident and provided to the City per Clause 5.2 (c) – Highway Traffic Incident Management Plan, of this Part C;
- G. Documenting Traffic Control measures and activities in accordance with this Part C and producing a Daily Lane Closure Report as set out in Appendix B;
- H. Documenting Site instructions and items noted on daily (site) reports which pertain to or affect traffic control, and updating the Highway Traffic Control Plans immediately to reflect the changes on Site, and then promptly submitting the revised plans to the City in accordance with Schedule 10 - Review Procedure, as updates to the Highway TTMP and applicable Highway TTMP sub-plans;
- I. Overseeing all requirements that contribute to the safety, convenience, and orderly movement of vehicular, cycling and pedestrian traffic;
- J. Attending the Project’s regularly scheduled traffic management meetings; and,
- K. Traffic Control supervision shall be provided by Traffic Control Supervisors on the Site on a 24 hour per day basis when Construction Activities are underway. During non-work periods, the Traffic Control Supervisor or accepted alternate shall be on the Site within 30 minutes of being notified. The Traffic Control Supervisors shall have appropriate personnel and equipment available on call, at all times.
- L. Carry out daily drive-by inspections as detailed in Appendix G.

(e) Traffic Control Personnel

- (i) All Traffic Control Personnel shall be qualified in accordance with the OHSA/CCOHS and the regulations thereunder.

(f) Traffic Management Committee

- (i) DB Co shall be responsible for forming a Traffic Management Committee that shall be comprised of DB Co, City, OC Transpo, MTO and representatives of Governmental Authorities that shall meet on a weekly basis.

- (ii) The purpose of this committee shall be to coordinate, plan, and take action with respect to current and future traffic and transit impacts that may be caused by the Highway Works.

Appendix A

1. Road Safety Audit Certificate (Stage 1)
2. Road Safety Audit Certificate (Stage 2)
3. Road Safety Audit Certificate (Stage 4)

Certificate Ref No. []

ROAD SAFETY AUDIT CERTIFICATE (STAGE 1)

This Certificate is being delivered pursuant to the agreement between City and [DB Co] dated • (“the Project Agreement”) relating to the Project. Defined terms and expressions used in this Certificate have the same meanings as ascribed thereto in the Project Agreement.

Form of Certificate to be used by the designer for certifying that a Stage 1 Road Safety Audit has been carried out in accordance with Article 10 of Part 9 of Schedule 15-2.

1. We certify that the Pre-Final Design Development of [.....] has been the subject of a Stage 1 Road Safety Audit in accordance with Article 10 of Part 9 of Schedule 15-2, the Design Management Plan and all other relevant provisions of the Project Agreement.

2. The Road Safety Audit Team’s report and statement certifying the audit has been carried out are attached.

Signed:

Road Safety Audit Team (Principal)

Name:

Title:

Date:

Professional Registration Number:

Affix Professional Seal

3. We certify that the Pre-Final Design Development of [.....] has been the subject of a Stage 1 Road Safety Audit in accordance with Article 10 of Part 9 of Schedule 15-2, the Design Management Plan and all other relevant provisions of the Project Agreement and that all observations and recommendations in the Road Safety Audit Team’s report have been satisfactorily addressed and resolved.

Signed:

Designer (Principal)

Name:

Title:

Date:

Professional Registration Number:

Affix Professional Seal

Signed:

Construction Contractor (Principal)

Name:

Title:

Date:

Professional Registration Number:

Affix Professional Seal

Signed:

DB Co Representative

Name:

Date:

4. Receipt of this Certificate is acknowledged.

Signed.....

HMQ Representative

Name.....

Date.....

ROAD SAFETY AUDIT CERTIFICATE (STAGE 2)

This Certificate is being delivered pursuant to the agreement between City and [DB Co] dated • (“the Project Agreement”) relating to the Project. Defined terms and expressions used in this Certificate have the same meanings as ascribed thereto in the Project Agreement.

Form of Certificate to be used by the designer for certifying that a Stage 2 Road Safety Audit has been carried out in accordance with Article 10 of Part 9 of Schedule 15-2.

1. We certify that the Final Design Development of [.....] has been the subject of a Stage 2 Road Safety Audit in accordance with Article 10 of Part 9 of Schedule 15-2, the Design Management Plan and all other relevant provisions of the Project Agreement.

2. The Road Safety Audit Team’s report and statement certifying the audit has been carried out are attached.

Signed:

Road Safety Audit Team (Principal)

Name:

Title:

Date:

Professional Registration Number:

Affix Professional Seal

3. We certify that the Final Design Development of [.....] has been the subject of a Stage 2 Road Safety Audit in accordance with Article 10 of Part 9 of Schedule 15-2, the Design Management Plan and all other relevant provisions of the Project Agreement and that all observations and recommendations in the Road Safety Audit Team’s report have been satisfactorily addressed and resolved.

Signed:

Designer (Principal)

Name:

Title:

Date:

Professional Registration Number:

Affix Professional Seal

Signed:

Construction Contractor (Principal)

Name:

Title:

Date:

Professional Registration Number:

Affix Professional Seal

Signed:

DB Co Representative

Name:

Date:

4. Receipt of this Certificate is acknowledged.

Signed.....

HMQ Representative

Name.....

Date.....

Certificate Ref. No. []

ROAD SAFETY AUDIT CERTIFICATE (STAGE 4)

This Certificate is being delivered pursuant to the agreement between City and [DB Co] dated • (“the Project Agreement”) relating to the Project. Defined terms and expressions used in this Certificate have the same meanings as ascribed thereto in the Project Agreement.

Form of Certificate to be used by the designer for certifying that a Stage 4 Road Safety Audit has been carried out in accordance with Article 10 of Part 9 of Schedule 15-2.

1. We certify that the [reference relevant works] as constructed, tested and commissioned has been the subject of a Stage 4 Road Safety Audit in accordance with Article 10 of Part 9 of Schedule 15-2, the Design Management Plan and all other relevant provisions of the Project Agreement.

2. The Road Safety Audit Team’s report and statement certifying the audit has been carried out are attached.

Signed:

Road Safety Audit Team (Principal)

Name:

Title:

Date:

Professional Registration Number:

Affix Professional Seal

3. We certify that the [reference relevant works] as constructed, tested and commissioned has been the subject of a Stage 4 Road Safety Audit in accordance with Article 10 of Part 9 of Schedule 15-2, the Design Management Plan and all other relevant provisions of the Agreement and that all observations and recommendations in the Road Safety Audit Team’s report have been satisfactorily addressed and resolved.

Signed:

Designer (Principal)

Name:

Title:

Date:

Professional Registration Number:

Affix Professional Seal

Signed:

Construction Contractor (Principal)

Name:

Title:

Date:

Professional Registration Number:

Affix Professional Seal

Signed:

DB Co Representative

Name:

Date:

4. Receipt of this Certificate is acknowledged.

Signed.....

HMQ Representative

Name.....

Date.....

Appendix B

Daily Lane Closure Report

- a) DB Co shall create a Daily Lane Closure Report for each Lane Closure on the Project. The purpose is to document the status of all of the various Lane Closures for all modes of transportation throughout the Project. The Daily Lane Closure Report may be either a hard copy document or an electronic form in a format compatible with City systems.
- b) The Daily Lane Closure Report shall be a field sheet format. The header of the document shall include but not be limited to headings for the Project Segment and number, date, day of week, location, time of the observations, name of observer, the signature of the observer, and whether the Lane Closure is a General Traffic Lane Closure, or a BRT Lane Closure.
- c) Each day (weekdays and weekends, and statutory and civic holidays), DB Co shall carryout Site inspections, in person or via electronic surveillance, with a focus on both the temporary and long-term Lane Closures in effect for both general traffic and BRT vehicles throughout the entire Project. The data shall be recorded on the Daily Lane Closure Report, the original of which shall be retained by DB Co until the Project warranty period is complete.
- d) In instances where Lane Closures change during the day (or night), DB Co shall carry out Site confirmation of the Lane Closures relevant to the changes at the start and end of each change-over of the Lane Closures and record the inspection on a Daily Lane Closure Report. The observations shall be taken at a frequency so as to confirm with an accuracy of +/- five minutes, the actual start and end times for each of the temporary Lane Closures.
- e) Each day, DB Co shall review the information recorded on the Daily Lane Closure Reports, and assess the execution of the Lane Closures, noting instances where the timing of the Lane Closure implementation/removal is not meeting the expectations of the Highway TTMP and Highway TTMP sub-plans, and identify the remedial action required such that the expectations for Lane Closures as set out in the Highway TTMP and Highway TTMP sub-plans shall be met.
- f) DB Co shall take immediate action to effect the requisite remedial measures needed in order to attend to the noted matters. DB Co shall document in the Daily Lane Closure Report the issue, the remedy and the action taken.
- g) DB Co shall continue to inspect a matter of traffic management concern until the issue is resolved.
- h) Each day, copies of the current Daily Lane Closure Report shall be forwarded by DB Co to the City, and to the Lead Traffic and Mobility.
- i) DB Co shall produce a Monthly Summary of the Daily Lane Closure Reports, noting the number of issues identified, the location and nature of the issues, the remedies for the issues, the actions taken and the results achieved. Trends in issues shall be identified, remedies for the trends ascertained, and remedial action implemented. All of this information shall be

documented in the Monthly Summary of the Daily Lane Closure Reports, and a copy of the summary shall be brought to the weekly Traffic Management Committee meeting for review and discussion, with copy to the City and the Lead Traffic and Mobility.

- j) The Daily Lane Closure Reports shall include, but not be limited to, observations taken during personal Site visits and/or via electronic/camera surveillance, carried out by a DB Co designated Traffic Control Supervisor, with respect to each of the following topics of lane closure information as relates to and in accordance with the current accepted Highway TTMP and current accepted Highway TTMP sub-plans.
- Lane closure required (Yes/no);
 - Planned lane closure (yes/no);
 - Scheduled lane closure time (Military Time – 24 hr clock);
 - Scheduled lane opening time (Military Time);
 - Actual lane closure time (Military Time);
 - Actual lane opening time (Military Time);
 - Period of the day (peak, off-peak, night, weekend, holiday);
 - Lane description:
 - A. Street name;
 - B. Direction of traffic flow;
 - C. Name of upstream cross street;
 - D. Name of downstream cross street;
 - E. Number of lanes closed;
 - F. No of blocks lane(s) is closed; and,
 - G. Lanes closed – Right turn, Through and right turn, Right through, Left through, through and left turn, left turn
 - Comments/other observations;
 - Equivalent lane closure hours for current observation;
 - Location Map to scale showing relevant lane configuration with closed lane(s) shown as hatched area;
 - Checked by (print name then signature); and,
 - Signed off by (print name then signature).

Appendix C

REFERENCE DOCUMENTS

OPS and MTO Special Provisions

| Document Type Date | Description |
|--|---|
| MTOD (at time of Commercial Close) | Ministry of Transportation Ontario Drawing (http://www.raqsb.mto.gov.on.ca/techpubs/OPS.nsf/OPSHomepage) |
| OPSD (at time of Commercial Close) | Ontario Provincial Standard Drawings (http://www.raqsb.mto.gov.on.ca/techpubs/OPS.nsf/OPSHomepage) |
| OPSS (at time of Commercial Close) | Ontario Provincial Standard Specifications (http://www.raqsb.mto.gov.on.ca/techpubs/OPS.nsf/OPSHomepage) |
| SSD (at time of Commercial Close) | Ministry of Transportation Ontario Structural Standard Drawing (http://www.raqsb.mto.gov.on.ca/techpubs/OPS.nsf/OPSHomepage) |
| Electrical ATMS SSP (at time of Commercial Close) | Ministry of Transportation Ontario Structural Standard Drawing (http://www.raqsb.mto.gov.on.ca/techpubs/OPS.nsf/OPSHomepage) |
| SSP 102S05 (May 2017) | Revision to Construction Section (compaction) |
| SSP 103F03 (June 2017) | Replaces OPSS 313 November 2016 |
| SSP 103F31 (June 2017) | Surface smoothness requirements |
| SSP 104S06 (December 2017) | Post Installation Inspection |
| SSP 105S09 (March 2018) | Amendment to OPSS 539, November 2014 |
| SSP 105S22 (June 2016) | Target Density |
| SSP 106S05 (June 2017) | ATMS work |
| SSP 106S09 (March 2018) | Proof of performance testing power supply |
| SSP 106S10 (March 2018) | Proof of performance testing underpass luminaires |
| SSP 106S16 (March 2018) | Proof of performance testing luminaires |
| SSP 107S02 (February 2017) | Sampling and testing of materials |
| SSP 107S04 (February 2013) | Delete epoxy coated steel |
| SSP 107S05 (April 2017) | Freeway Paving Operations |
| SSP 109S04 (March 2018) | Revisions to references to CAN/CSA |
| SSP 109S12 (May 2018) | Deletion of QVE |
| SSP 109S13 (July 2017) | Coating thickness measurements HML and OHS |
| SSP 109S17 (March 2018) | Replaces OPSS 905 |
| SSP 109S32 (March 2018) | Amendment to OPSS 928, April 2012 |
| SSP 109F57 (April 2018) | Amendment to OPSS 903, April 2016 |
| SSP 109S58 (March 2018) | Amendment to OPSS 942, November 2009 |
| SSP 110S04 (February 2018) | Amendment to OPSS 1001, November 2013 – Aggregate Produced from Mine By-Product Rock |
| SSP 110F10 (September 2001) | Use of slag |
| SSP 110S16 (May 2017) | Amendment to OPSS 1004, November 2012 – Quality Assurance Sampling, and Physical Property and Gradation Requirements for Granular Sheetting |

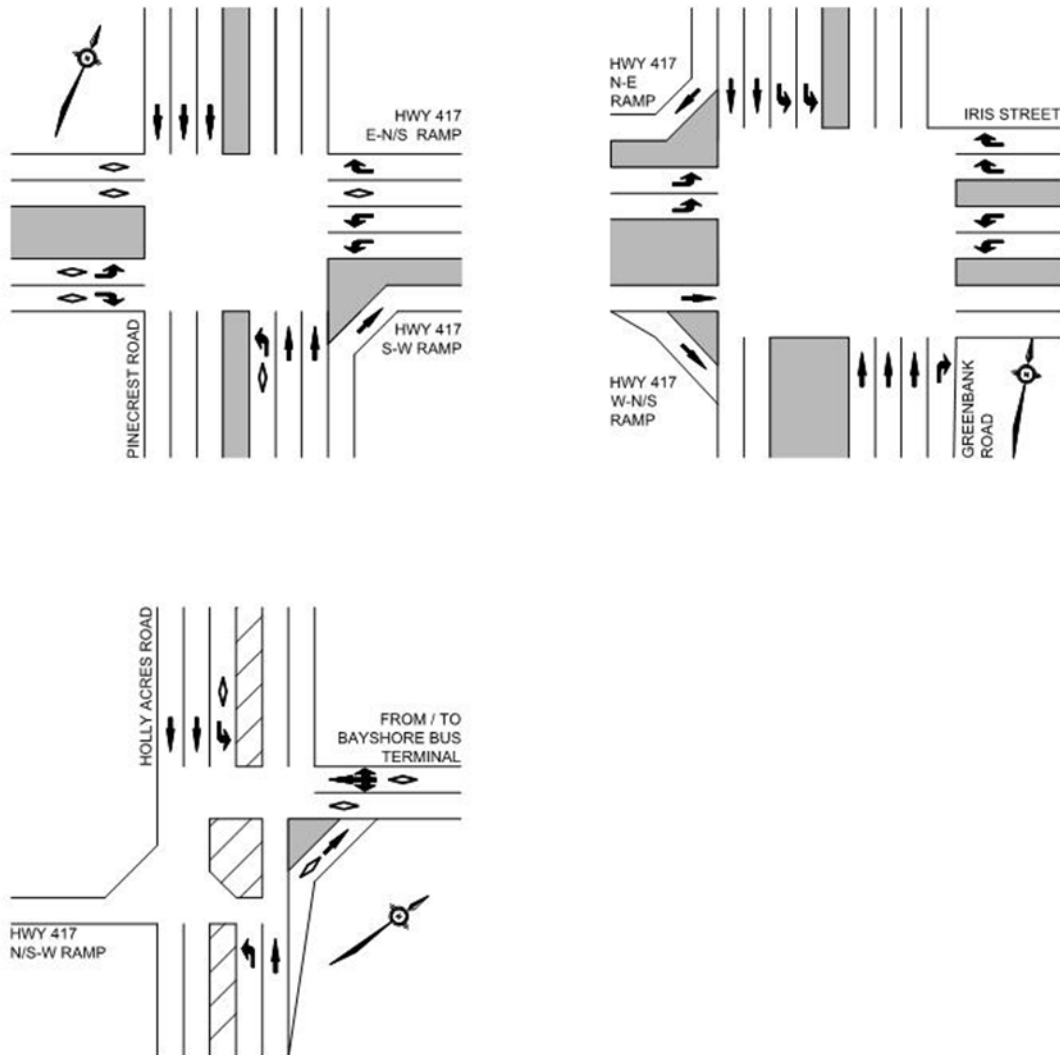
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| SSP 111F06 (March 2017) | Mix Design Criteria and Anti Stripping Treatment |
| SSP 111F09 (December 2017) | Additional test results and sampling for PGAC |
| SSP 111S12 (July 2017) | Replaces OPSS 1103 |
| SSP 112S07 (February 2008) | Replaces OPSS 1212 |
| SSP 112S10 (December 2017) | Bearing tolerances |
| SSP 113S03 (December 2004) | Cementing Materials submission and requirements |
| SSP 114S06 (June 2017) | Replaces OPSS 1440 |
| SSP 118S03 (February 2017) | Precast Hardened Concrete testing |
| SSP 124S01 (March 2018) | Coating inspection of HML |
| SSP 168F10 (September 2007) | ATMS Operations |
| SSP 168F14 (December 2017) | ATMS Quality Control |
| SSP 168S20 (September 2007) | ATMS protection existing system |
| SSP 199S48 (February 2017) | QVE Services |
| SSP 199S54 (February 2018) | Laboratory correlation program |
| SSP 199S55 (May 2004) | Record Drawings for Structures and Foundations |
| SSP 199F57 (December 2017) | General Requirements of Samples for Quality Assurance, Referee and Other Testing by the Owner or the Owner's Agent |
| SSP 199S64 (July 2016) | Referee Testing |
| SSP 305S03 (March 2017) | Amendment to OPSS 305, November 2016 – Granular Sealing |
| SSP 308F02 (February 2017) | Tack Coat requirements |
| SSP 351S01 (October 2016) | Tactile walking surface |
| SSP 407S06 (April 2014) | Amendment to MTC Form 407, March 1984 – Aggregate Requirements, Lift Rings, Adjustment Unit and Resilient Connectors |
| SSP 499S02 (March 2012) | Management of MH/CB Cleanout material |
| SSP 517F01 (July 2017) | Dewatering Requirements |
| SSP 599S22 (March 2018) | Design and Construction requirements RSS walls/slopes |
| SSP 599S23 (March 2018) | QC and QA testing for RSS materials |
| SSP 601S01 (November 2014) | Maintenance temporary traffic signals |
| SSP 681F15 (September 2007) | Training for ATMS work |
| SSP 681F19 (December 2017) | SIT of ATMS |
| SSP 681F25 (June 2017) | ATMS Maintenance and Warranty |
| SSP 682S07 (November 2017) | ATMS Ducts |
| SSP 682S12 (March 2018) | Power Supply Cabinet ATMS |
| SSP 682S14 (April 2018) | Concrete Pads ATMS |
| SSP 682S16 (June 2017) | Controller Cabinets ATMS |
| SSP 682S15 (September 2007) | Base mounted Communications Pedestals ATMS |
| SSP 682S17 (July 2012) | Advanced Traffic Controllers ATMS |
| SSP 682S18 (September 2007) | Loop Vehicle Detector Sensor Units ATMS |
| SSP 682S19 (May 2017) | ATMS Loop Detectors |
| SSP 682S26 (December 2017) | NITS installation and testing |
| SSP 682S27 (June 2017) | Pole mounted Controller Cabinet ATMS |
| SSP 682S28 (November 2013) | UPS for ATMS |
| SSP 682S30 (July 2009) | Concrete Poles with Camera raising lowering ATMS |

| | |
|-----------------------------|---|
| SSP 682S34 (June 2017) | External UPS Units ATMS |
| SSP 683S01 (December 2017) | Fibre Optic Communications Cable ATMS |
| SSP 683S02 (December 2017) | Splice Enclosures ATMS |
| SSP 683S28 (December 2017) | Aerial Fibre Optic Communications Cables ATMS |
| SSP 684S10 (February 2014) | Dome Cameras ATMS |
| SSP 685S01 (February 2016) | Variable Message Signs ATMS |
| SSP 685S07 (February 2016) | Fixed Support VMS ATMS |
| SSP 710S01 (September 2011) | Application of stop lines |
| SSP 710S02 (September 2011) | Second application of traffic paint |
| SSP 710S03 (September 2011) | Removing and obliterating pavement markings |
| SSP 710S04 (September 2011) | DSM requirement removing and obliterating pavement markings |
| SSP 710F07 (September 2011) | Short-term pavement marking material |
| SSP 721S05 (April 2016) | Type M SBGR mounting height |
| SSP 723S01 (August 2016) | Energy Attenuator Types |
| SSP 723S02 (February 2017) | Installation Energy Attenuator temporary narrow |
| SSP 732S03 (January 2018) | SBEAT Construction requirement |
| SSP 740S01 (September 2011) | Installation requirements concrete barrier |
| SSP 741S01 (August 2015) | Temporary Concrete Barrier Connections |
| SSP 741S02 (August 2016) | Movable Temporary Concrete Barrier requirements |
| SSP 760F01 (March 2018) | Noise Barrier design and construction requirements |
| SSP 799S03 (September 2011) | Temporary Transition Rail Requirements |
| SSP 799S04 (February 2013) | React 350 Construction requirements |
| SSP 799S05 (December 2017) | Certification of Safety Items |
| SSP 799S12 (May 2013) | Ramp Closure Gates construction requirements |
| SSP 799S17 (February 2017) | Intermediate Signs construction requirements |
| SSP 899S01 (March 2015) | Requirements for disposal of materials containing asbestos |
| SSP 914S03 (March 2016) | Form and fill grooves requirement |
| SSP 922F01 (November 2016) | Sampling for bearings |
| SSP 999S02 (March 2018) | Glass Fibre Reinforcing Polymer Reinforcing requirements |
| SSP 999F29 (March 2018) | Dowel Installation requirements |
| SSP 999S30 (March 2018) | Jacking of Superstructure requirements |
| SSP 999S31 (March 2018) | Non pre-stressed pre cast concrete bridge elements requirements |

Appendix E

Road Intersection Minimum Lane Configuration Diagrams

Appendix E represents the minimum lane configuration requirements at the following intersections. If the findings of DB Co's Traffic Analysis Report and design require additional travelled or auxiliary lanes in order to satisfy the requirements of this Schedule 15-2, Part 9, DB Co shall be responsible for the necessary roadway expansions or improvements in addition to the requirements shown in this Appendix E. Such expansions or improvements shall be identified to the City upon submission of the Traffic Analysis Report and approved by the City in writing. Active transportation facilities and associated infrastructure is not depicted in this Appendix E, but shall be provided by DB Co in accordance with the requirements detailed elsewhere in Schedule 15-2, Part 9. Grey areas denote raised concrete medians or islands. Raised medians and islands shall only be constructed at ramp terminals at locations identified below.



Appendix F

Context Sensitive Design Requirements

1.1 CSD Background

- (a) On previous Highway 417 projects between Walkley Road and Highway 416 in Ottawa, MTO has implemented a series of consistent architectural and aesthetic treatments (the “Context Sensitive Design Concepts” or “CSD Concepts”) into the design of various elements of highway infrastructure as part of its Context Sensitive Design (CSD) initiative.
- (b) Additional background on the MTO’s CSD initiatives can be found in the MTO’s Context Sensitive Design Report for the Queensway – Highway 417 (2011), however DB Co shall not extract CSD Concepts from this report for use on Highway Works, as it does not reflect actual CSD Concepts applied to recent Highway 417 projects.

1.2 CSD Design and Submission Requirements

- (c) The design requirements contained within this Appendix F pertain to CSD Concepts only and do not release DB Co of its responsibility to meet other Design Criteria contained elsewhere in Schedule 15-2, Part 9.
- (d) DB Co shall be required to incorporate applicable CSD Concepts and associated treatments into its design of the Highway Works to ensure consistency with other sections of Highway 417 in Ottawa. DB Co shall refer to the following MTO contracts and extract all applicable drawings and specifications pertaining to CSD Concepts for incorporation into Highway Works design with a similar level of detail:
 - (i) MTO Contract 2012-4007;
 - (ii) MTO Contract 2014-4030;
 - (iii) MTO Contract 2014-4038; and,
 - (iv) MTO Contract 2017-4031.
- (e) The CSD Concepts listed below shall be integrated into DB Co’s Highway Works design, in accordance with the referenced MTO contracts any other requirements detailed herein. The general descriptions below are made for the purpose of identifying CSD Concepts, and shall not be construed as the sole CSD design requirements applicable to Highway Works.
 - (i) Underpass Bridge Structures
 - A. Pilasters

1. Decorative pilasters shall be designed and constructed at the outside face of intermediate piers on multi-span Underpass Bridges. The pilasters shall incorporate a maple leaf emblem.
 2. Pilaster design shall be aesthetically consistent with those detailed in MTO Contract 2012-4007.
- B. Piers
1. Centre pier design shall be aesthetically consistent with those detailed in MTO Contract 2012-4007.
- C. Abutments
1. Abutment design shall be aesthetically consistent with those detailed in MTO Contract 2012-4007.
- D. Wing Walls
1. Wing wall design shall be aesthetically consistent with those detailed in MTO Contract 2012-4007.
- E. Parapets
1. Parapet design shall be aesthetically consistent with those detailed in MTO Contract 2012-4007.
- F. Underbridge Slopes
1. Underbridge slope design shall be aesthetically consistent with those detailed in MTO Contract 2012-4007.
- G. Beams and Girders
1. Beams and girder design shall be aesthetically consistent with those detailed in MTO Contract 2012-4007.
- H. Lighting
1. Underbridge lighting features shall be aesthetically consistent with those detailed in MTO Contract 2012-4007 and MTO Contract 2014-4038.
- I. Appurtenances
1. Underpass Bridges shall include bridge mounted street names, leaf emblems on pilasters, and any other relevant CSD Concepts.

2. Bridge appurtenances shall be aesthetically consistent with those detailed in MTO Contract 2012-4007.
- (ii) Walls
- A. Noise Barriers
1. Noise Barriers shall generally consist of precast concrete panels and posts. Translucent acrylic Noise Barriers shall be provided at certain locations as indicated elsewhere in this Schedule 15-2, Part 9.
 2. Noise Barriers, including the material, colour and texture patterns, and aesthetics shall be consistent with those detailed in MTO Contract 2012-4007 and MTO Contract 2014-4038.
- B. Retaining Walls
1. Retaining walls, including the material, colour and texture patterns, and aesthetics shall be consistent with those detailed in MTO Contract 2012-4007.
- (iii) Landscape Treatments
- A. Landscaping requirements shall be as detailed elsewhere in Schedule 15-2, Part 6 - Urban Design, Landscape Architecture and Connectivity Requirements and this Part 9.
- (iv) Highway Appurtenances
- A. Light Poles
1. Leaf emblems shall be affixed to every other light pole as per the pattern featured in MTO Contract 2017-4031.
 2. Light poles, including LED luminaires and associated appurtenances, shall be aesthetically consistent with those detailed in MTO Contract 2017-4031.
- B. Fencing
1. Chain link fencing within the MTO ROW shall be black with vinyl fence fabric as detailed in MTO Contract 2017-4031.
 2. Fencing shall be aesthetically consistent with that detailed in MTO Contract 2017-4031.
- C. Sign Structures

1. Overhead sign structures shall be aesthetically consistent with those detailed in MTO Contract 2012-4007 and MTO Contract 2017-4031.
- (f) As part of its Pre-Final Design Development submission in accordance with Schedule 10 – Review Procedure, DB Co shall submit to the City a report demonstrating its adherence to CSD requirements as specified in this Schedule 15-2.
- (i) DB Co shall be required to Address in a subsequent report submission, any CSD Concepts that are not appropriately integrated into its design, as determined by the City.
 - (ii) The report shall detail the following, at a minimum, pertaining to each CSD Concept:
 - A. Locations within the Highway Corridor Lands where each CSD Concept is to be integrated; and,
 - B. Typical aesthetic design details for each CSD Concept (including but not limited to materials, dimensions, layout, colour).

Appendix G
Maintenance During Construction

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ARTICLE 1 INTRODUCTION

1.1 SCOPE

DB Co shall carry out Maintenance Operations in accordance with the requirements of this Appendix G until Highway Final Completion.

MTO shall only be responsible for snow, ice and frost control on the travelled lanes and paved shoulders within the Construction Zone designation current at the time. DB Co shall be responsible for any snow removal in the construction work zone, behind temporary barriers or other devices.

The Maintenance Operations shall adhere to the specifications detailed in this Appendix G for addressing inspection, maintenance and repair.

The specifications identify DB Co's responsibilities and obligations of DB Co Parties performing the Maintenance Operations requirements.

1.2 TURN-OVER

The Highway Corridor Lands will be turned over to DB Co for maintenance as per the following procedure:

1. DB Co shall submit the Designation of Construction Zone to City in conjunction with Commencement Date to transfer Highway Corridor Lands to DB Co.
2. DB Co shall with City perform a field inspection of the Highway Corridor Lands following Financial Close and prior to the Turn-Over date to identify any deficiencies. City is the sole judge of whether or not the identified deficiencies require correction prior to the turnover date.
3. City shall prepare the Turn-Over Agreement Form A, which identifies the date and time that responsibility for maintenance is transferred to DB Co, and shall be executed by City and DB Co.
4. DB Co shall carry out Maintenance Operations within the Designation of Construction Zone limits until Final Highway Completion within the noted limits.
5. DB Co shall request the turnover of Maintenance Operations to City using the Turn-Over Agreement Form B.
6. A final turnover field inspection prior to turn over from DB Co to City shall be performed by DB Co and City to identify and deficiencies to be corrected by DB Co. The City is the sole judge or whether or not the identified deficiencies require correction prior to turnover date.

1.3 GENERAL

All conditions that are considered, or causing, a Hazard shall be addressed Immediately by DB Co upon Detection or being Made Aware.

All Maintenance Operations shall be completed according to all Laws and Regulations, Standards and this Appendix G to Schedule 15-2 Part 9.

When a date for completion or submission of a component of the Maintenance Operation is identified, such date is considered to be the Maintenance Standard for the activity. When this Appendix G identifies a Remedy Period, the Remedy Period is the time limit to correct a non-compliance to meet the Maintenance Standard. The Remedy Period begins when the non-compliance is Detected or should have been Detected. However if the non-compliance is causing or could cause safety or health Hazards, the Maintenance Operation shall be completed Immediately or as soon as possible to maximize the safety of the public.

The non-compliance becomes a Non Conformance where the Remedy Period time limit has not been met. The Non Conformance process as detailed in Schedule 11 shall be followed. For greater clarity the Maintenance Operations are part of the Works and the Construction Period Quality Failure as detailed in Schedule 21 shall apply.

The tables, in the articles in this Appendix G, detailing the Maintenance Standards designate, in brackets below each Maintenance Standard if the non-compliance will be processed in accordance with the NCR process as per Schedule 11 or in accordance with the Construction Period Quality Failure as defined in Schedule 21 with the designation of Minor Construction Period Quality Failure (Minor CPQF) or Medium Construction Period Quality Failure (Medium CPQF).

Subsequent Construction Period Quality Failure Deductions arising from a failure to remediate prior to the expiration of the applicable Remedial Period will be assessed as detailed in Section 6.2 of Schedule 21.

HIGHWAY MAINTENANCE TURN-OVER AGREEMENT FORM A

CONTRACT NO.: _____ HWY. NO: _____ REGION: _____

LOCATION: _____

DESCRIPTION: _____

CONTRACTOR: _____

DB Co and their parties, as per Project Agreement, do now take responsibility for the maintenance of the roadway, except for the exemptions listed below.

The following list of items will remain the responsibility of the Ministry or its Agents, including the Area Maintenance Contractor:

Winter Maintenance Operations

Date and time of maintenance transfer:

Date: _____ Time: _____

City
Administrator: _____
(signature) _____ Date _____

DB Co: _____
(signature) _____ Date _____

For Confirmation of Receipt:

Maintenance
Superintendent: _____
(signature) _____ Date _____

Area
Maintenance
Contractor: _____
(signature) _____ Date _____

Distribution:

City Administrator
Maintenance Coordinator (MTO)
Area Contracts Engineer (MTO)
Regional Contracts Engineer (MTO)

HIGHWAY MAINTENANCE TURN-OVER AGREEMENT FORM B

CONTRACT NO.: _____ HWY. NO: _____ REGION: _____

LOCATION: _____

DESCRIPTION: _____

CONTRACTOR: _____

The City and its agents, as per Project Agreement, do now take responsibility for the maintenance of the roadway, except for the exemptions listed below.

The following list of items will remain the responsibility of the Contractor or their Agents:

[additional items as per the Maintenance Items List]

Date and time of maintenance transfer:

Date: _____ Time: _____

City
Administrator: _____
(signature) Date

Contractor: _____
(signature) Date

For Confirmation of Receipt:

Maintenance
Superintendent: _____
(signature) Date

Area
Maintenance
Contractor: _____
(signature) Date

Distribution:

City Administrator
Maintenance Coordinator (MTO)
Area Contracts Engineer (MTO)
Regional Contracts Engineer (MTO)

ARTICLE 2 DEFINITIONS

For interpretation, the definitions found in this Article 2 and elsewhere in this document, apply throughout the Agreement (herein defined), unless otherwise specified.

Unless the context otherwise specifies or requires, for the purposes of this Agreement, the following terms shall have the following meanings:

Asphalt Pavement means a road surface made of a mixture of asphalt cement and aggregate, commonly referred to as “hot mix” or “flexible pavement”.

Aggregate means gravel, sand, clay, earth, shale, stone, limestone, dolostone, sandstone, marble, granite, or rock other than metallic ores, slag, and clinkers.

Bi-weekly means occurring every two weeks.

Breakout means damage to Concrete Barrier where concrete is missing from the full width of the cross-section.

Block Separation means a crack through the full width of the Concrete Barrier.

Construction Signs means all traffic control devices and signs, including vehicles, trailers, and the like that are provided to support signs, and equipment to supply sign lighting, but excludes Contract identification signs and Highway number markers, all as may be described in the OTM.

Contractor means the person, partnership, or corporation or joint venture undertaking the Work as identified in the Agreement (DB Co).

Curb and Gutter means a border and channel typically made of concrete at the edge of a street or road for conveying surface water.

Day means a calendar day.

Defect(s): means any deficient condition on the Highway Corridor Lands identified in the maintenance requirements.

Detect, Detected or Detection means observed, should have been observed or has been informed.

Deterioration means a physical breakdown of the Pavement and/or Roadbed.

Disposed, Disposed Of or Disposal means disposal according to the requirements of Schedule 17.

Drainage Features means the features that function to control or convey storm-water runoff. Drainage features may include, but are not limited to the following: curb and gutter, culverts with spans less than three metres, ditches and ditch inlets, drainage channels, swales, catch basins and manholes and sewers.

Driving Surface means that part of the Highway designed or intended for use by vehicular traffic excluding Shoulders, and as defined by the painted edgelines when available.

Energy Absorbing System (EAS) means either: cylinders filled with energy absorbing materials; or; mechanical devices with or without energy absorbing cartridges. Energy absorbing terminals are generally attached to Concrete Barrier, steel beam guide rail, or other fixed objects.

Eradicate/Eradication means to do away with the plants completely as if by pulling up by the roots.

Fully Paved Shoulders means a Paved Surface adjacent to the through or auxiliary lane.

Gravel Shoulders means areas of gravel placed adjacent to through lanes, auxiliary lanes, Partially Paved Shoulder or Fully Paved Shoulders.

Hand Tools means tools that are commonly called tools or implements of the trade and include small power tools. Individually, a tool shall be considered as a Hand Tool where the maximum cost is \$[REDACTED].

Hazardous Substance means, but is not limited to, any solid, liquid, gas or other substance or emission which is a contaminant, pollutant, dangerous substance, liquid waste, industrial waste, hazardous material or hazardous substance which is or becomes regulated by Environmental Laws or occupational health and safety law or which is classified as hazardous or toxic under Environmental Laws.

Immediate or Immediately means initiation of a Maintenance Operation activity as soon as possible after Detection or being Made Aware and no later than 30 minutes from the time of Detection or being Made Aware. If more than one activity requires Immediate action at the same time, DB Co shall complete the work giving priority to the highest degree of Hazard.

Incident Resolution means the Highway is free of Hazards and all lanes closed due to the Incident have been re-opened to public traffic.

Laws and Regulations means any and all applicable federal, provincial or municipal laws, by-laws, codes, orders, directives, rules, regulations or statutes affecting the Maintenance Operation which, in the ordinary and usual course of the maintenance, repair and/or construction of a Highway in the Province of Ontario, would be recognized, followed and/or implemented by the Crown and applicable provincial advisors.

Loop Crack means a pattern of through cracks that form a distinct continuous or discontinuous U-shape or V-shape in Concrete Barrier.

Maintenance Access Point means a structured opening to provide access to underground services.

Maintenance Operation means the activities performed to maintain the Highway in a safe and passable condition, to prolong the life of the asset, and other activities prescribed in the maintenance requirements.

Maintenance Standard means the minimum operational requirements and service levels for Highway maintenance in order to ensure the safety of Highway users and maintain Highway assets. Maintenance Standards are detailed in this Appendix G.

mcd/m2lx means a unit of measurement for Retroreflectivity (milicandelas per square metre per lux).

Partially Paved Shoulder means a Paved Surface adjacent to a through or auxiliary lane for a minimum width of 0.5 metres with the remaining shoulder surface being gravel.

Paved Surface means any surface with a hard surfaced finish constructed of Asphalt Pavement, Concrete Pavement or Surface Treatment.

Priority means completing the function in order of importance with respect to the public's safety.

Qualified Bridge Repair Crew means a group of three identified individuals that have knowledge of maintenance practices and repair methods relating to Highway Structures gained through a minimum of 3 years' work experience working on MTO Bridges. The crew shall consist of as a minimum one qualified supervisor, two qualified workers, a vehicle or vehicle/trailer combination equipped with tools, equipment and materials required to perform bridge repairs, including small hand tools such as hammers, wrenches, saws, trowels, shovels, rakes, brooms and power tools such as chainsaw, concrete saw, concrete vibrator, chipping guns, and hammer drills.

Qualified Inspector means a person with knowledge of Structure maintenance principals and ability to identify structure defects, gained through a minimum of three (3) years of highway or equivalent municipal structures inspection experience. The Qualified Inspector shall possess a certificate from a bridge inspection course, equivalent to the Ontario Good Roads Association's Bridge and Structure Inspection course.

Qualified Person means a person with knowledge of Structure maintenance principals and ability to identify structure defects, gained through a minimum of two (2) years of highway structures or equivalent municipal structures maintenance experience. The Qualified Person shall possess a certificate from a bridge training course, equivalent to the Ontario Good Roads Association's Bridge and Culvert Management course.

Ravelling is the progressive loss of pavement material from the surface downward, leaving a coarse texture of “pock marks” on the pavement surface.

Reasonable means a sound judgment or action that is not excessive or extreme nor insufficient.

Remedial Period means the period of time allowed for correcting a Defect after the expiration of the Remedy Period and as defined in Schedule 21 .

Remedy Period means the maximum period of time allowed for correcting a Defect after Detection.

Retracing of Pavement Markings means the routine recoating of existing markings, including center lines, edge of pavement lines, lane and turn lane lines and Pavement Marking Symbols, including stop bars, crosswalks, school crossings, railway crossings, arrows and other markings listed on the inventory, on existing pavement.

Retroreflectivity means the property of a material or device in which, when directionally irradiated, the reflected rays are preferentially returned in direction close to the opposite of the direction of the incident rays, this property being maintained over wide variations in the direction of the incident rays.

Rippling and Shoving means regular transverse undulations in the surface of the pavement in a wavy or “washboard” effect running across the pavement, or an unevenness of the pavement due to movement of the surface mat.

Roadbed means that part of the Work which is designed to support the Roadway.

Ruts or Rutting means longitudinal depressions or dishing developed on the Paved Surface or Gravel Shoulder.

Security Fence means fencing that is installed to control access to, or limit the movement of, vehicles, pedestrians, and animals within the Provincial Highways or to secure City assets.

Sink Hole means a void beneath the Paved Surface or in the Gravel Shoulder.

Standard means, when used alone, the generic term for Maintenance Standard Specifications, Standard Specifications and Standard Drawings.

Standard Specification or Standard Drawing or Maintenance Standard Specification means a standard practice required and stipulated by the Owner for performance of the Work.

Storm Sewer System means a drainage conveyance system that carries water away from Catch Basins or other underground Drainage Features.

Structural Maintenance means maintenance work completed to reduce further damage or deterioration of the asset, including repairs to clamping bars, joint cover plates, railing and handrails, retainer bars and deck and slab drains.

Sweeping means removal of a sand/gravel/vehicle dirt mixture from the Roadway and may include litter.

Turn-Over has the meaning as per Clause 1.2.

Vegetation means all plant life including grass, weeds, noxious weeds, brush and trees.

Zero Time means that the Remedy Period time is zero minutes

ARTICLE 3 INCIDENT RESPONSE

3.1 SCOPE

This article details the requirements to response to incidents on the Highway Corridor Lands.

3.2 REPORTING

Inspections and reports shall be according to the following including Table 3-1.

A Collision/Incident Report form (provided in Attachment 3 A) shall be completed regarding all Incidents within the Highway Corridor Lands in which there are fatalities, personal injury, lane or road closures, severe damage to crown property, or the possibility of litigation. Photographs complete with date, time and signature of photographer shall be taken to assist with documentation of the Incident. The photographs and documentation shall describe the occurrence as well as the road conditions, general operations and identify DB Co's personnel on site.

The OTOC shall be notified at the time of arrival and departure from each Incident Site. Updates shall be provided every 30 minutes regarding Incident Site status.

Table 3-1

| MAINTENANCE STANDARD | | REMEDY PERIOD | REMEDIAL PERIOD |
|--|---|---------------|-----------------|
| INSPECTIONS AND REPORTS | | | |
| Collision/Incident Reports (NCR process) | Collision/Incident Reports completed and submitted to the City within 48 hours of Incident Resolution | Zero Time | 1 Business Day |
| Notification to the OTOC (NCR process) | Notification and updates to the OTOC as specified | Zero Time | 15 minutes |

3.3 MAINTENANCE OPERATIONS

Incidents shall be responded to upon Detection by proceeding to the Incident Site to secure the site and/or provide assistance to emergency responders as required. Incident response shall be in addition to any other operations underway. All necessary action shall be taken to keep the public, adjacent landowners and workers safe. This shall include any or all of the following:

- 1) Provide traffic control according to the OTM and Ministry of Labour orders and assist in restoring traffic movement as quickly as possible.
- 2) Protect public and worker safety at Incident Sites.
- 3) Open and close lanes and/or ramp gates at the request of the police or City, as may be relayed by the OTOC.
- 4) Install, maintain and remove road closure signs as requested by the police or City, as may be relayed by the OTOC.
- 5) Contain spillage on the Highway Corridor Lands in conjunction and co-operation with regulatory agencies, the police and appropriate municipal and provincial authorities. The OTOC shall be notified in the case of a spill.

- 6) Secure, protect, or isolate damaged Highway infrastructure as requested or required and restore the Highway to a condition safe for public travel by completing temporary or permanent repairs to correct damage including damage to the following:
 - i. Roadside barrier systems.
 - ii. Roadside energy attenuators and terminal systems.
 - iii. Drainage systems.
 - iv. Electrical facilities.
 - v. Signs and sign support structures.
- 7) Remove and dispose of Debris from the Highway.
- 8) Permanent or temporary repairs shall be made as required to attain Incident Resolution.

3.4 RESPONSE TIME

Response time to all Incidents shall not exceed the time limits according to Table 3-2 Incident Response Time. The response time is the maximum allowable time from the time of Detection of the Incident until the appropriate Incident Response Equipment (Freeway) is on site.

Table 3-2 Incident Response Time

| MAINTENANCE STANDARD | | REMEDY PERIOD | REMEDIAL PERIOD |
|----------------------------------|---|---------------|-----------------|
| RESPONSE TIME | | | |
| Incident Detection (Medium CPQF) | Incident Response Equipment (Freeway) on site | 30 minutes | 10 minutes |

Additional resources including personnel and equipment shall be deployed upon being Made Aware of the necessity for the additional resources at the Incident Site. The additional resources shall include sufficient equipment and personnel to provide lane closures and services as required during winter and summer seasons.

3.5 RESPONSE TO EMERGENCY BRIDGE REPAIRS

The Qualified Inspector shall be available to respond to all emergency bridge Incidents which could require repair. The Qualified Inspector shall be deployed upon a request from the Incident response personnel. Temporary repairs may be allowed as approved by the City to allow for safe passage of vehicular and/or pedestrian traffic with a permanent repair plan submitted to the City within 48 hours.

Table 3-3

| MAINTENANCE STANDARD | | REMEDY PERIOD | REMEDIAL PERIOD |
|-----------------------------|--|---------------|-----------------|
| Emergency Bridge Repairs | | | |
| Response Time (Medium CPQF) | Respond on site to all bridge Incidents with a qualified supervisor upon notification of Incident response personnel | 1 hour | 1 hour |

ATTACHMENT 3 A

Contractor Name/Logo

Collision/Incident Report

Contract

☐ Preliminary

☐ Final

a) **Area:** Hwy _____ **LHRS Base Point** _____ **Offset:**

GPS Coordinates (if available):

b) **Location:** (provide distance from known reference point)

c) **Date/Time of Collision/Incident:** **Date:** _____ **Time:**

d) **Time of Road Closure:** _____ **Time Closure was cleared:**

Additional comments:

e) **Detour Information:**

f) **Collision/Incident:** (Brief Description including type of vehicle(s) involved)

g) **Number Fatal:** _____ **Number Serious Injuries:**

h) **Weather at Time of Collision/Incident:** (include start of storms, intensity, visibility, etc.)

i) **Physical Features:** (signage, lane markings, curve, grade, surface condition, shoulder condition, granular, fully or partially paved, etc.)

j) **Road Conditions at Time of Collision/Incident:** (Bare, Snow covered, Ice, Visibility, etc.)

k) **Time of Last Patrol and Equipment Activities: Road/Weather Conditions Detected During Patrol:**
(include actions taken by Patroller/Operator)

l) **Operations Underway at Time of Collision/Incident:** (include start times, DLA, pre-wet, equipment utilized, breakdowns, time equipment passed scene of Collision/Incident, etc.)

m) **Other Relevant Information:** (police activities/reports, public/media enquiries, etc.)

n) **City/Contractor Representative at Scene of Collision/Incident:**

o) **Report Prepared by:** _____ **Phone #:** _____ **Date/Time of Report:**

Update Prepared by: _____ **Phone #:** _____ **Date/Time Report Updated:**

p) **Other documents available:** ☐ **OPP Reports** ☐ **Fatal Collision Report** ☐ **Other** ☐
Photos

q) **Changeable Message Sign** (message used):

Note: The OTOC will provide as much information as possible, such as weather, physical features, road conditions, service delivery, operations and more if available. **Items 1 to 6 and 15 & 16 must be prepared immediately.** It is understood that the information may be very preliminary and subject to confirmation. This report must be reissued when additional details become known and/or, as reports are made available. This should occur within 48 hours of the incident. A full report must be issued once all information is received. This document must be considered as highly confidential and must not be released other than to those listed below.

ARTICLE 4 DRIVE-BY INSPECTIONS

4.1 SCOPE

This article details the requirements to carry out inspections on the Highway Corridor Lands.

4.2 INSPECTIONS AND REPORTS

Drive-by inspections of Highway Corridor Lands shall be undertaken by the Traffic Control Supervisor to note any Defects or Deficiencies that require immediate action or need to be scheduled for repair according to the applicable Maintenance Operation. Inspections shall include recording observations in the record keeping report as per Clause 1.10 of Schedule 15-2 Part 9 Part C and taking appropriate action on the following conditions:

- i. Deficiencies or Defects that pose an imminent Hazard shall be reported Immediately to the OTOC and the City.
- ii. Dangerous Goods Vehicle Accidents and Leaks/Spills of Unidentified Materials.

The primary responsibility for containment, clean-up and disposal of spilled material rests with the owner/person having control of the product at the time of the spill.

Unauthorized Signs

"Tack" signs (signs tacked to M.T.O. signs) or other forms of unauthorized advertising attached to property or set up within the Highway Corridor Lands shall be removed and disposed of properly.

Authorized Signs

Election signs and Canadian Forces Convoy Route markers may be permitted on the Highway Corridor Lands under specific conditions. These conditions shall be provided by the City.

Special signs may be allowed through permission from the City. The City shall provide copies of sign permits covering the approval.

Contaminated Property

The location and description of any evidence of contamination (e.g.: staining on the surface of the ground) on Highway Corridor Lands or adjacent properties shall be reported to the City.

Unplanned Closures

The Patroller shall contact the OTOC regarding all Provincial Highway unplanned closures or partial closures including time of closure, expected duration and time of re-opening.

Any deficiency or unusual circumstance not included above shall be reported to the City.

4.3 RECORD KEEPING

Reports shall be completed, dated and signed daily by the Traffic Control Supervisor(s) and shall include the following information when applicable:

- i. Weather.
- ii. Date.
- iii. Printed Name and Signature.

- iv. The time that drive-by inspections are completed, including start and end times including ramps covered.
- v. Maintenance Operations completed during the day.
- vi. Discussions with the public (name the individual).
- vii. Discussions with the OTOC, City or DB Co staff (name the individual).
- viii. Calls from the police and action taken.
- ix. Incident information.
- x. Page number (e.g., 1 of 1, 1 of 2).
- xi. Highway Corridor Lands deficiencies and Defects.

Reports shall be submitted to the City Bi-weekly after the Bi-weekly period ending or one business day after the City has requested the report. (see Table 4-1)

Any corrections to reports shall be made with a single strikethrough, no overwriting of text, and initialed by the person making the correction.

Table 4-1

| MAINTENANCE STANDARD | | REMEDY PERIOD | REMEDIAL PERIOD |
|-----------------------------------|--|---------------|-----------------|
| Inspections and Reports | | | |
| Inspection reports NCR Process | Reports shall be submitted to the City within seven Days of the Bi-weekly period ending or one business day after the City has requested the report. | Zero time | 1 Business Day |

In addition to the minimum daily frequency, inspections shall be conducted as needed to cover non-routine situations including:

- a) During and after heavy wind or rain events.
- b) Emergency call-outs.

4.4 INSPECTION

Deficiencies or Defects that pose an imminent Hazard that are Detected during drive-by inspection shall be Addressed Immediately.

The vehicle used for inspection shall be equipped with a digital camera with date/time stamp and a cellular telephone.

The Highway Corridor Lands shall be inspected within the Designated Construction Zone on a daily basis as per Table 4-2.

Table 4-2

| MAINTENANCE STANDARD | | REMEDY PERIOD | REMEDIAL PERIOD |
|------------------------------------|--|---------------|-----------------|
| Inspection | | | |
| Inspection Frequency (NCR Process) | Inspection of the Highway Corridor Lands within the Construction Zone completed by the Traffic Control Supervisor at the specified minimum frequency | Zero Time | 1 Business Day |

- a) Road inspection consists of driving at a safe speed to look for Defects or Deficiencies identified in this Appendix G. Road inspection can be completed as a separate activity or combined with other operations.

Actions to Address Hazardous conditions may include one or more of the following:

- i. Installing signs.
- ii. Dispatching a work crew.
- iii. Contacting the police.
- iv. Undertaking the repair or removal of the Hazard, if it can be completed safely.
- v. Contacting the appropriate authorities (i.e.: the OTOC, O.P.P., MOECC Spills Action Centre in case of a spill).
- vi. Placement of appropriate temporary warning signs or markers.

All Defects identified in the Maintenance Operation are important. However, first Priority should be given to public safety, worker safety and Roadway items.

Damage to MTO property shall be reported to the O.P.P. or local police.

The vehicle used for road inspection shall contain:

- i. Necessary equipment, materials and tools to undertake minor emergency repairs.
- ii. Signs that can be easily installed to warn motorists of potential safety Hazards.

When a Defect is observed, such as Debris on the Roadway that can be Addressed safely, the required Maintenance Operation activity shall be carried out according to the OTM.

When Defects are observed that could be Hazardous, such as washouts or guide rail damage, the location shall be marked with a TC 54, safety cone, or hazard marker, to alert motorists.

If it is noted that a Highway Corridor Lands Closure may be necessary, the O.P.P. or local police shall be contacted through the OTOC. Only the O.P.P. or local police have the authority to close a Provincial Highway.

When stranded motorists are noted they shall be contacted if assistance for towing or other services is required. If an incapacitated vehicle is posing a Hazard to other vehicular traffic, (e.g.: on the inside shoulder) it shall be removed as soon as conditions permit. The OTOC shall be notified.

Visual inspection of traffic signal heads and supports shall be undertaken following storms accompanied by high winds.

ARTICLE 5 ROADWAY MAINTENANCE

5.1 SCOPE

This article details the requirements to carry out Roadway maintenance on the Highway Corridor Lands

5.2 DEBRIS

Removal and management of Debris shall be according to the following.

- a) A spring clean-up shall be scheduled during the spring of each year. The spring clean-up shall include removing accumulations of Debris from the Winter Period including sand, gravel or vehicle dirt mixture from all Paved Surfaces and within the Highway Corridor Lands prior to June 1 of each year.

Accumulations of gravel or sand on Paved Surfaces that occur after completion of the spring clean-up and prior to November 15 of each year shall be removed upon Detection.

Debris, including dead animals, on the Roadway shall be removed according to Table 5-1. All Debris shall be managed in accordance with Schedule 17.

Table 5-1

| MAINTENANCE STANDARD | | REMEDY PERIOD | REMEDIAL PERIOD |
|-------------------------------|---|---------------|-----------------|
| Debris | | | |
| Spring Clean-up (Medium CPQF) | Completed no later than June 01 of each year. | Zero Time | 1 Business Day |
| Cleanup – Other (Minor CPQF) | Accumulation of gravel or sand on Paved Surfaces is removed upon Detection | 1 Day | 1 Business Day |
| Debris (Minor CPQF) | Debris on the Roadway greater than 0.010 m ³ (e.g., 20 cm X 20 cm X 25 cm), or greater than 30 cm in any one dimension which is a Hazard to the travelling public, is removed upon Detection | 2 hours | 1 hour |

- a) Spring clean-up shall be scheduled as soon as spring thaw permits and before catch basins are cleaned to limit the amount of foreign material entering the drainage system.
- b) Water shall be used to minimize dusty conditions during cleaning operations.
- c) Sweeping and flushing are two methods of hard surface cleaning.
- d) Debris Removal
 - i. There is a potential hazard when handling dead animals, syringes and other sharp objects. Proper gloves, footwear and clothing should always be worn when engaged in these types of activities.

- ii. Expert assistance should be obtained to identify un-labelled containers or unidentifiable materials.
- iii. Suspected explosives, such as pipe bombs, blasting caps or discarded dynamite, should not be handled and the O.P.P. or local police authority shall be called without delay.

5.3 PAVED SURFACES

Maintenance of Paved Surfaces shall be according to the following including Table 5-2.

Defects on Paved Surfaces shall be noted and action taken as follows and according to Table 7:

- i. Potholes on Roadways, including bridge decks, shall be repaired.
- ii. Pavement edge surface loss which extends more than 100 mm inward from the edge of the Paved Surface shall be repaired to maintain a straight and consistent edge of pavement.
- iii. Rocks or tree stumps protruding through the road surface by more than 25 mm shall be removed.
- iv. Water ponding on Paved Surfaces caused by high Gravel Shoulders shall be corrected.
- v. Cracks exceeding 25 mm in width on Bridge surfaces shall be repaired.
- vi. Sink Holes shall be repaired and reported to the City.
- vii. Deficiencies or Defects that pose an imminent Hazard shall be Addressed Immediately.

Proper signage warning motorists shall be installed upon Detection when indicated for each of the following items.

- i. Cracking – cracks that are 40 mm or wider on Paved Surfaces and cracks wider than 6 mm on concrete Bridge surfaces.
- ii. Distortions:
 - Bumps or depressions with a vertical depth differential of 50 mm or more over a 3 m length; install warning signage
 - Any bump or depression occurring at a bridge approach
 - Any sharp vertical displacement of more than 20 mm on a bridge surface; install warning signage
 - All settlements of approach slabs exceeding 100 mm; install warning signage
- iii. Water Ponding due to Paved Surface depressions.
- iv. Wheel Track Rutting – Paved Surface rutting greater than 25 mm in depth.
- v. Rippling and Shoving, Scaling, Ravelling or Spalling – any occurrence of these conditions.

Table 5-2

| MAINTENANCE STANDARD | | REMEDY PERIOD | REMEDY PERIOD |
|--------------------------|---|---------------|----------------|
| Paved Surfaces | | | |
| Potholes (Minor CPQF) | Any Pothole that is deeper than 50 mm and greater than 0.04 m² (e.g., 20 cm X 20 cm or 10 cm X 40 cm) on Asphalt Pavement or Concrete Pavement shall be repaired upon Detection | 3 Days | 1 Business Day |
| | Any pothole exceeding 20 mm in depth on a Bridge surface shall be repaired upon Detection | 3 Days | 1 Business Day |

| MAINTENANCE STANDARD | | REMEDY PERIOD | REMEDY PERIOD |
|--|--|---------------|----------------|
| Paved Surfaces | | | |
| Pavement Edge Surface Loss (NCR process) | Paved Surface edge surface loss which extends more than 100 mm inward from the outer edge shall be repaired upon Detection | 3 Days | 1 Business Day |
| Water Ponding (NCR process) | Water Ponding on Paved Surfaces resulting from high gravel shoulders repaired upon Detection | 3 Days | 1 Business Day |
| Distortion (NCR process) | Distortions as detailed above are marked with warning signage upon Detection | 3 Days | 1 Business Day |
| Cracking (NCR process) | Cracks in Asphalt Pavement Bridge surfaces wider than 25 mm shall be repaired upon Detection. | 3 Days | 1 Business Day |
| Sink Holes (NCR process) | Sink Holes shall be repaired upon Detection. | 3 Days | 1 Business Day |
| Hazards (Medium CPQF) | Deficiencies or Defects that pose an imminent Hazard shall be Addressed upon Detection | 2 hours | 1 hour |

5.4 SHOULDERS

Maintenance of Shoulders shall be according to the following including Table 5.3.

- a) Defects on Shoulders shall be noted and the following action taken.
 - i. Washouts on Shoulders shall be marked with warning devices upon Detection and remain marked until repaired.
 - ii. All washouts on Shoulders greater than 150 mm in depth shall be repaired upon Detection.
 - iii. Impediments to Drainage – Proper drainage of Shoulders may be impeded by preventable conditions including improper crossfall or the presence of berms or windrows. Preventable conditions impeding Shoulder drainage shall be corrected.
 - iv. Drop Off with a depth exceeding 40 mm for a length of at least 100 m shall be repaired upon Detection. Drop Off in excess of 75 mm at any location shall be repaired.
 - v. Ruts with a depth exceeding 100 mm shall be repaired.
 - vi. Deficiencies or Defects that pose an imminent Hazard shall be Addressed Immediately.

Table 5-3

| MAINTENANCE STANDARD | | REMEDY PERIOD | REMEDIAL PERIOD |
|---|---|---------------|-----------------|
| Shoulders | | | |
| Washouts (NCR process) | Washouts of 150 mm or deeper repaired upon Detection | 2 Days | 1 Business Day |
| | Washouts of 150 mm or deeper and measuring an area greater than 1.0 m ² ; or washouts of 150 mm or deeper and measuring an area greater than 0.5 m ² within 1.0 m of the Driving Surface, repaired upon Detection | 3 Days | 1 Business Day |
| Impediments to Drainage (NCR process) | Preventable Conditions impeding Shoulder drainage to function as designed corrected upon Detection | 3 Days | 1 Business Day |
| Drop Off (not construction related) (Minor CPQF)) | Drop Off exceeding 50 mm in depth for a length of 100 m or greater repaired upon Detection | 3 Days | 1 Business Day |
| | Drop Off exceeding 75 mm in depth at any location repaired upon Detection | 4 hours | 2 hours |
| Ruts (NCR process) | Ruts deeper than 100 mm repaired upon Detection | 2 Days | 1 Business Day |
| Hazards (Medium CPQF) | Deficiencies or Defects that pose an imminent Hazard shall be Addressed upon Detection | 2 hours | 1 hour |

ARTICLE 6 PAVEMENT MARKING

6.1 SCOPE

This specification covers the responsibilities and obligations for the Retracing of pavement markings and symbols.

The Work shall be completed in full compliance with the requirements of OPSS 710, Construction Specification for Pavement Marking.

6.2 REPORTS

- a) A Pavement Marking work plan based on priority of Pavement Marking condition and in accordance with the annual application completion dates in Table 6-4 Minimum Requirements shall be provided to the City prior to April 1 of each year.

- b) Material Safety Data Sheets

DB Co shall identify the selected pavement marking material(s) and provide Material Safety Data Sheets (MSDS) and Product Data Sheets to the City in advance of application.

- c) Daily Work Log

A Pavement Marking Daily Work Log and/or Durable Marking Daily Work Log (see Attachment 6 A and 6 B) shall be completed and submitted to the City within seven Days of the application.

- d) Retroreflectivity Report

A Retroreflectivity Report of readings taken with a retroreflectometer shall be completed and submitted to the City by September 1st of each year. Readings shall be taken on 10% of the centre lines and skip lines, 10% of edge lines and 10% of symbols.

Retroreflectivity sampling shall be conducted in accordance with ASTM D7585 and ASTM E1710. Sampling, when using mobile retroreflectometers, shall follow the same procedures as for handheld units, but shall also include calibration checks against a handheld unit.

Results from the sampling of centre lines, skip lines and edge line shall be reported as one reading based on the average of the readings taken over each kilometre section sampled.

Additional information outlining the format of the Retroreflectivity Report is detailed in Attachment 6 C.

Table 6-1

| MAINTENANCE STANDARD | | REMEDY PERIOD | REMEDIAL PERIOD |
|-------------------------|--|---------------|-----------------|
| Inspections and Reports | | | |
| Reports (NCR process) | All required documents are Timely, Accurate and Complete | Zero Time | 1 Business Day |

6.3 SAMPLING

Sampling shall be according to the following including Table 6-2

Samples shall be taken by DB Co to support Quality Control monitoring and shall be according to Table 6-2 Pavement Marking Material Sampling.

DB Co shall obtain additional samples, in the presence of the City representative, when requested.

Samples of Traffic Paints shall not be thinned or heated. The material shall be well mixed and homogeneous and shall be acquired approximately mid-way through the batch. The sample container shall be filled within 5 mm of the bottom of the lid rim.

The sample data label shall be completed with the manufacturer's name, coating colour, product code and batch number(s), contract number and location. The Sample Data Label, Form PH-CC-360, is available from the City.

All samples taken shall be retained by DB Co for a period of two years.

Table 6-2 Pavement Marking Material Sampling

| MATERIAL | SAMPLE SIZE | SAMPLE FREQUENCY | CONTAINER MATERIAL | SOURCE |
|--|--------------------|-------------------------|--------------------------------------|------------------------------|
| Water borne Traffic Paint | 125 ml | Once per batch | Plastic or plastic lined | Outlet valve (not spray gun) |
| Field reacted polymeric materials - Resin * - Catalyst * | 250 g 50 g | Once per batch | Metal or plastic Metal or plastic | Pail Pail |
| Glass beads | 250g | Once per batch | Metal or plastic | Bead gun |
| Preformed tape | 1 m | Once per batch | Container not required | Roll |
| Thermoplastic materials | 250 g | Once per batch | Steel panel | Applicator ** |

* Material type and manufacturer's mixing ratio of each unmixed material shall be indicated on container.

** An 8 cm x 8 cm raw sample of the thermoplastic material can be substituted for the coated panel sample.

Table 6-3

| MAINTENANCE STANDARD | | REMEDY PERIOD | REMEDIAL PERIOD |
|------------------------|--|---------------|-----------------|
| Sampling | | | |
| Sampling (NCR process) | All sampling requirements are met 100% of the time | Zero Time | 1 Business Day |

6.4 RETRACING OF PAVEMENT MARKINGS

Retracing of Pavement Markings shall be completed as per the following including Table 6-6.

The City shall be notified a minimum of 10 Days prior to the start of any on-site Pavement Marking activities or the start of any repairs required.

Only materials listed on the current MTO DSM listing shall be used.

Retroreflectivity Requirements

The Retroreflectivity of the Pavement Markings and Pavement Marking Symbols shall meet the minimum requirements identified in Table 6-4 Minimum Retroreflectivity Requirements (mcd/m²lx) from the Annual Application Completion Date until October 31 of each year. Retracing of all Pavement Markings and Symbols shall be completed each year by the Annual Application Completion Date according to Table 6-4.

An overlay of glass beads shall be applied, without delay after painting either by hand or mechanical means, to achieve complete and uniform coverage across the full width of the line.

Table 6-4 Minimum Retroreflectivity Requirements

| Highway Class | Marking Type | Annual Application Completion Date | Minimum Retroreflectivity | |
|---------------|------------------------|------------------------------------|---------------------------|---------------------------|
| | | Highway 417 and Ramps | White Marking | Yellow Marking |
| Highway | Centre Line Lane Lines | July 1 | 350 mcd/m ² lx | 300 mcd/m ² lx |
| | Edge Lines | August 1 | 350 mcd/m ² lx | 250 mcd/m ² lx |

Durability Requirements

No Pavement Marking Symbol or no 100 m segment of Pavement Marking shall have more than 25% material loss at any time.

Visibility Requirements

The visibility of the Pavement Markings and Pavement Marking Symbols shall meet the minimum requirements identified in Table 6-5 Visibility.

Based on a minimum required preview time of 3.65 seconds and the posted speed limit (vehicle speed) for the highway, the minimum preview distance, listed in Table 6-5 Visibility shall be required:

Table 6-5 Visibility

| Vehicle Speed (km/hr) | Preview Distance (m) |
|--------------------------|-------------------------|
| 60 | 61 |
| 70 | 71 |
| 80 | 81 |
| 90 | 91 |
| 100 | 101 |

Notes:

1. No visual assessments shall be undertaken during any type of inclement weather.
2. No visual assessments shall be undertaken after applications of sand salt or de-icing materials have been applied to the roadway until a duration period of 72 hours (3 Days) have elapsed after the last application of these materials.

Appearance

All Retracing of Pavement Markings shall be according to OTM Book 11.

All lines shall be straight and true with no severe tracking or splatter. Tracking and splatter shall be removed using a method which does not damage the pavement surface, and retracing shall be completed if necessary.

Table 6-6

| MAINTENANCE STANDARD | | REMEDY PERIOD | REMEDIAL PERIOD |
|----------------------------------|---|---------------|-----------------|
| Retracing of Pavement Markings | | | |
| Retro-reflectivity (Medium CPQF) | Pavement Markings or Pavement Marking Symbols not meeting minimum Retroreflectivity requirements repaired upon Detection | 14 Days | 1 Business Day |
| Annual Application (Medium CPQF) | Pavement Markings, for each highway class and marking type, retraced by the annual application completion dates in Table 6.4 Minimum Retroreflectivity Requirements | Zero Time | 1 Business Day |
| Durability (NCR process) | Any 100 m segment of Pavement Marking with more than 25% material loss shall be repaired upon Detection | 14 Days | 1 Business Day |
| | Any Pavement Marking Symbol with more than 25% material loss shall be repaired upon Detection | 14 Days | 1 Business Day |
| Visibility (NCR process) | Visibility readings not meeting the requirements of Table 6.5 Visibility on all Pavement Markings and Pavement Marking Symbols shall be repaired upon Detection | 14 Days | 1 Business Day |
| Appearance (NCR process) | Severe tracking or splatter or lines that are not straight and true shall be removed upon Detection | 5 Days | 1 Business Day |
| | Retraced Pavement Markings not in accordance with OTM Book 11 shall be corrected upon Detection | 5 Days | 1 Business Day |

ATTACHMENT 6 A

DURABLE MARKING DAILY WORK LOG

Date: _____

Contract: _____ **Contractor:** _____

Form # _____

MATERIAL

| Manufacturer | Material Type and Colour | Batch # | Product Code |
|--------------|--------------------------|---------|--------------|
| | | | |
| | | | |
| | | | |

ACCOMPLISHMENTS

| Hwy | Location | RRX | ARROW | STOP BLOCK | C/W | PLASTIC (kg) | BEADS (kg) |
|-----|----------|-----|-------|------------|-----|--------------|------------|
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

Comments: _____

Contractor Rep Signature: _____

ATTACHMENT 6 B

PAVEMENT MARKING DAILY WORK LOG

Area/Region _____ Date _____

Form # _____

Location _____ Contract # _____

Contractor _____

MATERIAL

| Manufacturer | Material Type and Colour | Batch # | Product Code |
|--------------|--------------------------|---------|--------------|
| | | | |
| | | | |
| | | | |

ACCOMPLISHMENTS

| Hwy | Location | Lane Lines (km) | Yellow (litres) | White (litres) | Glass Beads (kg) |
|-----|----------|-----------------|-----------------|----------------|------------------|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

Comments: _____

Contractor Rep Signature: _____

ATTACHMENT 6 C

RETROREFLECTIVITY REPORT

The report shall contain mobile retroreflectometer values (RL) in units of millicandelas per lux per square meter averaged over one kilometer lengths. The corresponding GPS coordinates for each one kilometer average shall be listed in a table showing RL values from the start to the finish of each data recording series. The report shall list the type of equipment used, date, time, line type measured and roadway identification with start and end point descriptions (it is convenient to identify intersections as start and end points). Test sections shall be limited to one roadway (i.e. the test section example below should contain data for only Hwy 11, not a combination of Hwy 11 and Hwy 65). For the case of single edge line or white skip measurements, report RL values in the Left Line column. The report shall be submitted to the City in excel spreadsheet format.

Typical layout for Mobile Retroreflectivity Report

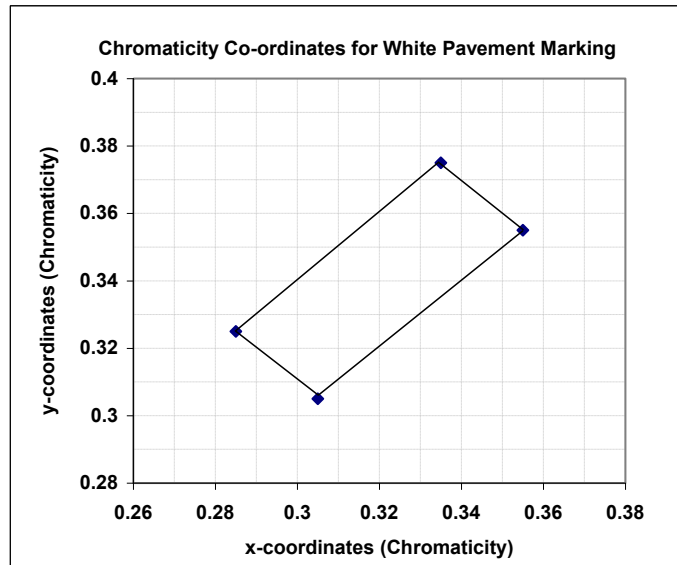
| | |
|-------------------------------|------------------------------|
| Road Section Evaluated | Hwy 11 from Hwy 65 To Hwy 66 |
| Date Data Collected | [REDACTED] |
| Contract # | |
| Distance driven (km) | 5 |
| Direction | North Bound |
| Line Type | Yellow Centre Line |
| Operator | |
| Instrument Used | Delta LTL-M |

| | | Average Retroreflectivity | |
|------------------------|-------------|----------------------------------|-----------------------------|
| Distance Driven | Time | Left Line | Right Line |
| (km) | | mcd/lx/m² | mcd/lx/m² |
| 1 | 14:00 | 390 | 402 |
| | | | |
| | | | |
| | | | |
| 5 | 15:00 | 384 | 389 |

CHROMATICITY COORDINATES

White:

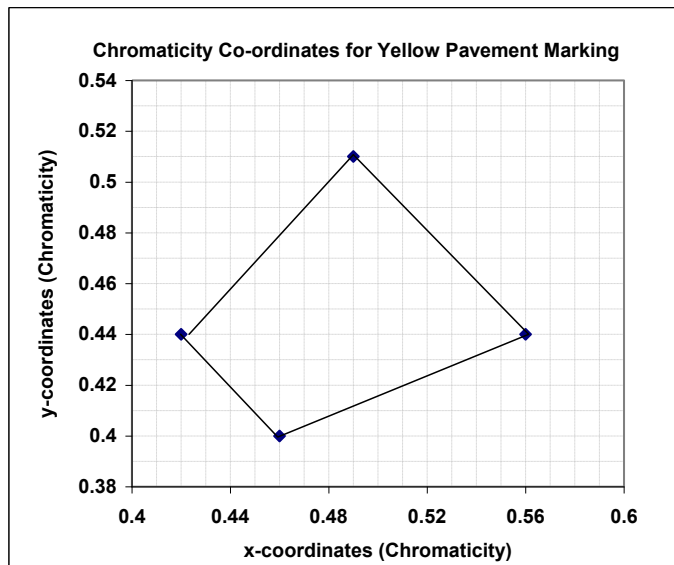
All colour measurements shall fall within the White Chromaticity Coordinates.



| | | | | | |
|-------|---------------|-------|-------|-------|-------|
| White | x-coordinates | 0.355 | 0.305 | 0.285 | 0.335 |
| | y-coordinates | 0.355 | 0.305 | 0.325 | 0.375 |

Yellow:

All color measurements shall fall within the Yellow Chromaticity Coordinates.



| | | | | | |
|--------|---------------|-------|-------|-------|-------|
| Yellow | x-coordinates | 0.560 | 0.460 | 0.420 | 0.490 |
| | y-coordinates | 0.440 | 0.400 | 0.440 | 0.510 |

ARTICLE 7 STRUCTURAL MAINTENANCE

7.1 SCOPE

This specification covers the maintenance of MTO Bridges on the Highway Corridor Lands.

The Work shall be completed in full compliance with the requirements of the following documents:

- a) Bridge Clearance and Load Restriction Manual (OSCLIS).
- b) Ontario Structure Inspection Manual.
- c) Concrete Barrier Repair, Rehabilitation and Maintenance Manual, 2003 (Draft).

7.2 INSPECTIONS AND REPORTS

Inspections and reports shall be according to the following including Table 7-1.

Inspections of Structures shall be planned, scheduled and carried out to ensure the safety of the travelling public. The required inspections shall be as follows:

- a) General drive-by inspections by the Traffic Control Supervisor to identify deficiencies and to schedule corrective action.
- b) A detailed annual maintenance inspection of all Structures by a Qualified Inspector completed no later than July 30th of each year.
- c) A detailed walk about inspection completed by a Qualified Person prior to November 15 each year, to identify additional Deficiencies including Hazards, erosion, obstructions to water flow and other general Defects. The Qualified Person shall complete the Structural Walkabout Inspection Report included in Attachment 7 A.
- d) Specific inspections by the Qualified Inspector shall be performed when the following situations occur:
 - i. Accident or motor vehicle collision involving a structure.

The results of the detailed annual inspections shall be noted in the Bridge Maintenance Inspection Report (see Attachment 7 B), Structural Culvert Inspection Form (see Attachment 7 C), or Retaining Wall Inspection Form (see Attachment 7 D) and the inspection reports detailing the condition of each Structure shall be submitted to the City before August 1st of each year.

The results of inspections conducted as a result of an accident or motor vehicle collision involving a structure shall be noted on the Structure Incident Report (see Attachment 7 E), and submitted to the City within 48 hours of the incident.

Structural Maintenance Defects identified in the annual detailed walk about inspections shall be corrected in accordance with this Maintenance Operation, and a summary of repairs made or details of further work required shall be provided to the City within 30 days of the inspections.

The City may conduct its own bridge and scaling inspections and any other structural component. DB Co shall coordinate its Routine Maintenance work, including traffic control, with the City in order to allow the

City to perform its inspection work concurrent with the DB Co's Routine Maintenance work. DB Co shall take all necessary measures to facilitate and accommodate the City inspectors' access when DB Co is performing Routine Maintenance work.

Qualified Inspector Requirements

Documents supporting the qualifications of the Qualified Inspector shall be submitted to the City prior to the Hand Over date. If the Qualified Inspector will be replaced, new documents shall be submitted to the City prior to the new Qualified Inspector performing any structural inspection work. The documents shall include a resume, the course certificate and completed inspection reports.

Reporting of Structural Maintenance Work

All Structural Maintenance and inspection work shall be recorded on the Structural Maintenance Report (see Attachment 7 F) and submitted by November 15th annually. The report shall include information on cleaning, inspections and minor repairs.

The City shall be notified within one Business Day of any temporary repairs completed which will require permanent repairs.

Table 7-1

| MAINTENANCE STANDARD | | REMEDY PERIOD | REMEDIAL PERIOD |
|-----------------------------------|---|---------------|-----------------|
| Inspections and Reports | | | |
| Inspections (Medium CPQF) | Detailed annual maintenance inspection of all Structures by a Qualified Inspector completed no later than July 30th of each year. | Zero Time | 1 Business Day |
| Inspections (Medium CPQF) | A detailed walk about inspection completed by a Qualified Person prior to November 15 each year | Zero Time | 1 Business Day |
| Qualified Inspector (NCR process) | All qualifications are provided prior to the individual performing Structural Maintenance or inspections requiring a Qualified Inspector and as updated | Zero Time | 1 Business Day |

The conditions as noted on the Bridge Maintenance Inspection Report (see Attachment B), Structural Culvert Inspection Form (see Attachment C), or Retaining Wall Inspection Form (see Attachment D) shall be inspected.

7.3 STRUCTURE CLEANING

Structure cleaning shall be according to the following.

The annual cleaning of Structures and Structure surfaces shall be planned, scheduled and carried out to remove all dirt, Debris and deleterious material and washing with water to remove the remaining chemicals and winter abrasives while ensuring the safety of the travelling public and meeting all environmental requirements.

The following surfaces are to be cleaned and washed annually:

- a) Decks, sidewalks, handrails, curbs, gutters and barrier walls.
- b) Abutments and pier columns/caps below expansion joints, abutment and retaining walls, columns and piers within five metres of edge of a roadway to a minimum height of five metres above the

surface.

- c) All associated drainage structures, including scuppers, drain troughs and drainpipes and flumes. Deck drains on bridges over water shall be blocked prior to removal of excess dirt, debris and deleterious materials such as sand and salt, to prevent their entry into watercourses.
- d) The approaches to the structure and all associated Bridge elements for a minimum distance of six metres as measured from the abutment joint or the first catch basin thereafter.
- e) Bearing seats, expansion joints and deck joints including troughs and seals.
- f) The roadside surface of light standards and sign supports attached to the structure to a height of three metres above deck level.
- g) Concrete slope protection.
- h) No Debris resulting from Structure cleaning shall be left on previously cleaned surfaces.

All Debris resulting from Structure cleaning shall be managed according to the requirements detailed in Schedule 17.

The accumulation of winter sand, salt and debris shall be removed prior to washing. This can be done manually or by mechanical sweeping.

Table 7-2

| MAINTENANCE STANDARD | | REMEDY PERIOD | REMEDIAL PERIOD |
|---------------------------------|---|---------------|-----------------|
| Structure Cleaning | | | |
| Spring Cleanup (Medium CPQF) | All Debris is removed from Structures no later than June 30 th of each year | Zero Time | 1 Business Day |
| | All Structures and components are washed no later than June 30 th of each year | Zero Time | 1 Business Day |

- a) Equipment
 - i. The minimum requirement for pressure washing equipment should be 520 kPa with a volume of 225 litres per minute, continuously running.
 - ii. A water tank with a minimum capacity of 9000 litres is recommended.

Procedures

- i. Particular attention should be given to the cleaning and flushing of any pockets formed where vertical and diagonal members connect to the bottom chord. Bottom truss chords should be cleaned and flushed along their entire length.
- ii. No washing should take place when there is a potential for temperatures below 0°C.
- iii. Washing should occur from higher to lower elevation to allow the water to carry debris downwards.
- iv. Local authorities should be consulted for permits and regulations before obtaining water from hydrants.
- v. Caution should be exercised when cleaning expansion joints so as not to damage the seal.

- vi. Refer to the Schedule 17, for dealing with birds' nests found on structures.
- vii. When performing cleaning operations, workers may be exposed to bird droppings and feathers from birds or bats. These materials may carry spores of infectious diseases. To control dust exposure, these materials should be wetted before removal and workers should wear appropriate personal protective equipment including disposable masks, gloves and coveralls. If materials cannot be dampened before removal, the worker should also wear a high efficiency particulate air (HEPA) filter. Before leaving the work site, protective clothing should be removed and dust should be washed from footwear.

7.4 STRUCTURE MAINTENANCE

Structural Maintenance shall be according to the following.

The structural components of the Bridge shall be maintained. The following Structural Maintenance items shall be completed on a regular maintenance schedule and according to the Remedy Periods in Table 7-2 or according to Article 5 Roadway Maintenance as applicable:

- a) Broken and missing bolts shall be replaced and loose bolts shall be tightened on expansion joints.
- b) All loose steel components or those causing a Hazard to the public, shall be repaired or made safe.
- c) All Handrail and Railing components shall be in place and functioning, and all bolts shall be tight
- d) All loose, damaged or missing Bridge components are tightened, repaired or replaced
- e) Temporary repairs of Concrete Barrier
- f) Defects on bridge surfaces, including potholes, distortions, settlement and cracks, shall be noted and action taken to meet the Maintenance Standards according to MSS 2001-Roadway Maintenance.

Table 7-3

| MAINTENANCE STANDARD | | REMEDY PERIOD | REMEDIAL PERIOD |
|-------------------------------------|--|---------------|-----------------|
| Structural Maintenance | | | |
| Structural Components (Minor CPQF) | All structural components not in place, secured and functioning in a proper operating manner shall be repaired or replaced upon Detection | 5 Days | 1 Business Day |
| Concrete Deficiencies (Medium CPQF) | All concrete deficiencies on all Structures which could result in any material falling on or near a live lane, sidewalk, pedestrian walkway, railway or navigable waterway shall be removed upon Detection | 2 hours | 2 hours |

ATTACHMENT 7 A

**STRUCTURAL WALKABOUT INSPECTION REPORT
(Non-Modular Bridges)**

Inspected by: _____

Based upon the last inspection as recorded above, identify any Hazards and new issues. Photos of the concerns may be attached or included.

| Hwy # | Site # | Site Name | Hazards/Concerns | Date |
|--------------|---------------|------------------|-------------------------|-------------|
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ATTACHMENT 7 B

Bridge Maintenance Inspection Report



Date(dd/mm): _____ Hwy: _____ Site: _____

Site Name: _____

Inspected By: _____ Vehicle #: _____

Bridge Type: _____ Bridge Lat/Long: _____

Bridge Length: _____ Bridge Width: _____

Spans: _____

Under Construction? ☐ Limited Inspection? ☐ Mark with an "X" if applicable for either

N/A Not Applicable Yes Component is showing this defect
DNI Did Not Inspect No Component is not showing this defect

SUPERSTRUCTURE - BRIDGE SURFACE

| Travelled Surface | N/A | DEFECT | | DNI | Maintenance Required / Comments |
|--|-----|--------|---|-----|---------------------------------|
| | | Y | N | | |
| Cracking | | | | | |
| Spalling, Delaminations, Ravelling | | | | | |
| Potholes | | | | | |
| Other | | | | | |
| General Component Notes (# Lanes on structure, etc): | | | | | |

| Approaches | N/A | DEFECT | | DNI | Maintenance Required / Comments |
|--------------------------|-----|--------|---|-----|---------------------------------|
| | | Y | N | | |
| Settled | | | | | |
| Potholes | | | | | |
| Cracked | | | | | |
| Other | | | | | |
| General Component Notes: | | | | | |

| Drainage Components | N/A | DEFECT | | DNI | Maintenance Required / Comments |
|--|-----|--------|---|-----|---------------------------------|
| | | Y | N | | |
| Broken, Damaged Components | | | | | |
| Obstructions | | | | | |
| Other | | | | | |
| General Component Notes (Specific Features Present): | | | | | |

| Expansion Joints | N/A | DEFECT | | DNI | Maintenance Required / Comments |
|--|-----|--------|---|-----|---------------------------------|
| | | Y | N | | |
| Leaking or Damaged Seal | | | | | |
| Joint Armour Broken, Damaged | | | | | |
| Loose/Damaged/Missing Components | | | | | |
| End Dams Breaking/Voided Armouring | | | | | |
| Other | | | | | |
| General Component Notes (Joint Type, # Joints, etc): | | | | | |

| Curbs, Sidewalks | N/A | DEFECT | | DNI | Maintenance Required / Comments |
|--|-----|--------|---|-----|---------------------------------|
| | | Y | N | | |
| Cracked | | | | | |
| Delaminated/Spalled | | | | | |
| Scaled | | | | | |
| Settling/Deflections | | | | | |
| Other | | | | | |
| General Component Notes (Sidewalks present or not, curb in median, etc): | | | | | |

Bridge Maintenance Inspection Report (cont'd)

| Barrier Walls | N/A | DEFECT | | DNI | Maintenance Required / Comments |
|---|-----|--------|---|-----|---------------------------------|
| | | Y | N | | |
| Cracked | | | | | |
| Delaminated | | | | | |
| Scaled | | | | | |
| Spalled | | | | | |
| Other (Settling, etc.) | | | | | |
| General Component Notes (type of wall, mounted railing, etc): | | | | | |

| Handrails & Posts | N/A | DEFECT | | DNI | Maintenance Required / Comments |
|---|-----|--------|---|-----|---------------------------------|
| | | Y | N | | |
| Bent, Broken, Missing | | | | | |
| Corroded | | | | | |
| Loose, Missing Fasteners | | | | | |
| Other | | | | | |
| General Component Notes (Rail Type, etc): | | | | | |

| Lighting | N/A | DEFECT | | DNI | Maintenance Required / Comments |
|---|-----|--------|---|-----|---------------------------------|
| | | Y | N | | |
| Missing Components | | | | | |
| Damaged | | | | | |
| Other | | | | | |
| General Component Notes (Pole Bases, Poles, etc): | | | | | |

| Signs | N/A | DEFECT | | DNI | Maintenance Required / Comments |
|--|-----|--------|---|-----|---------------------------------|
| | | Y | N | | |
| Missing Components | | | | | |
| Damaged | | | | | |
| Other | | | | | |
| General Component Notes (Signs mounted to structure, etc): | | | | | |

| Guiderail | N/A | DEFECT | | DNI | Maintenance Required / Comments |
|---|-----|--------|---|-----|---------------------------------|
| | | Y | N | | |
| Missing Components | | | | | |
| Damaged | | | | | |
| Other | | | | | |
| General Component Notes (Rail Type, etc): | | | | | |

SUPERSTRUCTURE - BRIDGE UNDERSIDE

| Girders, Beams, Diaphragms | N/A | DEFECT | | DNI | Maintenance Required / Comments |
|--|-----|--------|---|-----|---------------------------------|
| | | Y | N | | |
| Cracked | | | | | |
| Delaminated | | | | | |
| Corroded | | | | | |
| Spalled | | | | | |
| Other | | | | | |
| General Component Notes (Girder/beam type, etc): | | | | | |

Bridge Maintenance Inspection Report (cont'd)

| Steel Members | N/A | DEFECT | | DNI | Maintenance Required / Comments |
|--------------------------|-----|--------|---|-----|---------------------------------|
| | | Y | N | | |
| Corroded | | | | | |
| Cracked | | | | | |
| Bent, Broken, Twisted | | | | | |
| Other | | | | | |
| General Component Notes: | | | | | |

| Bearings | N/A | DEFECT | | DNI | Maintenance Required / Comments |
|--|-----|--------|---|-----|---------------------------------|
| | | Y | N | | |
| Cracked | | | | | |
| Aligned | | | | | |
| Corroded | | | | | |
| Seized | | | | | |
| Other | | | | | |
| General Component Notes (Bearing type, etc): | | | | | |

| Slopes & Embankments | N/A | DEFECT | | DNI | Maintenance Required / Comments |
|--|-----|--------|---|-----|---------------------------------|
| | | Y | N | | |
| Erosion | | | | | |
| Undermining | | | | | |
| Slope Paving Damage | | | | | |
| Other | | | | | |
| General Component Notes (Rip/Rap, Stone, etc): | | | | | |

| Brush & Trees | N/A | DEFECT | | DNI | Maintenance Required / Comments |
|---|-----|--------|---|-----|---------------------------------|
| | | Y | N | | |
| Growth | | | | | |
| Obstruction to Drainage | | | | | |
| Other | | | | | |
| General Component Notes (planted trees, etc): | | | | | |

SUBSTRUCTURE

| Piers | N/A | DEFECT | | DNI | Maintenance Required / Comments |
|--|-----|--------|---|-----|---------------------------------|
| | | Y | N | | |
| Cracked | | | | | |
| Delaminated | | | | | |
| Spalled | | | | | |
| Other | | | | | |
| General Component Notes (# of pier sets, # of piers, location (median/shoulder), etc): | | | | | |

| Abutments & Ballast Walls | N/A | DEFECT | | DNI | Maintenance Required / Comments |
|---------------------------|-----|--------|---|-----|---------------------------------|
| | | Y | N | | |
| Cracked | | | | | |
| Delaminated | | | | | |
| Scaling | | | | | |
| Spalling | | | | | |
| Other | | | | | |
| General Component Notes: | | | | | |

Bridge Maintenance Inspection Report (cont'd)

| Wing Walls | N/A | DEFECT | | DNI | Maintenance Required / Comments |
|--------------------------|-----|--------|---|-----|---------------------------------|
| | | Y | N | | |
| Cracked | | | | | |
| Delaminated | | | | | |
| Scaling | | | | | |
| Spalling | | | | | |
| Other | | | | | |
| General Component Notes: | | | | | |

| Retaining Walls | N/A | DEFECT | | DNI | Maintenance Required / Comments |
|--------------------------|-----|--------|---|-----|---------------------------------|
| | | Y | N | | |
| Cracked | | | | | |
| Delaminated | | | | | |
| Scaling | | | | | |
| Spalling | | | | | |
| Other | | | | | |
| General Component Notes: | | | | | |

| Soffit/Fascia | N/A | DEFECT | | DNI | Maintenance Required / Comments |
|--------------------------|-----|--------|---|-----|---------------------------------|
| | | Y | N | | |
| Cracked | | | | | |
| Delaminated | | | | | |
| Spalled | | | | | |
| Other | | | | | |
| General Component Notes: | | | | | |

OTHER ITEMS

| Timber | N/A | DEFECT | | DNI | Maintenance Required / Comments |
|--------------------------|-----|--------|---|-----|---------------------------------|
| | | Y | N | | |
| Cracked | | | | | |
| Broken | | | | | |
| Insects or Rot | | | | | |
| Other | | | | | |
| General Component Notes: | | | | | |

| Piles & Footings | N/A | DEFECT | | DNI | Maintenance Required / Comments |
|--------------------------|-----|--------|---|-----|---------------------------------|
| | | Y | N | | |
| Cracked | | | | | |
| Delaminated | | | | | |
| Settled | | | | | |
| Scoured | | | | | |
| Spalled | | | | | |
| Other | | | | | |
| General Component Notes: | | | | | |

Bridge Maintenance Inspection Report (cont'd)

Other General Site Notes and Recent Repairs

Recommended Repairs

Signature of Inspector:

Page 5 of 5

ATTACHMENT 7 C

Structural Culvert Inspection Report



Date (dd/mm): _____ Highway: _____ Site: _____

Site Name: _____

Inspected By: _____ Vehicle #: _____

Type: _____ Number of Spans & Span Width: _____

Length: _____ Height: _____

END 1

END 2

Inlet/Outlet: _____ Inlet/Outlet: _____

Lat/Long: _____ Lat/Long: _____

Bearing: _____ Bearing: _____

| Freeboard | Inlet | Outlet | Comments / Recommended Repairs |
|--|-------|--------|--------------------------------|
| Measurement (cm) between top of water level and underside of culvert | | | |

| Water Damage | Defect | | Location | Comments / Recommended Repairs |
|---|--------|---|----------------|--------------------------------|
| | Y | N | Up/Down Stream | |
| Scouring around the footings or any undermining of concrete aprons or | | | | |
| Washout of culvert backfills | | | | |
| Scouring at inlets or outlets | | | | |
| Erosion under or around culvert | | | | |
| Random, hand laid and grouted rip rap in disrepair | | | | |
| Stream, debris, aggradation, obstruction, vegetation | | | | |

| Concrete Condition | Defect | | Location | Comments / Recommended Repairs |
|--------------------------------------|--------|---|----------------|--------------------------------|
| | Y | N | Up/Down Stream | |
| Cracks | | | | |
| Spalling/Delamination | | | | |
| Security bars or grids in disrepair | | | | |
| Separation between pre-cast sections | | | | |
| Reinforcing steel exposed | | | | |

| Roadway | Defect | | Location | Comments / Recommended Repairs |
|---|--------|---|----------------|--------------------------------|
| | Y | N | Up/Down Stream | |
| Cracks, surface settlement, deflection, p | | | | |
| Ditch embankment settlement/ erosion | | | | |

| Retaining Walls | Defect | | Location | Comments / Recommended Repairs |
|------------------------------|--------|---|----------------|--------------------------------|
| | Y | N | Up/Down Stream | |
| Type (if applicable): | | | | |
| Cracks, settlement, rotation | | | | |
| Angle of recline/repose | | | | |

Structural Culvert Inspection Report

| Steel Culvert | Defect | | Location | Comments / Recommended Repairs |
|---|--------|---|----------------|--------------------------------|
| | Y | N | Up/Down Stream | |
| End(s) are deformed | | | | |
| Security bars or grids in disrepair | | | | |
| Headwall moved away from backfill | | | | |
| Culvert changed shape | | | | |
| Coupling ring(s) failing | | | | |
| Longitudinal seams failing | | | | |
| Pipe walls rupturing or buckling | | | | |
| Gaps developed between overlapping corrugations | | | | |
| Cracks or corrosion | | | | |
| Bolt holes are larger than the bolt and do not secure plates | | | | |
| Bolts or rivets shearing, loosening, missing or deteriorating | | | | |
| Invert perforations/material deterioration | | | | |
| Pipe uplifting | | | | |

| Extensions | Defect | | Location | Comments / Recommended Repairs |
|------------|--------|---|----------------|--------------------------------|
| | Y | N | (Inlet/Outlet) | |
| Type: | | | | |
| | | | | |

| Other Findings | Defect | | Location | Comments / Recommended Repairs |
|-------------------------|--------|---|----------|--------------------------------|
| | Y | N | | |
| Guiderail movement | | | | |
| Inlet/Outlet uplift | | | | |
| Brush/Tree Growth | | | | |
| Culvert Markers Missing | | | | |
| Other Findings | | | | |

Sketch of Deficiencies (if required) - Show Directional Arrow:



Top View

Notes:

Signature of Inspector: _____

ATTACHMENT 7 D

Retaining Wall Maintenance Inspection Report



Date (dd/mm): _____ Highway: _____ Site: _____

Location: _____

Inspected By: _____ Vehicle #: _____

Description: _____

Length: _____

| General Condition | Defect | | N/A | Comments / Recommended Repairs |
|----------------------------|--------|---|-----|--------------------------------|
| | Y | N | | |
| Settlement | | | | |
| Rotation/displacement | | | | |
| Displacement from backfill | | | | |
| Brush/Tree Growth | | | | |
| Fencing | | | | |
| Other | | | | |

| Concrete/RSS Retaining Wall | Defect | | N/A | Comments / Recommended Repairs |
|-----------------------------|--------|---|-----|--------------------------------|
| | Y | N | | |
| Cracking | | | | |
| Spalling/Delamination | | | | |
| Reinforcing steel exposed | | | | |
| Drain holes plugged/open | | | | |
| Other | | | | |

| Steel Retaining Wall | Defect | | N/A | Comments / Recommended Repairs |
|---------------------------|--------|---|-----|--------------------------------|
| | Y | N | | |
| Anchoring rusted, missing | | | | |
| separation between panels | | | | |
| Other | | | | |

| Gabion Retaining Wall | Defect | | N/A | Comments / Recommended Repairs |
|-----------------------|--------|---|-----|--------------------------------|
| | Y | N | | |
| Baskets in tact | | | | |
| Stone falling out | | | | |
| Scouring/Undermining | | | | |
| Other | | | | |

| Batter Measurement (Angle of Inclination/repose) | Defect | | N/A | Comments / Recommended Repairs |
|--|--------|---|-----|--------------------------------|
| | Y | N | | |
| Measured angle: | | | | |
| Leaning in/out | | | | |
| Erosion behind/around wall | | | | |
| Other | | | | |

Notes/General Condition/Recommended Repairs:

Signature of Inspector: _____

ATTACHMENT 7 E

Structure Accident-Incident Report



| | |
|------------------------------------|------------------------------|
| Maintenance Contractor _____ | Maintenance Contract # _____ |
| Date & Time of Accident _____ | |
| Site Number & Structure Name _____ | |
| Highway _____ | Police Report # _____ |
| Inspected By: _____ | Vehicle # _____ |

Complete All Applicable Areas Below

SUPERSTRUCTURE

| Travelled Surface | DEFECT | | Comments |
|-----------------------------------|--------|----|----------|
| | YES | NO | |
| Cracking | | | |
| Spalling, Delamination, Ravelling | | | |
| Potholes | | | |
| Other | | | |

| Expansion Joints | DEFECT | | Comments |
|------------------------------|--------|----|----------|
| | YES | NO | |
| Leaking or Damaged Seal | | | |
| Joint Armour Broken, Damaged | | | |
| End Dams Breaking | | | |
| Other | | | |

| Curbs, Sidewalks, Barrier Walls | DEFECT | | Comments |
|---------------------------------|--------|----|----------|
| | YES | NO | |
| Cracked | | | |
| Delaminated | | | |
| Scaled | | | |
| Spalled | | | |
| Other | | | |

| Handrails & Posts | DEFECT | | Comments |
|--------------------------|--------|----|----------|
| | YES | NO | |
| Bent, Broken, Missing | | | |
| Corroded | | | |
| Loose, Missing Fasteners | | | |
| Other | | | |

| Girders/Beams/Diaphragms | DEFECT | | Comments |
|--------------------------|--------|----|----------|
| | YES | NO | |
| Cracked | | | |
| Delaminated | | | |
| Corroded | | | |
| Spalled | | | |
| Other | | | |

Structure Accident-Incident Report

| Soffit/Fascia | DEFECT | | Comments |
|---------------|--------|----|----------|
| | YES | NO | |
| Cracked | | | |
| Delaminated | | | |
| Corroded | | | |
| Spalled | | | |
| Other | | | |

SUBSTRUCTURE

| Piers | DEFECT | | Comments |
|-------------|--------|----|----------|
| | YES | NO | |
| Cracked | | | |
| Delaminated | | | |
| Spalled | | | |
| Other | | | |

| Abutments | DEFECT | | Comments |
|-------------|--------|----|----------|
| | YES | NO | |
| Cracked | | | |
| Delaminated | | | |
| Scaling | | | |
| Spalled | | | |
| Other | | | |

| Ballast Walls / Wing Walls | DEFECT | | Comments |
|----------------------------|--------|----|----------|
| | YES | NO | |
| Cracked | | | |
| Delaminated | | | |
| Scaling | | | |
| Spalled | | | |
| Other | | | |

| Retaining Walls | DEFECT | | Comments |
|-----------------|--------|----|----------|
| | YES | NO | |
| Cracked | | | |
| Delaminated | | | |
| Scaling | | | |
| Spalled | | | |
| Other | | | |

Incident Summary

[illegible][illegible]

Date _____

ATTACHMENT 7 F

STRUCTURAL MAINTENANCE REPORT

Contract: _____

Date Submitted: _____

Submitted By: _____

Signature: _____

| Date Completed | Site # | Structure Name | Hwy | Deficiency Identified | Action Taken/Repair Recommendation |
|----------------|--------|----------------|-----|-----------------------|------------------------------------|
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ARTICLE 8 ROADSIDE MAINTENANCE

8.1 SCOPE

This specification covers the responsibilities and obligations for the year round Maintenance of Roadside features.

The Maintenance Operations shall be completed in full compliance with the requirements of the following documents:

- a) Concrete Barrier Repair and Rehabilitation Maintenance Manual.
- b) Sign Support Manual.
- c) Ontario Traffic Manual.
- d) King's Highway Guide Signing Policy Manual.
- e) Sign Support Inspection Guidelines.
- f) OPSD's for Small Sign Support Systems.
- g) Field Guide for the Restoration of Longitudinal Barriers (Chapter 16 of NCHRP Report 656).
- h) PMM 2016-05 Enhanced Delineation.

8.2 INSPECTIONS AND REPORTS

Inspections and reports shall be according to the following including Table 8-1.

- a) General drive-by inspections shall be carried out as detailed under Article 4.

Record deficiencies noted as detailed under Article 4.

Deficiencies or Defects that pose an imminent Hazard shall be Addressed Immediately and reported to the City.

An annual visual inspection shall be completed of all steel or wood ground mounted signs to identify reduced reflectivity, faded, or illegible signs. Inspections shall be completed prior to the end of the Winter Period of each year and submitted to the City.

An annual inspection shall be completed on all extruded aluminium signs and engineer designed supports on the Overhead Sign Support Maintenance Inspection Report or the Roadside Sign Support Maintenance Inspection Report (see Attachment 8 A and 8 B), and submitted to the City by August 1st. During the inspection for overhead sign supports loose base bolts on the footings shall be re-torqued and for the ground-mounted (roadside) sign supports all loose bolts shall be re-torqued including those on the footings, fuse plates, etc..

Maintenance access points, catch basins and ditch inlets shall be inspected annually by June 1 and the inspection recorded as per Article 5.

Table 8-1

| Maintenance Standard | | REMEDY PERIOD | REMEDIAL PERIOD |
|--|---|---------------|-----------------|
| Inspections and Reports | | | |
| Extruded Aluminum Signs and Engineer Designed Supports (Medium CPQF) | Annual inspection reports completed and submitted by August 1 each year | Zero Time | 1 Business Day |

8.3 SIGNS AND SIGN SUPPORTS

Maintenance of signs and sign supports shall be according to the following including Table 8-2.

- a) The MTO sign shop shall supply all Regulatory, Municipal (population), Warning and Information Signs as detailed in the Ontario Traffic Manual (OTM). All signs shall be ordered through the City and signs shall be shipped to the MTO Kanata Patrol Yards. All signs supplied by the MTO sign shop shall be received, unloaded and inspected upon delivery to verify the condition and ensure that sign size and directional arrows are correct and sign messages on new signs are spelled correctly. Proper storage and handling of all signs belonging to the City shall be ensured.
- b) Temporary condition and specialty signs are not supplied by the MTO sign shop. All approved temporary condition and specialty signs shall be supplied and installed according to the requirements of the Ontario Traffic Manual (OTM).
- c) Missing, damaged, illegible, obscured, reduced reflectivity, faded, twisted or deflected signs shall be replaced or repaired including overlays applied to ground-mounted extruded aluminium signs. Missing, broken, loose or cracked sign hardware, bent fasteners and bent brackets shall be repaired or replaced. Twisted, cracked, out of plumb, bent, unsound posts or posts not solid in the ground shall be repaired or replaced.
- d) When replacement of sign supports for steel or wood ground mounted signs is required due to damage, deterioration and/or missing sign supports, all non-standard sign supports shall be replaced with supports meeting current Standards.
- e) Missing or damaged snowplow markers, delineator markers, median markers, hazard markers and reflectorized guide rail strips shall be replaced, or new ones installed, including all other materials, hardware and posts for installation as required. These signs shall be supplied by DB Co.
- f) No permanent sign shall be installed at a new location or removed from its present location without Approval from the City. Should a condition or situation be identified that would warrant a new sign installation, the proposed sign, location and justification shall be provided to the City for consideration and approval. The sign layout shall be provided to the City prior to the sign installation.

Table 8-2

| Maintenance Standard | | REMEDY PERIOD | REMEDIAL PERIOD |
|---|---|---------------|-----------------|
| Signs and Sign Supports | | | |
| Stop, Stop Ahead, Yield, Yield Ahead, Traffic Signals Ahead, “New” (Wb3, Wb3F) and Checkerboard Signs (Medium CPQF) | Missing, damaged, illegible, obscured, reduced reflectivity, twisted or deflected signs; resources shall be deployed to replace or repair upon Detection | 2 hours | 1 hour |
| Regulatory Signs (NCR process) | Missing, damaged, illegible, obscured, reduced reflectivity, twisted or deflected Regulatory signs, other than Stop or Yield signs, shall be replaced or repaired upon Detection | 3 Days | 1 Business Day |
| Warning Signs (NCR process) | Missing, damaged, illegible, obscured, reduced reflectivity, faded, twisted or deflected warning signs, other than Stop Ahead, Yield Ahead, Traffic Signal Ahead, “New” (Wb3, Wb3F) or Checkerboard signs, shall be replaced or repaired upon Detection | 7 Days | 1 Business Day |
| Information Signs (NCR process) | Missing, damaged, illegible, obscured, reduced reflectivity, faded, twisted or deflected information signs shall be replaced or repaired upon Detection | 30 Days | 1 Business Day |
| | All required replacement signs shall be ordered upon Detection | 3 Days | 1 Business Day |
| | All signs installed upon delivery | 30 Days | 1 Business Day |
| Sign Hardware (NCR process) | Missing, broken, loose or cracked sign hardware, bent fasteners and bent brackets shall be replaced or repaired upon Detection | 7 Days | 1 Business Day |
| Sign Posts (NCR process) | Twisted, cracked, out of plumb, bent, unsound posts or posts not solid in the ground shall be replaced or repaired upon Detection | 30 Days | 1 Business Day |
| Engineer Designed Sign Structures (NCR process) | All Debris against the structure, missing plate covers and soil encroaching on the footing base shall be removed upon Detection | 30 Days | 1 Business Day |

- a) Sign inspections shall be carried out when the surface of the sign is dry.

Breakaway steel sign supports shall be inspected and pressure washed at the base to clear away sand/salt and debris as required.

Sign Maintenance

Cleaning:

- i. The face of the signs shall be cleaned by a method that does not scratch or damage the reflective sheeting.
- ii. Graffiti shall be removed using an approved method. The use of an approved clear coat overlay is recommended in areas with recurring graffiti problems.

Temporary Repairs:

- i. When conditions do not allow for the replacement of sign supports, signs shall be mounted on a portable stand or other acceptable method that will maintain the integrity of the sign.

8.4 GUIDERAIL AND OTHER SAFETY SYSTEMS

Maintenance of guiderail and other safety systems shall be according to the following including Table 8-3.

a) Steel Beam Guiderail

- i. Posts that are missing or damaged (including broken, excessively split or cracked or generally unsound) and /or affect the integrity and effectiveness of the system, shall be replaced.
- ii. Blocks that are not bolted firmly between the mounting posts and the steel beam rails shall be re-secured and any missing bolts and nuts shall be replaced.
- iii. Posts that have heaved, settled or are out of plumb in such a manner that the system effectiveness has degraded, shall be reset to the proper elevation and alignment.
- iv. Rails and channels that are missing or damaged (including dented, bent, torn, twisted or rusted) and/or affect the integrity and effectiveness of the system shall be replaced.
- v. The beam height shall be measured from the ground below the beam to the bottom of the beam.
- vi. Damaged or missing reflectorized strips or reflective markers shall be replaced.
- vii. High priority repairs according to NCHRP Report 656 Chapter 16 shall be completed within 7 Days.
- viii. Medium priority repairs according to NCHRP Report 656 Chapter 16 shall be completed prior to November 15 each year.

Concrete Barriers

- i. Two adjacent sections of temporary/modular Concrete Barriers misaligned by more than 7.5 cm or longitudinally separated by greater than 2.5 cm shall be reset to the proper alignment.
- ii. Any Breakout, Block Separation or Loop Crack shall be temporarily repaired and maintained until permanent repairs are completed.
- iii. Defects such as cracks and missing concrete that affect the integrity of the Concrete Barrier shall be reported to the City.
- iv. Other concrete defects such as spalling and scaling shall be reported to the City.
- v. Damaged or missing reflectorized strips or reflective markers shall be replaced.

Energy Absorbing Systems

- vi. Damaged Energy Absorbing Systems which compromise the integrity and effectiveness of the system shall be secured, delineated and made safe.
- vii. Energy Absorbing Systems which have shifted or moved out of original position shall be returned to the original layout.
- viii. All systems that contain moving parts shall be cleaned in order to ensure the system remains fully operational as intended by the design.
- ix. All hardware shall be adjusted, repaired or replaced as required to maintain the integrity and performance of the system.

Anti-Glare Screens that are damaged or missing shall be repaired or replaced.

Snow protection barriers that are damaged shall be reported to the City.

Table 8-3

| Maintenance Standard | | REMEDY PERIOD | REMEDIAL PERIOD |
|--|--|----------------------|-----------------|
| Guiderail and Other Safety Systems | | | |
| Steel Beam Guiderail (NCR process) | High priority repairs are completed upon Detection | 7 Days | 1 Business Day |
| | Medium priority repairs are completed upon Detection | prior to November 15 | 1 Business Day |
| Concrete Barriers (NCR process) | Two adjacent sections of temporary/modular Concrete Barrier misaligned by more than 7.5 cm or longitudinally separated by greater than 2.5 cm reset to the proper alignment upon Detection | 7 Days | 1 Business Day |
| | Temporary Concrete Barrier with Breakout, Block Separation or Loop Crack are to be replaced upon Detection and reported to the City | 24 hours | 1 Business Day |
| | Permanent Concrete Barrier with Breakout, Block Separation or Loop Crack shall be temporarily repaired upon Detection and maintained until permanent repairs are completed | 24 hours | 1 Business Day |
| Energy Absorbing Systems (NCR process) | All damaged Energy Absorbing Systems are protected and made safe upon Detection | 2 hours | 30 minutes |
| | All systems which require adjustment or realignment are corrected upon Detection | 7 Days | 1 Business Day |
| | All damaged Energy Absorbing Systems shall be repaired or replaced upon Detection | 7 Days | 1 Business Day |
| | All systems that contain moving parts are cleaned by June 1 st every year | Zero Time | 1 Business Day |
| Anti-Glare Screens (NCR process) | All damaged or missing anti-glare screens are repaired or replaced upon Detection | 21 Days | 1 Business Day |
| Snow Protection Barriers (NCR process) | All damaged snow protection barriers are reported to the City upon Detection | 7 Days | 1 Business Day |

8.5 CURB AND GUTTER

Maintenance of curb and gutter shall be according to the following including Table 8-4.

- a) Obstructions which could impede proper drainage shall be removed.

- b) Gaps or separations of greater than 50 mm between the curb and gutter and the adjacent pavement surface shall be repaired.
- c) Shoulder and embankment areas behind the curb and gutter shall be inspected for erosion and restored to their original profiles.

Table 8-4

| Maintenance Standard | | REMEDY PERIOD | REMEDIAL PERIOD |
|--------------------------------|--|---------------|-----------------|
| Curb and Gutter | | | |
| Obstructions (NCR process) | All obstructions impeding proper drainage are removed upon Detection | 2 hours | 1 hour |
| Gaps/ Separation (NCR process) | Gaps between curb and gutter and pavement surface exceeding 50 mm repaired upon Detection | 30 Days | 1 Business Day |
| Erosion (NCR process) | Erosion damage to the shoulder and embankment behind the curb is repaired by October 1st each year | Zero Time | 1 Business Day |

8.6 DRAINAGE SYSTEMS

Maintenance of drainage systems shall be according to the following including Table 8-5.

All materials removed from a drainage appliance shall be managed according to Schedule 17.

a) Catch Basins and Maintenance Access Points

- i. Remove all debris from the maintenance access points, catch basins and ditch inlets at a minimum once every two years and more frequently as required to ensure the sump is not filled to capacity.
- ii. All missing grates or lids shall be replaced.
- iii. All damaged frames shall be reported to the City.
- iv. All Defects in concrete work, all ladder rungs that are broken, missing or badly rusted, and bricking that is crumbling or broken shall be reported to the City.
- v. Settlement around maintenance access points, catch basins and structure approaches shall be reported to the City.
- vi. If the water flow appears to be obstructed within the connecting pipes, this Defect shall be reported to the City.

b. Sub-drains

- i. All obstructions that are impeding the flow shall be removed.
- ii. Missing rodent screens shall be replaced.
- iii. Buried outlets shall be uncovered.
- iv. Pipe ends that have been crushed shall be repaired.

c. Culverts and Storm Sewer Systems

- i. All Debris that may restrict water flow of a culvert or storm sewer at inlet or outlet, including two metres inside either end, shall be removed.

- ii. Debris and/or other material which is restricting water flow in the interior of a culvert or storm sewer (excluding two metres at either end) shall be reported to the City.
- d. Ditches
- i. All non-planned obstructions that are stopping, rerouting or reducing the free flow of water shall be removed.
 - ii. Damage to ditch lining shall be repaired or controlled to prevent erosion.
 - iii. Eroded or damaged ditch side-slopes, back-slopes and slope protection shall be repaired.

Table 8-5

| Maintenance Standard | | REMEDY PERIOD | REMEDIAL PERIOD |
|--|--|---------------|-----------------|
| Drainage Systems | | | |
| Catch Basins and Maintenance Access Points (NCR process) | All missing catch basin, ditch inlet and maintenance access point grates or lids are replaced upon Detection | 30 minutes | 1 hour |
| | All damaged catch basin, ditch inlet and maintenance access point frames are marked with warning devices and reported to the City upon Detection | 3 Days | 1 Business Day |
| | Sumps filled to capacity shall be cleaned upon Detection | 7 Days | 1 Business Day |
| | Crushed or buried pipe ends shall be repaired or replaced upon Detection | 30 Days | 1 Business Day |
| | Missing and damaged rodent/wildlife screens are repaired or replaced upon Detection | 60 Days | 1 Business Day |
| Culverts and Storm Sewer Systems (NCR process) | All Debris that may restrict water flow at inlet or outlet, and up to two metres inside either end, removed upon Detection | 30 Days | 1 Business Day |
| | Blockage that is causing a negative impact to City infrastructure or adjacent property shall be Addressed Immediately | Zero Time | 1 Business Day |
| Ditches (NCR process) | Erosion or damage of ditch slopes, linings, back slopes, inlets/outfalls and slope protection are repaired upon Detection | 60 Days | 1 Business Day |
| | Non-planned obstructions that may reduce flow capacity are removed upon Detection | 30 Days | 1 Business Day |
| | All non-planned obstructions that stop or reroute the free flow of water, or may cause flooding, removed upon Detection | 24 hours | 1 Business Day |

8.7 VEGETATION CONTROL

Vegetation control shall be according to the following including Table 8-7.

- a) Sight Distance
- i. Vegetation shall be controlled before it can obscure any sign.
 - ii. Vegetation shall be controlled before it can impair or obstruct sight visibility distances according to Table 8-6 Sight Visibility.

Table 8-6 Sight Visibility

| | | | | | | |
|------------------------------|-----|-----|-----|-----|-----|-----|
| Posted Speed (km/h) | 50 | 60 | 70 | 80 | 90 | 100 |
| Minimum Sight Distance (m) * | 110 | 135 | 160 | 185 | 215 | 245 |

*Note: Minimum sight distance means a clear line of vision along the road between the driver's eye (either moving/stationary vehicle) and the object to be seen (either moving/stationary). Eye level is measured at 1.05 m above road surface.

Vegetation that impedes traffic shall be removed.

Grass Mowing and Trimming

All grass visible to the travelling public shall be maintained at a height not exceeding 15 centimetres.

- i. Grass and weeds behind barrier walls in view of the travelling public shall be maintained below the height of the top of the barrier wall.
- ii. Grass impeding drainage or contributing to erosion by destroying desirable groundcovers shall be reported to the City.

Concrete/Asphalt Joints

- i. Vegetation growing in any concrete and/or asphalt joint or crack shall be Eradicated annually between July 1 and August 31.

Vegetation at Electrical Installations

- i. All vegetation, including trees, shall be removed from around all electrically powered equipment, including communication equipment within the working area, a minimum of twice per year by June 1 and September 1.
- ii. In addition, all vegetation within a two metre radius shall be maintained at a height of no greater than 300 mm around all electrically powered equipment and communication equipment requiring access. This includes all cabinets, power supplies, distribution assemblies, high mast poles, sub stations, RWIS stations, cameras, and communication pedestals. A one metre pathway, from the roadway to the equipment, shall also be maintained at a height no greater than 300 mm.

Table 8-7

| Maintenance Standard | | REMEDY PERIOD | REMEDIAL PERIOD |
|------------------------------|--|---------------|-----------------|
| Vegetation Control | | | |
| Sight Distance (NCR process) | Vegetation that impairs or obstructs sight visibility distances removed upon Detection | 1 Day | 1 Business Day |

| Maintenance Standard | | REMEDY PERIOD | REMEDIAL PERIOD |
|--|---|---------------|-----------------|
| Vegetation Control | | | |
| | Vegetation that impedes traffic or obstructs regulatory signs is removed upon Detection | 2 hours | 2 hours |
| Grass Mowing (NCR process) | All grass visible to the travelling public maintained at not more than 15 centimetres | 7 Days | 1 Business Day |
| | All grass and weeds behind barrier walls maintained below the height of the top of the barrier walls. | 7 Days | 1 Business Day |
| Weed Control (NCR process) | Noxious weeds identified through a weed order Eradicated according to the weed order | Zero Time | 1 Business Day |
| Concrete/ Asphalt Joints or Cracks (NCR process) | Vegetation growing in any concrete and/or asphalt joint or crack Eradicated annually by August 31 | Zero Time | 1 Business Day |
| Vegetation at Electrical Installations (NCR process) | Vegetation to be cleared twice annually by June 1 and Sept 1 | Zero Time | 1 Business Day |

8.8 FENCES AND OTHER BARRIERS

Maintenance of fences and other barriers shall be according to the following including Table 8-8.

a) Security Fence (or Farm Fence owned by the MTO)

- i. Where sections of MTO-owned farm or security fence are damaged temporary repairs shall be made immediately and permanent repairs scheduled and completed.

Ramp Gates

- i. Annual maintenance of ramp gates shall include, oiling or greasing of moving parts and locks as required, and replacement of damaged components or complete units.
- ii. All ramp gates shall be equipped with MTO approved locks.
- iii. Where ramp gates are damaged, repair or replacement shall be scheduled and completed.

Table 8-8

| Maintenance Standard | | REMEDY PERIOD | REMEDIAL PERIOD |
|--------------------------|--|---------------|-----------------|
| Fences & Other Barriers | | | |
| All Fences (NCR process) | Damaged or missing Security Fence or City owned Farm Fence allowing access to the highway is repaired temporarily upon Detection | 2 hours | 2 hours |
| | Permanent repairs completed upon Detection | 14 Days | 1 Business Day |

| Maintenance Standard | | REMEDY PERIOD | REMEDIAL PERIOD |
|--------------------------|--|---------------|-----------------|
| Fences & Other Barriers | | | |
| Ramp Gates (NCR process) | Ramp Gates maintained and damage repaired upon Detection | 7 Days | 1 Business Day |

8.9 OTHER ROADSIDE FEATURES

Maintenance of other Roadside features identified below shall be according to the following

a) Graffiti

- i. Graffiti visible by the public is removed by a paint removal method as identified in the Designated Sources of Material list.
- ii. All offensive graffiti is temporarily covered and scheduled for permanent removal.

Debris

- i. All mowed grassy areas visible to the travelling public shall be maintained free of litter and debris at all times between April 15th and November 15th of each year.
- ii. Items within the Roadside that may have a negative impact on public health or environmental safety shall be Addressed Immediately.
- iii. Debris, including dead animals, on the Roadside shall be removed. All Debris shall be managed in accordance with Schedule 17.

Table 8-9

| Maintenance Standard | | REMEDY PERIOD | REMEDIAL PERIOD |
|---------------------------|---|---------------|-----------------|
| Other Roadside Features | | | |
| Graffiti (NCR process) | All graffiti visible by the public is removed by a paint removal method as identified in the Designated Sources of Material list upon Detection | 10 Days | 1 Business Day |
| | All offensive graffiti is temporarily covered upon Detection | 2 hours | 1 hour |
| Debris (NCR process) | All Debris within the Roadside is removed upon Detection | 1 Day | 1 Business Day |

- i. There is a potential hazard when handling dead animals, syringes and other sharp objects. Proper gloves, footwear and clothing should always be worn when engaged in these types of activities.
- ii. Expert assistance should be obtained to identify unlabelled containers or unidentifiable materials.

OVERHEAD SIGN SUPPORT MAINTENANCE INSPECTION

Date: _____ Inspected by: _____

Structure Identification

| | | | |
|-----------------------|-----------------------------|---------------------------|----------------------------|
| Name/Location | | | |
| Hwy/Direction: | Core/Collector/Ramp: | Structure Type: | |
| Site #: | # Sign Panels: | Footing Type Left: | Footing Type Right: |

| | | DEFECT | | |
|--|-----|--------|----|-------------------------------|
| | N/A | Yes | No | Maintenance Required/Comments |
| Foundation | | | | |
| Concrete (cracked, spalled?) | | | | |
| Steel Pedestal (bent, rusted?) | | | | |
| Grout (broken?) | | | | |
| Bearing Surface (poor contact, lifting?) | | | | |
| Bases | | | | |
| Anchor Bolts (broken, loose?) | | | | |
| Base Plates (cracked?) | | | | |
| Legs of Support* | | | | |
| Leg (bends, dented, cracked?) | | | | |
| Bracing Diagonals (bent, cracked?) | | | | |
| Leg Connection (cracked, loose?) | | | | |
| Horizontal Portion of Support* | | | | |
| Chords (bent, dented?) | | | | |
| Bracing Diagonals (bent, dented?) | | | | |
| In Line Connections (loose?) | | | | |
| Attachments* | | | | |
| Sign Panels (bent, loose?) | | | | |
| Sign Panel Clamps (broken, loose?) | | | | |
| Walkway Arms (bent?) | | | | |
| Walkway (loose, bent?) | | | | |
| Walkway Clamps (broken, loose?) | | | | |
| Damping Assembly (loose?) | | | | |
| Other | | | | |
| Other | | | | |
| Follow Up with City? | | | | |
| General Comment | | | | |

* - Inspected from shoulder.

ATTACHMENT 8 B

ROADSIDE SIGN SUPPORT MAINTENANCE INSPECTION

Date: _____ Inspected by: _____

Structure Identification:

| | | |
|----------------|----------------------|-------------------------------------|
| Name/Location | | |
| Hwy/Direction: | Core/Collector/Ramp: | |
| Site #: | # Columns (Posts): | # Horizontal cross arms (if steel): |

| | N/A | DEFECT | | Maintenance Required/Comments |
|---|-----|--------|----|-------------------------------|
| | | Yes | No | |
| Foundation | | | | |
| Concrete (cracked, spalled?) | | | | |
| Columns (Posts) of Support* | | | | |
| Connection at ground, for breakaway sign (cracked, bent, loose?) | | | | |
| Connection below sign, for breakaway sign (cracked, bent, loose?) | | | | |
| Leg (bends, dented, cracked?) | | | | |
| Sign | | | | |
| Sign Panel (bent, loose?) | | | | |
| Sign Panel Clamps (broken, loose?) | | | | |
| Other | | | | |
| Other | | | | |
| Follow Up with Area Office? | | | | |
| General Comment | | | | |

ARTICLE 9 ELECTRICAL MAINTENANCE

9.1 SCOPE

This specification covers the responsibilities and obligations for all electrical maintenance and servicing activities within the Highway Corridor Lands.

The Maintenance Operation shall include identifying, documenting and taking the appropriate action necessary to correct all defects whether by Minor Maintenance or Non-Routine Maintenance.

The Maintenance Operation shall be completed in full compliance with the requirements of OPSS Prov 106 and the requirements detailed in Schedule 15-2 Part 9.

9.2 Non-Routine Maintenance

Non-Routine Maintenance of electrical systems shall be according to the following Maintenance Standards detailed in Table 9-1 and Table 9-2.

The Electrician (as defined in OPSS Prov 106) shall notify the City and the OTOC of all Critical Failures when first arriving on site. The Electrician shall notify the OTOC upon leaving the site.

Table 9-1 – Categories of Critical Failures in Electrical Systems

| CATEGORY 1 - System components are degraded or not working at all and there is an elevated priority due to a Major Incident or immediate safety hazard. CATEGORY 2 - Major system components are degraded or not working at all and there no immediate safety hazard. CATEGORY 3 - Minor system component is degraded or not working at all and there no immediate safety hazard | | | | |
|---|---|------------|------------|------------|
| SYSTEM | CRITICAL FAILURE | CATEGORY 1 | CATEGORY 2 | CATEGORY 3 |
| Power Distribution System | Aerial span wire down | X | | |
| | Emergency Cable Locates | X | | |
| | Faulty photo control circuit | | X | |
| | Pole knocked down or hit | X | | |
| | Power Supply knocked down, failure, damaged, de-energized or displaced | X | | |
| | Unattended and unsecured cabinet or enclosure | X | | |
| Illumination (Highway, High Mast) | Aerial span wire down | X | | |
| | All lighting not functioning at a Power Supply | X | | |
| | Emergency Cable Locates | X | | |
| | Faulty photo control circuit | | X | |
| | Greater than 30% of the luminaires connected to a Power Distribution System not functioning | | X | |
| | Greater than 40% of the luminaires not functioning at a Partial Illumination Critical Point | | X | |
| | Overhead equipment unfastened or hanging over roadway | X | | |

| CATEGORY 1 - System components are degraded or not working at all and there is an elevated priority due to a Major Incident or immediate safety hazard. CATEGORY 2 - Major system components are degraded or not working at all and there no immediate safety hazard. CATEGORY 3 - Minor system component is degraded or not working at all and there no immediate safety hazard | | | | |
|---|--|------------|------------|------------|
| SYSTEM | CRITICAL FAILURE | CATEGORY 1 | CATEGORY 2 | CATEGORY 3 |
| | Parking lot lighting | | | X |
| | Pole knocked down or hit | X | | |
| | Unattended and unsecured cabinet or enclosure | X | | |
| | Unbalance, unlatched or partially unlatched high mast lighting ring | X | | |
| Permanent Data Collection Stations, Cathodic Protection, Emergency Services Access Gates | Communication failure | | | X |
| | Controller control cabinet or enclosure knocked down, damaged or displaced | X | | |
| | Emergency Cable Locates | X | | |
| | Emergency Services Access Gate not functioning | X | | |
| | Pole knocked down or hit | | | X |
| | Unattended and unsecured cabinet or enclosure | X | | |
| | UPS system failure | | | X |

Table 9-2

| Maintenance Standard | | REMEDY PERIOD | REMEDIAL PERIOD |
|---------------------------------|---|-------------------|-----------------|
| Non-Routine Maintenance | | | |
| Electrical System (Medium CPQF) | Response to Category 1 Critical Failures upon Detection | 2 hours | 30 minutes |
| Electrical System (Medium CPQF) | Response to Category 2 Critical Failures upon Detection | 24 hours | 1 hour |
| Electrical System (NCR process) | Response to Category 3 Critical Failures upon Detection | Next Business Day | 1 Business Day |

9.3 Highway Lighting

Maintenance of Highway Lighting Systems shall be according to the following Maintenance Standards detailed in 9-3.

Routine Maintenance activities on all Highway Lighting Systems within the Highway Corridor Lands shall include:

- i. Minor Maintenance including inspecting, checking, elementary testing, cleaning, lubricating and performing minor repairs from the ground on all Highway Lighting System components including luminaires, lighting brackets, wiring, fuses, poles, frangible and safety bases, anchorage

- assemblies, pads and footings, lowering and raising devices within the Contract a minimum of once per year.
- ii. Major Maintenance including overhauling, testing and replacement of faulty components on all Highway Lighting System components including luminaires, lighting brackets, wiring, fuses, grounding, poles, pole bases, frangible and safety bases, anchorage assemblies, pads and footings within the Contract on a 4-year cycle starting in 2020.
 - iii. Detailed inspecting, checking, elementary testing, cleaning (including the reflector, refractor and inside the fixture), lubricating and performing minor repairs on conventional, underpass, tunnel and facility lighting on a 4-year cycle concurrent with the 4-year relamping cycle. For LED luminaires, the cleaning shall include the optical assemblies and heat-sinks.
 - iv. Replace all non-LED lamps on conventional, underpass, tunnel and facility lighting on a 4-year cycle. All lamps shall be replaced with the same type, including the exact same photometric distribution.
 - v. LED luminaires will not be replaced on a schedule but shall be replaced as required.

Some power supplies provide power to both Highway Lighting Systems and Intelligent Transportation Systems and other electrical facilities. Maintenance on the Highway Lighting Systems shall be performed without de-energizing the other system.

Table 9-3

| Maintenance Standard | | REMEDY PERIOD | REMEDIAL PERIOD |
|------------------------------------|--|------------------------|-----------------|
| Highway Lighting | | | |
| Full Illumination (NCR process) | More than 2 consecutive luminaires not functioning shall be repaired upon Detection | 7 Days | 1 Business Day |
| | Greater than 30% of luminaires connected to the Power Distribution System not functioning shall be repaired upon Detection | 24 hours | 1 Business Day |
| | Any single luminaire not functioning shall be repaired upon Detection | Next maintenance cycle | 1 Business Day |
| Partial Illumination (NCR process) | Greater than 40% of the luminaires at Critical Point not functioning shall be repaired upon Detection | 24 hours | 1 Business Day |
| | Any single luminaire not functioning shall be repaired upon Detection | 7 Days | 1 Business Day |
| Maintenance (NCR process) | Complete all Maintenance according to this specification | Zero Time | 1 Business Day |

9.4 High Mast Lighting

Maintenance Standards

Maintenance of high mast lighting shall be according to the following Maintenance Standards as detailed in Table 9-4.

Routine Maintenance activities on all High Mast Lighting Systems shall include:

- vi. Minor Maintenance including inspecting, checking, elementary testing, operational testing, cleaning, lubricating and performing minor repairs on all non-latching High Mast Lighting System components including luminaires, lighting brackets, wiring, poles, lowering and raising devices, anchorage assemblies, pads and footings, within the Contract a minimum of once every six months.
- vii. Major Maintenance including overhauling, testing and replacement of faulty components on all latching or non-latching High Mast Lighting System components including luminaires, lighting brackets, wiring, poles, lowering and raising devices, anchorage assemblies, pads and footings, within the Contract a minimum of once every six months.
- viii. Minor Maintenance including inspecting, checking, elementary testing, cleaning, lubricating and performing minor repairs on all top-latching High Mast Lighting System components including luminaires, lighting supports, wiring, poles, lowering and raising devices, anchorage assemblies, pads and footings, lowering and raising devices within the Contract a minimum of once every two years.
- ix. Major Maintenance including overhauling, testing and replacement of faulty components on all top-latching High Mast Lighting System components including luminaires, lighting brackets, wiring, poles, lowering and raising devices, anchorage assemblies, pads and footings within the Contract a minimum of once every two years.
- x. Replace all conventional lamps on High Mast Lighting System on a 4-year cycle starting in 2020. Lamps shall be replaced with the same type, including the exact same photometric distribution.
- xi. LED luminaires will not be replaced on a schedule but shall be replaced as required.
- i. Some power supplies provide power to both High Mast Lighting Systems and Intelligent Transportation Systems and other electrical facilities. Maintenance on the Highway lighting systems shall be performed without de-energizing the other system.

Table 9-4

| Maintenance Standard | | REMEDY PERIOD | REMEDIAL PERIOD |
|---------------------------|---|---------------|-----------------|
| High Mast Lighting | | | |
| Luminaires (NCR process) | Any luminaire not functioning shall be repaired upon Detection | 10 Days | 1 Business Day |
| | Non-functioning luminaires replaced when greater than 25% of the luminaires per high mast lighting pole not functioning | 2 Days | 1 Business Day |
| Maintenance (NCR process) | Complete all Maintenance according to this specification | Zero Time | 1 Business Day |

9.5 Permanent Data Collection Stations

Maintenance Standards

Maintenance of permanent data collection stations shall be according to the following Maintenance Standards including Table 9-5.

Routine Maintenance activities on all Permanent Data Collection Stations shall include:

- i. Inspecting, checking, changing, cleaning, summarizing, winterizing, replacing door filter, lubricating and performing minor repairs on all Permanent Data Collection Stations including heater, fan, screws, electrical connections, gasket, thermostats, filter assembly, cabinet/building, door, door handle and lock, digital timers, pole/pedestal, mounting hardware, grass/debris, rodents & insects, light bulb, overhead wiring, loop(s), telephone line, telecommunication modems, wireless VPM modems, counter battery, power supplies and perform Loop Detector Readings within the Contract two times per year between April 1st and May 31st, and between October 1st and November 30th.
- ii. Replace the Cortec corrosion inhibitors every 18 months.

A System Integration Test shall be completed by the manufacturer's authorized representative, for each Non-Routine Maintenance response.

Table 9-5

| Maintenance Standard | | REMEDY PERIOD | REMEDIAL PERIOD |
|---------------------------------------|---|---------------|-----------------|
| Permanent Data Collection Stations | | | |
| Routine Maintenance (NCR process) | Complete all Maintenance according to Standards | Zero Time | 1 Business Day |
| System Integration Test (NCR process) | Station passes the SIT and is collecting data continually for 14 Days after permanent repairs are completed | Zero Time | 1 Business Day |

9.6 Power Distribution System and Grounding

Maintenance Standards

Maintenance of Power Distribution Systems shall be according to the following Maintenance Standards as detailed in Table 9-6.

Routine Maintenance activities of Power Distribution System shall include:

- i. Minor Maintenance including inspecting, checking, elementary testing, cleaning, lubricating and performing minor repairs on all components including wiring, fuses, poles, frangible and safety bases, anchorage assemblies, pads and footings within the Contract a minimum of once per year.
- ii. Major Maintenance including overhauling, testing and replacement of faulty components including wiring, fuses, breakers, UPS systems, grounding, poles, pole bases, frangible and safety bases, anchorage assemblies, pads and footings, sub-stations, distribution assemblies, cabinets and power supplies on a 4-year cycle.
- iii. Solar panels shall be clean and clear, so there are no interruptions of continuous operations.
- iv. Check all 120 VAC line and ground rods, once every 12 months.
- v. Replace all UPS batteries on a 5-year cycle. Batteries shall be replaced with the same type, voltage and Amp-Hour capacity.

Table 9-6

| Maintenance Standard | | REMEDY PERIOD | REMEDIAL PERIOD |
|---|--|---------------|-----------------|
| Power Distribution System and Grounding | | | |
| Solar Panels (NCR process) | Solar panel output diminished, which causes interruption of continuous operations due to obstruction, dirt or snow to be repaired upon Detection | 2 Days | 1 Business Day |
| Routine Maintenance (NCR process) | Complete all Routine Maintenance according to the Standards | Zero Time | 1 Business Day |

Solar Panels within the Highway Corridor Lands shall be cleaned a minimum of three times per year (Feb, Jun, and Oct).

Appendix H

Pipe Installation by Trenchless Methods

Non Standard Special Provision

1. SCOPE

This Special Provision covers the requirements for pipe installation by various trenchless methods.

DB Co shall select the trenchless method of installation.

2.0 REFERENCES

This Special Provision refers to the following standards, specifications, or publications:

Ontario Provincial Standard Specifications, Construction:

| | |
|----------|--|
| OPSS 401 | Trenching, Backfilling, and Compacting |
| OPSS 404 | Support Systems |
| OPSS 407 | Manholes, Catch Basins and Ditch Inlets |
| OPSS 441 | Watermain Installation In Open Cut |
| OPSS 491 | Preservation, Protection, and Reconstruction of Existing Facilities |
| OPSS 492 | Site Restoration Following Installation of Pipelines, Utilities, and Associated Structures |
| OPSS 517 | Dewatering of Pipeline, Utility and Associated Structure Excavation |
| OPSS 539 | Temporary Protection Systems |

Ontario Provincial Standard Specification, Material:

| | |
|-----------|---------------------------------------|
| OPSS 1004 | Aggregates - Miscellaneous |
| OPSS 1301 | Cementing Materials |
| OPSS 1302 | Water |
| OPSS 1440 | Steel Reinforcement for Concrete |
| OPSS 1802 | Smooth Walled Steel Pipe |
| OPSS 1820 | Circular and Elliptical Concrete Pipe |

ASTM International:

D3350 - 10a Standard Specification for Polyethylene Plastics Pipe and Fittings Materials

American Water Works Association (AWWA)

C206-03 Field Welding of Steel Water Pipe

3.0 DEFINITIONS

For the purposes of this Appendix H, the following definitions apply:

Backreamer means a cutting head designed for the soil conditions and is attached to the leading end of a drill string to enlarge the pilot bore during a pullback operation to enable installation of the product.

Bore Path means a drilled path according to the grade and alignment tolerances specified in the Project Agreement and DB Co's design.

Carrier Pipe means a final pipe in direct contact with the material being conveyed.

Drilling Fluid Fracture or Frac Out means a condition where the drilling fluid's pressure in the bore is sufficient to overcome the in situ vertical confining stress, thereby fracturing the soil and allowing the drilling fluids to migrate to the surface at an unplanned location.

Drilling Fluids means a mixture of water and additives, such as bentonite, polymers, surfactants, and soda ash, designed to block the pore space on a bore wall, reduce friction in the bore, and to suspend and carry cuttings to the surface.

Entry Point means the location or excavation from which the bore is initiated for the installation of product.

Exit Point means the location or excavation to which the bore is directed for the installation of product.

Fusion means connecting product lengths into a continuous length using elevated temperatures and pressure.

Guidance System means an electronic system capable of indicating the position, depth, and orientation of the drill head during the drilling process.

Horizontal Directional Drilling (HDD) means directional boring or guided horizontal boring.

Inadvertent Returns means the flow of unexpected fluids towards the drilling rig that typically originated from an artesian aquifer encountered during the drilling process.

Launch Pit means an access excavation or existing access structure to an existing product for the insertion of the pipe bursting head and new product.

Loss of Circulation means the discontinuation of the flow of slurry in the bore back to the entry or exit point or other planned recovery points.

Multi Product Installation means two or more products installed in the same bore path. The products may or may not have the same diameters.

Pilot Bore means the initial bore to set horizontal and vertical alignment between the connecting points.

Pipe Bursting means the application of a pipe bursting head into the interior of and along the length of an existing product to split or fracture the existing product so that the existing product and surrounding material is opened up to a sufficient size to accommodate the insertion of a new product in the cavity created, without leaving any significant voids around the new product. Pipe bursting methods include static, pneumatic, and hydraulic. Pipe bursting is also known internationally as pipe cracking or pipe splitting.

Pipeline means to include sewers, culverts, watermains, and forcemains.

Product means pipelines, conduits, cable, or ducts.

Pull means the installation of one continuous reach of new product. Generally, a pull shall commence at a launch pit and terminate at a pull pit.

Pull Pit means an access excavation or existing access structure to an existing product to receive the new product or pipe bursting head or both.

Pullback means that part of the HDD method in which the drill string is pulled back through the bore path to the entry point, usually installing the product at the same time.

Reaming means a process for pulling a tool attached to the end of the drill string through the bore path to enlarge the bore and mix the cuttings with the drilling fluid. This could include multiple passes.

Rock means natural beds or massive fragments of the hard, stable, cemented part of the earth's crust that are igneous, metamorphic, or sedimentary in origin, which may or may not be weathered and includes boulders having a volume of 0.5 m³ or greater.

Single Product Installation means a single product installed into a bore path. The product may or may not have a tracer wire attached to it.

Slurry means a mixture of soil cuttings and drilling fluid.

Soil means all soils except those defined as rock, and excludes stone masonry, concrete, and other manufactured materials.

Strike Alert means a system that is intended to alert and protect the operator in the case of inadvertent drilling into an electrical utility cable. The strike alert system consists of a sensor and an alarm connected to the drill rig and a grounding stake. The alarm is set off when the sensor contacts 42.5 volts or 0.5 amperes. The alarm may be audio or visual or both.

Structure means a maintenance hole, valve chamber, or other such facility to access the product.

4.0 SUBMISSION AND DESIGN REQUIREMENTS

4.04 Submission Requirements

The following information shall be submitted to the City Representative for review a minimum of 14 days prior to commencing the pipe installation by trenchless method operations:

- a) A work plan outlining the procedure and schedule to be used to execute the work on the product service laterals, and structures.
- b) The work area layout.
- c) A list of personnel, including backup personnel, and their qualifications and experience.
- d) A traffic control plan.
- e) A safety plan, including the contracting company safety manual and emergency procedures.
- f) A settlement monitoring plan.
- g) Material and Equipment.
- h) Method for the removal of boulders and cobbles.

4.04.01 Jacking and Boring

When jacking and boring is selected as the trenchless method for pipe installation, DB Co shall also submit the following information, in addition to the submission requirements specified elsewhere, to the City Representative for review a minimum of 14 days prior to commencing the jacking and boring operations:

- a) Access shaft or pit design.
- b) Face support and other temporary support details.
- c) Excavation and dewatering plan.
- d) Grouting operation.
- e) Testing and monitoring plan.

The access shaft or pit details shall bear the seal and signature of an Engineer.

4.04.02 Horizontal Directional Drilling

When HDD is selected as the trenchless method for pipe installation, DB Co shall also submit the following information, in addition to the submission requirements specified elsewhere, to the City Representative for review a minimum of 14 days prior to commencing the HDD operations:

- a) A drilling fluid management plan including potential impacts and emergency procedures and associated contingency plans.

4.04.03 Pipe Bursting

When pipe bursting is selected as the trenchless method for pipe installation, DB Co shall also submit the following information, in addition to the submission requirements specified elsewhere, to the City Representative for review a minimum of 14 days prior to commencing the pipe bursting operations:

- a) Launch pit and pull pit locations.
- b) Working Drawings required to execute the work on the product.
- c) When fusion joining is used, written record of current training showing that the operator has been fully trained in the use of the fusion equipment by an authorized representative of the fusion equipment manufacturer and the product manufacturer or, when applicable, certified by the Owner or Utility Company for which the work is being completed.
- d) When applicable, product bypass and temporary supply system plans, including installation, operation, and testing procedures and a list of material and equipment to be used.
- e) Manufacturer's technical data containing complete information on new product:
 - i. Material composition, physical properties, inside diameter, and wall thickness.
 - ii. Maximum tensile strength and corresponding maximum allowable pulling force.
 - iii. Transporting, handling, and storing recommendations.
 - iv. Repair.
 - v. Fusion times and temperatures.
 - vi. Minimum bend radius.
 - vii. Recommended restraint method in structure.
 - viii. Product recovery requirements.
 - ix. Relaxation requirements.
- f) Contingency plans for the following potential conditions:
 - i. Unforeseen obstructions causing burst stoppage.
 - ii. Deviation from required alignment and grade.
 - iii. Extended service disruption.

- iv. Damage to the existing service connections and the replacement of product's structural integrity and methods of repair.
- iv. Damage to other existing Utilities.
- v. Soil heaving or settlement.
- vi. Contaminated soil or water.
- vii. Alignment passing through buried structures.

4.04.04 Pipe Ramming

When pipe ramming is selected as the trenchless method for pipe installation, DB Co shall also submit the following information, in addition to the submission requirements specified elsewhere, to the City Representative for review a minimum of 14 days prior to commencing the pipe ramming operations:

- a) Access shaft or pit design.
- b) Face support and other temporary support details.
- c) Excavation and dewatering plan.
- d) Grouting operation.
- e) Testing and monitoring plan.

The access shaft or pit details shall bear the seal and signature of an Engineer.

5.0 MATERIALS

5.01 Timber

Timber shall be sound, straight, and free from cracks, shakes, and large or loose knots.

5.02 Fittings

Fittings shall be suitable for and compatible with the class and type of pipe with which they will be used.

5.03 Valves

Valve type, class, pressure rating, and size shall be determined by DB Co and shall be suitable for the work.

5.04 Concrete Reinforcement

Steel reinforcing for concrete work shall be according to OPSS 1440.

5.05 Grout

Grout shall consist of a mixture of one part Portland cement according to OPSS 1301 and two parts mortar sand according to OPSS 1004, wetted with sufficient water to make the mixture plastic. Water shall be according to OPSS 1302.

5.08 Jacking and Boring

5.08.01 Pipe Materials

Concrete pipe shall conform to OPSS 1820.

Steel pipe shall conform to OPSS 1802 with welded joints.

5.09 Horizontal Directional Drilling

5.09.01 Drilling Fluids

The drilling fluids shall be mixed according to the manufacturer's recommendations and be appropriate for the anticipated soil conditions. Only bentonite and manufacturer-approved polymers shall be permitted for use as drilling fluids. All additives used shall be chemically inert, biodegradable, and non-toxic. No petroleum-based or detergent additives shall be permitted.

5.09.02 Pipe Materials

DB Co shall determine the pipe type and pipe class suitable for the Work.

5.10 Pipe Bursting

5.10.01 Pipe Materials

DB Co shall determine the pipe type and pipe class suitable for the Work.

5.10.02 Lubricant

Lubricant used to reduce friction, to maintain the annular space created by the pipe bursting head, and to allow the insertion of the new product shall be non-toxic and biodegradable.

5.11 Pipe Ramming

5.11.01 Pipe Materials

Steel pipe shall conform to OPSS 1802 with welded joints.

6.0 EQUIPMENT

6.01 Horizontal Directional Drilling

6.01.01 Directional Drilling Equipment

6.01.01.01 General

The directional drilling equipment shall consist of a directional drilling rig and a drilling fluid mixing and delivery system of sufficient capacity to successfully complete the product installation without exceeding the maximum tensile strength of the product being installed.

6.01.01.02 Drilling Rig

The directional drilling rig shall:

- a) consist of a leak-free hydraulically powered boring system to rotate, push, and pull hollow drill pipe into the ground at a variable angle while delivering a pressurized fluid mixture to a guidable drill head.
- b) contain a guidance system to accurately guide boring operations.
- c) be anchored to the ground to withstand the rotating, pushing, and pulling forces required to complete the product installation.
- d) be grounded during all operations or as specified by the drilling rig manufacturer.

6.01.01.03 Drill Head

The drill head shall be steerable by changing its rotation, be equipped with the necessary cutting surfaces and drilling fluid jets, and be of the type for the anticipated soil conditions.

6.01.01.04 Guidance System

The guidance system shall be setup, installed, and operated by trained and experienced personnel. The operator shall be aware of any magnetic or electromagnetic anomalies and shall consider such influences in the operation of the guidance system when a magnetic or electromagnetic system is used.

6.01.01.05 Drilling Fluid Mixing System

The drilling fluid mixing system shall be of sufficient size to thoroughly and uniformly mix the required drilling fluid.

6.01.01.06 Drilling Fluid Delivery System

The delivery system shall have sufficient flow capacity to ensure that all slurry volumes are adequate for the length and diameter of the final bore and the anticipated soil conditions. Connections between the delivery pump and drill pipe shall be leak-free.

6.02 Pipe Bursting

6.02.01 Pipe Bursting Head

The pipe bursting head shall be according to the manufacturer's specifications for head sizes recommended for various product diameters and types, as well as parameters associated with maximum allowable upsize percentages.

6.02.02 Pipe Bursting Power Source

The pipe bursting power source shall generate sufficient force to burst and compact the existing pipe product into the surrounding material. It must also be able to pull the new pipe product into place, if done simultaneously with the bursting operation without imparting undue stresses to the pipe product installed.

6.02.03 Fusion Equipment

Fusion equipment, when used, shall be size and rated for the product. Fusion clamps shall be sized to clamp the new product properly.

7.0 CONSTRUCTION

7.01 General

DB Co shall perform the pipe installation by a trenchless method as selected from the various methods described herein. An individual with previous experience in the selected method of installation shall supervise the work at all times.

The City Representative shall be notified at least 48 hours in advance of starting work.

The work area shall be kept sufficiently dry at all times to permit work to be performed in a safe and satisfactory manner.

7.02 Site Preparation

The work site shall be graded or filled to provide a level working area for the Equipment. No alterations beyond what is required for the selected pipe installation method shall be made. All activities shall be confined to designated work areas.

7.03 Preservation and Protection of Existing Facilities

Preservation and protection of existing facilities shall be according to OPSS 491 and as specified.

When specified in the Project Agreement and DB Co's design, an existing facility shall be exposed to verify its horizontal and vertical location. The number of exposures required to monitor work progress shall be as specified in the Project Agreement and DB Co's design.

7.04 Transporting, Unloading, Storing, and Handling Materials

Manufacturer's recommendations for transporting, unloading, storing, and handling of materials shall be followed.

7.05 Trenching, Backfilling, and Compacting

Trenching, backfilling, and compacting for entry and exit points or other locations along the pipeline installation shall be according to OPSS 401.

7.06 Support Systems

Support systems shall be according to OPSS 404.

7.07 Dewatering

Dewatering shall be according to OPSS 517.

7.08 Temporary Protection Systems

The construction of temporary protection systems shall be according to OPSS 539.

Where the stability, safety, or function of an existing roadway, railway, watercourse, other works, or proposed works may be impaired due to the method of operation, protection shall be provided. Protection may include sheathing, shoring, and piling where necessary to prevent damage to such works or proposed works.

7.09 Construction Shafts

Where required, construction shafts shall be provided at the locations determined by DB Co.

Shafts shall be maintained in a drained condition.

A secure fence shall be installed around the perimeter of the access shaft or pit area with gates and truck entrances. The fence shall be removed upon completion of the work.

7.10 Removal of Boulders and Cobbles

Methods for the removal of boulders and cobbles shall be according to DB Co's submissions. The City Representative shall be notified immediately of any obstructions encountered.

7.11 Jacking and Boring

7.11.01 Method of Jacking and Boring Procedure

The jacking and boring procedure to be used shall be submitted to the City Representative prior to commencing the work and shall be subject to the following limitations:

- a) Only smooth walled steel or concrete pipe shall be used.
- b) Hydraulically operated jacks of adequate number and capacity shall be provided to ensure smooth and uniform advancement without over-stressing of the pipe.
- c) A jacking head or collar shall be provided to transfer and distribute jacking pressure uniformly over the entire end bearing area of the pipe. In the case of concrete pipe, the jacking head shall be suitably padded.
- d) Two or more lubricated guide rails or sills shall be provided of sufficient length to fully support the pipe at the specified line and grade in the jacking pit.
- e) The jacking and boring procedure shall be compatible with the subsurface and groundwater conditions at the site.

7.11.02 Pipeline Installation

The pipeline shall be installed to the line, grade, and tolerance as designed.

When steel pipe is used as a carrier pipe, butt-welding of pipe joints shall be according to AWWA C206.

When steel pipe is used solely as a casing pipe, the welds shall be sufficient to support the jacking forces of the pipe installation.

The space between the casing pipe and the wall of the excavation shall be filled according to DB Co's submission on grouting operations.

The space between the casing pipe and the carrier pipe shall be filled according to DB Co's submission on grouting operations.

Joints shall be protected from crushing by placing 15 mm thick plywood on spigot shoulder. The plywood shall be cut to form a ring with the outer surface conforming to the outer circumference of the pipe.

7.11.03 Cathodic Protection

When specified in the Project Agreement and DB Co's design, cathodic protection on the casing pipe shall be provided.

7.12 Horizontal Directional Drilling

7.12.01 General

When strike alerts are provided on a drilling rig, they shall be activated during drilling and maintained at all times.

7.12.02 Preservation and Protection of Existing Facilities

Minimum horizontal and vertical clearances to existing facilities as specified in the Project Agreement and DB Co's design shall be maintained. Clearances shall be measured from the nearest edge of the largest backreamer required to the nearest edge of the facility being paralleled or crossed.

Existing underground facilities shall be exposed to verify its horizontal and vertical locations when the bore path comes within 1.0 m horizontally or vertically of the existing facility. Existing facilities shall be exposed by non-destructive methods. The number of exposures required to monitor work progress shall be as specified in the Project Agreement and DB Co's design.

7.12.03 Drilling Fluid Management

DB Co shall employ a containment, collection, and disposal method satisfactory to the City to prevent spillage of drilling fluids and inadvertent returns. DB Co shall immediately clean up and dispose of any spillages of drilling fluids.

7.12.04 Pilot Bore

The pilot bore shall be drilled along the bore path in accordance with the grade, alignment, and tolerances specified in the Project Agreement and DB Co's design. In the event the pilot bore does deviate, the City Representative shall be notified. The City Representative may require DB Co to pullback and re-drill from the location along the bore path before the deviation. In the event that a drilling fluid fracture, inadvertent returns, or loss of circulation occurs during pilot bore drilling operations, the City Representative shall be advised of the event and of the action taken.

If a drill hole beneath a road must be abandoned, the hole shall be backfilled with grout or bentonite to prevent future subsidence.

7.12.05 Reaming

When necessary, the bore shall be reamed using the appropriate tools to a diameter 50% greater than the outside diameter of the products to a maximum 300 mm beyond the product diameter.

The drilling mud in the annular region should not be removed after installation, but permitted to solidify and provide support for the pipe and surrounding soil.

7.12.06 Product Installation

7.12.06.01 General

The product shall be jointed according to manufacturer's recommendations. Where space and the Project Agreement and DB Co's design permit, the length of the product to be pulled shall be jointed as one length before commencement of the pulling operation.

The product shall be protected from damage during the pullback operation.

The minimum allowable bending radius for the product shall not be exceeded at the entry point, exit point, or any other location along the bore path.

Product shall be allowed to recover before the connection to new or existing facility is made. Product recovery time shall be according to manufacturer's recommendations.

A tracer wire shall be supplied and installed along with the product.

7.12.06.02 Pullback

After successfully reaming the bore to the required diameter, the product shall be pulled through the bore path. Once the pullback operation has commenced, it shall continue without interruption until the product is completely pulled into bore.

A swivel shall be used between the reamer and the product being installed to prevent rotational forces from being transferred to the product. When specified in the Project Agreement and DB Co's design, a weak link or breakaway connector shall be used to prevent excess pulling force from damaging the product.

The product shall be inspected for damage where visible at excavation pits and where it exits the bore. Any damage noted shall be rectified to the satisfaction of the City.

7.12.07 Product Testing

Where required, product testing shall be as specified in the Project Agreement and DB Co's design.

7.12.08 Record Keeping

Verification record requirements of the alignment and depth of the installed product shall be as specified in the Project Agreement and DB Co's design. A copy of the verification records shall be given to the City Representative at the completion of the HDD operations.

7.13 Pipe Bursting

7.13.01 General

The product shall be installed following the alignment and grade of the existing pipe and to the ovality specified in the Project Agreement and DB Co's design.

Launch pits and pull pits shall be sized to allow the use of the pipe bursting equipment and to allow the product to be installed such that the product manufacturer's recommendations for product bending radius are not exceeded.

7.13.02 Product By-Pass

When specified in the Project Agreement and DB Co's design, during the execution of the work the flow within the existing product shall be bypassed around the product being replaced and the continuity of service to each facility connected to the affected section of product shall be maintained.

The pumps and by-pass lines shall be of adequate capacity and size to handle all flows.

7.13.03 Preparation of Existing Product and Structures

All existing crosses, tees, valves, and service connections shall be located, exposed, and disconnected prior to any pipe bursting operation.

Prior to pipe bursting, the inlets, outlets, and benching of existing structures shall be enlarged sufficiently for clearance of the pipe bursting head and the new product. Enlargements shall be made neatly and be no greater than that required for their purpose. Size of the enlargements shall be sufficient to allow for restoration and sealing to the new product.

Existing product shall be cleared of obstructions (e.g., rocks and debris) or mechanical obstructions (e.g., repair sleeves, clamps, couplings, and intolerable deviations in grade or alignment) prior to pipe bursting.

7.13.04 Product Joining

7.13.04.01 Genera

The product shall be joined according to the manufacturer's recommendations.

The product shall be assembled and joined at the site to provide a leak-proof joint.

When space and the Project Agreement and DB Co's design permit, the length of the product to be pulled shall be joined as one length prior to the commencement of the pulling operation.

When used, fusion shall be performed by technicians trained in the use of the fusion equipment.

Joints shall be capable of withstanding the loading of the installation process. All joints shall be subject to acceptance by the City prior to insertion.

7.13.04.02 Connection to Product or Structures

Product shall be allowed to recover from any induced stresses and strains before connection to new or existing product or structures are made. Product recovery time shall be according to the manufacturer's recommendations.

The product connection to the structure or to an existing product shall be leak-proof.

7.13.04.03 Service Connections

Service connection work shall be as specified in the Project Agreement and DB Co's design.

Service connection work shall not commence until the product has fully recovered.

7.13.04.04 Product Installation

Installation procedures shall be according to the product manufacturer's guidelines.

The product shall be protected from damage during the installation process.

Suitable guides shall be used to protect the product from damage at the insertion point and at any intermediate re-entry points.

Upon commencement of the bursting process, product insertion shall be continuous from the launch pit to the pull pit, except when approved by the City. A pushing machine may be used to assist insertion from the rear.

When specified in the Project Agreement and DB Co's design, a weak link, breakaway connector, or load monitor shall be used to prevent excess pulling force from damaging the product.

7.13.04.05 Structures and Valves

When the new product enters or exits an existing structure, the structure wall shall be restored as specified in the Project Agreement and DB Co's design. Restoration shall securely locate and anchor the new product in the wall and shall produce a leak-proof seal.

The existing structure's benching shall be restored according to the requirements of the new product, any other incoming product, and as specified in the Project Agreement and DB Co's design.

When new structures or valves are specified, they shall be installed according to OPSS 407 and OPSS 441, respectively.

7.13.04.06 Testing

Testing of the product joining and installation shall be as specified in the Project Agreement and DB Co's design.

7.13.04.07 Record Keeping

Verification record requirements of the alignment and grade of the installed product shall be as specified in the Project Agreement and DB Co's design. A copy of the verification records shall be given to the City Representative at the completion of the pipe bursting operations.

7.14 Pipe Ramming

7.14.01 Method of Pipe Ramming Procedure

Method of installation to be used by DB Co shall be reviewed with the City Representative prior to commencing the work and shall be subject to the following limitations:

- a) Only smooth walled steel pipe shall be used.
- b) Pipe ramming equipment of adequate capacity shall be provided to ensure smooth and uniform advancement without overstressing of the pipe.
- c) A ramming head shall be provided to transfer and distribute jacking pressure uniformly over the entire bearing area of the pipe.
- d) Two or more lubricated guide rails or sills shall be provided of sufficient length to fully support the pipe at the specified line and grade in the ramming pit.

7.14.02 Product Installation

The pipeline shall be installed to the line, grade, and tolerance as specified in the Project Agreement and DB Co's design.

Long delays shall be avoided between pipe ramming operations.

Butt welding of pipe joints shall conform to AWWA C206.

Any distribution to the ground surface (heaving) as a result of the pipe ramming shall be immediately corrected by DB Co.

The space between the casing pipe and the wall of the excavation shall be filled according to DB Co's submission on grouting operations.

7.14.03 Excavated Materials

Satisfactory reusable excavated material required for backfill shall be separated from unsuitable excavated material.

7.15 Site Restoration

Site restoration shall be according to OPSS 492.

7.16 Certificate of Conformance

Certificates of conformance shall be submitted for all work for which Working Drawings are submitted.

A completed certificate of conformance shall be submitted to the City Representative upon completion of the work. The Quality Verification Engineer's seal and signature shall be affixed on the completed certificate of conformance confirming that work has been completed in general conformance with the Working Drawings and Project Agreement and DB Co's design.

7.17 Management of Excess Materials

Management of excess materials shall be according to the Project Agreement and DB Co's design.

SCHEDULE 16

ENCUMBRANCES

- (a) For the purposes of this Schedule 16, the defined term “Lands” shall include any portion of the Lands.
- (b) Each of the following, to the extent affecting the interest (whether real property interest or contractual interest) of the City in the Lands or any other person who owns the Lands (or any part thereof), is, in each case, considered to be an encumbrance for the purposes of the Project Agreement (each, an “**Encumbrance**”):
 - (i) all encumbrances, pledges, liens, charges, security agreements, security interests, leases, subleases, title retention agreements, mortgages, easements, encroachments, rights-of-way, restrictive covenants, work orders, options or adverse claims of any kind or character whatsoever relating to the title to the Lands disclosed or noted on the land registry office parcel registers or abstract indices for the Lands from time to time, including (but not limited to) those that may have been included in the Background Information as of the date of the Project Agreement, those described or contemplated in Schedule 20 - Lands and including those referred to in the legal descriptions for the Lands available in the applicable land registry office, in each case as assigned, amended, extended, supplemented, substituted and replaced from time to time;
 - (ii) liens, charges or prior claims for taxes (which term includes charges, rates and assessments) or utilities (including levies or imposts for sewers and other municipal utility services) not yet due or if due, the validity of which is being contested in good faith, and liens or charges for the excess of the amount of any past due taxes or utilities charges for which a final assessment or account has not been received over the amount of such taxes or utilities charges as estimated and paid by the City;
 - (iii) inchoate liens incidental to construction, renovations or current operations, a claim for which shall not at the time have been registered against the Lands or of which notice in writing shall not at the time have been given to the City pursuant to the CA or otherwise or any lien or charge, a claim for which, although registered, or notice of which, although given, relates to obligations not overdue or delinquent and in respect of any of the foregoing cases, the City has, where applicable, complied with the holdback or other similar provisions or requirements of the relevant construction contracts;
 - (iv) the rights reserved to or vested in the public or any municipality or governmental or other public authority by any statutory provision;
 - (v) any subsisting reservations, limitations, provisions and conditions contained in any grants from the Crown of any land or interests therein, including reservations of under-surface rights to mines and minerals of any kind including rights to enter, prospect and remove the same;
 - (vi) any encroachments, easements, rights-of-way, rights to use or similar interests revealed by any survey of the Lands or which would be revealed by an up-to-date survey of the Lands;

- (vii) any rights in favour of or accruing to holders of under-surface rights which could be ascertained by a review of registered title or other public records, or, if unregistered, which do not materially interfere with the use of the Lands for the purposes of the Works;
- (viii) unregistered agreements with any municipal, provincial or federal governments or authorities and any public utilities or private suppliers of services, provided such unregistered agreements have been disclosed to DB Co, are described in Schedule 20 - Lands or could be ascertained by commercially standard off-title searches, or, if not so disclosed, described, or ascertainable, which do not materially interfere with the use of the Lands for the purposes of the Works, and further provided that such agreements have been complied with up to Financial Close, or, if not complied with (excluding non-compliance by DB Co and DB Co Parties), that any non-compliance does not materially interfere with the use of the Lands for the purposes of the Works;
- (ix) unregistered agreements, authorizations, consents, postponements, subordinations, licences or instruments entered into provided that they have been disclosed to DB Co, are described in Schedule 20 – Lands or could be ascertained by commercially standard off-title searches, or, if not so disclosed, described or ascertainable, which do not materially interfere with the use of the Lands for the purposes of the Works, and further provided such agreements, authorizations, consents, postponements, subordinations, licences or instruments have been complied with up to Financial Close, or, if not complied with (excluding non-compliance by DB Co and DB Co Parties), that any non-compliance does not materially interfere with the use of the Lands for the purposes of the Works;
- (x) unregistered easements, rights-of-way, rights to use, restrictions, restrictive covenants and similar rights in real property or any interest therein provided that they have been disclosed to DB Co, are described in Schedule 20 – Lands or which could be ascertained by commercially standard off-title searches, or if not so disclosed, described or ascertainable, which do not materially interfere with the use of the Lands for the purposes of the Works, and further provided such easements, rights of way, rights to use, restrictions, restrictive covenants and similar rights or interests have been complied with up to Financial Close, or, if not complied with (excluding non-compliance by DB Co and DB Co Parties), that any non-compliance does not materially interfere with the use of the Lands for the purposes of the Works;
- (xi) zoning (including, without limitation, airport zoning regulations), land use, property standards and building by-laws and ordinances, and federal, provincial or municipal by-laws and regulations;
- (xii) minor imperfections of title;
- (xiii) statutory exceptions to title and any rights reserved to or vested in any person by any statutory provision;
- (xiv) the right of any prior owner, occupant or tenant of any portion of the Lands to occupy any portion of the Lands or to remove buildings, fixed machinery, equipment, fittings or other fixtures located on such portion of the Lands; and
- (xv) the rights of any person entitled to any portion of the Lands through length of adverse possession or prescription.

**SCHEDULE 17
ENVIRONMENTAL OBLIGATIONS**

[REDACTED]

SCHEDULE 18
COMMUNICATIONS AND STAKEHOLDER ENGAGEMENT OBLIGATIONS

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PART 1 DEFINITIONS

- 1.1** **“Construction Activities Incident”** has the meaning given in Section 5.1(e).
- 1.2** **“Construction Complaints Protocol”** has the meaning given in Section 4.15(b).
- 1.3** **“Communications Performance Report”** has the meaning given in Section 4.16(a).
- 1.4** **“Communications and Stakeholder Engagement Objectives”** has the meaning given in Section 2.2(a).
- 1.5** **“Communications and Stakeholder Engagement Plan”** has the meaning given in Section 3.1(a)(i).
- 1.6** **“Communications and Stakeholder Engagement Working Group”** has the meaning given in Section 6.1(a).
- 1.7** **“Crisis Communication Plan”** has the meaning given in Section 4.4(a).
- 1.8** **“DB Co Communications and Stakeholder Engagement Team”** has the meaning given in Section 3.2(a)(xix).
- 1.9** **“Key Milestone Celebrations”** means celebrations and larger events with the objective of building momentum for the Project, recognizing project milestones and partners. These celebrations include groundbreakings, progress events, and substantial completion.
- 1.10** **“Stakeholder Relations”** has the meaning given in Section 2.2(a)(i).

PART 2 PRINCIPLES, OBJECTIVES AND SCOPE

2.1 Communications and Stakeholder Engagement Principles

- (a) The Project represents an important infrastructure commitment by the City. Comprehensive plans for communications and Stakeholder engagement are required to ensure Stakeholders are informed and engaged where necessary and to meet the City's communications and Stakeholder engagement requirements.
- (b) The City and DB Co shall work together to deliver these communications and Stakeholder engagement activities pursuant to the Project Agreement, including this Schedule 18.
- (c) The City will act as the public face of the project and lead on all Stakeholder relations and communications activities.
- (d) DB Co acknowledges that:
 - (i) DB Co is the City's and the Stakeholders' primary source of information with respect to all matters within DB Co's control for the Project; and
 - (ii) the City, at all times during the Project Term, shall rely upon DB Co not only to anticipate matters which may be of interest and concern to Stakeholders during the Project Term (based on its experience as well as lessons learned during the course of the Project), but also to proactively organize and disseminate such information in accordance with its obligations in the Project Agreement.

2.2 Communications and Stakeholder Engagement Objectives

- (a) The Communications and Stakeholder Engagement Objectives of the Project are as follows:
 - (i) to engage with Stakeholders to provide targeted information to area residents and businesses on the Project design and Construction Activities and their potential impacts ("Stakeholder Relations") by:
 - (A) communicating disruptions, such as detours, overnight work, traffic adjustments and beginning of construction, in an effective and timely manner;
 - (B) providing public information and consultation opportunities to ensure Stakeholders are informed and engaged throughout to minimize complaints and increase understanding of the Project;
 - (C) ensuring Stakeholder input is obtained in a timely manner so that it may be properly considered by the Parties; and
 - (D) continuing to work with established community working groups and other networks identified during the planning and Environmental Assessment phase.
 - (ii) To communicate in a manner that builds excitement and understanding of the Project by:
 - (A) developing momentum-building communications to promote the Project, including

Key Milestone Celebrations, signage, hoarding, and advertising;

- (B) developing resources and templates to effectively and consistently communicate with Stakeholders; and
- (C) recognizing the contribution of the Parties in this Project Agreement and the City's funding partners.

2.3 Communication and Stakeholder Engagement Scope

- (a) The scope of this Schedule 18 includes, but is not limited to, all print, event and electronic communications and Stakeholder engagement related to: planning, design, Environmental Approvals, Construction Activities, Project milestones, community and Stakeholder relations, media relations, media and governmental events, other special events, public information meetings, branded products, the Project website, social media, complaints and issues related to the Project, and any responses to such complaints or issues.

**PART 3 COMMUNICATIONS AND STAKEHOLDER ENGAGEMENT RESPONSIBILITIES
DURING THE PROJECT TERM**

3.1 City Responsibilities

- (a) The City will assume the lead communications and Stakeholder engagement role and will have the primary responsibility for all communications matters and Stakeholder Relations related to the Project. The City will:
 - (i) develop a yearly updated Project communications and stakeholder engagement plan (the “**Communications and Stakeholder Engagement Plan**”) with input from DB Co;
 - (ii) develop and provide tools and templates for all communications and Stakeholder engagement Project materials, unless otherwise specified in this Schedule 18;
 - (iii) develop and maintain a website, with input from DB Co;
 - (iv) provide identified, dedicated lead communications and Stakeholder engagement contacts;
 - (v) act as the primary media contact for the Project;
 - (vi) provide final review and approval of all communications and Stakeholder engagement materials;
 - (vii) communicate promptly with all relevant parties on Project issues; and
 - (viii) provide coordinated updates to Stakeholders.

3.2 DB Co Responsibilities

- (a) DB Co shall:
 - (i) carry out all activities required to fulfill all of DB Co’s communications and Stakeholder obligations in accordance with this Schedule 18;
 - (ii) along with the City, participate in the development of Communications and Stakeholder Engagement Plans, and develop the Crisis Communication Plan in consultation with the City and Stakeholders and in accordance with this Schedule 18;
 - (iii) implement and comply with all plans, protocols and other documentation that have been reviewed and approved by the City and in accordance with this Schedule 18;
 - (iv) provide all information, materials and support to the City, as the City may reasonably require, in accordance with the requirements in the Communications and Stakeholder Engagement Plan and this Schedule 18;
 - (v) assist the City in responding to media, government and public enquiries related to the Project including but not limited to subject-matter expertise, key facts and media questions and answers in accordance with the requirements in the Communications and

Stakeholder Engagement Plan and this Schedule 18;

- (vi) provide, where required by the City, Project experts, to include but not be limited to design and construction engineers and environmental specialists to participate in special events, Stakeholder events and outreach meetings;
- (vii) in accordance with Part 5 of this Schedule, provide regular notifications to the City related to the management of local traffic during the Construction Period and ensure communication obligations in relation to the TTMP as detailed in Schedule 15-2, Part 7 – Traffic and Transit Management and Construction Access are fulfilled;
- (viii) attend special events, site tours and Stakeholder events and Stakeholder outreach meetings in accordance with Part 4 of this Schedule;
- (ix) work with the City to build and foster relationships with local businesses and the public in order to address the community's concerns about the Works;
- (x) make staff available to respond to enquiries from Stakeholders about the Works;
- (xi) support the City in providing regular updates to immediately-affected property owners, tenants and neighbourhoods on Works related issues;
- (xii) support the City in notifying affected residents and businesses of Construction Activities in accordance with Part 5 of this Schedule;
- (xiii) provide any necessary information required to demonstrate compliance with and fulfillment of the consultation related provisions of the Environmental Assessments and any other Environmental Approvals as detailed in Schedule 17 – Environmental Obligations;
- (xiv) support the City in making communications materials accessible to the public by meeting the City's Accessibility Standards in compliance with the *Accessibility for Ontarians with Disabilities Act* (AODA) and in keeping with the City's Accessibility Policy and Procedures;
- (xv) support the City in making communications materials available in French and English where required by the City in compliance with the City's Bilingualism Policy;
- (xvi) work with all DB Co Parties, the City, and Project Stakeholders in carrying out DB Co's obligations as set out in this Schedule 18;
- (xvii) ensure that DB Co and DB Co Parties exhibit a high degree of professionalism and courteousness with respect to carrying out all of DB Co's obligations under this Schedule 18, including:
 - (A) attendance at City-requested special events, site tours, Stakeholder events and Stakeholder outreach meetings;

- (B) managing staff and contractor parking such that it does not negatively impact neighbourhood or business access;
 - (C) not littering; and
 - (D) protecting and restoring any affected City and Third Party Facilities adjacent to the Works, in accordance with Schedule 15-2, Part 1, Article 4.1.
- (xix) provide a description of DB Co's dedicated communications and Stakeholder engagement team (the "**DB Co Communications and Stakeholder Engagement Team**"), within 45 days of Financial Close, including the roles, responsibilities and experience of each team member and DB Co Party who will assist the implementation of Schedule 18. The DB Co Communications and Stakeholder Engagement Team shall:
- (A) be led by a Director of Communications and Stakeholder Engagement who:
 - 1) shall have the qualifications set out in Schedule 9 – Key Individuals;
 - 2) is a member of DB Co's management team;
 - 3) is responsible for acting as the media spokesperson;
 - 4) possesses demonstrated relevant communications experience.
 - (B) provide sufficient other members of the team to meet the obligations of this Schedule who have relevant experience in communications writing, media relations, crisis communications, issues management, corporate and community relations;
 - (C) include at least one member acting as a Stakeholder outreach coordinator; and
 - (D) each member of the DB Co Communications and Stakeholder Engagement Team other than the Director shall possess a minimum of five years of transit or transportation construction-related communications experience.
- (b) DB Co acknowledges and agrees that, notwithstanding any other provision in this Schedule 18, the City will review and approve all communications and Stakeholder engagement materials with respect to the Project, and DB Co may not make any communications or disseminate any materials to Stakeholders with respect to the Project without the prior consent of the City.

3.3 Communications and Stakeholder Engagement Plan

- (a) The DB Co Communications and Stakeholder Engagement Team shall, no later than 60 days following Financial Close participate in the first Communications and Stakeholder Engagement Working Group meeting where the City will present an initial outline of the Project Communications and Engagement Plan.
- (b) Based on the outline of the Project Communications and Engagement Plan and in accordance with Schedule 18, DB Co will prepare a description of its communications and Stakeholder engagement requirements, including the DCR Consultation Plan, as part of the Communications and Stakeholder Engagement Plan no later than 90 days following Financial Close. This description will include the first submission of the first yearly construction schedule as detailed in Section 4.3(a)(i).

- (c) DB Co shall participate with the City in a workshop to finalize the Communications and Stakeholder Engagement Plan. The City's communications and stakeholder engagement lead will organize and chair the workshop no later than 120 days following Financial Close.
- (d) DB Co shall participate with the City to update the Communications and Stakeholder Engagement Plan:
 - (i) on an annual basis; or
 - (ii) more frequently as may be requested by the City, or as may be required to account for any changes in the circumstances of, or lessons learned with respect to the Project.

PART 4 COMMUNICATIONS AND STAKEHOLDER ENGAGEMENT ACTIVITIES

4.1 Communications Activities - General

- (a) DB Co shall support the following communication activities during the Construction Period as requested by the City, including:
 - (i) Project communications via the Project website and social media;
 - (ii) construction schedule for communications;
 - (iii) crisis communications;
 - (iv) issues management;
 - (v) media relations;
 - (vi) government reporting;
 - (vii) special events, site tours and trade shows;
 - (viii) Stakeholder events and Stakeholder outreach meetings;
 - (ix) hoarding design, installation and maintenance during the Construction Period;
 - (x) signage and branding;
 - (xi) advertising communications and marketing;
 - (xii) Project identity and graphic design;
 - (xiii) photography and video;
 - (xiv) renderings; and
 - (xv) crisis management.

4.2 Communications via the Project Website and Social Media

- (a) During the Construction Period, DB Co shall:
 - (i) support the City's social media strategy for the Project (which may include tools such as Twitter, Facebook, YouTube and Flickr) and the City's Project websites' static (written) and dynamic (multimedia) content, by providing, for review and approval by the City, where the quality of the photography and video is as described in Section 4.13:
 - (A) a monthly feature web article highlighting, but not limited to, one aspect of the Project including, design, innovations on the Project, feature on local workers,

general contractors or local companies, Construction Activities, or Project benefits, with a minimum length of 500 words, as well as two related Twitter posts for the Project's Twitter account;

- (B) a weekly construction update on Project construction that provides a recent summary of construction work completed and upcoming work along the alignment including high-quality representative professional photographs (see Section 4.13 for photo quality specifications);
 - (C) a weekly Twitter post with photograph(s) along with associated written description for the City's use, including the Mayor;
 - (D) notifications of public consultations, consultation materials and post-consultation summaries;
 - (E) develop all photos for weekly construction updates for submission to and approval by the City;
 - (F) interactive map(s) that provide an overview of the extensions, along with information on key activities at each site (stations), which should be regularly maintained and updated monthly at a minimum;
 - (G) monthly short video clips for the purposes of social media; and
 - (H) up-to-date graphics, photos and video clips showcasing the design of each Station and progress of the Construction Activities;
- (ii) provide drafts of proactive and reactive content for responses to crisis situations, immediate issues, public queries or complaints, no later than two hours after DB Co or the City becomes aware of any such crisis situation, immediate issue, public query or complaint;
 - (iii) provide draft advance notification for the purposes of website and social media updates for review and approval by the City with respect to meetings, events, initiatives, and Construction Activities that will have a direct impact on roads, traffic and/or transit; and
 - (iv) develop web content to support government Stakeholders (e.g. MTO) web and social media communications needs for review and approval by the City.

4.3 Construction Schedule for Communications

- (a) During the Construction Period, DB Co shall prepare and submit for the City's review and approval the following schedule information. In advance of submitting the schedule information, DB Co shall also submit a template of each schedule for the City's review and approval:
 - (i) a yearly construction schedule and detour plan in a format that is readily useable in communicating the Project milestones, to be updated on a yearly basis and no later than March 31st of each calendar year to the end of the Project Term. This yearly plan should come in the form of a report with a visual chart and accompanying wording that identifies

and describes timing and impacts of major issues and disruptive activities, and the communication milestones for the upcoming year, as categorized below:

- (A) final station designs
 - (B) start/end of prescribed detours
 - (C) start/end of station construction
 - (D) start/end of hwy works or other bundled projects/component of the works
 - (E) start/end of road closures
 - (F) start/end of sidewalk and/or MUP re-alignments
 - (G) start/end of works impacting greenspace/park areas
- (ii) a semi-annual construction schedule update for use in communicating project milestones, as well as a semi-annual Project dashboard to support the City's communications and social media strategies that highlights key statistics and benefits of the Project, including but not limited to the number of local firms employed, number of local jobs created and training through registered apprenticeship programs, sub-contract value, kilometres of track laid, amount of concrete poured, level of completion of stations along the alignment extensions, to be updated no later than December 31st and June 30th of each calendar year;
- (iii) a three-month look ahead calendar outlining construction activities, including a description of scope and anticipated impacts, and any notification requirements as detailed in Part 5 of this Schedule, and based on level of impact, and DB Co resources assigned, that will support the City's communications and social media strategies; and
- (iv) a dashboard to provide regular weekly updates and bi-weekly look-aheads about Construction Activities, including statistics, amount of local investments, number of direct jobs and training through registered apprenticeship programs, schedule and other information that will support the City's communications and social media strategies.

4.4 Crisis Communication

- (a) DB Co shall develop, in consultation with the City, a Crisis Communication Plan that outlines the roles, responsibilities and contacts for DB Co in relation to the City and other partners as required (e.g. MTO) with respect to crisis communications, and identify and rank a list of potential crisis issues that could develop during the performance of the Works (the "**Crisis Communication Plan**"). The Crisis Communication Plan shall comply with the City's emergency communication plan and include notification standards for media responses, as described in Section 4.6, and shall include a crisis communication protocol. The Crisis Communication Plan must be submitted to the City, in advance of any construction activities, for review and approval in accordance with Schedule 10 – Review Procedure.
- (b) The Crisis Communication Plan must be updated 30 days following a crisis event;
- (c) During the Project Term, DB Co shall:
- (i) provide ongoing assistance to the City in the City's development and updates to the Crisis Communication Plan;

- (ii) during a crisis situation, make available sufficient DB Co communications staff and Project resources in order to work effectively with the City to proactively manage and perform DB Co's communications responsibilities as set out in this Schedule 18; and
- (iii) during a crisis situation, provide the City with holding lines within 15 minutes of the event occurring.

4.5 Issues Management

- (a) During the Project Term, DB Co shall consult with and provide reasonable assistance to the City with respect to:
 - (i) identifying issues and trends as they emerge and develop strategies for tracking, addressing, mitigating, and minimizing issues related to the Project;
 - (ii) developing messages and strategies to address issues and provide accurate and timely information to affected Stakeholders; and
 - (iii) sharing information about potential issues related to the Project with other partners.
- (b) DB Co shall respond to all issues identified by the City within a timeframe as determined by the City for each issue.
- (c) DB Co shall develop an issues management protocol to be reviewed and approved by the City.

4.6 Media Relations

- (a) During the Project Term, DB Co shall:
 - (i) direct all media enquiries and interview requests to the City's lead communications contact, who will determine the organization that is most suitable to respond to the enquiry;
 - (ii) provide draft responses and messaging to the City, with respect to all media enquiries and interview requests in a timely manner and track each request that DB Co responds to in a media request log;
 - (iii) support the City with respect to all media enquiries and interview requests;
 - (iv) provide designated media relations staff (with backup media trained personnel, as required) with 24/7 availability to monitor, draft messaging and prepare responses to enquiries as requested by the City, in accordance with its level of urgency, as per the categories listed in Part 4.6(vii) below;
 - (v) provide communications training to DB Co staff, including refresher training regarding the City's communication protocols and policies for handling media, public, and Stakeholder interaction;

- (vi) make available a DB Co designated media relations staff member and construction manager or similar expert for the purposes of responding to technical matters related to media requests and interview requests if required and as requested by the City;
- (vii) provide the City with information as requested to respond to media inquiries and with the level of urgency defined by the City where the measure of the level of urgency and timelines is as detailed below:
 - (A) “Crisis” requires DB Co to provide a holding statement within 15 minutes, in line with the Crisis Communications Plan;
 - (B) “Urgent” is 1 hour;
 - (C) “Medium” is 6 hours; and
 - (D) “Low” is 24 hours; and
- (viii) at least twice-yearly, provide the City with a summary of key accomplishments in a media-ready format, that can be used by the City to approach media (summary of construction progress, benefits, local economic impacts, spotlight on innovation, look aheads, etc).

4.7 Government Reporting

- (a) During the Project Term, DB Co shall:
 - (i) support the City in meeting the requirements of the Governmental Authorities funding agreements for the Project by providing information about the Project status, upcoming milestones, and issues that may affect the Project including the provision of appropriate signage for construction and special events; and
 - (ii) participate in meetings with the City and Governmental Authorities when requested by the City.

4.8 Special Events, Site Tours and Trade Show

- (a) The City and DB Co shall collaborate to develop, plan, and coordinate various special events during the Project Term.
- (b) During the Project Term, DB Co shall:
 - (i) at the City’s request, make Project sites available for governmental, public relations, media and public tours and events such that the City may, upon advance notice to, and in conjunction with DB Co, organize special events, including tours of the Site and milestone celebrations, costs of which will be borne by the City, excluding costs related to shutdown of the Project Operations or accommodations at the Site to organize such events, which shall be borne by DB Co. DB Co shall support any event described in this Section 4.8(b) as requested by the City, and provide a power source for communications equipment, and any other associated site costs.

- (ii) ensure sufficient insurance and liability coverage is in place for any special events or venues, as required by the Project Agreement;
- (iii) make DB Co staff available for events, tours of the Site, and provide support as may be required by the City;
- (iv) develop content for events, as requested by the City, including but not limited to invitations, presentations, speaking notes, signage, high quality graphics, and other visuals;
- (v) support a minimum of two on-site full alignment tours (with Site access) and four special events per year;
- (vi) during the Construction Period and in consultation with the City, plan, organize and execute a trade show no later than 180 days following Financial Close. The City will develop templates for material to be used or displayed and will review and approve all materials to be distributed. The cost of the trade show will be borne by DB Co, including costs with respect to:
 - (A) renting the venue, tables, chairs;
 - (B) production of displays, invitations, signage and printed material;
 - (C) catering;
 - (D) print and radio advertising in trade and community and national media outlets as determined by the City;
 - (E) issuing invitations, tracking RSVPs and administering a survey;
 - (F) using best efforts to ensure a minimum attendance of 200 individuals, of which at least [REDACTED]% of attendees consist of industry vendors, suppliers and other Works-related businesses and contacts;
 - (G) providing overall event logistics and event production; and
 - (H) production of post-event report to the City, the content of which may be posted publicly to the City's website.

4.9 Stakeholder Events and Stakeholder Outreach Meetings

- (a) Stakeholder events include public information sessions and public open houses, where information is shared with a group, or community feedback is solicited and presented back to the community, and invitations to the public or a larger group are issued. DB Co shall:
 - (i) With respect to the Highway Works, DB Co shall hold events as required to fulfill the requirements of Schedule 17 – Environmental Obligations, including a minimum of one

event during design, and during Highway Works as required to communicate significant activities or changes and impacts, as requested by the City further to ongoing construction monitoring.

- (ii) hold a minimum of four events during design (presentation of bid designs), 30 events during pre-construction, and during construction as required to communicate significant activities or changes and impacts, as requested by the City further to ongoing construction monitoring; and
- (iii) during the Construction Period and in consultation with the City, support and organize and execute ongoing and unplanned Stakeholder special events, the costs of which will be borne by DB Co, including costs with respect to:
 - (A) developing content for all materials including, but not limited to, high-quality presentations, boards, invitations, handouts, post-event reports;
 - (B) developing high quality pop-up displays that speak to general project details, benefits, and construction timelines that can be used at all Stakeholder events updated for consultation events during design phase and pre-construction and construction outreach;
 - (C) developing high-quality community contact cards with information on project resources and key contacts during construction;
 - (D) covering the cost of print advertising in community newspapers, as described in this Schedule;
 - (E) at the City's discretion, distribute complete unaddressed mail drops to support these events; and
- (b) Stakeholder meetings include community presentations and project presentations. These are targeted meetings for a variety of audiences to resolve issues, and communicate general and/or specific project information to a targeted audience. DB Co shall provide technical staff as required, and provide content as required, including high-quality graphics.

4.10 Signage and Branding

(a) Construction and Promotional Signage

- (i) During the Project Term, DB Co shall:
 - (A) produce, print, install, and remove signage, including wayfinding and business signage;
 - (B) prior to installation, provide to the City for approval stamped shop drawings of the sign fabrication and installation details, together with a mock-up of the signage, location and confirmation of the applicable Permits, Licences, Approvals and Agreements;

- (C) ensure appropriate signage is provided in a visible location for affected businesses to seek to ensure continuity of their business operations, including compliance with the requirements of Schedule 15-2, Part 7, Article 6.
- (D) ensure that DB Co and DB Co Parties comply with the construction and promotional signage requirements set out in the Project Agreement;
- (E) ensure the government Project signs are visibly displayed along the corridor throughout the Project Term;
- (F) ensure that all signage is kept in good condition when installed and when not in use;
- (G) replace any signage that is damaged by DB Co at DB Co's expense;
- (H) provide screws, support posts and other fastening materials to install signage that are made of materials of good quality and durability;
- (I) remove graffiti on temporary signage within 24 hours or, in the event that graffiti cannot be removed by means of normal cleaning methods, DB Co shall replace the damaged signage;
- (J) upon request from the City, DB Co shall design and provide dimensions of hoarding, fencing and barriers to support temporary signage provided by the City; and
- (K) provide personnel to install, remove and relocate signage on an expedited basis, if required by the City.

(b) **Hoarding**

- (i) DB Co shall:
 - (A) develop a hoarding plan with the City that will respect various community contexts and build understanding and enhance the public image of the Project;
 - (B) as part of the hording plan, identify sites for the City's review and acceptance, where decorative hoarding would be beneficial and context-specific materials (scrim, metal sheets or plywood), and develop consistent hoarding design. Sites will include, but are not limited to:
 - 1) high visibility and/or high traffic (pedestrian, cycling or car);
 - 2) sites close to a community or greenspace being affected by Construction Activities; and
 - 3) sites in close proximity to businesses.
 - (C) produce, print, install, remove and store decorative hoarding, including wayfinding and business signage;

- (D) prior to installation, provide to the City for approval, stamped shop drawings of the decorative hoarding, fabrication and installation details, together with a mock-up of the decorative hoarding, location and confirmation of the applicable Permits, Licences, Approvals and Agreements;
 - (E) ensure that DB Co and DB Co Parties comply with the hoarding requirements set out in the Project Agreement;
 - (F) ensure that all decorative hoarding is kept in good condition when installed;
 - (G) replace any decorative hoarding that is damaged by DB Co at DB Co's expense; and
 - (H) remove graffiti on decorative hoarding within 24 hours or, in the event that graffiti cannot be removed by means of normal cleaning methods, DB Co shall replace hoarding at sites, to a maximum of five hoarding panel replacements per year, within a reasonable time period or as otherwise required by Applicable Law.
- (ii) The City shall develop the graphic design of the hoarding.

4.11 Advertising Communications and Marketing

- (a) During the Construction Period, the City shall:
- (i) provide DB Co with its plan detailing advertisement and communications marketing strategies for the Project;
 - (ii) provide DB Co with templates for use in drafting public notices and advertisements including Stakeholder engagement opportunities and construction impacts; and
 - (iii) review and approve advertisements produced by DB Co about the Project's design and construction impacts and Stakeholder engagement opportunities related to the Project.
- (b) During the Construction Period, DB Co shall:
- (i) support and contribute to the planning, development and execution of the City's public education and advertising campaigns related to the Works;
 - (ii) at DB Co's cost, plan, develop, and coordinate the placement of advertisements to communicate ongoing construction impacts and to inform Stakeholders of engagement activities through a mix of media, including but not limited to, print daily, community and commuter newspapers, radio, online media, multimedia and unaddressed mail in accordance with the following:
 - (A) for each of the 30 Stakeholder events described in Part 4 of this Schedule, DB Co shall provide one insertion in a local community or daily newspaper (black and white, half page in size);
 - (B) for construction notices that indicate significant, long-term construction impacts of

more than six months in duration, the frequency of the ads placed or notices issued will be based on the Construction Contractor's schedule and will include content for social media and City's regular communications channels (e.g. public service announcements), and could also include one local community or daily newspaper notice per major stage in work (black and white, quarter page in size); and

- (C) for significant construction impacts (defined by the City in the traffic notification process) that have a significantly high impact on traffic and mobility, DB Co is responsible for the production of and cost to book regular 15-second sponsor messages on weekdays, in the morning and afternoon peak commuter times. Radio ads will be played twice each hour between 6:00 a.m. and 10:00 a.m. in the morning and between 3:00 p.m. and 7:00 p.m. in the afternoon. Ads should appear on local radio stations of equal gross rating points to CFRB and/or CIHT (for radio).
- (iii) DB Co shall be responsible for the cost and coordination of Canada Post distribution of construction notices based on a 500 metre distribution area surrounding the area where the applicable Construction Activities are occurring; and shall:
 - (A) provide content for public information and Stakeholder engagement materials;
 - (B) write content for monthly newsletters about the Project, for review and approval of the City;
 - (C) use hoarding and any other areas within the Lands for communication of the Project; and
 - (D) not use, permit or authorize any third party to use any areas within the Lands for advertisement, without the prior written consent of the City, or as otherwise permitted in accordance with this Project Agreement;
- (iv) for clarity, DB Co shall submit all advertisements, insertions, construction notices, messages, and other associated documentation contemplated in this Section 4.10(b) for the City's review and approval prior to distributing, placing, posting, issuing, or producing any such advertisement, insertion, construction notice, message or any other documentation.

4.12 Project Identity and Graphic Design

- (a) The City shall develop the brand identity for the Project and provide templates to DB Co as required during the Construction Period.
- (b) During the Construction Period, DB Co shall:
 - (i) apply the City' design templates for information related to the Project and comply with Project identity standards on all information materials; and
 - (ii) provide all content and design layout of communication and community engagement materials, including quarterly newsletters, advertisements, public notices, flyers and publications to the City for review and approval at least three weeks prior to distribution.

4.13 Photography and Video

- (a) For the purposes of record-keeping and demonstrating the progress of the Project during the Construction Period, DB Co shall engage a professional photographer or field staff with appropriate equipment and training:
 - (i) on a regular basis and at least weekly, provide high-quality photographs, graphics and images of the Project to the City for use in publications, presentations and on public websites, using a professional DSLR or mirrorless type camera. Photographs must be sharp, high-quality digital JPEG files at 300 DPI with an 8-bit colour depth, preferably converted from RAW image format;
 - (ii) provide quality video clips of the Project to the City for use on Project websites and social media each month;
 - (iii) develop a promotional video during the design phase that incorporates information and visuals of the complete extension, including but not limited to station designs. Video should incorporate key facts of the project, objectives, and connections provided by the extensions (educational institutions, cultural institutions, recreation, retail destinations, etc.) with project objectives, stations renderings, project details and connectivity;
 - (iv) produce yearly, high-quality video during construction that incorporates visuals provided to the City with the objective of showing and highlighting construction progress; and
 - (v) cause DB Co staff or DB Co Parties to provide consent to City with respect to City's disclosure of photo and video content relating to the Project.
- (b) During the Project Term, DB Co shall, from time to time and as reasonably requested by the City, facilitate access for designated photographers and videographers.

4.14 Renderings

- (a) In addition to the renderings required in Schedule 10 – Review Procedure and Schedule 15-2, Part 4, Article 1 - Introduction, DB Co shall submit up to 10 additional photo-realistic renderings as requested by the City.

4.15 Complaints Protocols

- (a) During the Project Term, the City shall be responsible for approving all responses to complaints and enquiries relating to the Project, and will be the lead on their intake, and will lead on tracking.
- (b) During the Construction Period, DB Co shall:
 - (i) provide to the City for incorporation into the Construction Communications and Stakeholder Relations Plan, a complaints protocol addressing how DB Co will deal with and respond to enquiries, suggestions and complaints received with respect to the Project (the “**Construction Complaints Protocol**”) in an appropriate and timely manner, and

shall submit the Construction Complaints Protocol to the City for review and approval under the Schedule 10 – Review Procedure.

- (ii) be responsible for maintaining a software system that will track all complaints, enquiries, suggestions, and responses received with respect to the Project;
 - (iii) provide monthly complaint reports to the City, including an analysis of the main areas of concern to complainants; and
 - (iv) coordinate DB Co's complaint tracking and complaint reports with any internal complaint tracking or complaint reports established by the City with respect to the Project, as requested by the City.
- (c) DB Co acknowledges and agrees that the Construction Complaints Protocol will be publicly available at the request of the City.

4.16 Communications Performance Monitoring and Auditing

- (a) DB Co shall prepare a communications performance report ("**Communications Performance Report**") which shall be available for review each month in advance of the first Communications and Stakeholder Engagement Working Group weekly meeting for the month, as detailed in Section 6 of this Schedule. The Communications Performance Reports shall:
- (i) be in a format agreed to by the City; and
 - (ii) summarize DB Co's performance through the various communications activities in support of and execution of the protocols, strategies and plans developed for the Project.
- (b) DB Co shall develop an annual performance report, based on a template approved by the City, that summarizes the monthly reports and assesses DB Co's overall compliance with Schedule 18 obligations. The annual yearly performance report shall be submitted to the City in accordance Schedule 10 – Review Procedure.

PART 5 NOTIFICATION

5.1 General

- (a) With respect to Construction Activities that are reasonably anticipated to have a major impact on third party property owners, DB Co shall:
 - (i) provide Notice to the City of such Construction Activities at least two weeks prior to the commencement of such Construction Activities; and
 - (ii) provide a draft public notification at least two weeks prior to the commencement of such Construction Activities to the City for review and approval.

The draft notices provided by DB Co in accordance with this Section 5.1(a) shall include a comprehensive list of the elements owned by a third party which DB Co anticipates will have to be removed or relocated by the property owner, what elements can remain on the property, detailed drawings that describes the proposed Construction Activities (including new location of relocated items or impacts that might result from the Construction Activities and restoration plans), proposed timeline for Construction Activities (including duration and anticipated completion), contact information to obtain additional information, and any updates or complaints relating to such Construction Activities.

- (b) With respect to Construction Activities that are reasonably anticipated to have a major impact on transit users, pedestrians, residents, traffic, and/or Stakeholders generally, DB Co shall:
 - (i) provide Notice to the City of such Construction Activities at least 35 days prior to the commencement of such Construction Activities; and
 - (ii) provide a draft public notification at least 35 days prior to the commencement of such Construction Activities to the City for review.

For the purposes of this Section 5.1(b), “major impact” shall include but not be limited to overnight construction, temporary Construction Activities, final paving, commissioning activities, privately-owned elements to be relocated or removed by DB Co, and transit stop relocations.

- (c) With respect to Construction Activities that are reasonably anticipated to have a medium impact on transit users, pedestrians, residents, traffic, and/or Stakeholders generally, DB Co shall:
 - (i) provide Notice to the City of such Construction Activities at least 15 Business Days prior to the commencement of such Construction Activities; and
 - (ii) provide a draft public notification at least 10 Business Days prior to the commencement of such Construction Activities to the City for review.

For the purposes of this Section 5.1(c), “medium impact” shall include but not be limited to, major intersection work, any disruption to water, gas and/or other utilities, and impacts from noise or dust. For clarity, the notification provided by DB Co pursuant to Section 5.1(c)(ii) shall be delivered by DB Co on behalf of the City to all affected properties and in consultation with

Utility Companies, as applicable.

- (d) With respect to Construction Activities that are reasonably anticipated to have a minor impact on transit users, pedestrians, residents, traffic and/or Stakeholders generally, DB Co shall:
 - (i) provide Notice to City of such Construction Activities at least five Business Days prior to the commencement of such Construction Activities; and
 - (ii) provide a draft public notification at least 48 hours prior to the commencement of such Construction Activities to the City for review.

For the purposes of this Section 5.1(d), “minor impact” shall include short-term lane closures, minor pedestrian detours, and access and driveway work. DB Co shall ensure that access is maintained to properties impacted by the Construction Activities at all times.

- (e) With respect to an incident related to Construction Activities that are reasonably anticipated to have an impact on DB Co employees and contractors, transit users, pedestrians, residents, traffic and/or Stakeholders generally, and with respect to which DB Co cannot reasonably provide advance notice of any kind to the City or the public (a “**Construction Activities Incident**”), DB Co shall:
 - (i) immediately notify the City of such Construction Activities Incidents;
 - (ii) provide a draft public notification or messaging no later than 15 minutes following the commencement of such Construction Activities Incidents to the City for review;
 - (iii) be prepared to provide a public statement with respect to the Construction Activities Incidents at the request of the City; and
 - (iv) be prepared to enact the Crisis Communications Plan in consultation with the City and to react quickly to provide an immediate response to all affected Stakeholders.

For the purposes of this Section 5.1(e), a Construction Activities Incident shall include but not be limited to an accident on site or a major catastrophe.

- (f) The notifications provided by DB Co pursuant to this Section 5.1, once finalized by the City, shall be delivered by DB Co on behalf of the City to all affected properties and in consultation with Utility Companies, as applicable.

PART 6 COMMUNICATIONS AND STAKEHOLDER ENGAGEMENT WORKING GROUP

6.1 Communications and Stakeholder Engagement Working Group

- (a) DB Co shall provide staff to support the communications and Stakeholder engagement activities related to the Project. These DB Co staff along with identified City communications and Stakeholder engagement staff, will form a Communications and Stakeholder Engagement Working Group (the “**Communications and Stakeholder Engagement Working Group**”).
- (b) The leads on the Communications and Stakeholder Engagement Working Group representing both the City and DB Co will be members of the Works Committee to ensure that communications and Stakeholder relations issues as part of the Project are addressed in an efficient and effective manner.
- (c) The objective of the Communications and Stakeholder Engagement Working Group is for DB Co and the City to work together to develop and implement all communications plans and Stakeholder engagement and community engagement activities for the Project to:
 - (i) ensure timely, open, transparent, effective, consistent and proactive communications with Stakeholders and elected officials;
 - (ii) foster and maintain positive and constructive relationships with neighbourhoods, agencies and businesses that may be affected by decisions regarding the scope of the Project as well as Construction Activities; and
 - (iii) build trust and maximize Stakeholder understanding and support for the Project.
- (d) DB Co shall ensure that the Construction Manager, Design Manager and any other staff from DB Co or any DB Co Party that the City may require, are made available to support the Communications and Stakeholder Engagement Working Group as required.
- (e) Within 60 days following Financial Close, the Communications and Stakeholder Engagement Working Group will convene to discuss the communications and Stakeholder engagement obligations and to identify the working relationships, roles, responsibilities, deliverables and review approvals processes for the Project.
- (f) The Communications and Stakeholder Engagement Working Group will meet once per week throughout the Construction Period, or less frequently as agreed to by the City, to plan and implement communications and Stakeholder engagement strategies for the Project, share information, discuss community relations updates, identify and plan for communications, Stakeholder engagement and Project milestones, manage issues and receive schedule updates.

PART 7 PUBLIC DISCLOSURE AND MEDIA RELEASES

7.1 Public Disclosure and Media Releases

- (a) Neither DB Co nor any DB Co Parties shall issue or disseminate any media release, public announcement or public disclosure (whether for publication in the press, on the radio, television, internet or any other medium) relating to the Project, the Project Agreement, the City's activities or any related matters, without the prior written consent of the City.
- (b) Neither DB Co nor any DB Co Parties shall issue or disseminate any media release, public announcement or public disclosure (whether for publication in the press, on the radio, television, internet or any other medium) making any implicit or explicit reference to RTG, any RTG Party or any affiliate of RTG or any RTG Party, whatsoever, without prior written consent from RTG.
- (c) Neither Party shall use the other Party's name or refer to the other Party, directly or indirectly, in any media release, public announcement or public disclosure (whether for publication in the press, on the radio, television, internet or any other medium) relating to the Project, the Project Agreement, the City's activities or any matter related thereto, without the prior written consent of the other Party.
- (d) DB Co shall comply and shall ensure that all DB Co Parties comply, at all times, with the City's media release and publicity protocols or guidelines, as such protocols and/or guidelines may be updated by the City from time to time.

PART 8 PERFORMANCE CRITERIA

8.1 Application of Performance Criteria

- (a) DB Co shall comply with the Construction Period Performance Criteria in respect of this Schedule 18 set out in Attachment E of Schedule 21 – Construction Period Payments.

SCHEDULE 19

PROCUREMENT MONITORING AND IMPLEMENTATION PLAN

[REDACTED]

**SCHEDULE 20
LANDS**

PART A – DEFINITIONS AND INTERPRETATION

1. DEFINITIONS

1.1 For the purposes of the Project Agreement, including but not limited to this Schedule 20, the following terms have the following meanings. Any capitalized term not defined in this Schedule 20 shall have the meaning given to such term in the Project Agreement.

- (a) **“Additional Property Interest”** includes any additional parcel of land not forming part of the Lands, the expansion or alteration of any boundary of any parcel of land forming part of the Lands, the extension of any term of use of any parcel of forming part of the Lands beyond the term specified in the column marked “Duration” in the Lands Table and the inclusion of additional Permitted Uses for any parcel of land forming part of the Lands all as requested by DB Co in accordance with Section 8 of this Schedule 20 unless and until such parcel, extension, extended term or additional Permitted Use becomes part of the Lands and is included in the grant of the non-exclusive licence described in Section 16.1 of the Project Agreement in accordance with Section 16.7 of the Project Agreement;
- (b) **“City Road Allowance Lands”** means lands forming part of a municipal road having the status of a highway pursuant to Section 26 of the *Municipal Act, 2001* R.S.O. c.25. Within the Lands Table, property comprising City Road Allowance Lands are designated **“ROW”** in the column marked “Restrictions and Requirements”;
- (c) **“Commencement Date”** means, with respect to each parcel of property forming part of the Lands, either:
 - (i) the date identified in the column marked “Commencement Date” in the Lands Table; or,
 - (ii) the first day of the month following the occurrence of the event described in the column marked “Commencement Date” in the Lands Table (for example, Financial Close); or,
 - (iii) for lands designated City Road Allowance Lands (ROW) or Highway Corridor Lands (HCL), the date(s) specified in required permits, approvals or authorizations as described in Section 5 of this Schedule 20 and in Schedule 35 – Permits, Licenses, Approvals and Agreements;

and is the date upon which any parcel of land identified in the Lands Table becomes part of the Lands and is included in the non-exclusive licence granted by the City to DB Co in accordance with Section 16.1 of the Project Agreement;

- (d) **“Existing LRT Infrastructure Lands”** means lands shown on Property Request Plans identified as **“Stage 1 PRPs”** and included in a folder titled “Stage 1 PRPs” located in the Data Room, which are lands owned by the City, or lands in which the City has acquired an interest, and upon which Existing Infrastructure or Stage 1 Connection Infrastructure comprised of light rail transit system infrastructure and/or related infrastructure which is, has been or will be designed, constructed, operated and/or maintained by RTG and/or the RTG Parties is located. Existing LRT

Infrastructure Lands do not form part of the “Lands” except to the extent that they are also included in the Lands Table;

- (e) **“Highway Corridor Lands”** means lands forming part of the controlled access highways known as Highway 417 and Highway 416 and owned by the MTO which are designated **“HCL”** in the column marked “Restrictions and Requirements” in the Lands Table;
- (f) **“Lands”** means lands owned or to be acquired by the City or lands in respect of which the City has acquired or will acquire certain rights, all as set out in the Lands Table or otherwise deemed to be lands in accordance with this Schedule 20, and over which the City is granting to DB Co a non-exclusive license, right of use and access in accordance with Section 16.1 of the Project Agreement;
- (g) **“Lands Table”** means the table in Part B of this Schedule 20;
- (h) **“Optional Lands”** means property identified by DB Co during the procurement process which DB Co requested be included in the Lands, which the City agreed to make available to proponents and which DB Co requested be included in the Lands subject to the provisions of Section 8.2 with necessary amendments as described in Section 8.3 of this Schedule 20.
- (i) **“Permitted Use” or “Permitted Uses”** means the use(s) which may be put to each parcel forming part of the Lands as designated in the column marked “Permitted Use” in the Lands Table being one or more of the following:
 - (i) **“New MTO Infrastructure Lands”** means property forming part of the Lands and designated **“NMTOI”** in the column marked “Permitted Use” in the Lands Table representing the location where New MTO Infrastructure is to be constructed or installed in accordance with Schedule 15 – Output Specifications.
 - (ii) **“New Municipal Infrastructure Lands”** means property forming part of the Lands and designated **“NMI”** in the column marked “Permitted Use” in the Lands Table representing the location where New Municipal Infrastructure is to be constructed or installed in accordance with Schedule 15 – Output Specifications;
 - (iii) **“System Infrastructure Lands”** means property forming part of the Lands and designated **“SI”** in the column marked “Permitted Use” in the Lands Table representing the location where System Infrastructure is located or is to be constructed or installed in accordance with Schedule 15 – Output Specifications;
 - (iv) **“Temporary Access Lands”** means property forming part of the Lands and designated **“TA”** in the column marked “Permitted Use” in the Lands Table which may be used temporarily for the sole purpose of providing non-exclusive pedestrian and/or vehicular access to other property forming part of the Lands;
 - (v) **“Temporary Mobilization Lands”** means property forming part of the Lands and designated **“TM”** in the column marked “Permitted Use” in the Lands Table which may be used as part of a mobilization site or staging area, being a designated area where personnel, equipment, supplies, site offices and other facilities required to undertake the Construction Activities are established and maintained in accordance with the provisions of Schedule 15 – Output Specifications relating to mobilization sites; and

- (vi) **“Temporary Construction Lands”** means property forming part of the Lands and designated **“TC”** in the column marked **“Permitted Use”** in the Lands Table which may be used temporarily in connection with the construction of System Infrastructure, New Municipal Infrastructure, and/or New MTO Infrastructure but which may not be used as part of a mobilization site or staging area other than for short term storage of mobile equipment and material required for construction in close proximity to the relevant parcel of Temporary Construction Lands.
- (j) **“Property Request Plan”** or **“PRP”** means a diagram defining the extent, limits and/or approximate boundaries of property; and,
- (k) **“Third Party Access Agreements”** means the agreements, including Standard Agreements, listed or described in Section 4.1 of this Schedule 20.

2. TERM

- 2.1** The term of the non-exclusive licence to any parcel forming part of the Lands granted to DB Co by the City in accordance with Section 16.1 of the Project Agreement shall run from the Commencement Date identified in the Lands Table for such parcel until the earlier of:
- (a) the end of the period calculated by adding to the Commencement Date the number of months specified for each parcel in the column marked **“Duration”** in the Lands Table;
 - (b) the applicable Final Completion Date; and
 - (c) the Termination Date.

- 2.2** Unless otherwise stated in the Lands Table, the number of months identified in the column marked “Duration” in the Lands Table, represents a single term comprised of consecutive months commencing on the Commencement Date.

3. PERMITTED USES

- 3.1** DB Co’s use of any parcel forming part of the Lands shall be limited to the Permitted Use(s) designated in the column marked “Permitted Use” in the Lands Table.

- 3.2** The installation or construction of New Municipal Infrastructure in or on any parcel of lands designated New Municipal Infrastructure Lands may be limited to the construction or installation of the type(s) of infrastructure specified in the “Restrictions and Requirements” column of the Lands Table and/or in the Third Party Access Agreement(s) applicable to such parcel.

- 3.3** The installation of temporary excavation supports such as rock bolts, rock dowels, tie backs, soldier piles or secant piles any part of which will be left in place following completion of construction is only permitted in accordance with Section 3.4, within System Infrastructure Lands, or within Temporary Construction Lands if such Temporary Construction Lands have been expressly identified as being available for temporary excavation support.

- 3.4** Except as provided in this Section 3.4 or as expressly provided elsewhere in the Project Agreement, all Works shall take place exclusively within the boundaries of the Lands.

- (i) Subject to the requirements of Section 5.1 of this Schedule 20 and Schedule 35 with respect to the use of City Road Allowance Lands, DB Co may:

- (A) construct or install New Municipal Infrastructure within City Road Allowance Lands; and/or,
- (B) install temporary excavation supports such as rock bolts, rock dowels, tie backs, soldier piles and secant piles within City Road Allowance Lands; and/or,
- (C) use City Road Allowance Lands for the purposes of managing traffic in accordance with a Traffic Management Plan,

irrespective of whether the City Road Allowance Lands required for the purposes listed above are described in the Lands Table or in the PRPs.

- (ii) Subject to the requirements of Section 5.2 of this Schedule 20 and Schedule 35 with respect to the use of Highway Corridor Lands, DB Co may install rock bolts and rock dowels within Highway Corridor Lands for the purposes of providing temporary subterranean support of excavation irrespective of whether the Highway Corridor Lands required for these purposes are described in the Lands Table or in the PRPs.

- (iii) In addition to Section 3.4(i)(B) which permits the installation of temporary excavation supports such as rock bolts, rock dowels, tie backs, soldier piles and secant piles within City Road Allowance Lands, such supports may also be installed in accordance with a licence acquired by DB Co on its own behalf in accordance with Section 16.7(c) of the Project Agreement or by the City in accordance with Section 8 of this Schedule 20.

- (iv) The Lands Table and PRPs do not describe property required to accommodate Utility Works. Without limiting the provisions of the Project Agreement, including Section 8, Part 2, Schedule 15-2, which govern Utility Works, and subject to the requirements of Section 5.1 and 5.2 of this Schedule 20 and Schedule 35 with respect to the use of City Road Allowance Lands and Highway Corridor Lands, DB Co may undertake Utility Works within System Infrastructure Lands, City Road Allowance Lands, Highway Corridor Lands or in accordance with the terms of an existing easement in favour of the relevant Utility Company.
- (v) Utility Works will not be permitted on property other than System Infrastructure Lands, City Road Allowance Lands, Highway Corridor Lands or within the boundaries of and in accordance with the terms of an existing easement in favour of the relevant Utility Company unless and until a new easement over such property in favour of the relevant Utility Company, and satisfactory to the relevant Utility Company, is acquired by DB Co or by the City.
- (vi) New easements for Utility Works contemplated in Section 3.4(v) above shall be acquired by DB Co in accordance with Section 16.7(c) of the Project Agreement or by the City as Additional Property Interests in accordance with Section 8 of this Schedule 20, the costs of which acquisitions are to remain to DB Co's sole account not to be recovered through any Cash Allowance.
- (vii) Notwithstanding Section 3.4 (vi) above, the following exceptions to the provisions of Section 8 of this Schedule 20 shall apply to requests for Additional Property Interests made by DB Co with respect to new easements for Utility Company Self-Performed Works which are required solely as a result of Utility Agreements for Utility Company Self-Performed Work approved by the City in accordance with Section 11.29 of the Project Agreement:
 - (A) Section 8.1(a) shall not apply and a request may be made at any time during the Project Term;
 - (B) Sections 8.1(c), 8.1(d), 8.1(e), 8.1(f) and 8.1(g) shall not apply with the exception that, within fifteen (15) Business Days of the delivery by DB Co to the City of the materials described in Section 8.1(b), the City shall provide to DB Co an approximate estimate of the time which the City anticipates will be required to secure the required easement;
 - (C) Sections 8.2(b), 8.2(c), 8.2(e) and 8.2(f) shall not apply and the City shall use all reasonable efforts to complete the acquisition of the new easement with all due dispatch.

- 3.5 To the extent that DB Co undertakes, in accordance with Sections 3.4(i), 3.4(ii), 3.4(iii), 3.4(iv), and/or 3.4(v) above, any Works, Utility Company Self-Performed Work or traffic management on lands comprising City Road Allowance Lands, Highway Corridor Lands, or in accordance with the terms of a licence or easement acquired by DB Co pursuant to Section 16.7(c) of the Project Agreement or existing easements in favour of relevant Utility Companies, which lands are not identified in the Lands Table and PRPs, all of DB Co's obligations and liabilities in respect of the Lands and Site under the Project Agreement shall apply with equal effect to all activities of DB Co and DB Co Parties on such lands.

4. RESTRICTIONS AND REQUIREMENTS

- 4.1 In addition to any other restriction or requirement contained in the Project Agreement, including this Schedule 20 and Schedule 15- Output Specifications and Schedule 16 - Encumbrances, DB Co's access to and use of the Lands for the purposes of the Construction Activities is subject to the terms of the Third Party Access Agreements and other restrictions, qualifications and requirements contained in the Lands Table including as set out in the column marked "Restrictions and Requirements" including as described below:

- (a) "[REDACTED] Lease Terms" designates property, the use of which is subject to the terms and conditions of a lease between [REDACTED] and the City of Ottawa a copy of which is located in a file folder titled "Agreements" and located in the Data Room;
- (b) "Algonquin College Terms" designates property, the use of which is subject to the terms and conditions of the agreement between the City and Algonquin College a copy of which is located in a file folder titled "Agreements" and located in the Data Room;
- (c) "Existing LRT Infrastructure Lands Constraints" designates property which includes, abuts or is in close proximity to Existing System Infrastructure Lands where coordination with RTG and/or the RTG Parties may be required in accordance with the Interface Agreement and the terms of this Project Agreement;
- (d) "HONI Terms" designates property forming part of an electricity transmission or distribution corridor. The use of such lands may be subject to approvals pursuant to the provincial secondary land use program jointly administered by Infrastructure Ontario and Hydro One Networks Inc. and is also subject to the terms and conditions of a Standard Agreement comprising a grant of an easement or licence, by Her Majesty the Queen in right of Ontario as represented by the Ontario Infrastructure Lands Corporation to the City, to construct, use and maintain infrastructure within lands forming part of an electricity transmission or distribution corridor or to make temporary use of such lands for the purpose stipulated in the grant of easement or licence;
- (e) "[REDACTED] Terms" designates property, the use of which is subject to the terms and conditions of the agreement between the City and [REDACTED] a copy of which is located in a file folder titled "Agreements" and located in the Data Room;
- (f) "MTO Terms" designates property, the use of which is subject to the terms and conditions of a Standard Agreement comprising an encroachment permit granted by the MTO to the City with respect Highway Corridor Lands;
- (g) "NCC Terms & Conditions" designates property, the use of which is subject to the terms and conditions of agreements between the City and the National Capital Commission copies of which

are located in a file folder titled “Agreements” and located in the Data Room as well as the conditions of the Approvals in Principle issued by the National Capital Commission and any Federal Land Use Design and Transaction Approvals granted by the National Capital Commission with respect to the Project or any part thereof;

- (h) **“Parkland Improvement Works”** designates property to be improved with New Municipal Infrastructure being constructed by DB Co for the benefit of the National Capital Commission in accordance with Schedule 15 – Output Specifications and NCC Terms and Conditions;
- (i) **“[REDACTED] Terms”** designates property, the use of which is subject to the terms and conditions of the agreement between the City and [REDACTED] a copy of which is located in a file folder titled “Agreements” and located in the Data Room;
- (j) **“PWGSC Terms”** designates property, the use of which is subject to the terms and conditions of the agreement between the City and Her Majesty the Queen as represented by Public Works and Government Services Canada a copy of which is located in a file folder titled “Agreements” and located in the Data Room;
- (k) **“SOD Parcel”** designates property which has been identified by the City as a property where station oriented development is expected and where the City will provide opportunities for real estate development immediately above and/or integrated with a rail transit station, including but not limited to the sale of air rights above a rail transit station; and,
- (l) **“Stratified Parcel”** designates property having both horizontal and vertical boundaries.

The forgoing does not constitute an exhaustive list of the restrictions and requirements which may be listed in the column designated “Restrictions and Requirements” in the Lands Table or which may apply to any property forming part of the Lands.

4.2 All of the agreements referred to in Section 4.1 above, including the Standard Agreements, shall be treated, for the purposes of Section 17 of the Project Agreement and for the purpose of Schedule 16 – Encumbrances, as Encumbrances of which DB Co had knowledge prior to Financial Close. While the City has made efforts to incorporate significant construction, maintenance and other obligations flowing from the Third Party Access Agreements into the Project Agreement, DB Co shall be deemed to have reviewed each of the Third Party Access Agreements and shall perform all obligations and observe and comply with all restrictions contained therein which are relevant to the use of any part of the Lands and/or the performance of the Construction Activities.

4.3 Notwithstanding Section 4.2 above, to the extent that any of the agreements listed in Section 4.1 provide for the payment of a purchase price, licence fee, rent, or other consideration in exchange for the transfer from a third party property owner to the City of property, an interest in property or a contractual right to use property forming part of the Lands, such purchase price, licence fee, rent, or other consideration shall be paid by the City and not by DB Co, except to the extent that such purchase price, licence fee, rent, or other consideration is paid with respect to an Additional Property Interest, other than an Additional Property Interest acquired subject to the exception described in Section 3.4(vii) of this Schedule 20.

4.4 STANDARD AGREEMENTS

(a) For certain parts of the Lands the City will enter into easement, licence, or similar agreement(s) after Financial Close. The City intends to enter into such agreement(s) on substantively the same terms and conditions as an existing easement, licence or similar agreement that has been entered into by the City and that is provided as Background Information prior to Financial Close or are currently contemplated in the “Restrictions and Requirements” column of Part B (the “**Standard Agreements**”) copies of which are included in the folder titled “Agreements” in the Data Room. If, after Financial Close,

- (i) the City enters into one or more easement, license or similar agreement(s) in respect of any part of the Lands; or
- (ii) the City acquires any interest in or right to use any part of the Lands subject to any easement, license or similar agreement(s),

and such agreement(s) have substantively the same terms and conditions as the Standard Agreements, such agreement(s) shall be treated, for the purposes of Section 17 of the Project Agreement and for the purpose of Schedule 16 – Encumbrances, as though DB Co had knowledge of such agreements prior to Financial Close. This Section 4.4 shall not apply in circumstances where the City enters into an easement, license, or similar agreement after Financial Close on terms and conditions materially different from the Standard Agreement if such material differences cause a delay to DB Co in performing the Construction Activities, create additional material obligations or liabilities for DB Co, or cause a material increase in cost to DB Co, except to the extent that such easement, license or agreement relates to an Additional Property Interest, in which case the provisions of Section 8 of this Schedule 20 shall apply unless the Additional Property Interest is acquired subject to the exception described in Section 3.4(vii) of this Schedule 20.

5. USE OF CITY ROAD ALLOWANCE LANDS, HIGHWAY CORRIDOR LANDS AND TRANSMISSION CORRIDOR LANDS

5.1 City Road Allowance Lands

The use of City Road Allowance Lands or any part thereof by DB Co, including but not limited to the term of such use and the date upon which DB Co may commence any Construction Activities on City Road Allowance Lands or any part thereof is subject to the terms of required permits and approvals, including Road Cut Permits and Temporary Construction-Related Encroachment Permits, to be obtained by DB Co in accordance with Schedule 35 – Permits, Licenses, Approvals and Agreements.

5.2 Highway Corridor Lands

The use of Highway Corridor Lands by DB Co, including but not limited to the term and extent of such use and the date upon which DB Co may commence any Construction Activities on the Highway Corridor Lands is subject to MTO Terms including the requirement for DB Co to obtain from the MTO authorization to access the Highway Corridor Lands in accordance with the process established by the MTO.

5.3 Electricity Transmission/Distribution Corridor Lands

The use by DB Co of lands designated as being subject to HONI Terms, including but not limited to the term and extent of such use and the date upon which DB Co may commence any Construction Activities on such lands, is subject to HONI Terms including the requirement for approvals under the provincial secondary land use program as described in Schedule 35.

6. REPORT CARD PROCEDURE – TEMPORARY USE LANDS

Without altering DB Co's obligations to landscape, restore, remediate and/or reinstate the Lands or adjacent lands in accordance with the Project Agreement, including in accordance with Section 18.2 of the Project Agreement, Schedule 15 - Output Specifications and Schedule 17 – Environmental Obligations, for all parcels forming part of the Lands which are designated in the "Restrictions and Requirements" column of the Lands Table as a "**Report Card Parcel**", DB Co shall comply with the protocol described in this Section 6.

6.1 Report Card

Following the completion by DB Co of all Construction Activities on any Report Card Parcel, and at least thirty (30) days prior to the end of the term of use of such Report Card Parcel as specified in the Lands Table, DB Co shall submit to the City, as part of the Monthly Environmental Report required pursuant to Section 3.9(b) of Schedule 17 – Environmental Obligations, a summary report card in the form attached in Part C of this Schedule 20 together with the attachments set out therein for each Report Card Parcel (a "**Report Card**").

6.2 City Review of Report Card

Within twenty five (25) days of receipt of a Report Card, the City shall notify DB Co if the City, has an objection to the information contained in, or the steps taken by DB Co as set out in the Report Card, or requires additional environmental investigations in accordance with Section 18.2 of the Project Agreement and/or Schedule 17 – Environmental Obligations.

6.3 Remediation and Reinstatement

The remediation of any Contamination and/or reinstatement of any property which DB Co is required to undertake in accordance with Section 18.2 of the Project Agreement, Schedule 15 – Output Specifications and/or Schedule 17 – Environmental Obligations shall be completed prior to the expiry of the term of use for such property as specified in the Lands Table failing which, in addition to any other obligations of DB Co contained in the Project Agreement, DB Co shall be responsible for indemnifying and/or reimbursing the City with respect to all costs, claims and/or damages incurred by the City as a result of any failure to return possession of the property to the owner of the property prior to the end of the term of use described in the Lands Table.

7. ENVIRONMENTAL INVESTIGATION REPORTS

Information regarding the environmental condition of parts of the Lands, including information about Contamination on, in, under or migrating from parts of the Lands, is contained in the Background Information. In some instances, additional site specific environmental investigation reports have been included in the Background Information, in which case the City has made efforts to reference relevant Property Request Plans in Schedule 17 – Environmental Obligations; however, the inclusion of Property Request Plan references in Schedule 17 – Environmental Obligations shall in no way limit DB Co's obligations pursuant to Section 18.2 of the Project Agreement.

8. ADDITIONAL PROPERTY INTERESTS

8.1 Requests for Additional Property Interests

The following provisions shall be in addition to Section 16.7 of the Project Agreement governing requests for Additional Property Interests by DB Co.

- (a) The City will only consider requests for Additional Property Interests:
 - (i) During the sixty (60) day period commencing three (3) months following Financial Close (the “**First Additional Property Interests Request Period**”);
 - (ii) During the sixty (60) day period commencing twelve (12) months following Financial Close (the “**Second Additional Property Interests Request Period**”);
 - (iii) During the sixty (60) day period commencing twenty four (24) months following Financial Close (the “**Third Additional Property Interests Request Period**”); and,
 - (iv) During the sixty (60) day period commencing thirty-six (36) months following Financial Close (the “**Final Additional Property Interests Request Period**”).
- (b) Every request for Additional Property Interests submitted by DB Co shall:
 - (i) include a Property Request Plan prepared by DB Co at DB Co's cost describing the Additional Property Interest, including stratification if appropriate;
 - (ii) state the proposed Commencement Date and duration for the Additional Property Interest;

- (iii) detail DB Co's reasons for requesting the Additional Property Interest and provide a drawing or sketch describing the horizontal and vertical dimensions of any System Infrastructure, New MTO Infrastructure, New Municipal Infrastructure and/or other infrastructure to be installed and/or constructed by DB Co within the boundaries of the Additional Property Interest; and
 - (iv) indicate all reasonably foreseeable implications of acquiring the Additional Property Interest, including whether the acquisition of the Additional Property Interest is expected to result in cost savings for the City from a design, engineering or construction perspective.
- (c) DB Co shall pay to the City, in respect of any request for an Additional Property Interest, an administration fee calculated as follows:
 - (i) For each Additional Property Interest requested during the First Additional Property Interests Request Period, a fee of [REDACTED] Dollars, (\$[REDACTED]); and,
 - (ii) For each Additional Property Interest requested following the First Additional Property Interests Request Period, a fee of [REDACTED] Dollars, (\$[REDACTED]).
- (d) As soon as practicable and in any event within 15 Business Days after receipt of a request for Additional Property Interests, the City shall decide whether or not it is prepared to consider the request and shall either advise DB Co that it has elected not to consider the request or shall deliver to DB Co an approximate estimate of:
 - (i) the time which the City anticipates will be required to secure the Additional Property Interest; and
 - (ii) the anticipated cost of acquiring the Additional Property Interest.

The foregoing approximate estimates shall be in no way binding upon the City and shall not limit DB Co's obligations in Section 8.2(c).
- (e) DB Co acknowledges and agrees that any decision of the City pursuant to Section 8.1(d) above shall be final and binding on the Parties and in the event that the City elects not to consider the acquisition of any Additional Property Interest, DB Co acknowledges and agrees that the City's decision shall not be subject to resolution pursuant to Schedule 27 – Dispute Resolution Procedure.
- (f) If the City, in its sole discretion, elects to consider a request for an Additional Property Interest, the City shall be entitled to retain the administration fee payable in respect of such request for such Additional Property Interest in accordance with Section 8.1(c) above. Such fees are in addition to the costs payable by DB Co in accordance with Section 8.2(c) below and the City shall have no obligation to refund any part of such administrative fee whether or not the request for Additional Property Interests is withdrawn by DB Co as contemplated in 8.1(g)(i) below or whether or not the Additional Property Interest is acquired or accepted as part of the Lands for any reason whatsoever.
- (g) As soon as practicable, and in any event within 15 Business Days after the later of the date the estimate described in Section 8.1(d) above was delivered, DB Co shall either:

- (i) withdraw its request for the Additional Property Interest by written notice to the City; or
- (ii) issue a written confirmation directing the City to proceed with the acquisition of the Additional Property Interest.

If DB Co does not issue the confirmation described in Section 8.1(g)(ii) within such 15 Business Days, then, the request for Additional Property Interests shall be deemed to have been withdrawn. If DB Co does issue the confirmation described in Section 8.1(g)(ii) within such 15 Business Days, the City shall, subject to the provisions of Section 8.2 below, proceed with the acquisition of the Additional Property Interest.

8.2 Acquisition of Additional Property Interests

- (a) Notwithstanding anything to the contrary in the Project Agreement, the City's failure to acquire any Additional Property Interest, or its failure to acquire any Additional Property Interest on or prior to the Commencement Date proposed by DB Co, shall not constitute a Delay Event, a Compensation Event, a Relief Event or a City Event of Default under the Project Agreement.
- (b) The City shall be entitled to abandon the acquisition of any Additional Property Interest at any time, for any reason and in its sole and absolute discretion, in which case the Additional Property Interest will not form part of the Lands and will not be included in the non-exclusive licence granted to DB Co in accordance with Section 16.1 of the Project Agreement.
- (c) DB Co shall be responsible for all costs and expenses incurred by the City in connection with the acquisition of any Additional Property Interest, irrespective of whether the acquisition of the Additional Property Interest is completed and irrespective of whether the Additional Property Interest is acquired by negotiation or expropriation, including but not limited to all consideration paid to the owner, legal costs, including legal costs incurred by the City and third party legal costs, land surveying and appraisal costs, including third party land surveying and appraisal costs, administrative costs, the market value of the Additional Property Interest, disturbance damages, injurious affection and any and all compensation payable under the *Expropriations Act*, R.S.O. 1990, c. E. 26, if applicable, and the City shall be entitled, in accordance with Section 4.8 of the Project Agreement, to set off any such costs and expenses against any amounts otherwise due to DB Co pursuant to the terms of this Project Agreement.
- (d) Notwithstanding any provision of the Project Agreement to the contrary, including but not limited to Section 18.2, 18.3, and 18.4 of the Project Agreement, DB Co shall be responsible for any Contamination on, in or under, or migrating to or from any new parcel of land or any addition to any parcel forming part of the Lands acquired by the City as an Additional Property Interest, and for any Species-at-Risk, fossils, artifacts and other objects having artistic, historic, archaeological or monetary value, including human remains and burial sites which may be found on or at any new parcel of land or any addition to any parcel forming part of the Lands acquired by the City as an Additional Property Interest. DB Co may request the opportunity to undertake additional investigations with respect any Additional Property Interest and, if such additional investigations are undertaken, DB Co shall provide the results of such investigations to the City before the City completes the acquisition of the Additional Property Interest. In the event that the City is unable to obtain the consent of the relevant property owner with respect to any additional investigation requested by DB Co pursuant to this Section 8.2(d), the City shall notify DB Co that it is unable to obtain the required consent, in which case DB Co may, subject to its obligations in Section 8.2(c), direct the City to abandon the acquisition of the relevant Additional Property Interest.

Subject to this Section 8.2(d), the City shall have no obligation to conduct any investigation in connection with the acquisition of an Additional Property Interest.

- (e) The terms of any agreement, or amendment to an existing agreement, negotiated by the City with respect to the acquisition of any Additional Property Interest shall be treated, for the purposes of Section 17 of the Project Agreement and for the purpose of Schedule 16 – Encumbrances, as Encumbrances of which DB Co had knowledge prior to Financial Close provided, however, that if such an agreement or amendment is not a Standard Agreement, the City shall provide a copy of any such agreement or amendment to DB Co prior to concluding the agreement or amending agreement. Within ten (10) Business Days of delivery by the City of a copy of any agreement or amendment to DB Co, DB Co may, subject to its obligations in Section 8.2(c), direct the City to abandon the acquisition of the relevant Additional Property Interest, failing which DB Co shall be deemed to have accepted the terms of the agreement or amending agreement.
 - (f) DB Co may, from time to time request and the City shall provide an accounting of the costs incurred in respect of any acquisition of any Additional Property Interest by the City.
- 8.3** The provisions of Section 8.2 above shall apply with necessary amendments to the acquisition of Optional Lands by the City with the exception that Section 8.2(b) shall not apply and, while Section 8.2(a) shall apply, the City shall be required to use all reasonable efforts to secure the Optional Lands.

9. PROPERTY REQUEST PLANS

9.1 Conflict

In the event of any conflict between information contained on the face of a Property Request Plan and the Lands Table, the provisions contained in the Lands Table shall prevail.

9.2 Building Overlays

Building overlays included in Property Request Plans suggest the approximate extent of existing building envelopes only. Unless otherwise expressly provided in the Lands Table or in Schedule 15 – Output Specifications, notwithstanding the location of any building overlay, the grant of the non-exclusive licence, rights of use and access to any parcel forming part of the Lands extends only to within one hundred and fifty millimetres (150mm) from any existing building or structure. The City makes no representation as to the accuracy or completeness of building overlays included in Property Request Plans.

PART B – LANDS TABLE

[REDACTED]

PART C –FORM OF REPORT CARD

Report Card

Property Description:

PRP Reference:

Commencement Date:

Expected date of completion of Construction Activities and/or Works:

| | |
|--|--|
| Description of Use which DB Co has put to the Report Card Parcel (include particulars): | |
| Description of Any Physical Alteration to Report Card Parcel: | |
| Summary of Baseline Conditions (including reference to relevant Background Information): | |
| Summary of Spill Reports (append reports): | |
| Volume of soil imported (append lab reports): | |
| Description of any soil or groundwater sampling (include results) | |
| Follow up Environmental Investigation Recommended (include detail): | |

Every Report Card shall include the following attachments:

- (1) All applicable Property Request Plan(s) together with relevant site plans describing Report Card Parcel.
- (2) Lab reports with respect to imported soils (if any).
- (3) Spill reports (if any).
- (4) Copies of relevant Background Information or other environmental investigation reports.
- (5) Soil and Groundwater Sampling Reports (if any).

- (6) A summary of all reinstatement, restoration and/or rehabilitation works undertaken in accordance with Parts 1 and 6 of Schedule 15-2 or otherwise is required for all Report Card Parcels:
 - i. Designated Temporary Mobilization Lands (TM); and/or
 - ii. Where a significant grade change has occurred as a result of Construction Activities

SCHEDULE 21

CONSTRUCTION PERIOD PAYMENTS

1. INTERPRETATION AND DEFINITIONS

1.1 Interpretation

- (a) In this Schedule 21, and for the purposes of all calculations pursuant to this Schedule 21, all amounts cited in respect of capital costs and/or costs in respect of the construction of the Works are amounts net of any CA holdback.

1.2 Definitions

Any capitalized term not defined in this Schedule 21 shall have the meaning given to such term in the Project Agreement. In this Schedule 21, unless the context otherwise requires:

- (a) [not used]
- (b) “**Attachment A**”, “**Attachment B**”, “**Attachment C**”, “**Attachment D**”, “**Attachment E**”, “**Attachment F**” and “**Attachment G**” mean, respectively, Attachment A, Attachment B, Attachment C, Attachment D, Attachment E, Attachment F and Attachment G to this Schedule 21.
- (c) “**Capital Costs**” means costs incurred by DB Co in connection with the Project as reflected in the Financial Model that are not DB Co Soft Costs.
- (d) “**Construction Period Deduction**” means a deduction made from a Substantial Completion Payment in accordance with Section 6.1.
- (e) “**Construction Period Event**” means an incident or state of affairs that does not meet or comply with the Construction Period Performance Criteria, which is capable of becoming a Construction Period Quality Failure.
- (f) “**Construction Period Failure Category**” means the failure category described in the fourth column of the tables in Attachment E.
- (g) “**Construction Period Failure Type**” means the failure type described in the third column of the tables in Attachment E.
- (h) “**Construction Period Month**” means a calendar month during the Construction Period, except that:

- (i) the first Construction Period Month shall run from Financial Close until the end of the calendar month in which Financial Close occurs; and
 - (ii) the last Construction Period Month shall run from the first day of the calendar month in which the last Final Completion Date falls until the last Final Completion Date.
- (i) **“Construction Period Payment”** means a payment, which shall be no more frequent than once a month, calculated in accordance with this Schedule 21 and shall include the Financial Close CPP.
- (j) **“Construction Period Payment Application”** has the meaning set out in Section 3.3(a).
- (k) **“Construction Period Performance Criteria”** means the level of performance (as set out in the column entitled “Requirements to be met” in Attachment E) that DB Co must achieve to avoid a Construction Period Event for a failure to achieve compliance with the applicable Project Agreement requirement.
- (l) **“Construction Period Quality Failure”** means any failure by DB Co to comply with the requirements set out in the column entitled “Requirements to be met” corresponding to the Construction Period Performance Criteria designated as Construction Period Failure Type “CPQF” in Attachment E.
- (m) **“Construction Period Quality Failure Deduction”** has the meaning given in Section 6.2(a).
- (n) **“Contested Non-Conforming Works”** means Works in respect of which the City have given Notice to DB Co, pursuant to Section 51 of the Project Agreement (but not a Non-Conformance Report initiated by the City pursuant to Schedule 11 – Integrated Management System Requirements), that, in the opinion of the City, such Works are not in accordance with the Project Agreement, and DB Co has asserted that, in DB Co’s opinion, such Works are in accordance with the Project Agreement.
- (o) **“Credit Rules”** means the rules set out in Attachment F.
- (p) **“Critical Construction Period Quality Failure”** means a Construction Period Quality Failure designated as a Construction Period Failure Category of “Critical” in Attachment E.
- (q) **“Critical Qualifying NCR”** means a Qualifying NCR raised by the City or DB Co on a Critical Non-Conformance that requires all or any portion of DB Co Accepted Works to be removed or repeated because such DB Co Accepted Works have, or would reasonably be expected to have, a significantly adverse or materially adverse impact on:
 - (i) the safety of the Project, the environment, System Users or the public;
 - (ii) statutory and regulatory requirements;
 - (iii) the quality of the Works; or
 - (iv) the durability of the Works.
- (r) **“Critical Qualifying Process NCR”** means a Qualifying Process NCR raised by the City or DB Co on a Non-Conformance that requires physical progress on the Works to be stopped for longer than twenty-four (24) hours.

- (s) **“DB Co Accepted Works”** means all physical elements of the Works that have been accepted by DB Co as meeting its acceptance criteria for those Works, pursuant to its Inspection and Test Plan.
- (t) **“DB Co Construction Period Payment Documentation”** has the meaning set out in Section 3.1(c).
- (u) **“DB Co Funding Amount”** means, for each Payment Period, [REDACTED]% of the Total Capital Cost Incurred to Date for the applicable Payment Period.
- (v) **“DB Co Officer Construction Period Payment Certificate”** has the meaning set out in Section 3.1(d).
- (w) **“DB Co Soft Costs”** means the special purpose vehicle costs, accounting, tax, audit costs, rating agency fees, bid fee cost, independent certifier costs, pre-construction costs (e.g. bid pursuit costs, financial advisor, legal advisor, insurance advisor), other ancillary fees, interest and fees paid in connection with the Financing, in each case, in accordance with and as reflected in the Financial Model and incurred by DB Co in connection with the Project (or with respect to the interest or fees paid in connection with the Financing for purposes of calculating the Total Capital Cost Incurred to Date actually incurred by DB Co and verified pursuant to the Lender Advance Confirmations).
- (x) **“Earned Value”** means the budgeted cost of work performed in respect of each Payment Period, measured using the Earned Value Measurement Techniques and the Performance Measurement Baseline.
- (y) **“Earned Value Measurement Techniques”** means the techniques used to measure Earned Value established by DB Co and agreed with the Independent Certifier in accordance with the “Practice Standard for Earned Value Management” (2nd Edition, published in 2011 by the Project Management Institute, Inc.).
- (z) **“Earned Value Progress Ratio”** means, as of a Payment Calculation Date, the aggregate total Earned Value achieved by DB Co and certified by the Independent Certifier divided by the Projected Earned Value (Cumulative).
- (aa) **“Financial Close CPP”** means the Construction Period Payment to be made by the City to DB Co on Financial Close.
- (bb) **“Financing”** means the financing with the Lenders to finance the costs of the Project pursuant to the Lending Agreements.
- (cc) **“IC Construction Period Payment Authorization Certificate”** has the meaning set out in Section 3.3(c).
- (dd) **“Lender Advance Confirmations”** has the meaning set out in Section 3.1(a).
- (ee) **“Lender Advances”** has the meaning set out in Section 3.1(a)(i).
- (ff) **“Medium Construction Period Quality Failure”** means a Construction Period Quality Failure designated as a Construction Period Failure Category of “Medium” in Attachment E.

- (gg) **“Medium Qualifying NCR”** means a Qualifying NCR raised by the City or DB Co on a Medium Non-Conformance for all or any portion of DB Co Accepted Works that is not a Critical Qualifying NCR.
- (hh) **“Medium Qualifying Process NCR”** means a Qualifying Process NCR raised by the City or DB Co on a Non-Conformance that requires changes to a Works Submittal being used by DB Co in its delivery of the Works that is not a Critical Qualifying NCR.
- (ii) **“Minor Construction Period Quality Failure”** means a Construction Period Quality Failure designated as a Construction Period Failure Category of “Minor” in Attachment E.
- (jj) **“Minor Construction Period Quality Failure Tolerance”** has the meaning given in Section 6.3(a).
- (kk) **“Minor Qualifying NCR”** means a Qualifying NCR raised by the City on a Minor Non-Conformance on all or any portion of the Works that have been inspected and tested or approved by DB Co at a Witness Point or Hold Point, pursuant to the relevant Inspection and Test Plan but are not yet DB Co Accepted Works. For clarity, a Minor Qualifying NCR does not mean a Qualifying NCR raised by DB Co.
- (ll) **“Minor Qualifying Process NCR”** means a Qualifying Process NCR raised by the City on a Minor Non-Conformance that is not a Critical Qualifying Process NCR or Medium Qualifying Process NCR. For clarity, a Minor Qualifying Process NCR does not mean a Qualifying Process NCR raised by DB Co.
- (mm) **“Mobilization Credit”** has the meaning given in Section 1.3(e) of Attachment F.
- (nn) **“Monthly Non-Conformance Report”** means the monthly report to be submitted by DB Co in accordance with Section 2.11 of Schedule 11 – Integrated Management System Requirements.
- (oo) **“NCR”** means a Non-Conformance Report.
- (pp) **“Non-Conformance”** has the meaning given in Schedule 11- Integrated Management System Requirements.
- (qq) **“Non-Conformance Report”** has the meaning given in Schedule 11 – Integrated Management System Requirements.
- (rr) **“Payment Application Requirements”** has the meaning set out in Section 3.3(a).
- (ss) **“Payment Calculation Date”** means the date set out in Column 2 of Table A that is the date to be used as the “Payment Calculation Date” for the applicable Construction Period Payment, subject to Section 2.2(a)(ii).
- (tt) **“Payment Period”** means the payment period(s) identified in Column 1 of Table A.
- (uu) **“Performance Measurement Baseline”** is the Capital Cost loaded Works Schedule, at detailed activity level, that has achieved “NO COMMENT” or “MINOR COMMENT” status in accordance with Section 13 of the Project Agreement, as amended from time to time by the parties in accordance with Section 13 of the Project Agreement.

- (vv) **“Projected Capital Costs”** means, in respect of each Payment Period, the amount set out in Column 3A of Table A.
- (ww) **“Private Capital Invested”** means the total amount of Financing advanced and utilized in the Project to fund the Works, comprising the aggregate of all DB Co Funding Amounts.
- (xx) **“Projected Construction Period Payment”** means, in respect of each Construction Period Payment, the amount set out in Column 9 of Table A, which shall equal [REDACTED]% of the Projected Eligible Construction Period Payment for the applicable Payment Period.
- (yy) **“Projected Construction Period Payment (Cumulative)”** means, in respect of each Construction Period Payment, the amount set out in Column 10 of Table A.
- (zz) **“Projected DB Co Funding Amount”** means, in respect of each Payment Period, the amount set out in Column 6 of Table A, which shall equal [REDACTED]% of the Projected Eligible Construction Period Payment for the applicable Payment Period.
- (aaa) **“Projected DB Co Funding Amount (Cumulative)”** means, in respect of each Payment Period, the amount set out in Column 7 of Table A.
- (bbb) **“Projected DB Co Soft Costs”** means, in respect of each Payment Period, the amount set out in Column 3 of Table A.
- (ccc) **“Projected Earned Value”** means, in respect of each Construction Period Payment, the amount set out in Column 3B of Table A.
- (ddd) **“Projected Eligible Construction Period Payment”** means, in respect of each Construction Period Payment, the amount set out in Column 4 of Table A, which shall be the sum of the Projected DB Co Soft Costs and Projected Capital Costs.
- (eee) **“Projected Eligible Construction Period Payment (Cumulative)”** means, in respect of each Construction Period Payment, the amount set out in Column 5 of Table A.
- (fff) [not used]
- (ggg) **“Qualifying NCR”** means a Non-Conformance Report in accordance with Schedule 11 – Integrated Management System Requirements regarding any Non-Conformance discovered in the physical elements of any of the Works:
- (i) for which DB Co has continued, or has stated the intention to continue, construction of the Works past the relevant Witness Point or Hold Point in contravention of the Inspection and Test Plan; or
 - (ii) following DB Co’s stated completion of a task or component and DB Co’s statement that the requirements for Design and Construction Certification have been met in respect of such Works and such Works have been inspected and tested by DB Co pursuant to the Inspection and Test Plan,
- and shall include “Critical Qualifying NCR”, “Medium Qualifying NCR” or “Minor Qualifying NCR”.

- (hhh) **“Qualifying Process NCR”** means a Non-Conformance Report in accordance with Schedule 11 – Integrated Management System Requirements regarding any Non-Conformance discovered in the Project Operations as described in Attachment E, and shall include “Critical Qualifying Process NCR”, “Medium Qualifying Process NCR” or “Minor Qualifying Process NCR”.
- (iii) **“Remedial Period”** means the period allowed for remedying a Construction Period Quality Failure in accordance with the fifth column of the tables in Attachment E.
- (jjj) **“Repeated Minor Construction Period Quality Failure”** has the meaning set out in Section 6.3(c).
- (kkk) **“Request for Payment”** has the meaning set out in Section 3.3(a)(i).
- (lll) **“Supplementary Payment Calculation Date”** has the meaning set out in Section 2.3(a).
- (mmm) **“Table A”** means the Table A set out in Attachment A.
- (nnn) **“Total Capital Cost”** means \$[REDACTED]
- (ooo) **“Total Capital Cost Incurred to Date”** means the cumulative amount of the Total Capital Cost determined as of each Payment Calculation Date as the sum of:
 - (i) the cumulative aggregate of Capital Costs up to, and including, the Payment Period as set out in Table A, multiplied by the Earned Value Progress Ratio; and
 - (ii) the cumulative aggregate of DB Co Soft Costs up to, and including, the Payment Period as set out in Table A.
- (ppp) **“Unpaid Construction Period Payment”** means any portion of the Projected Eligible Construction Period Payment (Cumulative) set out in Table A that is unpaid after the last Construction Period Payment set out in Table A.

2. PAYMENTS BY THE CITY

2.1 Obligation to Pay

- (a) The City shall pay to DB Co:
- (i) the Construction Period Payments; and
 - (ii) the Substantial Completion Payments,
- in accordance with the Project Agreement and this Schedule 21.

2.2 Calculation of the Construction Period Payments

- (a) Each Construction Period Payment shall be calculated in accordance with the following:
- (i) subject to Section 2.2(a)(ii) and Section 2.3, the number of Construction Period Payments to be paid by the City is set out in Table A;
 - (ii) the first actual Payment Calculation Date shall be the first Payment Calculation Date set out in Table A and each Payment Calculation Date thereafter shall occur on the applicable Payment Calculation Date set out in Table A;
 - (iii) each Construction Period Payment shall equal the lesser of:
 - (A) the Projected Construction Period Payment (Cumulative) set out in Table A for the applicable Payment Period less the total value of all Construction Period Payments made by the City prior to the date of calculation; or
 - (B) the Total Capital Cost Incurred to Date minus the DB Co Funding Amounts prior to and including the applicable Payment Period less the total value of all Construction Period Payments made by the City prior to the date of calculation;

provided that, the amount of the Financial Close CPP shall be as determined in accordance with Section 3.4.

2.3 Payment of Unpaid Construction Period Payment Prior to Substantial Completion

- (a) After the expiration of all Payment Calculation Dates set out in Column 2 of Table A, DB Co may identify additional Payment Calculation Dates (each a “**Supplementary Payment Calculation Dates**”) for the purposes of seeking payment of any Unpaid Construction Period Payment, or any portion thereof, in accordance with the following:
- (i) DB Co shall provide at least 30 days’ Notice to the City of each Supplementary Payment Calculation Date;
 - (ii) All provisions of this Schedule 21 with respect to the application for, and calculation and Independent Certifier review of, a Construction Period Payment shall apply mutatis mutandis to an application for, and calculation and Independent Certifier review of, a payment pursuant to this Section 2.3;
 - (iii) Each Supplementary Payment Calculation Date shall occur no more than once a month;

and

- (iv) any Unpaid Construction Period Payment, or any portion thereof, not paid pursuant to this Section 2.3 shall be paid in accordance with Section 4.2.

2.4 [Not Used]

2.5 Calculation of Substantial Completion Payment

- (a) Subject to Section 2.3, the payment to be made by the City following Substantial Completion shall be calculated in accordance with the following:
 - (i) The payment made following Substantial Completion shall equal,
 - (A) the Substantial Completion Payment; **plus**
 - (B) in respect of West Substantial Completion any Unpaid Construction Period Payment as of the date of payment of the West Substantial Completion Payment.
 - (ii) For clarity, DB Co acknowledges and agrees that,
 - (A) the Substantial Completion Payments are intended to act as a “take-out” payment for Private Capital Invested in the Project;
 - (B) DB Co has structured its Construction Period Payments and the Substantial Completion Payments to ensure that the Total Capital Cost of the Project is paid in a timely manner, and satisfied in full from the final Substantial Completion Payment; and
 - (C) the City has the authority to pay up to **[REDACTED]**% of Total Capital Costs through payment of the Construction Period Payments, plus the Substantial Completion Payments.

3. CONSTRUCTION PERIOD PAYMENTS

3.1 Information to be Provided by DB Co – Lender Advance Confirmations and DB Co Construction Period Payment Documentation

- (a) In order to enable the City and the Independent Certifier to calculate and verify Earned Value, the progress of the Works, the Capital Costs, DB Co Soft Costs and the Construction Period Payments, DB Co shall deliver to the City Representative and the Independent Certifier:

- (i) evidence of all Private Capital Invested, including copies of all draw requests, reports, information, and documentation supporting, or required to be submitted to the Lenders, the Lenders' technical advisor and/or the Lenders' Agent, as the case may be, in respect of DB Co's applications for advances, draws, releases of funds or payments by the Lenders under the Lending Agreements ("**Lender Advances**"); and
 - (ii) all payment or advance confirmations issued by or on behalf of the Lenders including, for clarity, issued by the Lenders' technical advisor,
- (items in Section 3.1(a)(i) and Section 3.1(a)(ii) collectively referred to as "**Lender Advance Confirmations**"). Acceptable forms of confirmation would include such proof as wire transfer statements and/or bank statements and any other evidence as agreed between the City and DB Co.
- (b) DB Co shall acquire, from the Lenders or the Lenders' Agent, as part of the Financing and in a form and content acceptable to the City Representative, the right for DB Co to receive, and to deliver to the City and the Independent Certifier, copies of all Lender Advance Confirmations. DB Co shall deliver to the City Representative and the Independent Certifier, copies of all Lender Advance Confirmations within two Business Days following receipt of each Lender Advance by DB Co.
 - (c) In order to enable the City and the Independent Certifier to calculate and verify progress of the Earned Value of the Works, the Capital Costs, the DB Co Soft Costs and the Construction Period Payments, DB Co shall submit, to the Independent Certifier,
 - (i) all information required by Schedule 33 – Works Reports and Schedule 12 – Works Scheduling Requirements; and,
 - (ii) any other information reasonably required by the Independent Certifier to allow the Independent Certifier to assess the Earned Value, the Capital Costs, the DB Co Soft Costs and the payment to be made under Section 2.2(a)(iii)(B) and to assess the Total Capital Cost Incurred to Date,(collectively, the "**DB Co Construction Period Payment Documentation**").
 - (d) In conjunction with all Construction Period Payment Applications, DB Co shall complete and deliver to the City Representative and the Independent Certifier a DB Co officer certificate in substantially the form set out in Attachment C confirming the information set out therein ("**DB Co Officer Construction Period Payment Certificate**").

3.2 Intentionally Deleted

3.3 Submission and Review of DB Co Construction Period Payment Applications

- (a) No later than five days after each Payment Calculation Date, DB Co shall prepare, complete and deliver an application for payment of the applicable Construction Period Payment (a "**Construction Period Payment Application**") to the City Representative and the Independent Certifier. Each Construction Period Payment Application shall consist of,

- (i) a request for payment substantially in the form attached as Attachment B, including all documents contemplated in the request for payment pursuant to Attachment B (each, a **“Request for Payment”**);
 - (ii) except to the extent already delivered to the City, the Lender Advance Confirmations;
 - (iii) except to the extent already delivered to the City, the DB Co Construction Period Payment Documentation; and
 - (iv) a DB Co Officer Construction Period Payment Certificate certifying the amount of Total Capital Cost Incurred to Date, as of the applicable Payment Calculation Date.
- (collectively, (i) – (iv), the **“Payment Application Requirements”**).
- (b) DB Co shall cooperate with the City Representative and the Independent Certifier to permit the Independent Certifier’s review and assessment of the DB Co Construction Period Payment Documentation, the Lender Advance Confirmations and all other documentation submitted with the Construction Period Payment Application. Such cooperation shall include responding to inquiries by the Independent Certifier so that the Independent Certifier can verify any and all matters related to the DB Co Construction Period Payment Documentation and the Lender Advance Confirmations, and the statements contained therein, to the reasonable satisfaction of the Independent Certifier.
 - (c) Within five Business Days after the receipt by the Independent Certifier of a duly completed Construction Period Payment Application, the Independent Certifier shall review the Total Capital Cost Incurred to Date claimed in the Construction Period Payment Application and shall perform such inquiries, investigations and inspections as are necessary for the Independent Certifier to be able to verify Earned Value and Total Capital Cost Incurred To Date and shall provide a certificate (an **“IC Construction Period Payment Authorization Certificate”**) to the City Representative and the DB Co Representative setting out:
 - (i) a certification to the City of the Total Capital Cost Incurred to Date, in accordance with the Works Report; and
 - (ii) a calculation of the Construction Period Payment pursuant to Section 2.2, and a calculation of the corresponding DB Co Funding Amount for such Payment Period,
 - (d) The City shall, subject to and in accordance Article 4 of the Project Agreement and no later than five Business Days after the date of the IC Construction Period Payment Authorization Certificate, pay the applicable Construction Period Payment to DB Co.
 - (e) DB Co covenants and agrees that DB Co shall,

- (i) carry out the Works and make all payments due and payable to the Construction Contractor in respect of the Works and to the applicable recipients of the DB Co Soft Costs without further payments from the City other than Construction Period Payments, and the Substantial Completion Payments as set out in this Schedule 21; and
- (ii) continue to comply with the provisions of the Project Agreement and the CA including complying with all holdback and trust obligations from its own resources, if necessary, and as required under the CA.

3.4 Financial Close CPP

The preceding Sections 3.1 and 3.3 are subject to this Section 3.4.

The amount of the Financial Close CPP shall be [REDACTED]% of the mobilization costs.

Notwithstanding Sections 3.1 and 3.3, all deliveries of documents and other information, and related determinations, shall be made by the parties during the period prior to Financial Close so that the Financial Close CPP may be made by the City on Financial Close as part of the agreed flow of funds on that date. All required deliveries and other information shall be advised by the parties to each other in a timely manner.

4. SUBSTANTIAL COMPLETION PAYMENTS

4.1 Substantial Completion Payments

- (a) [Not used]
- (b) Once DB Co believes that it has satisfied:
 - (i) all requirements for East Substantial Completion, it shall deliver the East Substantial Completion Notice contemplated in Section 25.4 of the Project Agreement; and
 - (ii) all requirements for West Substantial Completion, it shall deliver the West Substantial Completion Notice contemplated in Section 25.4 of the Project Agreement.
- (c) The City shall, once all preconditions to eligibility for payment have been satisfied in accordance with the provisions of the Project Agreement, and subject to Article 4 of the Project Agreement, pay to DB Co:
 - (i) upon issuance of the East Substantial Completion Certificate, the East Substantial Completion Payment, plus, for clarity, applicable HST, on the East Substantial Completion Payment Date; and
 - (ii) upon issuance of the West Substantial Completion Certificate, the West Substantial Completion Payment plus, for clarity, applicable HST, less any Lane Closure Adjustment and Bus Rapid Transit Lane Closure Adjustment, on the West Substantial Completion Payment Date.

4.2 Payment of Remaining Unpaid Construction Period Payments

- (a) Subject to Section 2.3, once DB Co believes that it has satisfied all requirements for West Substantial Completion, it shall deliver an application for payment of any remaining Unpaid

Construction Period Payments for the Works to the City Representative and the Independent Certifier substantially in the form attached as Attachment D (the “**Unpaid Construction Period Payment Application**”) which shall provide all documentation in respect of such Unpaid Construction Period Payments. Once all of the conditions for payment of the West Substantial Completion Payment have been satisfied by DB Co, the City shall pay or cause to be paid to DB Co all such Unpaid Construction Period Payments.

5. GENERAL

- (a) DB Co shall provide direction to the City as to a bank account with a Schedule 1 Bank in Canada or an alternative bank in Canada provided such bank is permitted under the Lending Agreements, where each Construction Period Payment, the Substantial Completion Payments and any Unpaid Construction Period Payments, together with applicable HST, are to be deposited.
- (b) DB Co acknowledges and agrees that payment by the City of Construction Period Payments, the Substantial Completion Payments and the Unpaid Construction Period Payments in accordance with this Schedule 21 constitutes payment by the City to DB Co in satisfaction of the City’s obligation to pay Construction Period Payments and the Substantial Completion Payments, as applicable, to DB Co under the Project Agreement and in satisfaction of any trust obligation of the City with respect to such payments under Section 7 of the CA pursuant to Section 10 of the CA.
- (c) DB Co shall provide to the City, from time to time and no later than 5 Business Days after a request from the City, such information and documentation as the City may require (including certification in writing by a DB Co officer addressed to the City and the Independent Certifier, to demonstrate that the proceeds of the Construction Period Payments, and the Substantial Completion Payments are being used to pay duly authorized costs of the Works, special purpose vehicle costs, Financing costs, and other costs incurred to complete the Works) to verify that all amounts due and payable in respect of the costs of the Works, special purpose vehicle costs, Financing costs and other costs incurred to complete the Works for the applicable period in excess of the applicable Construction Period Payment or Substantial Completion Payment are being satisfied and to satisfy all holdback and trust obligations owed to the Construction Contractor and other Subcontractors from time to time under the CA.
- (d) Notwithstanding anything to the contrary in this Schedule 21 or the Project Agreement,
 - (i) the City is not obligated to make any payment to DB Co (including for clarity, any Construction Period Payments or Substantial Completion Payments) unless all conditions precedent applicable to such payment pursuant to this Schedule 21 have been satisfied by DB Co; and
 - (ii) the City is not obligated to make payment to DB Co if, in connection with the Works, the City is or becomes aware,
 - (A) that a claim for lien under the CA has been registered against the Lands; or
 - (B) that a notice of lien or claim for lien under the CA has been made against or in respect of the Lands or the holdbacks required to be maintained under the CA; or

- (C) that there has been a failure by DB Co or any DB Co Party to comply with the requirements of the CA, including a failure to satisfy the statutory holdbacks under the CA in respect of the Works,

(in each case to the extent that any such liens, claims or failures have been caused by an act or omission of DB Co or any DB Co Party), and provided that no payment from the City shall be withheld or delayed on the grounds of any liens registered or claimed, where such liens have been duly released, discharged or vacated in accordance with the requirements of the CA.

- (e) No Construction Period Payment, or Substantial Completion Payment or partial or entire use or occupancy of the New City Infrastructure, the New MTO Infrastructure or the Lands shall constitute acceptance by the City of the Works in accordance with the Project Agreement.
- (f) If the City or DB Co, acting in good faith, dispute a determination of the Independent Certifier made pursuant to this Schedule 21, the City shall pay the amounts in dispute in accordance with the determination of the Independent Certifier and the Party that wishes to dispute the decision of the Independent Certifier may refer such Dispute for resolution in accordance with Schedule 27 – Dispute Resolution Procedure.
- (g) Sections 4.2, 4.6 and 4.7 of the Project Agreement apply to Construction Period Payments, and the Substantial Completion Payments.
- (h) Notwithstanding anything to the contrary in the Project Agreement, the City shall not make any deduction, set-off or withholding from any Construction Period Payment or Unpaid Construction Period Payment other than in accordance with this Schedule 21.

6. CONSTRUCTION ENFORCEMENT DEDUCTIONS

6.1 Construction Period Deductions

- (a) If, at any time prior to Substantial Completion, DB Co commits a Construction Period Quality Failure, the City may, in its sole discretion, assess and accumulate a Construction Period Deduction and deduct the total of all Construction Period Deductions from the West Substantial Completion Payment.

6.2 Calculation of the Construction Period Deductions

- (a) Each Construction Period Deduction shall be calculated in accordance with the following formula:

$$TCPD_n = \sum CPD_n$$

Where:

$TCPD_n$ means the total Construction Period Deduction applicable to Payment Period n; and

$\sum CPD_n$ means the sum of Construction Period Deductions in respect of the relevant Payment Period in relation to Construction Period Quality Failures calculated in accordance with this Schedule 21 (the “**Construction Period Quality Failure Deduction**”)

- (b) The deduction attributable to each Construction Period Quality Failure shall be as follows:
- (i) in the case of a Minor Construction Period Quality Failure for a Non-Conformance Report initiated by DB Co, there shall be no deduction;
 - (ii) in the case of a Medium Construction Period Quality Failure for a Non-Conformance Report initiated by DB Co, each deduction shall equal \$[REDACTED];
 - (iii) in the case of a Minor Construction Period Quality Failure for a Non-Conformance Report initiated by the City:
 - (A) the first deduction shall equal \$[REDACTED]; and
 - (B) each subsequent deduction arising from a failure to remediate prior to the expiration of the applicable Remedial Period, shall be [REDACTED] per cent of the immediately previous deduction but shall not exceed [REDACTED] per cent of the first deduction;
 - (iv) in the case of a Medium Construction Period Quality Failure for a Non-Conformance Report initiated by the City:
 - (A) the first deduction shall equal \$[REDACTED]; and
 - (B) each subsequent deduction arising from a failure to remediate prior to the expiration of the applicable Remedial Period shall equal [REDACTED] per cent of the immediately previous deduction but shall not exceed [REDACTED] per cent of the first deduction; and
 - (v) in the case of a Critical Construction Period Quality Failure for a Non-Conformance Report initiated by either Party:
 - (A) the first deduction shall equal \$[REDACTED]; and
 - (B) each subsequent deduction arising from a failure to remediate prior to the expiration of the applicable Remedial Period shall equal [REDACTED] per cent of the immediately previous deduction but shall not exceed [REDACTED] per cent of the first deduction.
- (c) For clarity, subject to DB Co's right to Dispute the Construction Period Quality Failure, the occurrence of a Construction Period Quality Failure will immediately give rise to a right, on behalf of the City, to apply a Construction Period Quality Failure Deduction against the Substantial Completion Payment, irrespective of the Remedial Period permitted.
- (d) After the occurrence of a Construction Period Quality Failure, DB Co shall remediate the Construction Period Quality Failure prior to the expiration of the applicable Remedial Period set out in Attachment E.
- (A) If, prior to the expiration of the applicable Remedial Period, DB Co demonstrates, to the satisfaction of the City Representative, acting reasonably, that it has remedied the Construction Period Quality Failure, no further

Construction Period Deduction shall be made in respect of that Construction Period Quality Failure.

- (B) If DB Co fails to remediate a Construction Period Quality Failure prior to the expiration of the applicable Remedial Period, the City, may, in its sole discretion, apply a further Construction Period Deduction, calculated in accordance with this Section 6.2, and a further Remedial Period (or Remedial Periods) of the same duration shall be deemed to have commenced.
- (C) The City may, in their sole discretion, apply the applicable Construction Period Deduction each time DB Co fails to remediate a Construction Period Quality Failure prior to the expiration of the applicable Remedial Period until such time as DB Co demonstrates, to the satisfaction of the City Representative, acting reasonably, that it has remediated the applicable Construction Period Quality Failure.

6.3 Tolerances for Minor Construction Period Quality Failures for Non-Conformance Reports Initiated by the City

- (a) The City shall assess Construction Period Quality Failures on a Construction Period Month by Construction Period Month basis. Except as provided in Section 6.3(c), the City shall not apply a Construction Period Deduction due to a Minor Construction Period Quality Failure for a Non-Conformance Report initiated by the City in respect of any Construction Period Month in which the total number of Minor Construction Period Quality Failures for Non-Conformance Reports initiated by the City for that Construction Period Month is less than or equal to [REDACTED] (the “**Minor Construction Period Quality Failure Tolerance**”).
- (b) If the Minor Construction Period Quality Failure Tolerance is exceeded, the City may, in their sole discretion, apply a Construction Period Deduction for each Minor Construction Period Quality Failure for a Non-Conformance Report initiated by the City in excess of the Minor Construction Period Quality Failure Tolerance during the applicable Construction Period Month.
- (c) If, in any Construction Period Month, a Minor Construction Period Quality Failure for a Non-Conformance Report initiated by the City is due to circumstances that are substantively the same cause as a previous Minor Construction Period Quality Failure for a Non-Conformance Report initiated by the City (within the same Construction Period Month or in a different Construction Period Month) (a “**Repeated Minor Construction Period Quality Failure**”), then a Construction Period Deduction shall be made in respect of the third and each subsequent Repeated Minor Construction Period Quality Failure, irrespective of the Minor Construction Period Quality Failure Tolerance.

6.4 Administration of Construction Period Quality Failures and Construction Period Deductions

- (a) Subject to Sections 6.4(b) to 6.4(e) inclusive, the City shall use the Monthly Non-Conformance Report produced by DB Co for the purposes of calculating the relevant Construction Period Deductions.
- (b) If either Party believes that there is an error or omission in a Monthly Non-Conformance Report, that Party shall promptly provide Notice to the other Party of such error or omission. Immediately after a Notice given pursuant to this Section 6.4(b), DB Co and the City shall

attempt to resolve or clarify the error or omission and amend the applicable Monthly Non-Conformance Report, to their mutual satisfaction, acting reasonably. Subject to Section 6.4(e), if the Parties fail to resolve or clarify the error or omission within ten Business Days after a Notice given pursuant to this Section 6.4(b), either Party may refer the matter to the Dispute Resolution Procedure. Subject to Section 6.4(d) and Section 6.4(e), the Parties are prohibited from giving Notice of an error or omission pursuant to this Section 6.4(b) after the expiration of 60 days after the date of the applicable Monthly Non-Conformance Report.

- (c) Subject to Section 6.4(e), if DB Co fails to monitor or accurately report a Construction Period Event or Construction Period Quality Failure then, in addition to the Construction Period Deduction to be made in respect of the relevant Construction Period Quality Failure (if any), a failure to monitor or report a Construction Period Event or a Construction Period Quality Failure shall be deemed to be a Minor Construction Period Quality Failure.
- (d) In the event that any inspection or investigation by the City or DB Co pursuant to the Project Agreement reveals new errors, omissions or failures of the type referred to in Section 6.4(b) or Section 6.4(c), such errors, omissions or failures shall be dealt with in accordance with Section 6.4(b) or Section 6.4(c), as applicable, and, for clarity, the City may, in its sole discretion, apply Construction Period Deductions in respect of any Construction Period Quality Failures discovered pursuant to this Section 6.4(d) in the manner set out in Section 6.2. Any such Construction Period Deductions shall be made from the Substantial Completion Payment. For clarity, the 60 day deadline set out in Section 6.4(b) shall not apply to errors, omissions or failures revealed pursuant to this Section 6.4(d).
- (e) For the purposes of Sections 6.4(b), 6.4(c) and 6.4(d), if DB Co or a DB Co Party has engaged in fraudulent action or inaction, deliberate misrepresentation, or gross misconduct or incompetence,
 - (i) in the preparation of the Monthly Non-Conformance Report; or
 - (ii) in carrying out the Work resulting in Construction Period Quality Failures,then,
 - (iii) the 60 day deadline set out in Section 6.4(b) shall not apply; and
 - (iv) a failure to monitor or accurately report a Construction Period Event or Construction Period Quality Failure pursuant to Section 6.4(c) shall be deemed to be a Critical Construction Period Quality Failure.
- (f) For clarity, if Construction Period Performance Criteria are based upon Non-Conformance Reports, no Construction Period Deductions shall be made for a Non-Conformance Report which is subject to an objection by DB Co, a Notice of objection by DB Co or Dispute Resolution Process, pursuant to Part 7 of Schedule 11 – Integrated Management System Requirements.

6.5 Additional Requirements for Tracking and Reporting

- (a) In addition to the requirements of Section 7.2 of Part 7 to Schedule 11 – Integrated Management System Requirements, the Non Conformance Tracking System shall record Construction Period Quality Failure Deductions pursuant to this Schedule 21.

- (b) In addition to the requirements of Section 7.2 of Part 7 to Schedule 11 – Integrated Management System Requirements, the Monthly Non-Conformance Report shall contain:
 - (i) the number of Construction Period Quality Failure Deductions in each Construction Period Failure Category accrued within the last Construction Period Month pursuant to this Schedule 21; and
 - (ii) summary statistics and historic trends since Financial Close for the number of Construction Period Quality Failure Deductions in each Construction Period Failure Category each Construction Period Month pursuant to this Schedule 21.

6.6 Disputing a Non-Conformance Report During the Construction Period

- (a) In respect of the following circumstances, the Parties shall be subject to the binding determination of the Independent Certifier pursuant to Section 4.3 and 4.4 of Schedule 27 – Dispute Resolution Procedure and the Independent Certifier’s decision shall be final and shall not be subject to Dispute Resolution:
 - (i) a Notice of objection to a Non-Conformance Report has not been resolved by mutual agreement between the City and DB Co within five Business Days after the delivery of a Notice of the objection pursuant to Section 7.1(a)(v) and Section 7.1(a)(vii) of Part 7 to Schedule 11 – Integrated Management System Requirements; and
 - (ii) the Non-Conformance Report referred to in Section 6.6(a)(i) would have been a Construction Period Quality Failure with a Construction Period Failure Category of “Minor” if the Notice of objection referred to in Section 6.6(a)(i) had not been issued.

ATTACHMENT A

Table A: Payment Calculation Dates and Projected Construction Period Payments

| Payment Period (Column 1) | Payment Calculation Date (Column 2) | Projected DB Co Soft Costs (Column 3) | Projected Capital Costs (Column 3A) | Projected Earned Value (Cumulative) (Column 3B) | Projected Eligible Construction Period Payment (Column 4) | Projected Eligible Construction Period Payment (Cumulative) (Column 5) | Projected DB Co Funding Amount (Column 6) | Projected DB Co Funding Amount (Cumulative) (Column 7) | [not used] (Column 8) | Projected Construction Period Payment (Column 9) | Projected Construction Period Payment (Cumulative) (Column 10) |
|------------------------------|--|--|--|--|--|---|--|---|--------------------------|---|---|
| | [Financial Close] | | | | | | | | | | |
| 1. | 25-Apr-19 | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] | | [REDACTED] | [REDACTED] |
| 2. | 1-May-19 | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] | | [REDACTED] | [REDACTED] |
| 3. | 1-Jun-19 | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] | | [REDACTED] | [REDACTED] |
| 4. | 1-Jul-19 | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] | | [REDACTED] | [REDACTED] |
| 5. | 1-Aug-19 | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] | | [REDACTED] | [REDACTED] |
| 6. | 1-Sep-19 | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] | | [REDACTED] | [REDACTED] |
| 7. | 1-Oct-19 | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] | | [REDACTED] | [REDACTED] |
| 8. | 1-Nov-19 | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] | | [REDACTED] | [REDACTED] |
| 9. | 1-Dec-19 | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] | | [REDACTED] | [REDACTED] |
| 10. | 1-Jan-20 | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] | | [REDACTED] | [REDACTED] |
| 11. | 1-Feb-20 | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] | | [REDACTED] | [REDACTED] |
| 12. | 1-Mar-20 | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] | | [REDACTED] | [REDACTED] |

Project Agreement – Schedule 21 Execution Version

CONFIDENTIAL & PROPRIETARY

CONFIDENTIAL & PROPRIETARY

CONFIDENTIAL & PROPRIETARY

ATTACHMENT B

Form of Request for Payment

| | |
|---|--|
| TO: the City AND TO: [Independent Certifier] | BY: [DB Co Name] (“DB Co”) |
| Construction Period Payment No: | Project: Ottawa LRT Project-Stage 2 Confederation Line Extension (“Project”) |
| Date: [Date] | Project Agreement dated _____ (“Project Agreement”) |

1. DB Co hereby makes application for payment in the amount of _____ [insert amount in words] Dollars (\$[insert amount in numbers]) which is in respect of Payment Period No. ____ in Table A. This payment is for a portion of the Total Capital Costs pursuant to the terms of the Project Agreement and Schedule 21 – Construction Period Payments. Capitalized terms used and not defined herein shall have the same meaning given to them in the Project Agreement.
2. Attached to this Request for Payment is a DB Co Officer Construction Period Payment Certificate in respect of this Payment Period No. ____ [Note: Use the form of certificate set out in Attachment C of this Schedule 21.];
3. DB Co hereby certifies that the Earned Value and the Total Capital Cost Incurred To Date for the applicable Payment Period qualifies DB Co for the Construction Period Payment being requested herein.
4. Attached hereto as Appendix 1 are the Lender Advance Confirmations for the period covered by this Request for Payment.
5. Attached hereto as Appendix 2 is a current Workplace Safety and Insurance Board Clearance Certificate for Construction Contractor evidencing full compliance by [DB Co/Construction Contractor] with the requirements of the *Workplace Safety and Insurance Act, 1997* (Ontario).
6. Attached hereto as Appendix 3 is a Statutory Declaration by DB Co on CCDC Form 9A (2001) evidencing compliance by DB Co with the holdback requirements of the CA.

The information and calculations contained herein and on the attachments hereto are certified to be true, accurate and complete.

Dated at [City], [Province] this [day] day of [month], 20 [●].

[DB Co]

per: _____

Appendix 1

Summary of any Lender Advance Confirmations for the Period

Appendix 2

Current Workplace Safety and Insurance Board Clearance Certificate

Appendix 3

Statutory Declaration by DB Co on CCDC Form 9A (2001)

ATTACHMENT C

Form of DB Co Officer Construction Period Payment Certificate

| | |
|---|---|
| TO: the City AND TO: [Independent Certifier] | BY: [DB Co Name] (“DB Co”) |
| Progress Certificate/Construction Period Payment No: _____ | Project: Ottawa LRT Project-Stage 2 Confederation Line Extension (“Project”) |
| Date: [Date] | Project Agreement dated _____ (“Project Agreement”) |
| | Request for Payment dated _____ (“Request for Payment”) |

I, _____, the [insert title] of [DB Co] hereby certify for and on behalf of DB Co without incurring personal liability and confirm that the same be relied upon by the City and the Independent Certifier without further enquiry as of _____ [insert date] that:

1. I am a duly authorized [signing officer of][signatory for] DB Co, am familiar with the provisions of Project Agreement and have made reasonable investigations of corporate records and inquiries of other officers and senior personnel of DB Co in certifying the information set out below. Terms defined in the Project Agreement have the same meanings when used in this certificate.
2. No DB Co Event of Default has occurred and is continuing under the Project Agreement and the other Project Documents.
3. DB Co has available to it sufficient funds to achieve Substantial Completion in accordance with the Project Agreement subject to DB Co continuing to meet its obligations under the Project Agreement and in receipt of Construction Period Payments from the City.
4. All DB Co Funding Amounts that were to have been funded prior to the date of this Certificate have been funded.
5. All funds received and disbursed by DB Co in connection with the Project prior to the date of this Certificate have been used solely in respect of the payment of Total Capital Costs properly due and payable.
6. The requested Construction Period Payment amount to which this Certificate is attached does not exceed the Projected Eligible Construction Period Payment (Cumulative) set out in Table A applicable to the period to which this Certificate applies.
7. DB Co has complied with all requirements of Applicable Law in connection with the Project, including without limitation, all requirements under the *Workplace Safety and Insurance Act, 1997* (Ontario) and the CA. No claims for lien or notices of lien under the CA have been

received by DB Co or any DB Co Party which have not been duly released, discharged or vacated in accordance with the requirements of the CA, if applicable. Any notice of lien or claim for lien identified in paragraph 10 of the Request for Payment to which this Certificate is attached has been released, discharged or vacated in accordance with the requirements of the CA.

Dated this _____ day of _____, 20____.

Name: _____

Title: _____

Appendix 1 to Attachment C

Copies of any Lender Advance Confirmations

ATTACHMENT D

Form of Substantial Completion Payment Application

| | |
|--|--|
| TO: the City AND TO: [Independent Certifier] | BY: [DB Co Name] (“DB Co”) |
| [East / West] Substantial Completion Payment Application | Project: Ottawa LRT Project-Stage 2 Confederation Line Extension (“Project”) |
| Date: [Date] | Project Agreement dated _____ (“Project Agreement”) |

1. DB Co hereby makes application for the [East / West] Substantial Completion Payment [and Unpaid Construction Period Payments in the amount of [insert amount in words] Dollars (\$[insert amount in numbers])] [NTD: Unpaid Construction Period Payments to be paid at West Substantial Completion only] pursuant to the terms of the Project Agreement and Schedule 21 – Construction Period Payments. Capitalized terms used and not defined herein shall have the same meaning given to them in the Project Agreement.
2. DB Co has certified to the City that all requirements for [East / West] Substantial Completion and all conditions for issuance of the [East / West] Substantial Completion Certificate have been satisfied, and has performed all requirements and provided all assurances and documents set out in the definition of “[East / West] Substantial Completion” in the Project Agreement.
3. No DB Co Event of Default has occurred and is continuing under the Project Agreement.
4. DB Co has complied with all requirements of Applicable Law in connection with the Project, including without limitation, all requirements under the *Workplace Safety and Insurance Act, 1997* (Ontario) and the CA. No claims for lien or notices of lien under the CA have been received by DB Co or any DB Co Party which have not been duly released, discharged or vacated in accordance with the requirements of the CA.
5. Attached hereto as Appendix 1 is a current Workplace Safety and Insurance Board Clearance Certificate for DB Co evidencing full compliance by [DB Co/Construction Contractor] with the requirements of the *Workplace Safety and Insurance Act, 1997* (Ontario), as amended.
6. Attached hereto as Appendix 2 is a Statutory Declaration by DB Co on CCDC Form 9A (2001) evidencing compliance by DB Co with the holdback requirements of the CA.
7. Attached hereto as Appendix 3 is a sub-search of the title to the Lands against which a claim for lien under the CA could be registered, if applicable. Any notice of lien or claim for lien identified in such Appendix 4 has been released, discharged or vacated in accordance with the requirements of the CA.

The information and calculations contained herein and on the attachments hereto are certified to be true, accurate and complete.

Dated at [City], [Province] this [day] day of [month], 20 [●].

[DB Co]

per: _____

Appendix 1 to Attachment D
Workplace Safety and Insurance Board Clearance Certificate

Appendix 2 to Attachment D
Statutory Declaration by DB Co on CCDC Form 9A (2001)

Appendix 3 to Attachment D
Sub-search of the Title to the Lands

ATTACHMENT E

CONSTRUCTION PERIOD PERFORMANCE CRITERIA

Non-Conformances Discovered in Physical Elements of the Works

Table 1

| Reference | Requirement to be met | Construction Period Failure Type | Construction Period Failure Category | Remedial Period |
|---|---|----------------------------------|--------------------------------------|--|
| CPPC-01: Schedule 21 – Construction Period Payments | Physical elements of the Works shall meet the requirements of the Project Agreement, such that: (a) a Critical Qualifying NCR with a 'Pending Status' does not occur; or (b) DB Co Accepted Works are not Contested Non-Conforming Works. | CPQF | Critical | The first Remedial Period shall not exceed the time set in the NCR to resolve the Non-Conformance. The Remedial Period thereafter shall be the lesser of 20 Business Days (or such a period as approved by the City in its sole discretion) and the first Remedial Period. |
| CPPC-02: Schedule 21 – Construction Period Payments | Physical elements of the Works shall meet the requirements of the Project Agreement, such that a Medium Qualifying NCR with a 'Pending Status' does not occur. | CPQF | Medium | The first Remedial Period shall not exceed the time set in the NCR to resolve the Non-Conformance. The Remedial Period thereafter shall be the lesser of 20 Business Days (or such a period as approved by the City in its sole discretion) and the first Remedial Period. |
| CPPC-03: Schedule 21 – Construction Period Payments | Physical elements of the Works shall meet the requirements of the Project Agreement, such that a Minor Qualifying NCR with a 'Pending Status' does not occur. | CPQF | Minor | The first Remedial Period shall not exceed the time set in the NCR to resolve the Non-Conformance. The Remedial Period thereafter shall be the lesser of 20 Business Days (or such a period as approved by the City in its sole discretion) and the first Remedial Period. |

Non-Conformances that are not physical elements of the Works

Table 2

| Reference | Requirement to be met | Construction Period Failure Type | Construction Period Failure Category | Remedial Period |
|---|---|----------------------------------|--------------------------------------|--|
| CPPC-04: Schedule 21 – Construction Period Payments | Works that are not physical elements of the Works shall meet the requirements of the Project Agreement, such that a Critical Qualifying Process NCR with a 'Pending Status' does not occur. | CPQF | Critical | The first Remedial Period shall not exceed the time set in the NCR to resolve the Non-Conformance. The Remedial Period thereafter shall be the lesser of 20 Business Days (or such a period as approved by the City in its sole discretion) and the first Remedial Period. |
| CPPC-05: Schedule 21 – Construction Period Payments | Works that are not physical elements of the Works shall meet the requirements of the Project Agreement, such that a Medium Qualifying Process NCR with a 'Pending Status' does not occur. | CPQF | Medium | The first Remedial Period shall not exceed the time set in the NCR to resolve the Non-Conformance. The Remedial Period thereafter shall be the lesser of 20 Business Days (or such a period as approved by the City in its sole discretion) and the first Remedial Period. |
| CPPC-06: Schedule 21 – Construction Period Payments | Works that are not physical elements of the Works shall meet the requirements of the Project Agreement, such that a Minor Qualifying Process NCR with a 'Pending Status' does not occur. | CPQF | Minor | The first Remedial Period shall not exceed the time set in the NCR to resolve the Non-Conformance. The Remedial Period thereafter shall be the lesser of 20 Business Days (or such a period as approved by the City in its sole discretion) and the first Remedial Period. |

Specific Non-Conformances

Table 3

For clarity a deduction under Table 3 is not subject to a deduction under Table 2.

Construction Period Failure Categories defined in Table 3 shall escalate for persistent, ongoing and repeated Non-Conformances.

| Reference | Requirements to be met | Construction Period Failure Type | Construction Period Failure Category | Remedial Period |
|--|--|----------------------------------|--------------------------------------|------------------|
| CPPC-07: Project Agreement Section 11.19 | DB Co shall follow protocols as set out in Section 11.19 in accordance with TTMP, Construction Access Management Plan and the Output Specification | CPQF | Medium | 10 Business Days |
| CPPC-08: Project Agreement Section 20.1 | DB Co shall provide access to the City, and the Government Entities and their respective representatives to the Lands, the New City Infrastructure, Existing Infrastructure, the New MTO Infrastructure or any workshop | CPQF | Minor | 1 Business Day |
| CPPC-09: Project Agreement Section 20.5 | DB Co shall provide access to the Independent Certifier, and all Other Contractors to the Lands, the New City Infrastructure, Existing Infrastructure, the New MTO Infrastructure or any workshop | CPQF | Minor | 1 Business Day |
| CPPC-10: Project Agreement Section 26.2 | DB Co shall ensure that there are sufficient numbers of competent staff, including all relevant grades of supervisory staff, engaged in the performance of the Works to ensure the proper performance of the Project Agreement | CPQF | Medium | 20 Business Days |

| Reference | Requirements to be met | Construction Period Failure Type | Construction Period Failure Category | Remedial Period |
|--|--|---|---|------------------------|
| CPPC-11: Schedule 12 – Works Scheduling Requirements | DB Co shall prepare and submit PBS-1 at Financial Close. | CPQF | Critical | 5 Business Days |
| CPPC-12: Schedule 12 – Works Scheduling Requirements | DB Co shall prepare and submit, within 180 days after Financial Close, PBS 2. | CPQF | Critical | 5 Business Days |
| CPPC-13: Schedule 12 – Works Scheduling Requirements | DB Co shall prepare and submit a Recovery Schedule in accordance with the requirements of Schedule 12 – Works Scheduling Requirements, no later than the end of the subsequent reporting period. | CPQF | Critical | 5 Business Days |
| CPPC-14: Schedule 10 – Review Procedure | Works Schedules shall not receive a ‘Critical Comment’ or ‘Major Comment’ from the City more than once. | CPQF | Critical | n/a |

| Reference | Requirements to be met | Construction Period Failure Type | Construction Period Failure Category | Remedial Period |
|--|--|----------------------------------|--------------------------------------|-----------------|
| CPPC-15: Schedule 10 – Review Procedure | <p>The following Works Submittals shall not receive a “MAJOR COMMENT” or “CRITICAL COMMENT” from the City more than two times in a row for the same reason:</p> <p>(a) Design Management Plan, Construction Management Plan, Traffic and Transit Management Plan, Environmental Management Plan, Design Certificates, Construction Certificates, from Appendix A to Schedule 10 – Review Procedure; and</p> <p>(b) the Geotechnical Instrumentation Monitoring Plan from Appendix A to Schedule 10 – Review Procedure.</p> | CPQF | Medium | 5 Business Days |
| CPPC-16: Schedule 17 – Environmental Obligations, Appendix B | Submission of Environmental Management Plan Updates | CPQF | Medium | 5 Business Days |
| CPPC-17: Schedule 17 – Environmental Obligations, Appendix B | Submission of Annual Compliance Monitoring Report | CPQF | Medium | 5 Business Days |

| Reference | Requirements to be met | Construction Period Failure Type | Construction Period Failure Category | Remedial Period |
|---|--|---|---|--|
| CPPC-18: Schedule 17 – Environmental Obligations, Appendix B | Submission Independent Environmental Audit | CPQF | Medium | 5 Business Days |
| CPPC-19: Schedule 17 – Environmental Obligations, Appendix B | Submission of Sustainability Annual Report Card | CPQF | Medium | 5 Business Days |
| CPPC-20: Schedule 17 – Environmental Obligations, Appendix B | Submission Independent Environmental Audit | CPQF | Medium | 5 Business Days |
| CPPC-21: Schedule 17 – Environmental Obligations, Section 8.4 | DB Co shall ensure during the Construction Period, air-borne and ground- borne noise and vibration impacts on Sensitive Receivers do not exceed the Applicable Noise and Vibration Requirements and Additional Sensitive Receiver Performance Requirements | CPQF | Critical | 1 Business Day, or longer as agreed to by the City acting reasonably. |
| CPPC-22: Schedule 18 – Communications and Stakeholder Engagement Obligations, Part 4 | DB Co shall deliver communications and stakeholder engagement activities in accordance with Schedule 18 Part 4 | CPQF | Minor | 1 Business Day |
| CPPC-23: Schedule 18 – Communications and Stakeholder Engagement Obligations, Section 5.1 | DB Co shall provide Notification to the City and a draft public notification in accordance with the requirements of Schedule 18 Section 5.1 | CPQF | Minor | 1 Business Day |

| Reference | Requirements to be met | Construction Period Failure Type | Construction Period Failure Category | Remedial Period |
|--|--|---|---|------------------------|
| CPPC-24: Schedule 11 – Integrated Management System Requirements, Section 4.4 | DB Co shall prepare and submit each Inspection and Test Plan in respect of the Works to the City pursuant to Schedule 10 - Review Procedure at least 15 Business Days prior to performing the relevant Works. | CPQF | Minor | 1 Business Day |
| CPPC-25: Schedule 11 – Integrated Management System Requirements, Section 5.1(b) | DB Co shall provide an updated IMS Audit Plan at twelve month intervals following submission of the initial IMS Audit Plan. | CPQF | Medium | 20 Business Days |
| CPPC-26: Schedule 11 – Integrated Management System Requirements, Section 5.1(b) | At each occurrence of DB Co failing to follow the IMS Audit Plan without the prior agreement in writing of the City | CPQF | Medium | 20 Business Days |
| CPPC-27: Schedule 11 – Integrated Management System Requirements, Section 5.2(c) | All IMS Non-Conformances identified by the Internal IMS Audits must be addressed and corrective measures implemented by DB Co. DB Co shall provide final audit reports to the City within 10 Business Days of the closing of the audits. | CPQF | Medium | 5 Business Days |
| CPPC-28: Schedule 11 – Integrated Management System Requirements, Section 5.4(a)(ii) | DB Co shall prepare a Corrective Action plan, and submit it to the City within 20 Business Days of the closing of the City's IMS Audit. At each occurrence of DB Co failing to prepare a Corrective Action plan within the required time period. | CPQF | Minor | 1 Business Day |

| Reference | Requirements to be met | Construction Period Failure Type | Construction Period Failure Category | Remedial Period |
|--|---|---|---|------------------------|
| CPPC-29: Schedule 11 – Integrated Management System Requirements, Section 7.3(a) | DB Co shall resolve Non Conformances within the response time specified on the Non Conformance Reports. | CPQF | Minor | 5 Business Days |
| CPPC-30: Schedule 26 – Record Provisions, Section 1.1 | DB Co shall keep and maintain records in accordance with Schedule 26 Section 1.1 | CPQF | Minor | 10 Business Days |

Specific Non-Conformances for Lane Closures

Table 4

Non-Conformances in the Works Requiring Immediate Action

| Reference | Requirements to be met | Construction Period Failure Type | Construction Period Failure Category | Remedial Period |
|--|---|----------------------------------|--------------------------------------|---------------------|
| CPPC-31 Schedule 15-2 Part 9, Part C Article 4.4 table 4.4.1 | Lane Closures shall not start earlier than the Permitted Periods for Closures on Highway 416 and 417 Mainline | CPQF | Medium | Twenty (20) minutes |
| CPPC-32 Schedule 15-2 Part 9, Part C Article 4.4 table 4.4.1 | Lane Closures shall not end later than the Permitted Periods for Closures on Highway 416 and 417 Mainline. | CPQF | Medium | Twenty (20) minutes |
| CPPC-33 Schedule 15-2 Part 9, Part C Article 4.4 table 4.4.2 | Lane Closures shall not start earlier than the Permitted Periods for Closures on Crossing Roads | CPQF | Medium | Twenty (20) minutes |
| CPPC-34 Schedule 15-2 Part 9, Part C Article 4.4 table 4.4.2 | Lane Closures shall not end later than the Permitted Periods for Closures on Crossing Roads | CPQF | Medium | Twenty (20) minutes |
| CPPC-35 Schedule 15-2 Part 9, Part C Article 4.4 table 4.4.3 | Lane Closures shall not start earlier than the Permitted Periods for Closures on Highway 416 and 417 Ramps | CPQF | Medium | Twenty (20) minutes |
| CPPC-36 Schedule | Lane Closures shall not end later than the Permitted Periods for Closures on | CPQF | Medium | Twenty (20) minutes |

| Reference | Requirements to be met | Construction Period Failure Type | Construction Period Failure Category | Remedial Period |
|--|---|---|---|------------------------|
| 15-2 Part 9, Part C Article 4.4 table 4.4.3 | Highway 416 and 417 Ramps. | | | |
| CPPC-37 Schedule 15-2 Part 9, Part C Article 4.5 | Full Closure shall not start earlier than Permitted Periods for Closures. | CPQF | Critical | Two (2) hours |
| CPPC-38 Schedule 15-2 Part 9, Part C Article 4.5 | Full Closure shall not end later than Permitted Periods for Closures. | CPQF | Critical | Two (2) hours |

ATTACHMENT F

CREDIT RULES

1. CREDIT RULES FOR THE EVALUATION OF EARNED VALUE

1.1 Purpose of Credit Rules

- (a) The Credit Rules set out requirements agreed between the City and DB Co for use and interpretation of the Earned Value Measurement Techniques, pursuant to this Schedule 21.

1.2 Change of Credit Rules

- (a) In the event that DB Co or the City propose a change to the Credit Rules, the Independent Certifier may agree to such proposed change to the Credit Rule, provided that:
 - (i) any proposed change to the Credit Rules will result in revised Credit Rules that:
 - (A) continue to meet the Earned Value Measurement Techniques; and
 - (B) follow the principles, guidance, and intent of the Credit Rules set out in this Attachment F, wherever possible;
 - (ii) any proposed change to the Credit Rules is subject to consultation with the City and DB Co at least three months prior to the first Construction Period that uses those revised Credit Rules;
 - (iii) the Independent Certifier considers any responses made by the City and DB Co to a proposed change to the Credit Rules and the Independent Certifier provides a report justifying its decision regarding acceptance or rejection of any proposal to change the Credit Rules; and
 - (iv) prior to the start of the first Construction Period that is to use the revised Credit Rules for the evaluation of Earned Value:
 - (A) the proposed changes to the Credit Rules are agreed to by the Independent Certifier; and
 - (B) both the City and DB Co receive the revised Credit Rules from the Independent Certifier.

1.3 Selection of Measurement Methods

- (a) In principle, when selecting the appropriate measurement methods from the Earned Value Measurement Techniques, the following principles shall be applied:
 - (i) for tangible work or tasks taking three Construction Period Months or more to perform, the measurement methods shall be considered in the following decreasing order of preference:
 - (A) firstly, activity completion and physical measurement using the fixed formula 0/100 method; and
 - (B) secondly, weighted milestone;

- (ii) for tangible work or tasks taking one or two Construction Period Months to perform, the measurement methods shall be considered in the following decreasing order of preference:
 - (A) activity completion and physical measurement using the fixed formula 0/100 method; and
- (iii) for intangible work or tasks, the measurement methods shall be considered in the following decreasing order of preference:
 - (A) firstly, apportioned effort; and
 - (B) secondly, only where apportioned effort is not possible, level of effort.
- (b) Table 1 sets out the measurement methods that shall be used from the Earned Value Measurement Techniques for specific cost categories, unless there are technical reasons preventing these measurement methods from being used. The specific cost categories in Table 1 are set out in ‘Standard Cost Codes for Capital Projects – Definitions’, US Federal Transportation Administration.

| Table 1: Earned Value measurement methods for specific cost categories | | |
|---|---|---|
| Standard Cost Code | Description | Measurement Method from the Earned Value Measurement Techniques |
| 10 | Guideway | |
| 10.01 | Guideway: at-grade exclusive right-of-way (including trackwork) | Activity completion and physical measurement using the fixed formula 0/100 method |
| 10.04 | Guideway: aerial structure (including trackwork) | Activity completion and physical measurement using the fixed formula 0/100 method |
| 10.05 | Guideway: Built-up fill | Activity completion and physical measurement using the fixed formula 0/100 method |
| 10.06 | Guideway: underground cut & cover (including trackwork) | Activity completion and physical measurement using the fixed formula 0/100 method |
| 10.07 | Guideway: underground tunnel (including trackwork) | Activity completion and physical measurement using the fixed formula 0/100 method |
| 10.09 | Track: Direct fixation | Activity completion and physical measurement using the fixed formula 0/100 method |
| 10.10 | Track: Embedded | Activity completion and physical measurement using the fixed formula 0/100 method |
| 10.11 | Track: Ballasted | Activity completion and physical measurement using the fixed formula 0/100 method |
| 10.12 | Track: Special (switches, turnouts) | Activity completion and physical measurement using the fixed formula 0/100 method |
| 20 | Stations, Stops, Terminals, Intermodals | |
| 20.01 | At-grade station; stop; shelter; mall; terminal; platform | Activity completion and physical measurement using the fixed formula 0/100 method |
| 20.03 | Underground station; stop; shelter; mall; | Activity completion and physical |

| Table 1: Earned Value measurement methods for specific cost categories | | |
|---|---|---|
| Standard Cost Code | Description | Measurement Method from the Earned Value Measurement Techniques |
| | terminal; platform | measurement using the fixed formula 0/100 method |
| 20.05 | Joint development | Activity completion and physical measurement using the fixed formula 0/100 method |
| 30 | Support Facilities: Yards, Shops and Admin Buildings | |
| 30.01 | Administration Building: Office, sales, storage, revenue counting | Activity completion and physical measurement using the fixed formula 0/100 method |
| 30.03 | Heavy maintenance facility | Activity completion and physical measurement using the fixed formula 0/100 method |
| 30.05 | Yard and Yard Track | Activity completion and physical measurement using the fixed formula 0/100 method |
| 40 | Sitework and Special Conditions | |
| 40.01 | Demolition; clearing; earthwork | Activity completion and physical measurement using the fixed formula 0/100 method |
| 40.02 | Site utilities; utility relocation | Activity completion and physical measurement using the fixed formula 0/100 method |
| 40.03 | Hazardous material; contaminated soil mitigation; ground water treatments | Activity completion and physical measurement using the fixed formula 0/100 method |
| 40.04 | Environmental mitigation, e.g. wetlands, historic/archeologic, parks | Activity completion and physical measurement using the fixed formula 0/100 method |
| 40.05 | Site structures including retaining walls; sound walls and other structures | Activity completion and physical measurement using the fixed formula 0/100 method |
| 40.06 | Pedestrian and bike access and accommodation; landscaping | Activity completion and physical measurement using the fixed formula 0/100 method |
| 40.07 | Automobile; bus; van access ways including roads; parking lots | Activity completion and physical measurement using the fixed formula 0/100 method |
| 40.08 | Temporary facilities | Activity completion and physical measurement using the fixed formula 0/100 method |
| 50 | Systems | |
| 50.01 | Train control and signals | Activity completion and physical measurement using the fixed formula 0/100 method |
| 50.02 | Traffic signals and crossing protection | Activity completion and physical measurement using the fixed formula 0/100 method |
| 50.03 | Traction power supply and substations | Activity completion and physical measurement using the fixed formula 0/100 method |
| 50.04 | Traction power distribution and catenary | Activity completion and physical measurement using the fixed formula 0/100 method |

| Table 1: Earned Value measurement methods for specific cost categories | | |
|--|---|---|
| Standard Cost Code | Description | Measurement Method from the Earned Value Measurement Techniques |
| | | method |
| 50.05 | Communications | Activity completion and physical measurement using the fixed formula 0/100 method |
| 50.06 | Fare collection system and equipment | Activity completion and physical measurement using the fixed formula 0/100 method |
| 50.07 | Central control | Activity completion and physical measurement using the fixed formula 0/100 method |
| 80 | Professional Services and Agency Costs | |
| 80.01 | Preliminary design | Weighted milestone |
| 80.02 | Final design | Weighted milestone |
| 80.03 | Project management for design and construction | Apportioned effort |
| 80.04 | Construction administration and management | Apportioned effort |
| 80.05 | Professional liability and other insurance costs | Weighted milestone |
| 80.06 | Legal; permits; review fees by other agencies, cities, etc; | Weighted milestone |
| 80.07 | Surveys, testing (quality related), investigation, inspection | Weighted milestone or apportioned effort |
| 80.08 | Start up; testing and commissioning | Weighted milestone or apportioned effort |

- (c) The measurement methods associated with procurement of materials shall be in accordance with the following principles:
- (i) except as set out in Section 1.3(c)(ii), the costs of materials used in construction shall be included in the cost of each construction task and shall be evaluated for the purposes of Earned Value as part of each construction task using physical measurement; and
 - (ii) the costs of rail and large long-lead equipment manufactured off-site before installation, such as transformers and packaged air conditioning units, shall be evaluated for the purposes of Earned Value using the fixed formula measurement method, based on the payment terms of the supply contract, except that [REDACTED]% of any payments made by DB Co to the supplier will not be credited for the purposes of Earned Value until the rail or large equipment manufactured off-site is delivered to the Lands or a bonded warehouse.
- (d) The measurement methods associated with procurement of plant, such as cranes and road vehicles, shall be in accordance with the following principles:
- (i) the costs of plant, such as cranes and road vehicles, shall be evaluated for the purposes of Earned Value using the fixed formula measurement method, based on the payment terms of the supply contract, except that [REDACTED]% of any payments made by DB Co to the supplier will not be credited for the purposes of Earned Value until the plant is delivered to the Lands or a bonded warehouse.
- (e) In order to make the measurement of Earned Value more efficient during mobilization, DB Co may choose to identify a tranche of its mobilization cost, the amount of which will be equal to the mobilization cost agreed to between DB Co and the Lenders or Lenders' Consultant of the Cost of

the Works that shall be automatically credited for the purposes of measuring Earned Value at Financial Close (the “**Mobilization Credit**”), where:

- (i) the sum of the costs identified to the Mobilization Credit and the costs identified to the cost codes from Table 1 shall remain equal to the Cost of the Works;
- (ii) the scope of activity associated with the Mobilization Credit shall be documented by DB Co to the satisfaction of the Independent Certifier before the end of the second Construction Period Month in order to avoid double counting with the Earned Value for activities that are not included within the Mobilization Credit; and
- (iii) the Earned Value for the activities included within the Mobilization Credit shall be credited as Earned Value without using a measurement method from the Earned Value Management Techniques.

ATTACHMENT G

Intentionally Deleted

SCHEDULE 22

VARIATION PROCEDURE

1. VARIATIONS

1.1 Definitions

- (a) The following terms shall have the following meanings:
- (i) **“Capital Expenditure”** means capital expenditure as interpreted in accordance with Canadian GAAP.
 - (ii) **“DB Co Variation Notice”** has the meaning given in Section 2.1(a) of this Schedule 22.
 - (iii) **“Direct Cost”** has the meaning given in Appendix A of this Schedule 22.
 - (iv) **“Estimate”** has the meaning given in Section 1.4(a) of this Schedule 22.
 - (v) **“Variation”** means a variation, addition, reduction, substitution, omission, modification, deletion, removal or other change to the whole or any part of the Works.
 - (vi) **“Variation Confirmation”** has the meaning given in Section 1.7(a)(ii) of this Schedule 22.
 - (vii) **“Variation Directive”** means a written instruction which is issued on a form designated as a “Variation Directive Form” and signed by the City Representative directing DB Co to immediately proceed with a Variation pending the finalization and issuance of a Variation Confirmation for that Variation.
 - (viii) **“Variation Enquiry”** has the meaning given in Section 1.3(a) of this Schedule 22.

1.2 General

- (a) City has the right from time to time to propose and require DB Co to carry out and implement a Variation, and any such Variation shall be subject to the provisions of this Schedule 22 provided that City shall not be permitted to withdraw a Variation Enquiry (nor will a Variation Enquiry be deemed to have been withdrawn) with respect to those circumstances specified in the Project Agreement for which City is obligated to proceed with a Variation.
- (b) City shall be obligated to proceed with a Variation in certain circumstances specified in this Project Agreement, and any such Variation shall be subject to the provisions of this Schedule 22.
- (c) DB Co will not be entitled to any payment, compensation or extension of the Scheduled Substantial Completion Dates or other schedule milestones for a Variation except to the extent provided in a Variation Confirmation or Variation Directive in accordance with this

Schedule 22.

1.3 Variation Enquiry

- (a) If City proposes or is obligated pursuant to the terms of this Project Agreement or Applicable Law to initiate a Variation it shall deliver to DB Co a written notice of the proposed Variation (a “**Variation Enquiry**”).
- (b) A Variation Enquiry shall:
 - (i) describe the proposed Variation with sufficient detail to enable DB Co to prepare a detailed Estimate;
 - (ii) in the event that the proposed Variation will require a Capital Expenditure, state whether City intends to pay for the Variation by way of lump sum payment or payments, adjustment to the Guaranteed Price, (and, if applicable, with a request for DB Co to obtain financing for all or part of the Variation), or a combination thereof; and
 - (iii) provide a preliminary indication of any provisions of this Project Agreement (including the Output Specifications or the DB Co Proposal Extracts) that will be affected by the proposed Variation, as well as the amendments to this Project Agreement (including the Output Specifications or the DB Co Proposal Extracts) that may be necessary to accommodate the Variation.

1.4 Delivery of Estimate

- (a) As soon as practicable and in any event within 15 Business Days after receipt of a Variation Enquiry, or such longer period as the Parties agree acting reasonably, DB Co shall deliver its detailed breakdown, estimate and other information (an “**Estimate**”) prepared in accordance with and meeting the requirements of Section 1.6.

1.5 DB Co Grounds for Objection

- (a) DB Co may only refuse to deliver an Estimate if DB Co can demonstrate to City’s satisfaction, acting reasonably, within the period for delivery of an Estimate specified or agreed pursuant to Section 1.4(a), that:
 - (i) the implementation of the Variation would materially and adversely affect the health and safety of any person;
 - (ii) the implementation of the Variation would:
 - (A) infringe Applicable Law;
 - (B) cause to be revoked any of the existing Permits, Licences, Approvals or Agreements required by DB Co to perform the Works, and any such Permit, Licence, Approval or Agreement is not, using commercially reasonable efforts, capable of amendment or renewal; or
 - (C) require any new Permits, Licences, Approvals or Agreements for DB Co to

perform the Works, any of which will not, using commercially reasonable efforts by DB Co or City, as applicable, be obtainable;

- (iii) the proposed Variation would have a material and adverse effect on performance of the Works (except those Works which have been specified as requiring amendment in the Variation Enquiry) in a manner not compensated pursuant to this Schedule 22;
 - (iv) the implementation of the Variation would be a departure from Good Industry Practice;
 - (v) City does not have the legal power or capacity to require the Variation to be implemented or to do anything envisaged by this Schedule 22 in respect of or in connection with the Variation;
 - (vi) the Variation would, if implemented, result in a change in the essential nature of the Project;
 - (vii) the Variation Enquiry does not comply with the requirements of Section 1.3 (including a failure to include adequate information therein to enable DB Co to prepare an Estimate in respect thereof); or
 - (viii) in the case of a Variation relating to the Works, the time specified for commencement and/or completion of such Variation cannot be achieved by DB Co despite commercially reasonable efforts.
- (b) If DB Co refuses to provide an Estimate on the grounds set out in Section 1.5(a), DB Co shall, within the period for delivery of an Estimate specified or agreed pursuant to Section 1.4(a), deliver to City a written notice specifying the grounds upon which DB Co rejects the Variation and the details thereof.

1.6 Estimate Requirements

- (a) Unless City in a Variation Enquiry requires only specified limited information, each Estimate shall include the following information, sufficient to demonstrate to City's reasonable satisfaction:
- (i) the steps DB Co will take to implement the Variation, in such detail as is reasonable and appropriate in the circumstances;
 - (ii) any impact on Scheduled Substantial Completion Dates, and any other schedule impact on Project and completion of the Works (including for certainty, any impact of the proposed Variation after taking into consideration other Variations);
 - (iii) any impact on the performance of the Works and any other impact on this Project Agreement (including for certainty, any impact of the proposed Variation after taking into consideration other Variations);
 - (iv) any amendments to this Project Agreement or any Project Document required as a consequence of the Variation, the objective of such amendments being to ensure

that (save for the obligation of City to make payments or altered payments in respect of the Variation) the Parties are in no better and no worse position in relation to the Project than they would have been in if the Variation had not been implemented and, in particular, that there will be no material adverse change to the risk profile of the Project as a result of the Variation;

- (v) any impact on the Direct Costs of DB Co and the Subcontractors, including:
 - (A) any Capital Expenditure that will be incurred, reduced or avoided and the impact on DB Co's cash flows from incurring, reducing or avoiding such costs (whether financed by DB Co or City); and
 - (B) any other costs that will be incurred, reduced or avoided and the impact on DB Co's cash flows from incurring, reducing or avoiding such costs;
- (vi) either, subject to Section 1.9:
 - (A) a confirmation that the proposed Variation will not affect DB Co's existing financing or that DB Co's existing financing is adequate to implement the Variation; or
 - (B) if new or additional financing is required to implement the Variation, an indication as to the availability of such new or additional financing and the cost and terms of such new or additional financing;
- (vii) DB Co's preliminary indication of the potential increase or decrease, if any, to the Guaranteed Price;
- (viii) any Permits, Licences, Approvals and Agreements that must be obtained or amended for the Variation to be implemented, and the latest date by which DB Co must receive a Variation Confirmation and obtain or amend such Permits, Licences, Approvals and Agreements for the Estimate to remain valid; and
- (ix) the proposed methods of certification of any aspect of the Works required by the Variation if not covered by the provisions of this Project Agreement,

in each case, together with such supporting information and justification as is reasonably required.

- (b) In preparing its Estimate, DB Co shall include sufficient information to demonstrate to City's satisfaction, acting reasonably, that:
 - (i) DB Co has used or has obliged each Subcontractor (or will oblige any Subcontractor not yet selected) to use commercially reasonable efforts, including the use of competitive quotes or tenders (if appropriate or required by Sections 1.6(c) and 1.6(e)), to minimize any increase in costs and to maximize any reduction in costs;
 - (ii) except as otherwise set out herein, all costs of DB Co and the Subcontractors are limited to Direct Costs;

- (iii) DB Co and the Construction Contractor shall charge only the margins for overhead and profit as set out in Appendix B hereto (such margins each calculated on the basis of the applicable Direct Costs so that no margin of DB Co or the Construction Contractor is calculated on any other margin of DB Co or the Construction Contractor), and no other margins or mark-ups;
 - (iv) the margins for overheads and profit as set out in Appendix B hereto as applicable to DB Co's Direct Costs shall only be chargeable on Direct Costs of DB Co, such that DB Co shall not charge any margins on any amounts charged by the Construction Contractor;
 - (v) all costs of providing Works, including Capital Expenditures, reflect:
 - (A) labour rates applying in the open market to providers of services similar to those required by the Variation;
 - (B) any and all changes in the Output Specifications arising out of the proposed Variation; and
 - (C) any and all changes in risk allocation;
 - (vi) the full amount of any and all expenditures that have been reduced or avoided (including for any Capital Expenditure) and that all such expenditures, including all applicable margins for overhead and profit anticipated to be incurred but for the Variation, have been taken into account and applied in total to reduce the amount of all costs; and
 - (vii) DB Co has mitigated or will mitigate the impact of the Variation, including on the Works Schedule, the performance of the Works, the expected usage of utilities, and the Direct Costs to be incurred.
- (c) DB Co will use commercially reasonable efforts to obtain the best value for money when procuring any work, services, supplies, materials or equipment required by the Variation and will comply with all Good Industry Practice in relation to any such procurement, to a standard no less than DB Co would apply if all costs incurred were to its own account without recourse to City, including using commercially reasonable efforts to mitigate such costs.
- (d) As soon as practicable, and in any event not more than 15 Business Days after City receives an Estimate, DB Co and City shall discuss and seek to agree on the Estimate, including any amendments to the Estimate agreed to by the Parties.
- (e) If City would be required by Applicable Law or any policy applicable to City to competitively tender any contract in relation to the proposed Variation, City may require DB Co to seek and evaluate competitive tenders for the proposed Variation in accordance with such Applicable Law or policy.
- (f) City may modify a Variation Enquiry in writing at any time for any matter relating to the Estimate or the discussions in relation thereto, in which case DB Co shall, as soon as

practicable and in any event not more than 10 Business Days after receipt of such modification, notify City in writing of any consequential changes to the Estimate.

- (g) If the Parties cannot agree on an Estimate pursuant to Section 1.6(d), then any Dispute will be determined in accordance with Schedule 27 - Dispute Resolution Procedure.

1.7 Variation Confirmation

- (a) As soon as practicable, and in any event within 15 Business Days after the later of the date the Estimate was delivered and the date the Estimate was either agreed to or any Dispute in respect thereof was determined in accordance with Schedule 27 - Dispute Resolution Procedure, City shall either:
 - (i) subject to Sections 1.2(b) and 1.7(e), withdraw the Variation Enquiry by written notice to DB Co; or
 - (ii) issue a written confirmation (the “**Variation Confirmation**”) of the Estimate, including any agreed modifications thereto or any modifications resulting for the determination of a Dispute in respect thereof, which Variation Confirmation may be subject to DB Co obtaining financing pursuant to Section 1.8.
- (b) If City does not issue a Variation Confirmation within such 15 Business Days, then, subject to Sections 1.2(b) and 1.7(e), the Variation Enquiry shall be deemed to have been withdrawn.
- (c) Upon the Variation Confirmation being issued, and if applicable upon DB Co obtaining financing pursuant to Section 1.8:
 - (i) the Parties shall as soon as practicable thereafter do all acts and execute all documents to amend this Project Agreement necessary to implement the Variation, including in respect of any required extension of the Key Works Milestones and Work Schedules, and including provision for payment to DB Co as provided in Section 1.10;
 - (ii) DB Co shall implement the Variation as provided for in the Variation Confirmation, and subject to amendments pursuant to Section 1.7(c)(i), all provisions of this Project Agreement applicable to the Works shall apply to the Works as thereby changed and no additional claim with respect to the Variation or Variation Confirmation will be considered; and
 - (iii) payment in relation to the Variation shall be as provided for in Section 1.10 and pursuant to any amendments pursuant to Section 1.7(c)(i).
- (d) If a Variation Confirmation is subject to DB Co obtaining financing pursuant to Section 1.8, then the Variation Confirmation shall not be effective until:
 - (i) DB Co obtains such financing acceptable to City in its sole discretion; or
 - (ii) City in its sole discretion waives such requirement.

- (e) Except as hereinafter provided, until a Variation Confirmation has been issued:
 - (i) the determination of whether or not to proceed with a Variation shall at all times be at City's sole discretion, despite any Dispute or any other matter in relation to a Variation being referred to or determined by Schedule 27 - Dispute Resolution Procedure; and
 - (ii) City may at any time withdraw a Variation Enquiry and, subject to Section 1.7(f), City shall not be obligated to DB Co in respect of a Variation until such time as City in its sole discretion issues a Variation Confirmation and, if applicable, DB Co has obtained the financing requested by City or City has waived such requirement, provided that City may not withdraw (or be deemed to have withdrawn) a Variation Enquiry in circumstances where City is obligated pursuant to the terms of this Project Agreement to proceed with a Variation. In such circumstances Schedule 27 - Dispute Resolution Procedure shall be employed to finalize any aspects of the Variation which cannot otherwise be agreed to in accordance with the terms of this Schedule 22.
- (f) If a Variation Confirmation is not issued for any Variation Enquiry in respect of which DB Co has used commercially reasonable efforts to produce a fair and accurate Estimate, City shall reimburse DB Co for all Direct Costs reasonably and properly incurred by DB Co in connection with preparing the Estimate.

1.8 Financing

- (a) If DB Co in its Estimate confirms that existing financing is not available to pay for the proposed Variation and if City requests DB Co to obtain financing for a Variation, then a Variation Confirmation may be issued subject to DB Co obtaining financing. In such event, DB Co shall use commercially reasonable efforts to obtain the requested financing on terms satisfactory to DB Co, the Lenders and City, provided that, DB Co shall not be required to seek financing from any source other than the Lenders.
- (b) If DB Co has used commercially reasonable efforts to obtain the requested financing but has been unable to obtain an offer of financing on terms reasonably satisfactory to DB Co and City within 60 days of the date that City issues the Variation Confirmation, then DB Co shall have no further obligation to obtain financing for the Variation and any Variation Confirmation subject to financing shall no longer have any effect unless City, in its sole discretion, waives the requirement for financing or unless City is obligated to proceed with the Variation pursuant to the terms of this Project Agreement.
- (c) Subject to Section 1.9, if DB Co obtains an offer of financing on terms reasonably satisfactory to DB Co, DB Co shall provide City with details of such financing, and City shall, in its sole discretion, determine whether DB Co should proceed with such financing. If City determines that DB Co should not proceed with such financing, then DB Co shall have no further obligation to obtain financing for the Variation and any Variation Confirmation subject to financing shall no longer have any effect unless City, in its sole discretion, waives the requirement for financing or unless City is obligated to proceed with the Variation pursuant to the terms of this Project Agreement.
- (d) Subject to Section 1.9, City may at any time withdraw the requirement for DB Co to use

commercially reasonable efforts to obtain financing, after which DB Co shall have no further obligation to obtain financing for the Variation and any Variation Confirmation subject to financing shall no longer have any effect unless City in its sole discretion waives the requirement for financing or unless City is obligated to proceed with the Variation pursuant to the terms of this Project Agreement.

- (e) If City waives the requirement for financing or if DB Co has no further obligation to obtain financing for the Variation pursuant to Sections 1.8(b), 1.8(c) or 1.8(d), then DB Co shall proceed with the Variation as set out in the Variation Confirmation and City shall pay for the Variation as provided for in Section 1.10(a)(ii).

1.9 Increase or Decrease in the Cost of the Financing

- (a) If there is an increase or a decrease in the Cost of the Financing as a result of a Variation, the Guaranteed Price shall be increased or decreased by the increase or decrease to the Cost of the Financing. DB Co shall provide the calculation of the increase or decrease in the Cost of the Financing, together with a certificate of the Lenders' Agent verifying such calculation. Where the increase in the Cost of the Financing includes breakage costs, but the impact of the Variation on the Cost of the Financing could also be accommodated without incurring breakage costs, calculations for both options shall be provided to City, together with a certificate of the Lenders' Agent addressed to DB Co (which will expressly provide that the certificate may be relied upon by City) verifying such calculations. City shall, in its Sole Discretion, within 5 Business Days of receiving such certificate from the Lenders' Agent, select its preferred option by providing written notice to DB Co and the Lenders' Agent. For greater certainty, the increases or decreases in the Cost of the Financing shall be calculated in a commercially reasonable manner and in accordance with the Lenders standard banking practices and the Lending Agreements, and without regard to the identity of the party paying such costs and expenses and, with respect to any swap breakage costs or gains, such costs or gains shall be calculated in accordance with standard market practices.

1.10 Payment

- (a) If a Variation Confirmation has been issued and is not subject to financing, or if the requirement for financing has been satisfied by DB Co or has been waived by City, a price adjustment for the Variation, as set out in the Estimate and as adjusted and confirmed by the Variation Confirmation, shall be made as follows:
 - (i) the Guaranteed Price shall be adjusted as set out in the Variation Confirmation;
 - (ii) payment for Capital Expenditures as set out in the Variation Confirmation and not financed by DB Co shall be paid as follows:
 - (A) City shall pay such Capital Expenditures in lump sum payments based on a payment schedule agreed by City and DB Co, acting reasonably, to reflect the amount and timing of the Capital Expenditures to be incurred by DB Co in carrying out the Variation to the extent borne by City; and
 - (B) where payment for part of the Variation reflects the carrying out of, or specific progress towards, an element within the Variation, DB Co shall

provide satisfactory evidence confirming that the part of the Variation corresponding to each occasion when payment is due under the payment schedule has been duly carried out.

In the event City and DB Co fail to agree as to the terms of the payment schedule, the payment schedule shall be determined in accordance with Schedule 27 - Dispute Resolution Procedure, provided that, where all or any part of the Variation is being carried out by a third party under a contract with DB Co, subject to the terms of any contract between DB Co and that third party in relation to the implementation of the Variation having been approved by City (such approval not to be unreasonably withheld or delayed), the process under Schedule 27 - Dispute Resolution Procedure shall determine a payment schedule which would enable DB Co to be funded by City in time to make payments to that third party in accordance with its contract with DB Co.

- (b) City shall make payment to DB Co within 20 Business Days of receipt by City of invoices presented to City in accordance with the agreed payment schedule accompanied (where applicable) by the relevant evidence that the relevant part of the Variation has been carried out.
- (c) Payments by City in respect of a Variation shall be subject to applicable holdback provisions of the *Construction Act* (Ontario), as applicable.
- (d) DB Co shall not be entitled to any amount in excess of the amount of the Estimate confirmed in the Variation Confirmation.
- (e) Upon request by DB Co, City shall provide to DB Co copies of any consent or approval issued by City in connection with a proposed Variation.

1.11 Reduction in Works

- (a) If a Variation involves any reduction in Works which results in savings in Direct Costs to DB Co, such savings shall result in a reduction in the compensation payable to DB Co under this Project Agreement in an amount equal to such reduction in Direct Costs, and a Substantial Completion Payment or Substantial Completion Payments, or the balance of the Guaranteed Price, as applicable, shall be reduced accordingly.

1.12 Variation Directive

- (a) If an Estimate is not promptly agreed upon by City and DB Co or if there is a Dispute in relation thereto or if City, in its sole discretion, requires a Variation to be implemented prior to issuing a Variation Confirmation, then City may issue a Variation Directive and, following receipt of the Variation Directive:
 - (i) DB Co shall promptly proceed with the Variation;
 - (ii) the determination of the valuation and time extensions, if any, required in connection with such Variation, shall be made as soon as reasonably possible after commencement of the implementation of the Variation; and
 - (iii) pending final determination of the valuation and time extensions, if any, required in

connection with such Variation, the Independent Certifier, acting reasonably, shall determine the valuation in accordance with Appendices A and B hereto, with any Dispute to be determined in accordance with Schedule 27 - Dispute Resolution Procedure,

provided that, City shall fund all Variations implemented by way of a Variation Directive as provided for in Section 1.10(a)(ii).

2. DB CO VARIATIONS

2.1 General

- (a) DB Co shall deliver to City a written notice (a “**DB Co Variation Notice**”) for each Variation proposed by DB Co.

2.2 DB Co Variation Notice

- (a) A DB Co Variation Notice shall:
 - (i) set out details of the proposed Variation in sufficient detail to enable City to evaluate it in full;
 - (ii) specify DB Co’s reasons for proposing the Variation;
 - (iii) indicate all reasonably foreseeable implications of the Variation, including whether there are any costs or cost savings to City; and
 - (iv) indicate the latest date by which a Variation Enquiry must be issued.
- (b) If City, in its sole discretion, elects to consider the Variation proposed by DB Co, City may issue to DB Co a Variation Enquiry and the procedure set out in Section 1 will apply.

3. SMALL WORKS

3.1 General

- (a) DB Co shall carry out all Small Works requested by City.
- (b) If Small Works are requested by City, DB Co shall, within 10 Business Days of each such request and prior to carrying out the Small Works, provide City with a price for carrying out the Small Works.
- (c) If DB Co’s price is accepted by City, in its sole discretion, DB Co shall carry out the Small Works for such price.
- (d) City may at any time, in its sole discretion, including if City does not accept the price proposed by DB Co pursuant to Section 3.1(b), issue a Variation Enquiry or Variation Directive in respect of such Small Works, in which event the provisions of this Schedule 22, other than this Section 3, shall apply.
- (e) DB Co’s price shall include only its Direct Costs, as calculated in accordance with

Appendix A, together with applicable margins as set out in Appendix B.

3.2 DB Co to Minimize Inconvenience

- (a) DB Co shall notify City of the estimated duration of any Small Works so that City and DB Co can agree upon a convenient time for carrying out the same, so as to minimize and mitigate inconvenience and disruption to City. DB Co shall use commercially reasonable efforts to minimize the duration of any Small Works.

APPENDIX A

CALCULATION OF DIRECT COSTS

1. DIRECT COSTS

1.1 Subject to Section 1.2 of this Appendix A, the term “**Direct Cost**” means the cumulative total, without duplication, of only the following amounts, as paid or incurred by DB Co or the Subcontractors, as applicable, to the extent that they specifically relate to, and are attributable to, the Variation under which DB Co is expressly entitled to its Direct Cost and would not otherwise have been incurred:

- (i) wages and benefits paid for labour in the direct employ of DB Co or the Subcontractors while performing that part of the Works on Site;
- (ii) salaries, wages and benefits of DB Co’s or the Subcontractors’ personnel when stationed at the Site office in whatever capacity employed, or personnel engaged at shops or on the road, in expediting the production or transportation of materials or equipment;
- (iii) salaries, wages and benefits of DB Co’s or the Subcontractors’ office personnel engaged in a technical capacity;
- (iv) without limiting Sections 1.1(i), 1.1(ii) and 1.1(iii) of this Appendix A, contributions, assessments or taxes incurred for such items as employment insurance, provincial health insurance, workers’ compensation, and Canada Pension Plan, insofar as such costs are based on the wages, salaries, or other remuneration paid by DB Co or a DB Co Party to employees pursuant to Sections 1.1(i), 1.1(ii) and 1.1(iii) of this Appendix A, but excluding for certainty all income taxes on such wages, salaries and other remuneration;
- (v) travel and subsistence expenses of DB Co’s or the Subcontractors’ officers or employees referred to in Sections 1.1(i), 1.1(ii) and 1.1(iii) of this Appendix A;
- (vi) the cost of materials (including hand tools which have a retail value of \$[REDACTED] or less), products, supplies, equipment, temporary services and facilities, including transportation and maintenance thereof, which are consumed in the performance of the Variation;
- (vii) the rental costs of all tools (excluding hand tools which have a retail value of \$[REDACTED] or less), machinery, and equipment used in the performance of the Variation, whether rented from or provided by DB Co or others, including installation, minor repair and replacement, dismantling, removal, transportation and delivery costs thereof;
- (viii) deposits lost;
- (ix) the amount of all Subcontracts with the Subcontractors;

- (x) the amount paid for any design services;
- (xi) the cost of third party quality assurance required by City, such as independent inspection and testing services;
- (xii) charges levied by Governmental Authorities, but excluding fines or penalties not related to the implementation of the Variation;
- (xiii) subject to Section 1.1(iv) of this Appendix A and without limiting the obligation of City to pay HST under this Project Agreement, Taxes, but excluding:
 - (A) HST;
 - (B) taxes imposed on DB Co or a Subcontractor based on or measured by income or profit or otherwise imposed under the *Income Tax Act* (Canada), the *Income Tax Act* (Ontario) or any similar statute in any other jurisdiction;
 - (C) capital taxes based on or measured by the capital of DB Co or a Subcontractor;
 - (D) taxes relating to withholdings on any payments by DB Co or a Subcontractor; and
 - (E) taxes relating to any business or activity other than the business or activities related to, and conducted for, the purposes of the Works;
- (xiv) the cost of removal and disposal of contaminants, hazardous substances, waste products and debris for which DB Co is not responsible under this Project Agreement;
- (xv) termination payments which are required under Applicable Law to be made to employees of DB Co or Construction Contractor reasonably and properly incurred by DB Co or Construction Contractor arising as a direct result of any Variation reducing the scope of the Works, except to the extent that such termination payments are provided for in contracts of employment, agreements or arrangements that were not entered into in the ordinary course of business and on commercial arm's length terms;
- (xvi) the cost of financing as calculated pursuant to Section 1.9 of Schedule 22, including additional financing costs related to any delay caused by the implementation of the Variation;
- (xvii) the cost of competitively tendering any contract in relation to the proposed Variation which is required by Applicable Law or any policy applicable to City;
- (xviii) the cost of any additional insurance or performance security required or approved by City;
- (xix) the cost of obtaining all DB Co Permits, Licences, Approvals and Agreements; and

- (xx) except as specified in Section 1.2(vii), reasonable fees and disbursements of Project Co's legal advisors, reasonable fees and disbursements of DB Co's legal and technical advisors.

1.2 The Direct Cost otherwise payable shall be subject to and limited by the following:

- (i) the Direct Cost shall be net of all discounts, rebates and other price reductions and benefits, which relate to the Direct Cost incurred;
- (ii) the amount paid for materials, products, supplies and equipment incorporated into the Works as a result of the Variation shall not exceed commercially competitive rates available in the Province of Ontario for such materials, products, supplies and equipment from arms-length third party suppliers; provided this shall not restrict the cost of extending hire of equipment already in situ;
- (iii) the amount paid for any design services included in the Direct Cost, whether provided by DB Co's personnel, consultants, manufacturers or manufacturers' consultants, for hourly paid personnel shall not exceed **[REDACTED]** the actual salary received by those personnel (actual salary to be inclusive of all benefits, statutory remittances and holidays), and for salaried personnel, the actual salary per hour shall be calculated by dividing the annual salary (inclusive of all benefits, statutory remittances and holidays) by **[REDACTED]** hours;
- (iv) the amount paid for machinery and equipment rental costs shall not exceed the prevailing competitive commercial rate for which such equipment or machinery can be obtained in Ottawa, Ontario;
- (v) the Direct Cost shall not include any cost incurred due to the failure on the part of DB Co to exercise reasonable care and diligence in its attention to the prosecution of that part of the Works;
- (vi) the amount paid for salaries, wages and benefits of DB Co's or the Subcontractors' personnel shall reflect commercially competitive rates available in Ottawa; and
- (vii) the Direct Cost shall not include any reasonable fees and disbursements of Project Co's legal advisors incurred in connection with Small Works or the preparation of the Estimate.

APPENDIX B
APPLICABLE
MARGINS

| Party | Total Overhead and Profit Margin (as % of Direct Cost) | | |
|--|---|---|-----------------------------------|
| | For Projects under \$[REDACTED] | For Projects between \$[REDACTED] and \$[REDACTED] | For Projects over \$[REDACTED] |
| DB Co (Own Work) | [REDACTED]% | [REDACTED]% | [REDACTED]% |
| Construction Contractor (Own Work) | [REDACTED]% | [REDACTED]% | [REDACTED]% |
| Construction Contractor (Subcontracted Work) | [REDACTED]% | [REDACTED]% | [REDACTED]% |
| DB Co and Construction Contractor re: Cash Allowance Items | [REDACTED]% | [REDACTED]% | [REDACTED]% |

**SCHEDULE 23
COMPENSATION ON TERMINATION**

1 DEFINITIONS

1.1 Definitions

- (a) All capitalized terms not otherwise defined in this Schedule shall have the meanings ascribed to them in the Project Agreement and unless the context otherwise requires:
- (b) “**City Default Termination Sum**” has the meaning given in Section 3.1(c) of this Schedule 23.
- (c) “**DB Co Amount**” means any amount payable to DB Co as a return and/or profit to DB Co shown in the Financial Model, including for greater certainty in respect of any loans made or capital contributed to DB Co by any Affiliate of DB Co or a DB Co Party, prorated by a fraction, the numerator of which is the period between the date of commencement of the Works and the Termination Date, and the denominator of which is the period between the date of commencement of the Works and the latest Scheduled Substantial Completion Date.
- (d) “**DB Co Default Termination Sum**” has the meaning given in Section 2.1(b) of this Schedule 23.
- (e) “**Debt Amount**” means, at any time, the then outstanding principal amount of debt funded under the terms of the Lending Agreements by the Lenders to DB Co, together with all interest accrued thereon at that time, provided that at any time where any portion of the interest payable to the Lenders is subject to the Hedging Agreement(s), accrued interest in respect of such portion of the interest payable to the Lenders shall be calculated based on the fixed rate payable by DB Co under the Hedging Agreement(s) without regard to whether such fixed rate is payable directly to a Lender or to the Hedge Provider(s) under the Hedging Agreement(s) and all references to interest payable to the Lenders under the Project Agreement shall be construed accordingly. For greater certainty, the Debt Amount excludes the Debt Makewhole.
- (f) “**Debt Makewhole**” means, (i) at any time, any amount (other than the Debt Amount) then due and payable to the Lenders under the Lending Agreements with respect to the Debt Amount, including any “make whole” payments, breakage costs (less any breakage benefits) and all other fees, costs and expenses reasonably and properly incurred which DB Co is obligated to pay to the Lenders pursuant to the Lending Agreements with respect to the Debt Amount; and (ii) any swap breakage costs (less breakage benefits), if any, then due and payable to the Hedge Provider(s) under the Hedging Agreement(s) entered into with respect to the Debt Amount.
- (g) “**Demobilization Costs**” means all reasonable costs of DB Co associated with the demobilization of the Works as a result of the termination of the Project Agreement.
- (h) “**Employee Termination Payments**” means termination payments which are required under Applicable Law to be made to employees of DB Co or any DB Co Party as a direct result of terminating the Project Agreement (provided that DB Co or the relevant DB Co Party shall take commercially reasonable steps to mitigate its loss) and provided that, in

calculating such amount, no account should be taken of any liabilities and obligations of DB Co or the relevant DB Co Party arising out of:

- (i) contracts of employment or other agreements or arrangements entered into by DB Co or the relevant DB Co Party to the extent that such contracts of employment, agreements or arrangements were not entered into in connection with the Project; or
- (ii) contracts of employment or other agreements or arrangements entered into by DB Co or the relevant DB Co Party other than in the ordinary course of business and on commercial arm's length terms, save to the extent that amounts would have arisen if such contracts or other agreements or arrangements had been entered into in the ordinary course of business and on commercial arm's length terms.

(i) **"Invoice Date"** means the date that is the later of:

- (i) the date on which the City receives an invoice from DB Co for the Non-Default Termination Sum or City Default Termination Sum, as the case may be; and
- (ii) the date on which the City receives the supporting evidence required pursuant to Section 4.1(a) of this Schedule 23.

(j) **"Non-Default Termination Sum"** has the meaning given in Section 3.1(c) of this Schedule 23.

(k) **"Subcontractor Losses"** means, subject to DB Co's obligations under the Project Agreement to limit any compensation to Subcontractors, the amount reasonably and properly payable by DB Co to the Construction Contractor under the terms of the Design and Construction Contract as a direct result of the termination of the Project Agreement (including any reasonable commercial breakage fee), provided that such amount shall be reduced to the extent that DB Co or the Subcontractors fail to take commercially reasonable steps to mitigate such amount; provided that, no account should be taken of any liabilities and obligations of DB Co to the Subcontractors arising out of:

- (i) any loss of overhead or profit of such Subcontractor relating to any period or costs after the Termination Date (save to the extent the same are properly included in any reasonable commercial breakage fee set out in any of the Ancillary Documents);
- (ii) agreements or arrangements entered into by DB Co or the Subcontractors to the extent that such agreements or arrangements were not entered into in connection with those parties' obligations in relation to the Project; or
- (iii) agreements or arrangements entered into by DB Co or the Subcontractors other than in the ordinary course of business and on commercial arm's length terms, save to the extent that amounts would have arisen if such agreements or arrangements had been entered into in the ordinary course of business and on commercial arm's length terms.

2 COMPENSATION ON TERMINATION FOR DB CO DEFAULT

2.1 Compensation

- (a) If City terminates the Project Agreement pursuant to Section 36.3(a) of the Project Agreement, City shall pay the DB Co Default Termination Sum to DB Co.
- (b) The “**DB Co Default Termination Sum**” shall be an amount equal to the Guaranteed Price, as adjusted in accordance with the terms of the Project Agreement as of the Termination Date, less the aggregate, without duplication, of each of the following:
 - (i) all Construction Period Payments and Substantial Completion Payments paid by City on or before the Termination Date, plus all Construction Period Deductions and Lane Closure Adjustments (other than any Construction Period Deductions or Lane Closure Adjustments which, prior to the Termination Date, were set-off against a payment to DB Co by the City made on or before the Termination Date or which have otherwise been paid by or on behalf of DB Co on or before the Termination Date);
 - (ii) City’s estimate of the cost to complete the Works, including the cost to remedy any defective or deficient Works determined on a reasonable basis in consultation with the Independent Certifier and other consultants and including all reasonable and proper costs incurred by City in re-tendering the Works or any portion thereof;
 - (iii) City’s estimate of the aggregate of all Direct Losses suffered, sustained or incurred by City as a result of, in respect of, or arising out of the event or events which resulted in the termination of the Project Agreement and out of the termination together with all costs of entering into a new construction contract to complete the Works, including any warranty obligations for the Works in place and to be performed, on substantially the same terms and conditions as the Project Agreement;
 - (iv) any Completion Holdback as at the time the DB Co Default Termination Sum is required to be made; and
 - (v) the Legislative Holdback required to be maintained by City as at the time the DB Co Default Termination Sum is required to be made, which amount will be paid by City in accordance with the *Construction Act* (Ontario).
- (c) To the extent that any amounts that City has estimated or determined pursuant to Sections 2.1(b)(ii), 2.1(b)(iii) or 2.1(b)(iv) above, are in excess of what is required by City to complete the Works or compensate for Direct Losses, the Completion Holdback or the Legislative Holdback, as applicable the City shall promptly return such excess amounts to DB Co.
- (d) City shall pay the DB Co Default Termination Sum in accordance with Article 4 of this Schedule 23.

3 COMPENSATION ON NON-DEFAULT TERMINATION OR TERMINATION FOR CITY DEFAULT

3.1 Compensation

- (a) If DB Co terminates the Project Agreement pursuant to Sections 37.2(a)(ii) of the Project Agreement, the City shall pay to DB Co the City Default Termination Sum.
- (b) If the Project Agreement is terminated pursuant to Sections 38.1, 38.2 or 38.3 of the Project Agreement, the City shall pay to DB Co the Non-Default Termination Sum.
- (c) The “**Non-Default Termination Sum**” or “**City Default Termination Sum**”, as the case may be, shall be an amount equal to the aggregate, without duplication, of:
 - (i) all unpaid Construction Period Payments and Substantial Completion Payments properly due and payable under the Project Agreement to and including the Termination Date, any other amounts owing by the City to DB Co under the terms of the Project Agreement as of the Termination Date, and any Cost of the Financing directly related to such Construction Period Payments and Substantial Completion Payments, to the extent not funded under the Lending Agreements as part of the Debt Amount;
 - (ii) all Demobilization Costs, Employee Termination Payments and Subcontractor Losses;
 - (iii) the Debt Amount, plus the Debt Makewhole, each calculated as at the date of payment of the Non-Default Termination Sum or City Default Termination Sum, as the case may be;
 - (iv) the DB Co Amount calculated as at the date of payment of the Non-Default Termination Sum or City Default Termination Sum, as the case may be; and
 - (v) all other Direct Losses suffered, sustained or incurred by DB Co as a result of, or arising out of, the event or events which have resulted in the termination of the Project Agreement;less the aggregate of:
 - (vi) any Completion Holdback as at the time the Non-Default Termination Sum or City Default Termination Sum, as the case may be, is required to be made; and
 - (vii) any Legislative Holdback required to be maintained by City at the time the Non-Default Termination Sum or City Default Termination Sum, as the case may be, is required to be made.
- (d) To the extent that any amounts that City has determined pursuant to Section 3.1(c)(vi) or 3.1(c)(vii) above are in excess of what is required by City to holdback under the Project Agreement or maintain as Completion Holdback or Legislative Holdback, as applicable, City shall promptly return such excess amounts to DB Co.

- (e) City shall pay the Non-Default Termination Sum or City Default Termination Sum, as the case may be, in accordance with Article 4 of this Schedule 23.

4 GENERAL

4.1 Payment

- (a) In the event of a termination referred to in Section 3.1(a) or (b) of this Schedule 23, as soon as practicable, and in any event, within 60 days, after the Termination Date, DB Co shall give to City an invoice for the Non-Default Termination Sum or City Default Termination Sum, as the case may be, (reasonably estimated if not then known) and sufficient supporting evidence, reasonably satisfactory to City, justifying the amount of the Non-Default Termination Sum or City Default Termination Sum, as the case may be, including a detailed breakdown of each of the individual items comprising such sum. To the extent the Non-Default Termination Sum or City Default Termination Sum, as the case may be, is based on estimates of cost, the Parties will readjust as soon as such estimated costs can be determined.
- (b) City shall:
 - (i) pay to DB Co the Non-Default Termination Sum or City Default Termination Sum, as the case may be, within 60 days after the Invoice Date and so long as all demobilization of the Works has been completed; and
 - (ii) indemnify DB Co as provided in Section 46.2(c) of the Project Agreement in respect of any damages suffered or incurred as a result of the relevant termination sum (or any part of such sum that remains outstanding) not being received on the Termination Date:
 - (A) in an amount equivalent to the No Default Payment Compensation Amount for the period from (but excluding) the Termination Date to (and including) the date which is 60 days after the Invoice Date; and
 - (B) thereafter, in an amount equivalent to the Payment Compensation Amount until the date of payment.
- (c) In the event of a termination referred to in Section 2.1(a) of this Schedule 23, as soon as practicable, and in any event, within 120 days after the Termination Date, City shall calculate and notify DB Co of the DB Co Default Termination Sum under Section 2.1(b) of this Schedule 23, and shall deliver to DB Co sufficient supporting evidence reasonably satisfactory to DB Co.
- (d) City shall pay to DB Co the DB Co Default Termination Sum as soon as reasonably practicable, and in any event within 30 days after delivering the notice described in Section 4.1(c) of this Schedule 23.

4.2 Costs

The costs and expenses to be taken into account in the calculation of the Non-Default Termination Sum or City Default Termination Sum, as the case may be, due pursuant to this

Schedule 23 shall only be such costs and expenses that are reasonable and proper in quantum and that have been or will be reasonably and properly incurred.

4.3 Undisputed Amounts

Either City or DB Co may dispute the calculation of any Compensation Payment and in the event of a dispute, any undisputed amount shall be paid in accordance with this Schedule 23 and the disputed amount shall be dealt with in accordance with Schedule 27- Dispute Resolution Procedure.

4.4 Outstanding Debt Amount

- (a) Subject to Section 4.3 of this Schedule 23, the City shall be entitled to rely on a certificate of the Lenders' Agent as conclusive evidence as to the Debt Amount and Debt Makewhole, as applicable, outstanding at any relevant time.
- (b) If a receipt or other acknowledgement is given by the Lenders' Agent acknowledging or otherwise confirming receipt of payment or payments in respect of the Debt Amount or Debt Makewhole, as applicable, such receipt or other acknowledgement shall discharge City's obligation to pay such portion of compensation due to DB Co that is equal to the amount acknowledged or confirmed.

4.5 Set-off

City shall be entitled to set off against the Non-Default Termination Sum, the City Default Termination Sum, or the DB Co Default Termination Sum, such amounts not already taken into account in calculating the relevant Compensation Payment that City is entitled to set off or withhold pursuant to the Project Agreement, provided that the amount paid to DB Co on account of the Non-Default Termination Sum or City Default Termination Sum, as the case may be, shall never be less than the aggregate of the Debt Amount and the Debt Makewhole Amount.

4.6 Full and Final Settlement

- (a) Except as otherwise provided in Section 4.6(b) of this Schedule 23, any compensation paid pursuant to Section 2.1 or Section 3.1 of this Schedule 23 in the total amount owing thereunder shall be in full and final settlement of any claims, demands and proceedings of DB Co and the City and each shall be released from all liability to the other in relation to any breaches or other events leading to the termination of the Project Agreement and the circumstances leading to such breach or termination, and DB Co and the City shall be excluded from all other rights and remedies in respect of any such breach or termination, whether in contract, tort, restitution, statute, at common-law or otherwise.
- (b) Section 4.6(a) of this Schedule 23 shall be without prejudice to any liability, whether arising before, on or after the Termination Date, of either Party to the other, including under the indemnities contained in the Project Agreement that arose with respect to acts or omissions on or prior to the Termination Date (but not from termination itself or the events leading to such termination), to the extent such liability has not already been taken into account in calculating the relevant Compensation Payment under Section 4.5 of this Schedule 23.

(c) DB Co acknowledges that under the provisions of Section 4.5 of the Project Agreement, the City shall pay the Compensation Payment to DB Co and DB Co has irrevocably directed the City to make the Compensation Payment to the Lenders' Agent or as the Lenders' Agent may direct, as security for the Financing. The City acknowledges such direction and agrees to pay the Compensation Payment to the Lenders' Agent or as the Lenders' Agent may direct in accordance with such direction. DB Co acknowledges and agrees that payment by the City of the Compensation Payment in accordance with any such direction constitutes payment by the City to DB Co in satisfaction of the City's obligation to make:

- (i) the Compensation Payment under the Project Agreement; and
- (ii) any payment to DB Co under the Project Agreement, to the extent made in relation to the Guaranteed Price,

as the case may be, and in satisfaction of any trust obligation of the City in respect of such payments under Section 7 of the *Construction Act* (Ontario) pursuant to Section 10 of the *Construction Act* (Ontario).

SCHEDULE 24

INTELLECTUAL PROPERTY

1. INTERPRETATION

1.1 Definitions: In this Schedule 24 – Intellectual Property, unless the context indicates a contrary intention, terms which are defined in the Project Agreement (and not otherwise defined in this Schedule 24 – Intellectual Property) shall have meanings given to them in the Project Agreement and the following terms shall have the following meanings:

- (a) **“Assigned Intellectual Property”** has the meaning given in Section 2.5(a).
- (b) **“Assignee”** has the meaning given in Section 2.5(a).
- (c) **“Assignor”** has the meaning given in Section 2.5(a).
- (d) **“CBTC Intellectual Property”** means Subcontractor Intellectual Property of the Nominated Signalling Subcontractor.
- (e) **“City Intellectual Property”** means:
 - (i) Intellectual Property that is Owned, created, developed or acquired by City or any City Personnel:
 - (A) prior to the Project Term; or
 - (B) during the Project Term but outside the Project Scope; or
 - (C) during the Project Term and within the Project Scope, but which is not DB Co Intellectual Property, Subcontractor Intellectual Property or Third Party Intellectual Property;
 - (ii) the Developed Intellectual Property, excluding any Developed Intellectual Property that is specified in a Variation or by separate agreement of City and DB Co to be Owned by DB Co;
 - (iii) any other Project Data that is specified in a Variation or by separate agreement of City and DB Co to be Owned by City; and
 - (iv) subject to Section 41.4 of the Project Agreement, all Modifications to any of the foregoing, whether made by or on behalf of DB Co, City or any Subcontractor alone, jointly with each other or with any other person;

and which is used by City, or required to be used by DB Co or a Subcontractor, in the performance of their respective obligations in respect of the Project or under the Project Agreement.

- (f) **“City Personnel”** means persons acting on behalf of City or employed, engaged or retained by City in connection with the performance of City’s obligations in connection with the Project, including City’s consultants, contractors and subcontractors and the employees, officers,

directors, volunteers and agents of City and its direct and indirect consultants, contractors and subcontractors, excluding DB Co and any Subcontractor and their respective Personnel.

- (g) **“City Supplied Third Party Intellectual Property”** means Intellectual Property, Owned by a person other than City, DB Co, a Subcontractor or any of their respective Personnel that is delivered, supplied or otherwise provided by City to DB Co under the Project Agreement for the purpose of performing the Works and the Project, including any Background Information.
- (h) **“City Trade-Marks”** means the Trade-Marks Owned by City.
- (i) **“Copyleft Licence”** means any licence that requires, as a condition of use, modification and/or distribution of Copyleft Materials, that such Copyleft Materials, or other software or content incorporated into, derived from, used, or distributed with such Copyleft Materials: (i) in the case of software, be made available or distributed in a form other than binary (for example, source code form), (ii) be licenced for the purpose of preparing derivative works, (iii) be licenced under terms that allow the products or portions thereof or interfaces therefor to be reverse engineered, reverse assembled or disassembled (other than by operation of law), or (iv) be redistributable at no licence fee. Copyleft licences include the GNU General Public Licence, the GNU Lesser General Public Licence, the Mozilla Public Licence, the Common Development and Distribution Licence, the Eclipse Public Licence, and all Creative Commons “sharealike” licences.
- (j) **“Copyleft Materials”** means any software or content subject to a Copyleft Licence.
- (k) **“DB Co Embedded Software”** means computer software that is Owned by DB Co and that:
 - (i) is included, embedded or otherwise incorporated in Equipment;
 - (ii) is not licenced separately and apart from that Equipment; and
 - (iii) is not subject to a separate warranty, and is not subject to maintenance and repair separately from, that Equipment.
- (l) **“DB Co Intellectual Property”** means:
 - (i) Intellectual Property that is Owned, created, developed or acquired by DB Co or any DB Co Personnel:
 - (A) prior to the Project Term; or
 - (B) during the Project Term but outside the Project Scope; or
 - (C) during the Project Term and within the Project Scope, but which is not City Intellectual Property, City Supplied Third Party Intellectual Property, Subcontractor Intellectual Property, or Third Party Intellectual Property;
 - (ii) the DB Co Licenced Software;
 - (iii) the DB Co Embedded Software;
 - (iv) DB Co’s Technical Information;

- (v) the Project Intellectual Property;
 - (vi) the Project Data, excluding any other Project Data that are specified in a Variation or by separate agreement of City and DB Co to be Owned by City;
 - (vii) any Developed Intellectual Property that is specified in a Variation or by separate agreement of City and DB Co to be Owned by DB Co; and
 - (viii) Subject to Section 41.4 of the Project Agreement, all Modifications to any of the foregoing, whether made by or on behalf of DB Co, City, City Parties, or any Subcontractor alone, jointly with each other or with any other person.
- (m) **“DB Co Licenced Software”** means any computer software that is Owned by DB Co, is not DB Co Embedded Software and is delivered, supplied or otherwise provided by DB Co under the Project Agreement as or as part of any Deliverable.
- (n) **“DB Co Personnel”** means persons acting on behalf of DB Co or employed, engaged or retained by DB Co in connection with the performance of DB Co’s obligations under the Project Agreement, including DB Co’s consultants, contractors and Subcontractors and the employees, officers, directors, volunteers and agents of DB Co and its direct and indirect consultants, contractors and Subcontractors.
- (o) **“Deliverable”** means any item required to be supplied or delivered by DB Co to City within the Project Scope, including Equipment, Project Software, Project Data and all other deliverable requirements specified in Schedule 10 – Review Procedure.
- (p) **“Delivered”** means, with respect to any Intellectual Property, that such Intellectual Property is:
- (i) a Deliverable;
 - (ii) incorporated, embedded or otherwise included in any Deliverable, the Works or any part of the work delivered as part of the Works;
 - (iii) necessary for the undertaking, completion and performance of the Works or any Equivalent Activity; or
 - (iv) necessary for the Use by City or a subsequent Licensee of any Deliverable, the Works, or any part of the work delivered as part of the Works or any Intellectual Property in accordance with the rights granted to City hereunder;
- or that the Use of such Intellectual Property for any of the purposes set out in clause (iii) or (iv) above would infringe the Intellectual Property rights of any person.
- (q) **“Developed Intellectual Property”** means Intellectual Property that is:
- (i) created or developed, or Ownership of which is acquired, by DB Co, any Subcontractor or any DB Co Personnel, or Subcontractor Personnel, whether alone or together with each other or any other person, during the Project Term and within the Project Scope;

- (ii) created, developed or Ownership of which is acquired for the purposes of the Project, the Works; and
 - (iii) created or designed based on functional, design and performance specifications provided by City, or City Personnel, or City Parties;
- and, for greater certainty, Developed Intellectual Property does not include any DB Co Intellectual Property used to develop or create the Developed Intellectual Property.
- (r) **“Embedded Software”** means the DB Co Embedded Software, Subcontractor Embedded Software and Third Party Embedded Software.
 - (s) **“Equipment”** means all electrical and mechanical equipment, machinery, computer hardware and systems comprising or used in the Works.
 - (t) **“Equivalent Activity”** means any activity, undertaking or operation relating to the Works done by City, any permitted assignee of City pursuant to Section 49.2 of the Project Agreement and/or any other person acting on behalf of or under the authority of City, which activity, undertaking or operation if done by DB Co would be within the Project Scope, including the Works.
 - (u) **“Escrow Agent”** means a recognized provider of escrow services selected by DB Co and approved by City and having a location within the Province of Ontario with whom the Escrow Materials will be deposited in accordance with Section 3.11.
 - (v) **“Escrow Agreement”** means an escrow agreement that meets the requirements of Section 3.11 and pursuant to which Escrow Materials are held by the Escrow Agent and City are designated as a beneficiary party.
 - (w) **“Escrow Materials”** means:
 - (i) with respect to Software, the Source Materials for that Software; and
 - (ii) with respect to Embedded Software, the Source Materials for that Embedded Software.
 - (x) **“Escrow Provider”** means:
 - (i) DB Co in respect of the DB Co Licenced Software;
 - (ii) the applicable Subcontractor in respect of any Subcontractor Licenced Software;
 - (iii) the applicable third party licensor in respect of any Third Party Licenced Software;
 - (iv) DB Co in respect of the DB Co Embedded Software;
 - (v) the applicable Subcontractor in respect of any Subcontractor Embedded Software; and
 - (vi) the applicable third party licensor in respect of any Third Party Embedded Software.
 - (y) **“Expanded Purposes”** means (i) the Permitted Purposes; and (ii) for any other purpose of the City.

- (z) **“Licence”** means a non-exclusive licence or sub-licence, as applicable, granting the rights and subject to the restrictions and limitations set out in this Schedule 24.
- (aa) **“Licenced Intellectual Property”** means, with respect to any Licence, the Intellectual Property that is within the scope of that Licence as provided for in this Schedule 24.
- (bb) **“Licensee”** means, in respect of any Licence granted or required to be granted by DB Co pursuant to this Schedule 24, City or any permitted assignee under Section 49.2 of the Project Agreement that is the holder of that Licence at the relevant time.
- (cc) **“Licensor”** means DB Co in respect of the DB Co Licenced Software, the applicable Subcontractor in respect of any Subcontractor Licenced Software, or the applicable third party licensor in respect of any Third Party Licenced Software.
- (dd) **“Limited Modification Rights”** in respect of a Software or an Embedded Software, means the right to configure, customize or modify such Software or Embedded Software, without access to the Source Materials thereto, in order to have complete and unrestricted access to, or otherwise Use, all the functionalities within such Software or Embedded Software that is licenced to City under this Schedule 24.
- (ee) **“Modification”** means all corrections, modifications, changes, enhancements, improvements, supplements, customizations or derivative works, and includes the Limited Modification Rights, and **“Modify”** means to make a Modification.
- (ff) **“Open Source Licence”** means any licence meeting the Open Source Definition (as promulgated by the Open Source Initiative) or the Free Software Definition (as promulgated by the Free Software Foundation), or any substantially similar licence, including any licence approved by the Open Source Initiative, or any Creative Commons Licence. For the avoidance of doubt, Open Source Licences include Copyleft Licences.
- (gg) **“Open Source Materials”** means any software or content subject to an Open Source Licence.
- (hh) **“Ownership”** means, in respect of any Intellectual Property, ownership of all right, title and interest in and to that Intellectual Property and **“Own”**, **“Owned”** and **“Owner”** shall have corresponding meanings.
- (ii) **“Permitted Purposes”** means:
 - (i) during the Project Term, performance of City’s obligations and the exercise of City’s rights under the Project Agreement and any other agreements relating to the Project;
 - (ii) during the Project Term, City’s participation in the Works and any activity, undertaking or operation within the Project Scope, including its participation in the design and construction, operation, maintenance, repair, correction and renovation of the Works;
 - (iii) both during and after the Project Term, ongoing maintenance and lifecycle works related to the Works and the System Infrastructure, and any Equivalent Activity;
 - (iv) both during and after the Project Term, the use, integration and interoperation of the Works with:

- (A) any existing or other transit projects undertaken by or on behalf of City or interfacing with City projects, including any System Extension; and
 - (B) any existing or after-acquired systems, software, technology or equipment related to the use, operation, maintenance, repair, correction, and renovation of the Works and any System Extension;
- (v) both during and after the Project Term, and so long as the Licensee is City or other Governmental Authority:
 - (A) the provision of governmental services and the conduct of operations and activities provided in connection or otherwise associated with the Works and any System Extension and the Lands by City or any Governmental Authority or any emergency service provider; and
 - (B) the development of transportation standards, policies and procedures.
- (jj) **“Personnel”** means (i) in reference to DB Co, the DB Co Personnel, (ii) in reference to City, City Personnel, and (iii) in reference to any Subcontractor, such Subcontractor’s Personnel.
- (kk) **“Project Data”** means:
 - (i) all Design Data; and
 - (ii) any other materials, documents and/or data prepared by or on behalf of DB Co or Subcontractors in relation to the Works or the Project Agreement, excluding the Jointly Developed Materials, the Background Information and any Developed Intellectual Property.
- (ll) **“Project Intellectual Property”** means Intellectual Property that is created or developed, or Ownership of which is acquired, by DB Co, any Subcontractor or any DB Co Personnel or Subcontractor Personnel, whether alone or together with each other or any other person, during the Project Term and within the Project Scope, and which is created, developed or acquired for the purposes of the Project or the Works, but excluding Project Software, Embedded Software, Project Data, Developed Intellectual Property and Technical Information.
- (mm) **“Project Scope”** means the scope of the Project, including the performance of all Works, as defined by the terms of the Project Agreement.
- (nn) **“Project Software”** or **“Software”** means any DB Co Licenced Software, Subcontractor Licenced Software and Third Party Licenced Software, but does not include Embedded Software.
- (oo) **“Software Maintenance and Support”** means, with respect to any Software, the software maintenance and support services for that Software that are provided separately under a software maintenance and support agreement with the licensor of that Software.
- (pp) **“Software Tools”** means, with respect to any Software or Embedded Software, any routines, compilers, bootstraps, analyzers, monitors, toolkits and other software tools used by the licensor of such Software or Embedded Software in connection with the programming, compiling,

maintenance, debugging, analysis, configuration, customization, verification or monitoring of such Software or Embedded Software.

(qq) **“Source Materials”** means:

- (A) a complete source code version of the Software or Embedded Software, in machine-readable form which, when compiled, will produce the executable version of the Software or Embedded Software and in human-readable form with annotations in the English language or such other language as is acceptable to City, acting reasonably, in both cases on a storage medium suitable for long term archival storage;
- (B) a complete copy, in English or such other language as is acceptable to City, acting reasonably, in both electronic and paper form, suitable for long term archival storage, and appropriately labelled to describe the contents thereof, of all applicable documentation and other explanatory materials, including programmer’s notes, technical or otherwise, for the Software or Embedded Software as may be required for a person other than the licensor of the Software or Embedded Software, using a competent computer programmer possessing ordinary skills and experience, to further develop, maintain and operate the Software or Embedded Software without further recourse to the licensor, which will include, to the extent such items have been or are created for such Software or Embedded Software, general flow charts, input and output layouts, field descriptions, volumes and sort sequence, data dictionary, file layouts, processing requirements and calculation formulae, circuit diagrams and the details of all algorithms and which shall be deemed to include those materials, as revised from time to time; and
- (C) all Software Tools for such Software or Embedded Software, to the extent not previously delivered with the Software or Embedded Software.

(rr) **“Subcontractor Embedded Software”** means computer software that is Owned by a Subcontractor and that:

- (i) is included, embedded or otherwise incorporated in Equipment;
- (ii) is not licenced separately and apart from that Equipment; and
- (iii) is not subject to a separate warranty, and is not subject to maintenance and repair separately from, that Equipment.

(ss) **“Subcontractor Intellectual Property”** means, with respect to each Subcontractor:

- (i) Intellectual Property that is Owned, created, developed or acquired by that Subcontractor:
 - (A) prior to the Project Term; or
 - (B) during the Project Term but outside the Project Scope; or

- (C) during the Project Term and within the Project Scope, but which is not City Intellectual Property, City Supplied Third Party Intellectual Property, DB Co Intellectual Property, or Third Party Intellectual Property;
- (ii) the Subcontractor Licenced Software;
- (iii) the Subcontractor Embedded Software;
- (iv) the Subcontractor's Technical Information; and
- (v) subject to Section 41.4 of the Project Agreement, all Modifications to any of the foregoing, whether made by or on behalf of DB Co, City, City Parties, or any Subcontractor alone, jointly with each other or with any other person.
- (tt) **"Subcontractor Licenced Software"** means any computer software that is Owned by a Subcontractor, is not Subcontractor Embedded Software and is delivered, supplied or otherwise provided by the Subcontractor under the Project Agreement, the Subcontract as or as part of any Deliverable.
- (uu) **"Subcontractor Personnel"** means, with respect to any Subcontractor, persons acting on behalf of that Subcontractor or employed, engaged or retained by that Subcontractor in connection with the performance of that Subcontractor's obligations under the Project Agreement or the Subcontract, including the Subcontractor's consultants, contractors and subcontractors and the employees, officers, directors, volunteers and agents of the Subcontractor and its direct and indirect consultants, contractors and subcontractors.
- (vv) **"System Architecture and Look and Feel"** means any work product, including any Intellectual Property therein, Owned, created, developed, acquired or licenced whether by DB Co or any Subcontractor in respect of any aspect of the architecture or look and feel of the Works, including without limitation all designs, design details, drawings, specifications, prototypes, documentation, works and all instruments of architectural service that relate to the design identity, look and feel of any aspect of the architectural and landscape design whether in respect of the tunnel, landscape and urban design elements, fit and finish, or any other aspect of the Works.
- (ww) **"Technical Information"** means technical information relating to any Equipment supplied or Intellectual Property licenced under the Project Agreement, including software documentation, user and operating manuals, maintenance and repair manuals, parts lists and other materials relevant to the use, operation, maintenance or repair of such Equipment or Intellectual Property.
- (xx) **"Third Party Embedded Software"** means computer software that is not Owned by City, DB Co or a Subcontractor and that:
 - (i) is included, embedded or otherwise incorporated in Equipment;
 - (ii) is not licenced separately and apart from that Equipment; and
 - (iii) is not subject to a separate warranty, and is not subject to maintenance and repair separately from, that Equipment.

- (yy) **“Third Party Intellectual Property”** means Intellectual Property Owned by a person other than City, DB Co, a Subcontractor or any of their respective Personnel that is delivered, supplied or otherwise provided by DB Co or a Subcontractor under the Project Agreement as or as part of any Deliverable, including Third Party Licenced Software and Third Party Embedded Software.
- (zz) **“Third Party Licenced Software”** means any computer software that is not Owned by City, DB Co or a Subcontractor, is not Third Party Embedded Software and is delivered, supplied or otherwise provided by DB Co or a Subcontractor under the Project Agreement as or as part of any Deliverable.
- (aaa) **“Trade-Mark Licence Agreement”** means the trademark licence agreement entered into between DB Co and City providing for the licence by City of City Trade-Marks to DB Co, being substantially in the form of Appendix A attached to this Schedule 24.
- (bbb) **“Trust Rights”** has the meaning given in Section 2.5(b).
- (ccc) **“Use”** means, with respect to any Intellectual Property, to do any and all things with that Intellectual Property that the Owner of that Intellectual Property could do, including to load, transmit, access, execute, use, store, display, copy, adapt, translate, incorporate into other materials, practice, make and have made, but specifically excluding the right to Modify and subject to any limitations in the provision of this Schedule 24 pursuant to which a Licence is granted.

2. OWNERSHIP

- 2.1 **DB Co Intellectual Property:** DB Co shall be and remain the sole and exclusive Owner of the DB Co Intellectual Property. For certainty, nothing in this Schedule 24 shall transfer to DB Co any Ownership of, or grant to DB Co any right in respect of, City Intellectual Property used in the creation or development of or that is embodied, incorporated, embedded, otherwise included or illustrated in any DB Co Intellectual Property, except for the Licence granted under Section 3.1.
- 2.2 **City Intellectual Property:** City shall be and remain the sole and exclusive Owner of City Intellectual Property. For certainty, nothing in this Schedule 24 shall transfer to City any Ownership of, or grant to City any right in respect of, the DB Co Intellectual Property used in the creation or development of or that is embodied, incorporated, embedded, otherwise included or illustrated in any City Intellectual Property, except for the Licence granted under Section 3.2.

For greater clarity and without limiting City’s Ownership rights, DB Co acknowledges and agrees that City shall be entitled to Use and Modify the Developed Intellectual Property (other than any Developed Intellectual Property that is specified in a Variation or by separate agreement of City and DB Co to be Owned by DB Co) in any manner and for any purpose whatsoever, including without limitation in connection with the Expanded Purposes.

- 2.3 **Subcontractor Intellectual Property:** As between City and DB Co, but subject to any agreement to the contrary between DB Co and any Subcontractor, each Subcontractor shall be and remain the sole and exclusive Owner of its Subcontractor Intellectual Property.
- 2.4 **City Supplied Third Party Intellectual Property:** As between City and DB Co, but subject to any agreement to the contrary between City and the Owner of any City Supplied Third Party Intellectual Property, the Owner of any City Supplied Third Party Intellectual Property shall be

and remain the sole and exclusive Owner of any City Supplied Third Party Intellectual Property. For certainty, nothing in this Schedule 24 shall transfer to DB Co or any Subcontractor any Ownership of, or grant to DB Co or any Subcontractor any right in respect of, City Supplied Third Party Intellectual Property used in the creation or development of or that is embodied, incorporated, embedded, otherwise included or illustrated in any DB Co Intellectual Property or any City Intellectual Property or any Subcontractor Intellectual Property, except for the Licence granted under Section 3.1.

2.5 Assignments

- (a) If, notwithstanding Section 2.1, 2.2, 2.3, or 2.4 or Section 41.4 of the Project Agreement, either party (the “**Assignor**”) retains, acquires or owns any right, title or interest in or to any Intellectual Property that is to be Owned by another person (the “**Assignee**”) pursuant to Section 2.1, 2.2, 2.3, or 2.4 or Section 41.4 of the Project Agreement as applicable, (the “**Assigned Intellectual Property**”), then the Assignor will assign, and for no further consideration and without any further act or formality does hereby irrevocably assign, to the Assignee all of the Assignor’s worldwide right, title and interest in and to the Assigned Intellectual Property free and clear of all liens, claims, charges or encumbrances, but subject to any Licences granted or required to be granted by the Assignee to the Assignor pursuant to this Schedule 24.
- (b) If and to the extent that the assignment pursuant to Section 2.5(a) is not effective on the date hereof or on any future date, either generally or pursuant to the laws of any jurisdiction, then any and all right, title and interest in and to the Assigned Intellectual Property that is retained, acquired or owned by the Assignor (collectively, the “**Trust Rights**”), will be held by the Assignor in trust for the exclusive benefit and use of the Assignee, except for any Licences granted or required to be granted by the Assignee to the Assignor pursuant to this Schedule 24, and the Assignor will execute and deliver to the Assignee such transfers, assignments, documents and instruments as may be necessary to transfer and assign to the Assignee the Trust Rights, free and clear of all liens, claims, charges or encumbrances, promptly upon receipt thereof from the Assignee, and will otherwise cooperate with the Assignee to give effect to, record and register the Assignee’s ownership of the Trust Rights.
- (c) DB Co will include in each Subcontract provisions equivalent to Sections 2.5(a) or 2.5(b) with respect to: (i) City Intellectual Property, Jointly Developed Materials, Developed Intellectual Property, Project Data and any Modifications thereto, and shall enforce those provisions against each Subcontractor to the extent necessary to ensure that City remains at all times the sole and exclusive Owner of all such property; and (ii) City Supplied Third Party Intellectual Property and any Modifications thereto, and shall enforce those provisions against each Subcontractor to the extent necessary to ensure that the Licensor, as applicable, remains at all times the sole and exclusive Owner of all such property.

2.6 **Personnel:** City and DB Co shall, and DB Co shall include in each Subcontract an obligation of each Subcontractor to, ensure that their respective Personnel shall:

- (a) by duly executed written agreement or by operation of law, irrevocably and unconditionally sell, assign and transfer to that party all right, title and interest that its Personnel may have in or to any and all Intellectual Property referred to in this Schedule 24 and all Modifications thereto, such that agreements as to Ownership of Intellectual Property pursuant to Sections 2.1, 2.2, 2.3, or 2.4 and Section 41.4 of the Project Agreement and the assignment by that party pursuant to Section 2.5 include all right, title and interest of its Personnel; and

- (b) by duly executed written agreement, irrevocably waive all non-transferable rights, including moral rights, that they have or may have in any Intellectual Property assigned by such Personnel pursuant to Section 2.6(a) in favour of the assignee and its successors, assigns and licensees.

3. LICENCES

3.1 Licence by City to DB Co

- (a) Subject to Section 3.1(d), City hereby grants to DB Co:
 - (i) a royalty free, fully paid-up, limited Licence to Use and Modify City Intellectual Property for the sole purpose of and only to the extent necessary for the performance by DB Co of the Project Scope and its obligations under the Project Agreement;
 - (ii) a limited Licence to Use City Supplied Third Party Intellectual Property for the sole purpose of and only to the extent necessary for the performance by DB Co of the Project Scope and its obligations under the Project Agreement.
- (b) Subject to Section 3.1(d), DB Co may sublicense its rights under the Licence granted in Section 3.1(a) to any Subcontractor for the sole purpose of and only to the extent necessary for the performance by that Subcontractor of its obligations under its Subcontract.
- (c) Except as provided in Section 3.1(b), DB Co may not transfer, assign, sublicense or otherwise dispose of the Licence granted under Section 3.1(a) without the prior written consent of City, which consent may be given or refused by City in its absolute and unfettered discretion.
- (d) The Licence of any City Supplied Third Party Intellectual Property pursuant to Section 3.1(a) shall be subject to the terms and conditions of the licence agreement between City and the licensor of City Supplied Third Party Intellectual Property. The City will provide to DB Co a copy of any such third party licence agreement (which may be redacted as to financial and other terms not relevant to use of City Supplied Third Party Intellectual Property by DB Co and Subcontractors), or where prohibited from doing so by obligations of confidentiality to the third party licensor, a summary of the obligations, limitations and restrictions applicable to use of City Supplied Third Party Intellectual Property by DB Co and Subcontractors. DB Co will comply, and will require any Subcontractor to comply, with the terms and conditions of such third party licence agreement (as set out in the copy of the third party licence agreement or summary thereof provided by City to DB Co) to the extent applicable to DB Co and any Subcontractor in the performance of their respective obligations under the Project Agreement and any Subcontract. If requested by City, DB Co will, and will require any Subcontractor to, execute and deliver to City and the third party licensor an agreement that includes reasonable terms for the protection of the confidentiality of City Supplied Third Party Intellectual Property and an acknowledgement of the third party licensor's ownership thereof, unless DB Co disputes such ownership.
- (e) The Licence granted to DB Co under: Section 3.1(a)(i), and any sublicense granted by DB Co to a Subcontractor thereunder, will terminate upon the expiry or termination of DB Co's services and other obligations under the Project Agreement; Section 3.1(a)(ii) and any sublicense granted by DB Co to a Subcontractor thereunder, will terminate upon the earlier of: (A) expiry or termination of DB Co's services and other obligations under the Project Agreement; and (B) the termination of the contract in respect of the applicable City Supplied Third Party Intellectual Property or City's licence or sublicense rights thereunder.

- (f) The Licences granted to DB Co under Section 3 do not include licences to any City Trade-Marks. The use of any City Trade-Marks shall be governed by the terms of the Trade-Mark Licence Agreement.

3.2 Licence by DB Co to City

- (a) DB Co hereby grants to City a Licence to:
- (i) Use and Modify the DB Co Intellectual Property (excluding DB Co Licenced Software and DB Co Embedded Software) that is Delivered and the Subcontractor Intellectual Property (excluding the Subcontractor Licenced Software, the Subcontractor Embedded Software and excluding the right to Modify the CBTC Intellectual Property) that is Delivered;
 - (ii) Use, and have Limited Modification Rights to, the DB Co Licenced Software that is Delivered and the Subcontractor Licenced Software (excluding, for Limited Modification Rights, the Subcontractor Licenced Software comprising CBTC Intellectual Property) that is Delivered and only in respect of the modules that are Delivered; and
 - (iii) Use, and have Limited Modification Rights to, the DB Co Embedded Software and the Subcontractor Embedded Software (excluding, for Limited Modification Rights, the Subcontractor Embedded Software comprising CBTC Intellectual Property) as part of and for the Use of the Equipment in which such software is included, embedded or otherwise incorporated;

for the Permitted Purposes. Subject to Section 3.11, the Licences granted pursuant to this Section 3.2 in respect of Project Software and Embedded Software apply to only object code versions thereof and not the source code materials for any such Project Software or Embedded Software.

In addition and notwithstanding any other provision of this Schedule 24, DB Co hereby grants to City a Licence to Use and Modify any System Architecture and Look and Feel that is not owned by City pursuant to this Schedule 24, for the Expanded Purposes.

- (b) The Licence granted pursuant to this Section 3.2 will be irrevocable (except as provided in Section 3.2(d)), perpetual, royalty free, fully paid-up (upon payment of the fees specified in the Project Agreement for the Deliverable which consists of or incorporates the Licenced Intellectual Property in respect of which the Licence is granted), and permit Use by City on an enterprise basis without restriction or limitation as to users (whether by number, identity or otherwise), location, capacity, authorized system or otherwise, as part of or in connection with the Works, or in the case of the System Architecture and Look and Feel, in connection with the Expanded Purposes.
- (c) The Licence granted pursuant to this Section 3.2 may be transferred, assigned, sublicenced and otherwise disposed of by City subject to and in accordance with Section 49.2 of the Project Agreement, provided that the Licence in respect of DB Co Embedded Software and Subcontractor Embedded Software may only be transferred together with the Equipment in which such software is included, embedded or otherwise incorporated.
- (d) The Licence granted pursuant to this Section 3.2 may not be terminated except in the event of the failure of the Licensee to pay the applicable fees as provided for in the Project Agreement for the

specific Deliverable which consists of or incorporates the Licenced Intellectual Property, and such failure is not remedied by the Licensee within 60 days after notice by DB Co to the Licensee demanding that such failure be remedied, provided that any such termination shall apply only to the Licenced Intellectual Property to which such failure applied and not to any other Licenced Intellectual Property. Except as specifically provided in this Section 3.2(d), DB Co shall not be entitled to terminate or rescind the Licence granted under this Section 3.2, and if the Licensee commits any other breach of or default under this Schedule 24 or the Project Agreement, whether material or not and whether that breach or default is or is not capable of being remedied, DB Co's rights and remedies in respect of that breach or default shall be limited to such rights and remedies other than termination or rescission of the Licence granted under this Section 3.2 as may exist at law or in equity, it being acknowledged by DB Co that except as provided in this Section 3.2(d) the Licence granted under this Section 3.2 is perpetual and irrevocable. No breach of or default under this Schedule 24 by City shall constitute a repudiation of the Licence granted under this Section 3.2 by City.

- (e) The Licensee may provide and disclose the Licenced Intellectual Property to any employee, contractor, subcontractor, consultant, service provider, outsourcer or other person retained by the Licensee (including the Operator) in connection with the Permitted Purposes, except in respect of the System Architecture and Look and Feel in connection with the Expanded Purposes, and any such employee, contractor, subcontractor, service provider, outsourcer or other person may exercise all rights to Use and Modify the Licenced Intellectual Property as may be granted by the Licensee to such person within the scope of the Licence granted by DB Co to the Licensee pursuant to this Schedule 24, provided that the Licensee shall be responsible for anything done or failed to be done by any employee, contractor, subcontractor, service provider, outsourcer or other person to whom the Licensee provides and discloses the Licenced Intellectual Property, including a breach by any such person of City's obligations of confidentiality in respect of any Confidential Information that is or is part of Licenced Intellectual Property.
- (f) The Licensee may Use Project Software that is licenced pursuant to this Section 3.2 in multiple environments or instances, including for training, development, testing, staging, and disaster recovery and in a live, production or operating environment.
- (g) The Licensee may make copies of the Licenced Intellectual Property as may be reasonably necessary for Use and Modification of the Licenced Intellectual Property in accordance with the Licence granted pursuant to this Section 3.2 or otherwise this Schedule 24. All such copies shall be Owned by Owner of the original Licenced Intellectual Property and licenced to the Licensee pursuant to this Section 3.2. Except as permitted by this Schedule 24, the Licensee will not copy, Modify, disassemble, reverse engineer, decompile, translate or otherwise obtain or create the source code for any DB Co Intellectual Property, DB Co Licenced Software, DB Co Embedded Software, Subcontractor Intellectual Property, Subcontractor Licenced Software or Subcontractor Embedded Software.
- (h) The Licensee will not remove from any Licenced Intellectual Property any markings or notices with respect to the ownership thereof, Copyright therein or the confidentiality thereof.
- (i) Where City has the right to Modify any Licenced Intellectual Property, DB Co shall ensure that all authors of such Licenced Intellectual Property have waived all moral rights that such authors may have therein in favour of City and its successors, assigns and licensees.

3.3 Licences with Subcontractors

- (a) DB Co will be responsible to obtain from each Subcontractor the right to grant the Licence under Section 3.2 in respect of the Subcontractor Intellectual Property.
- (b) DB Co will be responsible to obtain from each Subcontractor the right to Use and Modify Subcontractor Intellectual Property (excluding the right to Modify the CBTC Intellectual Property) to the extent necessary for DB Co to perform its obligations under the Project Agreement, on such terms as are not in breach of or conflict with the Project Agreement.
- (c) DB Co will be responsible to grant to each Subcontractor the right to Use and Modify City Intellectual Property and DB Co Intellectual Property to the extent necessary for each Subcontractor to perform its obligations under its Subcontract, on such terms as are not in breach of or conflict with the Project Agreement.

3.4 Third Party Intellectual Property: DB Co will not, and will not permit any DB Co Personnel, Subcontractor or Subcontractor Personnel to, incorporate, embed or otherwise include in the Works or any Deliverable any Third Party Intellectual Property unless:

- (a) for Third Party Intellectual Property other than Third Party Embedded Software, such Third Party Intellectual Property is provided by the Owner thereof pursuant to a licence agreement that:
 - (i) grants to the Licensee rights equivalent to or better than the rights granted under the Licence in Section 3.2, including being assignable in accordance with Section 3.2(c), and, where the Third Party Intellectual Property is software or includes software, provides for the maintenance and support of that software on terms acceptable to City; or
 - (ii) has been approved by City in writing, which approval may be given or refused by City in its absolute and unfettered discretion;

and such licence agreement, if not entered into with City directly, has been assigned or is freely assignable to City;

- (b) for Third Party Embedded Software, either (i) such Third Party Embedded Software is embedded in Equipment and is not provided by the Owner thereof pursuant to a licence agreement, but may be used by City or any subsequent owner of the machine or equipment as part of and for the intended purposes of such machine or equipment upon the purchase thereof, or (ii) such Third Party Embedded Software is subject to a licence agreement that complies with Section 3.4(a).
- (c) If DB Co, DB Co Personnel, Subcontractor or Subcontractor Personnel incorporates, embeds or includes any Third Party Intellectual Property in the Works or any Deliverable other than in compliance with this Section 3.4, then in addition to any other rights and remedies City may have against DB Co, DB Co will at its sole cost and expense take all necessary steps to comply with this Section 3.4 or, if DB Co is unable to do so, to remove such Third Party Intellectual Property and replace it with DB Co Intellectual Property that provides the same functionality and performance as such Third Party Intellectual Property and which will operate within the Works without any degradation thereof or adverse effect thereon, and which will be included in the DB Co Intellectual Property for the purposes of the Licence granted pursuant to Section 3.2.

- 3.5 Non-Assertion:** DB Co agrees not to assert, and to cause its Subcontractors not to assert, any Intellectual Property right against City or any Licensee that would have the effect of diminishing the rights granted to City or any Licensee hereunder. Without limiting the generality of the foregoing, DB Co will not sue, and will cause its Subcontractors not to sue, City or any Licensee on the basis that any Equivalent Activity or the Ownership or Use of the Works or any Deliverable within the scope of the Permitted Purposes infringes any Intellectual Property right of DB Co or any Subcontractor.
- 3.6 Deliveries:** DB Co will deliver to City all Licenced Intellectual Property at the times specified in the Project Agreement, or where no time is specified, on or before the Final Completion Date or the Termination Date, whichever is first to occur. The media on which Project Software is delivered and tangible copies or embodiments of any Licenced Intellectual Property other than Project Software and will be the property of City, notwithstanding DB Co's, a Subcontractor's or a third party's Ownership of the Licenced Intellectual Property. If any Licenced Intellectual Property requires software in order to Use that Licenced Intellectual Property, DB Co will ensure that such software will be commercially available to City at a reasonable licence fee, or if such software is not commercially available, DB Co will at its cost provide such software and a licence therefor to City and City Parties, RTG and RTG Parties, on terms and conditions that do not result in any impairment of City's Use of the Licenced Intellectual Property in accordance with the Licence therefor.
- 3.7 Pass Through Obligations:** DB Co is responsible to include in all contracts with DB Co Personnel and in all Subcontracts with Subcontractors such terms and conditions as may be necessary for DB Co to grant, or obtain for City, the Ownership, Licences, rights and benefits provided for in this Schedule 24.
- 3.8 Conflicting Software Licences:** All software referenced in this Schedule 24 will be licenced in accordance with this Schedule 24, and any form of software licence agreement used or provided by a licensor in association with any such software will be of no force or effect and will not be binding on City or any other Licensee, even if by its terms such software licence agreement is stated to be accepted by the installation or use of the software, and regardless of any acceptance of such software licence agreement that is required in order to install or use the software.
- 3.9 Trade-Marks and Names:** Except as expressly set forth: (a) in the Trade-Mark Licence Agreement; (b) the Project Agreement; or (c) otherwise in a writing executed by each of City and DB Co, neither Party shall use any Trade-Marks owned by the other Party, or use the names or any identifying logos or otherwise of the other Party in any advertising or permit them so to be used.
- 3.10 Open Source.** DB Co shall not, and shall cause the Subcontractor not to, incorporate, embed or include any Open Source Materials in any Deliverables, City Intellectual Property, City Supplied Third Party Intellectual Property without the prior written consent of City.
- 3.11 Escrow Agreements**
- (a) If requested by City (which for the purposes of this Section 3.11 includes any permitted assignee under Section 49.2 of the Project Agreement), at any time during the Project Term, DB Co will, or will require the applicable Subcontractor or third party licensor to, enter into an Escrow Agreement for any Software or Embedded Software (an "**Escrowed Deliverable**") on terms that comply with this Section 3.11, or amend its existing Escrow Agreement for such Software or

Embedded Software to comply with this Section 3.11, and add City as a beneficiary under the Escrow Agreement.

- (b) The Escrow Provider will deposit with the Escrow Agent the Escrow Materials for the Escrowed Deliverable and all Modifications thereto provided by the Escrow Provider to City as part of the Works, Software Maintenance and Support (if purchased by or on behalf of City) or any other services performed by the Escrow Provider for City, and in the case of Software or the Embedded Software, the Escrow Provider will update the Escrow Materials to conform to the then-current version of the Software in use by City including all Modification thereto made for the benefit of City.
- (c) City will have the right, on reasonable notice to the Escrow Provider and the Escrow Agent, to verify that the Escrow Materials conform to the Escrowed Deliverable supplied to and in use by City to which the Escrow Materials relate. In addition, City may purchase such additional verification services as may be offered by the Escrow Agent and the Escrow Provider will cooperate with City and the Escrow Agent in the performance of those verification services.
- (d) City will have the right to obtain from the Escrow Agent a copy of the Escrow Materials upon any of the following events:
 - (i) the Escrow Provider is bankrupt;
 - (ii) a trustee, receiver, manager, receiver-manager, custodian or person having similar authority is appointed for the Escrow Provider or its business and assets and is not released or removed within 30 days after the appointment;
 - (iii) the Escrow Provider seeks protection from its creditors or undertakes any reorganization for the purpose of obtaining relief from its creditors;
 - (iv) the Escrow Provider ceases to carry on business; or
 - (v) in the case of Software, if City is purchasing Software Maintenance and Support for the Software in respect of which the Escrow Materials have been deposited, if the Escrow Provider has given City or any of its representatives notice that it will no longer provide Software Maintenance and Support or if the Escrow Provider defaults in the performance of Software Maintenance and Support and does not remedy that default within 30 days after receipt of notice from City demanding that the Escrow Provider do so.
- (e) DB Co shall ensure that the Escrow Agreement: (i) requires the Escrow Agent to release the Escrow Materials to City if any of the events listed in Section 3.11(d) occur; (ii) does not contain any provision placing any obligation on City, including without limitation, any indemnity obligation; and (iii) complies with and does not contradict any provision of this Section 3.11. Where this Section 3.11 places an obligation on the Escrow Agent, DB Co shall cause the Escrow Agent to comply with all such obligations.
- (f) DB Co hereby grants, and DB Co shall ensure that all Escrow Providers grant to City as of the date the applicable Software or the applicable Embedded Software is used in connection with the Project Scope, a Licence to:

- (i) Use the Escrow Materials to enable City to Use the Escrowed Deliverable to which the Escrow Materials relate for the Permitted Purposes, and where the Escrowed Deliverable is or contains Licenced Intellectual Property in accordance with the Licence applicable thereto;
 - (ii) make Modifications to the Escrow Materials notwithstanding any contradictory term or condition in the Licence applicable to the Escrowed Materials which Modifications are only used for the Permitted Purposes or the Expanded Purposes, as applicable, and are subject to confidentiality obligations under Section 3.11(f)(v);
 - (iii) recompile versions of the Software or Embedded Software from the Escrow Materials, which recompiled versions shall be deemed to form part of the Software or Embedded Software and be subject to the terms hereof;
 - (iv) make only those copies of the Escrow Materials that City reasonably requires for the purposes set out in Sections 3.11(f)(i), 3.11(f)(ii) and 3.11(f)(iii); and
 - (v) disclose the Escrow Materials, or any part thereof, only to agents, employees or contractors of City as reasonably required for the purposes set out in Sections 3.11(f)(i), 3.11(f)(ii) and 3.11(f)(iii), provided that such agents, employees and contractors are bound by obligations of confidentiality in respect of any Escrow Materials disclosed to them, the breach of which shall constitute a breach by City of its obligations of confidentiality in respect of the Escrow Materials.
- (g) The Licence granted pursuant to Section 3.11(f) will:
- (i) where the Escrow Provider is DB Co or a Subcontractor, form part of the Licence granted pursuant to Section 3.2; or
 - (ii) where the Escrow Provider is a third party, form part of the licence granted by such third party to City;
- and in either case remain in effect for so long as such licence remains in effect.
- (h) Except where City (i) terminates the Escrow Agreement, (ii) has a renewal right and fails to renew the Escrow Agreement, or (iii) fails to make payments as set out in Section 3.11(i), the Escrow Provider will not terminate or fail to renew the Escrow Agreement without entering into a new Escrow Agreement with a replacement escrow agent on terms and conditions substantially the same as the Escrow Agreement and this Section 3.11.
- (i) The City will pay all fees charged by the Escrow Agent in association with the deposit and maintenance of the Escrow Materials by the Escrow Agent under the Escrow Agreement for the benefit of City. The Escrow Provider shall have no responsibility or liability arising from any failure of City to pay fees when due in order to maintain the Escrow Materials with the Escrow Agent.
- (j) If City receives the Escrow Materials, then as between City and DB Co and notwithstanding any other provision of the Project Agreement, City will own all Modifications to the Escrow Materials made by or for City and all Intellectual Property in such Modifications.

3.12 Modifications: Notwithstanding the granting of any licence pursuant to this Schedule 24, where City has made any Modification to the DB Co Intellectual Property or the Subcontractor Intellectual Property other than (a) a Modification made by or on behalf of DB Co or a Subcontractor or otherwise authorized by DB Co or any Subcontractor, or (b) a Modification made through the Limited Modification Rights,

then,

- (i) any warranty provided by DB Co under the Project Agreement shall not apply solely in respect of such Modification;
- (ii) DB Co and the Subcontractors shall not be liable in respect of any Direct Losses arising in connection with such Modifications where such Modifications are the direct cause of such Direct Losses, and the Direct Losses would not have occurred but for the Modifications; and
- (iii) the indemnity obligations of DB Co set out in Section 46.1(f) of the Project Agreement shall not apply in respect of any such Modifications where the Modifications are the direct cause of such Direct Losses, and the Direct Losses would not have occurred but for the Modifications.

Appendix A

Form of Trade-Mark Licence Agreement

TRADE-MARK

LICENCE

AGREEMENT

THIS TRADE-MARK LICENCE AGREEMENT, effective as of [DATE] (the “**Agreement**”), is between City (the “**Licensor**”), and [•] (the “**Licensee**”), and Licensor and Licensee are referred to herein individually as a “**Party**” and collectively as the “**Parties**”.

WHEREAS:

1. Licensor and Licensee are parties to a Project Agreement dated [DATE] (the “**Project Agreement**”);
2. Capitalized terms used but not defined herein have the meanings assigned to them in the Project Agreement and this Schedule 24 thereto;
3. Licensor owns the trade-marks shown on Exhibit A (the “**Marks**”);
4. Licensee proposes to use the Marks in [Ontario] (the “**Territory**”) for the Limited Purpose set forth below; and
5. Subject to the terms and conditions set forth herein, Licensor is willing to grant to Licensee, and Licensee is willing to accept, a non-exclusive licence to use the Marks pursuant to the terms of this Agreement.

NOW THEREFORE in consideration of the covenants contained herein, the receipt and sufficiency of which are acknowledged, the Parties agree as follows:

1. **Grant:** Licensor grants to Licensee, and Licensee accepts, a limited, non-transferable, non-exclusive, royalty-free right and licence to use the Marks in the Territory for the sole purpose of and only to the extent necessary for the performance by Licensee of the Project Scope and its obligations under the Project Agreement (the “**Limited Purpose**”).
2. **No Right to Sublicence:** Licensee acknowledges and agrees that it does not have the right to sublicense the use of the Marks to any party without the express written consent of Licensor.
3. **Ownership:** Licensee acknowledges Licensor’s ownership of the Marks, and agrees that its use of the Marks shall enure to Licensor’s benefit.
4. **Licensee Covenants:** Licensee acknowledges that Licensor is the owner of all rights in the Marks, and, except as otherwise expressly permitted by this Agreement, Licensee shall not at any time do or suffer to be done any act or thing that will in any way impair the rights of Licensor in and to the Marks. Nothing in this Agreement grants, nor shall Licensee acquire, any right, title or interest in or to the Marks or any goodwill associated with the Marks, other than those rights expressly granted hereunder. Licensee shall affix to all materials that contain or bear one or more

of the Marks such legends and notices as Licensor may reasonably require. At Licensor's request, Licensee shall publish a public notice in the following form, or in any other form prescribed by Licensor from time to time, in appropriate publications addressed to the general public: "[MARK] is a trade-mark owned by [LICENSOR] used under licence by [LICENSEE]". Licensee undertakes to comply with all relevant laws and regulations pertaining to trade-marks and marking requirements. Licensee shall execute all documents and provide all assistance reasonably required by Licensor to apply for, obtain and maintain registrations for the Marks, and to enforce rights in, and defend any proceedings brought against applications or registrations for, the Marks.

5. **Restrictions On Use:** Notwithstanding anything contained in this Agreement or otherwise, Licensee shall use the Marks only in accordance with the design, description and/or appearance of the Marks as shown on Exhibit A. Licensee may not change or modify the Marks nor join the mark with any other words or designs. Licensee agrees to abide by any reasonable guidelines provided by Licensor from time to time in connection with the use of the Marks.
6. **Quality Standards and Control:** Licensee agrees that use of the Marks by Licensee in association with any products or services (the "**Products**" and "**Services**") will meet or surpass the standards set by Licensor and conveyed to Licensee from time to time for the character and quality of such Products and Services.
7. **Inspection:** At the request of the Licensor, the Licensee shall provide to Licensor for Licensor's review, comment and approval samples of the any Products and sample copies of materials associated with the Products or Services or used to advertise/promote the Products or Services.
8. **Breach of Licence:** Licensor may notify the Licensee if it objects to any proposed or actual use of the Marks if in Licensor's sole judgment (acting reasonably) Licensor believes that the Marks is being used or proposed to be used in a manner that erodes the goodwill associated with the Marks or otherwise reduces the value of the Marks. If Licensee is so notified, the Parties shall attempt to settle any dispute and Licensee shall, if directed by Licensor to do so, cease using or cease from using the Marks until the time such dispute has been settled between the Parties or otherwise finally determined.
9. **Infringement:** Licensee shall promptly notify Licensor upon becoming aware of any infringement or dilution of the Marks and shall cooperate fully with Licensor to stop such infringement or dilution. Licensor, in its sole discretion, will take any action that it deems necessary to protect the validity of the Marks, and Licensee hereby waives any rights that it may have pursuant to Section 50(3) of the *Trade-marks Act*.
10. **Indemnification:** Licensor does not assume any liability to Licensee, or third parties, for Licensee's goods or services, including the Products and Services, and Licensee shall defend, indemnify and hold harmless Licensor and its affiliates, successors and assigns, and their respective officers, directors, employees, agents, lawyers and representatives from and against any and all claims, causes of action, suits, damages, losses, liabilities, costs and expenses (including, but not limited to, reasonable lawyer fees and expenses), which may be sustained or suffered as a result of any such third party claims or arising from a breach of this Agreement by Licensee including, without limitation, any act or omission, which causes or is alleged to cause harm or a violation of any of the rights of any third party.

11. **Breach/Use Outside Limited Purpose:** In the event that Licensee breaches any of the terms of this Agreement, including use of the Marks outside the Limited Purpose or Territory as determined by Licensor in its sole discretion, but acting reasonably, Licensor shall have the option to terminate this Agreement immediately, and if so terminated, all subsequent use by Licensee will be unauthorized and subject to legal action. Upon the termination of this Agreement for any reason, all rights in the Marks granted to Licensee hereunder shall automatically revert to Licensor, Licensee shall have no further rights in the Marks, and Licensee shall immediately change its use of the Marks to uses that do not consist of or include the Marks or any words similar to the Marks. In the event of an unauthorized use of the Marks by Licensee, Licensee consents to the immediate entry of a court injunction preventing Licensee's further use of the Marks.
12. **Termination:** This licence granted to Licensee will terminate upon the expiry or termination of Licensee's services and other obligations under the Project Agreement.
13. **No Agency:** The Parties hereto are independent contractors with respect to each other, and nothing herein shall create any association, partnership, joint venture or agency relationship between them.
14. **Assignment:** Licensee may not convey, sublicense, assign, transfer, pledge, hypothecate, encumber or otherwise dispose of this Agreement without the prior written consent of Licensor, which consent may be unreasonably withheld.
15. **Headings:** The headings contained in this Agreement are for purposes of convenience only and shall not affect the meaning or interpretation of this Agreement.
16. **Notices:** All notices, requests, demands and other communications made in connection with this Agreement shall be made in the manner set out in the Project Agreement.
17. **Entire Agreement:** This Agreement constitutes the entire agreement between Licensor and Licensee with respect to the subject matter hereof and supersedes all prior agreements and understandings, whether oral, written, express or implied, between Licensor and Licensee.
18. **No Waiver:**
 - (a) No waiver made or given by a Party under or in connection with this Agreement shall be binding or effective unless the waiver is in writing, signed by an authorized representative of the Party giving such waiver, and delivered by such Party to the other Party. No waiver made with respect to any right, power or remedy in one instance will be deemed to be a waiver with respect to any other instance involving the exercise of such right, power, or remedy or with respect to any other right, power, or remedy.
 - (b) Failure by either Party to exercise any of its rights, powers or remedies hereunder or its delay to do so shall not constitute a waiver of those rights, powers or remedies. The single or partial exercise of a right, power or remedy shall not prevent its subsequent exercise or the exercise of any other right, power or remedy.
19. **Successors:** This Agreement shall be binding upon and shall enure to the benefit of the Parties and their respective successors and permitted assigns.

20. **Severability:** Each provision of this Agreement shall be valid and enforceable to the fullest extent permitted by law. If any provision of this Agreement is declared invalid, unenforceable or illegal by the courts of a competent jurisdiction, such provision may be severed and such invalidity, unenforceability or illegality shall not prejudice or affect the validity, enforceability and legality of the remaining provisions of this Agreement. If any such provision of this Agreement is invalid, unenforceable or illegal, the Parties shall, acting in good faith, promptly negotiate new provisions to eliminate such invalidity, unenforceability or illegality and to restore this Agreement as near as possible to its original intent and effect.
21. **Governing Law:** This Agreement shall be governed by and construed in accordance with the laws of the Province of Ontario and the laws of Canada applicable therein and shall be treated in all respects as an Ontario contract, without regard to conflict of laws principles. Each of the Parties attorn to the jurisdiction of the courts of the Province of Ontario and all courts competent to hear appeals therefrom.
22. **Counterparts:** The Project Agreement may be executed in one or more counterparts. Any single counterpart or a set of counterparts executed, in either case, by all the Parties shall constitute a full, original and binding agreement for all purposes. Counterparts may be executed either in original or faxed form provided that any Party providing its signature in faxed form shall promptly forward to the other Party an original signed copy of the Project Agreement which was so faxed.

[Remainder of page intentionally blank – Next page is the signature page.]

IN WITNESS WHEREOF, the Parties have signed this Agreement effective as of the date set forth above.

THE CITY OF OTTAWA

Per:

Name:

Title:

I/We have authority to bind the corporation.

[LICENSOR]

Per:

Name:

Title:

Per:

Name:

Title:

I/We have authority to bind the corporation.

EXHIBIT A

Trade-marks

[Note to Proponents: To be completed once trade-marks identified.]

SCHEDULE 25

INSURANCE AND PERFORMANCE SECURITY REQUIREMENTS

1. WORKS PHASE INSURANCE COVERAGE

1.1 Subject to Section 6, from and after execution of this Project Agreement and until the later of the (i) East Substantial Completion Date, or (ii) West Substantial Completion Date, DB Co shall, at its own expense, obtain and maintain, or cause to be obtained and maintained, exclusively through the City of Ottawa Construction Insurance Program (“COCIP”) the following insurances as further described in Appendix A to this Schedule 25:

- (a) “All Risks” Course of Construction Property, including Boiler and Machinery;
- (b) “Wrap-Up” Commercial General Liability and Non-Owned Automobile Liability;
- (c) Project Specific Professional Liability; and
- (d) Project Specific Pollution Liability (combined Contractors’ Pollution Liability and Pollution Legal Liability).

1.2 Subject to Section 6, from and after execution of this Project Agreement and until the later of the (i) East Substantial Completion Date, or (ii) West Substantial Completion Date, DB Co shall, at its own expense, obtain and maintain, or cause to be obtained and maintained, the following insurances as further described in Appendix A to this Schedule 25:

- (a) Automobile Liability;
- (b) Commercial General Liability and Non-Owned Automobile Liability (to be maintained by the Construction Contractor and each of the Subcontractors involved in the Works) with respect to off-site operations and activities;
- (c) Aircraft and Watercraft Liability (if any exposure);
- (d) “All Risks” Marine Cargo (if any exposure);
- (e) “All Risks” Contractors’ Equipment;
- (f) Comprehensive Crime; and
- (g) WSIB.

2. NO LIMIT ON RECOVERY

2.1 Notwithstanding any other provision of this Project Agreement, it is hereby agreed that the limits of liability specified in this Schedule 25 for insurance policies, whether such policies are required to be obtained by the City or by DB Co, shall in no way limit DB Co’s liability or obligations to the City or the City’s liability or obligations to DB Co, as applicable.

3. ADDITIONAL COVER

- 3.1 Without prejudice to the other provisions of this Schedule 25, the City and DB Co shall, at all relevant times and at their own expense, obtain and maintain those insurances which they are required to obtain and maintain by Applicable Law, or that they consider necessary.
- 3.2 The City reserves the right to require DB Co to purchase such additional insurance coverage as the City may reasonably require. The City also reserves the right to request such higher or lower limits of insurance or otherwise alter the types of coverage requirements, their minimum amounts and deductibles (taking into consideration such matters as the nature of the Works, contract value, industry standards and availability of insurance) as the City may reasonably require from time to time. Any additional costs of such additional and/or amended insurance shall be borne by the City and any cost savings resulting from the implementation of such additional and/or amended insurance shall be for the account of the City.

4. RESPONSIBILITY FOR DEDUCTIBLES

- 4.1 The Party responsible for the matter giving rise to a claim, to the extent responsible therefor, shall be responsible and liable for the payment of deductibles under any policy of insurance under which it is an insured party or under any policy of insurance DB Co is required to maintain under this Schedule 25. In the event that responsibility for the matter giving rise to the claim is indeterminable, the First Named Insured under the policy of insurance is responsible and liable for the payment of deductibles.

5. COOPERATION WITH INSURER'S CONSULTANT

- 5.1 If an insurer or an insurer's appointed consultant, for underwriting purposes or as a term of an insurance policy, needs to review any part of the performance of this Project Agreement, then the City and DB Co shall, and shall require the City Parties and the DB Co Parties, respectively, to:
- (a) cooperate with the insurer and its consultant, including providing them with such information and documentation as they may reasonably require; and
 - (b) allow the insurer and its consultant to attend meetings between DB Co and the City (or, as applicable, and if reasonably required by the insurer, between DB Co and those engaged by or through DB Co).

6. UNINSURABLE RISKS

- 6.1 The term "Uninsurable Risk" means a risk, or any component of a risk, against which DB Co is required to insure pursuant to this Schedule 25 and for which, at any time after the date of this Project Agreement, either:
- (a) the insurance required pursuant to this Schedule 25 (including the terms and conditions specified for such insurance herein) is not available in relation to that risk from insurers licensed in the Province of Ontario; or
 - (b) the insurance premium payable or the terms and conditions for insuring that risk are such that the risk is not generally being insured against in the Canadian insurance market.

DB Co has the onus of demonstrating, to the City's reasonable satisfaction that the foregoing definition applies to a particular risk.

- 6.2 DB Co shall notify the City as soon as possible and, in any event, within 15 Business Days of becoming aware of same, that a risk, or any component of a risk, has become an Uninsurable Risk, and shall provide the City with all relevant details in relation to such risk, including a copy of the relevant insurance policy.
- 6.3 DB Co and the City shall, as soon as possible following the provision of the notice referred to in Section 6.2, meet to discuss, in good faith, the appropriate means by which the Uninsurable Risk should be managed and, if DB Co and the City are able to agree to alternative arrangements, the Uninsurable Risk shall be managed in accordance with such alternative arrangements.
- 6.4 In the event that DB Co and the City, each acting in good faith, are unable to agree to alternative arrangements with respect to the management of an Uninsurable Risk within 15 Business Days of the expiry of the period referred to in Section 6.2, the City may, in its absolute discretion, either:
- (a) elect to assume responsibility for the Uninsurable Risk and, in respect of the year in which the relevant risk becomes an Uninsurable Risk and every year thereafter, withhold, in equal installments over the course of such year, from the payment or payments otherwise due to DB Co an amount equal to the annual premium (index linked) relating to the Uninsurable Risk as was current on the date immediately prior to the date on which the relevant risk became an Uninsurable Risk, in which case this Project Agreement shall continue in full force and effect; or
 - (b) terminate this Project Agreement in accordance with Section 38 of the Project Agreement as if such termination had occurred as a result of the Parties having failed to reach agreement in accordance with Section 38 of the Project Agreement following the occurrence of an event of Force Majeure, and, in accordance with the provisions of Schedule 23 – Compensation on Termination, pay to DB Co an amount equal to the Non-Default Termination Sum.
- 6.5 On the occurrence of an Uninsurable Risk, the City may, in its absolute discretion, either:
- (a) pay to DB Co an amount equal to the insurance proceeds that would have been payable to DB Co in connection with such Uninsurable Risk had the relevant insurance continued to be available, in which case this Project Agreement shall continue in full force and effect; or
 - (b) terminate this Project Agreement in accordance with Section 38 of the Project Agreement as if such termination had occurred as a result of the Parties having failed to reach agreement in accordance with Section 38 of the Project Agreement following the occurrence of an event of Force Majeure, and, in accordance with the provisions of Schedule 23 – Compensation on Termination, pay to DB Co an amount equal to the Non-Default Termination Sum.
- 6.6 With respect to any Uninsurable Risk:
- (a) DB Co shall continue to approach the insurance market on a regular basis and, in any event, at intervals of not less than 180 days and use reasonable efforts to

obtain insurance to cover as much or all of the Uninsurable Risk as can be insured in the available insurance market from time to time; and

- (b) Subject to Section 6.6(a), DB Co shall be relieved of its obligation to maintain insurance in respect of the Uninsurable Risk.

6.7 Where a risk which was previously an Uninsurable Risk ceases to be so, DB Co shall, at its own expense, obtain and maintain insurance in accordance with the requirements of this Schedule 25 in respect of the risk and the provisions of this Section 6 shall no longer apply to such risk.

7. TOTAL OR SUBSTANTIAL DESTRUCTION

7.1 In the event of damage to, or destruction of, all or substantially all of the Project for which there is coverage under an insurance policy, any insurance proceeds received by DB Co shall first be applied so as to ensure the performance by DB Co of its obligations under this Project Agreement, including, where appropriate, the reinstatement, restoration or replacement of the Project or any other assets, materials or goods necessary or desirable for the carrying out of the Works, all in accordance with the terms of the Insurance Trust Agreement.

8. SUBCONTRACTORS

8.1 DB Co shall require that all Subcontractors are covered by, or obtain, the insurance described in this Schedule 25, provided that DB Co shall determine the applicable limits to be obtained for such insurance. DB Co shall be solely responsible and liable for any damages which the City may suffer as a direct result of DB Co's failure to comply with the foregoing.

8.2 If DB Co receives notice that any Subcontractor employed by or through DB Co is not covered by any insurance required by this Schedule 25 to be obtained by DB Co, DB Co shall:

- (a) ensure that such insurance coverage is put in place;
- (b) remove the Subcontractor from the Site and ensure that such Subcontractor does not perform any further part of the Works until after such insurance coverage is put in place; or
- (c) if the Subcontractor cannot be covered by a particular policy as required by this Schedule 25, replace the Subcontractor with a new Subcontractor who can obtain the required insurance coverage; it being acknowledged by DB Co that the requirements and restrictions set forth in the Project Agreement regarding new and replaced Subcontractors shall be complied with.

9. RENEWAL

9.1 DB Co shall provide to the City, at least 5 Business Days prior to the expiry date of any policy of insurance required to be obtained by DB Co pursuant to this Schedule 25, evidence of the renewal of each such policy satisfactory to the City, acting reasonably.

10. NAMED AND ADDITIONAL INSURED AND WAIVER OF SUBROGATION

10.1 All insurance provided by DB Co, shall:

- (a) include DB Co, the City and Lenders as Named Insureds to the extent specified in Appendix A of this Schedule 25;
- (b) include the City, MOI, MTO, Province, Railway Company, RTG, Utility Company and Lenders as Additional Insureds, or loss payees with the Lenders' Agent as loss payee and as an Additional Insured, as their interests may appear, to the extent of their respective insurable interests to the extent specified in Appendix A of this Schedule 25;
- (c) except with respect to the Automobile Liability, Comprehensive Crime and WSIB specified in Appendix A to this Schedule 25, contain a waiver of subrogation as against the City and their respective shareholders, officials, directors, officers, employees, servants, consultants (other than Design Consultants) and agents;
- (d) contain a breach of warranty provision whereby a breach of a condition by DB Co will not eliminate or reduce coverage for any other insured; and
- (e) be primary insurance with respect to any similar coverage provided by any insurance obtained by or available to the City or Lenders, without any right of contribution of any insurance carried by the City or Lenders.

11. CERTIFICATES OF INSURANCE AND CERTIFIED COPIES OF POLICIES

- 11.1 Prior to the execution of the Project Agreement, DB Co will provide the City with certified copies of policies, confirming that the insurances specified in Section 1.1 have been obtained and are in full force and effect.
- 11.2 Prior to the execution of the Project Agreement, DB Co will provide the City with certificates of insurance or certified copies of policies, confirming that the insurances specified in Section 1.2 have been obtained and are in full force and effect. If certificates of insurance are provided, certified copies of the entire contents, exclusive of those contents that are not relevant to the Project, of all relevant insurance policies will be subsequently provided to the City no later than 90 days after execution of this Project Agreement.

12. FAILURE TO MEET INSURANCE REQUIREMENTS

- 12.1 If DB Co fails to obtain or maintain the insurance required by this Schedule 25, fails to furnish to the City a certified copy of each policy required to be obtained by this Schedule 25 or if, after furnishing such certified copy, the policy lapses, is cancelled, or is materially altered, then the City shall have the right, without obligation to do so, to obtain and maintain such insurance itself in the name of DB Co, and the cost thereof shall either, at the City's option, be payable by DB Co to the City on demand or be deducted by the City from the next payment or payments otherwise due to DB Co.
- 12.2 If coverage under any insurance policy required to be obtained by DB Co should lapse, be terminated or be cancelled, then, if directed by the City, all work by DB Co shall immediately cease until satisfactory evidence of renewal is produced.

13. MODIFICATION OR CANCELLATION OF POLICIES

- 13.1 Except as noted in Appendix A to this Schedule 25, all insurance provided by DB Co shall contain endorsements confirming that the policy will not be cancelled, adversely

reduced, adversely materially altered or adversely materially amended without the insurer(s) giving at least ninety (90) days prior written notice by registered mail, at the address specified, to the City and the Lenders' Agent. For greater certainty, the terms "adversely reduced", "adversely materially altered" and "adversely materially amended" as used in this provision shall mean any decrease or reduction in policy limits, aggregate limits or sub-limits (other than as a result of claims under the policy), any increase in any policy deductible or self-insured retention, any reduction in the policy coverage period, cancellation or suspension of coverage with respect to any insured parties from the time, the policy was issued for that policy period, addition of any exclusions or restrictions from the time the policy was issued for that policy period and any reduction or restriction in the scope of coverage provided under the policy, in all cases when such adverse reduction, adverse material alteration or adverse material amendment is initiated by the insurer.

- 13.2 All insurance provided by DB Co shall contain endorsements confirming that, in the event of cancellation for non-payment of premium, the insurer(s) will give at least fifteen (15) days prior written notice by registered mail, at the address specified, to the City and the Lenders' Agent.
- 13.3 With respect to insurances described in Section 1.1 (a), (b) and (c) and Section 1.2 (d), breach of any of the terms or conditions of the policies required to be provided by DB Co, or any negligence or wilful act or omission or false representation by an Insured under these policies, shall not invalidate the insurance with respect to the City, the Lenders or any other Insured, but only to the extent that such breach is not known to these parties.

14. INSURERS

- 14.1 All policies of insurance to be obtained by DB Co in accordance with this Schedule 25 shall be issued by financially sound Insurers acceptable to the City and Lenders, acting reasonably, and, where required by statute, be licensed to insure such risk in the Province of Ontario.
- 14.2 To be eligible to provide insurance, an Insurer must have the capacity to provide the particular insurance and shall have current ratings from time to time of either:
- (a) a Financial Strength Rating of not lower than "A-" for three out of the previous five years but not lower than "B" at any time during those five years, and a Financial Size Category not lower than VII, such ratings being those established by A.M. Best Company (**Best**); or
 - (b) a Long-Term Financial strength Rating of not lower than "A-" for three out of the past five years but not less than "BBB" at any time during those five years, a Short-Term Financial Strength Rating of not lower than "A-3" for three out of the previous five years and a Financial Enhancement Rating of not lower than "A-" for three out of the previous five years but not less than "BB+" at any time during those five years, such ratings being those established by Standard and Poor's (**S&P**); or
 - (c) if the Insurer is not rated by Best or S&P, an Insurer that is acceptable to the City and Lenders, acting reasonably, with respect to the insurances required by this Schedule 25.

15. POLICY TERMS AND CONDITIONS

- 15.1 All policies of insurance to be obtained by DB Co in accordance with this Schedule 25 shall be in form and substance satisfactory to the City, its insurance advisors and Lenders, acting reasonably.
- 15.2 To achieve the minimum limits for any type of insurance required under Appendix A, it is permissible to arrange the insurance under a single policy, or by a combination of primary, umbrella and/or excess policies.

16. FAILURE TO COMPLY

- 16.1 Neither failure to comply nor full compliance by DB Co with the insurance provisions of this Schedule 25 shall relieve DB Co of its liabilities and obligations under this Project Agreement.

17. PERFORMANCE SECURITY REQUIREMENTS

[REDACTED]

18. INSURANCE TRUST AGREEMENT

- 18.1 All losses under the “All Risks” Course of Construction Property Insurance policy, including Boiler & Machinery Insurance carried by DB Co prior to the later of (i) East Substantial Completion, or (ii) West Substantial Completion, which, in each case, relate to equipment purchased by the City, shall be payable solely to the City and shall not be payable to the Account Trustee or distributed pursuant to the Insurance Trust Agreement.

APPENDIX A TO SCHEDULE 25

INSURANCE REQUIREMENTS

Works Phase Insurance – Confederation Line Extension

From execution of the Project Agreement until each Substantial Completion Date, as applicable (Insurance for Works Phase)

Insurances to be provided, or caused to be provided, by DB Co and arranged through the COCIP program

| Type | Amount | Maximum Deductible | Principal Cover | Estimated Premium |
|---|--|--|--|-------------------|
| “All Risks” Course of Construction Property Including Boiler and Machinery | <p>\$[REDACTED], including Property of Every Description and all other property and equipment supplied by the City or the City Parties for incorporation into the Project.</p> <p>Soft Costs \$[REDACTED] (representing [REDACTED]% of Recurring / Continuing Soft Costs)</p> <p>Extra and Expediting Expense (minimum \$[REDACTED] sub-limit)</p> <p>Principal Extensions:</p> <ul style="list-style-type: none"> • Replacement Cost Valuation (Property) • Most Recent Technology Replacement Cost Valuation (Equipment or Machinery) • Flood (to policy limit with annual aggregate) • Natural or man-made earth movement, including earthquake, landslide or | <p>[REDACTED]% of loss value / \$[REDACTED] minimum Earthquake</p> <p>\$[REDACTED] Contractors’ Equipment (Equipment used in Tunnelling – subject to Insurer approvals)</p> <p>\$[REDACTED] Flood/Water Damage</p> <p>\$[REDACTED] Underground Losses</p> <p>\$[REDACTED] Testing and Commissioning</p> <p>\$[REDACTED] All other losses</p> | <p>“All Risks” Course of Construction Property Insurance covering the full insurable replacement cost of the Works including cold and hot testing / commissioning, of Boiler & Machinery equipment, including HVAC, Delay in Start-Up, Soft Costs, with no early occupancy restriction.</p> <p>This coverage shall be primary with respect to the Project without right of contribution of any insurance carried by the City or the Lenders.</p> | TBD |

| Type | Amount | Maximum Deductible | Principal Cover | Estimated Premium |
|------|---|--|-----------------|-------------------|
| | <ul style="list-style-type: none"> subsidence (to policy limit with annual aggregate) Electronic Data Processing equipment and media, including data restoration and re-creation costs Transit Unnamed locations Bylaws (with respect to Existing or Renovated Buildings) (minimum \$[REDACTED] sub-limit) Debris Removal (minimum \$[REDACTED] sub-limit) Off Premises Services (\$[REDACTED] sub-limit) Professional Fees (minimum \$[REDACTED] sub-limit) Fire Fighting Expenses (minimum \$[REDACTED] sub-limit) Valuable Papers (minimum \$[REDACTED] sub-limit) Accounts Receivable (minimum \$[REDACTED] sub-limit) Green Building and/or LEED Upgrades (minimum \$[REDACTED] sub-limit) Defence Costs (\$[REDACTED] sub-limit) Radioactive contamination caused by sudden and accidental release of radioactive isotopes (resulting from an | <ul style="list-style-type: none"> 48 hour waiting period applicable to Off Premises Services Service Interruption | | |

| Type | Amount | Maximum Deductible | Principal Cover | Estimated Premium |
|------|---|--------------------|-----------------|-------------------|
| | <p>accident to measuring, testing or medical equipment and subject to a \$[REDACTED] sub-limit)</p> <ul style="list-style-type: none"> • Contamination Clean-up or Removal (minimum \$[REDACTED] sub-limit) • Ammonia Contamination (minimum \$[REDACTED] sub-limit) • LEED Recertification, Commissioning, Testing Expenses (minimum \$[REDACTED] sub-limit) • Civil Authority Access Interruption (8 weeks) • Prevention of Ingress/Egress (8 weeks) • Permission for Partial Occupancy prior to Substantial Completion • Cost of Project Financing (12 Months), included in Soft Costs coverage • Margin of Profit Extension for Contractors • Testing and Commissioning (120 day limitation each component) <p>Permitted Exclusions:</p> <ul style="list-style-type: none"> • Cyber risk • Mould, fungi and fungal derivatives • Faulty workmanship, materials construction, or design but resultant damage to be insured to a minimum LEG 2 standard | | | |

| Type | Amount | Maximum Deductible | Principal Cover | Estimated Premium |
|------|--|--------------------|-----------------|-------------------|
| | <ul style="list-style-type: none"> • War risk • Terrorism • Nuclear or radioactive contamination, except re radioactive isotopes intended for scientific, medical, industrial or commercial use • Contractors' equipment (unless values are declared and risk accepted by Insurers – Contractors' Equipment Endorsement noted) • Sanctions Clause • Munich Re 101 Endorsement • Munich Re 121 Endorsement | | | |

Comments

- Named Insured includes DB Co, Lenders, Lenders' Agent, the Construction Contractor, subcontractors, sub-subcontractors, consultants, sub-consultants, and the City, as their respective interests may appear
- No provision permitted allowing a coinsurance penalty
- Insurance shall be primary without right of contribution of any other insurance carried by any Named Insured
- Additional key extensions of coverage:
 - Underground services, temporary works involved in the Project such as scaffolding, hoarding, etc., site preparation, including excavation and associated improvements, landscaping and property of others used in the Project
 - Losses payable in accordance with the Insurance Trust Agreement
 - Waiver of subrogation against all Named and Unnamed Insureds, including but not limited to DB Co, the City, Province, MTO, MOI, the Construction Contractor, subcontractors, professional consultants (other than for their professional liability), Lenders, Lenders' Agent, as well as officers, directors and employees, servants, and agents of the foregoing

| Type | Amount | Maximum Deductible | Principal Cover | Estimated Premium |
|------|---|--------------------|-----------------|-------------------|
| – | Frost or freezing to concrete – but only resultant damage from a peril not otherwise excluded | | | |
| – | Liberalization Clause | | | |
| – | Errors and Omissions | | | |
| – | Breach of Conditions | | | |
| – | Interims Payments Clause | | | |

Underwriters Principal underwriters in compliance with Clause 14 of this Schedule 25.

Works Phase Insurance – Confederation Line Extension

From execution of the Project Agreement until each Substantial Completion Date, as applicable (Insurance for Works Phase)

Insurances to be provided, or caused to be provided, by DB Co and arranged through the COCIP program

| Type | Amount | Maximum Deductible(s) | Principal Cover | Estimated Premium |
|--|--|---|--|-------------------|
| “Wrap-Up” Commercial General Liability and Non-Owned Automobile Liability | <p> \$[REDACTED] each occurrence, and in the annual aggregate with respect to Broad Form Products and Completed Operations Sub-limits: <ul style="list-style-type: none"> • \$[REDACTED] Non-Owned Automobile Liability • \$[REDACTED] Sudden and Accidental Pollution and Hostile Fire Pollution Liability • \$[REDACTED] “All Risks” Tenants' Legal Liability • \$[REDACTED] Prairie or Forest Fire Fighting Expenses • \$[REDACTED] Employee Benefits Administrative Errors and Omissions • \$[REDACTED] Contractors Rework • \$[REDACTED] Unmanned Aerial Vehicles • \$[REDACTED] Legal Liability for Damages To Non-owned Automobiles (SEF 94) • \$[REDACTED] / \$[REDACTED] </p> | <p> \$[REDACTED] per occurrence \$[REDACTED] per claim with respect to Contractors Rework \$[REDACTED] per claim with respect to each SEF 94, Tenants' Legal Liability, Employee Benefits Administrative Errors and Omissions and Prairie or Forest Fire Fighting Expenses </p> | <p> “Wrap-Up” Commercial General Liability and Non-Owned Automobile Liability insurance covering all construction operations on an occurrence basis against claims for Bodily Injury (including Death), Personal Injury, Property Damage (including Loss of Use), and including Products and Completed Operations Liability extension for a period of not less than 24 months, effective from the East Substantial Completion Date, and West Substantial Completion Date, as applicable. Sudden and Accidental Pollution and Hostile Fire Pollution coverage to be not less than IBC 2313 form (240 hours detection/240 hours notice coverage structure). This coverage shall be primary with respect to the Project without right of contribution of any insurance </p> | |

| Type | Amount | Maximum Deductible(s) | Principal Cover | Estimated Premium |
|------|---|-----------------------|---|-------------------|
| | Medical Payments | | carried by the City, MTO, MOI or the Lenders. | |
| | Principal Extensions: | | | |
| | <ul style="list-style-type: none"> • Owner's and Contractor's Protective • Blanket Contractual (written and oral) • Direct and Contingent Employers Liability • Employee Benefits Administrative Errors and Omissions • Personal Injury (nil participation) • Cross Liability and Severability of Interest with respect to each insured party • Blasting / demolition / excavating / underpinning / pile driving / shoring / caisson work / work below ground surface / tunneling / grading and similar operations associated with the Project, as applicable • Elevator and Hoist Collision Liability • Liberalized Notice of Claim Requirement, i.e., requirement to report will commence when knowledge is held by a designated project person(s) – to be identified by DB Co • Non-Owned Automobile Liability • Tenants' Legal Liability (All Risks) – subject to sub-limit • Medical Expenses – subject to sub-limit | | | |

| Type | Amount | Maximum Deductible(s) | Principal Cover | Estimated Premium |
|------|--|-----------------------|-----------------|-------------------|
| | <ul style="list-style-type: none"> Prairie or Forest Fire Fighting Expenses – subject to sub-limit Sudden and Accidental Pollution and Hostile Fire Pollution – subject to sub-limit Permission for Unlicensed Vehicles (partial road use) Unlicensed Equipment Loss of Use Without Property Damage Loading and Unloading of Automobiles Broad Form Property Damage Broad Form Completed Operations Intentional Injury, committed to Protect Persons or Property Accident Benefits Worldwide Territory, subject to suits being brought in Canada or the US Use of Drones | | | |
| | Permitted Exclusions: | | | |
| | <ul style="list-style-type: none"> Injury to employees, where WSIB provides valid coverage Property in the care, custody or control of the insured, except as provided under Broad Form Products and Completed Operations Operation of licensed motor vehicles, other than attached machinery while | | | |

| Type | Amount | Maximum Deductible(s) | Principal Cover | Estimated Premium |
|------|--|-----------------------|-----------------|-------------------|
| | <ul style="list-style-type: none"> used for its purpose, at the Project Site Physical damage to the Project, except during Broad Form Products and Completed Operations extension period Cyber risk Mould, fungi and fungal derivatives Professional liability of engineers, architects, and other professional consultants Nuclear or radioactive contamination, except release radioactive isotopes intended for scientific, medical, industrial or commercial use Sanctions Clause | | | |

Comments

- Named Insured includes DB Co and its Affiliates, the City, the Lenders, DB Co Parties involved in the Works, including the Construction Contractor, all subcontractors, sub-subcontractors, suppliers while working on Site, tradesmen while working on Site, engineers, architects, consultants and sub-consultants, (other than for professional liability), others as Additional Insureds, as may be required from time to time, arising from all operations and activities pertaining to the Works and the control and use of the Site
- Directors, officers, shareholders, employees of the insured parties involved in the Works covered as Additional Insureds
- Province, MTO, MOI, Railway Company, RTG, Utility Company as Additional Insureds
- Insurance shall be primary without right of contribution of any other insurance carried by any Named Insured
- Aggregate limits will be permitted for Products and Completed Operations, Prairie and Forest Fire Fighting Expenses, Sudden and Accidental Pollution and Hostile Fire Pollution and Employee Benefits Administrative Errors & Omissions Liability; no policy general aggregate will be permitted
- Professional service activities integral to the project, but not covering engineers, architects or other professional consultants, i.e., incidental

| Type | Amount | Maximum Deductible(s) | Principal Cover | Estimated Premium |
|---|--------|-----------------------|-----------------|-------------------|
| <p>professional liability risk of a Named Insured and their employed professionals is to be covered, but not the professional liability of independent fee-for-service professional consultants, architects or engineers</p> <ul style="list-style-type: none"> • Waiver of subrogation of insurers' rights of recovery, against all Named and/or Additional Insureds, including DB Co, the City, Province, MTO, MOI, Railway Company, RTG Utility Company, the Construction Contractor, subcontractors, sub-subcontractors, professional consultants, engineers, architects (other than for their professional liability), Lenders, Lenders' Agent, as well as officers, directors, employees, servants and agents of the foregoing | | | | |

Underwriters Principal underwriters in compliance with Clause 14 of this Schedule 25.

Works Phase Insurance – Confederation Line Extension

From execution of the Project Agreement until each Substantial Completion Date, as applicable (Insurance for Works Phase)

Insurances to be provided, or caused to be provided, by DB Co and arranged through the COCIP program

| Type | Amount | Maximum Self Insured Retention | Principal Cover | Estimated Premium |
|--|--|--|--|-------------------|
| Project Specific Professional Liability | <p>[\$[REDACTED]] minimum per claim / [\$[REDACTED]] in the aggregate (inclusive of defense and related costs and supplementary payments).</p> <p>Principal Extensions:</p> <ul style="list-style-type: none"> • Primary insurance extension • Mitigation extension • Automatic addition of firms • Present, former partner, executive officer, director or shareholder of Named Insureds while acting within their scope of duties for the Named Insured • Any individuals or personal corporations retained by the Named Insured under a personal services contract • Claim defined as a written or oral demand for money or a written or oral allegation in breach in the rendering or failure to render professional services received by the Insured or Named | <p>[\$[REDACTED]] per claim, with respect to mitigation losses</p> <p>[\$[REDACTED]] per claim, all other losses</p> | <p>Project Specific Professional Liability Insurance in connection with the design and construction of the Project from beginning of first design, through the entire construction period plus coverage for an extended reporting period of not less than 36 months effective the East Substantial Completion Date and West Substantial Completion Date, as applicable.</p> <p>This coverage shall be primary with respect to the Project without right of contribution of any insurance carried by the City, MTO, MOI or the Lenders.</p> | |

| Type | Amount | Maximum Self Insured Retention | Principal Cover | Estimated Premium |
|------|---|-----------------------------------|-----------------|----------------------|
| | <p>Insured and resulting from a single error, omission or negligent act</p> <ul style="list-style-type: none"> • Lawyer fees and associated expenses incurred in the investigation, defence, settlement, arbitration or litigation of claims • Duty to defend, even if the allegations are groundless, false or fraudulent • Worldwide Territory, subject to suits brought in Canada <p>Permitted Exclusions:</p> <ul style="list-style-type: none"> • Express warranties or guarantees • Estimates on profit, return • Faulty workmanship, construction or work which is alleged or in fact not constructed in accordance with the design of the Project or the construction documents • Design or manufacture of any good or products sold or supplied by the Named Insured • Terrorism • Nuclear Liability • Judgments and awards deemed uninsurable by law • Liability assumed under design contract, unless such liability would have attached to the Named Insured by law in | | | |

| Type | Amount | Maximum Self Insured Retention | Principal Cover | Estimated Premium |
|------|--------|-----------------------------------|-----------------|----------------------|
|------|--------|-----------------------------------|-----------------|----------------------|

- the absence of such agreement
- Punitive or exemplary damages, fines, penalties or interest or liquidated punitive or exemplary damages or fees
- Refusal to employ, termination of employment, humiliation or discrimination on any basis or other employment related practices or policies
- Sanctions Clause

Comments

- Named Insured: DB Co (as applicable), all engineers, architects, and other professional consultants that provide professional design services in connection with the Project
- Professional Services covered: All architectural, engineering, land surveying, environmental, landscape architectural, interior design/space planning, soil and material testing services, geotechnical services, and procurement services, including their replacements and/or sub-consultants of any tier
- Retroactive Date: Full retroactive coverage from date of first design activity
- Policy to be non-cancellable except for premium non-payment, material misrepresentation or concealment of facts, or a material breach of any condition of the policy

Underwriters Principal underwriters in compliance with Clause 16 of this Schedule 25.

Works Phase Insurance – Confederation Line Extension

From execution of the Project Agreement until each Substantial Completion Date, as applicable (Insurance for Works Phase)

Insurances to be provided, or caused to be provided, by DB Co and arranged through the COCIP program

| Type | Amount | Maximum Deductible(s) | Principal Cover | Estimated Premium |
|--|--|---|--|-------------------|
| Project Specific Pollution Liability (combined Contractors' Pollution Liability and Pollution Legal Liability): | <p> \$[REDACTED] per claim and in the aggregate for all claims, inclusive of defense and all costs and expenses </p> <p>Principal Extensions:</p> <ul style="list-style-type: none"> Hazardous Substances occurring at or emanating from the Project during the Policy period Microbial Matter (including Fungus/Mould) Underground/above-ground storage tanks First Party Restoration and Clean-up Costs Disposal Site Extension, including Transportation (reporting required) Duty to Defend Canada and US Territory Contractual Liability Emergency Response Costs <p>Permitted Exclusions:</p> <ul style="list-style-type: none"> Terrorism | <p> \$[REDACTED] per claim inclusive of defense and all costs and expenses </p> | <p> Pollution Liability insurance covering third party bodily injury, property damage consequential loss or damage, including clean-up and restoration costs, both at the Site and off-Site, as required. </p> <p> Extended Reporting Period: Minimum of 36 months after East Substantial Completion Date and West Substantial Completion Date, as applicable. </p> <p> This coverage shall be primary with respect to the Project without right of contribution of any insurance carried by the City, MTO, MOI or the Lenders. </p> | |

| Type | Amount | Maximum Deductible(s) | Principal Cover | Estimated Premium |
|------|---|-----------------------|-----------------|-------------------|
| | <ul style="list-style-type: none"> • War • Intentional Non-Compliance • Prior Knowledge/Known Conditions • WSIB • Employers' Liability • Professional Liability • Nuclear Liability • Property Damage to Motor Vehicles during Transportation | | | |

Comments

- Names Insured will include DB Co., its Affiliates, DB Co parties and all other parties engaged in the Works, including the Construction Contractor, subcontractors, sub-subcontractors, consultants and sub-consultants
- The City, Province, MTO, MOI, Railway Company, RTG, Utility Company and the Lenders will be identified as Additional Insureds or insured clients of DB Co. and its Affiliates
- The directors, officers, shareholders, and employees of the foregoing shall be Additional Insureds

Underwriters Principal underwriters in compliance with Clause 14 of this Schedule 25.

Works Phase Insurance – Confederation Line Extension

From execution of the Project Agreement until each Substantial Completion Date, as applicable (Insurance for Works Phase)

Insurances to be provided, or caused to be provided by DB Co

| Type | Amount | Maximum Deductible | Principal Cover | Estimated Premium |
|--|--|--------------------|---|-------------------|
| Automobile Liability | <p>[\$[REDACTED]] (Minimum) for DB Co and DB Co's Construction Contractor vehicles</p> <p>[\$[REDACTED]] (Minimum) for vehicles of any other subcontractors, sub-subcontractors, consultants, and sub-consultants, and workmen, tradesmen or other persons working on or at the Site</p> | | <p>Standard Ontario Owners Form for all vehicles operated by DB Co, the Construction Contractor, all subcontractors, sub-subcontractors, consultants and sub- consultants in connection with the Project.</p> <p>Business Automobile Liability insurance covering third party property damage and bodily injury liability (including accident benefits) arising out of any licensed vehicle.</p> <p>Policies shall be endorsed to preclude cancellation, except upon 60 days prior written notice provided to the City, MTO, MOI and the Lenders.</p> | |
| Commercial General Liability and Non-Owned Automobile Liability | <p>[\$[REDACTED]] each occurrence, and in the annual aggregate with respect to Broad Form Products and Completed Operations for DB Co and DB Co's Construction Contractor</p> | | <p>Commercial General Liability insurance covering all operations on an occurrence basis against claims for Bodily Injury (including Death), Broad Form Property Damage (including Loss of Use), and</p> | |
| For DB Co, the | [\$[REDACTED]] each occurrence and in the | | | |

| Type | Amount | Maximum Deductible | Principal Cover | Estimated Premium |
|---|---|--------------------|---|-------------------|
| Construction Contractor, all subcontractors, sub-subcontractors, consultants and sub-consultants, including Direct and Contingent Employers Liability, Products and Completed Operations Liability, and the City's and Contractor's Protective extensions | <p>annual aggregate with respect to Broad Form Completed Operations for any other contractor, subcontractors, sub-subcontractors, consultants and sub-consultants, workmen, tradesmen, or other persons involved in the Works</p> <p>In both instances, limits of liability may be structured as any combination of primary plus supplementary layers and Umbrella and/or Excess, or primary plus Umbrella and/or Excess</p> <p>Sub-limits (DB Co and DB Co's Construction Contractor):</p> <ul style="list-style-type: none"> • Full policy limits with respect to Non-Owned Automobile Liability • \$[REDACTED] Prairie or Forest Fire Fighting Expenses <p>Principal Extensions (required to be provided by the DB Co. and its Construction Contractor; shall be endeavoured to be provided by any other contractor, subcontractors, sub-subcontractors, consultants, sub-consultants, workmen, tradesmen or other persons involved in the Works):</p> | | <p>including Broad Form Products and Completed Operations Liability.</p> <p>This Commercial General Liability insurance will cover off-site activities connected to the Project and Products and Completed Operations Liability beyond the "Wrap-Up" Commercial General Liability Insurance policy's Products and Completed Operations extension period.</p> <p>This insurance shall be maintained in effect during the Works phase until twelve (12) months following the earlier of the termination of the insured's person's involvement in the Works and East Substantial Completion Date and West Substantial Completion Date, as applicable.</p> <p>Policies shall be endorsed to preclude cancellation, except upon 90 days prior written notice provided to the City, MTO, MOI and the Lenders.</p> | |

| Type | Amount | Maximum Deductible | Principal Cover | Estimated Premium |
|------|--|--------------------|-----------------|-------------------|
| | <ul style="list-style-type: none"> • The City's and Contractor's Protective • Blanket Contractual (written) • Direct and Contingent Employers Liability • Personal Injury (nil participation) • Cross Liability and Severability of Interest with respect to each insured party • Blasting/demolition/excavating/underpinning/pile driving/shoring/caisson work/work below ground surface/tunnelling/grading, and similar operations associated with the Works as applicable • Elevator and Hoist Collision Liability • Non-Owned Automobile Liability • Prairie or Forest Fire Fighting Expenses – subject to sub-limit • Permission for Unlicensed Vehicles' (partial road use) • Unlicensed Equipment • Loss of Use Without Property Damage • Loading and Unloading of Automobiles • Broad Form Property Damage • Broad Form Completed Operations • Intentional Injury, committed to Protect Persons or Property • Worldwide Territory, subject to suits | | | |

| Type | Amount | Maximum Deductible | Principal Cover | Estimated Premium |
|--|--------|--------------------|-----------------|-------------------|
| being brought in Canada or the US | | | | |
| Permitted Exclusions: | | | | |
| <ul style="list-style-type: none"> • Injury to employees, where WSIB provides valid coverage • Property in the care, custody or control of the insured, except as provided under Broad Form Products and Completed Operations • Operation of licensed motor vehicles, other than attached machinery while used for its purpose, or at the Project Site • Cyber risk • Mould, fungi and fungal derivatives • Professional liability of engineers, architects, and other professional consultants • Nuclear or radioactive contamination, except release of radioactive isotopes intended for scientific, medical, industrial or commercial use | | | | |
| <i>Comments</i> | | | | |
| <ul style="list-style-type: none"> • The City and the Lenders will be identified as Additional Insureds or insured clients of DB Co and its Affiliates | | | | |

| Type | Amount | Maximum Deductible | Principal Cover | Estimated Premium |
|--|--|--------------------|---|-------------------|
| Aircraft and Watercraft Liability | Minimum \$[REDACTED] inclusive, including \$[REDACTED] passenger hazard – Owned Aircraft | To be determined | Policies shall be endorsed to preclude cancellation, except upon 90 days prior written notice provided to the City, MTO, MOI and the Lenders. | |
| (If any exposure) | Minimum \$[REDACTED] inclusive – Non-Owned Aircraft Minimum \$[REDACTED] inclusive Owned or Non- Owned Watercraft | | | |

Comments

- The City, MTO, MOI and the Lenders will be identified as Additional Insureds or insured clients of DB Co and its Affiliates

| | | | |
|---------------------------------------|--|--------------|---|
| “All Risks” Ocean Marine Cargo | [REDACTED]% Replacement Cost Valuation basis | \$[REDACTED] | Property of Every Description destined for incorporation into the Project, during marine transit, on a full replacement value basis, with no co-insurance provision. This coverage shall be primary with respect to the Project without right of contribution of any insurance carried by the City or the Lenders. |
| (If any exposure) | | | |

| Type | Amount | Maximum Deductible | Principal Cover | Estimated Premium |
|------|--------|--------------------|-----------------|-------------------|
|------|--------|--------------------|-----------------|-------------------|

Comments

- Named Insured includes DB Co, Lenders, Lenders' Agent, the Construction Contractor, subcontractors, sub-subcontractors, consultants and sub-consultants and the City, as their respective interests may appear.

**“All Risks”
Contractors’
Equipment**

To cover DB Co, the Construction Contractor, subcontractors, sub-subcontractors consultants and sub-consultants

If Site equipment is three years old or less the sum insured shall be equal to [REDACTED]% of the replacement value of all contractors equipment used at the project. If Site equipment is more than three years old, actual cash value basis of loss settlement is acceptable.

“All Risks” coverage on all owned, rented, leased or borrowed contractors’ equipment used at the Project Site.

Comments:

- Waiver of subrogation rights against DB Co, the City, the Construction Contractor, subcontractors, sub-subcontractors, consultants, sub-consultants, Lenders, Lenders' Agent as well as officers, directors, shareholders and employees of the foregoing

| Type | Amount | Maximum Deductible | Principal Cover | Estimated Premium |
|--|---|--------------------|---|-------------------|
| Comprehensive Crime | \$[REDACTED] per loss with respect to Employee Dishonesty | | <p>Employee Dishonesty insurance against the fraudulent/dishonest acts of employees of DB Co and DB Co Parties including additional coverage for Broad Form Money and Securities, Money Orders and Counterfeit Paper, Depositors' Forgery, Computer Fraud and Funds Transfer Fraud, Audit Expenses and Credit Card Forgery.</p> <p>Custodial endorsement extending protection to clients.</p> <p>Insurance primary without right of contribution of any other insurance carried by the City or the Lenders.</p> | |
| Underwriters (All non-COCIP Works Phase insurances that are to be provided or caused to be provided by DB Co) Principal underwriters in compliance with Clause 14 of this Schedule 25 | | | | |
| WSIB | In accordance with Ontario Act's established benefits and schedules | Not Applicable | (i) DB Co and its Affiliates shall obtain and maintain at DB Co's expense, WSIB Insurance, in accordance with the Province of | |

| Type | Amount | Maximum Deductible | Principal Cover | Estimated Premium |
|------|--------|--------------------|---|-------------------|
| | | | <p>Ontario requirements.</p> <p>(ii) DB Co shall ensure that satisfactory evidence of WSIB Insurance is provided by all DB Co Parties, including all other consultants, sub consultants, contractors, subcontractors, suppliers and tradesmen working at the Site.</p> <p>Prior to commencement of the work, each of the foregoing shall provide satisfactory written confirmation of compliance, from the appropriate authority, including confirmation that all required assessments have been paid to date.</p> <p>Upon Substantial Completion of the entire Project, DB Co shall be provided with satisfactory written confirmation that all required assessments have been paid to date.</p> <p>On request, within 30 days of such request, DB Co shall deliver to the City evidence of the WSIB coverage maintained by any person involved in the Works, or</p> | |

| Type | Amount | Maximum Deductible | Principal Cover | Estimated Premium |
|------|--------|--------------------|---|-------------------|
| | | | confirmation of that person's exemption from WSIB coverage. | |

SCHEDULE 26

RECORD PROVISIONS

1 General Requirements

- 1.1** DB Co shall prepare, retain and maintain, at its own expense, all the records (including superseded records) referred to in Section 2.1 of this Schedule 26, as follows:
- (a) in accordance with this Section 1 ;
 - (b) in accordance with the Project Agreement;
 - (c) in accordance with the requirements of Good Industry Practice;
 - (d) having due regard to the guidelines and policies of the Office of the Information and Privacy Commissioner of Ontario;
 - (e) in accordance with the most stringent of DB Co's and the Construction Contractor's normal business practices;
 - (f) in accordance with Canadian GAAP;
 - (g) in chronological order;
 - (h) in electronic format in accordance with the City's designated record keeping system;
 - (i) in sufficient detail, in appropriate categories and generally in such a manner as to enable DB Co to comply with DB Co's obligations under Section 26 of the Project Agreement; and
 - (j) in a form that is capable of audit.
- 1.2** DB Co shall retain and maintain all records on the Site in addition to retaining and maintaining records referred to in Section 2.1 in electronic format on the City's designated record keeping system.
- 1.3** Wherever practical, original records shall be retained and maintained in a hard copy form. DB Co may retain true copies of original records where it is not practical to retain original records.
- 1.4** Any drawings (including, without limitation, the As-Built Drawings and Record Drawings) required to be made or supplied pursuant to this Project Agreement on the most updated version of the applicable software and editable in updated base software format (native files in a standard format), and when printed, be of a size appropriate to show the detail to be depicted clearly without magnifying aids, shall be consistent in size and format to drawings previously submitted by DB Co to City, and shall conform to the Output Specifications, Good Industry Practice, and the CAD Standards. All drawings are to be submitted via City's electronic control management system, with one hard copy provided to the City. DB Co shall make or supply drawings and other documents in such form as has been agreed by the Parties

and shall include secure back up facilities. The City shall provide DB Co access to the City's electronic control management system.

- 1.5** Records shall be stored in electronic format within the City's electronic control management system where DB Co shall have access thereto and will continue to have access thereto, such that City will be able to read, copy, download, and search same without licence or payment.
- 1.6** Subject to Sections 1.7 and 1.8, DB Co shall retain and maintain in safe storage, at its expense, all records referred to in Section 2.1 of this Schedule 26 for a minimum period of at least 7 years or such longer period as required by Applicable Law.
- 1.7** DB Co shall notify City if DB Co wishes to destroy any records referred to in this Schedule 26, or in respect of which the required period Section 1.6 or under Applicable Law for their retention has expired. The Parties agree that:
- (a) within 60 days of such notice, City may elect to require DB Co to deliver such records to City, in which case DB Co shall, at the expense of City, deliver such records (with the exception of Sensitive Information) to City in the manner and to the location as City shall specify; or
 - (b) if City fails to notify DB Co of its election pursuant to Section 1.7(a) within such 60 day period, DB Co may, at its expense, destroy such records.
- 1.8** In the event of a termination of this Project Agreement in accordance with its terms, DB Co shall deliver all records that DB Co retains and maintains pursuant to this Schedule 26 to City in the manner and to the location that City shall reasonably specify. City shall make available to DB Co all the records DB Co delivers pursuant to this Section 1.8 subject to prior reasonable notice. DB Co may deliver true copies of original records required by:
- (a) statute to remain with DB Co;
 - (b) DB Co in connection with its fulfilment of any outstanding obligations under this Project Agreement; or
 - (c) DB Co in connection with its fulfilment of any outstanding obligations under the Lending Agreements.
- 1.9** Where the termination of this Project Agreement arises:
- (a) as a result of a City Event of Default or pursuant to Section 36.3 of the Project Agreement, then the costs of delivering the records and the costs for retaining such records in safe storage will be borne by City; or
 - (b) for any other cause, then the costs of delivering the records and the costs for retaining such records in safe storage for a period of at least six years following the Final Completion Date or the Termination Date, as applicable (unless a longer period is required by Applicable Law), shall be borne by DB Co.

1.10 Within 30 days after the end of each calendar year (or partial year for the first and last year) of the Project Term, DB Co shall deliver to City a report, as reasonably requested by City in connection with City's financial reporting, detailing to the best of DB Co's knowledge at the time of any such report any and all liabilities, claims and demands, including contingent liabilities, claims and demands, that DB Co has or may have against City or that may be owing by City to DB Co. The Parties acknowledge and agree that the contents of any such report or the failure to mention any matter in any such report shall not limit either Party's rights or remedies against the other Party as contemplated by this Project Agreement.

1.11 DB Co shall provide to the City:

- (a) as soon as available and, in any event, within 60 days after the end of the first three fiscal quarters in each fiscal year, the unaudited consolidated financial statements of DB Co, including an unaudited balance sheet and an unaudited statement of income, for each such fiscal quarter, all prepared in accordance with the Applicable Accounting Standards (as defined in the Lending Agreement); and
- (b) as soon as available and, in any event, no more than 120 days after the end of each fiscal year, the annual audited financial statements of DB Co, prepared in accordance with the Applicable Accounting Standards (of the relevant jurisdiction in which the statements are produced) applied on a basis consistent with that of the preceding year,

and all of which documents, whether or not marked or identified as confidential or proprietary but subject to the exceptions contained in Section 42 of the Project Agreement, shall be treated by the City as Confidential Information of DB Co.

2 Records To Be Kept

2.1 Without limiting any other requirement of this Project Agreement, DB Co shall prepare, retain and maintain at its own expense:

- (a) the Project Agreement and the Project Documents, including all amendments to such agreements;
- (b) all records relating to the appointment and replacement of the City Representative and the DB Co Representative;
- (c) any documents, drawings (including, without limitation, the As-Built Drawings) or submissions in accordance with Schedule 10 - Review Procedure;
- (d) any documents relating to Development Approvals and other DB Co Permits, Licences, Approvals and Agreements, including any refusals and appeals relating to any applications;
- (e) all records relating to any statutory inspections of the Project or the Site, including any roadways;
- (f) a complete record of construction, including:

- (i) Construction Access Management Plan and all sub-plans;
 - (ii) Traffic and Transit Management Plans and all sub-plans;
 - (iii) all records generated by the Geotechnical Instrumentation and Monitoring Plan (as described in Schedule 15 – Output Specifications), including (but not limited to) baseline readings, routine monitoring records, and tunnel construction monitoring records;
 - (iv) records of all pre-construction inspections and post-construction inspections (as described in Schedule 15 – Output Specifications), including a log identifying corrective actions;
 - (v) records of all geotechnical and environmental investigations performed by DB Co (as described in Schedule 15 – Output Specifications), including (but not limited to) records pertaining to the decommissioning of any monitoring wells and the location of any well casings;
 - (vi) Works progress photography;
 - (vii) construction notices or other communications with adjacent businesses, property owners or tenants;
 - (viii) planned and unplanned interruptions of Utility Infrastructure;
 - (ix) a complaints log including responses and any corrective action; and
 - (x) any other items as requested by the City from time to time.
- (g) any notices, reports, results and certificates relating to Substantial Completion and Final Completion and completion of the DB Co Commissioning;
- (h) all operation and maintenance manuals;
- (i) any documents relating to events of Force Majeure, Delay Events, Compensation Events, and Relief Events;
- (j) all documents submitted in accordance with Schedule 22 - Variation Procedure;
- (k) any documents related to decisions resulting from the Dispute Resolution Procedure;
- (l) any documents related to a DB Co Change in Ownership or Change in Control;
- (m) any documents relating to any Refinancing;
- (n) all accounts for Taxes and transactions relating to Taxes, including in relation to HST applicable to the Project, but excluding any records for:
- (i) DB Co's liabilities or payments under the *Income Tax Act* (Canada), the *Income Tax Act* (Ontario) or any similar statute in any other jurisdiction;

- (ii) DB Co's liabilities or payments for capital taxes based on or measured by the capital of DB Co;
 - (iii) the withholdings of any payments by DB Co; or
 - (iv) any business or activity in addition to the business or activities related to, and conducted for, the purpose of the Project;
- (o) the financial accounts of DB Co referred to in Section 1.11 above;
- (p) [not used];
- (q) all records required by Applicable Law (including in relation to health and safety matters) to be maintained by DB Co with respect to the Works;
- (r) any documents relating to insurance and insurance claims;
- (s) all Jointly Developed Materials; and
- (t) all other records, documents, information, notices or certificates expressly required to be produced or maintained by DB Co pursuant to this Project Agreement.

2.2 Either Party may review the documents required to be prepared, retained and maintained by DB Co pursuant to Section 2.1.

SCHEDULE 27
DISPUTE RESOLUTION PROCEDURE

1 General

- 1.1 All disputes, controversies, or claims arising out of or relating to any provision of this Project Agreement, or the alleged wrongful exercise or failure to exercise by a Party of a discretion or power given to that Party under this Project Agreement, or the interpretation, enforceability, performance, breach, termination, or validity of this Project Agreement, including, without limitation, this Schedule 27, or any matter referred to for resolution pursuant to this Schedule 27 (collectively and individually, a “**Dispute**”) shall be resolved in accordance with the provisions of this Schedule 27.
- 1.2 The Parties agree that at all times each of them will make bona fide efforts to:
- (a) resolve by amicable negotiations any and all Disputes arising between them on a without prejudice basis; and
 - (b) have all Disputes resolved at the lowest level of management before engaging the dispute resolution processes described in Sections 2 to 9 of this Schedule 27.
- 1.3 If the Parties are unable to resolve a Dispute at the lowest level of management pursuant to Section 1.2(b) of this Schedule 27, either Party may deliver to the City Representative or the DB Co Representative, as applicable, a written notice of dispute (the “**Notice of Dispute**”), which Notice of Dispute shall, subject to the terms of this Schedule 27 requiring resolution of a Dispute pursuant to a specific dispute resolution process set forth in this Schedule 27, initiate the dispute resolution process described in Sections 2 to 9 of this Schedule 27, as applicable, as more particularly described in this Schedule 27. To be effective, the Notice of Dispute must expressly state that it is a notice of dispute, set out the particulars of the matter in dispute, describe the remedy or resolution sought by the Party issuing the Notice of Dispute and be signed by the City Representative, if given by City, or by the DB Co Representative, if given by DB Co.
- 1.4 In the event of a Dispute in respect of any Critical Item set out in Section 12 of this Schedule 27, the provisions of that Section 12 shall solely govern the resolution of such Dispute and, except as set forth in Section 12.3 of this Schedule 27, the provisions of Sections 1.2 and 2 to 9 of this Schedule 27 shall not apply.

2 Amicable Resolution by Party Representatives

- 2.1 On receipt of a Notice of Dispute, the City Representative and the DB Co Representative (collectively “**Party Representatives**” and individually “**Party Representative**”) shall each promptly and diligently make all reasonable bona fide efforts to resolve the Dispute. Each Party Representative shall provide to the other, on a without prejudice basis, frank, candid and timely disclosure of relevant facts, information and documents (except such documentation that is subject to legal privilege) as may be required or reasonably requested by the other to facilitate the resolution of the Dispute.

3 Amicable Resolution by Senior Officers of each Party

- 3.1 If, following the process referred to in Section 2 of this Schedule 27 (or as otherwise agreed to in writing by the Parties pursuant to Section 13.6 of this Schedule 27), a Dispute is not resolved by

the Party Representatives within 10 Business Days after receipt by a Party of the applicable Notice of Dispute, or within such longer period of time as the Party Representatives may both expressly agree, then at any time after the expiry of such period of time either Party Representative may, by notice in writing to the other, refer the Dispute to an executive of a Party who:

- (a) is in a position of authority above that of the City Representative or the DB Co Representative, as the case may be; and
- (b) subject only to approval of the board of directors or similar governing body of the Party, has full authority to resolve and settle the Dispute.

3.2 Once a Dispute is referred to them, the executive of each Party shall promptly and diligently make all reasonable bona fide efforts to resolve the Dispute. All discussions and negotiations, and all documents exchanged, between them related to the Dispute shall be on a without prejudice basis to facilitate the resolution of the Dispute.

4 Independent Certifier

4.1 This Section 4 applies to all Disputes that fall within the description of Section 4.2 of this Schedule 27, if the Parties fail to resolve any Dispute through the process referred to in Sections 2 and 3 of this Schedule 27 within 15 Business Days following referral of the Dispute to an executive in accordance with Section 3.1 (or such other period as may be agreed or expressly stipulated in respect of the relevant matter), or as otherwise agreed to in writing by the Parties pursuant to Section 13.6 of this Schedule 27.

4.2 All Disputes (other than Systems Integration Disputes which shall be resolved in accordance with Section 5 below) related to the Works and that:

- (a) arise prior to, or otherwise in relation to, East Substantial Completion or West Substantial Completion;
- (b) relate to completion of Minor Deficiencies;
- (c) relate to whether any proposed work constitutes a Variation;
- (d) relate to a review of Estimates or any other matters relating to Variations as the Independent Certifier is entitled to review and determine pursuant to Section 31 of the Project Agreement and Schedule 22 - Variations;
- (e) are referred to in this Project Agreement for determination by the Independent Certifier; or
- (f) relate to the Certification Services or any Certification Service Variations (as those terms are defined in the Independent Certifier Agreement);

shall initially be submitted to the Independent Certifier for independent determination by the Independent Certifier within such period as may be specified in this Project Agreement, or if no period is specified, within 10 Business Days after submission to the Independent Certifier.

- 4.3 Without limiting any obligations of the Parties under the Independent Certifier Agreement, the Parties shall cooperate with the Independent Certifier and provide such information, records and documents as may be required by the Independent Certifier to make the determination within the period referred to in Section 4.2 of this Schedule 27.
- 4.4 The Independent Certifier's decision to issue or not to issue a Substantial Completion Certificate shall be final and binding on the Parties solely in respect of determining a Substantial Completion Payment Date, and a Dispute in relation to a Substantial Completion Payment Date shall not be subject to resolution pursuant to this Schedule 27. Save and except as aforesaid, the Independent Certifier's determinations are not binding on the Parties, and all Disputes in relation to the Independent Certifier's decisions shall be resolved pursuant to this Schedule 27, provided however that Section 6 of this Schedule 27 shall not apply unless otherwise agreed by the Parties on terms acceptable to the Parties.

5 System Integration Verifier

- 5.1 This Section 5 applies to all Systems Integration Disputes, if the Parties fail to resolve such Systems Integration Dispute through the process referred to in Sections 2 and 3 of this Schedule 27 within 15 Business Days following referral of the Dispute to an executive in accordance with Section 3.1 (or such other period as may be agreed or expressly stipulated in respect of the relevant matter), or as otherwise agreed to in writing by the Parties pursuant to Section 13.6 of this Schedule 27.
- 5.2 All Systems Integration Disputes shall initially be submitted to the Systems Integration Verifier for independent determination by the Systems Integration Verifier within 10 Business Days after submission to the Systems Integration Verifier, or such other period of time as may be agreed by the Parties, acting reasonably.
- 5.3 The Parties shall cooperate with the Systems Integration Verifier and provide such information, records and documents as may be required by the Systems Integration Verifier to make the determination within the period referred to in Section 5.2 of this Schedule 27.
- 5.4 Where it is determined by the Systems Integration Verifier that:
- (a) corrective measures must be taken by DB Co to resolve a Systems Integration Dispute, those measures must be implemented by DB Co as soon as reasonably practical, without payment by the City unless (i) the Systems Integration Verifier determines otherwise; or (ii) that determination is subsequently reversed by a binding and final determination made in a subsequent proceeding;
 - (b) corrective measures are not required to be taken by DB Co to resolve a Systems Integration Dispute, the City may, at its option, require corrective measures to be taken forthwith by DB Co, in which case those measures must be implemented by DB Co as soon as reasonably practical provided that the City undertakes to pay DB Co for Direct Costs, plus reasonable overhead and profit incurred by DB Co as such costs are so incurred; provided that no such costs should exceed the amount DB Co is entitled to receive pursuant to Schedule 22 – Variation Procedure thereby incurred upon completion of those corrective measures, but any such undertaking and payment shall be without prejudice to the City's right to contest the determination made by the Systems Integration Verifier in a subsequent proceeding. The City shall provide DB Co such reasonable

extensions of time in respect of DB Co's obligations under this Project Agreement necessary to allow DB Co to effect the corrective measures and such extension of time may be treated as a Delay Event if so determined by the Independent Certifier with input from the Systems Integration Verifier.

- 5.5 The Systems Integration Verifier's determinations are not binding on the Parties, and all Disputes in relation to the Systems Integration Verifier's determinations shall be resolved pursuant to this Schedule 27, provided however that Section 6 of this Schedule 27 shall not apply unless otherwise agreed by the Parties on terms acceptable to the Parties.

6 Adjudication

- 6.1 If the Parties fail to resolve any Dispute through the process referred to in Sections 2 and 3 of this Schedule 27 within 15 Business Days following referral of the Dispute to an executive in accordance with Section 3.1 (or such other period as may be agreed or expressly stipulated in respect of the relevant matter) and it is not a Dispute referred to in Section 4.2 of this Schedule 27, a Systems Integration Dispute, or a Dispute referred to arbitration or litigation pursuant this Schedule 27 (except as otherwise agreed to in writing by the Parties pursuant to Section 13.6 of this Schedule 27), either Party may, by written notice signed by their Party Representative and delivered to the other Party Representative, refer the Dispute to an adjudicator selected in accordance with Section 6.2 of this Schedule 27 (the "**Adjudicator**").
- 6.2 The Adjudicator nominated by the Party issuing the Notice of Dispute shall be agreed between the Parties within 5 Business Days after delivery of the notice requiring that the Dispute be resolved by an Adjudicator or, failing agreement within such 5 Business Days, either Party shall apply to the Ontario Superior Court of Justice for appointment of the Adjudicator, in which case the court shall appoint the Adjudicator at the earliest opportunity from the list of potential Adjudicators submitted by the Parties or, if either or both Parties fail to submit their list of potential Adjudicators within 7 Business Days, the court may appoint any person as the Adjudicator who meets the requirements set out in this Schedule 27 for qualifications and experience of the Adjudicator pursuant to the *Arbitration Act* (Ontario) as if the adjudicator was an arbitrator under the *Arbitration Act* (Ontario). The Adjudicator shall:
- (a) be independent of and at arm's length to DB Co, City, any Government Entity, RTG, and RTG Party, the Lenders and any other person having an interest in the Project or any of the Contract Documents;
 - (b) if the Dispute arises during the life of the Project Agreement, be familiar with design and construction of a project similar to the Project; and
 - (c) be a person who has the qualifications and experience with respect to the particular issues in Dispute.
- 6.3 The Adjudicator shall resolve the Dispute in accordance with the United Kingdom Construction Industry Council's *Model Adjudication Procedure: Fourth Edition* (the "**Model Adjudication Procedure**") the terms of which are incorporated herein by reference, subject to the following modifications:
- (a) notwithstanding paragraph 14 of the *Model Adjudication Procedure*, within 7 Business Days of appointment in relation to a particular Dispute, the Adjudicator shall require the Parties to submit in writing their respective arguments; provided that, where necessary,

the onus of proving that the Project was designed and constructed in accordance with all relevant specifications and requirements set forth in the Project Agreement is on DB Co. The Adjudicator shall, in his absolute discretion, determine the procedure of the adjudication proceedings including without limitation, whether a hearing is necessary in order to resolve the Dispute;

- (b) notwithstanding paragraphs 16 and 24 of the *Model Adjudication Procedure*, in any event, and subject to Section 6.4 of this Schedule 27, the Adjudicator shall provide to both Parties his written decision on the Dispute, within 10 Business Days of appointment (or within such other period as the Parties may agree after the reference). The Adjudicator shall give detailed reasons for the Adjudicator's decision. The Adjudicator shall be entitled to award compensation to a Party and shall be entitled to state the relief for such Party, which may include deeming the occurrence of any Relief Event, Delay Event and/or Compensation Event. Unless otherwise provided for in this Schedule 27, the Adjudicator's decision shall be binding on the Parties, but not final;
- (c) notwithstanding paragraphs 29 and 30 of the *Model Adjudication Procedure*, the Adjudicator's costs, including any legal fees, of any reference shall be borne as the Adjudicator shall specify or in default, equally by the Parties. In no circumstances shall the Adjudicator be entitled to order a successful or partially successful Party in an adjudication to pay more than one half of the Adjudicator's fees. Each Party shall bear its own costs arising out of the reference, including legal costs and the costs and expenses of any witnesses;
- (d) the Adjudicator shall be deemed not to be an arbitrator but shall render his decision as an expert and the provisions of the *Arbitration Act, 1991* (Ontario) and the law relating to arbitration shall not apply to the Adjudicator (other than as set out in Section 6.2) or his determination or the procedure by which he reached his determination;
- (e) notwithstanding paragraph 26 of the *Model Adjudication Procedure*, the Adjudicator shall act impartially and may take the initiative in ascertaining the facts and the law. Unless otherwise expressly provided in this Project Agreement, the Adjudicator shall have the power to open up, review and revise any opinion, certificate, instruction, determination or decision of whatever nature given under this Project Agreement. For greater certainty, the Independent Certifier's decision to issue or not to issue a Substantial Completion Certificate shall be final and binding solely in respect of determining a Substantial Completion Payment Date, and a Dispute in relation to a Substantial Completion Payment Date shall not be subject to resolution pursuant to this Schedule 27;
- (f) the Adjudicator shall execute a non-disclosure agreement (the "**Non-Disclosure Agreement**") in a form satisfactory to the Parties, providing that, among other things, all information, data and documentation disclosed or delivered by a Party to the Adjudicator in consequence of or in connection with his appointment as the Adjudicator shall be treated as confidential and without prejudice to any potential litigation proceedings. The Adjudicator shall not, save except as expressly permitted by the Non-Disclosure Agreement, disclose to any person any such information, data or documentation, and all such information, data or documentation shall remain the property of the Party disclosing or delivering the same and all copies shall be returned to such Party on completion of the Adjudicator's mandate with respect to the Dispute; and

- (g) notwithstanding paragraph 34 of the *Model Adjudication Procedure*, the Adjudicator shall not be liable for anything done or omitted to be done in the discharge or purported discharge of his functions as Adjudicator unless the act or omission is in bad faith. Any employee or agent of the Adjudicator is similarly protected from liability.

6.4 Where it is determined by the Adjudicator that:

- (a) corrective measures must be taken by DB Co to resolve a Dispute, those measures must be implemented by DB Co as soon as reasonably practical, without payment by City unless (i) the Adjudicator determines otherwise; or (ii) that determination is subsequently reversed by a binding and final determination made in a court proceeding;
- (b) corrective measures are not required to be taken by DB Co to resolve a Dispute, City may, at its option, require corrective measures to be taken forthwith by DB Co, in which case those measures must be implemented by DB Co as soon as reasonably practical provided that City undertakes to pay DB Co for Direct Costs, plus reasonable overhead and profit incurred by DB Co as such costs are so incurred; provided that no such costs should exceed the amount DB Co is entitled to receive pursuant to Schedule 22 – Variation Procedure thereby incurred upon completion of those corrective measures, but any such undertaking and payment shall be without prejudice to City's right to contest the determination made by the Adjudicator in a subsequent proceeding. City shall provide DB Co such reasonable extensions of time in respect of DB Co's obligations under this Project Agreement necessary to allow DB Co to effect the corrective measures and such extension of time may be treated as a Delay Event if so determined by the Adjudicator.

6.5 Subject to a right to require the Dispute to be arbitrated or litigated pursuant to Sections 7, 8 and 9 of this Schedule 27 by giving the required notices to arbitrate or litigate within the time periods specified therein, the Parties agree that the Adjudicator's determination is final and binding and not subject to appeal, arbitration, litigation or any other dispute resolution process, and both Parties expressly waive all rights of appeal in connection with the Adjudicator's determination.

7 Referral of Disputes to Arbitration or Litigation

7.1 If:

- (a) the amount awarded the Adjudicator pursuant to Section 6 of this Schedule 27 is more than \$[REDACTED] (index linked) in the aggregate or \$[REDACTED] (index linked) in any one year;
- (b) the Dispute involves issues other than monetary claims by one Party against the other Party and which a Party reasonably believes are material and significant to that Party;
- (c) a Notice of Dispute has been issued for a Dispute in relation to the Independent Certifier's decisions for which Section 4.4 of this Schedule 27 provides that Section 6 of this Schedule 27 shall not apply to resolve such Dispute; or
- (d) a Notice of Dispute has been issued for a Systems Integration Dispute in relation to the Systems Integration Verifier's decisions for which Section 5.5 of this Schedule 27 provides that Section 6 of this Schedule 27 shall not apply to resolve such Dispute,

then, subject to the right of a Party to require litigation of the Dispute pursuant to Section 9.1 of this Schedule 27 or a consolidation of proceedings pursuant to Section 11 of this Schedule 27, either Party may, by written notice signed by their Party Representative, request that the Dispute be resolved by arbitration pursuant to Section 8 of this Schedule 27 upon the written consent of the other Party. Such notice will not be effective unless it indicates it is a notice to arbitrate, is signed by the Party Representative and is delivered to the other Party Representative within 15 Business Days after receipt of the Adjudicator's decision or the Notice of Dispute referred to in Section 7.1(c) of this Schedule 27, as applicable, and provided further that such notice expressly identifies the specific Dispute and decision of the Adjudicator, the Independent Certifier, or the Systems Integration Verifier, as applicable, that is to be the subject of the arbitration.

- 7.2 If a Party is entitled to refer a Dispute to which Section 6 of this Schedule 27 apply to arbitration or litigation pursuant to Sections 7.1 or 9.1 of this Schedule 27 then, unless the Parties otherwise expressly agree in writing, all information, documents and submissions prepared by a Party for the Adjudicator which are not business records that would otherwise be kept in the normal course of business by the Party for its business purposes, and all decisions and determinations by the Adjudicator, shall be confidential and inadmissible in any arbitration or litigation proceeding. For greater certainty, the Adjudicator shall not be called as a witness by either party in any arbitration or litigation proceeding.

8 Resolution by Arbitration

- 8.1 Upon the mutual written consent of the parties,

- (a) where the Parties fail to resolve a Dispute through the process set out in Sections 2, 3, 4, 5 and 6 (to the extent required) of this Schedule 27, and
- (b) all other requirements set out in this Schedule 27 have been satisfied,

such Dispute may be referred to arbitration in accordance with the *Arbitration Act, 1991* (Ontario) and this Section.

- 8.2 Disputes referred to arbitration shall be resolved by a single arbitrator unless one of the Parties, by notice in writing delivered to the other Party within 5 Business Days after a notice to arbitrate pursuant to Section 7.1 of this Schedule 27 has been delivered, expressly requires that the Dispute that is the subject of that notice to arbitrate be resolved by a three person arbitration tribunal, in which case that particular Dispute shall be resolved by a three person arbitration tribunal.

- 8.3 If the arbitration tribunal is comprised of a single arbitrator, the arbitrator shall be appointed as follows:

- (a) if the Parties agree on the arbitrator, the Parties shall jointly appoint the arbitrator as soon as possible and in any event within 5 Business Days after delivery of the notice to arbitrate pursuant to Section 7 of this Schedule 27; and
- (b) if the Parties fail to agree or jointly appoint the arbitrator within such 5 Business Day period, either Party may apply to the Ontario Superior Court of Justice for appointment of the arbitrator, in which case the court shall appoint the arbitrator at the earliest opportunity in accordance with the following:

- (i) from the lists of potential arbitrators submitted to the court by the Parties, provided that potential arbitrators meeting the necessary qualifications and experience set out in this Schedule 27 are on the list; or
- (ii) if one Party fails to submit its list of potential arbitrators to the court within 5 Business Days of a request from the court to submit a list, from the list submitted by the other Party provided that potential arbitrators meeting the necessary qualifications and experience set out in this Schedule 27 are on the list of that other Party; or
- (iii) if no list is submitted by either Party, or if the list or lists submitted do not include potential arbitrators with the necessary qualifications and experience, the court shall be entitled at its sole discretion to appoint anyone who meets the requirements set out in this Schedule 27 for the qualifications and experience of the arbitrator.

8.4 If the arbitration tribunal is comprised of three arbitrators:

- (a) the arbitrators shall be appointed as follows:
 - (i) each Party shall appoint one arbitrator no later than 5 Business Days after delivery of the notice to arbitrate pursuant to Section 7 of this Schedule 27;
 - (ii) if a Party fails to appoint an arbitrator within 5 Business Days after delivery of the notice to arbitrate, the other Party is entitled to apply to the Ontario Superior Court of Justice to appoint that arbitrator, in which case the court shall appoint that arbitrator at the earliest opportunity using a comparable process to that described in Section 8.3(b) of this Schedule 27;
 - (iii) the arbitrators appointed in accordance with the foregoing shall, within 5 Business Days after their appointment, jointly appoint a third arbitrator who shall also act as the chair of the arbitration tribunal and who, in addition to all other required qualifications, shall have experience in arbitration or judicial processes and procedures; and
 - (iv) if the two arbitrators appointed by the Parties fail to appoint a third arbitrator within the required time, either of the other two arbitrators may apply to the Ontario Superior Court of Justice for appointment of the third arbitrator, in which case the court shall appoint the third arbitrator at the earliest opportunity using a comparable process to that described in Section 8.3(b) of this Schedule 27; and
- (b) the arbitrators appointed by the Parties shall at all times be neutral and act impartially and shall not act as advocates for the interests of the Party who appointed them.

8.5 All arbitrators must have qualifications and experience relevant to the issues in the Dispute and also have qualifications and experience as arbitrators.

8.6 No one shall be nominated or appointed to act as an arbitrator who is or was in any way interested, financially or otherwise, in the conduct of the Works or in the business affairs of City, DB Co, RTG, any RTG Party or any consultant, subconsultant or subcontractor of any of them.

- 8.7 The arbitrator(s) shall have the jurisdiction and power to:
- (a) amend or vary any and all rules under the *Arbitration Act, 1991* (Ontario), including rules relating to time limits, either by express agreement of the Parties or, failing such agreement, as the arbitrator(s) consider appropriate and necessary in the circumstances to resolve the Dispute and render an award;
 - (b) require some or all of the evidence to be provided by affidavit;
 - (c) hold a hearing at which evidence and submissions are presented by the Parties;
 - (d) direct either or both Parties to prepare and provide the arbitrator(s) with such documents, test results or other things as the arbitrator(s) may require to assist them in the resolution of the Dispute and rendering of an award;
 - (e) require either Party to supply or prepare for examination by the arbitrator(s) and the other Party, any document or information the arbitrator(s) considers necessary;
 - (f) inspect the Works, giving reasonable notice to each Party of the time when, and the place where, the arbitrator(s) intend(s) to conduct any inspections;
 - (g) award any remedy or relief that a court or judge of the Ontario Superior Court of Justice could order or grant subject to and in accordance with this Project Agreement, including, without limitation, interim orders, interim and permanent injunctions, and specific performance; and
 - (h) require either or both Parties to take and provide to the arbitrator(s) such measurements, perform such tests, perform such audits, or take any and all such other measures or steps as the arbitrator(s) consider necessary or desirable to aid them in making a fair and reasonable award.
- 8.8 The place of arbitration shall be Ottawa, Ontario. The language of the arbitration shall be English.
- 8.9 The costs of an arbitration are in the discretion of the arbitrator(s) who, in addition to any jurisdiction and authority under applicable law to award costs, has the jurisdiction and authority to make an order for costs on such basis as the arbitrator(s) considers appropriate in the circumstances, including to award actual legal fees and disbursements and expert witness fees, and to specify or order any or all of the following:
- (a) the Party entitled to costs;
 - (b) the Party who must pay the costs;
 - (c) the amount of the costs or how that amount is to be determined; and
 - (d) how all or part of the costs must be paid.
- 8.10 In exercising discretion to award costs, however, the arbitrator(s) will take into account the desire of the Parties that costs should generally be awarded to each Party in proportion to the relative success that each Party has in the arbitration.

- 8.11 The award of the arbitrator(s) shall be final and binding upon both Parties, and both Parties expressly waive all rights of appeal in connection with the award of the arbitrator(s). Judgment may be entered upon the award in accordance with Applicable Law in any court having jurisdiction.
- 8.12 The Parties agree to and shall co-operate fully with the arbitrator(s) and proceed with the arbitration expeditiously, including in respect of any hearing, in order that an award may be rendered as soon as practicable by the arbitrator(s), given the nature of the Dispute. The arbitrator(s) shall render a decision as soon as possible and, in any event, shall use all reasonable efforts to render a decision no later than 20 Business Days after the date of the hearing, or such longer period of time as agreed to in writing by the Parties. If the arbitration tribunal is comprised of three arbitrators, the decision of a majority of the arbitration tribunal shall be deemed to be the decision of the arbitration tribunal, and where there is no majority decision, the decision of the chair of the arbitration tribunal shall be deemed to be the decision of the arbitration tribunal.
- 8.13 This Project Agreement, including this Schedule 27, constitutes an agreement to arbitrate that shall be specifically enforceable.
- 8.14 Any arbitrator appointed pursuant to this Section 8 of this Schedule 27 shall keep all information about the Dispute confidential and shall not disclose such information to anyone other than the Parties.

9 Litigation

- 9.1 Notwithstanding that a notice to arbitrate has been delivered pursuant to Section 7.1 of this Schedule 27, following receipt of the Adjudicator's award or determination pursuant to Section 6 of this Schedule 27, or if applicable a Notice of Dispute has been issued following receipt of a decision of the Independent Certifier if the Dispute is a Dispute in relation to the Independent Certifier's decisions for which Section 4.4 of this Schedule 27 provides that Section 6 of this Schedule 27 shall not apply, or if applicable a Notice of Dispute has been issued following receipt of a determination of the Systems Integration Verifier if the Dispute is a Systems Integration Dispute in relation to the Systems Integration Verifier's determination for which Section 5.5 of this Schedule 27 provides that Section 6 of this Schedule 27 shall not apply, if one or more of the following apply then either Party may elect, by written notice signed by their Party Representative, to require that the Dispute be referred to and resolved solely by litigation in the Ontario Superior Court of Justice, and both Parties agree to attorn to the exclusive jurisdiction of the courts of the Province of Ontario in respect of the Dispute:
- (a) if the actual or potential total value or amount at issue in the Dispute (as determined by adding all claims and counterclaims) is more than \$[REDACTED] (index linked) in the aggregate or \$[REDACTED] (index linked) in any one year; or
 - (b) if the Dispute is considered by City to involve material issues of public health or safety.

Such notice will not be effective unless it indicates it is a notice to submit the Dispute to litigation, is signed by the Party Representative and is delivered to the other Party Representative within 15 Business Days after receipt of the Adjudicator's determination, or the Notice of Dispute referred to in Section 7.1(c) or (d) of this Schedule 27, as applicable, and provided further that such notice expressly identifies the specific Dispute and determination of the Adjudicator,

Independent Certifier, or Systems Integration Verifier, as applicable, that is to be the subject of the litigation.

9.2 If neither Party delivers a notice of election to resolve a particular Dispute by litigation in the manner and within the time specified in Section 9.1 of this Schedule 27, then:

(a) provided that one Party has, in the manner and within the time period specified in Section 7.1 of this Schedule 27, given notice to the other Party of election to resolve that Dispute by arbitration, and subject to a consolidation of proceedings pursuant to Section 11 of this Schedule 27, that Dispute shall be resolved only by arbitration pursuant to Sections 8.2 to 8.14 of this Schedule 27; and

(b) **[Intentionally Deleted].**

9.3 **[Intentionally Deleted].**

10 Consolidation of Project Agreement Adjudication, Arbitration and Litigation

10.1 For all Disputes that arise prior to East Substantial Completion, unless:

- (a) both Parties otherwise agree; or
- (b) the issue in a particular Dispute arises in connection with the Review Procedure; or
- (c) the issue in a particular Dispute is such that waiting until after East Substantial Completion to resolve that Dispute will cause irreparable harm to one of the Parties; or
- (d) the issue in a particular Dispute arises in connection with requirements of achieving or deficiencies in not achieving East Substantial Completion; or
- (e) in respect to a particular Dispute, the Dispute is consolidated with Third Party Arbitration or Third Party Litigation (as hereinafter defined) pursuant to Section 11 of this Schedule 27;

all adjudication, arbitral and litigation proceedings between the Parties prior to East Substantial Completion with respect to the East Works shall be stayed and consolidated into, as applicable, a single adjudication, arbitration and a single litigation proceeding, with the adjudication, arbitration and, if applicable, litigation, proceeding promptly and expeditiously after East Substantial Completion.

10.2 For all Disputes that arise prior to West Substantial Completion, unless:

- (a) both Parties otherwise agree; or
- (b) the issue in a particular Dispute arises in connection with the Review Procedure; or
- (c) the issue in a particular Dispute is such that waiting until after West Substantial Completion to resolve that Dispute will cause irreparable harm to one of the Parties; or
- (d) the issue in a particular Dispute arises in connection with requirements of achieving or deficiencies in not achieving West Substantial Completion; or

- (e) in respect to a particular Dispute, the Dispute is consolidated with Third Party Arbitration or Third Party Litigation (as hereinafter defined) pursuant to Section 11 of this Schedule 27;

all adjudication, arbitral and litigation proceedings between the Parties prior to West Substantial Completion with respect to the West Works shall be stayed and consolidated into, as applicable, a single adjudication, arbitration and a single litigation proceeding, with the adjudication, arbitration and, if applicable, litigation, proceeding promptly and expeditiously after West Substantial Completion.

11 Consolidation with Third Party Disputes

- 11.1 Subject to Section 11.4 of this Schedule 27, if either Party is involved in an arbitration in the Province of Ontario with a third party (“**Third Party Arbitration**”), and if such Third Party Arbitration involves common factual or legal issues (including common issues of damages) which are also the subject of a Dispute between the Parties for which a Notice of Dispute has been given, then any arbitration of the Dispute between the Parties which includes those common factual, legal or damages issues (“**Project Agreement Arbitration**”) shall be stayed, consolidated or joined with the Third Party Arbitration(s) but only if City, DB Co and the other Parties all agree or, failing their agreement, if a court in the Province of Ontario on application considers it just and convenient in all the circumstances that the Project Agreement Arbitration should be stayed or consolidated or joined with the Third Party Arbitration.

- 11.2 Subject to Section 11.4 of this Schedule 27, if either Party is involved in litigation in the Province of Ontario with a third party (“**Third Party Litigation**”) and if:

- (a) such Third Party Litigation involves common factual or legal issues (including common issues of damages) which are the subject of a Project Agreement Arbitration; and
- (b) one of the Parties is brought directly into the Third Party Litigation as a Party to that litigation,

then on the application of either Party to the court in the Province of Ontario having jurisdiction the court may, if it determines that it is just and convenient in all the circumstances, order a stay of either or both the Project Agreement Arbitration proceeding and Third Party Litigation, or order a joinder of the Project Agreement Arbitration and the Third Party Litigation. If such joinder is ordered, the Project Agreement Arbitration and the Third Party Litigation ordered to be joined by the court shall be determined by that court or by another court in Ontario such that the Project Agreement Arbitration and the Third Party Litigation shall be resolved in one forum. For purposes of the foregoing, joinder of the Project Agreement Arbitration and the Third Party Litigation shall be construed to include stays and conditional stays of issues in the Project Agreement Arbitration pending the commencement and completion of third party proceedings by one or both of the Parties in the Third Party Litigation.

- 11.3 In considering whether to order a stay, consolidation or joinder of a Project Agreement Arbitration with a Third Party Arbitration or Third Party Litigation, the court will be entitled to give substantial weight to the desire by the Parties that all Disputes which are related to Third Party Arbitration or Third Party Litigation be resolved in a single forum to avoid multiplicity of proceedings and the potential for contradictory findings of fact, liability and quantum, and to ensure the arbitrator or court has the advantage of obtaining full evidence and disclosure from the Parties and from the other Parties, as applicable and as required to resolve the Dispute and to

make findings of fact, liability and quantum of damages and awards or judgments binding on the Parties based on all available evidence.

11.4 Sections 11.1 and 11.2 of this Schedule 27 only apply:

- (a) if the Dispute between the Parties includes a claim by one Party against the other for contribution or indemnity for that Party's liability or potential liability to the third party where such liability results or will result from an award in the Third Party Arbitration or a judgment in the Third Party Litigation; and
- (b) to those specific issues that are common issues in the Project Agreement Arbitration, the Third Party Arbitration and the Third Party Litigation, such that all other issues in the Dispute shall continue to be resolved by Project Agreement Arbitration and shall not be consolidated with the Third Party Arbitration or Third Party Litigation.

12 Critical Items

12.1 In the event that a Dispute relates to one or more of the following elements, features or aspects of the Project (the "**Critical Items**"):

- (a) **[Not Applicable]**.

the effect of which is likely to materially impede the proper and timely completion of the Works, such Dispute shall be resolved in accordance with Section 12.2 of this Schedule 27.

12.2 Any Dispute with respect to any Critical Item shall be resolved in an expeditious manner and shall not be subject to the Dispute Resolution Procedure set forth in this Schedule 27 and must be resolved to the satisfaction of City and DB Co within two hours of being reported by DB Co or otherwise identified by City. For the purposes of this Section 12, "resolved" means a proposed solution must be agreed between the City Representative and DB Co within that two hour period, including a time frame for implementing a proposed solution. For greater certainty, it is understood that in some cases the nature or extent of a Critical Item may not permit that Critical Item to be solved or otherwise resolved within two hours.

12.3 In the event that:

- (a) there is a Dispute related to a Critical Item that cannot be resolved within the two hours set forth in Section 12.2 of this Schedule 27,
 - (i) as to the existence of a problem or its extent, or
 - (ii) with respect to the proposed solution, or
- (b) there is a Dispute concerning the effectiveness of any solution proposed in respect of a Critical Item

then that Dispute must be resolved by an Adjudicator in accordance with Section 6 of this Schedule 27 within one Business Day of such Adjudicator being asked to undertake such an adjudication. Decisions of the Adjudicator with respect to Disputes relating to Critical Items are final and binding with respect to the action being taken, but not with respect to fault or the cost or timing implications of the matter in dispute. Decisions of the Adjudicator with respect to fault or

the cost or timing implications shall be treated as a Dispute and determined in accordance with the provisions of this Schedule 27.

13 Miscellaneous

- 13.1 DB Co and City shall diligently carry out their respective obligations under this Project Agreement during the pendency of any Disputes, including, without limitation, adjudication proceedings, arbitration proceedings or litigation proceedings. If during the pendency of any Dispute it is considered necessary by either Party to proceed in respect of the matter that is in Dispute, then without prejudice to DB Co's rights in respect of the Dispute (including in respect of Delay Events, Compensation Events and Variations), DB Co shall proceed in accordance with the direction of City, and in the event the matter in dispute is determined in favour of DB Co, proceeding in accordance with City's position shall: (i) subject to and in accordance with Section 32 of this Project Agreement, be treated as a Delay Event; (ii) subject to and in accordance with Section 33 of this Project Agreement, be treated as a Compensation Event; and (iii) subject to and in accordance with Schedule 22 – Variation Procedure, result in a Variation. For greater certainty:
- (a) in respect of any Dispute relating to the Works referred to in Section 4.2 of this Schedule 27, the Independent Certifier shall be the decision maker of first instance and the Parties shall comply with the initial decision of the Independent Certifier unless and until it is overturned in a subsequent arbitration or litigation proceeding; and
 - (b) in respect of any Systems Integration Dispute, the Systems Integration Verifier shall be the decision maker of first instance and the Parties shall comply with the initial decision of the Systems Integration Verifier unless and until it is overturned in a subsequent arbitration or litigation proceeding.
- 13.2 Nothing contained in this Schedule 27 will prevent the Parties from seeking interim protection from the courts of the Province of Ontario, including seeking an interlocutory injunction, if necessary to prevent irreparable harm to a Party.
- 13.3 The Parties shall indemnify each other in respect of any damages suffered or incurred on amounts agreed to be paid pursuant to resolution of a Dispute by the Party Representatives or by the executives of the Parties pursuant to Sections 2 and 3 of this Schedule 27, and on the amount of any award or judgment as follows:
- (a) for amounts payable by DB Co to City, DB Co shall indemnify City as provided for at Section 46.1(e) of this Project Agreement from and against any damages suffered or incurred resulting from any overpayment to DB Co or, as applicable, any underpayment or non-payment by DB Co from the date of any overpayment to DB Co or, as applicable, from the date on which payment was due under this Project Agreement to City until the date of payment; or
 - (b) for amounts payable by City to DB Co, City shall indemnify DB Co as provided for at Section 46.2(c) of this Project Agreement from and against any damages suffered or incurred resulting from any overpayment to City or, as applicable, any underpayment or non-payment by City from the date of any overpayment to City or, as applicable, from the date on which payment was due under this Project Agreement to DB Co until the date of payment.

- 13.4 DB Co shall ensure that any and all documents and other information in the possession or control of any DB Co Party that are available to DB Co and that may be necessary for the resolution of a Dispute on an informed basis by the Party Representatives or by the executives of the Parties pursuant to Sections 2 and 3 of this Schedule 27, or by an expert, the Systems Integration Verifier, an adjudicator, an arbitrator or a court of competent jurisdiction, are made available in a timely manner to City and the City Representative.
- 13.5 City shall ensure that any and all documents and other information in the possession or control of any City Party that are available to City and that may be necessary for the resolution of a Dispute on an informed basis by the Party Representatives or by the executives of the Parties pursuant to Sections 2 and 3 of this Schedule 27, or be an expert, the Systems Integration Verifier, an adjudicator, an arbitrator or court of competent jurisdiction, are made available in a timely manner to DB Co and the DB Co Representative.
- 13.6 The Parties can, by written agreement, on a Dispute by Dispute basis:
- (a) extend any or all timelines set out in this Schedule 27;
 - (b) agree to waive or by-pass any one or more of the Dispute resolution processes in Sections 2, 3, 4, 5 and 6 of this Schedule 27 and, instead, proceed directly to resolution of the Dispute by arbitration or litigation pursuant to Sections 7, 8 and 9 of this Schedule 27;
 - (c) agree to (i) resolve a Dispute by litigation rather than adjudication or arbitration notwithstanding the requirements of Section 6 and Section 8 of this Schedule 27, or (ii) agree to resolve a Dispute by arbitration rather than adjudication or litigation notwithstanding the requirements of Section 6 and Section 9 of this Schedule 27, or (iii) agree to resolve a Dispute by adjudication rather than arbitration or litigation notwithstanding the requirements of Section 8 and Section 9 of this Schedule 27;
 - (d) **[Intentionally Deleted]**; and
 - (e) agree to resolve a Dispute relating to Critical Items by adjudication, arbitration or litigation notwithstanding the requirements of Section 12 of this Schedule 27.
- 13.7 This Schedule 27 shall survive the expiration or termination of this Project Agreement for any reason.

SCHEDULE 28

REFINANCING

1. DEFINITIONS

1.1 In this Schedule 28 – Refinancing, unless the context indicates a contrary intention, terms which are defined in the Project Agreement (and not otherwise defined in this Schedule 28 – Refinancing) shall have meanings given to them in the Project Agreement and the following terms shall have the following meanings:

(a) “**Exempt Refinancing**” means:

- (i) a change in taxation or change in accounting treatment pursuant to a Change in Law or change in Canadian GAAP;
- (ii) the exercise of any right, the grant of any amendment, waiver or consent or any similar action under the Lending Agreements by the Lenders that does not provide for a financial benefit to DB Co under those agreements;
- (iii) any Qualifying Bank Transaction;
- (iv) any Rescue Refinancing;
- (v) any Refinancing that was approved by the City prior to the execution of the Project Agreement and occurs during the first six months following the date of the Project Agreement;
- (vi) any amendment, variation or supplement of any agreement approved by the City as part of any Variation under the Project Agreement; or
- (vii) any Permitted Borrowing.

(b) “**Qualifying Bank**” means a lending institution that is:

- (i) a bank listed in Schedule I, II or III of the *Bank Act* (Canada); or
- (ii) a bank, life insurance company, pension fund or fund managed by a professional fund manager that controls, either directly or through its affiliates, funds in excess of \$[REDACTED],

provided such institution is not a Restricted Person or a person whose standing or activities compromise (i) the City’s reputation or integrity, or (ii) the nature of the public transit system in the City of Toronto or the Province of Ontario so as to affect public confidence in the public transit system in the City of Toronto, the Province of Ontario or the Project.

(c) “**Qualifying Bank Transaction**” means:

- (i) the disposition by a Lender of any of its rights or interests in the Lending Agreements to a Qualifying Bank;

- (ii) the grant by a Lender to a Qualifying Bank of any rights of participation in respect of the Lending Agreements; or
 - (iii) the disposition or grant by a Lender to a Qualifying Bank of any other form of benefit or interest in either the Lending Agreements or the revenues or assets of DB Co, whether by way of security or otherwise.
- (d) **“Qualifying Refinancing”** means any Refinancing that will give rise to a Refinancing Gain that is not an Exempt Refinancing.
- (e) **“Refinancing”** means:
 - (i) any amendment, variation, novation, supplement or replacement of any Lending Agreement;
 - (ii) the exercise of any right, or the grant of any waiver or consent, under any Lending Agreement;
 - (iii) the disposition of any rights or interests in, or the creation of any rights of participation in respect of, the Lending Agreements or the creation or granting of any other form of benefit or interest in either the Lending Agreements or the contracts, revenues or assets of DB Co whether by way of security or otherwise; or
 - (iv) any other arrangement put in place by DB Co or another person which has an effect which is similar to any of the foregoing provisions of this definition above or which has the effect of limiting DB Co’s ability to carry out any of the foregoing provisions of this definition.
- (f) **“Refinancing Financial Model”** means a comprehensive and detailed financial model satisfactory to the City, acting reasonably, prepared for the purpose of Section 2 of this Schedule 28, which financial model shall be similar in form and content to the Financial Model, suitable for the purposes for which it will be used in this Schedule 28, and shall take into account:
 - (i) cash flows for the entire Project Term;
 - (ii) any changes in structure and funding since the date of the Project Agreement;
 - (iii) the performance of the Works to the date of the Refinancing;
 - (iv) macroeconomic assumptions; and
 - (v) all other relevant factorshaving regard to any Exempt Financings previously undertaken in respect of which no Refinancing Gain is payable, and any Qualifying Financings in respect of which a Refinancing Gain has previously been paid.
- (g) **“Refinancing Gain”** means an amount equal to the greater of zero and $(A - B)$, where:

A = the total Cost of the Financing as calculated using the Refinancing Financial Model but without taking into account the effect of the Refinancing.

B = the total Cost of the Financing as calculated using the Refinancing Financial Model and taking into account the effect of the Refinancing.

- (h) “**Rescue Refinancing**” means any Refinancing which takes place due to the failure or prospective failure of DB Co to comply with any material financial obligation under the Lending Agreements, or any of them, which does not increase any liability of the City, whether actual or potential.

2. REFINANCING

2.1 DB Co shall not carry out:

- (a) any Qualifying Refinancing unless DB Co has obtained the prior written consent of the City, subject to Section 2.2; or
- (b) any Exempt Refinancing or any other Refinancing which does not result in a Refinancing Gain unless DB Co has delivered Notice of such Refinancing to the City before five Business Days of such Refinancing, except that such Notice shall not be required for a disposition by a Lender of its rights or participation in the Lending Agreements where such disposition is a trade of bonds issued as provided under a book-based system of a depository and pursuant to a trust indenture that comprises a portion of the Financing.

2.2 The City may withhold its consent to any Qualifying Refinancing, in its sole discretion:

- (a) where any person with whom DB Co proposes to carry out a Qualifying Refinancing is a Restricted Person;
- (b) if, at the time the Qualifying Refinancing is contemplated and effected, the Qualifying Refinancing will materially adversely affect the ability of DB Co to perform its obligations under the Project Documents or the Project Agreement; or
- (c) if, at the time the Qualifying Refinancing is contemplated and effected, the Qualifying Refinancing will have the effect of increasing any liability of the City, whether actual or contingent, present or future, known or unknown.

2.3 The City shall be entitled to receive:

- (a) a [REDACTED]% share of any Refinancing Gain arising from a Qualifying Refinancing, in respect of any Refinancing Gain up to (when considered in aggregate with all previous Qualifying Refinancings) a Refinancing Gain of \$[REDACTED];
- (b) a [REDACTED]% share of any further Refinancing Gain arising from a Qualifying Refinancing, in respect of any Refinancing Gain in excess of \$[REDACTED] and up to (when considered in aggregate with all previous Qualifying Refinancings) a Refinancing Gain of \$[REDACTED]; and
- (c) a [REDACTED]% share of any further Refinancing Gain arising from a Qualifying Refinancing.

- 2.4 DB Co shall promptly provide the City with full details of any proposed Qualifying Refinancing, including a copy of the proposed Refinancing Financial Model and the basis for the assumptions used in the proposed Refinancing Financial Model. The City shall (before, during and at any time after any Refinancing) have unrestricted rights of audit over the Refinancing Financial Model and any documentation (including any aspect of the calculation of the Refinancing Gain) used in connection with such Refinancing (whether or not such Refinancing is determined to be a Qualifying Refinancing). DB Co shall promptly, and, in any event, within five Business Days after receiving a written request from the City, provide any information in relation to a proposed Refinancing as the City may reasonably require. DB Co shall keep the City informed as to any changes to the terms of the Refinancing. Both the City and DB Co shall at all times act in good faith with respect to any Refinancing.
- 2.5 The City's share of the Refinancing Gain shall, subject to prior consent of DB Co, be received as a reduction in the amount of a Substantial Completion Payment and if such consent is not provided, shall be paid to the City from the net proceeds of the Qualifying Refinancing. Notwithstanding the preceding provisions, the City shall have the right to receive its share of the Refinancing Gain by way of a reduction to the latest Substantial Completion Payment irrespective of DB Co's prior consent.
- 2.6 The City and DB Co will negotiate in good faith to agree upon the basis and method of calculation of the Refinancing Gain. If the parties fail to agree upon the basis and method of calculation of the Refinancing Gain or the payment of the City's share, the Dispute shall be determined in accordance with Schedule 27 - Dispute Resolution Procedure. If applicable, both the City and DB Co shall work collaboratively to establish the rate setting process required to complete the Refinancing.
- 2.7 The Refinancing Gain shall be calculated after taking into account the reasonable out-of-pocket costs that each Party directly incurs in relation to the Qualifying Refinancing and on the basis that, within 15 Business Days following any Qualifying Refinancing, DB Co will reimburse the City for all such reasonable out-of-pocket costs incurred by the City.

SCHEDULE 29

FORM OF PERFORMANCE GUARANTEE OF CONSTRUCTION GUARANTOR

THIS GUARANTEE is made as of the [•] day of [•], 20[•]

BETWEEN:

THE CITY OF OTTAWA (“City”)

- AND -

EAST WEST CONNECTORS GP, [REDACTED] (“DB Co”)

- AND -

[•], a corporation incorporated under the laws of [•] (“**Construction Guarantor**”)

WHEREAS:

- A. City and DB Co have entered into a project agreement dated as of the [•] day of [•], 20[•] (which agreement, including the schedules thereto, as the same may be amended, modified, restated, supplemented or replaced, from time to time, is hereinafter called the “**Project Agreement**”).
- B. DB Co and [REDACTED] (“**Construction Contractor**”) have entered into a design and construction contract dated as of the [•] day of [•], 20[•] (which agreement, including the schedules thereto, as the same may be amended, modified, restated, supplemented or replaced, from time to time, is hereinafter called the “**Design and Construction Contract**”), which requires the Construction Guarantor to provide a guarantee of the obligations of Construction Contractor in favor of DB Co.
- C. As an inducement to City to enter the Project Agreement with DB Co, Construction Guarantor has agreed to absolutely, unconditionally and irrevocably guarantee to City, as a direct obligation, the full and prompt performance and observance by Construction Contractor of its obligations in the Design and Construction Contract, and in furtherance thereof has agreed to enter into this Guarantee.
- D. On or about the date hereof, (i) the City, DB Co and [REDACTED], acting as agent for and behalf of the Lenders (the “**Lenders’ Agent**”) intend to enter into a direct lender agreement (the “**Lenders’ Direct Agreement**”) to provide for, inter alia, certain rights in favor of the Lenders’ Agent with respect to the Project Agreement Design, and (ii) the Construction Contractor, the Lenders’ Agent and DB Co intend to enter into a direct lender agreement on or about the date hereof (the “**Construction Contractor Direct Agreement**”) to provide for, inter alia, certain rights in favor of the Lenders’ Agent with respect to the Design and Construction Contract.

NOW THEREFORE IN CONSIDERATION of the mutual covenants and agreements of the parties hereinafter contained and for other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the parties covenant and agree as follows:

1. DEFINITIONS AND INTERPRETATION

1.1 Definitions

- (a) Unless otherwise defined herein, all capitalized terms will have the meanings ascribed to them in the Project Agreement.
- (b) Unless otherwise expressly provided herein, this Guarantee shall be interpreted in accordance with Schedule 1 – Definitions and Interpretation of the Project Agreement.
- (c) For the purpose of this Guarantee, the term “**Guaranteed Obligations**” has the meaning given in Section 2.1(a).

1.2 Survival and Term

This Guarantee shall survive the termination or other expiry of the Project Agreement. The obligations under this Guarantee shall commence on Financial Close and the liability of the Guarantor hereunder shall terminate concurrently with the expiration of the Latent Defect Warranty Period, except with respect to any claims existing and for which notice has been given prior to such expiry date, in which case this Guarantee shall not terminate with respect to such claims until such claims have been satisfied in full.

2. GUARANTEE

2.1 Guarantee

- (a) Construction Guarantor does hereby absolutely, unconditionally and irrevocably guarantee jointly to each of City and DB Co (each a “**Guaranteed Party**” and collectively, the “**Guaranteed Parties**”), as a direct obligation, the full and prompt performance and observance by Construction Contractor of each and every covenant, agreement, undertaking and obligation of Construction Contractor contained in the Design and Construction Contract (collectively, the “**Guaranteed Obligations**”),
- (b) Notwithstanding any other provision of this Guarantee:
 - (i) Construction Guarantor’s undertakings and obligations are derivative of and not in excess of Construction Contractor’s obligations under the Design and Construction Contract and Construction Guarantor retains all rights, claims, defences and limitations of liability possessed by Construction Contractor under the terms of the Design and Construction Contract or arising from the parties’ performance or failure to perform thereunder and shall be entitled to assert any contractual defences that would have been available to Construction Contractor, including, for greater certainty, that the alleged non-performance or non-observance by Construction Contractor of the Guaranteed Obligations arises out of or is a result of either a City Event of Default as set out in section 37.1(a) of the Project Agreement or a DB Co event of default under the Design and Construction Contract that is triggered by a City Event of Default; and
 - (ii) in no event shall the aggregate liability of the Construction Guarantor, and any of its affiliates, employees, officers and directors, under this Guarantee exceed an amount equal

to [REDACTED]% of the Contract Price, but this limit of liability shall not extend to interest and enforcement costs payable under this Guarantee.

2.2 General Provisions Relating to the Guarantee

- (a) Each and every default in performance or observance of any of the Guaranteed Obligations by Construction Contractor shall give rise to a separate claim and cause of action hereunder, and separate claims or suits may be made and brought, as the case may be, hereunder as each such default occurs.
- (b) The Guarantee herein provided for shall be a continuing, absolute and unconditional guarantee of performance and observance of the Guaranteed Obligations and shall remain in full force and effect until each and all of the Guaranteed Obligations shall have been fully and satisfactorily discharged in accordance with the terms and provisions of the Design and Construction Contract and Construction Guarantor shall have fully and satisfactorily discharged all of its obligations under this Guarantee.
- (c) The liability of Construction Guarantor hereunder shall remain in full force and effect irrespective of and shall in no way be affected or impaired by (and no notice to Construction Guarantor shall be required in respect of):
 - (i) any compromise, waiver, renewal, extension, indulgence, amendment, addition, deletion, change in, modification of, or release of any security (including any other guarantee, letter of credit or bond) for or in respect of any of the Guaranteed Obligations;
 - (ii) any amalgamation, merger or consolidation of Construction Contractor or Construction Guarantor or any sale, lease or transfer of any of the assets of DB Co or Construction Guarantor;
 - (iii) any Change in Ownership of Construction Contractor or Construction Guarantor;
 - (iv) the termination or other expiry of the Project Agreement or the Design and Construction Contract;
 - (v) any Delay Event (it being acknowledged, however, that the performance of the Guaranteed Obligations shall be extended accordingly);
 - (vi) any change in the financial condition of Construction Contractor or Construction Guarantor;
 - (vii) any DB Co Event of Default described in Section 36.1(a)(i) of the Project Agreement or the equivalent Construction Contractor event of default under the Design and Construction Contract, or any resulting release, stay or discharge of any Guaranteed Obligation;
 - (viii) any lack or limitation of power, incapacity or disability on the part of Construction Contractor or any other irregularity, defect or informality on the part of Construction Contractor with respect to the Guaranteed Obligations;

- (ix) any provision of any laws, statutes, rules or regulations of general application in relation to suretyship or any other circumstance that might constitute, under law generally applicable to suretyship, a defence available to, or a discharge of, Construction Guarantor in respect of the Guaranteed Obligations or this Guarantee;
- (x) the exercise of any rights under the Lending Agreements, including the right of Lenders (A) to cure either: (x) any DB Co Event of Default by or on behalf of DB Co under the Project Agreement or (y) any Construction Contractor event of default by or on behalf of Construction Contractor under the Design and Construction Contractor and/or (B) to assume the obligations of DB Co and complete the Guaranteed Obligations in the manner provided in the Design and Construction Contract;
- (xi) the assignment by City in accordance with the provisions of Section 49.2 of the Project Agreement; or
- (xii) any other occurrence or circumstance whatsoever, whether similar or dissimilar to the foregoing that, under law generally applicable to suretyship, might otherwise constitute a legal or equitable defence or discharge of the liabilities of a guarantor or surety that might otherwise limit recourse against Construction Guarantor.

For the avoidance of doubt, to the extent that the occurrence of any of the circumstances described in Section 2.2(c)(v), Section 2.2(c)(x) or Section 2.2(c)(xi) above results in a modification to the scope or extent of the Guaranteed Obligations, then the Guarantor's obligations under this Guarantee shall apply in relation to the Guaranteed Obligations as so modified.

- (d) The obligations and liabilities of Construction Guarantor hereunder shall not be impaired, diminished, abated or otherwise affected by the commencement by or against Construction Contractor or Construction Guarantor of any proceedings under any bankruptcy or insolvency law or laws relating to the relief of debtors, readjustment of indebtedness, reorganizations, arrangements, compositions or extension or other similar laws.
- (e) The Guaranteed Parties shall not be bound to exhaust their recourse against Construction Contractor or others or any securities or other guarantees either Guaranteed Party may at any time hold before being entitled to performance of the Guaranteed Obligations by the Construction Guarantor and Construction Guarantor renounces all benefits of discussion and division.
- (f) It is the intent and purpose hereof that Construction Guarantor shall not be entitled to and does hereby waive any and all defences which are, under law generally applicable to suretyship, available to a guarantor, sureties and other secondary parties at law or in equity. Without limiting the generality of the foregoing, Construction Guarantor hereby waives notice of acceptance of this Guarantee and of the non-performance by Construction Contractor, diligence, presentment, protest, dishonour, demand for performance from either Guaranteed Party and notice of non-performance or failure to perform on the part of Construction Contractor and all other notices whatsoever. The Guarantee hereunder is a guarantee of performance and compliance. In order to hold Construction Guarantor liable hereunder, there shall be no obligation on the part of either Guaranteed Party at any time to demand or resort for performance to Construction Contractor, its properties or assets or to any security, property or other rights or remedies whatsoever, nor shall there be any requirement that Construction Contractor be joined as a party to any proceeding for the enforcement of any provision of this Guarantee and each Guaranteed Party shall have the

right to enforce the provisions of this Guarantee irrespective of whether or not legal proceedings or other enforcement efforts against Construction Contractor are pending, seeking resort to or realization upon or from any of the foregoing. Without limiting the foregoing, it is understood that repeated and successive demands may be made and recoveries may be had hereunder as and when from time to time, Construction Contractor shall default under or with respect to any of the Guaranteed Obligations, and that, notwithstanding recovery hereunder for or in respect of any such default, the Guarantee herein shall remain in full force and effect unamended and shall apply to each and every subsequent default.

- (g) Without prejudice to and without releasing, discharging, limiting or otherwise affecting in whole or in part the obligations and liabilities of Construction Guarantor under this Guarantee and without in any way requiring the consent of or giving notice to Construction Guarantor, the Guaranteed Parties may grant time, renewals, extensions, indulgences, releases and discharges to and accept compositions from or otherwise deal with Construction Contractor and/or Construction Guarantor or others, including any other guarantor, as the Guaranteed Parties may see fit and the Guaranteed Parties may take, abstain from taking or perfecting, vary, exchange, renew, discharge, give up, realize on or otherwise deal with security and guarantees in such manner as the Guaranteed Parties may see fit.
- (h) Neither an action or proceeding brought under this Guarantee regarding the Guaranteed Obligations nor any judgment or recovery in consequence of that action or proceeding operates as a bar or defence action or defence to any further action that may be brought under this Guarantee. Construction Guarantor acknowledges that, if judgment is granted on an action or proceeding commenced under this Guarantee, the obligations of Construction Guarantor to City do not merge with or end Construction Guarantor's obligations hereunder.
- (i) The liability of Construction Guarantor under this Guarantee shall arise forthwith after demand has been made in writing on Construction Guarantor.

3. REPRESENTATIONS AND WARRANTIES

3.1 Construction Guarantor Representations and Warranties

- (a) Construction Guarantor represents and warrants to City that as of the date of this Guarantee: **[REPRESENTATIONS TO BE UPDATED PER GUARANTOR BASED ON JURISDICTION OF INCORPORATION]**
 - (i) Construction Guarantor is a corporation incorporated and validly existing under the laws of the jurisdiction of its organization, is in good standing with the Ministry of Government and Consumer Services of Ontario with respect to the filing of annual returns, and has all the requisite corporate power and authority to own, lease and operate its properties and assets, to carry on its business as it is currently being conducted, to enter into this Guarantee and the Ancillary Documents to which it is a party and to perform its obligations hereunder and thereunder;
 - (ii) Construction Guarantor has the requisite power, authority and capacity to execute and deliver and perform this Guarantee and the Ancillary Documents to which it is a party, and to do all acts and things, and execute, deliver and perform all other agreements, instruments, undertakings and documents as are required by this Guarantee and the Ancillary Documents to which it is a party to be done, executed, delivered or performed;

- (iii) no steps or proceedings have been taken or are pending to supersede, repeal or amend its constating documents, articles or by-laws or any shareholders agreement in a manner that would materially impair or limit its ability to perform its obligations under this Guarantee or any of the Ancillary Documents to which it is party and such documents and agreements are in full force and effect as of the date hereof;
- (iv) this Guarantee and the Ancillary Documents (when executed and delivered) to which Construction Guarantor is a party, have been duly authorized, executed, and delivered by Construction Guarantor and constitute legal, valid, and binding obligations of Construction Guarantor, enforceable against Construction Guarantor in accordance with their respective terms, subject only to:
 - (A) limitations with respect to the enforcement of remedies by bankruptcy, insolvency, moratorium, winding-up, arrangement, reorganization, fraudulent preference and conveyance and other laws of general application affecting the enforcement of creditors' rights generally; and
 - (B) general equitable principles and the fact that the availability of equitable remedies is in the discretion of a court and that a court may stay proceedings or the execution of judgments;
- (v) the authorization, execution, delivery and performance by Construction Guarantor of this Guarantee and the Ancillary Documents to which it is a party do not violate or conflict with, or constitute a default under:
 - (A) its constating or organizational documents or any unanimous shareholders agreement or similar rights agreement binding on Construction Guarantor;
 - (B) any Applicable Law; or
 - (C) any covenant, contract, instrument, agreement or understanding to which it is a party or by which it or any of its properties or assets is bound or affected;
- (vi) Construction Contractor is **[an indirect wholly-owned subsidiary]** of the Construction Guarantor;

[Note to Proponents: To be updated to reflect DB Co's final structure.]
- (vii) there are, to the knowledge of its senior management, no actions, suits, proceedings, or investigations pending or threatened against Construction Guarantor, at law or in equity, before any Governmental Authority or arbitral body (whether or not covered by insurance) that individually or in the aggregate could result in any material adverse effect on the business, properties, or assets, or the condition, financial or otherwise, of Construction Guarantor or in any impairment of its ability to perform its obligations under this Guarantee or any Ancillary Documents to which it is a party, and Construction Guarantor has no knowledge of any violation or default with respect to any order, writ, injunction or decree of any Governmental Authority or arbitral body that would result in any such material adverse effect or impairment; and
- (viii) Construction Guarantor is able to meet its obligations as they generally become due.

4. NOTICES

4.1 Notices to Parties

All notices, requests, demands, instructions, certificates, consents and other communications (each being a “**Notice**”) required or permitted under this Guarantee shall be in writing (whether or not “written notice” or “notice in writing” is specifically required by the applicable provision of this Guarantee). Notices shall be served by sending the same by registered mail, facsimile or by hand, (in each case, with a copy by electronic transmission) as follows:

If to City:

City of Ottawa
110 Laurier Ave West
Ottawa, Ontario K1P 1J1
Mail code: [REDACTED]

Attention: [REDACTED]
Email: [REDACTED]

If to DB Co:

East West Connectors GP
[REDACTED]

Fax No.: [REDACTED]
Attn.: [REDACTED]

With a copy to:

[REDACTED]

Fax No.: [REDACTED]
Attn.: [REDACTED]

Email: [REDACTED]

If to Construction Guarantor:

[Address]

Fax No.: [•]
Attn.: [•]

With a copy to:

[Address]

Fax No.: **[•]**

Attn.: **[•]**

4.2 Facsimile

Where any Notice is provided or submitted to a party via facsimile, an original of the Notice sent via facsimile shall promptly be sent by regular mail or registered mail. For greater certainty, a notice given via facsimile shall not be invalid by reason only of a party's failure to comply with this Section 4.2.

4.3 Change of Address

Any party to this Guarantee may, from time to time, change any of its contact information set forth in Section 4.1 by prior Notice to the other parties, and such change shall be effective on the Business Day that next follows the recipient parties' receipt of such Notice unless a later effective date is given in such Notice.

4.4 Deemed Receipt of Notices

(a) Subject to Sections 4.4(b), (c) and (d):

- (i) a Notice given by registered mail shall be deemed to have been received on the third Business Day after mailing;
- (ii) a Notice given by hand delivery shall be deemed to have been received on the day it is delivered; and
- (iii) a Notice given by facsimile shall be deemed to have been received on the day it is transmitted by facsimile.

(b) If the party giving the Notice knows or ought reasonably to know of difficulties with the postal system which might affect negatively the delivery of mail, any such Notice shall not be mailed but shall be made or given by personal delivery or by facsimile transmission in accordance with this Article 4.

(c) If any Notice delivered by hand or transmitted by facsimile is so delivered or transmitted, as the case may be, either on a day that is not a Business Day or on a Business Day after 4:00 p.m. (recipient's local time), then such Notice shall be deemed to have been received by such recipient on the next Business Day.

(d) A Notice given by facsimile shall be deemed to have been received by the recipient on the day it is transmitted only if a facsimile transmission report (maintained by the sender) indicates that the transmission of such Notice was successful.

4.5 Service on City

Where any Notice is required to be served on the Guaranteed Parties, the obligation to serve such Notice shall be fulfilled by serving it on the Guaranteed Parties in accordance with the provisions of this Article 4.

5. GENERAL

5.1 Amendments

This Guarantee may not be varied, amended or supplemented except by an agreement in writing signed by duly authorized representatives of the parties and stating on its face that it is intended to be an amendment, restatement or other modification, as the case may be, to this Guarantee.

5.2 No Double Recovery.

5.3 Neither the City, nor DB Co, nor the Lenders' Agent shall be entitled to recover compensation or make a claim pursuant to this Guarantee in respect of any loss that the City, DB Co or the Lenders' Agent has incurred, or any failure to perform on the part of the Construction Contractor or any other guarantor, or in respect of any interest or enforcement costs, in each case to the extent that the City, DB Co or the Lenders' Agent has already been compensated in respect of such loss, failure, interest or enforcement costs (including through insurance proceeds, application of any security held by the City, DB Co or the Lenders' Agent towards satisfaction of the Guaranteed Obligations or from any third party).

5.4 Waiver

- (a) No waiver made or given by a party under or in connection with this Guarantee shall be binding or effective unless the waiver is in writing, signed by an authorized representative of the party giving such waiver, and delivered by such party to the other parties. No waiver made with respect to any right, power or remedy in one instance will be deemed to be a waiver with respect to any other instance involving the exercise of such right, power, or remedy or with respect to any other right, power, or remedy.
- (b) Failure by any party to exercise any of its rights, powers or remedies hereunder or its delay to do so shall not constitute a waiver of those rights, powers or remedies. The single or partial exercise of a right, power or remedy shall not prevent its subsequent exercise or the exercise of any other right, power or remedy.

5.5 Entire Agreement

Except where provided otherwise in this Guarantee, this Guarantee, together with the Project Agreement, and the Ancillary Documents to which it is party, constitute the entire agreement between the parties in connection with its subject matter and supersedes all prior representations, communications, negotiations and understandings, whether oral, written, express or implied, concerning the subject matter of this Guarantee, including the Request for Proposals.

5.6 Severability

Each provision of this Guarantee shall be valid and enforceable to the fullest extent permitted by law. If any provision of this Guarantee is declared invalid, unenforceable or illegal by the courts of a competent jurisdiction, such provision may be severed and such invalidity, unenforceability or illegality shall not prejudice or affect the validity, enforceability and legality of the remaining provisions of this Guarantee. If any such provision of this Guarantee is invalid, unenforceable or illegal, the parties shall, acting in good faith, promptly negotiate new provisions to eliminate such invalidity, unenforceability or illegality and to restore this Guarantee as near as possible to its original intent and effect.

5.7 Enurement

This Guarantee shall enure to the benefit of, and be binding on, the Guaranteed Parties and Construction Guarantor and their respective permitted successors and assigns. DB Co has concurrently with the execution and delivery of this Guarantee assigned to and in favour of the Lenders' Agent, and granted to the Lenders' Agent a security interest in (inter alia), all of its right, title and interest in and to this Guarantee. The Construction Guarantor acknowledges and, to the extent necessary, consents to such grant of a security interest and assignment and any further assignment or novation by the Lenders' Agent to a person who acquires any interest in the Design and Construction Contract from the Lenders' Agent. To the extent not already provided under the Lenders' Construction Contractor Direct Agreement, the Lenders' Agent shall provide notice thereof to the Guarantor. This Guarantee may not be assigned by the Construction Guarantor without the prior written consent of the Guaranteed Parties, such consent not to be unreasonably withheld.

5.8 Acknowledgement of Lenders' Construction Contractor Direct Agreement & Lender's Direct Agreement

The Construction Guarantor acknowledges the provisions of (i) the Lenders' Construction Contractor Agreement and agrees that the Lenders' Agent shall be entitled to the rights of DB Co under this Guarantee when and if the Lenders' Agent enforces the security interest referred to in Section 5.6 and (ii) the Lenders' Direct Agreement pursuant to which the City undertakes to exercise any and all rights it may have under this Guarantee only in accordance with the provisions of the Lenders' Direct Agreement.

5.9 Governing Law and Jurisdiction

- (a) This Guarantee shall be governed by and construed in accordance with the laws of Ontario and the laws of Canada applicable therein and shall be treated in all respects as an Ontario contract, without regard to conflict of laws principles.
- (b) Subject to Section 5.9(c) below, both parties hereby irrevocably attorn to the exclusive jurisdiction of the courts of the Province of Ontario and all courts competent to hear appeals therefrom.
- (c) The Parties agree that the dispute resolution procedure provided for in Schedule 27 – Dispute Resolution Procedure to the Project Agreement shall apply to any dispute under this Guarantee.

5.10 Cumulative Remedies

Except as otherwise set forth in this Guarantee, the rights, powers and remedies of each party set forth in this Guarantee are cumulative and are in addition to and without prejudice to any other right, power or remedy that may be available to such party under this Guarantee or the Project Agreement, or Ancillary Documents.

5.11 Further Assurance

Each party shall do all reasonable things, from time to time, and execute all reasonable further documents necessary to give full effect to this Guarantee.

5.12 Costs

Each party shall be responsible for paying its own costs and expenses incurred in connection with the negotiation, preparation and execution and delivery of this Guarantee.

5.13 Language of Agreement

- (a) Each of the parties acknowledges having requested and being satisfied that this Guarantee and related documents be drawn in English. Chacune des parties reconnaît avoir demandé que ce document et ses annexes soient rédigés en anglais et s'en déclare satisfaite.
- (b) For greater certainty, all correspondence, notices, drawings, test reports, certificates, specifications, information, operating and maintenance instructions, name plates, identification labels, instructions and notices to the public and staff and all other written, printed or electronically readable matter required in accordance with, or for purposes envisaged by, this Guarantee shall be in English.

5.14 Proof of Authority

The Guaranteed Parties and Construction Guarantor each reserve the right to require any person executing this Guarantee on behalf of another party to provide proof, in a form acceptable to the Guaranteed Parties or Construction Guarantor, as applicable, that they have the requisite authority to execute this Guarantee on behalf of and to bind either Guaranteed Party or Construction Guarantor, as applicable.

5.15 Counterparts

This Guarantee may be executed in one or more counterparts. Any single counterpart or a set of counterparts executed, in either case, by both parties shall constitute a full, original and binding agreement for all purposes. Counterparts may be executed either in original or faxed form provided that any party providing its signature in faxed form shall promptly forward to the other party an original signed copy of this Guarantee which was so faxed.

5.16 Joint and Several

If Construction Guarantor is comprised of more than one person, then each such person shall be jointly and severally liable for the obligations and liabilities of Construction Guarantor hereunder.

[SIGNATURE PAGES IMMEDIATELY FOLLOW]

IN WITNESS WHEREOF the Parties have executed this Guarantee as of the date first above written.

THE CITY OF OTTAWA

Per:

Name: [REDACTED]

Title: [REDACTED]

EAST WEST CONNECTORS GP

Per:

Name: [REDACTED]

Title: [REDACTED]

Per:

Name: [REDACTED]

Title: [REDACTED]

I/We have authority to bind the corporation

[CONSTRUCTION GUARANTOR]

Per:

Name:

Title:

Per:

Name:

Title:

I/We have authority to bind the corporation

SCHEDULE 30

INSURANCE TRUST AGREEMENT

THIS AGREEMENT is made as of the 24th day of April, 2019

AMONG:

THE CITY OF OTTAWA

(the “City”)

AND:

[REDACTED]

(the “Lenders’ Agent”)

AND:

EAST WEST CONNECTORS GP, [REDACTED]

(“DB Co”)

AND:

[REDACTED]

(the “Account Trustee”)

WHEREAS:

- (A) The City and DB Co have entered into the Project Agreement.
- (B) The City, the Lenders’ Agent and DB Co have entered into the Lenders’ Direct Agreement.
- (C) The City, the Lenders’ Agent and DB Co have agreed that all amounts from time to time contained in the Insurance Trust Account are to be held in trust by the Account Trustee in accordance with the terms of this Insurance Trust Agreement, and that no releases, distributions or transfers of any funds from the Insurance Trust Account shall be made other than in accordance with the terms of this Insurance Trust Agreement.

NOW THEREFORE in consideration of the mutual covenants and agreements of the Parties hereinafter contained and for other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the Parties covenant and agree as follows:

1. DEFINITIONS

In this Insurance Trust Agreement, unless the context otherwise requires:

- (a) “**Account Trustee**” has the meaning given on the first page of this Insurance Trust Agreement.
- (b) “**Appointed Representative**” has the meaning given in the Lenders’ Direct Agreement.
- (c) “**Bank**” means [REDACTED].
- (d) “**Business Day**” has the meaning given in the Project Agreement.
- (e) “**Change of Authorization Event**” has the meaning given in Section 8(a)(ii) of this Insurance Trust Agreement.
- (f) “**Change of Authorization Notice**” has the meaning given in Section 8(b)(ii) of this Insurance Trust Agreement.
- (g) “**Default Notice**” means a written notice given by the Lenders’ Agent to the Account Trustee and the City that an event of default under the Lending Agreements has occurred and is continuing.
- (h) “**Default Period**” means the period commencing on the date upon which the Account Trustee and the City receives a Default Notice and ending on the date upon which the Account Trustee and the City receives written notice from the Lenders’ Agent that the event of default which was the subject matter of the applicable Default Notice has been cured.
- (i) “**Governmental Authority**” has the meaning given in the Project Agreement.
- (j) “**Insurance Policies**” has the meaning given in Section 4 of this Insurance Trust Agreement.
- (k) “**Insurance Proceeds**” has the meaning given in Section 5(a) of this Insurance Trust Agreement.
- (l) “**Insurance Trust Account**” means [REDACTED].
- (m) “**Insurance Trust Agreement**” means this Insurance Trust Agreement.
- (n) “**City**” has the meaning given in the Project Agreement.
- (o) “**Lenders**” has the meaning given in the Project Agreement.
- (p) “**Lenders’ Agent**” has the meaning given on the first page of this Insurance Trust Agreement.
- (q) “**Lenders’ Direct Agreement**” means the Lenders’ Direct Agreement made on or about the date hereof between the City, DB Co and the Lenders’ Agent.
- (r) “**Lending Agreements**” has the meaning given in the Project Agreement.
- (s) “**Notice Period**” has the meaning given in the Lenders’ Direct Agreement.

- (t) **“Order”** has the meaning given in Section 7(k) of this Insurance Trust Agreement.
- (u) **“Party”** means any of the City, DB Co, the Lenders’ Agent or the Account Trustee, and **“Parties”** means all of the City, DB Co, the Lenders’ Agent and the Account Trustee.
- (v) **“person”** has the meaning given in the Project Agreement.
- (w) **“Project”** has the meaning given in the Project Agreement.
- (x) **“Project Agreement”** means the project agreement made on or about the date hereof between the City and DB Co.
- (y) **“DB Co”** has the meaning given on the first page of this Insurance Agreement.
- (z) **“DB Co Event of Default”** has the meaning given in the Project Agreement.
- (aa) **“Replacement Project Agreement”** has the meaning given in the Lenders’ Direct Agreement.
- (bb) **“Replacement DB Co”** has the meaning given in the Lenders’ Direct Agreement.
- (cc) **“Step-In Notice”** has the meaning given in the Lenders’ Direct Agreement.
- (dd) **“Step-In Period”** has the meaning given in the Lenders’ Direct Agreement.
- (ee) **“Trust Property”** means all of the property held in trust by the Account Trustee pursuant to this Insurance Trust Agreement, including, without limitation, the Insurance Trust Account, and all amounts from time to time contained therein, the Insurance Policies and the Insurance Proceeds.

2. INTERPRETATION

This Insurance Trust Agreement shall be interpreted according to the following provisions, unless the context requires a different meaning:

- (a) The headings in this Insurance Trust Agreement are for convenience of reference only, shall not constitute a part of this Insurance Trust Agreement, and shall not be taken into consideration in the interpretation of, or affect the meaning of, this Insurance Trust Agreement.
- (b) Unless the context otherwise requires, references to specific Sections, Clauses, Paragraphs, Subparagraphs, and other divisions are references to such Sections, Clauses, Paragraphs, Subparagraphs, or divisions of this Insurance Trust Agreement and the terms **“Section”** and **“Clause”** are used interchangeably and are synonymous.
- (c) Words importing persons or parties are to be broadly interpreted and include an individual, corporation, limited liability company, joint stock company, firm, partnership, joint venture, trust, unincorporated organization, Governmental Authority, unincorporated body of persons or association and any other entity having legal capacity, and the heirs, beneficiaries, executors, administrators or other legal representatives of a person in such capacity.

- (d) Unless the context otherwise requires, wherever used herein the plural includes the singular, the singular includes the plural, and each of the masculine, feminine and neuter genders include all other genders.
- (e) References to any standard, principle, agreement or document include (subject to all relevant approvals and any other provisions of this Insurance Trust Agreement concerning amendments) a reference to that standard, principle, agreement or document as amended, supplemented, restated, substituted, replaced, novated or assigned.
- (f) The words in this Insurance Trust Agreement shall bear their natural meaning.
- (g) References containing terms such as:
 - (i) “hereof”, “herein”, “hereto”, “hereinafter”, and other terms of like import are not limited in applicability to the specific provision within which such references are set forth but instead refer to this Insurance Trust Agreement taken as a whole; and
 - (ii) “includes” and “including”, whether or not used with the words “without limitation” or “but not limited to”, shall not be deemed limited by the specific enumeration of items but shall, in all cases, be deemed to be without limitation and construed and interpreted to mean “includes without limitation” and “including without limitation”.
- (h) In construing this Insurance Trust Agreement, the rule known as the ejusdem generis rule shall not apply nor shall any similar rule or approach to the construction of this Insurance Trust Agreement and, accordingly, general words introduced or followed by the word “other” or “including” or “in particular” shall not be given a restrictive meaning because they are followed or preceded (as the case may be) by particular examples intended to fall within the meaning of the general words.
- (i) Where this Insurance Trust Agreement states that an obligation shall be performed “no later than” or “within” or “by” a stipulated date or event which is a prescribed number of days after a stipulated date or event, the latest time for performance shall be 5:00 p.m. on the last day for performance of the obligation concerned, or, if that day is not a Business Day, 5:00 p.m. on the next Business Day.
- (j) Where this Insurance Trust Agreement states that an obligation shall be performed “on” a stipulated date, the latest time for performance shall be 5:00 p.m. on that day, or, if that day is not a Business Day, 5:00 p.m. on the next Business Day.
- (k) Any reference to time of day or date means the local time or date in Ottawa, Ontario.
- (l) Unless otherwise indicated, time periods will be strictly construed and time shall be of the essence hereof.
- (m) Whenever the terms “will” or “shall” are used in this Insurance Trust Agreement they shall be construed and interpreted as synonymous and to read “shall”.
- (n) The City, the Lenders’ Agent and DB Co covenant and agree to observe and perform their respective covenants, agreements and obligations under the provisions of the

Lenders' Direct Agreement and further covenant and agree as between them, that if there is any conflict or inconsistency between the provisions of the Lenders' Direct Agreement and this Insurance Trust Agreement, the provisions of the Lenders' Direct Agreement shall govern and prevail to the extent of such conflict or inconsistency.

3. INSURANCE TRUST ACCOUNT

- (a) Prior to the commencement of a Default Period, the Insurance Trust Account and all amounts from time to time contained therein, including interest thereon, shall be held in trust by the Account Trustee for the benefit of DB Co. During a Default Period, the Insurance Trust Account, and all amounts from time to time contained therein, shall be held in trust by the Account Trustee for the benefit of the Lenders' Agent and the Lenders, provided that, upon receipt by the Account Trustee of a Change of Authorization Notice, the Insurance Trust Account, and all amounts from time to time contained therein, shall be held in trust by the Account Trustee for the benefit of the City.
- (b) The Account Trustee shall not distribute or transfer any funds from the Insurance Trust Account other than in accordance with the terms of this Insurance Trust Agreement.
- (c) Notwithstanding any other provision of this Insurance Trust Agreement and subject to Section 3(d), the Lenders' Agent, the City, and DB Co agree that if any of them either receives any Insurance Proceeds from the Insurance Trust Account or has the right to direct the Account Trustee to advance funds in respect of any Insurance Proceeds from the Insurance Trust Account to third parties, such funds shall be directed, used or advanced only for one of the following purposes:
 - (i) the repair, reinstatement, restoration or replacement of the Confederation Line Phase 2 Project or any other assets, materials or goods necessary or desirable for the carrying out of the Works in respect of which such Insurance Proceeds have been paid;
 - (ii) the completion of the Project; or
 - (iii) indemnification for any the City loss for which the subject Insurance Proceeds were paid under the Insurance Policies (as defined below).

For greater certainty, use of any Insurance Proceeds received in respect of a claim by DB Co for delay in start-up, soft costs or business interruption may be applied in accordance with the terms of the Lending Agreements so as to enable DB Co to carry out the Works.

- (d) Notwithstanding anything in this Insurance Trust Agreement, if the City is entitled to indemnification under the Insurance Policies in respect of any loss incurred by the City, such related insurance proceeds are to be paid directly to the City by the Insurer or the Account Trustee and shall not be Insurance Proceeds subject to Section 3(c)(i) or (ii) of this Insurance Trust Agreement. For greater certainty it is understood and agreed that the City shall be required to use such proceeds for carrying out the purposes referred to in Sections 3(c)(i) and (ii) in respect of which such proceeds have been paid.

4. DELIVERY OF ORIGINAL INSURANCE POLICIES

- (a) DB Co shall deliver, or cause to be delivered, to the Account Trustee originals of all property and asset related insurance policies that DB Co is required to maintain under the Project Agreement (collectively, the “Insurance Policies”), and the Account Trustee shall hold the original copy of the Insurance Policies in trust for the benefit of each of the beneficiaries and loss payees, as the case may be, thereunder.

5. INSURANCE PROCEEDS

- (a) Subject to Section 3(d), the Account Trustee shall distribute any proceeds of any Insurance Policy that are paid over to it by any insurer, DB Co, the Lenders’ Agent or the City (the “Insurance Proceeds”) as follows:
 - (i) in the case of any property builders’ risk “All Risk” insurance, boiler and machinery insurance or property insurance policies that DB Co is required to maintain under the Project Agreement:
 - (A) if the Account Trustee has not received a Default Notice and:
 - (1) if the amount of such Insurance Proceeds, together with the aggregate of all Insurance Proceeds in respect of the assets in respect of which such Insurance Proceeds have been paid in the same calendar month, is less than \$[REDACTED], to DB Co to repair, restore or replace the assets in respect of which such Insurance Proceeds have been paid; or
 - (2) if the amount of such Insurance Proceeds, together with the aggregate of all Insurance Proceeds in respect of the assets in respect of which such Insurance Proceeds have been paid in the same calendar month, is equal to or greater than \$[REDACTED], to the Lenders’ Agent to reimburse DB Co for the costs of repairing, restoring or replacing the assets in respect of which such Insurance Proceeds have been paid; or
 - (B) if the Account Trustee has received a Default Notice, to the Insurance Trust Account to be distributed by the Account Trustee in such amounts and to such persons as the Lenders’ Agent may at any time or from time to time direct in writing, provided that, if the Account Trustee has received a Change of Authorization Notice, the Account Trustee shall release such Insurance Proceeds from the Insurance Trust Account in such amounts and to such parties as the City may at any time or from time to time direct in writing, in each case, to repair, restore or replace the assets in respect of which such Insurance Proceeds have been paid.
- (b) The Account Trustee shall distribute any excess Insurance Proceeds remaining after the distributions contemplated in Section 5(a) have been made, including, without limitation, any Insurance Proceeds held in the Insurance Trust Account:
 - (i) if the Account Trustee has not received a Default Notice, to DB Co; and

- (ii) if the Account Trustee has received a Default Notice, to such persons as the Lenders' Agent, or, following receipt by the Account Trustee of a Change of Authorization Notice, the City, may at any time or from time to time direct in writing.
- (c) Each of DB Co, the Lenders' Agent and the City shall forthwith deliver, or cause to be delivered, to the Account Trustee, any and all Insurance Proceeds it received from time to time and is not otherwise entitled to in accordance with the terms of this Insurance Trust Agreement.
- (d) The Account Trustee shall deposit to the Insurance Trust Account all amounts that are paid over to it pursuant to the Insurance Policies or otherwise by DB Co, the City or the Lenders' Agent and shall not transfer, release or distribute any such proceeds other than in accordance with this Insurance Trust Agreement.

6. ACCOUNT AGREEMENT

- (a) The Account Trustee hereby agrees to promptly provide to the Lenders' Agent all monthly statements and other information with respect to the Insurance Trust Account provided to the Account Trustee by the Bank pursuant to the relevant account agreement. The Account Trustee further agrees that it shall make such requests to the Bank for additional information with respect to the Insurance Trust Account as the Lenders' Agent may from time to time request in writing.
- (b) The Account Trustee hereby agrees to promptly provide to the City all monthly statements and other information with respect to the Insurance Trust Account provided to the Account Trustee by the Bank pursuant to the relevant account agreement. The Account Trustee further agrees that it shall make such requests to the Bank for additional information with respect to the Insurance Trust Account as the City may from time to time request in writing.

7. THE ACCOUNT TRUSTEE

- (a) The Account Trustee shall not have any duty or obligation to manage, control, use, make any payment in respect of, register, record, insure, inspect, sell, dispose of or otherwise deal with any part of the Trust Property except as expressly provided by the terms of this Insurance Trust Agreement. The Account Trustee shall carry out all written directions given by the Lenders' Agent, the City or DB Co, as applicable, in accordance with this Insurance Trust Agreement and shall not be required to exercise any discretion in exercising any of its duties under this Insurance Trust Agreement in pursuance of such written directions. The Account Trustee shall not be bound to do or take any act, action or proceeding by virtue of the powers conferred on it hereby unless and until it shall have been required to do so under the terms hereof and has received instruction, advice or direction from the Lenders' Agent, the City or DB Co, as applicable, as to the action to be taken (except with respect to actions specifically set out herein to be performed by the Account Trustee).
- (b) The Account Trustee will exercise its powers and carry out its obligations hereunder as account trustee honestly, in good faith and in the best interests of the beneficiaries hereunder and in connection therewith will exercise that degree of care, diligence, and

skill that a reasonably prudent professional trustee would exercise in comparable circumstances. Unless otherwise required by law, the Account Trustee will not be required to give bond surety or security in any jurisdiction for the performance of any duties or obligations hereunder. No provision of this Insurance Trust Agreement shall be construed to relieve the Account Trustee from liability for its own dishonesty, fraud, negligence (including, without limitation, negligence in the handling of funds), wilful misconduct, bad faith or reckless disregard of any duty hereunder.

- (c) The Account Trustee will not be subject to any liability whatsoever, in tort, contract or otherwise in connection with the Trust Property or the carrying out of its duties under this Insurance Trust Agreement to the Lenders' Agent, the Lenders, the City, DB Co or any other person for any action taken or permitted by it to be taken, or for its failure to take any action, or for not performing any act or fulfilling any duty, obligation or responsibility hereunder by reason of any occurrence beyond the control of the Account Trustee (including, but not limited to, any act or provision of any present or future law or of any Governmental Authority, any act of God or war, or the unavailability of any wire or communication facility), provided that the foregoing limitation will not apply in respect of any action or failure to act arising from or in connection with wilful misconduct, negligence or reckless disregard of duty by the Account Trustee. The Account Trustee in doing anything or permitting anything to be done in respect of the Trust Property or the carrying out of its duties under this Insurance Trust Agreement is, and will be conclusively deemed to be, acting as trustee for the beneficiaries hereunder and not in any other capacity. Except to the extent provided in this Section 7(c), the Account Trustee will not be subject to any liability for debts, liabilities, obligations, claims, demands, judgments, costs, charges or expenses against or with respect to the Trust Property, arising out of anything done or permitted by it to be done or its failure to take any action in respect of the execution of its duties hereunder and resort will be had solely to the Trust Property for the payment or performance thereof, and no other property or assets of the Account Trustee, whether owned in its personal capacity or otherwise, will be subject to levy, execution or other enforcement procedure with regard to any obligation under this Insurance Trust Agreement.
- (d) The Account Trustee shall not be required to expend or risk its own funds or otherwise incur financial liability in the performance of any of its duties hereunder, or in the exercise of any of its rights or powers hereunder, or in acting at the request or direction of the Lenders' Agent on behalf of the Lenders or of the City or of DB Co, unless it shall have received adequate indemnity or security against such risk or liability satisfactory to it.
- (e) Notwithstanding the foregoing, the Account Trustee shall be liable for any action or failure to act arising from or in connection with the dishonesty, fraud, negligence (including, without limitation, negligence in the handling of funds), wilful misconduct, bad faith or reckless disregard of any duty hereunder by the Account Trustee or any of its directors, officers or employees, or the failure to comply with the standard of care referred to in Section 7(b).
- (f) Except as otherwise provided in Sections 7(c), 7(d) and 7(e):
 - (i) the Account Trustee may rely and shall be protected in acting or refraining from acting upon any signature, resolution, certificate, statement, instrument, opinion,

report, notice, request, direction, consent, order or other paper or document reasonably believed by it in good faith to be genuine and to have been signed or presented by the proper party or parties; and

- (ii) the Account Trustee may exercise its powers and perform its duties by or through such attorneys, representatives, agents and employees as it shall appoint; and may consult with counsel, accountants and other skilled persons selected and employed or retained by it, and the Account Trustee shall not be liable for anything done, suffered or omitted in good faith by it in accordance with the written advice of such counsel, accountants or other skilled persons (provided that such advice pertains to such matters as the Account Trustee may reasonably presume to be within the scope of such person's area of competency) and not contrary to any express provision in this Insurance Trust Agreement.
- (g) DB Co hereby agrees to pay, indemnify and hold harmless the Account Trustee from and against any and all loss, liability, cost, claim and expense incurred by the Account Trustee with respect to the performance of this Insurance Trust Agreement by the Account Trustee or any of the Account Trustee's directors, officers or employees, unless arising from its or their own dishonesty, fraud, negligence (including, without limitation, negligence in the handling of funds), wilful misconduct, bad faith or reckless disregard of any duty hereunder.
- (h) Subject to the terms and conditions set forth in the Account Trustee fee letter, the Account Trustee shall receive from the Trust Property reasonable compensation for its services hereunder and shall be reimbursed by DB Co for its reasonable fees and expenses (including the disbursements and reasonable fees of counsel).
- (i) The Account Trustee agrees to look solely to DB Co, and not, except as expressly set forth herein, to the Lenders' Agent, the Lenders or the City for any claim for indemnification which may arise under this Insurance Trust Agreement.
- (j) The Account Trustee shall be responsible for keeping all appropriate books and records relating to the receipt and disbursement of all money which it receives hereunder.
- (k) If at any time the Account Trustee is served with any judicial or administrative order, judgment, decree, writ or other form of judicial or administrative process which in any way affects the Trust Property held by it hereunder (including, but not limited to, orders of attachment or garnishment or other forms of levies or injunctions or stays relating to the transfer of Trust Property) (each, an "Order"), the Account Trustee is authorized to comply therewith in any manner as it or legal counsel of its own choosing deems appropriate. The Account Trustee shall in no way be bound to call for further evidence (whether as to due execution validity or effectiveness, or the jurisdiction of any court, or as to the truth of any fact), and shall not be responsible for any loss that may be occasioned by its failing to do so. If the Account Trustee complies with any Order, the Account Trustee shall not be liable to any of the parties hereto or to any other person or entity even though such Order may be subsequently modified or vacated or otherwise determined to have been without legal force or effect. If the Account Trustee is served with any Order, it shall forthwith and, in any event, within three (3) Business Days, deliver a copy of such Order to each of the Lenders' Agent, the City and DB Co.

- (l) Unless otherwise specifically set forth herein, the Account Trustee shall proceed as soon as practicable to collect any cheques or other collection items at any time deposited hereunder. All such collections shall be subject to the Account Trustee's usual collection practices or terms regarding items received by the Account Trustee for deposit or collection. Except and to the extent provided herein, the Account Trustee shall not be required, or have any duty, to notify any person of any payment or maturity under the terms of any instrument deposited hereunder, nor to take any legal action to enforce payment of any cheque, note or security deposited hereunder, or to exercise any right or privilege which may be afforded to the holder of any such security.
- (m) In the event that the Account Trustee determines that any direction, instruction, notice or other communication given under this Insurance Trust Agreement by the Lenders' Agent or, where the Account Trustee has received a Change of Authorization Notice, the City, is ambiguous or uncertain, the Account Trustee may, in its sole discretion, refrain from taking any action other than retaining possession of the Trust Property, unless the Account Trustee has received written instructions, signed by the Lenders' Agent or, if the Account Trustee has received a Change of Authorization Notice, the City, which resolve such ambiguity or uncertainty, provided that the Account Trustee shall, forthwith upon determining that such direction, instruction, notice or other communication is ambiguous or uncertain, seek clarification from the Lenders' Agent, or where the Account Trustee has received a Change of Authorization Notice, the City, to resolve such ambiguity or uncertainty.
- (n) Prior to receipt of a Change of Authorization Notice by the Account Trustee, any instruction, notice or other communication delivered to the Account Trustee by the Lenders' Agent shall be paramount to and supersede any direction, instruction, notice or other communication from any other party to this Insurance Trust Agreement, and the Account Trustee shall comply with such direction, instruction, notice or other communication from the Lenders' Agent. After the Account Trustee has received a Change of Authorization Notice, any instruction, notice or other communication delivered to the Account Trustee by the City shall be paramount to and supersede any direction, instruction, notice or other communication from any other party to this Insurance Trust Agreement, and the Account Trustee shall comply with such direction, instruction, notice or other communication from the City.
- (o) Each of the Lenders' Agent and the City shall provide to the Account Trustee an incumbency certificate setting out the names and sample signatures of individuals authorized to give instructions to the Account Trustee hereunder. The Account Trustee shall be entitled to rely on each such incumbency certificate until a revised or replacement incumbency certificate is provided to the Account Trustee by the Lenders' Agent or the City, as applicable. The Account Trustee shall refuse to act upon any instruction given by the Lenders' Agent or the City which is signed by any person other than an individual named in the incumbency certificate provided to the Account Trustee by the Lenders' Agent or the City, as applicable, pursuant to this Section 7(o), as any such incumbency certificate may be amended, supplemented or replaced from time to time.
- (p) The Account Trustee shall be entitled to rely on, and act upon, any direction, instruction, notice or other communication provided to it hereunder which is sent to it by facsimile transmission, provided that any such direction, instruction, notice or other

communication is signed by an individual named in the incumbency certificate delivered to the Account Trustee by the Lenders' Agent or the City, as applicable, pursuant to Section 7(o).

- (q) The Account Trustee shall retain the right not to act and shall not be liable for refusing to act if, due to a lack of information or for any other reason whatsoever, the Account Trustee, in its sole judgment, determines that such act might cause it to be in non-compliance with any applicable anti-money laundering or anti-terrorist legislation, regulation or guideline. Further, should the Account Trustee, in its sole judgment, determine at any time that its acting under this Insurance Trust Agreement has resulted in its being in non-compliance with any applicable anti-money laundering or anti-terrorist legislation, regulation or guideline, then it shall have the right to resign on 10 days' written notice to DB Co and the City, or any shorter period of time as agreed to by DB Co and the City, notwithstanding the provisions of Section 7(a) of this Insurance Trust Agreement, provided that (i) the Account Trustee's written notice shall describe the circumstances of such non-compliance; and (ii) if such circumstances are rectified to the Account Trustee's satisfaction within such 10 day period, then such resignation shall not be effective.

8. LENDER'S AGENT AND CITY RIGHTS TO DIRECT

- (a) Until the first to occur of:
 - (i) the expiry of the Notice Period under the Lenders' Direct Agreement where no Step-In Notice has been delivered thereunder;
 - (ii) the expiry of the Step-In Period under the Lenders' Direct Agreement where:
 - (A) there has been no assignment to a Replacement DB Co;
 - (B) no Replacement Project Agreement has been entered into; or
 - (C) the Appointed Representative has not cured the DB Co Event of Default,

(each, a "Change of Authorization Event"), the Lenders' Agent shall, subject to Sections 3 and 4 of this Insurance Trust Agreement, have the exclusive right to direct the Account Trustee with respect to the Insurance Trust Account, the Insurance Policies and the Insurance Proceeds.
- (b) Upon the occurrence of a Change of Authorization Event:
 - (i) the Lenders' Agent shall cease to be entitled, and the City shall thenceforth be entitled, to direct the Account Trustee with respect to the Insurance Trust Account, the Insurance Policies and the Insurance Proceeds; and
 - (ii) the Lenders' Agent and the City shall jointly provide notice to the Account Trustee (a "Change of Authorization Notice") that the City shall, as of the date of such Change of Authorization Event, have the exclusive right to direct the Account Trustee with respect to the Insurance Trust Account, the Insurance Policies and the Insurance Proceeds.

9. TERMINATION

- (a) Subject to the provisions of Section 9(b), this Insurance Trust Agreement shall remain in full force and effect and be binding in accordance with and to the extent of its terms until:
 - (i) the obligations of DB Co to the Lenders' Agent and the Lenders under the Lending Agreements have been paid and performed in full and the Lenders have no further obligation to make any further advances or other credit accommodations under the Lending Agreements; and
 - (ii) the obligations of DB Co to the City have been paid and performed in full.
- (b) The Account Trustee may terminate this Insurance Trust Agreement at any time upon 60 days prior written notice to the other parties hereto, provided that no termination of this Insurance Trust Agreement by the Account Trustee shall be effective until such time as the Lenders' Agent, the City, and DB Co have entered into a replacement Insurance Trust Agreement on the same terms and conditions as this Insurance Trust Agreement with a replacement account trustee satisfactory to the Lenders' Agent, the Lenders and the City.

10. ASSIGNMENT

- (a) The Account Trustee shall not assign, transfer or otherwise dispose of any of its rights or obligations under this Insurance Trust Agreement without the prior written consent of the Lenders' Agent, the City and DB Co.

11. NOTICES

- (a) All notices, requests, demands, instructions, certificates, consents and other communications required or permitted under this Insurance Trust Agreement shall be in writing (whether or not "written notice" or "notice in writing" is specifically required by the applicable provision of this Insurance Trust Agreement) and served by sending the same by registered mail, facsimile or by hand, as follows:

If to City:

City of Ottawa
110 Laurier Ave West
Ottawa, Ontario K1P 1J1
Mail code: [REDACTED]

Attention: [REDACTED]
With an electronic copy, for information purposes only, to: [REDACTED]

If to Lenders' Agent:

[REDACTED]

Fax No.: [REDACTED]

Email: [REDACTED]
Attn.: [REDACTED]

If to DB Co:

East West Connectors GP
[REDACTED]

Attn.: [REDACTED]
Email: [REDACTED]
[REDACTED]

With a copy to:

[REDACTED]

Attn.: [REDACTED]

Email: [REDACTED]

If to Account Trustee:

[REDACTED]

Fax No.: [REDACTED]
Attn.: [REDACTED]

Email: [REDACTED]

- (b) Where any notice is provided or submitted to a Party via facsimile, an original of the notice sent via facsimile shall promptly be sent by regular mail or registered mail. For greater certainty, a notice given via facsimile shall not be invalid by reason only of a Party's failure to comply with this Section 11(b).
- (c) Any Party to this Insurance Trust Agreement may, from time to time, change any of its contact information set forth in Section 11(a) by prior notice to the other Parties, and such change shall be effective on the Business Day that next follows the recipient Party's receipt of such notice unless a later effective date is given in such notice.
- (d) Subject to Sections 11(e), 11(f) and 11(g):
 - (i) a Notice given by registered mail shall be deemed to have been received on the third Business Day after mailing;
 - (ii) a Notice given by hand delivery shall be deemed to have been received on the day it is delivered; and
 - (iii) a Notice given by facsimile shall be deemed to have been received on the day it is transmitted by facsimile.

- (e) If the Party giving the Notice knows or ought reasonably to know of difficulties with the postal system which might affect negatively the delivery of mail, any such Notice shall not be mailed but shall be made or given by personal delivery or by facsimile transmission in accordance with this Section 11.
- (f) If any Notice delivered by hand or transmitted by facsimile is so delivered or transmitted, as the case may be, either on a day that is not a Business Day or on a Business Day after 4:00 p.m. (recipient's local time), then such Notice shall be deemed to have been received by such recipient on the next Business Day.
- (g) A Notice given by facsimile shall be deemed to have been received by the recipient on the day it is transmitted only if a facsimile transmission report (maintained by the sender) indicates that the transmission of such Notice was successful.

12. AMENDMENTS

This Insurance Trust Agreement may not be varied, amended or supplemented except by an agreement in writing signed by duly authorized representatives of the Parties and stating on its face that it is intended to be an amendment, restatement or other modification, as the case may be, to this Insurance Trust Agreement.

13. WAIVER

- (a) No waiver made or given by a Party under or in connection with this Insurance Trust Agreement shall be binding or effective unless the waiver is in writing, signed by an authorized representative of the Party giving such waiver, and delivered by such Party to the other Parties. No waiver made with respect to any right, power or remedy in one instance will be deemed to be a waiver with respect to any other instance involving the exercise of such right, power, or remedy or with respect to any other right, power, or remedy.
- (b) Failure by any Party to exercise any of its rights, powers or remedies hereunder or its delay to do so shall not constitute a waiver of those rights, powers or remedies. The single or partial exercise of a right, power or remedy shall not prevent its subsequent exercise or the exercise of any other right, power or remedy.

14. FORCE MAJEURE

No party shall be liable to any other party, or held in breach of this Insurance Trust Agreement, if prevented, hindered, or delayed in the performance or observance of any provision contained herein by reason of acts of God, riots, terrorism, acts of war, epidemics, earthquakes, or any other similar causes beyond the affected party's reasonable control and where such failure in performance is not caused directly or indirectly by the affected party (including but not limited to, mechanical, electronic or communication interruptions, disruptions or failures, unless caused by the negligent or willful misconduct of the affected party). Performance times under this Insurance Trust Agreement shall be extended for a period of time equivalent to the time lost because of any delay that is excusable under this Section, provided that the affected party shall take commercially reasonable steps to mitigate or remedy the event giving rise to the delay.

15. RELATIONSHIP BETWEEN THE PARTIES

The Parties are independent contractors. This Insurance Trust Agreement is not intended to and does not create or establish between the Parties any relationship as partners, joint venturers, employer and employee, master and servant, or, except as provided in this Insurance Trust Agreement, of principal and agent.

16. ENTIRE AGREEMENT

Except where provided otherwise in this Insurance Trust Agreement, this Insurance Trust Agreement constitutes the entire agreement between the Parties in connection with its subject matter and supersedes all prior representations, communications, negotiations and understandings, whether oral, written, express or implied, concerning the subject matter of this Insurance Trust Agreement.

17. SEVERABILITY

Each provision of this Insurance Trust Agreement shall be valid and enforceable to the fullest extent permitted by law. If any provision of this Insurance Trust Agreement is declared invalid, unenforceable or illegal by the courts of a competent jurisdiction, such provision may be severed and such invalidity, unenforceability or illegality shall not prejudice or affect the validity, enforceability and legality of the remaining provisions of this Insurance Trust Agreement. If any such provision of this Insurance Trust Agreement is invalid, unenforceable or illegal, the Parties shall, acting in good faith, promptly negotiate new provisions to eliminate such invalidity, unenforceability or illegality and to restore this Insurance Trust Agreement as near as possible to its original intent and effect.

18. ENUREMENT

This Insurance Trust Agreement shall enure to the benefit of, and be binding on, each of the Parties and their respective successors and permitted transferees and assigns.

19. GOVERNING LAW AND JURISDICTION

- (a) This Insurance Trust Agreement shall be governed by and construed in accordance with the laws of Ontario and the laws of Canada applicable therein and shall be treated in all respects as an Ontario contract, without regard to conflict of laws principles.
- (b) The Parties agree that the courts of the Province of Ontario and all courts competent to hear appeals therefrom shall have exclusive jurisdiction to hear and settle any action, suit, proceeding or dispute in connection with this Insurance Trust Agreement and hereby irrevocably attorn to the exclusive jurisdiction of such courts.
- (c) [Intentionally Deleted].

20. FURTHER ASSURANCE

Each Party shall do all things, from time to time, and execute all reasonable further documents necessary to give full effect to this Insurance Trust Agreement.

21. LANGUAGE OF AGREEMENT

Each Party acknowledges having requested and being satisfied that this Insurance Trust Agreement and related documents be drawn in English. Chacune des parties reconnaît avoir demandé que ce document et ses annexes soient rédigés en anglais et s'en declare satisfaite.

22. COUNTERPARTS

This Insurance Trust Agreement may be executed in one or more counterparts. Any single counterpart or a set of counterparts executed, in either case, by all the Parties shall constitute a full, original and binding agreement for all purposes. Counterparts may be executed either in original or faxed form provided that any Party providing its signature in faxed form shall promptly forward to such Party an original signed copy of this Insurance Trust Agreement which was so faxed.

[EXECUTION PAGES IMMEDIATELY FOLLOW]

IN WITNESS WHEREOF the Parties have executed this Insurance Trust Agreement as of the date first above written.

THE CITY OF OTTAWA

Per:

Name: **[REDACTED]**

Title: **[REDACTED]**

I have authority to bind the corporation

[EXECUTION PAGE FOR INSURANCE TRUST AGREEMENT]

EAST WEST CONNECTORS GP

Per: _____

Name: [REDACTED]

Title: [REDACTED]

Per: _____

Name: [REDACTED]

Title: [REDACTED]

I/We have authority to bind the corporation.

[EXECUTION PAGE FOR INSURANCE TRUST AGREEMENT]

[REDACTED]

Per: _____

Per: _____

I/We have authority to bind the corporation

[EXECUTION PAGE FOR INSURANCE TRUST AGREEMENT]

[REDACTED]

Per: _____
Name:
Title:

Per: _____
Name:
Title:

I/We have authority to bind the corporation

[EXECUTION PAGE FOR INSURANCE TRUST AGREEMENT]

SCHEDULE 31

DB CO INFORMATION

[REDACTED]

SCHEDULE 32

[REDACTED]

**SCHEDULE 33
WORKS REPORTS**

PART 1 CURRENT PBS UPDATE Each month following Financial Close, within ten (10) Business Days following the prior month's end, DB Co shall submit a PBS Update, which shall include the following:

- (a) actual start and finish dates for completed Activities;
- (b) actual start dates, physical percent complete and remaining duration for Activities in progress;
- (c) projected sequences of Activities for future work;
- (d) revised relationships and durations for unfinished Activities, if warranted;
- (e) identify the Critical Path(s) in a Critical Path report;
- (f) show Near-Critical Path Activities; and
- (g) a PBS Update table, which shall include the following:
 - (i) added and deleted activities;
 - (ii) changes to original durations;
 - (iii) changes to constraints;
 - (iv) changes to lags;
 - (v) changes to calendar assignments; and
 - (vi) logic changes.

All changes included in the PBS Update table shall include reasoning for the change.

- 1.2 The Earned Value in a Payment Period shall match the amount eligible for claiming in the applicable Construction Period Payment Application in accordance with Schedule 21 – Construction Period Payments.
- 1.3 The PBS Update shall use the Current PBS baseline. The PBS Update shall not be used to re-baseline the Schedule. All re-baselines shall be performed in accordance with Schedule 12 – Works Scheduling Requirements.
- 1.4 The PBS Update shall remain in compliance with Table 1 of Schedule 12 – Works Scheduling Requirements.
- 1.5 DB Co shall revise the Activities within the Current PBS as appropriate to identify the current sequence of Works. If this revision causes impact on the Critical Path(s), or creates a new Critical Path(s), DB Co shall summarise the changes in the Monthly Progress Report.

- 1.6 Where Activities are divided due to changes in maximum duration, the parent activity dollar value shall be preserved across the new children.
- 1.7 The PBS Update shall at all times remain in compliance with the requirements of Schedule 12 – Works Scheduling Requirements.
- 1.8 The PBS Update shall be submitted in two electronic file formats. The first format shall be in the native file format of the software used to generate and manage the Works Schedules, which shall be the exported .XER file for the latest version of Primavera Professional Project Management (PPM). The second format shall be a word-searchable high resolution colour PDF version. Upon City's request, DB Co shall provide the details of the software and any additional software plug-ins used by DB Co, a copy of any templates, and the details for any software settings it has used in its scheduling software, such as calendar settings, user and administrative preferences, schedule settings, and any other information required to enable the City to replicate the Works Schedules submitted by DB Co using the native file formats provided by DB Co.

PART 2 MONTHLY PROGRESS REPORT The provisions of this Schedule 33 shall apply to the Monthly Progress Reports.

- 2.2 All information included in the Monthly Progress Reports related to Works Schedules shall be in accordance with the requirements of Schedule 12 – Works Scheduling Requirements.
- 2.3 Each month following Financial Close, DB Co shall submit to the City the Monthly Progress Report. DB Co shall submit the Monthly Progress Report within 10 Business Days following the prior month's end.
- 2.4 The Monthly Progress Report shall be divided by Division and shall contain a narrative with the following items:
 - (a) an executive summary describing the general status of the Works, including design, construction, and testing and commissioning activities;
 - (b) description of progress for each Division and the Project as a whole, including all phases of Works. Identify start date and completion dates on major areas of Works.
 - (c) For the requirements from 2.4(d) to 2.4(l), where there are no current actions or concerns, DB Co shall withhold the heading.
 - (d) Identification of tasks or activities which are causing delay, or may cause delay to, the Works Schedule. The Identification of tasks shall be grouped by:
 - (i) System Infrastructure;
 - (A) facilities;
 - (B) structures;
 - (C) Systems;
 - (D) tunnels;

- (E) guideway;
 - (F) LMSF; and
 - (G) roadways.
- (ii) progress of design and review (until complete); and
- (iii) progress and issues for:
 - (A) communications and public engagement;
 - (B) traffic and transit management (including upcoming road closures);
 - (C) progress for Utility Work;
 - (D) demolitions and removals;
 - (E) safety, security, and emergency management;
 - (F) property access;
 - (G) status update of all Permits, Licences, Approvals and Agreements;
 - (H) environmental monitoring and compliance status;
 - (I) status of warranty work;
 - (J) operations training in accordance with Schedule 15.2 Part 1 Article 17; and
 - (K) all testing and commissioning.
- (e) contemplated innovations, where applicable;
- (f) outstanding contractual decisions;
- (g) listing of any Variation Directive or Variation Confirmations that were identified or executed during the period from the submission of the previous month's Monthly Progress Report to the submission of the current Monthly Progress Report, including their status;
- (h) identification of problems and issues that are causing delay or may cause delay to the works schedule that arose during the current reporting period, outstanding problems and issues, and summary of resolved problems and issues;
- (i) identification of requested and/or required City actions for the next month;
- (j) advance notice of requested and/or required City actions for the next six months;
- (k) any other information specifically requested by the City on the progress of the applicable Works;

- (l) description and associated metrics to demonstrate compliance on Project elements as appropriate;
- (m) selected digital progress photographs that summarise key achievements of Project progress as outlined in the Monthly Progress Report narrative;
- (n) general summary of Works planned for the upcoming period;
- (o) summary quality assurance/quality control findings; and
- (p) a table of “Near-Critical Activities” for all Works Activities with a float of less than 10 Business Days.

2.5 The Monthly Progress Report shall also include, the following:

- (a) sustainability compliance status;
- (b) summarised quality assurance and quality control data, including:
 - (i) status until approval of each management plan. Once the relevant plan is reported as “Complete”, the plan can be removed from the following Monthly Progress Report; and
 - (ii) status until approval of Design Certificates and Construction Certificates. Once the relevant certificate is reported as “Complete”, the certificate can be removed from the following monthly report.
- (c) IMS metrics, including:
 - (i) results of monthly Integrated Management System reports, IMS Audit reports and information from the Non-Conformance Tracking System (as described in Schedule 11 - Integrated Management System Requirements), status of Internal IMS Audits and External IMS Audits;
 - (ii) identified Non-Conformances and deficiencies in ongoing Works as identified by the City or DB Co or both; and
 - (iii) threat and vulnerability actions (with summary).
- (d) health, safety, and environmental metrics, including:
 - (i) lost time injuries;
 - (ii) restricted work cases;
 - (iii) medical treatment injuries;
 - (iv) fatalities;
 - (v) near misses;

- (vi) all reportable incidents; and
 - (vii) accidents with no lost time.
- (e) community metrics, including:
 - (i) received and resolved complaints;
 - (ii) community outreach events; and
 - (iii) community involvement.
- (f) management staffing changes, deletions, and additions for DB Co (if applicable);
- (g) status of Proceeding At Risk Matters (if applicable);
- (h) status of all Submittals pursuant to the requirements of the Project Agreement;
- (i) Subcontract status, including:
 - (i) consultants;
 - (ii) Subcontracts awarded;
 - (iii) tenders;
 - (iv) involvement of social enterprises;
 - (v) apprenticeships;
 - (vi) labour report (average workforce); and
 - (vii) contracts terminated and for what cause.
- (j) DB Co shall use the data to develop, and provide to the City in an acceptable format, the following tabulated data on a monthly basis from the Financial Close date until the latest Final Completion:
 - (i) if applicable, the revised forecast cash flow in accordance with a Recovery Schedule;
 - (ii) the actual Earned Value (EV) as equal to the Activities at [REDACTED]% completion in the Current PBS;
 - (iii) the revised forecast cash flow to complete the Works in accordance with the Current PBS;
 - (iv) the overall progress expressed as a percentage of the physical work completed; and
 - (v) DB Co shall use the data to calculate the following performance indicators for inclusion in the Monthly Progress Report:

- (A) Planned Value curve from PBS-1;
 - (B) Planned Value (PV) as calculated up to the Current PBS status date;
 - (C) Earned Value (EV) as calculated up to the Current PBS status date; and
 - (D) Schedule Performance Index (SPI) = Earned Value (EV)/ Planned Value (PV), expressed as a percentage.
- (k) risk management summary, which shall include the following where applicable:
- (i) updated risk register;
 - (ii) risk response plans requiring action from the City;
 - (iii) claims;
 - (iv) liens;
 - (v) environmental issues;
 - (vi) labour;
 - (vii) outstanding disputes;
 - (viii) safety and security;
 - (ix) operational risks;
 - (x) Stakeholder risks; and
 - (xi) other risks.

2.6 The Monthly Progress Report shall include a variance section that contains:

- (a) the information provided in Section 1.1(g) in a tabular format; and
- (b) a summarized narrative that provides justification for the changes.

PART 3 MISCELLANEOUS SUBMISSIONS Where the following deliverables are submitted separately to the Monthly Progress Report, DB Co shall submit following deliverables in accordance with the timing identified in Schedule 12:

- (a) Short Duration Schedule: Micro Works Schedule
- (b) Short Duration Schedule: Testing and Commissioning Schedule
- (c) Short Duration Schedule: Schedule to Complete

3.2 The Short Duration Schedules can be provided in either hard copy or .pdf, as agreed in discussions with the City.

- 3.3 DB Co shall prepare and submit a Testing and Commissioning schedule narrative.
- 3.4 This narrative shall be provided six months prior to commencement of testing and commissioning activities, and updated following any detailed revision to the strategy.
- 3.5 DB Co shall prepare and submit a Testing & Commissioning Schedule narrative to identify the strategy to achieve:
- (a) East Substantial Completion;
 - (b) West Substantial Completion;
 - (c) East Final Completion; and
 - (d) West Final Completion (including completion of Remaining Works).
- 3.6 The Testing and Commissioning Schedule narrative shall contain:
- (a) Description of the testing philosophy and process;
 - (b) Description of the interrelationships and system interfaces within the Confederation Line East Extension and Confederation Line West Extension, and between the Confederation Line East Extension and Confederation Line West Extension and the Existing Confederation Line;
 - (c) Description of testing and commissioning sequencing to achieve each Substantial Completion and Final Completion (including completion of Remaining Works); and
 - (d) Identification of potential conflicts and challenges to achieve each Substantial Completion and Final Completion (including completion of Remaining Works).

SCHEDULE 34

MOBILITY MATTERS

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PART A MOBILITY MATTERS – BUS RAPID TRANSIT LANE CLOSURES

1. DEFINITIONS

In this Schedule 34, the following definitions shall have the following meanings:

- 1.1 **“Aggregate Actual Bus Rapid Transit Lane Closures”** or **“AABRTLCC”** means the actual number of BRT lanes, measured in hours per hour type (“Peak”, “Off Peak”, “Night”), or portions thereof that are closed for each monthly period.
- 1.2 **“Aggregate Actual Bus Rapid Transit Lane Closures Cost”** or **“AABRTLCC”** means the total cost of BRT Lane Closures, calculated to be the multiplication of number of hours of AABRTLCC and the relevant Unit Rate Price.
- 1.3 **“Aggregate Bus Rapid Transit Target Lane Closures”** or **“ABRTLCC”** means the total BRT target Lane Closures, measured in hours per hour type (“Peak”, “Off Peak”, “Night”), which,
 - (a) are set forth in the BRT Lane Closure Target Letter submitted by DB Co at Commercial Close and which has been accepted by the City; and
 - (b) include and account for all requirements of Schedule 15 - Output Specifications.
- 1.4 **“Aggregate Bus Rapid Transit Target Lane Closure Cost”** or **“ABRTLCC”** means the total cost of the target Lane Closures, calculated to be the multiplication of number of hours of ABRTLCC and the relevant Unit Rate Price, as set forth in the BRT Lane Closure Target Letter submitted by DB Co at Commercial Close and which has been accepted by the City.
- 1.5 **“BRT Lane”**, means any lane within the City of Ottawa reserved for use by buses only.
- 1.6 **“BRT Lane Closure”** means any reduction in width, obstruction, or closure of a BRT Lane to bus traffic along any segment, as a result of DB Co’s construction activities, as described below. All partial width reductions, obstructions, or closures along a segment will be considered a full Lane Closure, with the exception of localized lane shifts as described in Section 1.6 (d) below. Lane closures will be measured on a per segment, per hour basis. A maximum of one (1) BRT Lane Closure in each direction will be assessed at any given segment. **“Peak”** means Monday through Friday between the hours of 0600h – 0930h, or 1500h – 1830h. **“Night”** means the hours between 2200h – 0500h. **“Off Peak”** means all other hours not defined as “Peak” or “Night”. BRT Lane Closures will no longer be in effect once West Substantial Completion has been achieved.
 - (a) Bus rapid transit segments
 - (i) Tunney’s Pasture Station to Dominion Station (BRT-W-1);
 - (ii) Dominion Station to Sir John A MacDonald Parkway 400m west of Dominion Station (BRT-W-2);

- (iii) Sir John A MacDonald Parkway 400m west of Dominion Station to 550m north of Lincoln Fields Station (BRT-W-3); note, this segment does not have any dedicated BRT lanes;
- (iv) Sir John A MacDonald Parkway 550m north of Lincoln Fields Station to Lincoln Fields Station (BRT-W-4);
- (v) Lincoln Fields Station to Queensway Station (BRT-W-5);
 - A. Portions of this segment are common to BRT-SW-2. BRT-W-5 shall consist only of those elements that are unique to the connection between Lincoln Fields Station and Queensway Station; common elements shall be part of segment BRT-SW-2.
- (vi) Lincoln Fields Station to Iris Station (BRT-SW-2);
- (vii) Iris Station to Baseline Station (BRT-SW-1);
- (viii) Queensway Station to Pinecrest Station (BRT-W-6);
- (ix) Pinecrest Station to Bayshore Station (BRT-W-7);
- (x) Bayshore Station to Holly Acres Road (BRT-W-8);
- (xi) Holly Acres Road to Moodie LMSF (BRT-W-9)
- (xii) Blair Station to OR 174 500m east of Transitway overpass (BRT-E-1);
- (xiii) OR 174 500m east of Transitway overpass to 800m east of Montreal Road (BRT-E-2);
- (xiv) OR 174 800m east of Montreal Road to 800m east of Jeanne d’Arc (BRT-E-3); and
- (xv) OR 174 800m east of Jeanne d’Arc to Place d’Orleans Station (BRT-E-4).
- (xvi) OR 174 Place d’Orleans Station to Trim Station (BRT-E-5); note, this segment does not have any dedicated BRT lanes
- (b) DB Co shall include as a BRT Segment any BRT Lane not defined in this Schedule 34 where a need for the closure of a BRT Lane has been identified.
- (c) BRT Lane Closures will no longer be in effect for segments BRT-E-1, BRT-E-2, BRT-E-3 and BRT-E-4 once East Substantial Completion has been achieved.
- (d) Localized deviations of Transitway lanes, that do not result in an increase in travel times greater than [REDACTED] within a given BRT segment, and only where a minimum of one travel lane is provided in each direction of travel, shall not be considered “BRT Lane Closures” for the purposes of Schedule 34 - Mobility Matters.

- (i) The combined total increase in travel times due to localized deviations shall not exceed [REDACTED] simultaneously in the following combinations of BRT segments:
 - (A) BRT-W-1, BRT-W-2, BRT-W-3, BRT-W-4, BRT-W-5, BRT-W-6, BRT-W-7, BRT-W-8, BRT-W-9;
 - (B) BRT-W-1, BRT-W-2, BRT-W-3, BRT-W-4, BRT-SW-1, BRT-SW-2;
 - (C) BRT-E-1, BRT-E-2, BRT-E-3, BRT-E-4, BRT-E-5.
 - (ii) Any localized deviation causing the travel time increase to exceed [REDACTED] in any of the combinations of BRT segments noted in (i) above shall be considered as a BRT Lane Closure for the purposes of Schedule 34 – Mobility Matters.
 - (A) The combinations of BRT segments noted in (i) above shall not include BRT segments that have been permanently closed.
- 1.7 **“Bus Rapid Transit Lane Closure Adjustment” or “BRTLCA”** means the deduction which may be made by the City from DB Co (which amount will be deducted from the West Substantial Completion Payment) as calculated pursuant to Section 5 of this Part A of this Schedule 34.
- 1.8 **“Bus Rapid Transit Lane Closure Adjustment Offset” or “BRTLCAO”** means the amount of money that DB Co can use to reduce the BRTLCA, if applicable, as calculated pursuant to Section 5 of this Part A of this Schedule 34.
- 1.9 **“Bus Rapid Transit Lane Closure Analysis Report”** has the meaning given to it in Section 2.3.
- 1.10 **“Bus Rapid Transit Lane Closure Measurement and Verification Plan”** has the meaning given to it in Article 6.2 (k) of Part 7 – Traffic and Transit Management and Construction Access to Schedule 15-2 – Design and Construction Requirements of the Project Agreement. This plan shall outline the means by which the Independent Certifier shall perform their review of the lane closures as described in Section 3.5.
- 1.11 **“Bus Rapid Transit Lane Closure Target Letter”** means the letter set out in Appendix C.
- 1.12 **“Mobility Matters Review Meeting”** has the meaning given in Section 3.6.
- 1.13 **“Monthly Bus Rapid Transit Lane Closure Adjustment Contribution”** means the value for any given month that shall contribute to the Bus Rapid Transit Lane Closure Adjustment as calculated pursuant to Section 5.
- 1.14 **“Monthly Peak Hour BRT Lane Interruption Report”** means a report to be submitted on a monthly basis (at the same time as the BRT Lane Closure Analysis report) outlining all Peak Hour Bus Rapid Transit Interruptions and their costs, as defined in Section 6.
- 1.15 **“Peak Hour Bus Rapid Transit Interruptions”** means unplanned interruptions to the operation of the BRT during Peak periods by either an unplanned event or a planned event exceeding the

time restrictions granted. For further clarity, Peak Hour BRT Interruptions would only be for interruptions caused by the actions of DB Co or their subcontractors. Peak Hour BRT Interruptions as defined above are not included in AABRTLCC.

- 1.16 “**Unit Rate Price**” means the price for each BRT Segment of BRT Lane Closure as set in Appendix B. The prices are hourly rates, based on time of day.

2. CONTENT AND FORMAT OF THE LANE CLOSURE ANALYSIS REPORT

- 2.1 DB Co shall quantify its projected occupation of BRT Lanes on City roadways on the basis of the formulae and procedures contained in this Schedule 34. DB Co shall monitor its occupation of the BRT lanes on a monthly basis.
- 2.2 BRT Lane Closures on Highway 417 shall not be considered as part of this Schedule 34, except for Peak Hour Bus Rapid Transit Interruptions as described in Section 6.
- 2.3 DB Co shall deliver to the City a report summarizing the findings of AABRTLCC (the “**BRT Lane Closure Analysis Report**”), on a monthly basis, no later than 5 Business Days after the end of each month.
- 2.4 DB Co shall include copies of all documents required to fully support the BRT Lane Closure Analysis Report.
- 2.5 The BRT Lane Closure Analysis Report shall, at a minimum, include the following information for the relevant month:
- (a) using the template shown in Appendix A to this Schedule, a summary of target and actual BRT Lane Closures by BRT Segment, time, date and duration, indicating Peak, Off Peak or Night, including any exceptional changes forecasted for the upcoming monthly period (being changes of plus or minus [REDACTED]% in any BRT segment, for Peak, Off Peak or Night periods);
 - (b) projected BRT Lane Closures for the remaining duration of the Construction Period along with trends and potential risks associated with these BRT Lane Closures;
 - (c) accurate and precise data in support of the items set out in Sections 2.5(a) and 2.5(b);
 - (d) presentation of AABRTLCC and the AABRTLCC for the applicable month, and on a cumulative basis as of the applicable month;
 - (e) establishment of a basis for continued monitoring of BRT Lane Closures and adjustments to the AABRTLCC;
 - (f) outline of any outstanding issues from any previous BRT Lane Closure Analysis Reports and mitigating strategies to address those issues;
 - (g) adjustments to the AABRTLCC and the AABRTLCC for the applicable month, and on a cumulative basis as of the applicable month;

- (h) DB Co's estimate of the Monthly BRT Lane Closure Adjustment Contribution;
- (i) measurement and verification of BRT Lane Closures in accordance with Lane Closure Measurements and Verification Plan in Section 3.5; and
- (j) summary tables from all previous BRT Lane Closure Analysis Reports delivered by DB Co to the City.

2.6 Following the review and acceptance of the final BRT Lane Closure Analysis Report by the City Representative, the data set out in the BRT Lane Closure Analysis Report will be used by the City to determine the Monthly BRT Lane Closure Adjustment Contribution.

3. PROCEDURES FOR DETERMINING MONTHLY BRT LANE CLOSURE ADJUSTMENT CONTRIBUTIONS

- 3.1 The City shall not consider the following closures of BRT Lanes to be BRT Lane Closures for the purposes of this Schedule 34, and such closures of lanes shall not contribute to the Monthly Lane Closure Adjustment Contribution:
- a) where an existing BRT Lane width is less than the minimum lane width requirements during construction, specified Schedule 15-2 Part 7 Table 7-1.3, maintaining the lane as open for BRT operations at its existing width.
- 3.2 The City shall assess DB Co for the cost of BRT Lane Closures based on the total BRT Lane Closures that occur during Peak, Off Peak, and Night hours. All BRT Lane Closures shall be included in the calculation of the Monthly BRT Lane Closure Adjustment Contribution as provided in Section 5.
- 3.3 The ABRTTLC shall form the benchmark for calculating the BRT Lane Closure cost with respect to the AABRTLCC. The AABRTLCC shall be used to calculate the Monthly BRT Lane Closure Adjustment Contribution. The ABRTTLC shall not be amended, altered or adjusted except by the process described in Section 4.
- 3.4 [Not used]
- 3.5 The measurement and verification of BRT Lane Closure shall be performed by the Independent Certifier. No later than 30 days prior to the initial planned BRT Lane Closure within any BRT Segment, DB Co shall provide the City with a BRT Lane Closure Measurement and Verification Plan. All subsequent BRT Lane Closure Analysis Reports are to be based on this plan.
- 3.6 No later than 5 Business Days following the submission of the BRT Lane Closure Analysis Report (or as agreed to between the Parties), DB Co and the City shall convene a review meeting (the “**Mobility Matters Review Meeting**”) to be attended by the DB Co Representative and the City Representative. At the Mobility Matters Review Meeting, DB Co shall present the BRT Lane Closure Analysis Report to the City. The City and DB Co shall discuss the Aggregate Actual BRT Lane Closure for the preceding period, as well as review any proposed “localized deviations” as described in Section 1.6 (d). DB Co’s measurement and verification of BRT Lane Closure(s) shall be reviewed and confirmed by the City Representative.
- 3.7 DB Co shall assist the City Representative by providing information with respect to BRT Lane Closures and access to the BRT Lane Closure records, and by other means as may reasonably be required to confirm the information in the BRT Lane Closure Analysis Report. The City shall promptly give Notice to DB Co of the details of any disagreement with respect to all or any aspect of the BRT Lane Closure Analysis Report, and the Parties shall then seek to agree to any matters in dispute. The process shall be as follows:
- (a) AABRTLCC and AABRTLCC shall be determined at the Mobility Matters Review Meeting;

- (b) No later than 20 Business Days following each Mobility Matters Review Meeting, or within such period as may be otherwise agreed between the City Representative and the DB Co Representative, acting reasonably:
 - (i) The City shall confirm their acceptance of all or any aspect of the BRT Lane Closure Analysis Report; and
 - (ii) Subject to Section 4, DB Co and the City shall agree to any adjustments to the ABRTTLC and ABRTTLCC.
 - (c) If the City disputes DB Co's estimate of the Monthly BRT Lane Closure Adjustment Contribution in the BRT Lane Closure Analysis Report, the City shall, no later than 10 Business Days following receipt of the BRT Lane Closure Analysis Report, or within such other period as may be agreed by the City Representative and DB Co, acting reasonably, submit an account to DB Co indicating the difference in calculation between the City's estimate and DB Co's estimate of the Monthly BRT Lane Closure Adjustment Contribution. If either DB Co or the City wish to dispute any account presented pursuant this Section 3.7(c), they must do so by written Notice to the other Party no later than 10 Business Days following receipt of such account. The City Representative and the DB Co Representative shall use reasonable efforts to resolve the dispute for an additional 10 Business Days. If there is no agreement within such 10 Business Days, then either Party may refer the matter to the Dispute Resolution Procedure.
 - (d) If neither Party objects in accordance with Section 3.7(c), or, following final determination of the disputed account in accordance with Section 3.7(c), DB Co shall use the relevant Monthly BRT Lane Closure Adjustment Contribution to determine the BRT Lane Closure Adjustment. The BRT Lane Closure Adjustment shall be shown as a separate item within the invoice for the West Substantial Completion Payment.
- 3.8 For the purpose of calculating the BRT Lane Closure Adjustment, the calculation shall be completed no later than 60 days prior to the Scheduled West Substantial Completion Date (or at a later date as mutually agreed to by the City Representative and DB Co), comparing the total AABRTLCC of each BRT Segment for the entire Construction Period to the total ABRTTLCC for that same road BRT segment for the entire Construction Period. If, subsequent to this calculation being completed, there is a change to the Scheduled West Substantial Completion Date, DB Co shall amend their Lane Closure Target (in accordance with Section 4 of this Schedule 34) and the BRT Lane Closure Adjustment. For clarity, over-performance of any one BRT Segment cannot be added to underperformance of any other, with the exception of the BRT Lane Closure Adjustment Offset, as outlined in Section 5.2 below.

4. PROCESS FOR AMENDING THE AGGREGATE TARGET LANE CLOSURE AND ASSOCIATED COST

- 4.1 In all cases, changes to the ABRTTLC and ABRTTLCC must be consistent with the principles outlined in the TTMP. Changes proposed must provide reference to the TTMP or a site-specific Traffic Control Plan (as defined in Schedule 15-2 Part 7).
- 4.2 DB Co and the City shall, acting reasonably, agree to make any adjustments to the ABRTTLC, ABRTTLCC, AABRTLCC and AABRTLCC, but only in the event of changes implemented due to

an amendment of the Project Agreement, a Relief Event that is also a Delay Event pursuant to Section 32.1 (a) (xi) of the Project Agreement, or a Variation that would cause BRT Lane Closure changes. The City, at its discretion, may allow a revision to the Target Letters to reflect an agreed-upon change in Project Schedule, in the absence of an amendment of the Project Agreement or a Variation.

- 4.3 The Party requesting an amendment to the ABRTTLC in accordance with Section 4.2 shall initiate a Variation in accordance with Schedule 22 – Variation Procedure. The amended TTMP shall include a detailed analysis of the impacts to traffic and transit services, including an analysis of BRT Lane Closure requirements. The amended TTMP shall include a recommendation regarding amendments to the ABRTTLC. Both the City and DB Co shall agree to the amended ABRTTLC no later than 20 Business Days following receipt of amended TTMP. If there is no agreement within a further 10 Business Day period, then either Party may refer the matter to the Dispute Resolution Procedure.

5. CALCULATION OF MONTHLY BRT LANE CLOSURE ADJUSTMENT CONTRIBUTION AND LANE CLOSURE ADJUSTMENT

5.1 Comparing AABRTLCC to ABRTTLCC:

- (a) After the acceptance of the final BRT Lane Closure Analysis Report described in Section 2 and prior to the Scheduled West Substantial Completion Date, DB Co shall compare the total AABRTLCC for each BRT Segment to the total ABRTTLCC for each BRT Segment, and if the AABRTLCC is more than [REDACTED]% greater than the ABRTTLCC, for any BRT Segment, then DB Co shall calculate the Monthly BRT Lane Closure Adjustment Contribution set out in Section 5.3 and deduct the amount of the BRT Lane Closure Adjustment from the West Substantial Completion Payment to be made in accordance with the Project Agreement. For clarity, the Lane Closure Adjustment deduction from the West Substantial Completion Payment shall not be subject to the limitations set out in Article 47.4 of the Project Agreement.
- (b) If the AABRTLCC is greater than [REDACTED]% of the ABRTTLCC for any monthly period for any BRT Segment, then DB Co shall submit a detailed remediation plan no later than 10 Business Days following the end of the month to explain how it will reduce the AABRTLCC for the BRT Segment in subsequent period(s), such that the variance will not exceed the [REDACTED]% for the subsequent periods. DB Co shall present progress and achievements of the remediation plan at subsequent Mobility Matters Review Meeting(s).

5.2 The formula to calculate the BRT Lane Closure Adjustment Offset is set out in this Section 5.2.

- (a) For the purposes of Section 5.2 (b), in respect of all BRT Segments for all months:

A = the summation of the AABRTLCC for all segments and all months

T = the summation of the ABRTTLCC for all segments and all months

- (b) The BRT Lane Closure Adjustment Offset for the entire project shall be calculated as follows:

- (i) $BRTLCAO = \$[REDACTED]$;
- (ii) $BRTLCAO$ must be greater than or equal to $\$[REDACTED]$;
- (iii) If $A > T$, then $BRTLCAO$ is $\$[REDACTED]$.

5.3 The formulae to calculate the Monthly BRT Lane Closure Adjustment Contribution are set out in this Section 5.3.

- (a) For the purposes of Section 5.3(b), in respect of each BRT Segment:

$A =$ the AABRTLCC for each BRT Segment in the relevant month

$T =$ the ABRTTLCC for each BRT Segment in the relevant month

- (b) In respect of any given month during the period leading up to West Substantial Completion for each BRT Segment:

(i) If $A > [REDACTED]T$, then Monthly BRT Lane Closure Adjustment Contribution = $[REDACTED]$;

(ii) If $A < T$, then Monthly BRT Lane Closure Adjustment Contribution = $[REDACTED]$

(iii) If $[REDACTED]T \geq A \geq T$, then Monthly BRT Lane Closure Adjustment Contribution = $\$[REDACTED]$

(iv) if the sum of all Monthly BRT Lane Closure Adjustment Contributions in each month prior to West Substantial Completion $< \$[REDACTED]$, then BRT Lane Closure Adjustment for that BRT Segment = $\$[REDACTED]$; and

(v) if the sum of all Monthly BRT Lane Closure Adjustment Contributions in each month prior to West Substantial Completion $> \$[REDACTED]$, then BRT Lane Closure Adjustment for that BRT Segment = the sum of all Monthly BRT Lane Closure Adjustment Contributions in each month prior to West Substantial Completion.

- (c) The BRT Lane Closure Adjustment for the project shall be equal to the sum of the BRT Lane Closure Adjustment for each segment, minus the BRT Lane Closure Adjustment Offset. If the calculated BRT Lane Closure Adjustment for the project is less than $\$[REDACTED]$, then it shall equal $\$[REDACTED]$.

6. PEAK HOUR BRT LANE INTERRUPTIONS

6.1 The City will assess DB Co for Peak Hour BRT Lane Interruptions at a cost of $\$[REDACTED]$ per minute.

6.2 Any time assessed in the cost associated with Peak Hour BRT Lane Interruptions will not be included in calculations of BRT Lane Closure Adjustments.

- 6.3 The City shall assess DB Co for the cost of Peak Hour BRT Lane Interruptions. All Peak Hour BRT Lane Interruptions shall be formulated into a Monthly Peak Hour BRT Lane Interruption Report to be submitted by DB Co with the BRT Lane Closure Analysis Report.
- 6.4 Peak Hour BRT Lane Interruptions shall not be applicable after a BRT segment has been permanently closed.
- 6.5 DB Co shall calculate the cost of Peak Hour BRT Interruptions and deduct this amount from the Construction Period Payment or West Substantial Completion Payment, as applicable, following the most recent Monthly Peak Hour BRT Lane Interruption report in accordance with Project Agreement Article 4 – Payment, and Schedule 21 – Construction Period Payments.
- 7. BRT CLOSURES FOR CONVERSION TO LRT**
- 7.1 When the full BRT Lane Closures occurs for conversion to LRT, only two (2) BRT Lane Closures (one in each direction) will be applied for each segment that is closed.
- 8. APPLICATION**
- 8.1 The Lane Closure provisions of this Schedule 34 will no longer be in effect once West Substantial Completion has been achieved.

PART B MOBILITY MATTERS – LANE CLOSURES

1. DEFINITIONS

In this Schedule 34, the following definitions shall have the following meanings:

- 1.1 “**Aggregate Actual Lane Closures**” or “**AALC**” means the actual number of lanes, or portions thereof that are closed for each monthly period, measured in hours per hour type (“Peak”, “Off Peak”, “Night”).
- 1.2 “**Aggregate Actual Lane Closures Cost**” or “**AALCC**” means the total cost of Lane Closures.
- 1.3 “**Aggregate Target Lane Closures**” or “**ATLC**” means the total target Lane Closures, measured in hours per hour type (“Peak”, “Off Peak”, “Night”), which,
 - (a) are set forth in the Lane Closure Target Letter; and
 - (b) include and account for all requirements of Schedule 15 - Output Specifications.
- 1.4 “**Aggregate Target Lane Closure Cost**” or “**ATLCC**” means the total cost of the target Lane Closures, as set forth in the Lane Closure Target Letter submitted by DB Co at Commercial Close and which has been accepted by the City.
- 1.5 “**Arterial**” has the meaning given in the City of Ottawa’s Road Classification System (City of Ottawa).
- 1.6 “**Blocks**” are the physical units upon which Lane Closure costs are to be calculated for the purposes of this Schedule 34, and
 - (a) for any streets proposed to be occupied by DB Co are delineated between two adjacent intersections, irrespective of whether the intersections are signalized or unsignalized.
 - (b) a block will start and end at the start and end of the intersections on either side of it, but not include the intersections themselves.
 - (c) On OR 174, blocks are delineated between adjacent interchanges, at the mid-point of the road crossing OR 174, and shall include mainline lanes and ramps.

For clarity, a laneway opening shall not constitute an intersection for the purposes of this Section 1.6.
- 1.7 “**Collector**” has the meaning given in the City of Ottawa’s Road Classification System (City of Ottawa).
- 1.8 “**Federal Roadways**” means roadways under the ownership and operation of the Federal Government or the National Capital Commission).
- 1.9 “**High Cost Measures**” means, in respect of a monthly period, discrete Lane Closure saving measures that incur capital expenditure greater than [REDACTED]% of the discrete Lane Closure savings cost.

1.11 **“Lane Closure” or “Lane Closures”** means any reduction in width, obstruction, or closure of a lane in any Block, as a result of the Works, to bus or vehicular traffic or parking and loading between two intersecting streets, including tapers, with the exception of where an equivalent facility to the one that has been closed has been provided, in accordance with Section 1.11 (g) below. All partial width reductions, obstructions, or closures within any Block will be considered as a full Lane Closure. Lane Closures will be measured on a per Block, per hour basis. **“Peak”** means Monday through Friday between the hours of 0630h – 0930h, or 1500h – 1830h. **“Night”** means the hours between 2200h – 0500h. **“Off Peak”** means all other hours not defined as “Peak” or “Night”. Travel lanes shall be classified as Arterial, Major Collector, Collector, Local, City Freeway (OR 174), or Federal, based on the City’s Transportation Master Plan, or if they are federally owned. The following rules apply to Lane Closures:

- (a) Lane Closures will no longer be in effect once East or West Substantial Completion (as applicable) has been achieved, or once closed lanes have been reopened in their ultimate configuration;
- (b) lanes that have limited openings such as “local traffic only” shall be considered not available for use for the purpose of this Section 1.11;
- (c) any reduction in width, obstruction, or closure of a lane, taking place before West Substantial Completion, that is solely as a result of a Utility Company carrying out activities with respect to its own new Utility Company Infrastructure following the handback of the applicable new Utility Company Infrastructure to such Utility Company shall be deemed not to constitute a Lane Closure or contribute to any Lane Closure for the purposes of this Schedule 34;
- (d) any reduction in width, obstruction, or closure of a lane that is solely the result of self-performed Utility Work by a Category 1 Utility Company shall not contribute to any Lane Closure for the purposes of this Schedule 34;
- (e) reduction in width, obstruction, or closure of an on-street bicycle lane shall not constitute a “Lane Closure” for the purposes of this Schedule 34, provided that the traffic lane adjacent to the closed bicycle lane meets the required width for a “shared lane” as outlined in Schedule 15-2 Part 7 Table 7-1.3;
- (f) Lane Closures shall not apply to open travel lanes that are reduced in width from their existing width where such reduced widths are specifically prescribed in Schedule 15-2 Part 2 Article 6 or Schedule 15-2 Part 7;
- (g) where the traffic management associated with a lane closure provides an equivalent facility to the one closed with respect to a) vehicular level of service, b) truck level of service, c) transit level of service, d) lane width, e) posted speed, and f) on-road cycling facilities, such a lane closure shall not be considered a “Lane Closure” for the purposes of this Schedule 34; and
- (h) where a roadway’s ultimate configuration has fewer total lanes than its configuration at Financial Close, the affected road segments shall consider the difference in number of lanes as “closed” until East or West Substantial Completion (as applicable), even if the roadway’s ultimate configuration is achieved prior to East or West Substantial Completion.

- 1.12 **“Lane Closure Adjustment”** or **“LCA”** means the deduction which may be made by The City from DB Co (which amount will be deducted from the West Substantial Completion Payment) as calculated pursuant to Section 5.
- 1.13 **“Lane Closure Analysis Report”** has the meaning given to it in Section 2.3.
- 1.14 **“Lane Closure Measurement and Verification Plan”** has the meaning given to it in Section 6.2 (j) of Part 7 – Traffic and Transit Management and Construction Access to Schedule 15-2 – Design and Construction Requirements. This plan shall outline the means by which the Independent Certifier shall perform their review of the lane closures as described in Section 3.6.
- 1.15 **“Lane Closure Target Letter”** means the letter set out in Appendix F.
- 1.16 **“Left Turn Lane Closure”** means any reduction in width, obstruction, or closure of an exclusive left turn lane within the Road Sections, of Arterial or Collector road classification, at the Site, such that the lane is not available for use by the public due to the Works. For clarity, lanes that have limited openings such as “local traffic only” shall be considered not available for use by the public for the purposes of this Section 1.14.
- 1.17 **“Local”** has the meaning given in City of Ottawa’s Road Classification System (City of Ottawa).
- 1.18 **“Major Collector”** has the meaning given in the City of Ottawa’s Road Classification System (City of Ottawa).
- 1.19 **“Mobility Matters Review Meeting”** has the meaning given in Section 3.7.
- 1.20 **“Monthly Lane Closure Adjustment Contribution”** means the value for any given month that shall contribute to the Lane Closure Adjustment as calculated pursuant to Section 5.
- 1.21 **“Monthly Peak Hour Lane Interruption Report”** means a report to be submitted on a monthly basis (at the same time as the Lane Closure Analysis report) outlining all Peak Hour Lane Interruptions and their costs, as defined in Section 6.
- 1.22 **“Peak Hour Lane Interruptions”** means unplanned interruptions to the operation of roadway lanes, excluding BRT lanes, during Peak periods by either an unplanned event or a planned event exceeding the time restrictions granted. For further clarity, Peak Hour Lane Interruptions would only be for interruptions caused by the actions of DB Co or their subcontractors. Peak Hour Lane Interruptions as defined above are not included in AALC.
- 1.23 **“Right Turn Lane Closure”** means any reduction in width, obstruction, or closure of an exclusive right turn lane within the Road Sections, of Arterial or Collector road classification, at the Site, such that it is not available for use by the public due to the Works. For clarity, lanes that have limited openings such as “local traffic only” shall be considered “not available for use by the public” for the purposes of this Section 1.23.
- 1.24 **“Road Sections”** means the defined portions of the Site where Works are to be undertaken in which the Unit Rate Prices for Lane Closure are to be applied for any Lane Closure, Left Turn Lane Closure or Right Turn Lane Closure. Each of the Road Sections has a Unit Price structure for Lane Closure costs per Block, defined in Appendix E to this Schedule, and based on the

City's roadway classification. Any portion of an individual roadway requiring Lane Closures shall be considered to be a Road Section. A Road Section can be a single isolated block, or a continuous stretch of adjacent blocks having the same roadway classification. All Road Sections are to be identified in the monthly Lane Closure Analysis Reports.

1.25 “**Traffic and Transit Management Plan**” or “**TTMP**” means the plan for the manner in which traffic and transit will be managed during construction activities and the method used to determine the magnitude of the impacts.

1.26 “**Unit Rate Price**” for each Lane Closure, Left Turn Lane Closure or Right Turn Lane Closure means the prices for each Block of each Road Section, and for each type of lane, as set out in Appendix E. The prices are hourly rates.

2. CONTENT AND FORMAT OF THE LANE CLOSURE ANALYSIS REPORT

2.1 DB Co shall quantify its projected occupation of lanes on City roadways on the basis of the formulae and procedures contained in this Schedule 34. DB Co shall monitor its occupation of the lanes on a monthly basis.

2.2 Lane closures on Highway 417 and its interchange ramps shall not be considered as part of this Schedule 34.

2.3 DB Co shall deliver to the City a report summarizing the findings of AALC (the “**Lane Closure Analysis Report**”), on a monthly basis, no later than 5 Business Days after the end of each month.

2.4 DB Co shall include copies of all documents required to fully support the Lane Closure Analysis Report.

2.5 The Lane Closure Analysis Report shall, at a minimum, include the following information for the relevant month:

- (a) using the template shown in Appendix D to this Schedule, a summary of target and actual Lane Closures by Road Section and breakdown by road classification (Arterial, Major Collector, Collector, Local), location, time, date and duration, indicating Peak, Off Peak or Night, including any exceptional changes forecasted for the upcoming monthly period (being changes of plus or minus [REDACTED]% in any Road Section, for Peak, Off Peak or Night periods);
- (b) projected Lane Closures for the remaining duration of the Construction Period along with trends and potential risks associated with these Lane Closures;
- (c) accurate and precise data in support of the items set out in Sections 2.5(a) and 2.5(b);
- (d) presentation of AALC and the AALCC for the applicable month, and on a cumulative basis as of the applicable month;
- (e) establishment of a basis for continued monitoring of Lane Closures and adjustments to the AALC;

- (f) outline of any outstanding issues from any previous Lane Closure Analysis Reports and mitigating strategies to address those issues;
- (g) adjustments to the ATLC and the ATLCC for the applicable month, and on a cumulative basis as of the applicable month;
- (h) DB Co's estimate of the Monthly Lane Closure Adjustment Contribution;
- (i) measurement and verification of Lane Closures in accordance with Lane Closure Measurements and Verification Plan in Section 3.6; and
- (j) summary tables from all previous Lane Closure Analysis Reports delivered by DB Co to the City.

2.6 Following the review and acceptance of the final Lane Closure Analysis Report by the City Representative, the data set out in the Lane Closure Analysis Report will be used by the City to determine the Monthly Lane Closure Adjustment Contribution.

3. PROCEDURES FOR DETERMINING MONTHLY LANE CLOSURE ADJUSTMENT CONTRIBUTIONS

- 3.1 The City shall not consider the following closures of lanes to be Lane Closures for the purposes of this Schedule 34, and such closures of lanes shall not contribute to the Monthly Lane Closure Adjustment Contribution:
- a) where an existing lane width is less than the minimum lane width requirements during construction, specified in Schedule 15-2 Part 7 Table 7-1.3, maintaining the lane as open for traffic operations at its existing width.
- 3.2 DB Co shall not use lane configurations that will remain after West Substantial Completion to determine Lane Closures. For clarity, the lane configuration of each roadway as of Financial Close shall be the configuration used to calculate Lane Closures.
- 3.3 The City shall assess DB Co for the cost of Lane Closures based on the total Lane Closures that occur during Peak, Off Peak, and Night hours. All Lane Closures shall be included in the calculation of the Monthly Lane Closure Adjustment Contribution as provided in Section 5.
- 3.4 The ATLC shall form the benchmark for calculating the Lane Closure cost with respect to the AALC. The AALCC shall be used to calculate the Monthly Lane Closure Adjustment Contribution. The Lane Closure Target shall not be amended, altered or adjusted except by the process described in Section 4.
- 3.5 [Not used]
- 3.6 The measurement and verification of Lane Closure shall be performed by the Independent Certifier. No later than 30 days prior to the initial Lane Closure within any Road Section, DB Co shall provide the City with a Lane Closure Measurement and Verification Plan. All subsequent Lane Closure Analysis Reports are to be based on this plan.

- 3.7 No later than 5 Business Days following the submission of the Lane Closure Analysis Report (or as agreed to between the Parties), DB Co and the City shall convene a review meeting (the “**Mobility Matters Review Meeting**”) to be attended by the DB Co Representative and the City Representative. At the Mobility Matters Review Meeting, DB Co shall present the Lane Closure Analysis Report to the City. The City and DB Co shall discuss the Aggregate Actual Lane Closure for the preceding period, as well as review any proposed “equivalent facilities” as described in Section 1.11(g). DB Co’s measurement and verification of Lane Closure(s) shall be reviewed and confirmed by the City Representative.
- 3.8 DB Co shall assist the City Representative by providing information with respect to Lane Closures and access to the Lane Closure records, and by other means as may reasonably be required to confirm the information in the Lane Closure Analysis Report. The City shall promptly give Notice to DB Co of the details of any disagreement with respect to all or any aspect of the Lane Closure Analysis Report, and the Parties shall then seek to agree to any matters in dispute. The process shall be as follows:
- (a) AALC and AALCC shall be determined at the Mobility Matters Review Meeting;
 - (b) No later than 20 Business Days following each Mobility Matters Review Meeting, or within such period as may be otherwise agreed between the City Representative and the DB Co Representative, acting reasonably:
 - (i) The City shall confirm their acceptance of all or any aspect of the Lane Closure Analysis Report; and
 - (ii) Subject to Section 4, DB Co and the City shall agree to any adjustments to the ATLC and ATLCC.
 - (c) If the City disputes DB Co’s estimate of the Monthly Lane Closure Adjustment Contribution in the Lane Closure Analysis Report, the City shall, no later than 10 Business Days following receipt of the Lane Closure Analysis Report, or within such other period as may be agreed by the City Representative and DB Co, acting reasonably, submit an account to DB Co indicating the difference in calculation between the City’s estimate and DB Co’s estimate of the Monthly Lane Closure Adjustment Contribution. If either DB Co or the City wish to dispute any account presented pursuant this Section 3.8(c), they must do so by written Notice to the other Party no later than 10 Business Days following receipt of such account. The City Representative and the DB Co Representative shall use reasonable efforts to resolve the dispute for an additional 10 Business Days. If there is no agreement within such 10 Business Days, then either Party may refer the matter to the Dispute Resolution Procedure;
 - (d) If neither Party objects in accordance with Section 3.8(c), or, following final determination of the disputed account in accordance with Section 3.8(c), DB Co shall use the relevant Monthly Lane Closure Adjustment Contribution to determine the Lane Closure Adjustment. The Lane Closure Adjustment shall be shown as a separate item within the invoice for the West Substantial Completion Payment;
- 3.9 For the purpose of calculating the Lane Closure Adjustment, the calculation shall be completed no later than 60 days prior to the Scheduled West Substantial Completion Date (or at a later date as mutually agreed to by the City Representative and DB Co), comparing the total AALCC of

each Road Section for the entire Construction Period to the total ALTCC for that same Road Section for the entire Construction Period. If, subsequent to this calculation being completed, there is a change to the Scheduled West Substantial Completion Date, DB Co shall amend their Lane Closure Target (in accordance with Section 4) and the Lane Closure Adjustment. For clarity, over-performance of any one Road Section cannot be added to underperformance of any other.

4. PROCESS FOR AMENDING THE AGGREGATE TARGET LANE CLOSURE AND ASSOCIATED COST

- 4.1 In all cases, changes to the ATLC and ATLCC must be consistent with the principles outlined in the TTMP. Changes proposed must provide reference to the TTMP or a site-specific Traffic Control Plan (as defined in Schedule 15-2 Part 7).
- 4.2 DB Co and the City shall, acting reasonably, agree to make any adjustments to the ATLC, ATLCC, AALC and AALCC, but only in the event of changes implemented due to an amendment of the Project Agreement, a Relief Event that is also a Delay Event pursuant to Section 32.1 (a) (xi) of the Project Agreement, or a Variation that would cause Lane Closure changes. The City, at its discretion, may allow a revision to the Target Letters to reflect an agreed-upon change in Project Schedule, in the absence of an amendment of the Project Agreement or a Variation.
- 4.3 The Party requesting an amendment to the ATLC in accordance with Section 4.2 shall initiate a Variation in accordance with Schedule 22 – Variation Procedure. The amended TTMP shall include a detailed analysis of the impacts to traffic and transit services, including an analysis of Lane Closure requirements. The amended TTMP shall include a recommendation regarding amendments to the ATLC. Both the City and DB Co shall agree to the amended ATLC no later than 20 Business Days following receipt of amended TTMP. If there is no agreement within a further 10 Business Day period, then either Party may refer the matter to the Dispute Resolution Procedure.

5. CALCULATION OF MONTHLY LANE CLOSURE ADJUSTMENT CONTRIBUTION AND LANE CLOSURE ADJUSTMENT

- 5.1 Comparing Aggregate Actual Lane Closures Costs to Aggregate Target Lane Closure Costs:
 - (a) After the acceptance of the final Lane Closure Analysis Report described in Section 2 and prior to the West Scheduled Substantial Completion Date, DB Co shall compare the total AALCC for each Road Section to the total ATLCC for each Road Section, and if the AALCC is more than [REDACTED]% greater than the ATLCC, for any Road Section, then DB Co shall calculate the Monthly Lane Closure Adjustment Contribution set out in Section 5.2 and deduct the amount of the Lane Closure Adjustment from the West Substantial Completion Payment to be made in accordance with the Project Agreement. For clarity, the Lane Closure Adjustment deduction from the West Substantial Completion Payment shall not be subject to the limitations set out in Article 47.4 of the Project Agreement;
 - (b) If the AALCC is greater than [REDACTED]% of the ATLCC for any monthly period for any Road Section, then DB Co shall submit a detailed remediation plan no later than

10 Business Days following the end of the month to explain how it will reduce the AALCC for the Road Section in subsequent period(s), such that the variance will not exceed the [REDACTED]% for the subsequent periods. DB Co shall present progress and achievements of the remediation plan at subsequent Mobility Matters Review Meeting(s).

5.2 The formulae to calculate the Monthly Lane Closure Adjustment Contribution are set out in this Section 5.2.

(a) For the purposes of Section 5.3(b), in respect of each Road Section:

A = the AALCC for each Road Section in the relevant month

T = the ATLCC for each Road Section in the relevant month

(b) In respect of any given month during the period leading up to West Substantial Completion for each Road Section:

(i) If $A > [\text{REDACTED}]T$, then Monthly Lane Closure Adjustment Contribution = $(A - [\text{REDACTED}])$;

(ii) If $A < T$, then Monthly Lane Closure Adjustment Contribution = $[\text{REDACTED}]$

(iii) If $[\text{REDACTED}]T \geq A \geq T$, then Monthly Lane Closure Adjustment Contribution = $[\text{REDACTED}]$

(iv) if the sum of all Monthly Lane Closure Adjustment Contributions in each month prior to West Substantial Completion $< [\text{REDACTED}]$, then Lane Closure Adjustment for that Road Section = $[\text{REDACTED}]$; and

(v) if the sum of all Monthly Lane Closure Adjustment Contributions in each month prior to West Substantial Completion $> [\text{REDACTED}]$, then Lane Closure Adjustment for that Road Section = the sum of all Monthly Lane Closure Adjustment Contributions in each month prior to West Substantial Completion.

6. PEAK HOUR LANE INTERRUPTIONS

6.1 The City will assess DB Co for Peak Hour Lane Interruptions in accordance with Table 6.1 for the following non-performance measures per lane that is not open.

Table 6.1 - Peak Hour Lane Interruption Costs

| Road Classification* INCLUDING Transit Routes and Lanes | Initial value to be assessed if lane is not open as required | Additional value to be assessed at the end of each additional 10-minute period that the lane is not open. |
|---|--|---|
| Federal Roadways | \$(REDACTED) | \$(REDACTED) |
| Federal Roadways with Transit | \$(REDACTED) | \$(REDACTED) |
| [Intentionally deleted] | [Intentionally deleted] | [Intentionally deleted] |
| [Intentionally deleted] | [Intentionally deleted] | [Intentionally deleted] |
| Arterial | \$(REDACTED) | \$(REDACTED) |
| Arterial with Transit | \$(REDACTED) | \$(REDACTED) |
| Major Collector | \$(REDACTED) | \$(REDACTED) |
| Major Collector with Transit | \$(REDACTED) | \$(REDACTED) |
| Collector | \$(REDACTED) | \$(REDACTED) |
| Collector with Transit | \$(REDACTED) | \$(REDACTED) |
| City Freeway (OR 174) | \$(REDACTED) | \$(REDACTED) |

* See the following link for City Road Classifications: <http://ottawa.ca/en/city-hall/planning-and-development/official-plan-and-master-plans/official-plan/volume-1-official-11>

6.2 Any time assessed in the cost associated with Peak Hour Lane Interruptions will not be included in calculations of Lane Closure Adjustments.

6.3 The City shall assess DB Co for the cost of Peak Hour Lane Interruptions. All Peak Hour Lane Interruptions shall be formulated into a Monthly Peak Hour Lane Interruption Report to be submitted by DB Co with the Lane Closure Analysis Report.

6.4 DB Co shall calculate the cost of Peak Hour Lane Interruptions and deduct this amount from the Construction Period Payment or West Substantial Completion Payment, as applicable, following the most recent Monthly Peak Hour Lane Interruption Report in accordance with Project Agreement Article 4 – Payment, and Schedule 21 – Construction Period Payments.

7. APPLICATION

7.1 The Lane Closure provisions of this Schedule 34 will no longer be in effect once West Substantial Completion has been achieved.

APPENDIX A

BRT LANE CLOSURE REPORT SUBMITTAL REQUIREMENTS

| Total BRT Lane Closure Summary | Lane Closure Unit Rate | BRT Lane Closure Target | | Actual BRT Lane Closures | | Percent Variance between columns v and iii of this table | Monthly BRT Lane Closure Adjustment Contribution |
|--------------------------------|---|-----------------------------------|---|--------------------------|--|--|--|
| | Unit Rate based on roadway classification and time of day | Number of Target Closures (hours) | Cost of BRT Lane Closure for monthly period (calculated based on number of closures multiplied by Unit Price Rate, multiplied by number of hours) | Usage | Cost of BRT Lane Closures for monthly period (calculated based on number of closures multiplied by Unit Price Rate, multiplied by number of hours) | | |
| Column reference | i | ii | iii | iv | v | vi | vii |
| BRT Segment BRT-W-1 Peak | \$(REDACTED) | | | | | | |
| BRT Segment BRT-W-1 Off Peak | \$(REDACTED) | | | | | | |
| BRT Segment BRT-W-1 Night | \$(REDACTED) | | | | | | |
| Sub-total: BRT Segment BRT-W-1 | | | | | | | |
| BRT Segment BRT-W2 Peak | \$(REDACTED) | | | | | | |

| | | | | | | | |
|---------------------------------------|--------------|--|--|--|--|--|--|
| BRT Segment BRT-W-2 Off Peak | \$(REDACTED) | | | | | | |
| BRT Segment BRT-W-2 Night | \$(REDACTED) | | | | | | |
| <i>Subtotal: BRT Segment BRT-W-2</i> | | | | | | | |
| BRT Segment BRT-W-4 Peak | \$(REDACTED) | | | | | | |
| BRT Segment BRT-W-4 Off Peak | \$(REDACTED) | | | | | | |
| BRT Segment BRT-W-4 Night | \$(REDACTED) | | | | | | |
| <i>Subtotal: BRT Segment BRT-W-4</i> | | | | | | | |
| BRT Segment BRT-SW-1 Peak | \$(REDACTED) | | | | | | |
| BRT Segment BRT-SW-1 Off Peak | \$(REDACTED) | | | | | | |
| BRT Segment BRT-SW-1 Night | \$(REDACTED) | | | | | | |
| <i>Subtotal:-BRT Segment BRT-SW-1</i> | | | | | | | |
| BRT Segment BRT-SW-2 Peak | \$(REDACTED) | | | | | | |
| BRT Segment BRT-SW-2 Off Peak | \$(REDACTED) | | | | | | |
| BRT Segment BRT-SW-2 Night | \$(REDACTED) | | | | | | |

| | | | | | | | |
|---|--------------|--|--|--|--|--|--|
| <i>Subtotal: BRT Segment BRT-SW-2</i> | | | | | | | |
| BRT Segment BRT- W-5 Peak | \$(REDACTED) | | | | | | |
| BRT Segment BRT- W-5 Off Peak | \$(REDACTED) | | | | | | |
| BRT Segment BRT- W-5 Night | \$(REDACTED) | | | | | | |
| <i>Subtotal: BRT Segment BRT-W-5</i> | | | | | | | |
| BRT Segment BRT- W-6 Peak | \$(REDACTED) | | | | | | |
| BRT Segment BRT- W-6 Off Peak | \$(REDACTED) | | | | | | |
| BRT Segment BRT- W-6 Night | \$(REDACTED) | | | | | | |
| <i>Subtotal: BRT Segment BRT-W-6</i> | | | | | | | |
| BRT Segment BRT- W-7 Peak | \$(REDACTED) | | | | | | |
| BRT Segment BRT- W-7 Off Peak | \$(REDACTED) | | | | | | |
| BRT Segment BRT- W-7 Night | \$(REDACTED) | | | | | | |
| <i>Subtotal: BRT Segment BRT-W-7</i> | | | | | | | |
| BRT Segment BRT- W-8 Peak | \$(REDACTED) | | | | | | |

| | | | | | | | |
|--------------------------------------|--------------|--|--|--|--|--|--|
| BRT Segment BRT-W-8 Off Peak | \$[REDACTED] | | | | | | |
| BRT Segment BRT-W-8 Night | \$[REDACTED] | | | | | | |
| <i>Subtotal: BRT Segment BRT-W-8</i> | | | | | | | |
| BRT Segment BRT-W-9 Peak | \$[REDACTED] | | | | | | |
| BRT Segment BRT-W-9 Off Peak | \$[REDACTED] | | | | | | |
| BRT Segment BRT-W-9 Night | \$[REDACTED] | | | | | | |
| <i>Subtotal: BRT Segment BRT-W-9</i> | | | | | | | |
| BRT Segment BRT-E-1 Peak | \$[REDACTED] | | | | | | |
| BRT Segment BRT-E-1 Off Peak | \$[REDACTED] | | | | | | |
| BRT Segment BRT-E-1 Night | \$[REDACTED] | | | | | | |
| <i>Subtotal: BRT Segment BRT-E-1</i> | | | | | | | |
| BRT Segment BRT-E-2 Peak | \$[REDACTED] | | | | | | |
| BRT Segment BRT-E-2 Off Peak | \$[REDACTED] | | | | | | |
| BRT Segment BRT-E-2 Night | \$[REDACTED] | | | | | | |

| | | | | | | | |
|--|--------------|--|--|--|--|--|--|
| <i>Subtotal: BRT Segment BRT-E-2</i> | | | | | | | |
| BRT Segment BRT-E-3 Peak | \$(REDACTED) | | | | | | |
| BRT Segment BRT-E-3 Off Peak | \$(REDACTED) | | | | | | |
| BRT Segment BRT-E-3 Night | \$(REDACTED) | | | | | | |
| <i>Subtotal: BRT Segment BRT-E-3</i> | | | | | | | |
| BRT Segment BRT-E-4 Peak | \$(REDACTED) | | | | | | |
| BRT Segment BRT-E-4 Off Peak | \$(REDACTED) | | | | | | |
| BRT Segment BRT-E-4 Night | \$(REDACTED) | | | | | | |
| <i>Subtotal: BRT Segment BRT-E-4</i> | | | | | | | |
| Substantial Completion Weekday Peak | | | | | | | |
| Substantial Completion Weekday Off Peak | | | | | | | |
| Substantial Completion Night/Weekend | | | | | | | |
| <i>Total: Substantial</i> | | | | | | | |

| | | | | | | | |
|------------|--|--|--|--|--|--|--|
| Completion | | | | | | | |
|------------|--|--|--|--|--|--|--|

APPENDIX B

UNIT RATES FOR EACH BRT LANE CLOSURE, LEFT TURN LANE CLOSURE AND RIGHT TURN LANE CLOSURE

1. UNIT RATE PRICES FOR BRT LANE CLOSURES (Price per hour per Block for BRT lanes in segments not identified in Appendix A)

| | Peak * | Off Peak ** | Night *** |
|-----------------------|------------|-------------|------------|
| BRT Lane Closure Cost | [REDACTED] | [REDACTED] | [REDACTED] |

* As defined in Part A - Section 1.6

** As defined in Part A - Section 1.6

*** As defined in Part A - Section 1.6

APPENDIX C

BRT LANE CLOSURE TARGET LETTER

[See Attached]

APPENDIX D

LANE CLOSURE REPORT SUBMITTAL REQUIREMENTS

| Total Lane Closure Summary | Lane Closure Unit Rate | Lane Closure Target | | Actual Lane Closures | | Percent Variance between columns iv and ii of this table | Monthly Lane Closure Adjustment Contribution |
|----------------------------------|---|---------------------------|---|----------------------|--|--|--|
| | Unit Rate based on roadway classification and time of day | Number of Target Closures | Cost of Lane Closure for monthly period (calculated based on number of closures multiplied by Unit Price Rate, multiplied by number of hours) | Usage | Cost of Lane Closures for monthly period (calculated based on number of closures multiplied by Unit Price Rate, multiplied by number of hours) | | |
| Column reference | i | ii | iii | iv | v | vi | vii |
| Road Section 1 Peak | | | | | | | |
| Road Section 1 Off Peak | | | | | | | |
| Road Section 1 Night | | | | | | | |
| <i>Sub-total: Road Section 1</i> | | | | | | | |
| Road Section 2 Peak | | | | | | | |
| Road Section 2 Off Peak | | | | | | | |

| | | | | | | | |
|--|--|--|--|--|--|--|--|
| Road Section 2 Night | | | | | | | |
| <i>Subtotal: Road Section 2</i> | | | | | | | |
| Road Section xx Peak | | | | | | | |
| Road Section xx Off Peak | | | | | | | |
| Road Section xx Night | | | | | | | |
| <i>Subtotal:-Road Section xx</i> | | | | | | | |
| Substantial Completion Weekday Peak | | | | | | | |
| Substantial Completion Weekday Off Peak | | | | | | | |
| Substantial Completion Night/Weekend | | | | | | | |
| <i>Total: Substantial Completion</i> | | | | | | | |

APPENDIX E

UNIT RATES FOR EACH LANE CLOSURE, LEFT TURN LANE CLOSURE AND RIGHT TURN LANE CLOSURE

1. UNIT RATE PRICES FOR LANE CLOSURES (Price per Hour per Block)

| | Peak * | Off Peak ** | Night *** |
|------------------|------------|-------------|------------|
| Arterial | [REDACTED] | [REDACTED] | [REDACTED] |
| Major Collector | [REDACTED] | [REDACTED] | [REDACTED] |
| Collector | [REDACTED] | [REDACTED] | [REDACTED] |
| Local | [REDACTED] | [REDACTED] | [REDACTED] |
| City Freeway | [REDACTED] | [REDACTED] | [REDACTED] |
| Federal Roadways | [REDACTED] | [REDACTED] | [REDACTED] |

* As defined in Part B - Section 1.11

** As defined in Part B - Section 1.11

*** As defined in Part B - Section 1.11

APPENDIX F
LANE CLOSURE TARGET LETTER

[See Attached]

SCHEDULE 35**PERMITS, LICENCES, APPROVALS AND AGREEMENTS**

- a) The Permits, Licences, Approvals and Agreements may include, but are not limited to those included in the tables below.
- b) The following Responsibility Tables will be updated by addendum, if applicable, upon receipt of further information.
- c) The following Responsibility Tables are for the purpose of the performance of the Works.
- d) If, for any permit, licence, approval or authorization listed in this Schedule 35, where there is a legislative requirement for the applicant to be the City, then DB Co shall act as the City's agent and will be responsible for all aspects of the application preparation and submittal process at DB Co's own cost and expense. If required, the City will sign off on the application.
- e) All other Permits, Licences, Approvals and Agreements not listed herein or otherwise noted, are the responsibility of DB Co.

[NOTE to PROPONENTS: the Ontario Ministry of the Environment and Climate Change (MOECC) has changed to the Ontario Ministry of the Environment, Conservation and Parks (MECP). For the purpose of this Schedule they are considered to be the same.]

Stage 2 LRT PLAA (Draft)

| Permits, Licenses and Approvals | Issuing Agency | Status | Responsibility of: City of Ottawa or DB Co. or Other |
|---|----------------|--|--|
| Site Plan Control – Development Outside of the Public Transit System Right-of-Way | City of Ottawa | Not started. Necessary where required under specific circumstances such as infrastructure not part of the LRT infrastructure, e.g. parking lot redesign and over-build of stations. Consultation with the City will be required. | DB Co |
| Building and Demolition Permits – Stations and MSF | City of Ottawa | Not started. | DB Co |
| Noise By-law Exemption | City of Ottawa | Not started. | DB Co |
| Approval under Sewer Use By-law to discharge waste water | City of Ottawa | Not started. | DB Co |
| Road Cut Permit (utility circulation) | City of Ottawa | Not started. | DB Co |
| Temporary Construction-Related Encroachment Permit | City of Ottawa | Not started. | DB Co |
| Temporary Construction Easements | City of Ottawa | Not started. | DB Co |
| Street or Lane Closing/Opening | City of Ottawa | Not started. | DB Co |
| Zoning By-Law Amendment | City of Ottawa | Not started. Necessary where required under specific circumstances , e.g. station related development. | DB Co |

| Permits, Licenses and Approvals | Issuing Agency | Status | Responsibility of: City of Ottawa or DB Co. or Other |
|--|-----------------------------|--|--|
| | | Consultation with the City will be required. Where associated with station related development and | |
| Sign Permit | City of Ottawa | Not started. | DB Co |
| Permit under Ontario Heritage Act | City of Ottawa | Not started. May be necessary if heritage resources affected. | DB Co |
| Emergency Services Approval – Fire and Life Safety | City of Ottawa | Not started. | DB Co |
| Offer to Connect (“OTC”) | TBD | Not started. | The City will execute the Offers To Connect (“OTC”) with Hydro Ottawa; however, DB Co, at its sole cost and expense, to complete all work required to secure and fulfill OTC agreements including PA Schedule 15-2 – Design and Construction Requirements.c”) with Hydro Ottawa; however, DB Co, at its sole cost and expense, to complete all work required to secure and fulfill OTC agreements including PA Schedule 15-2 – Design and Construction Requirements. |
| Electrical Plan Review | Electrical Safety Authority | Not started. | DB Co |

| Permits, Licenses and Approvals | Issuing Agency | Status | Responsibility of: City of Ottawa or DB Co. or Other |
|--|--|--------------|--|
| Construction Registration Permit | Electrical Safety Authority | Not started. | DB Co |
| Notice of Project as per <i>Occupational Health and Safety Act</i> (Ontario) | Ministry of Labour | Not started. | DB Co |
| Registration of Constructors and Employers Engaged in Construction | Ministry of Labour | Not started. | DB Co |
| Permit to Take Water | Ontario Ministry of the Environment and Climate Change | Not started. | DB Co |
| Environmental Compliance Approval (ECA)– SWM Facilities | Ontario Ministry of the Environment and Climate Change | Not started. | DB Co |
| ECA – Water and Sanitary Sewer | Ontario Ministry of the Environment and Climate Change (In certain instances the City of Ottawa has delegated authority from MOECC for review) | Not started. | DB Co |

| Permits, Licenses and Approvals | Issuing Agency | Status | Responsibility of: City of Ottawa or DB Co. or Other |
|--|--|--|--|
| ECA – Air and Noise | Ontario Ministry of the Environment and Climate Change | Not started. | DB Co |
| Environmental Activity and Sector Registry (EASR) | Ontario Ministry of the Environment and Climate Change | Not started. | DB Co |
| Approvals from MOECC under Ontario Environmental Assessment Act O. Reg 231/08 for the LRT Confederation Line West Extension and Confederation Line East Extension. | Ontario Ministry of the Environment and Climate Change | Separate approvals have been received from the MOECC Minister for the Environmental Project Reports for Confederation Line West Extension and Confederation Line East Extension. The EPR reports and approvals are available in the data room. | City |

| Permits, Licenses and Approvals | Issuing Agency | Status | Responsibility of: City of Ottawa or DB Co. or Other |
|--|--|--|---|
| Approvals from MOECC under Ontario Environmental Assessment Act O. Reg 231/08 for the Bayshore to Moodie Bus Rapid Transit (BRT) Conversion to Light Rail Transit (LRT) | Ontario Ministry of the Environment and Climate Change | Approvals have been received from the MOECC Minister for the Environmental Project Report for the Bayshore to Moodie Bus Rapid Transit (BRT) Conversion to Light Rail Transit (LRT) The EPR reports and approvals are available in the data room. | City |
| Approval from MOECC under Ontario Environmental Assessment Act through the Class EA for Provincial Transportation Facilities - Highway 417 Expansion preliminary design. | Ontario Ministry of the Environment and Climate Change | MTO has completed the Highway 417 (Ottawa Queensway) from Highway 416 to Easterly to Anderson Road, Preliminary Design and Environmental Assessment, GWP 663-93-00, Transportation Environmental Study Report (TESR) in accordance with their Class EA process for Provincial Transportation Facilities. | MTO |
| Approval from MOECC under Ontario Environmental Assessment Act through the Class EA for Provincial Transportation Facilities - Highway 417 Expansion detail design. | Ontario Ministry of the Environment and Climate Change | A [REDACTED]% design has been undertaken by WSP for the MTO DB Co will be required to complete a detail design documented in a Design and Construction Report (DCR) for MTO Highway 417 components | DB Co |
| Amendments to the approvals of MOECC under Ontario Environmental Assessment | Ontario Ministry of the | An addendum to the Confederation Line West Extension Environmental | DB Co is responsible for any other addendums to the approved to the |

| Permits, Licenses and Approvals | Issuing Agency | Status | Responsibility of: City of Ottawa or DB Co. or Other |
|---|--|---|--|
| Act O. Reg 231/08 | Environment and Climate Change | Project Report is being prepared by the City and for the Bayshore terminal bus station and lay-by area and will be provided to DB Co in the data room. | Environmental Project Reports that are required following Financial Close. |
| Amendments to the approvals of MOECC under Ontario Environmental Assessment Act – Highway 417 Expansion | | The City of Ottawa has completed the Municipal Class Environmental Assessment (EA) Study for the Maitland Avenue Highway 417 Bridge Cycling Improvements. The 30 day review period will be complete on June 8, 2018. No Part II Order Requests were received and the MTO Clearance letter has been posted | DB Co responsible to incorporate these changes into the DCR as required. |
| Endangered Species Act Permits | Ontario Ministry of Natural Resources and Forestry | City has identified Species at Risk for which permitting under ESA will be required. The City has initiated the permits. | The City of Ottawa will submit all approval documentation with DB Co as an agent for the implementation of the permits conditions related to design and construction activities. The City of Ottawa will be responsible for the monitoring portion of the permit conditions. Permits that have been received prior to financial close will be provided. Pending permit applications will also be provided with the understanding the proposed mitigation measures are conditional until the permit is |

| Permits, Licenses and Approvals | Issuing Agency | Status | Responsibility of: City of Ottawa or DB Co. or Other |
|---|--|--|---|
| | | | received. |
| Public Lands Act Work Permit | Ontario Ministry of Natural Resources and Forestry | Initiated by City. | DB Co to implement |
| Archaeology – Letter of acceptance verifying the report complies with Ministry requirements and filed with Ontario Public Register of Archaeological Reports | Ontario Ministry of Tourism Culture and Sport | City has received Acceptance Letters for Confederation West and Confederation East Extension Stage 1 Archaeological Assessment. Stage 2 Archaeological Assessments are underway by the City. | City is responsible to obtain the acceptance letter in respect of all those archaeological assessments completed by the City in advance of Financial Close. DB Co is responsible to obtain the acceptance letter in respect of all those archaeological assessments required after Financial Close. |
| Approval for provincial funding | Ontario Ministry of Transportation | City is seeking provincial funding | City |
| Approval from MTO for building and land use permit in accordance with the requirements of the Public Transportation and Highway Improvement Act | Ontario Ministry of Transportation | Not started. | DB Co |
| Approval from MTO for Encroachment Permits in accordance with the requirements of the Public Transportation and Highway Improvement Act for the new proposed Pedestrian Bridges and the | Ontario Ministry of Transportation | City is consulting with MTO Engineering Section and currently finalizing property requirements for submission to MTO Corridor Management Office. City is consulting with MTO Engineering | City |

| Permits, Licenses and Approvals | Issuing Agency | Status | Responsibility of: City of Ottawa or DB Co. or Other |
|--|--------------------------------------|---|--|
| permanent System Infrastructure | | Section to coordinate property requirements prior to submission to MTO Corridor Management Office for review and approval. | |
| Approval from MTO for Encroachment Permits in accordance with the requirements of the Public Transportation and Highway Improvement Act for Construction Activities on Lands as identified in Schedule 20. | Ontario Ministry of Transportation | Not started. | DB Co |
| All access to Highway Corridor Lands is coordinated and approved by the MTO using the Eastern Region ROW Form, which may be submitted following issuance of an Encroachment Permit for the segment of Highway Corridor Lands where access is sought. | Ontario Ministry of Transportation | Not started. | DB Co |
| Approval pursuant to Ontario Regulation 174/06 – Development, Interference with Wetlands and Alterations to Shorelines and Watercourses | Rideau Valley Conservation Authority | Not started. | DB Co |
| Approval pursuant to Section 35 of the Fisheries Act or Clearance that no approval is required. | Fisheries and Oceans Canada | City has consulted with the DFO and and no Fisheries Act Authorization is required for the Pinecrest Creek realignment. DFO provided a Letter of Advice which is available in the | DB Co to implement. |

| Permits, Licenses and Approvals | Issuing Agency | Status | Responsibility of: City of Ottawa or DB Co. or Other |
|--|--|--|---|
| | | data room. | |
| License to Collect Fish for Scientific Purpose | Ministry of Natural Resources and Forestry – Kemptville District | Not started. | DB Co |
| Land Access Permit | National Capital Commission | Not started. To be obtained by DB Co. should access be required to NCC properties not included in the Lands. | DB Co |
| Land Acquisition and/or Lease | PSPC, NCC | Contingent on City receiving NCC FLUDA | City |
| CEAA 2012 Section 67 CEAA determinations | NCC, PSPC, ECCC, DFO (if required) | <p>The City has prepared the Confederation Line Environmental Effects Evaluation (EEE) to submit to federal authorities for determinations. NCC and PSPC have approved the EEE</p> <p>The NCC is currently preparing the environmental effects evaluation report for the Sir-John-A.Macdonald parkway linear park works.</p> | <p>Design and construction relevant environmental commitments part of the Confederation Line EEE document to be implemented by DB Co.</p> <p>The commitments for the Confederation Line EEE are included in Appendix A of Schedule 17 and the Confederation Line EEE has been made available.</p> |

| Permits, Licenses and Approvals | Issuing Agency | Status | Responsibility of: City of Ottawa or DB Co. or Other |
|---|---------------------------------------|---|---|
| Species at Risk Act Permits | Environment Canada and Climate Change | <p>City has identified Species at Risk for which permitting under SARA will be required. The City has initiated permits.</p> <p>Applications have been made available.</p> | <p>The City of Ottawa will submit all approval documentation with DB Co as an agent for the implementation of the permits conditions related to design and construction activities. The City of Ottawa will be responsible for the monitoring portion of the permit conditions.</p> <p>Permits that have been received prior to financial close will be provided. Pending permit applications will also be provided with the understanding the proposed mitigation measures are conditional until the permit is received.</p> |
| Approval for federal funding | Infrastructure Canada | City is seeking provincial funding | City |
| Any and all Remaining Permits, Licenses, Authorizations and Approvals | Various Agencies | Not started. | DB Co |
| NCC Approval in Principle | NCC | <p>Western Light Rail Transit (WLRT) Project – Alignment and Functional Design Approval in Principle received from NCC on January 27, 2017.</p> <p>No Approval in Principle is needed to be issued by the NCC for the</p> | City |

| Permits, Licenses and Approvals | Issuing Agency | Status | Responsibility of: City of Ottawa or DB Co. or Other |
|--|------------------|---|---|
| | | Confederation East Extension Alignment. Functional Design Approval in Principle received from NCC on June 20, 2018 for Moodie extension. | |
| NCC Concept Design Approval | NCC | ~ May 2018 | City based on DB Co's proposal design |
| NCC Property Transaction Approval | NCC | ~ May 2018 | City |
| NCC Federal Land Use, Design and Transaction Approval | NCC | January 1 2019 – December 31 2021 | City |
| Transport Canada approval to build a SWM pond in the airport's restricted zone | Transport Canada | Letter of conditions from Transport Canada received on August 29, 2017. | DB Co to implement mitigation measures described in July 17, 2017 letter from NCC to Transport Canada except for the baseline bird monitoring program reporting to Transport Canada (August 2017 to December 2018) to be completed by the City. |

| Permits, Licenses and Approvals | Issuing Agency | Status | Responsibility of: City of Ottawa or DB Co. or Other |
|---|--------------------------------|--|---|
| Ontario <i>Invasive Species Act</i> obligations regarding propagation of restricted species | MOECC | Presence of dog strangling vine has been noted by the City during 2017 field surveys in the Pinecrest creek corridor. | DB Co to complete restricted invasive species surveys before project is carry out and to incorporatated mitigation measures into the Environmental Management Plan to ensure legal obligations are met. |
| Provincial Secondary Land Use Program – Real Estate transaction management review and approval process. | Hydro One Networks Inc. (HONI) | City is currently working with HONI and HONI have issued an approval in principle based on RCD. HONI will require well-advanced detail design prior to a final approval of all proposed SI / NMI real estate transaction within the transmission corridor. Final approval from HONI will require DB Co to work closely with HONI during detail design phase. | City |

APPENDIX A – LISTED DB Co PLAAs

| Listed DB Co PLAA's | Timeline for Final Determination by the City |
|---|--|
| Site Plan Control - Development Outside of the Public Transit System Right-of-Way | [REDACTED] |
| Building and Demolition Permits - Stations and MSF | [REDACTED] |
| Noise By-law Exemption * If approved by ward councillor | [REDACTED] |
| Approval discharge waste water - Under Sewer Use By-law | [REDACTED] |
| Road Cut Permit Utility Circulation | [REDACTED] |
| Temporary Construction-Related Encroachment Permit ROW/Property | [REDACTED] |

| Listed DB Co PLAA's | Timeline for Final Determination by the City |
|--|--|
| Street or Lane Closing/Opening | [REDACTED] |
| Zoning By-Law Amendment | [REDACTED] |
| Sign Permit | [REDACTED] |
| Permit Under Ontario Heritage Act | [REDACTED] |
| Emergency Services Approval - Fire and Life Safety | [REDACTED] |

APPENDIX B – INDICATIVE MTO RESPONSE TIMES

- a) The following table identifies indicative MTO response times for certain DB Co Permits, Licences, Approvals and Agreements for which the MTO is the issuing Governmental Authority. The indicative MTO response times stated below are provided for information only and shall not be binding on the MTO, the City or any City Party. DB Co shall not be entitled to any relief from its obligations under the Project Agreement or additional time or compensation as a result of a failure of the MTO to approve or respond within such indicative response times.

| Deliverable | Indicative MTO Response Times |
|--|--------------------------------------|
| Addenda to MTO Design Criteria | [REDACTED] |
| Proposal for use of products not on DSM (including samples, justification, etc. as applicable) | [REDACTED] |
| Final Eligibility Letter for EA Clearance and comments/responses | [REDACTED] |
| Designation of Construction Zone Associated speed reductions | [REDACTED] |
| Temporary PHM-125 | [REDACTED] |
| Permanent PHM-125 | [REDACTED] |
| Variations to Permitted Periods | [REDACTED] |
| Application(s) for extended closure | [REDACTED] |
| Application(s) for full closure | [REDACTED] |

| | |
|---|------------|
| Ontario Regulation (for dedicated bus lane) | [REDACTED] |
| Closures (outside Permitted Periods, Sundays, Full Closure) | [REDACTED] |
| Encroachment Permits | [REDACTED] |

SCHEDULE 36
INTERFACE AGREEMENT
[REDACTED]

**SCHEDULE 37
EXTENSION AND ADDITIONAL PHASES**

**ARTICLE I
DEFINITIONS**

1.1 Definitions

In this Schedule 37, unless the context otherwise requires:

- (a) **“City Extension Requirements”** means the proposal delivered by the City pursuant to Section 2.2(c).
- (b) **“DB Co Extension Proposal”** means the proposal delivered by DB Co pursuant to Sections 2.2(d) and (e).
- (c) **“Extension Contractor”** means a Person engaged by the City to perform any part of a System Extension, which Person may or may not be DB Co.
- (d) **“Extension Lenders”** means any Person or Persons who provide financing to an Extension Contractor or to DB Co in respect of a System Extension, and, where the context so permits, prospective financiers or lenders.
- (e) **“Extension Notice Response”** means the response delivered by the DB Co pursuant to Section 2.2(b).
- (f) **“Extension Permits, Licences and Approvals”** means all permissions, consents, approvals, certificates, permits, licences, statutory agreements and authorizations needed to complete a System Extension described in the City Extension Requirements in accordance with Applicable Law.
- (g) **“Extension Work”** means the design, construction, installation, testing, commissioning and completion of a System Extension, including rectification of any Extension Work Minor Deficiencies.
- (h) **“Extension Work Minor Deficiencies”** means any defects, deficiencies and items of outstanding work which would not materially impair the City’s use and enjoyment of the System Extension.
- (i) **“Integrated System Extension”** means the development, testing, commissioning and certification of additional facilities, infrastructure, electrical and mechanical equipment, computer hardware and systems, including communication and control systems, extending, and connected with, the Existing Confederation Line, Confederation Line East Extension, and/or Confederation Line West Extension, such that all components of the System Infrastructure, as so extended, function together as one coherent fully integrated system.
- (j) **“Notice of Extension”** means the notice delivered by the City pursuant to Section 2.2(a).
- (k) **“Non-Integrated System Extension”** means the development, testing, commissioning and certification of additional facilities, infrastructure, electrical and mechanical equipment, computer hardware and systems, including communication and control systems, in order to form a transit system that connects with the Existing Confederation Line, Confederation Line East Extension or

Confederation Line West Extension, at a single interchange point such that the other components of the Existing Confederation Line, Confederation Line East Extension and Confederation Line West Extension do not form part of a coherent integrated system with such extended transit system.

- (l) **“DB Co Extension Proposal”** means the proposal delivered by DB Co pursuant to Section 2.2(d).
- (m) **“Reciprocal Agreement”** means the agreement to be executed in the event of a Non-Integrated System Extension as described in further detail in Section 3.1(e).
- (n) **“System Extension”** means either an Integrated System Extension or a Non-Integrated System Extension.

ARTICLE II SYSTEM EXTENSION

2.1 System Extension

- (a) The City and DB Co acknowledge that the City may, in its Discretion, elect to pursue one or more System Extensions during the Project Term. The City may pursue any System Extension through an Extension Contractor or through a negotiated agreement with DB Co in accordance with this Schedule 37. In the event the City elects to engage an Extension Contractor, the City may decide which Persons are eligible for consideration, and such persons may or may not include DB Co or any DB Co Party, in the City’s discretion, and the City may use any form of competitive procurement, sole-source contract, lease or transaction structure that the City in its Discretion decides. If the City elects to negotiate an agreement with DB Co, the Parties shall follow the process set out in Section 2.2. Notwithstanding the foregoing, the City shall not implement a System Extension in accordance with this Schedule 37 through a negotiated agreement with DB Co for any System Extension in respect of which capital costs are reasonably anticipated to exceed \$[REDACTED].
- (b) The City may in its Discretion elect to implement a System Extension by way of a Variation in which case Section 31.1 of the Project Agreement and the provisions of Schedule 22 – Variation Procedure shall apply in respect of such System Extension.
- (c) The City may in its Discretion elect to procure or negotiate, as the case may be, the performance of Extension Work in respect of a System Extension through consolidated or separate procurements or negotiations.
- (d) For clarity, the City may pursue a System Extension at any time or times pursuant to any of the alternatives set out in this Section 2.1 in its Discretion. In the event the City has elected to pursue a System Extension in accordance with this Section 2.1, the City may, at any time prior to entering into a binding agreement in respect of the System Extension, in its Discretion, elect to cease pursuing the System Extension under the chosen alternative and pursue the same System Extension under a different alternative process.

2.2 Negotiation between the City and DB Co of Extension Work

- (a) If the City notifies DB Co that it wishes to negotiate with DB Co to perform Extension Work, the City shall provide DB Co with a Notice of Extension which will include information respecting the project, including:
 - (i) a description of the scope of the Extension Work;
 - (ii) preliminary “term sheet level” output specifications for the Extension Work, including: details with respect to alignment, number of stations, length of track (in kilometres), modelling results and performance expectations with respect to the System Extension, as-builts for Existing Infrastructure and utilities, condition reports, results of environmental assessments, development plans, stakeholder engagement information, location and capacity requirements of any maintenance and storage facilities, and
 - (iii) a preliminary schedule and required timelines for completion of the Extension Work.
- (b) Within a period of 30 days after the date of receipt of the Notice of Extension, DB Co shall deliver to the City its Extension Notice Response advising the City whether or not DB Co desires to proceed to the next stage of negotiation with the City in respect of the System Extension. In the event DB Co desires to proceed, DB Co shall, within a period of 60 days after the delivery of its Extension Notice Response, deliver to the City a preliminary cost estimate and schedule for the Extension Work.
- (c) If the City elects, in its Discretion, to continue to consider DB Co for the Extension Work, the City shall within a period of 120 days after the date of receipt of DB Co’s Extension Notice Response, deliver its City Extension Requirements. The City Extension Requirements (which shall be non-binding on the City) shall include:
 - (i) a draft heads of terms agreement for the Extension Work;
 - (ii) draft output specifications and commissioning processes for the System Extension;
 - (iii) draft “term sheet level” parameters of the payment mechanism to be used in respect of the Extension Work; and
 - (iv) guidelines with respect to the structure of construction or permanent financing to be secured by DB Co;
- (d) Within a period of 150 days after the date of receipt of the City Extension Requirements, DB Co shall deliver to the City the DB Co Extension Proposal which shall be non-binding on DB Co. The DB Co Extension Proposal shall include:
 - (i) a detailed cost estimate and construction schedule in respect of the Extension Work;
 - (ii) any impact the Extension Work, would have on DB Co’s activities under the Project Agreement;

- (iii) any contemplated amendments to the Project Agreement to coordinate the Extension Work;
- (iv) the expected Direct Costs of DB Co and each Subcontractor that will be incurred in respect of the Extension Work, including:
 - (A) any Capital Expenditure that will be incurred; and
 - (B) any other costs that will be incurred, reduced or avoided and the impact on DB Co's cash flows from incurring, reducing or avoiding such costs;
- (v) preliminary terms of the financing structure specified in the City Extension Requirements;
- (vi) any Extension Permits, Licences and Approvals that must be obtained or any Permits, Licences and Approvals amended for the Extension Work, to be implemented;

in each case, together with such supporting information and justification as is reasonably required.

- (e) In preparing the DB Co Extension Proposal, DB Co shall include sufficient information to demonstrate to the City's satisfaction, acting reasonably, that:
 - (i) DB Co has used or has obliged each Subcontractor (or will oblige any Subcontractor not yet selected) to use commercially reasonable efforts, including the use of competitive quotes or tenders to minimize costs in respect of the System Extension;
 - (ii) except as otherwise set out herein, all costs of DB Co and each Subcontractor are limited to Direct Costs;
 - (iii) DB Co and any Subcontractor shall charge only the margins for overhead and profit as set out in Appendix B to Schedule 22 – Variation Procedure (such margins each calculated on the basis of the applicable Direct Costs so that no margin of DB Co or any Subcontractor is calculated on any other margin under the Project Agreement of DB Co or any Subcontractor), and no other margins or mark ups;
 - (iv) the margins for overheads and profit as set out in Appendix B to Schedule 22 – Variation Procedure as applicable to DB Co's Direct Costs shall only be chargeable on Direct Costs of DB Co, such that DB Co shall not charge any margins on any amounts charged by any Subcontractors;
 - (v) all costs of completing the Extension Work, including Capital Expenditures, reflect labour rates applying in the open market to providers of services similar to those required for the Extension Work;
 - (vi) DB Co has mitigated or will mitigate the impact of the Extension Work on DB Co's obligations under the Project Agreement, including on the Works Schedule, the expected usage of utilities, and the Direct Costs to be incurred; and

- (vii) DB Co will use commercially reasonable efforts to obtain the best value for money when procuring any work, services, supplies, materials or equipment required in respect of the Extension Work, and will comply with all Good Industry Practice in relation to any such procurement, to a standard no less than DB Co would apply if all costs incurred were to its own account without recourse to the City, including using commercially reasonable efforts to mitigate such costs.
- (f) Subject to Section 2.2(g), as soon as practicable after the receipt of the DB Co Extension Proposal, the City and DB Co shall, in good faith and acting reasonably, negotiate the terms of the binding agreement for the performance of the Extension Work, as well as any necessary amendments to the Project Agreement, based on the contents of the City Extension Requirements and the DB Co Extension Proposal.
- (g) Notwithstanding anything contained in this Schedule 37, except as may be the subject matter of a competitive procurement process, no agreement relating to the subject matter of this Schedule 37 shall be effective unless entered into in writing by each of the Parties and the entering into of same shall be subject to each Party's Discretion. Either Party may in its Discretion elect to cease negotiations at any time in the process set out in this Section 2.2 prior to the signing of such written agreement.

ARTICLE III DB CO COOPERATION

3.1 DB Co Cooperation with the City and Interface with an Extension Contractor

- (a) In the event the City pursues a System Extension with an Extension Contractor that is not DB Co, subject to Section 3.1(b) DB Co shall use commercially reasonable efforts to provide such assistance to the City as the City may request, acting reasonably. Such assistance shall include but is not limited to:
 - (i) the development of technical specifications in respect to the Extension Work, and the evaluation of designs proposed by prospective Extension Contractors to ensure compatibility with the deliverables under the Project Agreement and other items as specified by the City;
 - (ii) permitting the City access to relevant information respecting the LMSF and other items as specified by the City;
 - (iii) advising the City on potential modifications to the Extension Work, that could result in cost savings or other benefits to the City; and
 - (iv) the development of an interface protocol between the City, DB Co and the Extension Contractor.

The City and DB Co's obligations under this Section 3.1(a) shall be subject to and in accordance with the provisions of Schedule 24 – Intellectual Property.

- (b) The City shall pay DB Co reasonable consulting fees in respect of the assistance DB Co provides pursuant to this Section 3.1. Such consulting fees shall be agreed by the parties prior to DB Co providing assistance to the City and shall be invoiced on a monthly basis

(or such other period as the parties may agree) and shall be paid within 30 days of receipt of an invoice from DB Co. Each DB Co invoice shall set out in reasonable detail, the nature of assistance provided in the invoice period, the personnel involved and the time committed by DB Co personnel in respect of such assistance.

- (c) As soon as practicable after the City provides notice to DB Co that the City has reached a binding agreement with an Extension Contractor, the City and DB Co shall meet with the Extension Contractor and, in good faith and acting reasonably, negotiate and execute an interface agreement and/or construction procedures agreement to govern matters relating to the coordination of DB Co's activities in respect of the Project Operations and the Extension Contractor's activities relating to the Extension Work. The City shall also include, in its agreement with any Extension Contractor, an obligation on the Extension Contractor to negotiate with the City and DB Co in the terms of the interface agreement and/or construction procedures agreement in good faith and acting reasonably.
- (d) In the event of an Integrated System Extension, the agreement to be negotiated between the City, DB Co and the Extension Contractor pursuant to Section 3.1(c) shall include provisions related to:
 - (i) the rights and obligations of the City, DB Co and the Extension Contractor in respect of the physical linking, testing and commissioning, safety and system certification of the System and the Integrated System Extension;
 - (ii) commissioning requirements with respect to the extended lines; and
 - (iii) a protocol with respect to the testing of the entire Integrated System Extension to ensure integration and ability for the operation of the entire line as contemplated in the Output Specifications and the final output specifications developed in respect of the Integrated System Extension.
- (e) In the event of a Non-Integrated System Extension, the City, DB Co, the Extension Contractor, and the Extension Lenders shall execute a reciprocal agreement in a form to be agreed to between the parties acting reasonably and negotiating in good faith (the "**Reciprocal Agreement**"). The Reciprocal Agreement shall govern the rights of the parties in respect of the station, infrastructure or other location on the System Infrastructure which has an interchange point with the Non-Integrated System Extension and shall govern matters such as:
 - (i) reciprocal easements or other rights-of-access;
 - (ii) appropriate cost sharing arrangements;
 - (iii) sharing of information;
 - (iv) decision making process regarding matters affecting the interchange between the System Infrastructure and the Non-Integrated System Extension; and
 - (v) mutual repair obligations of structural or other elements in common between the System Infrastructure and the Non-Integrated System Extension.

**SCHEDULE 38
UTILITY BASELINE REPORT**

[REDACTED]