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**ARTICLE 1
GENERAL PROVISIONS**

1.1 Reference Documents

Without limiting any other provision in the Agreement, Project Co will undertake the Design and Construction in compliance with all applicable standards, including the standards listed in Appendix A [Reference Documents] to Schedule 1.

1.2 Reference Concept

The Province's consultants undertook the Reference Concept for the Project, copies of which have been made available to Project Co as Disclosed Data.

Project Co may use the Reference Concept as a reference only, but the Province makes no representation or warranty whatsoever, express or implied, as to the accuracy or completeness of any aspect of the Reference Concept, or that the Reference Concept complies with the Project Requirements. Any use by Project Co of any or all aspects of the Reference Concept in performing the Project Work shall be entirely at Project Co's own risk.

Project Co is responsible for all aspects of the Design and Construction whether or not it uses all or any part of the Reference Concept, and the Project Co is responsible to independently verify the accuracy of any information contained in or inferred from the Reference Concept if Project Co uses any of such information in its Design.

1.3 Interpretation

- (a) This Schedule and its Appendices are written as an output specification and define what Project Co must achieve in the Design and Construction. Except as expressly stated otherwise, Project Co will carry out the Design and Construction as required and contemplated by each provision of this Schedule and its Appendices whether or not the provision is written as an obligation of Project or is stated in the passive or imperative form.
- (b) Where "cost effective", "appropriate", "sufficient", "minimize" and related or similar terms are used in this Schedule, they are to be construed and interpreted from the perspective of a prudent public owner of a major transit system that is responsible for all capital and operating costs over the life of the system.
- (c) The word "provide" is to be construed as including all necessary Design and Construction except to the extent the context or the express provision otherwise requires.

1.4 Purpose

This Schedule describes the minimum Design and Construction Requirements for the Project. Project Co will:

- (a) perform the Design and Construction in accordance with this Schedule;

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- (b) provide supporting specifications for all components through the design phases, including detailed technical specifications; and
- (c) submit all such specifications to the Province for review in accordance with Schedule 2 [Representatives, Review Procedure and Consent Procedure] and Appendix G [Systems General Requirements], as applicable.

1.5 Project Overview

In summary, the Project will include the following components:

- (a) approximately 5.7 km of Guideway to extend the Existing Millennium Line from VCC-Clark Station to a new terminus station, Arbutus Station, as further described in Schedule 4 Part 2 Article 3 [Alignment], including:
 - (i) extension of the Existing Millennium Line elevated Guideway from the tail track west of VCC-Clark Station approximately 700 metres westward to Great Northern Way Station; and
 - (ii) approximately five kilometers of underground Guideway from Great Northern Way Station to Arbutus Station, including beneath Broadway Street;
- (b) six underground Stations, including the integration with the existing Broadway-City Hall Station on the Canada Line;
- (c) integration with the Existing SkyTrain System, including the existing automatic train control, other electrical and mechanical systems and the existing vehicle fleet.

1.6 Responsibility for Design and Construction

Project Co shall be responsible for the Design and the Construction, all of which shall be carried out in strict accordance with the Design and Construction Requirements and in such a manner as to comply with this Agreement and all other applicable Project Requirements.

1.7 Responsibility for Products, Equipment and Other Items

Project Co is fully responsible for meeting all requirements of this Agreement notwithstanding that the Province has specified certain products, Equipment or other items in Schedule 4 [Design and Construction]. By entering into this Agreement, Project Co will be deemed to have accepted all responsibility in relation to the use of any such products, Equipment or other items specified by the Province.

1.8 Province Project Office

- (a) Project Co shall, at its sole cost and expense, make available to the Province, from 30 days after the Effective Date until 30 days after the Total Completion Date, a minimum of 10,000 square feet of office space co-located with Project Co's field construction office, providing the Province with secure, unrestricted access and including the following:

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- (i) one boardroom of sufficient size to fit a minimum of 20 people;
 - (ii) ten enclosed offices and twenty cubicle desk spaces;
 - (iii) a separation wall between enclosed offices and the other offices;
 - (iv) twelve secure parking stalls; and
 - (v) dedicated kitchen facility including sink, fridge, microwave and dishwasher.
- (b) The office space provided by Project Co pursuant to Section 1.8(a) of this Article shall include sufficient office furnishings and equipment, other than computer and telephone network systems, to permit the unrestricted use of the office space by the Province.
- (c) The office space provided by Project Co pursuant to Section 1.8(a) of this Article shall be located in close proximity to Project Co's office, and preferably in the same building.

1.9 BCIB Project Office

- (a) In addition to and separate from the office provided by Project Co in accordance with Section 1.8(a), Project Co shall, at its sole cost and expense, make available to BCIB, from 30 days after the Effective Date until 30 days after the Substantial Completion Date, a minimum of 1000 square feet of office space in close proximity to Project Co personnel responsible for employee relations matters on the Project Site, providing BCIB with secure, unrestricted access and including the following:
- (i) three enclosed offices;
 - (ii) one boardroom of sufficient size to fit a minimum of 20 people;
 - (iii) three secure parking stalls; and
 - (iv) access to kitchen and washroom facilities.
- (b) The office space provided by Project Co pursuant to Section 1.9(a) of this Article shall include sufficient office furnishings and equipment, other than computer and telephone network systems, to permit the unrestricted use of the office space by BCIB.
- (c) From time to time, BCIB personnel may require access to satellite trailer boardrooms to deal with potential employee issues. Project Co will make an effort to provide boardroom access to support BCIB's performance of its role as an employer.

1.10 Broadway Subway Project Alignment Stationing (Chainage)

All stationing (STA.) provided in this Agreement is specific to the inbound track alignment stationing shown in the Project Lands Drawings, provided in Appendix C to Schedule 8 [Lands].

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1.11 Responsibility for Municipal and Provincial Facilities

Project Co is responsible for, and the Project Work includes, the Design and Construction, including completion, commissioning and testing, of the Project Infrastructure, which shall be carried out in strict accordance with the Design and Construction Requirements and the Design and Construction Certification Procedure and in such a manner as to comply with this Agreement and all other applicable Project Requirements.

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Article 2. Independent Certifier

2.1 Selection of Independent Certifier

2.1.1 General

- (a) Unless the parties, acting reasonably, agree to an earlier date, the Province and Project Co shall, not less than 365 days before the Substantial Completion Target Date, cooperate to select an independent qualified firm of Professional Engineers as the Independent Certifier in accordance with the provisions of this Article 2 [Independent Certifier] and enter into the Independent Certifier Contract with the Independent Certifier.
- (b) If the procurement laws, policies or guidelines applicable to the Province require the award of the Independent Certifier Contract to be made based on a competitive tender process, the selection of the Independent Certifier pursuant to Article 2.1.1(a) of this Part 1 shall be determined by the conduct of a competitive tender process, the terms of which shall be reasonable and materially consistent with the terms of such processes conducted for the appointment of roles similar to that of the Independent Certifier on other projects in the Province and shall be agreed upon by the Province and Project Co, both acting reasonably, following the Effective Date.

2.1.2 Failure to Agree

- (a) If the award of the Independent Certifier Contract is required to be determined by the conduct of a competitive tender process in accordance with Article 2.1.1(b) of this Part 1, and the Province and Project Co fail, not less than 15 months before the Substantial Completion Target Date, to agree on the terms of conduct of a competitive tender process pursuant to Article 2.1.1(b) of this Part 1, the dispute as to the terms of conduct of such competitive tender process shall be resolved pursuant to the Dispute Resolution Procedure.
- (b) If the award of the Independent Certifier Contract is not required to be determined by the conduct of a competitive tender process in accordance with Article 2.1.1(b) of this Part 1 and the Province and Project Co fail to agree upon the selection of an Independent Certifier within the period of time specified in Article 2.1.1(a) of this Part 1, then the Independent Certifier shall be chosen as follows:
 - (i) each of the Province and Project Co shall, within five Business Days after the expiry of such period, select three suitably qualified and experienced potential Independent Certifier candidates that would be acceptable to that party, and shall provide notice thereof to the other party, with a ranking of preference among the candidates;
 - (ii) if the Independent Certifier candidate ranked highest by both the Province and Project Co is the same firm, that firm shall be the Independent Certifier; and
 - (iii) if the Province and Project Co have not selected a common Independent Certifier in accordance with Article 2.1.2(b)(ii) of this Part 1, then following the expiration of the five Business Day period referred to in Article 2.1.2(b)(i) of this Part 1, either party may apply to the BCICAC for selection of the Independent Certifier, in which case the BCICAC shall select the Independent Certifier in

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accordance with Article 14 of the BCICAC's Domestic Commercial Arbitration Rules of Procedure.

2.1.3 Independent Certifier Qualifications

- (a) Unless the Province or Project Co otherwise agree, no person shall be nominated or appointed to act as an Independent Certifier who, or any of whose Affiliates, is or at any time has been involved or interested in the conduct of:
 - (i) any of the Project Work on behalf of Project Co or any Subcontractor; or
 - (ii) the Project on behalf of the Province.
- (b) The Independent Certifier shall, at a minimum:
 - (i) be a suitably qualified and experienced firm of Professional Engineers in respect of projects of the nature and scope of the Project;
 - (ii) have the ability and resources necessary to carry out services of the nature required of an engineer to certify Substantial Completion of the Project Work, and to perform and discharge all other functions and responsibilities of the Independent Certifier under the Independent Certifier Contract; and
 - (iii) be without bias or conflict of interest.

2.2 Independent Certifier Contract

2.2.1 Form of Contract

The Independent Certifier Contract shall be substantially in the form set out in Appendix D [Form of Independent Certifier Contract] to Schedule 4. The Province and Project Co acknowledge and agree that the form of Independent Certifier Contract remains subject to modification following review by the Independent Certifier, with any such modifications requiring the agreement of the Province and Project Co.

2.2.2 Independent Certifier Services

The services to be provided by the Independent Certifier are described in the Independent Certifier Contract.

2.2.3 Change in Terms

Neither the Province nor Project Co shall without the other's prior written agreement:

- (a) waive, settle, compromise or otherwise prejudice any rights or claims against the Independent Certifier under or in connection with the Independent Certifier Contract; or
- (b) vary the terms of the Independent Certifier Contract or the services performed or to be performed by the Independent Certifier.

2.3 Performance of Obligations

2.3.1 Independent Certifier Contract

Each of the Province and Project Co shall perform its respective obligations arising under or in connection with the Independent Certifier Contract.

2.3.2 Cooperation

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

2.3.3 Information

- (a) The Province shall provide the Independent Certifier with a complete copy of this Agreement as executed by the parties.
- (b) The Province shall provide the Independent Certifier with a complete copy of each Change Certificate issued by the Province's Representative within 10 Business Days of issuance of the Change Certificate.
- (c) The Province and Project Co shall provide the Independent Certifier with any information that the Independent Certifier reasonably requires for the purpose of providing the services described in the Independent Certifier Contract.

2.3.4 Access to Project Site

The Province and Project Co shall permit the Independent Certifier to have access to the Project Site and the Project Infrastructure and to all documents and records relating to the Project Work (other than documents and records which are legally privileged), as the Independent Certifier reasonably requires to carry out its responsibilities under and in accordance with the Independent Certifier Contract.

2.4 Replacement of Independent Certifier

2.4.1 General

- (a) The Independent Certifier may, at any time, be discharged and replaced by another Independent Certifier by mutual agreement of the Province and Project Co.
- (b) If the Independent Certifier's appointment is terminated for any reason and the procurement laws, guidelines or policies applicable to the Province require the award of the Independent Certifier Contract for the replacement Independent Certifier to be made based on a competitive tender process, the selection of a replacement Independent Certifier, the terms of which process shall be determined by the conduct of a competitive

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tender process, shall be reasonable and materially consistent with the terms of such processes conducted for the appointment of roles similar to that of the Independent Certifier on other projects in the Province and shall be agreed upon by the Province and Project Co, acting reasonably.

- (c) If the Independent Certifier's appointment is terminated for any reason and the procurement laws, guidelines or policies applicable to the Province do not require the award of the Independent Certifier Contract for the replacement Independent Certifier to be made based on a competitive tender process, the Province and Project Co shall cooperate with each other in order to appoint a suitably qualified and experienced firm of Professional Engineers having, at a minimum, the qualifications described in Article 2.1.3 [Independent Certifier Qualifications] of this Part 1 to act as the Independent Certifier as soon as reasonably practicable.
- (d) The terms of the replacement Independent Certifier's appointment shall, unless otherwise agreed, be substantially as set out in the Independent Certifier Contract and the provisions of Article 2.3 [Performance of Obligations] of this Part 1 shall apply *mutatis mutandis* with respect to the replacement Independent Certifier.

2.4.2 Failure to Agree on Replacement

- (a) If the Province and Project Co fail to agree upon the terms of conduct of a competitive tender process required to be conducted in accordance with Article 2.4.1(b) of this Part 1, the dispute as to the terms of conduct of such competitive tender process shall be resolved pursuant to the Dispute Resolution Procedure.
- (b) If the award of the Independent Certifier Contract for the replacement Independent Certifier is not required to be determined based on a competitive tender process in accordance with Article 2.4.1(b) of this Part 1, and if the Province and Project Co fail to agree upon a replacement Independent Certifier within five Business Days of the original Independent Certifier's appointment being terminated, then a replacement Independent Certifier shall be selected in accordance with the provisions of Article 2.1.2(b) of this Part 1, which provisions shall apply *mutatis mutandis*.

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Article 3. Municipal Requirements

3.1 General

3.1.1 Scope

(a) With respect to the Municipal Agreement, a redacted copy of which has been provided by the Province to Project Co in the Data Room, Project Co, at its own cost and expense:

- (i) shall, until the Substantial Completion Date, perform all obligations of the Province under the Municipal Agreement (such that any reference in the Municipal Agreement to “Province” will be read as reference to “Project Co”, and reference to the “Province’s contractors” will be read as “Project Co or Project Co’s Subcontractors”), except for those Province obligations set out in:
 - A. Section 2.1 [Acknowledgment and Acceptance of Alignment of Broadway Subway];
 - B. Section 2.2 [Access and Occupation of Construction-Required Lands];
 - C. Section 2.3 [Access and Occupation of System-Required Lands];
 - D. Section 2.4 [Access-Required Lands];
 - E. Section 2.7 [Notice of Access and Use of Project-Required Lands];
 - F. Section 2.9 [Additional City Lands];
 - G. Section 2.11 [Time Limits on the Province’s Exercise of Access and Occupation Rights];
 - H. Subsections (a) and (b) of Section 3.1 [Pre-Existing Rights on Project-Required Lands];
 - I. Subsection (b) of Section 4.5 [Communications, Community Relations and Business Relations];
 - J. Section 4.8 [City Resources];
 - K. Section 5.1 [General, DAP and CAP];
 - L. Subsection (a) of Section 5.2 [City Infrastructure and City Utilities Generally];
 - M. Section 5.4 [Sprinklers];

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- N. Section 6.1 [Plans, Drawings, Surveys and other Information provided by the Province to the City with respect to Project Infrastructure Work, City Infrastructure Work and City Utilities Work];
- O. Section 6.3 [City Infrastructure Work];
- P. Section 6.4 [City Utilities Work], except for subsection (g) of Section 6.4;
- Q. Section 6.6 [City Enhancements];
- R. Section 6.14 [Cost Adjustments];
- S. Section 6.15 [Payment];
- T. Section 6.16 [Maintenance of Project Infrastructure];
- U. Section 7.1 [Assignment by Province]; and
- V. Section 8.1 [Indemnification by the Province];

of the Municipal Agreement, provided that the exceptions listed in Article 3.1.1(a)(i) of this Part 1 shall not amend, alter or derogate from any of Project Co's obligations set out in this Agreement, including its indemnity obligations, and its obligations to rectify the Final Deficiency List Deficiencies and Project Work Defects, and to perform Project Co's warranty obligations in accordance with Schedule 4, Part 2, Article 8 [Utilities], Schedule 4, Part 2, Article 9 [Roads], Schedule 5 [Project Work Defects and Warranties], and the Agreement generally;

- (ii) shall comply with, observe and abide by, and not do, or omit to do or permit to be done or omitted to be done, anything to cause Province to be in breach of, the Municipal Agreement; and
- (iii) acknowledges the rights of the City under the Municipal Agreement.

3.1.2 Municipal Lands

Project Co shall have access to the Project Site in accordance with Schedule 8 [Lands] and all other applicable terms and conditions of this Agreement.

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3.1.3 Public Utilities

- (a) With respect to work on Utilities owned by the City of Vancouver and Metro Vancouver Regional District, Project Co shall comply with Article 8 [Utilities], Part 2 of Schedule 4.
- (b) Without limiting Article 3.1.3(a) of this Part 2, where a Public Utility is owned by the City of Vancouver, Project Co shall be responsible for undertaking all design and construction reviews with the City of Vancouver. For certainty, the City of Vancouver is responsible for the review and inspection of the Design and Construction of any Public Utilities owned by the City of Vancouver that are constructed, installed, altered, upgraded and/or augmented by the carrying out of the Project Work.
- (c) Without limiting Article 3.1.3(a) of this Part 2, where a Public Utility is owned by Metro Vancouver Regional District, Project Co shall be responsible for undertaking all design and construction reviews with Metro Vancouver Regional District. For certainty, Metro Vancouver Regional District is responsible for the review and inspection of the Design and Construction of any Public Utilities owned by the Metro Vancouver Regional District that are constructed, installed, altered, upgraded and/or augmented by the carrying out of the Project Work.

3.1.4 Noise, Vibration and Hours of Project Work

Project Co shall observe and comply with Article 20 [Noise and Vibration], Part 2 of Schedule 4, in relation to noise, vibration and the hours during which Construction activities may be undertaken.

3.1.5 Roads

- (a) Project Co shall comply with Article 9 [Roads], Part 2 of Schedule 4, in relation to the Design and Construction of permanent roads and roadway structures and other matters dealt with in Article 9 [Roads].
- (b) Project Co shall comply with Part 4 [Traffic Management] of Schedule 4 in relation to:
 - (i) the Design and Construction of temporary roads; and
 - (ii) Traffic Management.

SCHEDULE 4 PART 1 ARTICLE 3: MUNICIPAL REQUIREMENTS

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- (c) Without limiting Article 3.1.5(a) of this Part 2, Project Co shall be responsible for undertaking all design and construction reviews of Municipal Roads with the Province's Representative in accordance with Article 9 [Roads], Part 2 of Schedule 4.

3.1.6 Environmental

- (a) Project Co shall observe, comply with and perform all of its obligations and duties related to and in respect of the Municipal Roads and Municipal Lands as set out in Schedule 6 [Environmental Obligations] of this Agreement.

3.1.7 Municipal Infrastructure

- (a) Except where specifically required otherwise in this Agreement, all Municipal Infrastructure, other than the permanent roadworks referred to in Article 9.2 [Permanent Roadworks] and Public Utilities owned by the City of Vancouver referred to in Article 8.4 [Utilities owned by the City of Vancouver], both Part 2 of Schedule 4, that requires decommissioning, abandonment or closure by Project Co shall be replaced with systems, fixtures and facilities which are of equal quality and capacity on a Like-for-Like (as such term is defined in the Municipal Agreement) basis.
- (b) Where Project Co has decommissioned, abandoned or closed any removable Municipal Infrastructure on the Municipal Lands, Project Co shall offer the City of Vancouver the opportunity to accept or reject such removable Municipal Infrastructure and where such removable Municipal Infrastructure is:
 - (i) accepted by the City of Vancouver, Project Co shall deliver such infrastructure to such the City of Vancouver public work yard or to any other location as agreed upon between Project Co and the City of Vancouver; or
 - (ii) rejected by the City of Vancouver, Project Co is entitled to retain or dispose of such infrastructure and any costs incurred or income derived from such retention or disposal shall be for the account of Project Co.

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3.1.8 Pre-Existing Rights

- (a) The City of Vancouver has disclosed documents setting out certain pre-existing rights over portions of Municipal Roads, and this has been provided by the Province to Project Co as Disclosed Data.
- (b) Project Co shall be responsible for reviewing the pre-existing rights provided as Disclosed Data, complying with the terms of such rights, and coordinating the Project Works to avoid conflict with any structures or improvements associated with these rights.
- (c) For any structures or improvements fixed to private property where conflict cannot be avoided, Project Co shall submit to the Province's Representative under the Consent Procedure, in advance of the commencement of construction activities, the following information:
 - (i) a description of the location(s) of areas of the Project Site affected;
 - (ii) the nature of the rights that require to be modified or terminated to facilitate the Project Works;
 - (iii) the scope of works required to modify any structures or improvements associated with these rights; and
 - (iv) a description of the replacement strategy, where applicable. For any pre-existing rights relating to awnings and above-grade easements, Project Co will be required to reinstate these structures or improvements on a Like-for-Like (as defined in the Municipal Agreement) basis on completion of the Project Works within the vicinity of the Project Lands.
- (d) For any pre-existing rights associated with street uses, such as patios, sidewalk merchandise displays, light pole banners (not including hardware), newspaper boxes, street vendor signs and sandwich boards, Project Co shall coordinate with the City to facilitate removal of the street use item, at Project Co's cost. Project Co shall coordinate with the City regarding the reinstatement of all street use items as soon as reasonably practicable. The following notice requirements shall be met for removal of the following street use items:

STREET USE	
Items	Notice Requirement
Sidewalk Patio (w/ Railings)	Minimum 3 months, with preference for removal to take place over winter (non-patio season)
Sidewalk Patio (w/o Railings)	Minimum 1 month, with preference for removal to take place over winter (non-patio season)
Sidewalk Merchandise Display	Minimum 1 month
Light Pole Banner (not including hardware)	Minimum 3 months, with preference for additional advance notification if possible.

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Newspaper Box	Minimum 2 weeks
Street Vendor	Minimum 3 weeks
Sandwich Board	Minimum 3 weeks

3.2 Permits and Fees

- (a) In undertaking the Project, the Province is exercising its authority concerning the use and development of land and the planning, construction, alteration, servicing and use of improvements on, in and over land. Subject to Article 3.2(b) of this Part 1, Project Co is not required to obtain any development, building, occupancy, or other Permit or preliminary or other plan approvals from the City of Vancouver in connection with the performance of the Project Work.
- (b) Except where specifically required otherwise in this Agreement, Project Co is not required to obtain any Permits or to pay Permit fees, development charges or other municipal fees or charges to the City of Vancouver in connection with the performance of the Project Work except as required in relation to:
- (i) Utilities as required by Article 8 [Utilities], Part 2 of Schedule 4;
 - (ii) the modification of buildings as set out in Section 6.3 of Schedule 8 [Lands];
 - (iii) any fieldwork undertaken by the City of Vancouver on behalf of Project Co, including inspections and testing;
 - (iv) repairs and/or fieldwork undertaken by the City of Vancouver in dealing with an emergency caused or contributed to by the work of Project Co;
 - (v) testing and inspection of the Traffic Signals as required by Article 9 [Roads], Part 2 of Schedule 4; and
 - (vi) any permits required by agencies other than the City of Vancouver that are administered by the City.

3.3 Notice of Access and Use

- (a) Except in the case of an emergency, before entering onto:
- (i) any Municipal Roads for the purposes of the commencement of any Construction activities and/or implementation of any changes to Traffic which require Traffic Control Plans; or
 - (ii) any Municipal Lands that are not Municipal Roads for the purpose of the commencement of any Construction activities,

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Project Co shall give to the Province not less than 7 Business Days' prior written notice of Project Co's intention to enter onto such Municipal Roads or the Minimum Notice Period set out in Schedule 8 [Lands] for Municipal Lands that are not Municipal Roads, as applicable.

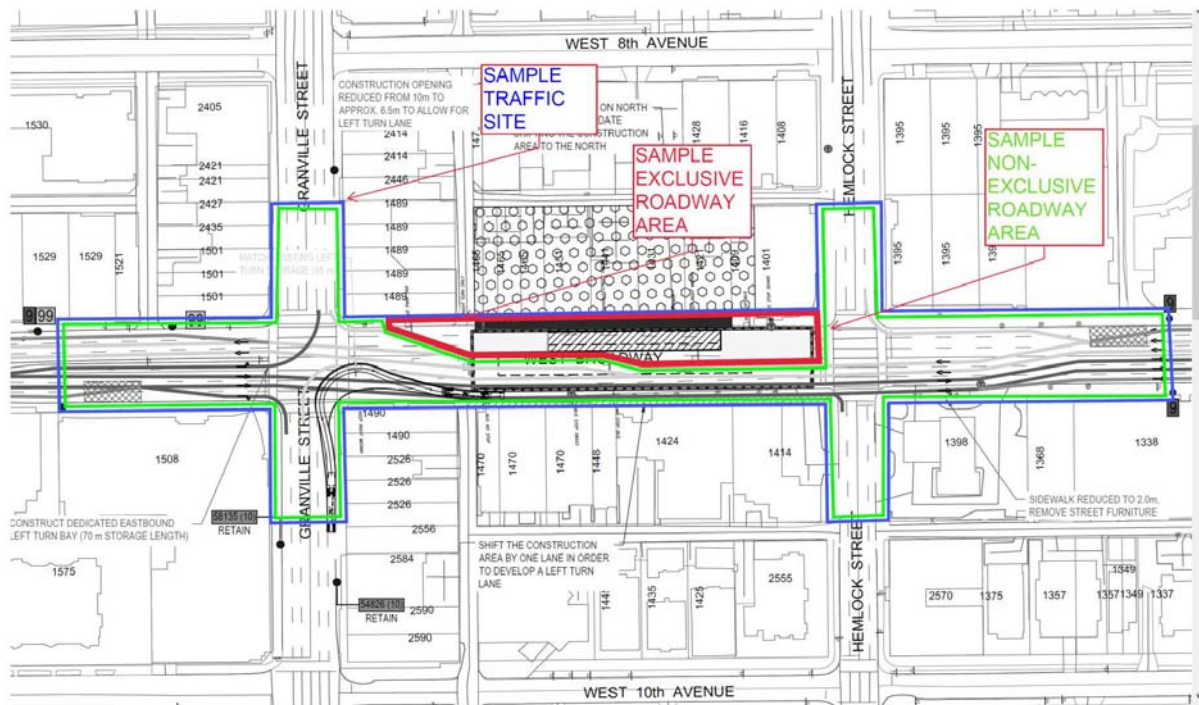
- (b) Any notice pursuant to Article 3.3(a) of this Part 1 shall identify:
 - (iii) the Municipal Roads or the Municipal Lands that are not Municipal Roads in question;
 - (iv) the planned date of entry by Project Co;
 - (v) the purpose of the entry;
 - (vi) the expected duration of use; and
 - (vii) with respect to any Municipal Roads, whether such road shall be an Exclusive Road or a Non-Exclusive Road.
- (c) Upon notification and Project Co's entry onto the Municipal Roads as either Exclusive Road within the Traffic Site or Non-Exclusive Road within the Traffic Site, these portions of the Municipal Roads will form part of the Project Site. Project Co will continue to be responsible for these portions of the Municipal Roads as part of the Project Site, until handover of these Municipal Road in accordance with Article 9.8, Part 2, Schedule 4.
- (d) Nothing in this Article 3.3 [Notice of Access and Use] shall affect the obligation of Project Co to comply with any other notice requirements of this Agreement with respect to occupation or use of the Project Site, including Article 1.3.2 [Traffic Management Communications Plan], Part 4 of Schedule 4, and Schedule 8 [Lands].
- (e) Project Co shall be responsible for the maintenance and cleanliness of all Municipal Lands that are not Municipal Roads. Project Co shall be responsible for the maintenance and cleanliness of Municipal Roads in accordance with the road maintenance scope split specified in Article 3.4 [Maintenance of Municipal Road Infrastructure] of this Part 1 of Schedule 4. Where required, Project Co shall be responsible for providing access through Municipal Lands to allow for municipal garbage, recycling and organics collection service.

3.4 Maintenance of Municipal Road Infrastructure

(a) When used in Article 3.3 [Notice of Access and Use] of this Part 1 and this Article 3.4 [Road Maintenance], the following terms have the meaning set out below:

- (i) **“Exclusive Road”** means a Municipal Road or portion thereof that is occupied and used by Project Co only, with the exception of access for an emergency or in accordance with Section 4.7 [Access to Site and Project Infrastructure by Others] of this Agreement. An example illustration of an Exclusive Road is shown in the figure below.
- (ii) **“Non-Exclusive Road”** means a Municipal Road or portion thereof where access and use of such Municipal Road is shared by Project Co with the City of Vancouver. An example illustration of a Non-Exclusive Road is shown in the figure below.

Figure 1: Traffic Site



SCHEDULE 4 PART 1 ARTICLE 3: MUNICIPAL REQUIREMENTS

(b) The scope split matrix table set out in this Article 3.4(b) provides the breakdown of the responsibilities of each of Project Co and the City of Vancouver respectively with respect to the maintenance of Non-Exclusive Roads within the Traffic Site, Exclusive Roads within the Traffic Site, and roads outside the Traffic Site. Unless noted otherwise in the Table A and B, the responsible party shall be responsible to undertake the defined scope at their cost and expense.

A - Road Maintenance Scope Split Activities within the Traffic Site			
Major Maintenance Activity	Scope Definition	Project Co	City
WINTER ROAD MAINTENANCE AND DIRT/DUST CONTROL	A1 Non-Exclusive Roads - Winter road maintenance of driving surface (both vehicular and bicycle related) consisting only of snow removal (including proactive measures when snow is forecast) using equipment, brine, materials and/or chemicals for snow and ice control, subject to A3, A4, and A5 below.		X
	A2 Non-Exclusive Roads - Winter road maintenance of boulevards/sidewalks consisting only of snow removal (including proactive measures when snow is forecast) using equipment, brine, materials and/or chemicals for snow and ice control.	X	
	A3 Non-Exclusive Roads - Close cooperation with the City, including, if any, joint road inspections required by the City, to facilitate winter road maintenance and routine litter/dirt sweeping.	X	
	A4 Non-Exclusive Roads - Temporary removal of construction materials and equipment identified during joint road inspection that would impede winter road maintenance and routine litter/dirt sweeping.	X	
	A5 Non-Exclusive Roads - Snow removal of those sections of road where, although the road surface is drivable by vehicles, the road surface is still compromised by construction activities in that it poses a risk to the City's snow plough blade (such as, for example, temporary steel plates covering utility work, road ramps covering cabling, bailey bridge approaches, etc.). Project Co shall be responsible for removal of snow from these sections of roads, as well as within an allowance of 100m either side of the compromised road surface. The Project Co shall be responsible for identifying these sections of roads to	X	

SCHEDULE 4 PART 1 ARTICLE 3: MUNICIPAL REQUIREMENTS

A - Road Maintenance Scope Split Activities within the Traffic Site			
Major Maintenance Activity	Scope Definition	Project Co	City
	the City. The Project Co shall be liable for any damages incurred by the City where these sections of roads have not been identified to the City.		
	A6 Non-Exclusive Roads - Dirt/dust sweeping, construction related waste, and litter within Traffic Site to be the responsibility of the Project Co and any additional areas where deemed by the Province's Representative that dirt/dust on the road is primarily caused by, attributable to or required by the Project Co's construction activities.	X	
ALL OTHER MAINTENANCE OF EXISTING MUNICIPAL ROADWAYS	A7 Non-Exclusive Roads - Maintenance of the following elements of existing municipal roadway, with any maintenance required as a result of damage caused by Project Co, shall be at Project Co's cost and expense, including: <ul style="list-style-type: none"> • repair or replacement of all other existing road signs not covered by A8 below; • maintenance (including bulb replacement) of pedestrian and roadway lighting, provided Project Co provides access; • landscape control and pruning of existing medians and boulevard to ensure unobstructed sight lines; and • maintenance of City street furniture, including bus shelters, garbage bins, bike racks, newspaper boxes, traffic signs, benches, wayfinding signage, litter cans, recycling blue containers, parking meters. 		X
	A8 Exclusive Roads and Non-Exclusive Roads - All other maintenance of existing municipal roadway structures and elements not covered by A7 (including existing pedestrian sidewalks) pertaining to road user safety including: <ul style="list-style-type: none"> • cleaning of existing roadside ditch drains and 	X	

SCHEDULE 4 PART 1 ARTICLE 3: MUNICIPAL REQUIREMENTS

A - Road Maintenance Scope Split Activities within the Traffic Site			
Major Maintenance Activity	Scope Definition	Project Co	City
	<p>catch basins;</p> <ul style="list-style-type: none"> • restriping of existing pavement markings during construction; • maintenance (including bulb replacement) of pedestrian and roadway lighting, where Project Co cannot provide access or if immediate maintenance is required for traffic safety; • repair or replacement of existing road signs related to Traffic Control and Traffic Management; • repair of existing pedestrian sidewalks; • repair of existing road pavement (such as pot-holes) including damage/rutting caused by temporary bus stop locations; and • maintenance of temporary bus stops. 		
	<p>A9 Exclusive Roads and Non-Exclusive Roads - Maintenance of existing roadway structure and elements where deemed by the Province's Representative, acting reasonably, that such road maintenance is primarily caused by, attributable to or required by the Project Co's construction activities, necessitating road maintenance over and above that typically undertaken by the City. Where such additional road maintenance is undertaken by the City instead of by the Project Co, this additional road maintenance will be at the cost and expense of the Project Co.</p>	X	
<p>ALL OTHER MAINTENANCE OF TEMPORARY MUNICIPAL</p>	<p>A10 Exclusive Roads and Non-Exclusive Roads - Maintenance of all temporary roadway structures and elements (including existing pedestrian sidewalks) constructed by the Project Co including:</p>	X	

SCHEDULE 4 PART 1 ARTICLE 3: MUNICIPAL REQUIREMENTS

A - Road Maintenance Scope Split Activities within the Traffic Site			
Major Maintenance Activity	Scope Definition	Project Co	City
ROADWAYS	<ul style="list-style-type: none"> • repair of temporary road pavement (such as pot-holes), sidewalks, and curb and gutter; • repair or replacement of temporary road signs (including construction advisory signage and transit priority signage); • cleaning of temporary roadside ditch drains and catch basins; • maintenance of temporary bus stops, and temporary pedestrian and bicycle routes and detours • restriping of temporary pavement markings; and • maintenance (including bulb replacement) of temporary pedestrian and roadway lighting. 		
MAINTENANCE OF EXISTING TRAFFIC SIGNALS	<p>A11 Exclusive Roads and Non-Exclusive Roads - Maintenance of all existing Traffic Signals, with any maintenance required as a result of damage caused by Project Co, shall be at Project Co's cost and expense, including:</p> <ul style="list-style-type: none"> • repair or replacement of faulty or damaged existing Traffic Signal components • repair or replacement of existing traffic signal loops • repairs or maintenance to the existing traffic controller <p>For certainty, the maintenance of existing Traffic Signals set out in this Item A11 only pertains to maintenance work not caused by, attributable to or required by the Project Co's construction activities or required to be carried out by the Project Co pursuant</p>		x

SCHEDULE 4 PART 1 ARTICLE 3: MUNICIPAL REQUIREMENTS

A - Road Maintenance Scope Split Activities within the Traffic Site			
Major Maintenance Activity	Scope Definition	Project Co	City
	to Item A14.		
	A12 Exclusive Roads and Non-Exclusive Roads - Where maintenance to existing traffic controllers is required and it is deemed by the Province's Representative, acting reasonably, that such maintenance to traffic controllers is caused by, attributable to or required by the Project Co's construction activities, the City of Vancouver may, using its electrical maintenance contractor, undertake the necessary repairs at the cost of the Project Co.		X
	A13 Exclusive Roads and Non-Exclusive Roads - Coordination and close cooperation with the City of Vancouver to allow access for maintenance of existing Traffic Signals, and existing traffic loops and traffic controllers. Where maintenance to existing traffic loops is required and it is deemed by the Province's Representative, acting reasonably, that such maintenance to traffic loops is caused by, attributable to or required by Project Co's Construction activities, Project Co. is to undertake the necessary maintenance at the cost of Project Co.	X	
MAINTENANCE OF MODIFIED, NEW TEMPORARY AND NEW PERMANENT TRAFFIC SIGNALS	A14 Exclusive Roads and Non-Exclusive Roads - Maintenance of all modified and new temporary Traffic Signals shall be maintained by Project Co, in accordance with the installation and modification scope split in Attachment C to Schedule 4, Part 4, Article 1 of the agreement. For certainty, all existing Traffic Signals will be considered as a modified Traffic Signal as of the earlier of (i) Project Co's requests for modifications to traffic controller cabinet or implementation of any Traffic Signal timing changes to facilitate construction activities; or (2) Project Co physically modifying the existing Traffic Signal.	X	
	A15 Exclusive Roads and Non-Exclusive Roads - Maintenance of the portions of the modified and new		X

SCHEDULE 4 PART 1 ARTICLE 3: MUNICIPAL REQUIREMENTS

A - Road Maintenance Scope Split Activities within the Traffic Site			
Major Maintenance Activity	Scope Definition	Project Co	City
	temporary Traffic Signals shall be by the City of Vancouver for the elements identified as City of Vancouver scope in the installation and modification scope split in Attachment C to Schedule 4, Part 4, Article 1 of the agreement. City of Vancouver shall perform this work at the request of Project Co, and at the cost and expense of Project Co.		
	A16 Exclusive Roads and Non-Exclusive Roads - Maintenance of existing Traffic Signals where deemed by the Province’s Representative, acting reasonably, that such Traffic Signal maintenance is caused by, attributable to or required by the Project Co’s construction activities. Where such additional maintenance of Traffic Signals is undertaken by the City of Vancouver instead of by the Project Co, this additional Traffic Signal maintenance will be at the cost and expense of the Project Co.	x	
	A17 Exclusive Roads and Non-Exclusive Roads - Coordination and close cooperation with the City of Vancouver to allow access and maintenance of modified or new temporary Traffic Signals, in accordance with scope split in Item A15 .	x	
	A18 Exclusive Roads and Non-Exclusive Roads - Project Co shall be responsible for the cost and expense of maintenance of the new permanent Traffic Signals until substantial completion of those portions of Roads and handover to the City of Vancouver. Maintenance work shall be conducted in accordance with the installation scope split in Attachment A to Schedule 4, Part 2, Article 9 [Roads] of the agreement.	x	

SCHEDULE 4 PART 1 ARTICLE 3: MUNICIPAL REQUIREMENTS

B – Road Maintenance Scope Split Activities outside the Traffic Site			
Major Maintenance Activity	Scope Definition	Project Co	City
WINTER ROAD MAINTENANCE AND DIRT/DUST CONTROL	B1 - Winter road maintenance of driving surface (both vehicular and bicycle related) consisting only of snow removal (including proactive measures when snow is forecast) using equipment, brine, materials and/or chemicals for snow and ice control. Winter road maintenance of boulevards /sidewalks consisting only of snow removal (including proactive measures when snow is forecast) using equipment, brine, materials and/or chemicals for snow and ice control.		X
	B2 - Close cooperation with the City, including, if any, joint road inspections required by the City, to facilitate winter road maintenance and litter/dirt sweeping.	X	
	B3 - Dirt/dust sweeping outside the Traffic Site where deemed by the Province’s Representative that dirt/dust on the road is primarily caused by, attributable to or required by the Project Co’s construction activities.	X	
ALL OTHER MAINTENANCE OF EXISTING MUNICIPAL ROADWAYS	B4 - All other maintenance of existing municipal roadway structures and elements (including existing pedestrian sidewalks) pertaining to road user safety including: <ul style="list-style-type: none"> • repair of existing road pavement (such as pot-holes) including damage/rutting caused by temporary bus stop locations, except for temporary #99 B-Line bus stops without concrete bus pads; • repair or replacement of existing road signs; • cleaning of existing roadside ditch drains and catch basins; • restriping of existing pavement markings; • landscape control and pruning of existing 		X

SCHEDULE 4 PART 1 ARTICLE 3: MUNICIPAL REQUIREMENTS

B - Road Maintenance Scope Split Activities outside the Traffic Site			
Major Maintenance Activity	Scope Definition	Project Co	City
	<p>medians and boulevard to ensure unobstructed sight lines;</p> <ul style="list-style-type: none"> • maintenance (including bulb replacement) of pedestrian and roadway lighting; • repair of existing pedestrian sidewalks; • maintenance of City street furniture, including bus shelters, garbage bins, bike racks, newspaper boxes, traffic signs, benches, wayfinding signage, litter cans, recycling blue containers, parking meters, red light cameras; 		
	<p>B5 - Coordination and close cooperation with the City to facilitate all other road maintenance of existing Municipal Road structures and elements set out above. Repair of existing road pavement (such as pot-holes) including damage / rutting caused by temporary bus stop locations for the #99 B-Line without concrete bus pads.</p>	X	
	<p>B6 - Maintenance of existing roadway structure and elements where deemed by the Province's Representative, acting reasonably, that such road maintenance is primarily caused by, attributable to or required by the Project Co's construction activities, necessitating road maintenance over and above that typically undertaken by the City. Where such additional road maintenance is undertaken by the City instead of by the Project Co, this additional road maintenance will be at the cost and expense of the Project Co.</p>	X	
	<p>B7 - Repair or replacement of construction advisory signage.</p>	X	
	<p>B8 - Repair or replacement of existing transit priority signage.</p>		X
MAINTENANCE	<p>B9 - Maintenance of all existing Traffic Signals</p>		X

SCHEDULE 4 PART 1 ARTICLE 3: MUNICIPAL REQUIREMENTS

B - Road Maintenance Scope Split Activities outside the Traffic Site			
Major Maintenance Activity	Scope Definition	Project Co	City
OF EXISTING, MODIFIED, AND NEW TRAFFIC SIGNALS	including: <ul style="list-style-type: none"> • repair or replacement of faulty or damaged Traffic Signal components • repair or replacement of traffic loops repairs to the traffic controller by the City of Vancouver 		
	B10 - For certainty, the maintenance of existing Traffic Signals set out at Item B9 only pertains to maintenance work not caused by, attributable to or required by the Project Co's construction activities or required to be carried out by the Project Co pursuant to Item A14 .		X
	B11 - Where maintenance to existing traffic controllers is required and it is deemed by the Province's Representative, acting reasonably, that such maintenance to traffic controllers is caused by, attributable to or required by the Project Co's construction activities, the City of Vancouver may undertake the necessary repairs at the cost of the Project Co.		X
	B12 - Where maintenance to existing traffic loops is required and it is deemed by the Province's Representative, acting reasonably, that such maintenance to traffic loops is caused by, attributable to or required by the Project Co's Construction activities, Project Co undertake the necessary maintenance at the cost of the Project Co.	X	

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- (c) Where Project Co is required to undertake road maintenance activities as set out in this Article 3.4 [Road Maintenance], Project Co shall offer the City of Vancouver the opportunity to undertake such road maintenance activities on behalf of Project Co on such terms and conditions as Project Co and the City of Vancouver may agree before Project Co engages any Subcontractor to perform such work. If the City of Vancouver agrees to perform road maintenance activities on or in respect of roads which are within its boundaries on terms and conditions acceptable to Project Co, Project Co shall retain the services of the City of Vancouver to undertake such road maintenance activities, at Project Co's cost and expense.
- (d) Trolley Overhead wires located outside of the Traffic Site are to be maintained by CMBC. The maintenance of Trolley Overhead wires will be at Project Co's cost where such maintenance is deemed by the Province's Representative as primarily caused by, attributable to or required by Project Co's Construction activities, necessitating maintenance over and above that typically undertaken CMBC. Such additional maintenance will be undertaken by CMBC at the cost and expense of Project Co.
- (e) Trolley Overhead poles and bases located outside of the Traffic Site are to be maintained by CMBC. Project Co shall be financially responsible for maintenance of Trolley Overhead poles and bases where deemed by the Province's Representative that such maintenance is primarily caused by, attributable to or required by Project Co's construction activities, necessitating maintenance over and above that typically undertaken CMBC. Such additional maintenance will be undertaken by Project Co at the cost and expense of Project Co.
- (f) Project Co shall provide the City of Vancouver with ten (10) Business Days' notice prior to occupying the Exclusive Roads so that necessary City activities can be completed prior to occupation (including but not limited to the removal or relocation of all City receptacles). These activities shall be at the cost and expense of Project Co.
- (g) If the Province is invoiced for any costs or expenses in relation to the road maintenance activities set out in this Article 3.4 [Road Maintenance] which are the responsibility of Project Co or, if such costs or expenses are otherwise charged directly to the Province, the Province, after giving Project Co not less than five (5) Business Days' notice of such costs and expenses to permit Project Co to dispute liability for amounts invoiced or charged, may pay such costs and expenses and, upon demand, Project Co shall forthwith reimburse the Province for any amount so paid.

3.5 Utility Maintenance

The maintenance and repair of Utilities (including Public Utilities owned by the City of Vancouver within Municipal Lands, and Utilities owned by Metro Vancouver Regional District) shall be undertaken in accordance with Article 8 [Utilities], Part 2 of Schedule 4.

3.6 Cooperation, Schedule and Work Priority

- (a) Project Co shall develop and submit to the Province's Representative for review, acting reasonably, pursuant to the Review Procedure, a schedule of those elements of the Works Schedule which pertain to the City of Vancouver so that the Province may provide the same to the City of Vancouver and to facilitate the coordination of the Project Work with the operation, maintenance, repair and replacement of Municipal Infrastructure by the City of Vancouver.
- (b) As required by the Province, Project Co shall require the Communications Director or a designated representative of Project Co to attend any meeting between the Province and the City of Vancouver or their respective representatives on matters which relate to the development and construction of the Broadway Subway within the applicable Municipal Lands and any other matters of concern in relation to such development and construction.
- (c) If so required by the Province, Project Co shall assist the Province in preparing a report within 15 Business Days after each meeting contemplated in Article 3.6(b) of this Part 1, by providing, in a timely manner, comprehensive, accurate and detailed information sufficient to enable the Province to prepare such report, the contents of which shall include:
 - (i) details of how Project Co has considered the concerns, issues and matters raised by the City of Vancouver and how Project Co proposes to address and remedy each of the concerns, issues and matters raised by the City of Vancouver; and
 - (ii) if Project Co proposes not to address or remedy in whole or in part any concern, issue or matter raised by the City of Vancouver, reasons why such concern, issue or matter raised by the City of Vancouver is proposed to not be addressed or remedied.

SCHEDULE 4 PART 1 ARTICLE 3: MUNICIPAL REQUIREMENTS

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- (d) Nothing in this Article 3.6 [Cooperation, Schedule and Work Priority] shall affect the obligation of Project Co to comply with any requirements of this Agreement with respect to Public Utilities owned by the City of Vancouver set out in Article 8 [Utilities], Part 2 of Schedule 4.

- (e) Project Co acknowledges that the City of Vancouver will continue to perform their development application approval function and obligation for lands in and around the Project Lands during the Design and Construction of the Broadway Subway including development applications in process provided as Disclosed Data and, as such, where municipal utility work or roadworks, or temporary shoring works resulting from any municipal development approval is required on the Project Lands, Project Co shall:
 - (i) co-operate reasonably with the City of Vancouver and the land owner of the development, as applicable, to accommodate such municipal utility work or roadworks, or temporary shoring works; and
 - (ii) be responsible for coordinating such municipal utility work or roadworks or temporary shoring works with the City of Vancouver and land owner of the development, as applicable, where these works are either in conflict with the Design and Construction of the Broadway Subway, or where these works fall within any part of the Project Site where Construction activities are being carried out.

3.7 Surveys, Inspections, Plans, Drawings and Other Information

- (a) Prior to commencing construction activities within the City of Vancouver, Project Co shall conduct a Pre-Construction Condition Survey of all Municipal Infrastructure that may potentially be damaged or impacted, directly or indirectly, by all work required in the Design, Construction, testing and commissioning of the Broadway Subway Project and Project Co shall thereafter conduct condition surveys and Post-Construction Condition Surveys with respect thereto, and shall provide all reports required in respect thereof, all in accordance with Article 4 [Existing Conditions], Part 2 of Schedule 4.
- (b) Subject to any applicable requirements in Article 9 [Roads], Part 2 of Schedule 4, all drawings for any Municipal Infrastructure that is to be constructed, installed, altered, upgraded and/or augmented by Project Co shall be prepared by Project Co in accordance with the current drawing standards of the City of Vancouver.
- (c) Project Co shall deliver record drawings for any Municipal Infrastructure that has been constructed, installed, altered, upgraded and/or augmented by Project Co in accordance with the requirements for record drawings set out in Article 3.2.1.1 [Record Drawings], Part 3 of Schedule 4:
 - (i) to the Province's Representative for review, acting reasonably, in accordance with the Review Procedure, within 30 days following substantial completion of the applicable Municipal Infrastructure; and
 - (ii) following the review by the Province's Representative in accordance with Article 3.7(c)(i) of this Part 1, to the City of Vancouver within 60 days following substantial completion of the applicable Municipal Infrastructure.

3.8 Municipal Enhancements

- (a) Project Co has no obligation under this Agreement to undertake work on or in respect of Municipal Infrastructure other than as provided by this Agreement.
- (b) Except where specifically provided otherwise in this Agreement, Project Co shall consider requests by the City of Vancouver for the construction by Project Co of new works and infrastructure and upgrades to existing Municipal Infrastructure on such terms and conditions as Project Co and the City of Vancouver may agree. Any work so undertaken by Project Co shall not be part of the Project Work and shall not be undertaken by Project Co unless such additional work can be designed and constructed without impacting the Project Schedule or negatively affecting the performance or increasing the cost of any part of the Project Work. Any such work undertaken by Project Co shall be, as between Project Co and the Province, at the sole risk, cost and expense of Project Co and Project Co shall be solely responsible for reaching agreement with the City of Vancouver on the terms and conditions for any such work, including payment terms, scheduling, interactions with third parties, performance of any warranty or deficiency work associated therewith and collection of all amounts owing to Project Co in connection therewith.

3.9 Handover

Any Municipal Infrastructure that has been constructed, installed, altered, upgraded and/or or augmented by Project Co shall be handed over by Project Co in accordance with the applicable handover requirements contained in Article 9 [Roads], Part 2 of Schedule 4.

3.10 Repairs to Damaged Municipal Infrastructure

If it is determined, whether pursuant to the Post-Construction Condition Survey in accordance with Article 4 [Existing Conditions], Part 1 of Schedule 4, or otherwise, that Project Co has damaged any Municipal Infrastructure in the performance of the Project Work, then Project Co shall:

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- (a) where the Municipal Agreement provides that the City of Vancouver shall undertake the repair of such damage, reimburse the City of Vancouver for the cost of such repairs; or
- (b) where the Municipal Agreement does not provide that the City of Vancouver, undertake the repair, repair such damage, at Project Co's cost and expense,

to the extent necessary to restore the damaged Municipal Infrastructure on a Like-for-Like basis.

3.11 Assistance with Notice and Disputes

- (a) Project Co shall cooperate with and provide, at its own cost and expense, all information, documentation and other assistance reasonably requested by the Province, as applicable, to:
 - (i) give notice to the City of Vancouver in accordance with the provisions of the Municipal Agreement relating to the Project Work on or in respect of Municipal Lands owned by the City of Vancouver; and
 - (ii) resolve any dispute between the City of Vancouver and the Province, as applicable, relating to the Project Work on or in respect of Municipal Lands owned by the City of Vancouver in accordance with the dispute resolution procedures of the Municipal Agreement.

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Article 4. Existing Conditions

4.1 General

4.1.1 Scope

- (a) This Article 4 [Existing Conditions] specifies requirements and criteria for the Project Work in relation to Existing Conditions, including the preparation, implementation and delivery of plans and reports in respect of such Project Work.

4.1.2 General

- (a) Without limiting any other provision of this Agreement, Project Co shall take all steps and measures necessary:
 - (i) to provide, perform and carry out the Project Work, including any Project Work undertaken during the General Project Work Defect Warranty Period and Latent Project Work Defect Warranty Period, so as to:
 - A. not cause damage or otherwise adversely impact Existing Conditions; and
 - B. prevent damage or other adverse impacts to Existing Conditions arising from or as a result of the performance, provision and carrying out of the Project Work,

provided that damage to property or other adverse impacts, to the extent that such damage or other adverse impacts is a reasonable and unavoidable consequence of performing the Project Work in accordance with this Agreement and in compliance with all other obligations of Project Co under this Agreement, will not constitute a breach of this Article 4.1.2(a); and
 - (ii) taking into account the design life of each of the components of the Broadway Subway Project where specified in this Agreement, to prevent damage or other adverse impacts to Existing Conditions arising from or as a result of the Project Work or the use of the Broadway Subway in accordance with or as anticipated by this Agreement.

4.2 Construction Risk and Impact Assessment and Report

4.2.1 Construction Risk and Impact Assessment

- (a) Project Co shall carry out a risk and impact assessment of any Existing Condition that may potentially be damaged or otherwise adversely impacted, directly or indirectly:
 - (i) by the performance, provision and carrying out of the Project Work; or

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- (ii) over the design life of each of the components of the Broadway Subway Project, arising from or as a result of the Project Work or the use of the Broadway Subway in accordance with this Agreement,

which assessment shall be undertaken in sufficient time so as to comply with the deadline for submission of the Construction Risk and Impact Assessment Report set out in Article 4.2.2(a) of this Part 1.

- (b) Without limiting the generality of the risk and impact assessment to be undertaken by Project Co under Article 4.2.1(a) of this Part 1, Project Co shall, as part of such assessment be responsible for:
 - (i) identifying and locating any Existing Condition referred to in Article 4.2.1(a) of this Part 1, whether or not such Existing Condition is disclosed in Disclosed Data or in any office of public record; and
 - (ii) identifying any and all potential damage and other adverse impacts on any Existing Conditions, including the following potential damages and other adverse impacts arising from the Project Work:
 - A. deformations resulting from static or vibratory loads, or deformations resulting from changes in groundwater pressures or groundwater drawdown;
 - B. cracking of slabs, pavements, walls, utilities or other facilities;
 - C. modification of surface or underground drainage patterns, or impacts on wells and aquifers and other effects arising from changed groundwater conditions;
 - D. increased stresses on underground structures and utilities;
 - E. re-grading or removal of support from slopes which would result in decreased support or stability of such slopes below the level of support or stability existing as at the date of Project Co's risk and impact assessment; and
 - F. any potential conflicts between any Existing Condition and the Project Work.
- (c) As part of its risk and impact assessment, Project Co shall, using engineering analysis, define the area (the "**Zone of Influence**") containing any Existing Conditions that may potentially be damaged or otherwise adversely impacted, directly or indirectly:
 - (i) by the performance, provision and carrying out of the Project Work; or
 - (ii) over the design life of each of the components of the Broadway Subway Project, arising from or as a result of the Project Work or the use of the Broadway Subway in accordance with or as anticipated by this Agreement.

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- (d) Without limiting Project Co's obligation to define the Zone of Influence, Project Co shall include the following in the Zone of Influence:
 - (i) all structures, track and roadway on Railway Lands (as required by any Railway Agreement, Railway Construction/Entry Permit or Transport Canada requirement);
 - (ii) any Existing Facility located on any legal parcel of land or Municipal Road above the Tunnel or any Underground Structure to be constructed under this Agreement;
 - (iii) any Existing Facility located on any legal parcel of land immediately adjacent to any legal parcel of land or Municipal Road described in Article 4.2.1(d)(ii); and
 - (iv) any additional Existing Conditions that the Province may reasonably request.

4.2.2 Construction Risk and Impact Assessment Report

- (a) By no later than 40 Business Days prior to the commencement of construction activities, Project Co shall prepare and submit to the Province's Representative, for review under the Consent Procedure, a construction risk and impact assessment report (the "**Construction Risk and Impact Assessment Report**" or "**CRIAR**") that has been signed and sealed by the Geotechnical Manager and that presents the findings of the risk and impact assessments undertaken by Project Co under Article 4.2.1 [Construction Risk and Impact Assessment] of this Part 1. Project Co may, instead of submitting a single CRIAR for the Project, divide the Project Site into segments and prepare a separate CRIAR for each segment, in which case Project Co shall submit the CRIAR for a segment to the Province for review under the Consent Procedure no less than 2 months prior to the commencement of the construction activities in the applicable segment.
- (b) Without limiting the generality of the foregoing, Project Co shall prepare the CRIAR so that the CRIAR, with respect to the segment of the Construction covered by the applicable CRIAR:
 - (i) identifies the Zone of Influence and all Existing Conditions within the Zone of Influence;
 - (ii) sets out the results of Project Co's analysis regarding ground deformations (both horizontal and vertical) anticipated by Project Co as a result of the provision, performance and carrying out of the Project Work, including:
 - A. the basis of the analysis, including:
 - (1) the key input criteria;
 - (2) the basis for the selection of the key input criteria;
 - (3) a description of the analysis methodology; and

SCHEDULE 4 PART 1 ARTICLE 4: EXISTING CONDITIONS

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- (4) such other information as required to support the analytical prediction;
 - B. where applicable, the predicted depth, width, slope and shape, ground strains and other related characteristics of the ground settlement associated with all Underground Structures sections;
 - C. drawings showing:
 - (1) the predicted horizontal and vertical deformation contours;
 - (2) the transient settlement trough that will develop ahead of the advancing Tunnel; and
 - (3) the expected response of the Existing Condition to the forces referenced in Articles 4.2.2(b)(ii)C(1) and (2) of this Part 1; and
 - D. the impact that such deformations will have on Existing Conditions, as well as an assessment of deformations considered acceptable for each Existing Condition;
- (iii) in respect of each Existing Condition within the Zone of Influence, identifies and assesses the potential causes of damage or other adverse impacts arising from the Project Work, including:
 - A. the geotechnical and hydrogeological characteristics of the ground under and around the Existing Condition, as well as the test holes and geotechnical test parameters and values that were used for the evaluation of such characteristics;
 - B. the proposed construction methodologies, including construction sequencing and equipment to be used in connection with the construction; and
 - C. the ground displacements, vibrations and changes in groundwater conditions induced by the construction;
- (iv) in respect of each Existing Condition within the Zone of Influence, identifies the nature of the potential damage and other adverse impacts arising from the Project Work, including:
 - A. deformations resulting from:
 - (1) static or vibratory loads; and
 - (2) changes in groundwater pressures or groundwater drawdown;
 - B. cracking of slabs, pavements, walls, utilities or other facilities;
 - C. modification of surface or underground drainage patterns, and impacts on wells and aquifers and other effects arising from changed groundwater conditions;

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- D. increased stresses on underground structures and utilities; and
 - E. re-grading or removal of support from slopes which would result in decreasing the support or stability of such below the level of support or stability existing as at the date of Project Co's risk and impact assessment;
- (v) in respect of each Existing Condition within the Zone of Influence, describes Project Co's proposed temporary and permanent methods, measures and procedures (including accommodating, protecting, relocating, modifying, re-constructing, decommissioning and/or abandoning such Existing Condition) to prevent potential damage and other adverse impacts to such Existing Condition;
- (vi) where damage or other adverse impacts to an Existing Condition resulting from or caused by the performance, provision or carrying out of the Project Work in accordance with this Agreement is unavoidable despite Project Co's compliance with Good Industry Practice:
- A. identifies the nature and extent of such unavoidable damage or other adverse impacts to such Existing Condition; and
 - B. describes Project Co's proposed steps and measures:
 - (1) to repair the damage or mitigate other adverse impacts to such Existing Condition to a state equivalent to that which existed prior to the damage or other adverse impact; and
 - (2) where it is not feasible, because of the Design and Construction of one or more Stations, to repair the damage or mitigate the other adverse impacts to such Existing Condition to a state equivalent to that which existed prior to the damage or adverse impact, Project Co may, with the prior written approval of the relevant owner(s):
 - I. restore such Existing Condition to a state as close to comparable to that which existed prior to the damage or adverse impact; or
 - II. relocate, modify, reconstruct, decommission or abandon such Existing Condition; and
- (vii) identifies the instrumentation that Project Co proposes to utilize to monitor the Existing Conditions during the construction to verify that ground deformations are within the predicted and tolerable limits permitted by this Agreement, including at a minimum:
- A. the proposed type, location, installation method and data collection procedures (including monitoring frequency) of such instrumentation; and
 - B. for each instrument:

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- (1) the action level for any settlement, lateral movement or strains, or changed water conditions as applicable (“**Action Levels**”); and
 - (2) the specific action(s) that are to be taken at each identified Action Level.
- (viii) identifies the instrumentation and/or measures that Project Co proposes to utilize to monitor the Existing Conditions during the construction of mined Underground Structures, if applicable, such as probing ahead of the tunnel excavation to verify ground conditions and advance detection of ground loss that may result in damage to Existing Conditions such as sink holes;
- (c) Without limiting the generality of the foregoing, Project Co shall develop a specific CRIAR for the Existing Conditions and sites outlined in Article 4.2.2(c)(i) of this Part 1 below, with additional minimum requirements outlined in Article 4.2.2(c)(ii) of this Part 1:
 - (i) Project Co shall identify Existing Conditions and sites that are more sensitive to ground deformation, settlement or vibration related impacts of construction activities due to the proximity, type of building or structure, or type of uses in the building or structure, that would require more regular and detailed monitoring activities, including at minimum the following locations:
 - A. 887 Great Northern Way – PID 024-175-650 (QLT Building);
 - B. 175 East Broadway – PID 015-539-199 (Lee Building);
 - C. Canada Line Broadway City Hall Station and Canada Line guideway above and immediately adjacent the Broadway Subway Project;
 - D. 1490 West Broadway (Kaplan Building);
 - E. 8th Avenue Interceptor Sewer (Metro Vancouver);
 - F. Capilano 4 & 5 Watermain – Existing and Modified (Metro Vancouver);
 - G. Existing SkyTrain VCC tail track guideway structure;
 - H. Emily Carr University – Motion Capture Studio;
 - I. Medical sites with vibration sensitive medical equipment or operations, as may be determined through the Pre-Construction Condition Surveys conducted in Article 4.4;
 - J. Other sites with vibration sensitive equipment or operations, as may be determined through the Pre-Construction Condition Surveys conducted in Article 4.4; and
 - K. Residential Building at 384 East 1st Avenue – Strata Plan EPS3641;

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- (ii) Project Co shall incorporate the following additional minimum monitoring requirements into the CRIAR for the Existing Conditions and sites outlined in Article 4.2.2(c)(i) of this Part 1:
 - A. provision of automated motorized total stations, or other appropriate means of ground and structure movement monitoring where applicable (such as extensometers, tiltmeters, inclinometers, strain gauges, etc.), for real time, continuous movement monitoring in accordance with the requirements in Article 6 of Part 2; and
 - B. provision of vibration monitoring equipment as required in accordance with the requirements in Article 6 of Part 2. Project Co shall address in the Noise and Vibration Management Plan, the means to mitigate vibration related impacts from construction activities and the scheduling of the construction activities.
- (d) Without limiting the generality of the foregoing, Project Co shall acquire and implement a Satellite Settlement Monitoring System to monitor movement of Existing Conditions within a perimeter of 100 metres from the Broadway Subway Project in accordance with the following minimum requirements:
 - (i) the system will provide satellite images and data with a minimum resolution and accuracy of 1m by 1m ground pixel resolution and millimetre accuracy using satellites that can capture images using shorter wave band lengths (i.e. X-Band);
 - (ii) Project Co shall obtain the minimum number of baseline satellite images to allow for ± 3 millimetre accuracy of ground movements prior to the start of construction, which will be used to generate a complete baseline and canvas of monitoring points along the alignment;
 - (iii) Project Co shall cause a satellite interferometry expert to analyze the baseline images, process the resultant data using a multi-image processing algorithm, and generate an initial baseline report. This initial baseline report shall be the basis of the settlement monitoring. Project Co shall determine, based on this initial baseline report, actual monitoring points to be used during tunnelling and construction of Underground Structures;
 - (iv) Project Co shall acquire images once per month during active construction of the Tunnel and Underground Structures, from commencement through to completion and once every 3 months thereafter; and
 - (v) Project Co shall provide regular reports to the Province beginning with the initial baseline report, reporting as images are updated, and at Substantial Completion. Each report will present the settlement values recorded throughout the entire study area.

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- (e) Without limiting the generality of the foregoing, Project Co shall submit a specific CRIAR, which also incorporates the requirements of the Canada Line Technical Memo, "BSP Requirement for Monitoring Construction Impact" (provided in Appendix P [Broadway-City Hall Canada Line Station] to Schedule 4).

4.3 Mitigation of Damage and Other Impacts

4.3.1 Impact Mitigation Plan

- (a) Project Co shall, for each Existing Condition identified in the CRIAR as being vulnerable to damage or other impacts arising from the design and construction of the Broadway Subway or the Operational Millennium Line, prepare and implement a work plan ("**Impact Mitigation Plan**") that sets out, in sufficient detail to inform the Province, of the particulars of the temporary and permanent methods, measures and procedures (including accommodating, protecting, relocating, modifying, re-constructing, decommissioning and/or abandoning such Existing Condition) that Project Co shall provide, perform and carry out to prevent, minimize or resolve damage or other adverse impacts to the Existing Condition arising from the design and construction of the Broadway Subway Project and the Operational Millennium Line, including the instrumentation and the frequency of monitoring required to allow preventative measures to be taken to protect Existing Conditions.
- (b) Project Co shall submit the Impact Mitigation Plan in respect of each Existing Condition to the Province's Representative for review under the Review Procedure no later than 20 Business Days prior to commencing any of the Project Work set out in such plan. Project Co shall use all reasonable efforts to obtain the written approval of the owner(s) of the applicable Existing Condition to the contents of such plan, which approval, where obtained, shall be submitted with the Impact Mitigation Plan. Notwithstanding the foregoing, Project Co shall obtain the written approval of the owner(s) of any Existing Condition that Project Co proposes to relocate, modify, reconstruct, decommission or abandon, which written approval shall be submitted with the applicable Impact Mitigation Plan.
- (c) Without limiting the generality of the foregoing, Project Co shall submit a specific Impact Mitigation Plan, which also incorporates the requirements of the Canada Line Technical Memo, "BSP Requirement for Monitoring Construction Impact" (provided in Appendix P [Broadway-City Hall Canada Line Station] to Schedule 4).
- (d) The Impact Mitigation Plan for an Existing Condition shall be sealed by an Architect or by a Professional Engineer, as applicable, where such plan contains any design documents for permanent methods, measures or procedures.

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- (e) When performing the Project Work in relation to Existing Conditions, Project Co shall comply with all Impact Mitigation Plans which are approved under the Review Procedure, and which comply with the requirements provided in this Article 4.3.1 [Impact Mitigation Plan].

4.3.2 Mitigation and Rectification of Damage or Other Impacts

- (a) Where Project Co has identified that damage or other adverse impact resulting from or to be caused by the performance, provision or carrying out of the Project Work to an Existing Condition is unavoidable despite Project Co's compliance with Good Industry Practice and its Impact Mitigation Plans, Project Co shall:
 - (i) to the reasonable satisfaction of the owner(s) of the affected Existing Condition, as applicable:
 - A. repair the damage or mitigate other adverse impacts;
 - B. restore such Existing Condition to a state as close to comparable to that which existed prior to the damage or other adverse impact; or
 - C. relocate, modify, reconstruct, decommission or abandon such Existing Condition; and
 - (ii) prior to Substantial Completion, use all reasonable efforts to obtain written confirmation from the owner(s) that they are so satisfied and submit to the Province written confirmation of the satisfaction of the owner(s) with such steps and measures to the extent that such written confirmations have been obtained.
- (b) If any damage or other adverse impacts occurs to any Existing Condition or any other property as a result of the Project Work, Project Co shall promptly take all steps and measures necessary to rectify the damage or other adverse impacts to the satisfaction of the owner(s) of such Existing Condition or other property and shall, prior to Substantial Completion, submit to the Province written confirmation of the satisfaction of the owner(s) with such steps and measures.
- (c) Notwithstanding Articles 4.2.2(a) and (b), Part 3 of Schedule 4, Project Co shall, in respect of any relevant part of the Project Site in respect of which an Access Period Expiry Date applies that is prior to the Substantial Completion Date, complete all Project Work necessary to comply with the requirements of Articles 4.2.2(a) and (b), Part 3 of Schedule 4, by no later than the applicable Access Period Expiry Date unless a later date has been agreed to with the relevant owner(s).

4.4 Pre – Construction Condition Survey and Reports

4.4.1 Pre-Construction Condition Surveys

- (a) By no later than 45 Business Days prior to the commencement of any excavation, dewatering, tunneling, or other settlement- or vibration-producing activity as part of the Construction, Project Co shall:
- (i) with respect to each Existing Condition within the Zone of Influence, carry out a comprehensive pre-construction condition survey of the state of the Existing Condition (each a “**Pre-Construction Condition Survey**”), which survey shall include, as applicable, the following:
 - A. where the survey is in respect of an Existing Facility:
 - (1) a visual inspection of the exteriors and interiors of the Existing Facility; and
 - (2) a survey giving elevations of the basement and ground floor of the Existing Facility;
 - B. a record of the state of the Existing Condition by means of video and photographs and, where an Existing Condition is a sewer system, a CCTV survey of the sewer system. Without limiting the generality of the foregoing, Project Co shall prepare a video condition survey of streets and sidewalks, gravity sewer and drainage systems within the Zone of Influence;
 - C. notations, measurements and engineering sketches of any existing damage in the Existing Condition, including architectural, structural, cosmetic, plumbing, or electrical damage;
 - D. identification of any equipment sensitive to vibration or movement located within or in respect of the Existing Condition; and
 - (ii) without limiting the foregoing, carry out a comprehensive pre-construction condition survey (the “**Transit Facilities Pre-Construction Condition Survey**”) of the Existing Transit Facilities infrastructure that will remain or will be reused as part of the permanent works described in Article 18 [Integration with Transit Facilities], including:
 - A. Existing Millennium Line tail track;
 - B. VCC-Clark Station (as required);
 - C. the CMBC transit exchange at VCC-Clark Station including access roads, sidewalks and passenger facilities (as required);
 - D. the existing Canada Line Broadway–City Hall Station; and

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- E. the existing CMBC overhead trolley infrastructure on Broadway from Prince Edward Street to Vine Street including one block on either side perpendicular to Broadway.
- (b) Project Co shall take all steps and measures necessary to ensure that the Pre-Construction Condition Survey of an Existing Condition is undertaken in accordance with the requirements of this Agreement, including as necessary:
 - (i) cleaning sewer and drainage pipes to facilitate preparation of the Pre-Construction Condition Survey; and
 - (ii) using all reasonable efforts to obtain the prior approval of the owner(s) of the Existing Condition to undertake the Pre-Construction Condition Survey.
- (c) Project Co shall provide the owner(s) and occupier(s) of each Existing Condition with the opportunity to attend during the course of the Pre-Construction Condition Survey of the Existing Condition.
- (d) The Province's Representative shall be entitled to attend during the course of the Pre-Construction Condition Survey of each Existing Condition and Project Co shall provide 24 hours' advance written notice to the Province's Representative of the timing and location of each such survey at each Existing Condition.
- (e) Project Co shall ensure that an Architect or a Professional Engineer, as applicable, assumes responsibility for any Pre-Construction Condition Survey involving any of the following aspects of an Existing Facility:
 - (i) structural;
 - (ii) architectural; or
 - (iii) any plant or equipment within the Existing Facility.
- (f) Project Co shall incorporate the requirements of the Canada Line Technical Memo, "BSP Requirement for Monitoring Construction Impact" (provided in Appendix P [Broadway-City Hall Canada Line Station] to Schedule 4) into the Pre-Construction Condition Surveys.

4.4.2 Pre-Construction Condition Survey Reports

- (a) By no later than 20 Business Days prior to the commencement of any excavation, dewatering, tunnelling, or other settlement- or vibration-producing activity as part of the construction which may damage or affect an Existing Condition within the Zone of Influence, Project Co shall prepare and submit a pre-construction condition report with respect to the Existing Condition (each a "**Pre-Construction Condition Survey Report**") for review by the Province's Representative under the Review Procedure that:
 - (i) summarizes all of Project Co's survey findings with respect to the pre-construction state of the Existing Condition;

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- (ii) includes copies of all photographs and videos, including, as applicable, CCTV sewer system surveys, taken by Project Co of the Existing Condition; and
 - (iii) includes all data and other information collected by Project Co regarding the Existing Condition, including the data and information required under Article 4.4.1 [Pre-Construction Condition Surveys] of this Part 1.
- (b) Where Article 4.4.1(e) of this Part 1 applies with respect to the survey of an Existing Condition, the Pre-Construction Condition Survey Report in respect of the Existing Condition must be signed and sealed by the applicable Architect or a Professional Engineer who assumed responsibility for the survey of the Existing Condition.

4.5 Surveys and Updates to Plans and Reports during Construction

4.5.1 Discovery of Damage during Construction

- (a) If, at any time during construction, an Existing Condition is damaged or otherwise adversely impacted by the Project Work, Project Co shall, with respect to that Existing Condition:
- (i) immediately notify the Province's Representative of such damage or other adverse impact;
 - (ii) as soon as practicable conduct a further survey of such Existing Condition utilizing the same survey procedures as were undertaken with respect to the condition prior to the commencement of construction under Article 4.4.1 [Pre-Construction Condition Surveys] of this Part 1; and
 - (iii) within 5 Business Days of completion of the survey undertaken in accordance with Article 4.5.1(a)(ii) of this Part 1, submit to the Province's Representative a report under the Review Procedure, which report shall, with respect to the further survey:
 - A. summarize all of Project Co's survey findings with respect to the damaged or otherwise adversely impacted state of the Existing Condition;
 - B. include copies of all photographs and videos taken by Project Co of the Existing Condition, both before and after the damage or other adverse impact; and
 - C. include all data and other information collected by Project Co regarding the damage or other adverse impact of the Existing Condition, including the data and information required under Article 4.4.1 [Pre-Construction Condition Surveys] of this Part 1; and

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(iv) comply with Article 4.3.2(b) of this Part 1.

4.5.2 Updates to Zone of Influence, CRIAR, Mitigation Plans and Surveys

(a) If, at any time during construction, an Existing Condition located outside the Zone of Influence is damaged or otherwise adversely impacted by the Project Work, then Project Co shall, in addition to complying with Article 4.5.1(a) of this Part 1:

(i) Within 15 Business Days of the discovery of such damage:

A. expand and re-define the Zone of Influence so as to include in the Zone of Influence all Existing Conditions in similar proximity to the Existing Condition that was damaged or otherwise adversely impacted by the Project Work; and

B. update the CRIAR as required to add to the CRIAR any Existing Conditions within the expanded and re-defined Zone of Influence (such update to meet all requirements of Article 4.2.2 of this Part 1), and submit the updated CRIAR to the Province for review under the Review Procedure;

(ii) at least 10 Business Days before carrying any Project Work that could damage or have an adverse effect on any Existing Condition added to the CRIAR in accordance with Article 4.5.2(a)(i) of this Part 1:

A. update the Impact Mitigation Plan to address such Existing Condition(s) (such updated to meet all requirements of Article 4.3 of this Part 1) and submit the updated Impact Mitigation Plan to the Province for review under the Review Procedure; and

B. carry out a Pre-Construction Survey, and submit to the Province a Pre-Construction Survey Report, for such Existing Condition(s), which survey and report will meet the requirements set out in Article 4.4 of this Part 1.

4.6 Post – Construction Condition Surveys and Reports

4.6.1 Post-Construction Condition Surveys

(a) Project Co shall carry out a comprehensive post-construction survey of each Existing Condition within the Zone of Influence (each a “**Post-Construction Condition Survey**”) to identify any changes in the state of each Existing Condition. Project Co shall undertake the Post-Construction Condition Survey of an Existing Condition no more than three months prior to making application for Substantial Completion but not prior to the completion of any Project Work that may yet damage the Existing Condition. In undertaking the Post-Construction Condition Survey of an Existing Condition, Project Co shall, at a minimum, undertake the same survey procedures as were undertaken with that

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Existing Condition prior to Construction under Article 4.4.1 [Pre-Construction Condition Surveys] of this Part 1.

- (b) Without limiting the generality of the foregoing, Project Co shall carry out and submit a comprehensive Post-Construction Condition Survey (the “**Transit Facilities Post-Construction Condition Survey**”) of the Existing Transit Facilities infrastructure that will remain or will be reused as part of the permanent works described in Article 18 [Integration with Transit Facilities], including:
- A. Existing Millennium Line tail track;
 - B. VCC-Clark Station (as required);
 - C. the CMBC transit exchange at VCC-Clark Station including access roads, sidewalks and passenger facilities (as required);
 - D. the existing Canada Line Broadway–City Hall Station; and
 - E. the existing CMBC overhead trolley infrastructure on Broadway from Prince Edward Street to Vine Street including one block on either side perpendicular to Broadway.

Project Co will carry out the Transit Facilities Post-Construction Condition Survey no more than three months prior to making application for Substantial Completion but not prior to the completion of any Project Work that may yet damage the Existing Transit Facilities infrastructure.

4.6.2 Post-Construction Condition Survey Reports

- (a) By not less than two months prior to making application for Substantial Completion, Project Co shall, with respect to each Existing Condition within the Zone of Influence (including any Existing Transit Facilities infrastructure that is the subject of the Transit Facilities Post-Construction Condition Survey), prepare and submit a post-construction condition survey report (each a “**Post-Construction Condition Survey Report**”) for review by the Province’s Representative under the Review Procedure that:
- (i) summarizes all findings with respect to the post-construction state of the Existing Condition, including a comparison of the pre- and post-construction states of each Existing Condition;
 - (ii) includes copies of all photographs and videos, including CCTV sewer system surveys, taken by Project Co of the Existing Condition following completion of construction; and
 - (iii) includes all data and other information collected by Project Co regarding the Existing Condition following completion of Construction, including the data and information required under Article 4.4.1 [Pre-Construction Condition Surveys] of this Part 1.
- (b) If a Post-Construction Condition Survey identifies any damage or other adverse impacts to an Existing Condition caused by the Project Work, Project Co shall:

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- (i) in the applicable Post-Construction Condition Survey Report, describe Project Co's proposed temporary and permanent methods, measures and procedures to repair the identified damage or other adverse impacts and to prevent further damage or other adverse impacts; and
- (ii) undertake the repair and mitigation work described in the applicable Post-Construction Condition Survey Report in accordance with the requirements of Article 4.3.2 [Mitigation of Damage or Other Impacts] of this Part 1.

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Article 6. Work by Others

6.1 General

6.1.1 Scope

- (a) This Article 6 [Work by Others] identifies works to be undertaken by Project Co, and other parties such as the Province, TransLink, municipalities, Utility Suppliers or other Third Party Contractors, in connection with and to facilitate the Project Work.
- (b) Without limiting any other obligations of Project Co under this Agreement, including under Part 4 [General Obligations of Project Co] of the Agreement, Project Co shall be responsible for the scheduling and the coordination of the Project Work with work undertaken by parties other than Project Co in accordance with this Article 6 [Work by Others].

6.2 Advance Work

6.2.1 General

- (a) Project Co acknowledges that the Advance Work Contractors are performing Advance Work on certain parcels of Project Lands after the Effective Date. If an Advance Work Contractor requires access to a parcel (or parcels) of the Project Lands after the Specified Access Date (or Specified Access Dates) to complete the Advance Work, such Advance Work will become Concurrent Work and any such Advance Work Contractor will become a Concurrent Work Contractor in accordance with Article 6.2.11 [Coordination with Advance Work Contractors] of this Part 1.

6.2.2 BC Hydro Power Work

- (a) The BC Hydro Power Work to be undertaken by BC Hydro and/or the applicable Advance Work Contractor(s) includes the following:

- (ii) the supply, installation, and energizing of two 12kV feeder lines to provide power for a potential Tunnel Boring Machine (TBM) along existing duct banks, from the BC Hydro Murrin Substation to a manhole along Great Northern Way in the vicinity of the Thornton Street intersection. This work is completed.
- (b) Notwithstanding Article 6.2.2(a) of this Part 1, the Province will not, as part of the Advance Work or otherwise, be undertaking any of the following with respect to the AC power supply in connection with the Project Work, including to all switchgear vaults (including those switchgear vaults installed by the Province as part of the Advance Work), ductbanks, manholes, cables, switchgear equipment, transformers and other electrical equipment:

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- (i) the supply, installation, construction and energizing of the service connections (including additional ductbanks, manholes, vaults, cables and other electrical equipment) for a potential TBM from the manhole referred to in Article 6.2.2(a)(ii) of this Part 1;
 - (ii) any further work and service connections, including the supply, installation, construction and energizing of any additional duct banks, manholes, vaults, cables, switchgear equipment and other electrical equipment, required in connection with the 12kV power to the anticipated PPS locations; and
 - (iii) coordinating, protecting, relocating and resolving any potential conflicts amongst any existing BC Hydro infrastructure, the work referred to in Article 6.2.2(a) of this Part 1, and the Design and Construction of the Project Infrastructure.
- (c) To the extent that any of the work and equipment described in Article 6.2.2(b)(i) through 6.2.2(b)(iii) of this Part 1 inclusive is required for electrical power for or in respect of the Project Work, Project Co shall be responsible for undertaking all such work and supplying such equipment at its own cost and expense, whether such work is undertaken by Project Co or by BC Hydro subject to the coordination of Project Co.
- (d) Further details of the BC Hydro Power Work are provided as Disclosed Data in the BC Hydro Power Work Contract, as applicable.

6.2.3 Trolley Overhead Work

6.2.3.1 Trolley Overhead Work

- (a) The Trolley Overhead work includes the following:
- (i) Trolley Overhead removal and relocation work to be undertaken by Coast Mountain Bus Company (CMBC) or Advance Work Contractors, and Project Co as described in Article 6.2.3.2 of this Part 1, which includes the removal of Trolley Overhead infrastructure along the Broadway Traffic Site and at the following intersections along Broadway: Main Street, Cambie Street, Oak Street, Granville Street and Arbutus Street;
 - (ii) at Project Co's discretion, additional Trolley Overhead removal work to be undertaken by CMBC and Project Co, all of which shall be performed at Project Co's cost, as described in Article 6.2.3.3 of this Part 1; and
 - (iii) Trolley Overhead reinstatement work to be undertaken by CMBC and Project Co as described in Article 6.2.3.4 of this Part 1. Subject to Article 6.2.3.1(a)(iv) of this Part 1, Project Co shall only be responsible for the costs related to the reinstatement work performed by Project Co in accordance with Article 6.2.3.4 of this Part 1.

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- (iv) To the extent Trolley Overhead reinstatement work under Article 6.2.3.4 of this Part 1 is required due to any additional Trolley Overhead work requested by Project Co in accordance with Article 6.2.3.3 [Additional Trolley Overhead Removal Work] or Article 18.9 [Trolley Overhead Removals and Modifications] of this Part 2, all such reinstatement work, including reinstatement work performed by CMBC, will be performed at Project Co's cost.

6.2.3.2 Advance and Concurrent Trolley Overhead Removal and Relocation Work

- (a) CMBC will remove Trolley Overhead running wires, guy wires, switches and DC feeder cables as Advance Work and Concurrent Work to facilitate the Project Work. The scope of such work is defined in the Coast Mountain Bus Company (CMBC) Trolley Overhead Removal and Retention drawings provided as Disclosed Data.
- (b) Project Co shall, at its cost, be responsible for removal of the foundations and steel poles for the Trolley Overhead work described in Article 6.2.3.2(a) of this Part 1, and shall coordinate with CMBC, the City, and other third parties in accordance with Schedule 4 Part 2 Article 9 [Roads].
- (c) Trolley Overhead wire removal on Broadway, as described in Article 6.2.3.2(a) of this Part 1, is anticipated to begin by July 1, 2020 and finish by September 30, 2020, except between Hemlock Street and Oak Street. The Trolley Overhead wire removals will be in substantial compliance with Project Co's submission for Trolley Overhead removals in accordance with Article 18.9(d) of Part 2 of Schedule 4. Trolley Overhead wire removals are planned to occur discretely for each Station segment and will be approximately 2 to 4 weeks in duration for each Station site. Project Co will coordinate with CMBC and facilitate access to the Project Site to enable completion of the work described in Article 6.2.3.2(a).
- (d) Project Co shall plan its schedule to maintain Trolley Overhead infrastructure between Hemlock Street and Oak Street for as long as safely possible before beginning construction in this area. Project Co shall provide written notification to the Province of its schedule for this Trolley Overhead removal a minimum of 6 months prior to the anticipated commencement of works by Project Co in the vicinity of Hemlock Street.
- (e) Except as otherwise specified on the drawings described in Article 6.2.3.2(a) of this Part 1, or confirmed in writing by the Province, all Trolley Overhead infrastructure shall be retained for the duration of the Project Work. Refer to Schedule 4, Part 4 Article 1, Attachment E [Bus Routes], regarding Trolley Overhead infrastructure in the vicinity of the Broadway Subway Project that shall remain operational during Construction, including:
 - (i) northbound to eastbound right turn wires connecting Fir Street to Broadway eastbound;

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- (ii) eastbound running wires, guy wires, switches and DC feeder cables between Fir Street and Granville Street;
- (iii) eastbound to northbound left turn wires connecting Broadway to Granville Street;
- (iv) north-south wires crossing Broadway at Granville Street;
- (v) north-south wires crossing Broadway at Cambie Street;
- (vi) north-south wires crossing Broadway at Main Street;
- (vii) right turn wires connecting Main Street to Broadway; and
- (viii) running wires, guy wires, switches and DC feeder cables east of Main Street.

6.2.3.3 Additional Trolley Overhead Removal Work

- (a) With the exception of the Trolley Overhead infrastructure referenced in Article 6.2.3.2(e) of this Part 1, additional removals of Trolley Overhead infrastructure or relocation of poles supporting Trolley Overhead may be permitted subject to approval under the Consent Procedure. Project Co shall cause CMBC to undertake such additional removals of the Trolley Overhead running wires, guy wires, switches and DC feeder cables, and Project Co shall be responsible for such additional removals of the Trolley Overhead foundations and poles and coordinating with CMBC, the City, and other third parties in accordance with Schedule 4 Part 2 Article 9 [Roads]. All work required for the additional removals, including the work performed by CMBC, shall be performed at Project Co's cost. The safety requirements, process, and timelines are identified in Schedule 4 Part 2 Article 18 [Integration with Transit Facilities].

6.2.3.4 Trolley Overhead Reinstatement Work

- (a) Trolley Overhead reinstatement work shall be undertaken by CMBC and Project Co in accordance with the scope split for the works as detailed in Schedule 4 Part 2 Article 9 [Roads], and generally as follows:
 - (i) Project Co shall be responsible for the reinstatement of foundations and poles and shall coordinate with CMBC, the City, and other parties in accordance with Schedule 4 Part 2 Article 9 [Roads]; and
 - (ii) CMBC will undertake the reinstatement of all Trolley Overhead running wires, guy wires, switches and DC feeder cables.
- (b) Project Co shall plan its schedule such that reinstatement of Trolley Overhead wires can progressively be installed by CMBC within the Project Work schedule, and as Project Co completes the Project Work in the vicinity of each intersection and Station site. Project Co shall notify the Province of its schedule a minimum

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of 9 months prior to anticipated completion at each Station segment so that the Trolley Overhead wire reinstatement schedule can be coordinated with the Project Work schedule. Project Co shall ensure that its schedule accommodates the following:

- (i) Trolley Overhead wire reinstatement is anticipated to be completed discretely for each Station segment and will be of a 3 month duration for each Station segment, except South Granville Station which will be of a 6 month duration; and
- (ii) priority of Trolley Overhead infrastructure reinstatement at the intersection of Hemlock Street and Broadway as soon as possible after the construction of the South Granville Station box and vents.

6.2.4 Installation of Fibre Optic Cable Work

- (a) The Installation of Fibre Optic Cable Work includes the installation of a 288-fibre optic cable from the OMC to VCC-Clark Station by the applicable Advance Work Contractor(s), to connect the BSP to the OMC.
- (b) 144 fibres within the 288-fibre optic cable will be dedicated to the BSP.
- (c) The 144 fibres dedicated to BSP will be available to Project Co in the EER at VCC-Clark Station, as described in the Installation of Fibre Optic Work Contract, which is provided as Disclosed Data.
- (d) Further details of the Installation of Fibre Optic Cable Work are provided in the Installation of Fibre Optic Work Contract which is provided as Disclosed Data.
- (e) The anticipated completion date of the Installation of Fibre Optic Cable Work by the Advance Work Contractor(s) is March 31, 2023.

6.2.5 Telus Fibre Optic Cable Relocation

- (a) Cambie Street
 - (i) Telus' existing 32-way fibre optic ductbank along Cambie Street between 10th Avenue and Broadway will be relocated to a new ductbank to accommodate the extension of the existing BCH-CL outbound platform.
 - (ii) The fibre optic ductbank will be relocated from Cambie Street and 10th Avenue, and will travel west along 10th Avenue to Ash Street, north on Ash Street to 8th Avenue, east along 8th Avenue to tie back to the existing Telus on Cambie Street and 8th Avenue, as shown in the drawings provided as Disclosed Data. The total length of this ductbank relocation is anticipated to be approximately 590m.
 - (iii) The remaining Telus infrastructure on Cambie Street between 10th Avenue and Broadway will be abandoned in place.

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- (iv) Project Co shall be responsible for the removal and disposal of any abandoned Telus infrastructure referenced in Article 6.2.5(a)(iii) of this Part 1 as required to accommodate the Project Work.
 - (v) Not used.
 - (vi) Not used.
 - (vii) The civil works associated with this relocation were completed in April, 2020. However, the anticipated completion date of the fibre optic cable relocation, which will allow for Project Co to remove the remaining Telus infrastructure as described in Article 6.2.5(a)(iv) of this Part 1, is March 31, 2021.
- (b) Thornton Street
- (i) Telus' existing eight 100mm PVC fibre optic ducts on Thornton Street will be relocated to East 1st Avenue to accommodate the Construction of Great Northern Way Station and a potential TBM launch site, as shown in the drawings provided as Disclosed Data.
 - (ii) The remaining Telus infrastructure on Thornton Street between Great Northern Way and East 1st Avenue will be abandoned in place.
 - (iii) Project Co shall be responsible for the removal and disposal of any abandoned Telus infrastructure referenced in Article 6.2.5(b)(ii) of this Part 1 as required to accommodate the Project Work.
 - (iv) The fibre optic relocation on Thornton Street is complete.
- (c) Broadway from Yew Street to East of Burrard Street
- (i) Telus' existing wooden fibre optic ductbank on Broadway between Yew Street and Burrard Street will be relocated to a new ductbank on the north side of Broadway along or within the sidewalk to accommodate the Construction of the Broadway Subway, approximately 700m in length, as shown in the drawings provided as Disclosed Data.
 - (ii) Existing Telus overhead aerial wires in this area will also be relocated to the new ductbank on the north side of Broadway, referenced in Article 6.2.5(c)(i)
 - (iii) The remaining Telus infrastructure on Broadway between Yew Street and Burrard Street will be abandoned in place.
 - (iv) Project Co shall be responsible for the removal and disposal of any abandoned Telus infrastructure referenced in Article 6.2.5(c)(iii) of this Part 1 as required to accommodate the Project Work.

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- (v) The civil works associated with this relocation are expected to be completed in May, 2020. However, the anticipated completion date of the fibre optic cable relocation which will allow for Project Co to remove the remaining Telus infrastructure as described in 6.2.5(c)(iv)) of this Part 1 is November 30, 2020.
- (d) Main Street
 - (i) Telus' fibre optic line on Main Street will be terminated at the intersection of Main Street and Broadway at the service connection to the private property on the corner of Main Street and Broadway, as shown in the drawings provided as Disclosed Data to accommodate the Construction of Mount Pleasant Station.
 - (ii) The remaining Telus infrastructure between the termination at the private property on the corner of Main Street and Broadway and the manhole on the east side of Main Street will be abandoned in place.
 - (iii) Project Co shall be responsible for the removal and disposal of any abandoned Telus infrastructure referenced in Article 6.2.5(d)(ii) of this Part 1 as required to accommodate the Project Work.
 - (iv) The fibre optic relocation on Main Street is complete.
- (e) Broadway - Granville Street to Hemlock Street (including Telus in lane for integrated Granville Station)
 - (i) Telus' existing 12 way fibre optic duct bank along Broadway, between Granville Street and Hemlock Street will be relocated as part of the PCI SG Development, and will include the relocation of the existing Telus infrastructure in the north/south lane (immediately east of Granville Street) running between Broadway and W 8th Avenue. The relocation work will begin at a manhole (MH 107) on W 10th Avenue heading east to the intersection of W 10th Avenue and Hemlock Street, then north along the west side of Hemlock Street to the intersection of W 8th Avenue and Hemlock Street, and then head west along W 8th Avenue tying into the existing Telus infrastructure at the north/south lane immediately east of Granville Street (MH 1495). The total length of this duct bank relocation is anticipated to be 490 metres.
 - (ii) The remaining Telus infrastructure on Broadway Street between Granville and Hemlock will be abandoned in place. Other utility infrastructure impacted by the Telus relocation, described in Article 6.2.5(e)(i) of this Part 1, may also be abandoned in place as noted in the Disclosed Data referenced in Article 6.2.5(e)(vi) of this Part 1.
 - (iii) A new VED telecommunications duct will be installed by the City in the same location as the abandoned Telus infrastructure on Broadway. The

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VED relocation work will begin at a manhole (MH 14) on Broadway, head east to another manhole (MH 15) located at the intersection of Broadway and the lane immediately to the east of Broadway, and then will head south terminating in the southern section of the lane outside of the Station Site. As a consequence of the VED installation work described in this Article 6.2.5(e)(iii), MH 15 will be removed by the City.

- (iv) Project Co shall be responsible for the removal and disposal of any abandoned utility infrastructure, including the abandoned Telus infrastructure, referenced in Article 6.2.5(e)(ii) of this Part 1 as required to accommodate the Project Work.
- (v) The anticipated completion date of the relocation described in this Article 6.2.5(e) which will allow for Project Co to remove the remaining infrastructure as described in 6.2.5(e)(iv) of this Part 1, is November 30, 2020.
- (vi) The drawings for this proposed relocation are provided as Disclosed Data.

6.2.6 Fortis Gas Distribution Line Relocation

- (a) Thornton Street
 - (i) An existing Fortis gas distribution line on Thornton Street (approximately 110m of 114mm DP/PE and 25m of 60mm DP/PE) will be abandoned and replaced with a new 55m gas distribution line (114mm DP/PE) to be connected on the north and west side of the Thornton Street and East 1st Avenue intersection to accommodate the Construction of Great Northern Way Station and a potential TBM launch site, as shown in the drawings provided as Disclosed Data.
 - (ii) Project Co shall be responsible for the removal and disposal of any abandoned Fortis gas distribution line infrastructure referenced in Article 6.2.6(a)(i) of this Part 1 as required to accommodate the Project Work.
 - (iii) The Fortis gas distribution line relocation on Thornton Street is complete.

6.2.7 BC Hydro

- (a) Thornton Street
 - (i) An existing BC Hydro ductbank on the west side of Thornton Street will be abandoned and relocated to East 1st Avenue to accommodate the Construction of Great Northern Way Station and a potential TBM launch site, as shown in the drawings provided as Disclosed Data.

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- (ii) Project Co shall be responsible for the removal and disposal of any abandoned BC Hydro infrastructure referenced in Article 6.2.7(a)(i) of this Part 1 as required to accommodate the Project Work.
- (iii) The BC Hydro ductbank relocation on Thornton Street is complete.
- (b) Arbutus Street
 - (i) BC Hydro will be responsible for the supply, installation, and energizing of the installation, of a duct bank which runs from the overhead pole line on Arbutus Greenway to an underground duct bank, along the lane south of Broadway to Arbutus Street and then North across the Broadway/Arbutus intersection to the intersection of Arbutus and West 7th Avenue, then east along West 7th Avenue and then crossing West 7th Avenue to the north side. BC Hydro will also be responsible for tying in all overhead infrastructure to underground infrastructure and vice-versa, as per the proposed BC Hydro relocation drawings, which are provided as Disclosed Data. The BC Hydro work described in this Article 6.2.7(b)(i) will include the discontinuance and removal of the overhead BC Hydro poles currently in place along the Arbutus Greenway between Broadway and W 8th Avenue.
 - (ii) The anticipated completion date of the BC Hydro ductbank relocation on Broadway at Arbutus is January 31, 2021.

6.2.8 901 Great Northern Way Building Modifications

- (a) The existing building at 901 Great Northern Way will be modified by the Province and/or the Advance Work Contractor to accommodate the Province Infrastructure. The modifications will include the partial demolition of the northern section of the building (approximately 500 sq. meters) and the construction of a new concrete masonry wall supported by piled foundations. The building modification works are described in the "901 Great Northern Way Building Alterations" drawing set provided as Disclosed Data.
- (b) The anticipated completion date of the building modification works at 901 Great Northern Way is November 1, 2021.

6.2.9 Sanitary Sewer Relocation at Main Street

- (a) A design has been prepared by Aplin and Martin for the City to relocate an existing 170 lineal metre 600 mm diameter City sanitary main including redirecting adjacent catch basin leads as required to maintain drainage service for the area. The existing sanitary main will be abandoned and a new sewer line will need to be relocated outside of the Main Street area to accommodate the construction of Mount Pleasant Station. The design drawings and report are provided as Disclosed Data.

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- (b) Project Co shall be responsible for the construction of the new sewer line described in Article 6.2.9(a).
- (c) Project Co shall be responsible for the removal and disposal of the abandoned City sewer and catch basin leads referenced in Article 6.2.9 (a) of this Part 1 as required to accommodate the Project Work.
- (d) Not used.

6.2.10 South Granville Station Integration

- (a) As described in Article 10.20 [South Granville Station Integration] of Part 2 of Schedule 4, PCI will, as part of the PCI SG Development, undertake the design and construction of the Station headhouse shell structure and the Station Plaza for South Granville Station.
- (b) Project Co shall be responsible for the components of work related to the Station headhouse and Station Plaza as described in Article 10.20 [South Granville Station Integration] of Part 2 of Schedule 4 and the SG Station Scope of Work Drawings included in Appendix A to Schedule 4.
- (c) Applicable dates for design submissions and access to the Station headhouse shell structure and Station Plaza are set out in Article 10.20 [South Granville Station Integration] and in the Site Requirements.
- (d) PCI will, as part of the integration of the PCI SG Development with the South Granville Station, undertake the design and construction of necessary utility relocations impacted by, and those utilities within, the footprint of the PCI SG Development, including BC Hydro overhead, Teraspan microfibre ducts, Shaw ductbank, Fortis 88 mm gas main and the Telus infrastructure located within and outside of the PCI SG Development, specifically described in Article 6.2.5(e).

6.2.11 Coordination with Advance Work Contractors

- (a) If an Advance Work Contractor requires access to the Project Site after the relevant Specified Access Date specified in this Article 6.2 [Advance Work] to complete Advance Work, or deficiency, warranty, seasonal or other work related to any Advance Work, for the purposes of this Agreement, including Article 6.3.1 [Coordination with Concurrent Work Contractors] of this Part 1:
 - (i) such Advance Work Contractor, while it is on the Project Site after the applicable date, shall be deemed to be a Concurrent Work Contractor for the purposes of this Agreement; and
 - (ii) any such Advance Work, or deficiency, warranty, seasonal or other work related to any Advance Work, shall be deemed to form part of the Concurrent Work.

6.3 Concurrent Work

6.3.1 Coordination with Concurrent Work Contractors

- (a) Project Co shall consult and co-ordinate its activities with each of the Province, TransLink, InTransitBC and the Concurrent Work Contractors, as applicable, and shall carry out the Project Work and perform its obligations under this Agreement so as not to prevent or unnecessarily hinder the Province, TransLink, IntransitBC and the Concurrent Work Contractors, as applicable, from performing and completing any of the Concurrent Work Components and so that, to the greatest extent possible, the Project Work and the Concurrent Work may proceed in a co-coordinated and efficient manner with minimum disruption or adverse impact to the flow of Traffic within the Project Site and adjacent properties.
- (b) Project Co, or any person for whom Project Co is in law responsible, shall not take, fail to take, permit to be taken, or permit the failure to take, any action that results in the Province being in breach of any of its obligations relating to any Concurrent Work Component contracts.
- (c) The Province will not be in breach of this Agreement or any of its obligations under this Agreement and, except as otherwise expressly provided in this Agreement, Project Co will not have any Claim against the Province, as a result of or arising out of any term or condition contained in any of the Concurrent Work Component contracts or any exercise of rights (whether proper or improper) or default by the Province, TransLink, InTransitBC or any Concurrent Work Contractor relating to any Concurrent Work Component contracts.
- (d) In the event of any disagreement or dispute between Project Co, TransLink, InTransitBC and/or any Concurrent Work Contractor with respect to the co-ordination of their respective activities under this Agreement and any Concurrent Work Component, respectively, the disagreement or dispute shall be resolved by the Province in the first instance, having due regard to the rights and interests of all parties.

6.3.2 Concurrent Work at Stations

- (a) The Concurrent Work to be undertaken at the Broadway City Hall Station, Great Northern Way Station and South Granville Station is described in Articles 4 [Structures], 10 [Architecture], 11 [Mechanical], 12 [Electrical], 13 [Systems] and 21 [Guideway and Station Ventilation System], all of Part 2 of Schedule 4.

6.3.3 Compass Card, Faregates and RFID Work

- (a) The Concurrent Work related to Compass Card, Fare Gates and RFID Work is set out in Article 14 [Compass Card and Faregates] and Article 18 [Integration with Transit Facilities], both of Part 2 of Schedule 4.

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6.3.4 Third Party Cellular and Wi-Fi Equipment

- (a) The Concurrent Work related to third party cellular and Wi-Fi equipment is set out in Articles 10 [Architecture] and 12 [Electrical] of Part 2, and Appendix G [Systems General Requirements], all of Schedule 4.
- (b) Third party cellular and Wi-Fi equipment includes the permanent installation of the cellular and Wi-Fi equipment:
 - (i) at the Stations; and
 - (ii) in the Tunnel,as described and defined in Articles 10 [Architecture] and 12 [Electrical] of Part 2, and Appendix G [Systems General Requirements], all of Schedule 4, and in the Concurrent Work Contractor preliminary designs provided as Disclosed Data Exact coverage areas will be determined between TransLink and its third party cellular and Wi-Fi equipment contractor.
- (c) Project Co shall make provision for cabinets measuring 2.0m height x 2.0m width x 1.0m depth for third party cellular and Wi-Fi amplification equipment to be located no more than 700m from a Station throughout the Tunnel(s).
- (d) Cabinets for third party cellular and Wi-Fi amplification equipment shall meet all maintainability requirements specified in Appendix G [Systems General Requirements] of Schedule 4, and shall be located in Cross Passages where possible.
- (e) Where cabinets for third party cellular and Wi-Fi amplification equipment cannot be located in Cross Passages, Project Co shall ensure that the cabinets are easily accessible for maintenance, in accordance with maintainability requirements in Appendix G [Systems General Requirements] of Schedule 4.
- (f) Project Co shall ensure that all enabling works required for the third party cellular and Wi-Fi equipment that it is responsible for are completed no later than six months prior to the Substantial Completion Date unless otherwise approved by the Province in its discretion.
- (g) Without limiting any other provision of this Agreement, Project Co shall provide access to the applicable Station areas and the Tunnel to the Province and the applicable Concurrent Work Contractor(s) to facilitate installation, and commissioning of the third party cellular and Wi-Fi equipment as early as possible, but not later than six months prior to the Substantial Completion Date unless otherwise approved by the Province in its discretion.
- (h) Project Co shall be responsible for the overall project management and scheduling of all work required to install and commission third party cellular

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and Wi-Fi equipment on BSP, including the work to be performed by Concurrent Work Contractor(s).

- (i) Project Co shall work cooperatively with the Concurrent Work Contractor(s) and shall provide the Province and the Concurrent Work Contractor(s) with a look ahead schedule of the works to be performed within the Stations and Tunnel that are required to accommodate third party cellular and Wi-Fi equipment. Project Co shall provide the look ahead schedule at least 30 days prior to such works being performed, or as otherwise agreed to by the Concurrent Work Contractor(s), and shall update the look ahead schedule on a weekly basis and provide such weekly updates to the Province, TransLink, and the Concurrent Work Contractor(s).
- (j) Project Co shall provide its design drawings and documents to the Concurrent Work Contractor(s) as required to allow the Concurrent Work Contractor(s) to complete their design, installation and commissioning works.
- (k) The Concurrent Work Contractor(s) will provide its design drawings to Project Co for review and comment to ensure that the designs by the Concurrent Work Contractor(s) and Project Co are properly coordinated and ensure that there are no conflicts.
- (l) As part of Project Co's responsibility set out in this Article 6.3.4, Project Co shall, in consultation with the Concurrent Work Contractor(s), establish an agreed design submission review process for the Concurrent Work Contractor(s) to submit its design drawings and/or documents to Project Co, which submission process must include the Province and TransLink being copied on all submissions and review comments between Project Co and the Concurrent Work Contractor(s).

6.3.5 Not Used

6.3.6 Not Used

6.3.7 Not Used

6.3.8 Third Party Commercial Spaces

- (a) The third party commercial space requirements at Stations, including commercial retail units (CRUs), automated teller machines (ATMs), vending machines, Commercial Lockers, passenger assistance kiosks (PAK), and advertising public information displays (A-PID) are set out in Article 10.6 [Station Component Design Requirements – Third Party Commercial Spaces] of Part 2 of Schedule 4, Table L-10.6.1 [Third Party Commercial Location by Station], provided in Appendix L of Schedule 4, and in Article 11 [Mechanical], and Article 12 [Electrical] of Part 2 of Schedule 4.

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- (b) Project Co shall ensure that the Design and Construction of all third party commercial space requirements set out in Article 6.3.8(a) of this Part 1 are completed no later than five months prior to the Substantial Completion Date unless otherwise approved by the Province in its discretion, to enable TransLink and their Concurrent Work Contractors to complete their work.
- (c) Without limiting any other provision of this Agreement, Project Co shall provide access to the applicable Station areas and the Tunnel to TransLink and the applicable Concurrent Work Contractor(s) to facilitate construction, installation, and commissioning of the third party commercial equipment and works as set out in Article 6.3.8(a) of this Part 1 as early as possible, but not later than five months prior to the Substantial Completion Date unless otherwise approved by the Province in its discretion.

6.3.9 Trolley Overhead Work

- (a) CMBC and/or the Concurrent Work Contractors will work with Project Co to remove and reinstate Trolley Overhead infrastructure as Concurrent Work. The Concurrent Work related to Trolley Overhead reinstatement is set out in Article 6.2.3 [Trolley Overhead Work] of this Part 1, and Schedule 4 Part 2 Article 9 [Roads] and Article 18.9 [Trolley Overhead Removals and Modifications].

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Article 1. General

1.1 Broadway Subway Operating Parameters

1.1.1 SkyTrain System Operating Hours

- (a) Project Co shall undertake the Design and Construction of the Broadway Subway such that:
 - (i) the Integrated SkyTrain System is capable of providing passenger service every day of each year from approximately 05:00A.M. to 01:30A.M. on the following day, with fewer service hours on Saturdays, Sundays, and holidays as may be specified by TransLink; and
 - (ii) approximately 60 minutes prior to the commencement of passenger service each day, and approximately 15 minutes after the completion of passenger service on the following day, a Train without customers may be used to sweep the Guideway for obstructions or carry staff, as applicable, on the Existing SkyTrain System or the Integrated SkyTrain System.

1.1.2 Canada Line Operating Hours

- (a) Project Co shall undertake the Design and Construction of Project Work on the Canada Line such that:
 - (i) the Canada Line is capable of providing passenger service every day of each year from approximately 04:45A.M. to 01:45A.M. on the following day, with alternative service hours as may be specified by TransLink; and
 - (ii) such that approximately 30 minutes prior to the commencement of passenger service each day, and approximately 20 minutes after the completion of passenger service on the following day, a Train without customers may be used to sweep the guideway for obstructions or carry staff, as applicable, on the Canada Line.

1.1.3 Environment

- (a) Without limiting any other provision of this Agreement, Project Co shall provide, perform and carry out the Project Work, including the Design and Construction of the Project Infrastructure to the extent required to be constructed, installed, altered, upgraded or augmented by the carrying out of the Project Work, so as to ensure that the Broadway Subway is capable of operation at all times under the following ambient environmental conditions:
 - (i) temperature range: -20°C to +40°C;

- (ii) humidity range: 10% to 100% with condensation;
- (iii) maximum wind velocity: 90km/hr sustained, with gusts to 130km/h;
- (iv) maximum rainfall rate: 26mm/h;
- (v) maximum daily rainfall: 89.4mm;
- (vi) maximum daily snowfall: 31.2cm;
- (vii) freezing rain: 1 day per year;
- (viii) the Seismic Performance Level requirements as set out in Article 5 [Seismic], Part 2 of Schedule 4; and
- (ix) any other conditions that can cause ice, frost, dew, or other condensation to form on the Guideway (for certainty, this Article 1.1.3(a)(ix) shall not require Project Co to provide, perform and carry out the Project Work to ensure that the Broadway Subway is capable of operation at temperature, humidity, wind velocity, rainfall, snowfall or freezing rain levels or seismic requirements that fall outside the relevant levels or requirements specified in Articles 1.1.3(a)(i) to 1.1.3(a)(viii) of this Part 2, as applicable).

1.1.4 Climate Resilience Requirements

- (a) In addition to the environmental conditions described in Article 1.1.3(a)(ix), Project Co shall assess the findings and the identified risks and mitigation measures set out in the Province's Climate Lens - Climate Resilience Assessment, provided as Disclosed Data. Project Co shall ensure that the Design Manual covers the risks and mitigation measures identified in the Climate Lens - Climate Resilience Assessment.

1.2 Broadway Subway Project Naming and Mnemonics

1.2.1 General

- (a) Table 1.2.2-a and Table 1.2.3-a set out the interim names and mnemonics for the Stations, platforms and PPSs for the Broadway Subway Project.
- (b) The Province will confirm final names and mnemonics for the Stations, platforms and PPSs in accordance with Section 2.16(d) of this Agreement.
- (c) Project Co shall incorporate the final names and mnemonics for Stations, platforms and PPSs into the Design and Construction of the Broadway Subway Project as described in Schedule 4.

1.2.2 Stations and Platforms

- (a) Table 1.2.2-a sets out the mnemonics for Stations and platforms for the Broadway Subway Project.

Table 1.2.2-b Station and Platform Names and Mneumonics

Interim Station Name	Station Mnemonic	Platform Mnemonic
Great Northern Way Station	GN	inbound - GNI outbound - GNO
Mount Pleasant Station	MP	inbound - MPI outbound - MPO
Broadway - City Hall Station	CH	inbound - CHI outbound - CHO
Fairview-VGH Station	OA	inbound - OAI outbound - OAO
South Granville Station	SG	inbound - SGI outbound - SGO
Arbutus Station	AR	inbound - ARI outbound - ARO

1.2.3 Propulsion Power Substations

- (a) Table 1.2.3-a sets out the mnemonics for PPSs for the Broadway Subway Project.

Table 1.2.3-b Propulsion Power Substation Names and Mneumonics

PPS Location	PPS Mnemonic
Mount Pleasant Station	MPZ
Fairview-VGH Station	OAZ
Arbutus Station	ARZ

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Article 2. Fire and Life Safety Committee

2.1 General

2.1.1 Scope

- (a) This Article 2 describes the role and membership of the Fire and Life Safety Committee (FLSC) for the Broadway Subway Project, and the related obligations of Project Co.

2.1.2 Purpose

- (a) The purpose of the FLSC is to liaise with key stakeholders and the Emergency Response Agencies and to advise on fire and life safety operational issues that may impact the Design and Construction of the Broadway Subway Project. For clarity, the FLSC is not responsible for determining applicable code criteria or code compliance, but rather only providing operational input into Project Co's proposed Design as related to fire and life safety.

2.1.3 Roles and Responsibilities

- (a) The primary roles and responsibilities of the FLSC will include:
 - (i) facilitating the exchange of information among FLSC members during the Design and Construction of the BSP;
 - (ii) responding to issues tabled for review by FLSC members and making evaluations and recommendations for the purpose of minimizing fire and life safety hazards to patrons, employees, emergency response personnel, and property in respect of the BSP;
 - (iii) liaising with TSBC as needed;
 - (iv) obtaining and considering input from the Emergency Response Agencies regarding emergency access and response to all components of the BSP;
 - (v) responding to unresolved fire and life safety operational issues arising during the Design and the Construction of the BSP;
 - (vi) responding to fire and life safety operational issues arising during testing and commissioning of the BSP; and
 - (vii) establishing training programs and interfacing between TransLink and the Emergency Response Agencies.

2.1.4 Establishment and Membership of FLSC

- (a) The parties will cooperate to establish the FLSC in accordance with this Article 2.
- (b) The FLSC will consist of seven core members, with one member to be nominated by each of the following:
 - (i) the Province;

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- (ii) TransLink;
 - (iii) BCRTC;
 - (iv) ProTrans, which member will participate only in relation to issues related to integration of the Broadway - City Hall Canada Line Station with the BSP;
 - (v) Project Co;
 - (vi) the BCRA; and
 - (vii) Vancouver Fire and Rescue Services.
- (c) The core member nominated by Project Co as referred to in Article 2.1.4(b)(v) will chair the FLSC.
- (d) In addition to the core members referred to in Article 2.1.4(b) of this Part 2, the FLSC will be supplemented with the following other liaison members on an as-needed basis:
- (i) a municipal liaison member nominated by the City of Vancouver;
 - (ii) a liaison member nominated by British Columbia Ambulance Service;
 - (iii) a liaison member nominated by Vancouver Police Department;
 - (iv) a liaison member nominated by Metro Vancouver Transit Police; and
 - (v) a liaison member nominated by TSBC.

2.1.5 Project Co Obligations

- (a) Project Co shall be responsible for organization and management of the FLSC.
- (b) FLSC meetings will be held quarterly. If more regular meetings are required based on Project demands, Project Co will coordinate and communicate to the committee members and will organize such additional meetings as are required.
- (c) Project Co shall circulate FLSC meeting minutes for comment by FLSC members and attendees.
- (d) Project Co shall liaise and communicate with the FLSC, who will review the fire and life safety aspects of the Design and Construction of the BSP, including any changes to infrastructure or operations of the Canada Line portion of the integrated Broadway - City Hall Station.
- (e) At the onset of the BSP, Project Co will define and implement a schedule outlining a list of anticipated review items and priorities for the FLSC, so as to prioritize the FLSC time and schedule well in advance. Project Co shall issue this schedule to FLSC members and adhere to this schedule. Project Co will notify the FLSC of any updates to this schedule.
- (f) Project Co acknowledges that the FLSC may raise fire and life safety issues relating to the Design and Construction of the BSP, including any changes to

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infrastructure or operations of the Canada Line portion of the integrated Broadway – City Hall Station, and the FLSC may require Project Co to meet with it to discuss fire and life safety issues and to make recommendations regarding fire and life safety issues to Project Co.

- (g) Project Co shall ensure that recommendations from the FLSC are acceptable to the Province's Representative, in its discretion, before Project Co incorporates such recommendations into any Design submissions pursuant to any applicable procedures pursuant to Part 3 [Certification and Completion] of Schedule 4.
- (h) Project Co acknowledges that any Emergency Response Agency may require specialized access equipment unique to the Broadway Subway Project. The FLSC will, as necessary, convey these requirements to Project Co, and, if such requirements are acceptable to the Province's Representative in its discretion, then Project Co shall incorporate such requirements into the BSP. Project Co shall assume that the specialized access equipment will be similar to the specialized access equipment which has been provided for the Existing Skytrain System and include the following items at underground Station and Tunnel portal locations:
 - (i) track-mounted handcarts with manual breaking capabilities to accommodate ERA stretchers and equipment, contained in a readily accessible and secure waterproof housing unit; and
 - (ii) firefighter's equipment locker, including supplies.

**BROADWAY SUBWAY PROJECT
PROJECT AGREEMENT
SCHEDULE 4 PART 2**

This page and the following 99 pages redacted in their entirety

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Article 5. Seismic

5.1 General

- (a) This Article 5 [Seismic] specifies the seismic requirements and criteria for and in respect of the Design and Construction of the Project.
- (b) Without limiting any other provisions of this Agreement, Project Co shall carry out all seismic, structural and geotechnical investigations, analyses, assessments, determinations, testing and development of inputs necessary to perform the Project Work in accordance with this Article 5 [Seismic].
- (c) The seismic Design provided, performed or carried out by or on behalf of Project Co pursuant to this Agreement shall conform to, comply with and satisfy all of the requirements of this Agreement and Good Industry Practice.

5.2 Codes and Standards

- (a) Without limiting Article 5.1 [General], Project Co shall, in carrying out the seismic design and analyses of the At Grade Guideway, Elevated Guideway structures, Underground Structures and other Structures (as referenced this Article 5.10 [Other Structures] of this Part 2) ensure that the seismic design and analyses procedures comply with the requirements set out in this Article 5 [Seismic], and the provisions of the following codes and standards, which shall apply in the following order of priority, from highest to lowest:
 - (i) BC Supplement to CAN/CSA-S6;
 - (ii) CAN/CSA-S6;
 - (iii) AASHTO LRFD Seismic Bridge Design;
 - (iv) AASHTO LRFD Bridge Design Specifications; and
 - (v) AASHTO LRFD Road Tunnel Design and Construction Guide Specifications.
- (b) Without limiting Article 5.1 [General], Project Co shall, in carrying out the seismic design and analyses of the Building Structures and, Operational and Functional Components (OFC), ensure that the seismic Design and analyses procedures comply with the requirements set out in this Article 5 [Seismic], and the provisions of the following codes and standards, which shall apply in the following order of priority, from highest to lowest:
 - (i) National Building Code of Canada (NBCC);
 - (ii) British Columbia Building Code (BCBC);
 - (iii) CAN / CSA A23.3;
 - (iv) Canadian Foundation Engineering Manual; and

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- (v) CAN/CSA-S832.
- (c) The following geotechnical resistance factors (Φ) shall be used in the Design of deep foundations associated with the different Seismic Performance Levels for structures identified in Article 5.4.2 [Required Seismic Performance Levels] of this Part 2, and for Elevated Guideway in Article 5.7 [Elevated Guideway] and in Article 5.9 [Elevated Guideway Tie-in with the Existing Millennium Line] of this Part 2:
 - (i) Static Design – Deep Foundations
Resistance factors in Table 6-2 of CAN/CSA S6:
Degree of Understanding in Table 6.2 of CAN/CSA S6 shall be benchmarked as per Table 6.2a of the BC Supplement to CAN/CSA S6
 - (ii) Seismic Design – Deep Foundations
Immediate Use Performance:
 Φ factor shall be the same as for Static Design
Repairable and Life Safety Performance:
 Φ factor shall be as follows:
Capacity protected elements and performance-based design, use $\Phi = 1.0$
Force-based design, use $\Phi = \Phi_{\text{static}} + 0.2$: $\Phi \leq 1.0$
 - (iii) For Immediate Use Performance and Repairable and Life Safety Performance, the Consequence Factor shall be taken as 1.0. Regardless of the resistance factor used, Project Co shall ensure that the structures meet the Seismic Performance Levels defined in Article 5.3.2 [Required Seismic Performance Levels] of this Part 2.

5.3 Seismic Performance Level Requirements

5.3.1 General

- (a) Project Co shall ensure that the seismic design for the Elevated Guideway structures, Underground Structures, Building Structures and Operational and Functional Components complies with the requirements of the Seismic Performance Levels specified in this Article 5.3 [Seismic Performance Level Requirements].

5.3.2 Required Seismic Performance Levels

- (a) Project Co shall ensure that the seismic design for all Elevated Guideway structures complies with the following:

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- (i) for the 100-Year Return Period Earthquake Event Level, the required Seismic Performance Level [Performance Criteria] shall be the Minimal Damage [Immediate Use] Performance Level as per the BC Supplement to CAN/CSA-S6; and
 - (ii) for the 2475-Year Return Period Earthquake Event Level, the required Seismic Performance Level [Performance Criteria] shall be the Repairable Damage [Service Limited] Performance Level as per the BC Supplement to CAN/CSA-S6.
- (b) Project Co shall ensure that the seismic design for all Underground Structures complies with the following:
 - (i) for the 100-Year Return Period Earthquake Event Level, the required Seismic Performance Level [Performance Criteria] shall be the Minimal Damage [Immediate Use] Performance Level as per the BC Supplement to CAN/CSA-S6; and
 - (ii) for the 2475-Year Return Period Earthquake Event Level, the required Seismic Performance Level [Performance Criteria] shall be the Repairable Damage [Service Limited] Performance Level as per the BC Supplement to CAN/CSA-S6.
- (c) Project Co shall ensure that the seismic design of all Building Structures complies with the following:
 - (i) for the 100-Year Return Period Earthquake Event Level, the required Seismic Performance Level shall be Minimal Building Structures Damage; and
 - (ii) for the 2475-Year Return Period Earthquake Event Level, the required Seismic Performance Level shall be “High” Importance Category as defined in NBCC.
- (d) Project Co shall ensure that the seismic design of all OFCs complies with the following:
 - (i) for the 100-Year Return Period Earthquake Event Level, the required Seismic Performance Level shall be “Fully Functionality” as that term is defined in the CSA S832.
 - (ii) for the 2475-Year Return Period Earthquake Event Level, the required Seismic Performance Level shall be “Life Safety” with exception of essential OFCs defined in Article 5.11.1(b) of this Part 2 which shall be “Limited Functionality” as that terms defined in the CSA S832.
- (e) Project Co shall ensure that the seismic design of Elevated Guideway tie-in with the existing Millennium Line tail track near VCC Clark Station complies with the following:

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- (i) for the 100-Year Return Period Earthquake Event Level, the required Seismic Performance Level shall be the Minimal Damage [Immediate Use] Performance Level as per the BC Supplement to CAN/CSA-S6;
 - (ii) for the 475-Year Return Period Earthquake Event Level, the required Seismic Performance Level [Performance Criteria] shall be the Repairable Damage [Service Limited] Performance Level as per the BC Supplement to CAN/CSA-S6; and
 - (iii) for the 2475-Year Return Period Earthquake Event Level, the required Seismic Performance Level [Performance Criteria] shall be the Probable Replacement [Life Safety] Performance Level as per the BC Supplement to CAN/CSA-S6.
- (f) Project Co shall ensure that the seismic design for all Elevated Guideway structures and Underground Structures complies with the track tolerances set out in Article 13.10.3.4 [Track Construction Tolerances] of this Part 2 such that the required Seismic Performance Level for the 100-Year Return Period Earthquake Event Level is not compromised.
 - (g) Article 5.4 [Seismic Inputs and Geotechnical Analysis Requirements] of this Part 2 sets out the seismic inputs and geotechnical design requirements for all Structures that Project Co shall meet in order to satisfy each applicable Seismic Performance Level.
 - (h) Article 5.6 [Elevated Guideway] of this Part 2 sets out the seismic design requirements for the Elevated Guideway structures that Project Co shall meet in order to satisfy each applicable Seismic Performance Level.
 - (i) Article 5.7 [Underground Structures] of this Part 2 sets out the seismic design requirements for Underground Structures that Project Co shall meet in order to satisfy each applicable Seismic Performance Level.
 - (j) Article 5.8 [Building Structures] of this Part 2 sets out the seismic design requirements for Building Structures that Project Co shall meet in order to satisfy each applicable Seismic Performance Level.
 - (k) Article 5.9 [Elevated Guideway Tie-in with the Existing Millennium Line] of this Part 2 sets out the seismic design requirements for Elevated Guideway tie-in at the existing VCC Clark Station that Project Co shall meet in order to satisfy each applicable Seismic Performance Level.
 - (l) Article 5.11 [Operational and Functional Components] of this Part 2 sets out the seismic design requirements for OFCs that Project Co shall meet in order to satisfy each applicable Seismic Performance Level.
 - (m) The specified limits of allowable damages for the performance design of a Permitted ERS and other components of the Elevated Guideway structures are set out in Articles 5.6.3.3 [Performance Requirements and Permitted ERSs] and

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5.6.3.4 [Potentially Permitted ERSs and Other Components], both of this Part 2, as applicable.

5.4 Seismic Inputs and Geotechnical Analysis Requirements

5.4.1 General

- (a) Project Co shall carry out the Design of all Structures using the applicable seismic inputs specified in this Article 5.4 [Seismic Inputs and Geotechnical Analysis Requirements]. Without limiting the generality of the foregoing, Project Co shall, in order to confirm that each of the applicable Seismic Performance Levels can be achieved, be responsible for:
 - (i) analyzing and determining those areas of the Alignment that are underlain by soils likely to experience liquefaction, lateral spreading, and movements when subjected to ground motions from an earthquake event at each of the applicable Earthquake Event Levels and performing all required site-specific ground response and soil-structure interaction analyses for the Design of all Structures;
 - (ii) analyzing and determining those areas of the Alignment that are underlain by soils susceptible to partial liquefaction (cyclic mobility) and movements when subjected to ground motions from an earthquake event at each of the applicable Earthquake Event Levels and performing all required site-specific ground response and soil-structure interaction analyses for the Design of all Structures; and
 - (iii) analyzing and determining those areas of the Alignment that are underlain by soils unlikely to experience liquefaction or cyclic mobility when subjected to ground motions from an earthquake event at each of the applicable Earthquake Event Levels. Where Project Co identifies such areas, the Design of any Structures within such areas may be carried out using force-based methods or site-specific ground response and soil-structure interaction analysis methods.
- (b) Project Co shall, in the seismic design of the Project, include the interaction of the Guideway and the tracks, as well as the interaction of the Guideway with all other components fixed to the Guideway.

5.4.2 Seismic Inputs

- (a) Project Co shall, in carrying out the Design of the Structures:
 - (i) apply, as seismic inputs for the design, the site-specific firm-ground motion time-histories and design response spectra provided in Appendix M [Earthquake Acceleration Time History Development, 26 February, 2019] to Schedule 4;

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- (ii) ensure that, for any design based on inelastic time-history analysis, the design response shall be the controlling mean response quantity obtained from analysis using the seismic inputs for Crustal, Inslab and Interface (where applicable) earthquake scenarios. Use seismic inputs comprising the full suite of five sets of records, provided in Appendix M [Earthquake Acceleration Time History Development, 26 February, 2019] to Schedule 4, where a set of records is defined as two orthogonal records and the relevant vertical input for each applicable Earthquake Event Level.
- (b) The Microsoft Excel files with the spectrally-matched acceleration velocity and displacement time-histories referenced in Appendix M [Earthquake Acceleration Time History Development, 26 February, 2019] and to be used by Project Co are provided as Disclosed Data.

5.4.3 Soil-Structure Interaction Analysis Requirements

- (a) Soil-structure interaction analysis for foundation and underground structure design undertaken by Project Co shall use de-coupled or coupled methods as follows:
 - (i) subject to Articles 5.4.3(a)(ii) and (iii) of this Part 2, de-coupled methods of analyses shall be used as a minimum;
 - (ii) coupled methods of analyses shall be used at a minimum of seven sections for that part of the Broadway Subway Project from west of Sta. 100+300 to Sta. 105+600 to confirm the results of the de-coupled methods of analyses. At least one section shall be for the Elevated Guideway; and
 - (iii) analysis sections undertaken pursuant to Article 5.4.3(a)(ii) of this Part 2 shall be located where changes in ground slope, structure type and configuration, and site soil conditions occur and where de-coupled methods of analyses have been performed.
- (b) Soil-structure interaction analysis software used by Project Co shall take into consideration the following:
 - (i) the non-linear behaviour of the soil and the applicable structure; and
 - (ii) the pre-earthquake and post-earthquake stress-strain response of the geologic materials modeled.
- (c) Mean input parameters of the range demonstrated by testing shall be considered by Project Co in undertaking all analyses required under this Article 5.4.3 [Soil-Structure Analysis Requirements].
- (d) Project Co shall ensure that:
 - (i) all analyses required under this Article 5.4.3 [Soil-Structure Analysis Requirements] shall be carried out by Professional Engineers who

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- have demonstrated experience in soil-structure interaction analysis;
and
- (ii) all analysis methodologies, assumptions, and input parameters used in the seismic design shall, in addition to the Design and Construction Certification Procedures, be documented in the SDSM and subject review and acceptance by the Province's Representative under the Consent Procedure, in accordance with Article 5.5 [Seismic Design Strategy Memorandum] of this Part 2.
- (e) For the purposes of Article 5.4.3(a) of this Part 2, the de-coupled and coupled methods of analyses mean the following:
- (i) in the de-coupled method of soil-structure interaction analysis, the soil and the structure are modeled separately, and an analysis is performed of the soil-structure system in multiple steps. The soil and the structure may be represented to different degrees of detail and the analysis accounts for inertial loads, kinematic interaction effects, possible separation effects between the soil and the foundation, and soil and structure behavior in an approximate manner; and
 - (ii) in the coupled method of soil-structure interaction analysis, the soil and the structure are modeled together, and an analysis is performed of the complete soil-structure system in one step. The soil and the structure are represented to the same degree of detail and the analysis accounts for the possible separation effects between the soil and the foundation, and soil and structure behavior.

5.4.4 Ground Response and Deformation Analysis Requirements

- (a) Ground response analysis for location-specific response spectra and liquefaction assessment for all foundation and subsurface structure designs carried out by Project Co shall use one-dimensional or two-dimensional methods as follows:
 - (i) two-dimensional methods of analyses shall be used for that part of the Broadway Subway Project Sta. 100+000 to Sta. 101+000 and within 40m on either side of the Alignment centerline; and
 - (ii) one-dimensional methods of analyses may be used for the remaining areas.
- (b) Ground response analysis software utilized by Project Co in carrying out the seismic design shall include the non-linear and hysteretic soil behaviour using either equivalent linear or incremental elastic methods. For those soil profiles where it is demonstrated that the earthquake-induced shear stresses exceed the strength of soil, incremental elastic methods that consider strain rate-adjusted shear strength of soils shall be used by Project Co. The results of equivalent linear and incremental elastic methods shall be assessed by Project Co for

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consistency when multiple Earthquake Event Levels are involved and the results shall not be mixed or combined.

- (c) Ground deformation analyses shall be carried out by Project Co to consider two or three-dimensional methods.
- (d) Mean stiffness and damping parameters (equivalent linear) and mean stiffness and strain rate adjusted strength parameters (incremental elastic) of geological materials modeled and seismic inputs provided in Appendix M [Earthquake Acceleration Time History Development, 26 February, 2019] to Schedule 4 shall be used by Project Co in all ground response analyses. Mean input parameters of the range demonstrated by testing shall be used by Project Co in all analyses required under this Article 5.4.4 [Ground Response and Deformation Analysis Requirements].
- (e) The design location-specific acceleration response spectra prepared by Project Co shall correspond to the controlling mean response spectra obtained from analysis using the seismic inputs for crustal, inslab and interface (where applicable) earthquake scenarios. Use the seismic inputs provided in Appendix M [Earthquake Acceleration Time History Development, 26 February, 2019] to Schedule 4 for each Earthquake Event Level.
- (f) Project Co shall ensure that:
 - (i) all evaluations shall be carried out by Professional Engineers who have demonstrated experience in all the specified ground response analysis methods; and
 - (ii) all analysis methodologies, assumptions, and input parameters used by Project Co shall be documented in the SDSM.

5.4.5 Slope and Embankment Analysis Requirements

- (a) Seismic deformations experienced by slopes and embankments shall be evaluated by Project Co using simplified or detailed ground response analysis methods as follows:
 - (i) the simplified methods of analyses may be used for slopes and embankments where the soil stratigraphic profile results in a defined failure plane and to estimate plausible upper and lower bounds for ground movements; and
 - (ii) detailed ground response analysis methods are required when estimates of both the pattern and magnitude of movements need to be established for the seismic design and Project Co shall use the seismic inputs provided in Appendix M [Earthquake Acceleration Time History Development, 26 February, 2019] to Schedule 4.
- (b) Analysis methods required under this Article 5.4.5 [Slope and Embankment Analysis Requirements] shall include reduced post-earthquake soil shear

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strength and shear stiffness of geologic materials resulting from development of high excess pore water pressures.

- (c) Where Project Co uses simplified methods of analyses, upper-bound movements shall be used for the seismic design of the Structures.
- (d) Where Project Co uses detailed methods of analyses, mean movements shall be used for Design of the Structures.

5.4.6 Soil Liquefaction Assessment Requirements

Project Co shall assess the potential for soil liquefaction and related ground deformations along the Alignment in accordance with this Article 5.4 [Seismic Input and Geotechnical Analysis Requirements].

- (a) The effects of soil liquefaction that Project Co shall evaluate in its liquefaction assessment include the following:
 - (i) lateral spreading of ground with gentle slopes and vertical settlements;
 - (ii) slope movements and potential for flow slide failures;
 - (iii) loss of bearing capacity, punching failure, and settlement of shallow foundations;
 - (iv) soil movement-induced lateral loads, downdrag loads, and loss of load carrying capacity of deep foundations;
 - (v) increased lateral earth pressures on walls and buoyancy forces on underground structures and Utilities; and
 - (vi) all other effects that will impact the Seismic Performance Level of the structures.
- (b) For analysis of soil liquefaction using simplified methods, the following earthquake magnitude shall be used:
 - (i) for the 100-Year Return Period Earthquake Event Level, the earthquake magnitude shall be taken as M6.7 for the crustal and inslab earthquake motions;
 - (ii) for the 475-Year Return Period Earthquake Event Level, the earthquake magnitude shall be taken as M7 for the crustal and inslab earthquake motions; and
 - (iii) for the 2475-Year Return Period Earthquake Event Level, the earthquake magnitude shall be taken as M7 for the crustal and inslab earthquake motions. The mean earthquake magnitude shall be taken as M8.4 for the interface earthquake motions.

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- (c) Project Co shall carry out the Design of the foundations of all structures to accommodate the soil loads imposed on them due to liquefaction-induced ground deformations.
- (d) Subject to acceptance of the seismic design by the Province's Representative, acting reasonably, in accordance with the Consent Procedure, limited inelastic deformation of piles and shafts may be permitted in order to resist liquefaction-induced loading, provided that the seismic design of the foundations of any structure remains in compliance with the Seismic Performance Level requirements set out in Article 5.3 [Seismic Performance Level Requirements] of Part 2.

5.5 Seismic Design Strategy Memorandum

5.5.1 General

- (a) Project Co shall, in accordance with the requirements of this Article 5.5 [Seismic Design Strategy Memorandum], prepare and submit to the Province's Representative under the Consent Procedure a seismic design strategy memorandum (the "**SDSM**") in respect of each Structure, highlighting in sufficient details the design strategy and approach that Project Co proposes to use with respect to the seismic design of the applicable Structure.
- (b) Each SDSM prepared by Project Co shall include the following:
 - (i) the assumptions and seismic design approach;
 - (ii) the design strategy to meet required performance goals for each Seismic Performance Level;
 - (iii) any Permitted ERSs or Potentially Permitted ERSs in seismic load paths, and the corresponding limits of inelastic response;
 - (iv) the step-by-step detailed methodology and assumptions for analysis and design;
 - (v) the methodologies used to demonstrate compliance with global and component performance requirements;
 - (vi) the methodologies used to evaluate inelastic strains and deformations in any proposed ERS components;
 - (vii) the component and foundation properties used in global dynamic analyses;
 - (viii) the seismic ground motion input for each applicable Seismic Performance Level;
 - (ix) the following to a sufficient level to develop the seismic strategy;

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- A. the global modal characteristics of the structure, including primary modes of vibration with minimum of 90% mass participation;
 - B. the global seismic demands, including maximum deflections and displacements; and
 - C. the local component performance as determined in local substructure push-over analyses to demonstrate component performance compliance with the required performance goals,
- and shall be based on a capacity-protected and performance-based design approach, as described in this Article 5 [Seismic].
- (c) Project Co shall, in the SDSM of each Structure type, consider the applicable category for the Structure, based on features affecting seismic design strategies, including:
 - (i) typical single span structures with similar span length, soil conditions and ground motions;
 - (ii) typical regular structures with similar number of spans per frame, span lengths, substructure skews, substructure number of columns, heights and stiffnesses, foundation types, soil conditions, and ground motions; and
 - (iii) other categories for non-typical or irregular structures, including bridges.
 - (d) Project Co shall submit each SDSM to the Province's Representative under the Consent procedure. In the event that an SDSM is rejected by the Province's Representative, Project Co shall submit a revised SDSM that addresses all of the comments made by the Province's Representative.
 - (e) Notwithstanding Article 2.8 [Early Commencement of Work] of Schedule 2, Project Co shall not submit the Final Design of a Structure to the Province's Representative or proceed with construction activities in respect of any components of a Structure dependent on seismic design strategy until the SDSM for the applicable Structure has been reviewed and accepted by the Province's Representative under the Consent Procedure.
 - (f) Any seismic Interim Design submissions and seismic Final Design submissions submitted by Project Co to the Province's Representative shall comply with the applicable SDSM reviewed and accepted by the Province's Representative. The comments provided by the Province's Representative with respect to each of the Interim Design and Final Design shall be based on and shall not be inconsistent with the SDSM reviewed and accepted by the Province's Representative.
 - (g) Prior to submitting the seismic Interim Design and Final Design submissions for each Structure to the Province's Representative under the Review Procedure,

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Project Co must obtain the Province's Representative acceptance of the SDSM for that relevant Structure under the Consent Procedure. Any seismic design of a Structure submitted in absence of an accepted SDSM will be rejected by the Province's Representative. For all seismic Design submissions, Project Co must include the accepted SDSM for that Structure

- (h) Project Co shall submit all seismic Designs in accordance with Article 2.2.4 [Design Submissions, Review and Reports for Non-System Components] of Part 3 of this Schedule 4.

5.5.2 SDSM Workshops

- (a) Project Co shall incorporate as part of the Non-System Design Management Plan that is to be provided under Article 2.2.3 [Non-Systems Design Management Plan and Technical Appraisal Forms] of Part 3 of this Schedule 4, SDSM workshop(s) with the Province. The intent of the workshop(s) is for Project Co and the Province's Representative to discuss any comments provided by the Province's Representative on the Interim and Final SDSM for each Structure and allow all to bring specific design concerns to the forefront for discussion.
- (b) Upon receipt of SDSM comments from the Province's Representative, Project Co shall be responsible for organizing and coordinating the SDSM workshop(s) for the relevant Structures.
- (c) Discussion of any issues or potential resolution of issues at these SDSM meetings does not constitute acceptance of variation to the requirements within this Article. If applicable, Project Co shall submit a written request for variation to any requirements in this Article in accordance with the Consent Procedure.
- (d) Project Co acknowledges that nothing in these SDSM workshops is intended to make the Province responsible for the Design or the Design schedule, and that Project Co remains responsible for the Design and the Design schedule.

5.6 Elevated Guideway

5.6.1 General Requirements

- (a) Project Co shall carry out the Design of the Elevated Guideway in compliance with the seismic requirements of this Article 5 [Seismic], including the following:
 - (i) seismic inputs as set out in Article 5.4 [Seismic Inputs and Geotechnical Analysis Requirements] of this Part 2;
 - (ii) the Seismic Performance Level requirements as set out in Article 5.3 [Seismic Performance Level Requirements] of this Part 2;
 - (iii) component level seismic performance requirements as set out in Articles 5.6.3.3 [Performance Requirements and Permitted ERSs] and

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- 5.6.3.4 [Potentially Permitted ERSs and Other Components] of this Part 2; and
- (iv) the applicable provisions of the standards and codes as referenced in Article 5.2 [Codes and Standards] of this Part 2.
- (b) Following confirmation of acceptance of the SDSM in respect of a Structure by the Province's Representative, and in advance of commencing any construction activities in respect of such Structure, Project Co shall submit complete seismic Interim Design submissions for the Structure in accordance with Article 2 [Design and Construction Certification Procedures], Part 3 of Schedule 4, which submissions shall demonstrate compliance of the seismic design with the approved SDSM for the applicable Structure and shall include:
- (i) the design plans and specifications as required by this Agreement;
 - (ii) supporting engineering documents for:
 - A. the Structure itself, and the bearings, foundation and other devices and component properties to be used in the analyses;
 - B. the foundation properties;
 - C. the global modal analysis results, with minimum of 90% mass participation;
 - D. ground motions;
 - E. global seismic demands;
 - F. the local push-over analyses and component demands;
 - G. the design strength and ductility of the Structure's components;
 - H. the demand-capacity comparisons;
 - I. the conformance checks with the seismic performance requirements set out in this Article 5 [Seismic]; and
 - J. Project Co's response to any comments made by the Province's Representative in respect of the SDSM.

5.6.2 Earthquake Resisting Systems and Capacity Protected Components

5.6.2.1 Permitted ERSs and Capacity Protected Components

- (a) Project Co's seismic design strategy for each Elevated Guideway structure, as reflected in the applicable SDSM, shall include the following:
- (i) identifying each of the Permitted ERS components and Capacity-Protected Components;
 - (ii) in accordance with the capacity-protected design approach, providing that the strength of all Capacity-Protected Components shall be stronger than the overstrength capacity of any Permitted ERSs

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adjacent to or in the seismic load path of the applicable Capacity-Protected Components;

- (iii) for seismic design strategies that will include inelastic response of a Permitted ERS, setting out the procedures to conduct global time history and/or local stand-alone push-over analyses of substructure systems, as applicable, to demonstrate performance-based compliance of the Permitted ERS components with the Seismic Performance Level requirements specified in Article 5.6.3.3 [Performance Requirements and Permitted ERSs] of this Part 2. For the inelastic response of the components of a Permitted ERS of a substructure, the analyses undertaken by Project Co shall include nonlinear push-over analyses of the substructure system up to calculated seismic displacement demands to establish ductility demands, and to determine ductility capacities associated with the applicable Seismic Performance Level; and
 - (iv) providing that all Capacity-Protected Components shall remain elastic during an earthquake event at all applicable Earthquake Event Levels.
- (b) Project Co's seismic design strategy for a Permitted ERS in an Elevated Guideway structure, as reflected in the applicable SDSM, the Interim Design submissions and the Final Design submissions, shall clearly demonstrate:
- (i) the function of the Permitted ERS as incorporated in the Design of the Elevated Guideway structure in protecting Capacity-Protected Components; and
 - (ii) the compliance of the design of the Elevated Guideway structure with the requirements of each of the applicable Seismic Performance Levels.

5.6.2.2 Potentially Permitted ERSs

- (a) The use of an ERS other than a Permitted ERS requires the acceptance of the Province's Representative, acting reasonably, in accordance with the Consent Procedure. Examples of Potentially Permitted ERSs include:
 - (i) minor inelastic response of piles below ground, so long as seismic performance requirements set out in Article 5.6.3.4.7 [Foundations] of this Part 2 are met, and pile component integrity and performance are not jeopardized; and
 - (ii) sacrificial (fuse) shear keys, allowing for sliding of the superstructure to limit seismic loads.
- (b) Project Co shall, in its submissions to the Province's Representative for the acceptance of a Potentially Permitted ERS, provide proof to substantiate compliance of the Potentially Permitted ERS with the Seismic Performance Level requirements set out in Article 5.6.3.4 [Potentially Permitted ERSs and Other

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Components] of this Part 2, which submissions shall be made as part of the SDSM, or a submission to amend the SDSM, in respect of the applicable Guideway structure.

5.6.3 Design Procedure for Elevated Guideway Structures

5.6.3.1 Procedural Steps

- (a) In carrying out the seismic design of each Elevated Guideway structure, Project Co shall carry out the following procedural steps:
 - (i) the ground motion step, which consists of preparing the ground motion level for each of the Earthquake Event Levels applicable to the Elevated Guideway structure segment location as determined in accordance with Article 5.4.4 of this Part 2;
 - (ii) the SDSM step, which consists of developing a SDSM for each Elevated Guideway structure in accordance with Article 5.5 [Seismic Design Strategy Memorandum] of this Part 2 and identifies the proposed use of any Permitted ERS or a Potentially Permitted ERS in respect of such structure;
 - (iii) the analytical modeling step, which consists of carrying out the following analyses:
 - A. seismic demand and component performance analyses shall be based on representative analytical modeling and component performance representation;
 - B. where inelastic response of ductile column plastic hinging is part of the seismic design strategy, dynamic analyses shall include representative analyses to determine upper bound seismic deflection and displacement demands;
 - C. detailed inelastic deformation analyses of ductile column plastic hinges shall be evaluated in local push-over analyses of substructure systems, subjected to the imposed deflections and displacements from the global analyses. Representative analytical modeling features shall include the following:
 - (1) expected steel and material properties;
 - (2) spine/beam elements for superstructure, bent cap, columns, and other linear flexure components, as applicable;
 - (3) effective component properties representing the expected performance of the applicable component within analysis models;

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- (4) for deflection and displacement analyses, column section properties shall be based on cracked section properties as determined by column moment-curvature analyses; and
 - (5) spring elements with translational and rotational properties to represent abutments, pier and column foundations, member end joints, expansion joints and other discontinuities, as applicable;
 - (iv) the seismic demand analysis procedure step, which step shall be based on representative analytical idealization of structure stiffness, mass and damping distribution, using applicable global dynamic analysis methods suited for the type of structures. For a typical Elevated Guideway structure, at a minimum, applicable dynamic analysis methods to be considered by Project Co shall correspond to the specified analysis methods for lifeline bridges in CAN/CSA-S6 Table 4.12 and Table 4.13 and Article 4.6 [Guideway Design Criteria] of this Part 2, including:
 - A. elastic dynamic analysis including multi-mode response spectrum analysis or elastic time-history analysis*;
 - B. inelastic static pushover analysis*; and
 - C. non-linear time history analysis*.

* Seismic analysis requires 3-dimensional spine and spring models representing structure components, discontinuities, and foundation stiffness, mass, and damping distribution, using a commercially available and validated software; and
 - (v) for non-typical structures or features, other detailed analysis methods, such as nonlinear dynamic analyses, finite element analyses, and local inelastic pushover analysis of substructure systems, as applicable, shall be carried out by Project Co, subject acceptance of the proposed analysis methods by the Province's Representative as part of the applicable SDSM.
- (b) The results of the analyses undertaken by Project Co pursuant to Articles 5.6.3.1(a)(iii) through (iv) of this Part 2, as applicable, shall be included as part of the Interim Design submissions and the Final Design submissions in respect of the applicable Elevated Guideway structure.
- (c) The analysis methods used by Project Co shall be appropriate for the type, regularity, and complexity of the applicable Guideway structure, and are subject to review and acceptance by the Province's Representative as part of the applicable SDSM. At a minimum, the analysis methods used by Project Co shall comply with provisions of CAN/CSA-S6 Section 4.4.5 for lifeline bridges for seismic performance category 3.

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- (d) The primary demand parameters determined by Project Co from global dynamic analyses undertaken in respect of an Elevated Guideway structure shall be deflection and displacement demands.
- (e) The inelastic component behavior of ERS ductile components, such as the ductile response of columns when used in the seismic design strategy, shall be determined by Project Co via non-linear analyses, or equivalent step-by-step linearized push-over analyses, of substructure models with inelastic component response representation, such as column plastic hinging, foundation nonlinearities, or other nonlinearities as permitted and present.
- (f) Project Co shall evaluate demand strains for a column plastic hinging Permitted ERS via nonlinear section analyses to demonstrate compliance with seismic performance requirements as specified in Article 5.6.3.3 [Performance Requirements and Permitted ERSs] of this Part 2. Prior to undertaking such evaluation, Project Co shall obtain the acceptance of the Province's Representative under the Consent Procedure for the proposed method of non-linear section analysis in respect of the applicable Permitted ERS and shall include the preliminary results of such evaluation in the SDSM relating to the applicable Permitted ERS.
- (g) Depending on the seismic design strategy selected by Project Co, and subject to displacement demands for each Earthquake Event Level, Project Co shall conduct local deformation and strain-based push-over analyses of substructure systems in order to:
 - (i) assess the response of a Permitted ERS or a Potentially Permitted ERS, as applicable;
 - (ii) establish strain demands for each component of the substructure system;
 - (iii) demonstrate compliance with the specified seismic performance requirements set out in Article 5.6.3.3 [Performance Requirements and Permitted ERSs] and 5.6.3.4 [Potentially Permitted ERSs and Other Components], both of this Part 2, as applicable;
 - (iv) account for the Guideway foundation soil-structure interaction effects;
 - (v) develop strain limits corresponding to component level performance requirements as set out in Article 5.6.3.3 [Performance Requirements and Permitted ERSs] and 5.6.3.4 [Potentially Permitted ERSs and Other Components], both of this Part 2, as applicable, in accordance with the accepted SDSM;
 - (vi) demonstrate with supportive design documents that the strain demands of a Permitted ERS or a Potentially Permitted ERS are within specified seismic performance requirements as set out in Articles 5.6.3.3 [Performance Requirements and Permitted ERSs] and

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5.6.3.4 [Potentially Permitted ERSs and Other Components], both of this Part 2, as applicable;

- (vii) demonstrate seismic demand on all capacity-protected components are within range of their elastic strength; and
- (viii) account in the Design for lateral drift of the columns and the resulting P-Delta effects.

Project Co shall include the results of the analyses undertaken by in it accordance with this Article 5.6.3.1(g) in respect of a Guideway structure in the Interim Design and the Final Design of the applicable Guideway structure.

5.6.3.2 Seismic Design of Elevated Guideway Structure Components

- (a) Project Co shall ensure that the seismic design of the components of each Elevated Guideway structure complies with the following:
 - (i) where Project Co proposes to use bearing and base isolation as a Permitted ERS, such use shall be subject to validation testing for the range of response and performance requirements;
 - (ii) where Project Co proposes to use seismic dampers as a Permitted ERS, such use shall be subject to validation testing for the range of response and performance requirements;
 - (iii) subject to proof of compliance with the Seismic Performance Level requirements for each of the Earthquake Events Levels, such proof to be provided by way of analyses and testing;
 - (iv) where Project Co proposes to use fused bearing behavior, such as sliding, as well as behavior of isolation bearings, as a Permitted ERS, such use shall require detailed non-linear dynamic analyses of ground motion time histories, corresponding to the Earthquake Events Levels, accounting for soil-structure interaction and potential non-linear behavior in soils and structural components;
 - (v) an ultimate system displacement capacity of at least 25% greater than demands determined from non-linear dynamic analyses shall be required for the Design of base-isolated Structures at each applicable Earthquake Event Level; and
 - (vi) where Project Co proposes to use bearings, base isolations, or damper design behavior as Permitted ERSs, such use shall require Project Co to demonstrate compliance with the applicable seismic performance requirements set out in Article 5.6.3.3 [Performance Requirements and Permitted ERSs] of this Part 2 and certified laboratory testing corresponding to the range of seismic design performance of the applicable Permitted ERS, the results of which shall be included with the Interim Design submissions and the Final Design submissions of the applicable Guideway structure.

5.6.3.3 Performance Requirements and Permitted ERSs

5.6.3.3.1 General

- (a) Project Co shall carry out the Design of the Elevated Guideway structure components in accordance with the following:
 - (i) Permitted ERSs shall be limited to ductile substructure elements, such as columns, braced frames, and moment resisting frames, as well as special devices such as base isolation and energy absorption devices, all as described in Section 4 of CAN/CSA-S6 for design of Capacity-Protected elements, and in compliance with the Seismic Performance Level requirements set out in Article 5.3 [Seismic Performance Level Requirements] of this Part 2;
 - (ii) the seismic response of a Permitted ERS shall be limited to the allowable range of response within specified Seismic Performance Level requirements for that component;
 - (iii) the Design shall include strain-based component inelastic response for a Permitted ERS, corresponding to each of the Seismic Performance Levels set out in Article 5.3 [Seismic Performance Level Requirements] of this Part 2; and
 - (iv) all Capacity-Protected Components shall remain elastic.
- (b) Project Co shall ensure that the seismic design of the Elevated Guideway structures complies with the Seismic Performance Level requirements, including, where a ductile reinforced concrete column is used, the specific strain-based limits for ductile reinforced concrete columns, set out in each of Articles 5.6.3.3.2 [Minimal Damage (Immediate Use) Performance Level] and 5.6.3.3.3 [Repairable Damage (Service Limited) Performance Level], all of this Part 2, as well as the equivalent performance of other applicable Permitted ERS Components.
- (c) Project Co shall, for columns other than ductile reinforced concrete columns, submit for acceptance by the Owner's Representative in accordance with the Consent Procedure, the proposed supportive material that will demonstrate seismic performance levels equivalent to the Seismic Performance Level requirements for ductile reinforced concrete columns referred to in Article 5.6.3.3.1(b) of this Part 2.

5.6.3.3.2 Minimal Damage (Immediate Use) Performance Level

- (a) Project Co shall carry out the Design of the components of the Elevated Guideway structure in accordance with the applicable provisions in Article 5.2 [Codes and Standards] and Article 5.3 [Seismic Performance Requirement Level Requirements] of this Part 2:

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- (i) damage to the Elevated Guideway structure, if any, shall be limited to the components of a Permitted ERS, and such damage to a Permitted ERS shall be limited to minor damage capable of inspection and repair without disruption to passenger service of the Millennium Line;
- (ii) where a ductile reinforced concrete column is used as a Permitted ERS, allowable performance shall be as per maximum strains shall be within limits of plastic hinging as defined in MoTI Supplement to CAN/CSA-S6; and
- (iii) for the components of a Potentially Permitted ERS, and subject to acceptance by the Province's Representative, acting reasonably, in accordance with the Consent Procedure, strain limits with equivalent performance levels may be used.

5.6.3.3.3 Repairable Damage (Service Limited) Performance Level

- (a) Project Co shall carry out the Design of the components of the Elevated Guideway structure in accordance with the applicable provisions in Article 5.2 [Codes and Standards] and Article 5.3 [Seismic Performance Requirement Level Requirements] of this Part 2:
 - (i) the structure may experience inelastic behaviour, however primary members shall be repairable in place;
 - (ii) damage to the Elevated Guideway structure shall be limited to the Permitted ERS, which damage shall be limited to repairable damage only;
 - (iii) for a reinforced concrete column Permitted ERS, allowable performance shall be as follows:
 - A. maximum concrete and steel strains shall be within limits of plastic hinging as defined in the MoTI Supplement to CAN/CSA-S6; and
 - B. for confined concrete strain, using the industry accepted Mander's Model for confined concrete or an equivalent method, and moment-curvature analysis, provide confinement to prevent crushing of the confined core concrete; and
 - (iv) for the components of a Potentially Permitted ERS and subject to the acceptance of the Province's Representative, acting reasonably, in accordance with the Consent Procedure, strain limits with equivalent seismic performance levels may be used.

5.6.3.4 Potentially Permitted ERSs and Other Components

5.6.3.4.1 General

- (a) Project Co shall, in the seismic design of the Elevated Guideway, ensure that the Guideway's superstructure, bent caps, column end joints, expansion joints,

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foundations and any base isolation utilized comply with the requirements in applicable provisions of the standards and codes as referenced in Article 5.2 [Codes and Standards] and Seismic Performance Levels set out in Article 5.3 [Seismic Performance Level Requirements] of this Part 2.

- (b) For Elevated Guideway structure components other than Permitted ERSs, Project Co shall undertake a comparable level of design and analysis in applicable provisions of the standards and codes as referenced in Article 5.2 [Codes and Standards] and the requirements outlined for Permitted ERSs in Article 5.6.3.3 [Performance Requirements and Permitted ERSs] of this Part 2, and shall, as part of the applicable submissions for Interim Design and Final Design, satisfy the Province's Representative that the requirements of the equivalent seismic performance levels will be complied with.

5.6.3.4.2 Superstructure

- (a) Project Co shall, in the seismic design of the Elevated Guideway structures, ensure that all superstructure components are treated as Capacity-Protected Components that will remain elastic during an earthquake event at all applicable Earthquake Events Levels and Seismic Performance Levels.

5.6.3.4.3 Bearings and Seat Widths

- (a) Project Co shall, in the seismic design of the Elevated Guideway Structures, ensure compliance with the seismic performance requirements for shear keys, adequate seat width, and other design features in the event of a failure of the bearings.

5.6.3.4.4 Bent Caps

- (a) Project Co shall ensure that bent cap components (which are capacity-protected components) remain elastic at all applicable Earthquake Event Levels and Seismic Performance Levels.

5.6.3.4.5 Fixed Column End Connections

- (a) Project Co shall ensure that fixed column end connections, including bent cap-column joints and column-footing joints (which are capacity-protected components), remain elastic at all applicable Earthquake Event Levels and Seismic Performance Levels.

5.6.3.4.6 Expansion Joints

- (a) Project Co shall, in the seismic design of the Elevated Guideway structures components, account for expansion joints opening and closing during each Earthquake Event Level and shall ensure that, notwithstanding Article 5.3.2 [Required Seismic Performance Levels] of this Part 2, such expansion joints will perform in accordance with the following Seismic Performance Level requirements:

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- (i) with respect to the 100-Year Period Earthquake Event Level, the Minimal Damage Performance Level shall apply, as a results of joint closure will be permitted, as long as service can be maintained;
- (ii) with respect to the 2475-Year Period Earthquake Event Level, the Repairable Performance Level shall apply, and some repairable damage as a result of joint closure impact can be permitted, as long as damage is localized and repairable; and
- (iii) at all Earthquake Event Levels and Seismic Performance Levels, Project Co shall ensure adequacy of joint seat width to prohibit unseating.

5.6.3.4.7 Foundations

- (a) Project Co shall, in the seismic design of the Elevated Guideway structures, ensure that the foundation components, including the footings and pile caps, and the fixed column connection to footings and pile caps, are Capacity-Protected Components which shall remain elastic during an earthquake event at all Earthquake Event Levels.
- (b) If minor damage of individual piles is shown to result in compliant performance with the applicable Seismic Performance Level requirements, Project Co may propose the use of such piles as a Potentially Permitted ERS. Unless Project Co receives acceptance, acting reasonably, of such use pursuant to the Consent Procedure, piles shall be considered Capacity-Protected Components requiring elastic response during an earthquake event at applicable Earthquake Event Levels.
- (c) The seismic design and performance of all piles, whether a Permitted ERS or a Capacity-Protected Component, shall comply with the following:
 - (i) the seismic design of the pile foundations shall address the effects of inertial loading from the Structure and the loading from ground displacements due to seismic shaking; and
 - (ii) settlement that results from liquefaction of soils shall be identified and accounted for in the seismic design of the piles.
- (d) In addition to the requirements set out in Article 5.6.3.4.7(c) of this Part 2, and unless piles have been accepted as a Potentially Permitted ERS in respect of an Elevated Guideway structure, Project Co shall design all piles as Capacity-Protected Components with demand loads in accordance with the BC Supplement to CAN/CSA-S6.

5.7 Underground Structures

5.7.1 General Requirements

- (a) Project Co shall carry out the Design of the Underground Structures in compliance with the seismic requirements of this Article 5 [Seismic], including the following:
 - (i) the applicable provisions of the standards and codes as referenced in Article 5.2 [Codes and Standards] of this Part 2;
 - (ii) the Seismic Performance Level requirements as set out in Article 5.3 [Seismic Performance Level Requirements] of this Part 2; and
 - (iii) seismic inputs as set out in Article 5.4 [Seismic Inputs and Geotechnical Analysis Requirements] of this Part 2.

- (b) Following confirmation of acceptance of the SDSM in respect of a Structure by the Province's Representative, and in advance of commencing any construction activities in respect of such Structure, Project Co shall submit complete seismic Interim Design submissions for the Structure in accordance with Article 2 [Design and Construction Certification Procedures], Part 3 of Schedule 4, which submissions shall demonstrate compliance of the seismic design with the approved SDSM for the applicable Structure and shall include:
 - (i) the design plans and specifications as required by this Agreement;
 - (ii) supporting engineering documents for:
 - A. the Structure itself, and properties to be used in the analyses;
 - B. geotechnical parameters;
 - C. ground motions and global seismic demands;
 - D. soil-structure interaction analyses consistent with the SDSM;
 - E. the design strength and ductility of the structure's components;
 - F. the demand-capacity comparisons;
 - G. the conformance checks with the seismic performance requirements set out in the SDSM and this Article 5 [Seismic]; and
 - H. Project Co's response to any comments made by the Province's Representative in respect of the SDSM.

5.7.2 Design Procedure

5.7.2.1 General Design Procedure

- (a) In carrying out the seismic design of the Structure, Project Co shall carry out the following procedural steps:
 - (i) the seismic input step, which consists of preparing the ground motions and response spectrum for each of the Earthquake Event

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- Levels applicable to the Structure segment location as determined in accordance with Article 5.3.2(c) [Seismic Performance Level Requirements] of this Part 2;
- (ii) the SDSM step, which consists of developing a SDSM for each Structure in accordance with Article 5.5 [Seismic Design Strategy Memorandum] of this Part 2 and identifies the ERS in respect of such Structure;
 - (iii) the analytical step, which consists of carrying out the component capacity analyses based on representative analytical modeling and performance representation; and
 - (iv) the seismic demand analysis procedure step, which shall be based on representative analytical idealization of the structure stiffness and mass distribution, using applicable analysis methods suited for the type of structure. Non-linear dynamic analysis, finite element/difference analysis, local inelastic pushover analysis of structural systems, as applicable, shall be carried out by Project Co, subject to review and acceptance of the proposed analysis method by the Province's Representative as part of the applicable SDSM.
- (b) The results of the analyses undertaken by Project Co pursuant to Articles 5.7.2.1(a)(i) through (iv) of this Part 2, as applicable, shall be included as part of the Interim Design submissions and the Final Design submissions in respect of the applicable Structure.
 - (c) The analysis methods used by Project Co shall be appropriate for the type, regularity, depth, surrounding ground, and complexity of the applicable Structure, and are subject to acceptance by the Province's Representative as part of the applicable SDSM.
 - (d) The inelastic component behavior of the ERS shall be determined by Project Co via non-linear analyses, or equivalent step-by-step linearized push-over analyses with inelastic component response representation, such as plastic hinging, or other nonlinearities as permitted and present. Representative analytical modeling features shall include the expected steel and material properties.
 - (e) Depending on the seismic design strategy selected by Project Co, and subject to displacement demands for each Earthquake Event Level, Project Co shall conduct the analysis of the Structure in order to:
 - (i) assess the response of the ERS;
 - (ii) account for soil-structure interaction effects;
 - (iii) establish strain demands for each component of the structural system;
 - (iv) demonstrate compliance with the specified seismic performance requirements set out in Article 5.3.2(c) [Seismic Performance Level Requirements] of this Part 2; and

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- (v) demonstrate seismic demand on all capacity-protected components are within range of their elastic strength.

5.7.2.2 Tunnel

- (a) Project Co shall carry out the Design of the Tunnel based on the ground deformation approach, as described in Section 10.8 of AASHTO LRFD Road Tunnel Design and Construction Guide Specifications.
- (b) Project Co shall carry out the Design of the Tunnel to withstand the ovaling/racking, axial and curvature deformations and differential deformations imposed by the ground and all seismic loads.
- (c) Project Co shall carry out preliminary analyses for the Design of the Tunnel by ignoring the stiffness of the Tunnel and imposing the computed "free-field" ground deformations on the Tunnel, in accordance with the following:
 - (i) as this simplified procedure is generally applicable for tunnels embedded in geologic materials that are "stiffer" than the Tunnel, Project Co shall confirm the validity of the results by carrying out soil-structure interaction analyses at representative locations that account for the actual soil-structure system in place in accordance with Article 5.4.3 [Soil-Structure Interaction Analysis Requirements] of this Part 2;
 - (ii) in cases where the Tunnel is embedded in geologic materials that are "softer" than the Tunnel, Project Co shall base the design on soil-structure interaction response analyses in accordance with Article 5.4.3 [Soil-Structure Interaction Analysis Requirements] of this Part 2; and
 - (iii) the free-field ground deformations shall be derived at the elevation of the tunnel section that is of interest. As a minimum, the determination of the free-field ground deformations shall consist of site-specific one-dimensional site response analyses by using:
 - A. appropriate strain dependent shear modulus reduction curves and damping curves assigned to the soil and rock strata at the site; and
 - B. effective shear modulus values determined from measured in-situ shear wave velocities compatible with the level of the shear strain that may develop in the ground at the elevation of the tunnel under the design earthquake shaking.
- (d) For the purposes of Article 5.7.2.2(c) of this Part 2, Project Co shall interpret the terms "stiffer" and "softer" using the principles set out in Wang (1993). (Reference: Wang, J.N., 1993. "Seismic Design of Tunnels: A State-of-the-art Approach". Parsons Brinckerhoff Quade & Douglas, Inc., New York, NY, Monograph 7).

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- (e) For the purposes of Article 5.7.2.2(c) of this Part 2, soil-structure interaction analyses mean the following two general approaches:
 - (i) the first approach is based on closed-form solution that accounts for soil-structure interaction effect. The closed form solution is based on the following assumptions: (1) the tunnel is of completely circular shape (without decks or walls inside) with uniform lining section, (2) surrounding soil is uniform, and (3) there is no interaction effect from adjacent tunnel or other structures; and
 - (ii) the second approach is a numerical modeling approach that uses numerical models of the structures to account for structural properties, varying soil stratigraphy and soil properties, leading to more rigorous solutions for deformations. If the actual soil-structure systems encountered in the field are more complex than the assumed conditions described for the closed-form solution approach (which could lead to unreliable results), then the use of numerical modelling approach shall be adopted by Project Co.
- (f) Soil-structure interaction analyses based on the closed-form solution approach shall take into consideration the following:
 - (i) the strain compatible elastic modulus of the surrounding ground shall be derived using the effective strain-compatible shear modulus obtained from the results of the site-specific response analysis;
 - (ii) the moment of inertia of the concrete lining per unit width shall be determined based on the expected behavior of the selected lining under the combined seismic and static loads, accounting for cracking and joints between segments and between rings as appropriate; and
 - (iii) the cracked section of concrete shall be used for bending stress as appropriate.
- (g) Project Co shall ensure that the seismic design of the Tunnel is in compliance with the requirements of the Seismic Performance Levels applicable to the Earthquake Event Levels, as set out in Article 5.3 [Seismic Performance Level Requirements] of this Part 2.
- (h) Without limiting the generality of Articles 5.7.2.1 [General Design Procedure] of this Part 2, in carrying out the Design of the Tunnel, including those sections constructed using either precast concrete segmental lining or cast-in-place concrete lining, as applicable, Project Co shall, as applicable:
 - (i) include seismic loads due to ovaling deformations and axial and curvature deformations. Seismic ovaling deformation shall be combined with deformations resulting from non-seismic loads;
 - (ii) be responsible for the selection of a minimum of six locations along the Tunnel alignment for carrying out the soil-structure interaction

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- analyses in accordance with Article 5.4.3 [Soil-Structure Interaction Analysis Requirements] of this Part 2 in order to confirm the results of ovaling deformations established from the “free-field” method;
- (iii) design the Tunnel lining so as to withstand the seismic ground strains caused by axial and curvature deformations of the ground. Seismic axial and curvature deformations shall be combined with deformations resulting from non-seismic loads;
 - (iv) evaluate potential stress concentrations at the structural interfaces between the Tunnel and other structures, such as the reinforced concrete box structures, cross passages, and ventilation/access structures; and
 - (v) design watertight flexible joints, as required, to accommodate the differential movements and stress concentration during a seismic event as determined from the seismic soil-structure interaction analyses.
- (i) The evaluation procedure for the longitudinal response (due to axial/curvature deformations) of the Tunnel structures shall be based on the procedures outlined in Section 10.8.3.2 of AASHTO LRFD Road Tunnel Design and Construction Guide Specifications. Three-dimensional site response analyses may be evaluated by uncoupling the longitudinal and transverse seismic response.

5.7.2.3 Reinforced Concrete Box Structures and Transition Box

- (a) Project Co shall carry out the Design of the reinforced concrete box structures and the Transition Box to withstand the racking deformations imposed by the ground due to the vertically propagating shear waves, and all inertia forces due to vertical seismic motions.
- (b) Project Co’s seismic design strategy, as reflected in the applicable SDSM, shall include the following:
 - (i) identifying each of the Earthquake Resisting System (ERS) components and Capacity-Protected Components;
 - (ii) in accordance with the capacity-protected design approach, providing that the strength of all Capacity-Protected Components shall be stronger than the overstrength capacity of any ERSs adjacent to or in the seismic load path of the applicable Capacity-Protected Components;
 - (iii) for seismic design strategies that will include inelastic response of a ERS, setting out the procedures to conduct global time-history and/or local stand-alone push-over analyses of substructure systems, as applicable, to demonstrate performance-based compliance of the ERS components with the Seismic Performance Level requirements

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- specified in Article 5.3 [Seismic Performance Level Requirements] of this Part 2; and
- (iv) providing that all Capacity-Protected Components shall remain elastic during an earthquake event at all applicable Earthquake Event Levels.
- (c) Project Co's seismic design strategy for a ERS in a structure, as reflected in the applicable SDSM, the Interim Design submissions and the Final Design submissions, shall clearly demonstrate:
- (i) the function of the ERS as incorporated in the Design of the Structure in protecting Capacity-Protected Components; and
 - (ii) the compliance of the design of the Structure with the requirements of each of the applicable Seismic Performance Levels.
- (d) In performing the Design of the reinforced concrete box structures and the Transition Box, Project Co shall:
- (i) obtain the seismic loads due to racking deformations and dynamic earth pressures;
 - (ii) account for vertical ground accelerations;
 - (iii) obtain the critical racking deformation demand using both soil-structure interaction analysis;
 - (iv) perform soil-structure interaction analyses in accordance with Article 5.4.3 [Soil-Structure Interaction Analysis Requirements] of this Part 2 for each Station and the Transition Box; and
 - (v) design the inelastic behavior to occur in location which are readily observable and accessible for repair. The box roof slab, box invert slab, and box joints shall be considered capacity protected to perform as essentially elastic during and following the 2475-Year Return Period Earthquake Event Level.
- (e) Without limiting any other applicable provisions of Article 4 [Structures] of this Part 2, structural elements inside the station box structures not considered part of the ERS shall be designed to CSA A23.3 Clause 21.11. Interior columns and longitudinal interior walls shall be designed and detailed to accommodate transverse racking displacements. Interior columns and transverse walls shall also be designed to resist dynamic forces in the longitudinal axis of the station.
- (f) Potential stress concentrations at the following critical locations shall be properly assessed and designed for: (1) abrupt change of stiffness between two adjoining geologic layers, (2) adit/station or tunnel/station interfaces, and (3) shaft/surface building interfaces. Flexible watertight connections shall be used between any two structures with substantially different stiffness/mass.
- (g) Project Co shall, as part of the Design of the Broadway - City Hall Station, include:

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- (i) the interface between the new Broadway – City Hall Millennium Line (BCH-ML) Station and existing Broadway-City Hall Canada Line (BCH-CL) Station and
 - (ii) modifications to the existing structures of BCH-CL Station, within the SDSM, which shall be submitted to the Province’s Representative for review and acceptance in accordance with Article 5.5 [Seismic Design Strategy Memorandum] of this Part 2.
- (h) In accordance with the requirements of Article 4 [Structures] of this Part 2, Project Co shall provide a connection with permissible seismic movements between the new Structures of the BCH-ML Station and the existing structures of BCH-CL Station, such that no seismic loads from the Broadway Subway Project structures will be transferred to the existing Canada Line structures
 - (i) Without limiting any other applicable provisions of Article 4 [Structures] of this Part 2, Project Co shall design the modifications to the existing structures of BCH-CL Station in accordance with the seismic design requirements provided in the Canada Line Design Manual.

5.7.2.4 Retaining Walls and U-Sections

- (a) Project Co shall evaluate retaining walls and U-sections supporting less than 5 m of soil at the soil-wall interface using simplified methods of analyses that consider variations in the dynamic lateral earth pressures with wall movements/rotations as described in CAN/CSA S6 to confirm compliance with the Seismic Performance Level requirements specified in this Article 5 [Seismic]. The seismic inputs provided in Appendix M [Earthquake Acceleration Time History Development, 26 February, 2019] to Schedule 4 for the applicable Earthquake Event Levels, as modified by the site coefficients defined in CAN/CSA S6, applicable for site soil classes, shall be used in the design of such retaining walls.
- (b) Project Co shall evaluate retaining walls and U-sections supporting 5 m or more of soil at the soil-wall interface using soil-structure interaction analysis methods specified in Articles 5.4.3 [Soil-Structure Interaction Analysis Requirements] of this Part 2, this Article 5.7.2.4 [Retaining Walls and U-Sections] and the seismic inputs provided in Appendix M [Earthquake Acceleration Time History Development, 26 February, 2019] to Schedule 4.
- (c) Analyses required of Project Co under this Article 5.7.2.4 [Retaining Wall and U-Sections] shall include the mean input soil shear strength and shear stiffness parameters for geologic materials demonstrated by testing and shall account for the degradation of these parameters due to cyclic loading effects.
- (d) Project Co shall design all deep foundations in accordance with the BC Supplement to CAN/CSA-S6, and include:

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- (i) the effects of inertial loading from the Structure and the loading from ground displacements due to seismic shaking; and
- (ii) settlement that results from liquefaction of soils.

5.7.2.5 Lateral Loading from Existing Buildings

- (a) Where direct interaction between surface buildings and underground structures occurs, the effect of surface buildings on underground structures, expressed in terms of base shear and/or rocking moments, shall be added to the ground deformation effects on underground structures.
- (b) In cases where buildings and underground structures are separated by earth materials, the additional lateral pressure due to the internal forces transmitted from the building through the earth to the underground structures shall be determined and added to the ground deformation effects on the underground structures.
- (c) Project Co shall be responsible for the evaluation of the effect of existing surface buildings on underground structures subject to review and acceptance by the Province's Representative as part of the applicable SDSM.

5.8 Building Structures

5.8.1 General Seismic Design Requirements

- (a) Project Co shall carry out the design of all Building Structures in compliance with the seismic requirements of this Article 5 [Seismic], including the following:
 - (i) the applicable provisions of the standards and codes as referenced in Article 5.2 [Codes and Standards] of this Part 2;
 - (ii) the Seismic Performance Level requirements as set out in Article 5.3 [Seismic Performance Level Requirements] of this Part 2;
 - (iii) the location-specific ground response analysis requirements set out in NBCC;
 - (iv) the 100-Year and 2475-Year Return Period Earthquake Event Level acceleration response spectra as set out in Appendix M [Earthquake Acceleration Time History Development, 26 February, 2019] to Schedule 4; and
 - (v) the dynamic analysis procedures identified in NBCC.
- (b) Project Co shall Design stairs to remain essentially elastic at the 100-Year and 2475-Year Return Period Earthquake Event Level.
- (c) Project Co shall Design stairs to accommodate the Design interstorey drift. Stairs support shall be provided with a proper bearing length and clearance to avoid

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seismic pounding with the supporting structure, if applicable. There shall be no loss of vertical support or inducement of displacement-related compression damage in these components.

5.8.2 Performance Requirements at the 100-Year Earthquake Level

- (a) Project Co shall perform the seismic design of the Building Structures at the 100-Year Return Period Earthquake Event Level to:
 - (i) minimum lateral earthquake force obtained from the NBCC equations with R_d and R_o equal to 1.0 and “Importance Factor” of 1.3;
 - (ii) exhibit essentially elastic behavior; and
 - (iii) limit the interstorey drift ratio not to exceed 0.5%.

5.8.3 Modifications to Existing Buildings

- (a) Where Project Co is required or needs to modify any existing Building Structures (with exception to the existing BCH-CL Station), Project Co shall comply with the requirements set out in Schedule 7 [Lands].
- (b) For any modification to existing Building Structures to be undertaken by Project Co, Project Co shall ensure that that seismic design complies with the requirements set out in the VBBL.
- (c) Modifications to the existing BCH-CL Station shall comply with seismic requirements set out in this Article 5.7.2.3(g), (h) and (i) of Part 2.
- (d) Unless otherwise specifically allowed in the Agreement, Project Co shall allow sufficient seismic separation between the existing Building Structures modification and the Province Infrastructure to ensure that the structures behave independently from each other under a Seismic event.

5.9 Elevated Guideway Tie-in with the Existing Millennium Line

- (a) Project Co shall carry out the Design of the Elevated Guideway tie-in with the existing Millennium Line tail track near VCC Clark Station in accordance with the requirements set out Article 5.3 [Seismic Performance Level Requirements] of this Part 2 and 5.4.2(a) of this Part 2. The Design of the tie-in shall include any modifications, as required, to the existing structure as well as the existing substructure supporting the new Elevated Guideway.
- (b) The existing Elevated Guideway structures with increased seismic demands may require retrofit or replacement by Project Co.

5.10 Other Structures

- (a) For any structures not specifically addressed in this Article 5 [Seismic], Project Co shall undertake a comparable level of Design and analysis as is outlined for the Guideway in Article 5.6 [Elevated Guideway] of this Part 2 and shall satisfy the Province's Representative that the requirements of the equivalent seismic performance levels will be complied with.

5.11 Operational and Functional Components

5.11.1 General Seismic Design Requirements

- (a) Project Co shall carry out the seismic design of OFCs including their support, fixation, and attachment in compliance with the seismic requirements of this Article 5 [Seismic], including the following:
 - (i) NBCC;
 - (ii) CSA S832;
 - (iii) the Seismic Performance Level requirements as set out in Article 5.3 [Seismic Performance Level Requirements] of this Part 2;
 - (iv) the location-specific ground response analysis requirements set out in NBCC; and
 - (v) the 100-Year and 2475-Year Return Period Earthquake Event Level acceleration response spectra as set out in Appendix M [Earthquake Acceleration Time History Development, 26 February, 2019] to Schedule 4.

Project Co will be responsible for preparing and submitting a list of those OFCs considered essential to providing emergency operation of the system during and immediately following an earthquake to the Province's Representative in accordance with the Consent Procedure for acceptance by the Province's Representative acting reasonably.

- (b) Project Co shall use an "Importance Factor" (as that term is defined in the NBCC) of 1.5 to calculate the Design demands, forces and displacements of the OFCs to be defined by Project Co in accordance with the requirements of this Article 5.11 [Operational and Functional Components] including its supports, fixations and attachments as to be applied to the seismic performance levels set out in Article 5.3.2(e) of this Part 2.
- (c) Project Co shall for the 100-Year Return Period Earthquake Event Level use element or component response modification factor (R_p) equal to 1 in the lateral force equation (V_p) set out in NBCC.

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Article 6. Geotechnical

6.1 General

6.1.1 Scope

- (a) This Article 6 [Geotechnical] specifies the geotechnical requirements and criteria for the Project Work.
- (b) Without limiting any other provision of this Agreement, Project Co shall carry out all geotechnical investigations, exploration, analyses, testing, monitoring and interpretation necessary to perform the Project Work in accordance with this Agreement.

6.1.2 Codes and Standards

- (a) Project Co shall ensure that the geotechnical aspects of the Design and Construction of the Broadway Subway Project and all other aspects of the Project Work comprising or connected with the geotechnical aspects of the Design and Construction are carried out in accordance with, as applicable, the following codes and standards and the requirements set out in this Article 6 [Geotechnical]. Project Co shall apply the following codes and standards in descending order of precedence, and any additional codes and standards determined necessary by Project Co:
 - (i) BC Supplement to CAN/CSA-S6;
 - (ii) CAN/CSA-S6;
 - (iii) Ministry of Transportation & Highways Technical Bulletin GM9801, "Guidelines for Geotechnical Reports", March 30, 1998;
 - (iv) AASHTO Standard Specifications;
 - (v) FHWA Guidelines - NH1-00-043: "Mechanically Stabilized Earth Walls and Construction Guidelines", Section 5.3, (2001);
 - (vi) Canadian Foundation Engineering Manual;
 - (vii) Recognized Products List;
 - (viii) Recommendations for Prestressed Rock and Soil Anchors, Post-Tensioning Institute;
 - (ix) BC Ministry of Transportation and Infrastructure's "Manual of Control of Erosion and Shallow Slope Movement";

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- (x) CAN/ULC-S102.2-10; and
- (xi) ASTM standards as appropriate.

6.2 Geotechnical Manager

6.2.1 Qualifications

- (a) Project Co shall, at all times, retain a competent and qualified person to act as the geotechnical manager in connection with this Agreement (the “**Geotechnical Manager**”), which person shall be a Professional Engineer and shall have, at a minimum, the following qualifications:
 - (i) a post-graduate degree in geotechnical engineering, soil mechanics or rock mechanics;
 - (ii) a minimum of 15 years of supervisory experience in geotechnical design and construction relating to support of tunnels, roadways, bridges, retaining walls and other related elements;
 - (iii) geotechnical design and construction experience on major projects that are comparable in scope, complexity and nature to the Project;
 - (iv) experience in establishing geotechnical design parameters and in interpreting and applying geotechnical baseline reports and geotechnical data reports; and
 - (v) experience in developing and implementing geotechnical instrumentation and monitoring programs.

6.3 Subsurface Investigation Plan

6.3.1 Subsurface Investigation Plan - Content

- (a) Subject to Article 6.3.2(a) [Subsurface Investigation Plan - Review Procedure] of this Part 2, Project Co shall develop, implement, maintain and, as in situ conditions require, update a subsurface investigation plan (the “**Subsurface Investigation Plan**” or the “**SIP**”) that demonstrates the methods, measures and processes that Project Co will implement, as Project Co deems necessary to meet the requirements of the Project as set out in this Agreement, to supplement the geotechnical reports provided by the Province as part of the Disclosed Data in order to better understand and define the subsurface conditions to be taken into account in the Design and the Construction of the Broadway Subway Project. The SIP shall be signed and sealed by the Geotechnical Manager and, at a minimum, shall include the following information:

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- (i) the specific test hole locations;
- (ii) the frequency and type of sampling;
- (iii) the type and location of laboratory and/or field testing;
- (iv) the schedule for implementation of the SIP (the “**SIP Schedule**”);
- (v) the locations, procedures and processes to implement the investigations;
- (vi) the methods, policies and procedures to be implemented to ensure that all investigations and related activities:
 - A. will be conducted in accordance with all applicable Permits, agreements, plans and Laws;
 - B. will be completed in accordance with the SIP Schedule; and
 - C. otherwise will be conducted and completed in accordance with the terms of this Agreement.

6.3.2 Subsurface Investigation Plan - Review Procedure

- (a) Project Co shall not commence any investigations, earthworks or excavations unless and until the SIP has been submitted to the Province’s Representative for review in accordance with the Review Procedure.
- (b) If any updates are made to the SIP, Project Co will submit such updates to the Province’s Representative for review in accordance with the Review Procedure.

6.3.3 Subsurface Investigation Plan - Implementation

- (a) Project Co shall ensure that it is able to undertake the investigations set out in the SIP during Construction.
- (b) Project Co shall, in implementing the SIP and subject to Article 6.3.3(c) of this Part 2:
 - (i) survey the location of each test hole, geophysical survey line and any other investigation element, which survey shall determine station and offset, elevation, and coordinates, all of which shall be included on the test hole records; and
 - (ii) retain all samples:
 - A. resulting from the drilling of the test holes; or
 - B. examined as part of the laboratory and/or field testing work.

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- (c) Project Co shall retain all surveys prepared and samples taken during the implementation of the SIP until the Total Completion Date and shall, upon request made by the Province prior to Total Completion, deliver to the Province all surveys and samples taken during the implementation of the SIP.
- (d) Project Co shall backfill all borings, test pits, roto sonic holes, probe holes, cone penetration tests and any other test holes in a manner that prevents:
 - (i) any subsequent settlement of the backfill;
 - (ii) any leakage of water under artesian pressure; and
 - (iii) the creation of hazards to persons, animals, or equipment.
- (e) Project Co shall ensure that all monitoring wells and test holes, including those drilled/installed in previous investigations documented in the project Geotechnical Data Report as well as any monitoring wells and test holes drilled by Project Co, are abandoned in accordance with all applicable Laws.
- (f) Project Co shall restore all finished and landscaped surfaces that are disturbed in connection with the implementation of the SIP in accordance with the applicable Conditions of Access and Article 4 [Existing Conditions], Part 1 of Schedule 4.
- (g) Project Co shall remove all surplus material, temporary structures and debris resulting from the Project Work upon completion of all field investigations.

6.4 Foundations

- (a) Project Co shall carry out the Design and the Construction of the excavations, site grading and foundations for the Guideway and the Stations in accordance with the requirements and criteria set out in this Article 6.4 [Guideway and Stations Foundations] and so as to ensure that:
 - (i) the total and differential settlements of the Guideway and Station are compatible with the function and performance requirements of the Broadway Subway Project over the design life of each of the components of the Guideway and Stations as set out in this Agreement; and
 - (ii) the Guideway and Stations do not adversely impact any Existing Conditions.
- (b) Project Co shall demonstrate, through comprehensive geotechnical and structural analyses and designs forming part of its submissions for review under Part 3 [Certification and Completion] of Schedule 4, that the stringent tolerances set out for the track and the Alignment in this Schedule 4 will continue to be met over the design life of each of the components of the Broadway Subway Project.

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- (c) Project Co shall carry out:
 - (i) sufficiently detailed field and laboratory investigations to characterize the subsurface variations; and
 - (ii) analyses and modeling of deformations under static, live and seismic loading conditions anticipated over the design life of each of the components of the Broadway Subway Project.
- (d) For greater certainty, the results of the analyses required by Articles 6.4(b) and 6.4(c), both of this Part 2, in no way limit Project Co's obligations under this Agreement and Project Co shall remain responsible for satisfying the overall performance objectives of the Broadway Subway Project over the design life of each of its components, as set out in this Agreement.
- (e) Foundations supporting the Great Northern Way Station and the Guideway to the east of this Station, shall extend into bedrock such that the loads on the structures are transferred into the underlying bedrock.
- (f) The seismic requirements and criteria for foundations are set out in Article 5 [Seismic] of this Part 2.

6.5 Slope Stability

- (a) Project Co shall:
 - (i) ensure that the factor of safety for the slope stability analysis of any new or existing (whether modified or not by Project Co as part of the Project Work) cut and fill slopes located within the Permanent Project Lands and Zone of Influence, including such slopes that may be impacted by the Project Work, is not less than 1.5 under static loading conditions;
 - (ii) investigate all existing cut and fill slopes that may be impacted by, or may impact, the Project Work to determine whether each existing slope meets the functional and performance requirements of this Article 6 [Geotechnical];
 - (iii) with respect to the slopes investigated under Article 6.5(a)(ii) of this Part 2, carry out all work necessary to bring such cut and fill slopes that may be impacted by or may impact the Project Work into compliance with this Article 6 [Geotechnical]; and
 - (iv) provide all new and existing cut and fill slopes that may be impacted by or may impact the Project Work with protection against erosion and shallow slope movement in accordance with the Manual of Control of Erosion and Shallow Slope Movement.

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- (b) The seismic requirements and criteria for cut and fill slopes are set out in Article 5 [Seismic] of this Part 2.

6.6 Retaining Walls

- (a) Project Co shall design all retaining walls in accordance with the requirements and criteria set out in this Article 6.6 [Retaining Walls].
- (b) Project Co shall use the retaining wall systems and abutment wall types identified in the Recognized Products List, except the following:
 - (i) mechanically-stabilized earth (“MSE”) walls with dry cast concrete block facings;
 - (ii) metal bin walls;
 - (iii) steel sheet pile walls in areas that are visible to the public; and
 - (iv) walls with wire facings, where visible to the public and/or subject to spray or surface runoff containing de-icing chemicals.
- (c) Notwithstanding any other provision of this Agreement, Project Co shall not use:
 - (i) MSE walls with extensible reinforcement as abutment walls or wing walls; or
 - (ii) geotextiles as soil reinforcement.
- (d) Project Co shall apply the requirements of the FHWA Guidelines – NH1-00-043 for MSE walls if the requirements of the AASHTO Standard Specifications do not apply.
- (e) Project Co shall use:
 - (i) precast concrete facing panels for all MSE abutment walls and MSE wing walls; and
 - (ii) a precast concrete coping along the top of such walls.
- (f) Project Co shall ensure that the minimum soil reinforcement length for walls influenced by abutment footings is the greater of:
 - (i) 70% of the distance from the top of the leveling pad to the surface of the road or the Guideway; and
 - (ii) the minimum length required by the AASHTO Standard Specifications.

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- (g) For the purposes of this Article 6.6 [Retaining Walls], any reinforcing strip within a 1:1 slope of an abutment footing or a pile cap shall be considered as being influenced by the footing.
- (h) Project Co shall, for all walls described in this Article 6.6 [Retaining Walls] provide sufficient drainage for all walls such that the walls meet the design requirements of this Agreement.

6.7 Lightweight Fills

- (a) Project Co shall ensure that all lightweight fills used in the Construction of the Project comply with this Article 6.7 [Lightweight Fills].
- (b) Project Co shall ensure that the proper function of all lightweight fills is preserved and maintained throughout the 100 year design life of the structural components of the Broadway Subway Project (refer to Schedule 4, Part 2, Article 4 [Structures] of this Part 2) and that such fills are protected against:
 - (i) applied loads;
 - (ii) ground water;
 - (iii) road salts;
 - (iv) weather and fire;
 - (v) flotation under flood conditions; and
 - (vi) fuel spills.
- (c) Project Co shall ensure that, where walls are used to contain flammable lightweight fills, the walls have a 2-hour fire rating.
- (d) Project Co shall ensure that the foundation system and landscaping do not compromise any protective covers used to protect the lightweight fills. Adequate thickness of cover shall be provided over the lightweight fills, which shall be no less than 1.2 m in thickness.
- (e) Project Co shall base the design, selection and placement of lightweight fills on flotation forces corresponding to the inundation of the lightweight fill to the 200-year flood level, regardless of the flood protection for the area in which the lightweight fills are to be used.
- (f) Project Co shall not use any of the following as lightweight fills:
 - (i) shredded rubber tires; or

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- (ii) hog fuel or woodwaste.
- (g) Project Co shall, wherever EPS lightweight fills are used, ensure that the EPS:
 - (i) is supplied in the form of blocks;
 - (ii) is classified as to surface-burning characteristics in accordance with CAN/ULC-S102.2-10, having a flame spread rating not greater than 500;
 - (iii) has a minimum compressive strength, measured in accordance with ASTM D1621, of 125 kPa at a strain of not more than 5%;
 - (iv) has a density of not less than 22 kg/m³; and
 - (v) blocks are fully wrapped with minimum 10-mil thickness black polyethylene sheeting, with sheeting joints overlapped by a minimum of 0.5m.

6.8 Not Used

6.9 Geotechnical Reports

6.9.1 General

- (a) Project Co shall prepare all geotechnical reports as necessary to meet the requirements of the Project as set out in this Agreement, including documentation from, and consistent with, the findings of the activities of this Article 6 [Geotechnical] and the other Articles of this Agreement, which geotechnical reports shall include, at a minimum, the following:
 - (i) a summary of the results of the field testing;
 - (ii) all instrumentation data;
 - (iii) all laboratory investigation programs;
 - (iv) all engineering studies;
 - (v) all engineering parameters; and
 - (vi) all geotechnical design analyses and recommendations, including those provided in technical memoranda.
- (b) Project Co shall follow Ministry of Transportation Technical Bulletin GM9801, "Guidelines for Geotechnical Reports", March 30, 1998 for the general format of all geotechnical reports and shall ensure that such reports include the information listed in this Article 6.9 [Geotechnical Reports], as applicable.

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- (c) All geotechnical reports and plans prepared by Project Co in accordance with this Agreement, shall be signed and sealed by the Geotechnical Manager.
- (d) Except as provided in Articles 6.9.2 [Geotechnical Investigation Report(s)] and 6.9.3 [Geotechnical Design Report(s)], both of this Part 2, with respect to Geotechnical Investigation Report(s) and Geotechnical Design Report(s), respectively, Project Co shall submit geotechnical reports to the Province's Representative for review in accordance with the Review Procedure no later than two months following completion of the Project Work that such report(s) document.
- (e) Project Co shall, for record purposes, also provide to the Province's Representative an electronic copy of all geotechnical reports without password protection.

6.9.2 Geotechnical Investigation Report(s)

- (a) Project Co shall, within one month of completion of field and laboratory testing with respect to the site investigation for any design segment of the Project Work, submit report(s) ("**Geotechnical Investigation Report(s)**") in accordance with the Review Procedure, for review by the Province's Representative setting out the documentation from, and consistent with, the findings of the investigation activities carried out by Project Co in accordance with this Article 6 [Geotechnical], which report(s) shall include, at a minimum:
 - (i) an executive summary;
 - (ii) a description of purpose and scope of report;
 - (iii) a description of methodology and equipment used;
 - (iv) all results and factual data collected;
 - (v) a description of site conditions, geology, inferred subsurface stratigraphy and groundwater levels;
 - (vi) plans, sections and profiles showing surveyed test locations and inferred stratigraphy; and
 - (vii) a summary of engineering properties of strata.

6.9.3 Geotechnical Design Report(s)

- (a) Project Co shall prepare geotechnical design report(s) in support of the design for the Broadway Subway Project ("**Geotechnical Design Report(s)**") in accordance with this Article 6.9 [Geotechnical Reports].

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- (b) Project Co shall, at all Interim Design completion stages, submit Geotechnical Design Report(s), which report(s) shall include, at a minimum:
 - (i) an executive summary;
 - (ii) a description of the purpose and the scope of the report;
 - (iii) an outline of design codes, criteria, parameters and philosophies applied in the report;
 - (iv) interpretation of inferred subsurface conditions and geotechnical design parameters at each major component of the Project Work;
 - (v) methodologies, references and descriptions of all computer models used;
 - (vi) discussion of the geotechnical design and construction issues, and the geotechnical approach to developing the Project Site and the facilities to meet performance requirements;
 - (vii) results of all geotechnical analysis and recommendations in support of the design and the construction. At a minimum, Project Co shall address the following:
 - A. the Project Site preparation and proposed treatment to achieve design grades and total and differential settlement tolerances within the Project Work;
 - B. the recommended geotechnical instrumentation program, including instrumentation details and monitoring frequency so as to confirm performance of the design and the Project Work during Construction and the General Project Work Defect Warranty Period, and, once operational, during the design life of each of the components of the Broadway Subway Project;
 - C. the seismic performance and design recommendations, addressing seismic site response to input ground motions, liquefaction potential, lateral spreading/displacements, soil-structure interaction, and lateral earth pressures;
 - D. the foundation design for each component to be constructed by Project Co, including:
 - (1) vertical and lateral load capacity;
 - (2) bearing capacity of shallow and deep foundations;
 - (3) settlement predictions both during the General Project Work Defect Warranty Period and through the design life of the applicable facility;

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- (4) consideration of differential settlement within and along Structures and the Guideway, and between piled and grade-supported facilities; and
 - (5) recommendations for mitigative measures, where required, to ensure satisfactory performance throughout the design life of the applicable facility;
 - E. the recommendations for quality management testing of all geotechnical aspects of the Project Work, such as static and dynamic pile testing, and for quality management testing of any other ground support or improvement systems;
 - F. the geotechnical design of embankments and retaining structures, including stability, bearing capacity, settlements during construction, and, during the design life of each of the components of the Broadway Subway Project, consideration of long-term settlements and methods to mitigate any such settlements;
 - G. the subsurface and site drainage requirements;
 - H. the Design and installation of any underground facilities;
 - I. the recommendations for all fill material specifications and placement; and
 - J. the recommendations on all geotechnical aspects of the construction, including temporary excavation and shoring design, staged excavation and fill placement, and dewatering;
 - (viii) recommendations for any additional geotechnical investigation, testing, or analysis required to address any insufficiency in the information and data regarding the Project Site available to Project Co; and
 - (ix) drawings showing the proposed geotechnical designs.
- (c) Project Co shall, as part of each of the Final Design submissions stage and of the Records Documentation, submit a neat, bound, indexed set of design calculations, along with electronic copies on CD of software model data files, for any geotechnical design work completed for the Project Work. All calculations shall be initialed by both the Designer and the Designer's checker.
- (d) Project Co shall update the Geotechnical Design Report(s) prepared at all Interim Design completion stages and shall submit the updated Geotechnical Design Report(s) with the Final Design submissions to be submitted in accordance with Article [Design and Construction Certification Procedures], Part 3 of Schedule 4.

6.10 Instrumentation and Monitoring

6.10.1 Scope

- (a) Monitoring of the geotechnical and hydrogeological aspects of the Project Work is required in order to:
 - (i) verify Project Co's compliance with the requirements of this Agreement, including the Project Schedule;
 - (ii) verify the parameters, assumptions and analyses developed and used by Project Co in:
 - A. the Design and Construction of the Broadway Subway Project; and
 - B. the ground improvements as described by Project Co in the Construction Risk and Impact Assessment Report prepared in accordance with Article 4 [Existing Conditions], Part 1 of Schedule 4, and the Ground Improvement Plan;
 - (iii) permit Project Co to control the Construction of the Broadway Subway Project;
 - (iv) detect evidence of any impending failures of any aspects of the Broadway Subway Project;
 - (v) measure the impact, if any, of the Broadway Subway Project, once operational, on Existing Conditions within the Zone of Influence;
 - (vi) provide evidence to assist with the handling of construction-related damage claims made by third parties; and
 - (vii) measure and identify the causes and distribution of ground movement and deformations with respect to the Guideway and the Stations so as to ensure the performance of the Broadway Subway in accordance with this Agreement.
- (b) To achieve the objectives set out in Article 6.10.1(a) of this Part 2, Project Co shall, in accordance with this Article 6.10 [Instrumentation and Monitoring]:
 - (i) develop a plan for the installation and monitoring of geotechnical and hydrogeological instrumentation described in Article 6.10.7 [Instrumentation & Monitoring Plan] of this Part 2;
 - (ii) procure and install the geotechnical and hydrogeological instrumentation in accordance with the Instrumentation & Monitoring Plan;

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- (iii) until the Total Completion Date, monitor the instrumentation, collect data from the instrumentation and report on the collected data to the Province's Representative in accordance with the Instrumentation & Monitoring Plan; and
- (iv) in accordance with the Instrumentation & Monitoring Plan and as of the Total Completion Date, transfer to the Province or its designate the geotechnical and hydrogeological instrumentation required to monitor the ongoing performance of the Guideway and the Stations, and the responsibility for the monitoring, data collection and reporting associated with such instrumentation.

6.10.2 Monitoring of Existing Conditions

- (a) Without limiting the generality of Article 6.10.1 [Scope] of this Part 2, Project Co shall undertake the following in respect of Existing Conditions within the Zone of Influence:
 - (i) prior to starting the construction, install instrumentation to monitor and record the effects of each of the design and construction of the Broadway Subway, the use of Broadway Subway, once operational, on such Existing Conditions; and
 - (ii) conduct monitoring of such instrumentation until the Total Completion Date, with monitoring sufficient and frequent enough to facilitate management and control of the Project Work such that the continued safe use and operation of such Existing Conditions is ensured.
- (b) In addition to any other requirements in the Project Agreement, where there are Laws, standards or procedures relating to use and operation of any Existing Facilities within the Zone of Influence, such as those operated by the City of Vancouver, Public Utilities, Regulated Utilities, or BNSF, Project Co shall:
 - (i) undertake sufficient monitoring to address the facility owner's responsibilities in relation to such Laws, standards or procedures; and
 - (ii) communicate the results of all monitoring to each applicable facility owner and the Province's Representative within the timelines established by the Province or, if the owner is the City of Vancouver, a Public Utility, a Regulated Utility or BNSF, then within the timeline established by the City of Vancouver, Public Utility, Regulated Utility or BNSF.

6.10.3 Monitoring of Ground Movement and Deformations

- (a) Without limiting the generality of Article 6.10.1 [Scope] of this Part 2, Project Co shall, at a minimum, carry out monitoring of ground deformations within the Zone of Influence; and

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- (b) Project Co is responsible to specify minimum number and locations of monitoring, and the frequency of monitoring for the Existing Conditions within the Zone of Influence to adequately monitor potential ground movement and deformation, groundwater effects, vibration, and other considerations resulting from construction activities, and to be responsive in implementing actions to prevent and mitigate damage to Existing Conditions in the execution of the Work. The Province may request additional locations and frequencies of monitoring, as may be reasonably required to be responsive in implementing actions to prevent and mitigate damage to Existing Conditions in the execution of the Work.

6.10.4 Monitoring of Ground Improvements and Other Geotechnical Aspects of the Project Work

Without limiting the generality of Article 6.10.1 [Scope] of this Part 2, in the areas of the Project Site where Project Co will be undertaking or constructing ground improvements (which, for the purposes of this Article 6.10 [Instrumentation and Monitoring], includes foundations, cuts, fills, dewatering or retaining walls), Project Co shall install and monitor until the Total Completion Date, geotechnical and hydrogeological instrumentation so as to:

- (a) measure the impact of the Project Work on the improvements and the impact of such improvements on Existing Facilities within the Zone of Influence; and
- (b) provide assurance to the Province regarding the performance of the Broadway Subway Project in accordance with this Agreement, including this Schedule 4.

6.10.5 Monitoring of Guideway Deformations

- (a) Without limiting the generality of Article 6.10.1 [Scope] of this Part 2, Project Co shall develop and implement an instrumentation plan, which shall comply with the requirements of Article 6.10.7 [Instrumentation & Monitoring Plan] of this Part 2, that will accurately monitor the Guideway deformations so as to ensure that such deformations do not, during the design life of each of the applicable components, exceed the deformation tolerances of each of the Guideway and the Stations permitted by this Agreement.
- (b) Without limiting the generality of Articles 6.10.1 [Scope] and 6.10.5(a), both of this Part 2, Project Co shall carry out monitoring so as ensure that ground movements and deformations of the Guideway are consistent with the requirements of this Schedule 4, as well as any analyses carried out by Project Co with respect to such movements and deformations.
- (c) Project Co shall, upon completion of each of the following:

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- (i) the erection of each Guideway span; and
 - (ii) each concrete pour for any at-grade slab or U-Section of the Guideway, establish accessible survey monitoring hubs to facilitate the monitoring of Guideway deformations so as to ensure that such deformations do not, during the design life of each of the applicable components, exceed the deformation tolerances of the Guideway permitted by this Agreement.
- (d) Project Co shall ensure that the accessible survey monitoring hubs described at Article 6.10.5(c) of this Part 2 are located, at a minimum:
- (i) at each pier and at the midway point between any two piers; and
 - (ii) at 20 m intervals where the track is not elevated or is not in the Tunnel.

6.10.6 Submittals Regarding Instrumentation and Monitoring

- (a) Project Co shall submit the following under the Review Procedure to the Province's Representative:
- (i) the Instrumentation & Monitoring Plan, such plan to be submitted at least three months prior to commencing any construction that the instrumentation is intended to monitor;
 - (ii) for review in accordance with Article 6.10.9(b) [Quality Management of Instrumentation and Monitoring] of this Part 2, the qualifications of all Instrumentation Specialist(s) within 45 days of the Effective Date;
 - (iii) Instrumentation & Monitoring Report(s) as described in Article 6.10.8(a) [Instrumentation & Monitoring Reporting] of this Part 2;
 - (iv) the test hole log for any instrumentation installed in test holes, which log must be submitted before monitoring of such instrumentation begins but no later than 10 Business Days after the completion of installation of the applicable instrumentation. Project Co will detail this requirement in the Instrumentation & Monitoring Report;
 - (v) the location data of each instrument, which data must be submitted before monitoring of such instrumentation begins but no later than 10 Business Days after the completion of the installation of each instrument. Project Co will detail this requirement in the Instrumentation & Monitoring Report;
 - (vi) except where provided otherwise in this Article 6.10 [Instrumentation and Monitoring], all monitoring data within 48 hours of being acquired in electronic format. Project Co will detail this requirement in the Instrumentation & Monitoring Plan.

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- (vii) in accordance with Schedule 6 [Quality Management] and this Article 6.10 [Instrumentation and Monitoring], quality management procedures with respect to the geotechnical and hydrogeological instrumentation and monitoring; and
- (viii) decommissioning records, including test hole abandonment logs, waste disposal certificates, and other completed forms and documents, within 10 Business Days after completion of any work to decommission instrumentation and test holes.

6.10.7 Instrumentation & Monitoring Plan

- (a) Project Co shall develop, implement, maintain and update, as in situ conditions require, an instrumentation and monitoring plan (the “**Instrumentation & Monitoring Plan**”) that:
 - (i) is based on the requirements of this Article 6.10 [Instrumentation and Monitoring] and the geotechnical instrumentation program set out in the Construction Risk and Impact Assessment Report;
 - (ii) demonstrates the methods, measures and processes that Project Co will implement in order to fulfill the objectives set out at Article 6.10.1 [Scope] of this Part 2, including identifying which instrumentation will remain operational following the Total Completion Date and which instrumentation is to be decommissioned at or prior to the Total Completion Date;
 - (iii) for each instrument installed by Project Co to monitor Existing Facilities pursuant to Article 4.2.2(b)(vii) [Construction Risk and Impact Assessment Report], Part 1 of Schedule 4, define Action Levels and the specific actions that are to be taken at each Action Level. Project Co shall include notifications to the Province for each of the Action Levels in the plan;
 - (iv) identifies the proposed frequency of monitoring and reporting as developed by Project Co:
 - A. in accordance with the overall requirements of this Article 6 [Geotechnical]; and
 - B. such that timely notice is provided of significant deformations and movements (e.g. the Action Levels being approached for any instrument), as well as instrumentation malfunction or loss;
 - (v) provides details for the automated motorized total stations (AMTS) referenced in Article 4.2.2(c) [Construction Risk and Impact Assessment Report], which shall include the following minimum requirements:

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- A. provide high quality precision optical survey prisms and/or surfaces appropriate for reflectorless monitoring in conjunction with fully AMTS under computer control to provide near real-time, continuous movement monitoring at locations required in the Construction Risk and Impact Assessment Report. The automated system shall provide the means to remotely monitor the three components of movement of precision targets mounted on buildings, other structures, utilities, and other Existing Facilities as appropriate to ± 1 millimetre accuracy;
- B. where optical survey prisms are used the AMTS shall be fixed a maximum of 120 m from the furthest installed prism within the line-of-sight, and where reflectorless surfaces are used the AMTS shall be fixed a maximum of 80 m from the furthest desired monitoring point within the line-of-sight;
- C. where AMTS are located within anticipated zones of settlement, stable reference points (optical prisms or reflectorless) beyond the expected settlement zone are to be established as control points;
- D. sufficient collection period of baseline measurements to differentiate changes in monitoring data due to Project Work from natural environmental variations (i.e. seasonal changes in ambient temperature, groundwater levels, and moisture content). A baseline reading of at least a period of 6 month duration before any excavation of Project Work within 50 metres of the instrumentation is required.;
- E. provide the Province with real time remote access to the continuous movement monitoring information, which is continuously uploaded or updated to a centralized location;
- F. the monitoring system shall be linked to an automatic alert system capable of disseminating immediate email/text message alerts when predefined threshold limits are exceeded;
- G. the monitoring system shall provide three-dimensional displacement vectors for all the survey prisms with details of the measurement precision. The system shall be configured to report the monitoring data on project plan layout of the Underground Structures, and other works relative to the Existing Conditions being monitored;
- H. installation shall be under the direction of the automated motorized total station specialist who shall select the locations of the prisms and total stations, based on the requirements in this Agreement; and

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- I. provision of a spare automated motorized total station in the event of a failure, available to be installed within 2 hours; and
- (vi) provides details for the vibration monitoring equipment, such as seismographs, to address the vibration monitoring requirements referenced in Article 4.2.2(c) [Construction Risk and Impact Assessment Report].
- (b) Project Co shall ensure that the frequency of monitoring and reporting developed and proposed in the Instrumentation & Monitoring Report complies with the following minimum requirements:
 - (i) for instrumentation installed to monitor the construction of the Tunnel, monitoring is no less frequent than the following, unless otherwise agreed by the Province:
 - A. one reading per hour where active tunnelling or excavation is within 25 m of the applicable instrument;
 - B. one reading every 4 hours where active tunnelling or excavation is within 50 m of the applicable instrument;
 - C. one reading per day where the Tunnel face is within 100 m of the applicable instrument; and
 - D. one reading per week where the Tunnel face is greater than 100 m from the applicable instrument. Areas that fall outside of this zone behind the Tunnel face shall be read on a weekly basis for a one month, and quarterly for two years after completion of tunneling or until directed to stop by the Province, whichever is earlier.;
 - (ii) the data from the readings required under Article 6.10.7(b)(i) of this Part 2 is provided to the Province's Representative within four hours of the time of measurement; and
 - (iii) where not specifically identified in Article 6.10.7(b)(i) of this Part 2, otherwise in compliance with the requirements of this Article 6 [Geotechnical].
- (c) The Instrumentation & Monitoring Plan shall be sealed by the Instrumentation Specialist(s), and submitted to the Province's Representative for review in accordance with the Review Procedure, and in accordance with Article 6.10.6(a).

6.10.8 Instrumentation & Monitoring Reporting

- (a) By not later than ten Business Days prior to the commencement of construction activities, Project Co shall prepare and submit to the Province's Representative

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for review in accordance with the Review Procedure, report(s) ("**Instrumentation & Monitoring Report(s)**") in order to confirm that Project Co has implemented the Instrumentation & Monitoring Plan and that the objectives set out in Article 6.10.1 [Scope] of this Part 2 are being and will continue to be met. Without limiting the generality of the foregoing sentence, the Instrumentation & Monitoring Report(s) prepared by Project Co, signed and sealed by the Instrumentation Specialist, shall include the following:

- (i) a summary table for all instrument installations by number and location, showing the date and the time of installation;
- (ii) an initial schedule of monitoring readings to obtain baseline readings;
- (iii) for any proposed instrumentation, the instrumentation specifications, including the manufacturer's technical specifications, installation procedures, operating and maintenance manuals and other descriptive literature;
- (iv) for any vibrating wire instruments, test data demonstrating that the sensor has, when thermal effects have been considered, been stable for a period not less than five years under laboratory conditions;
- (v) a description of the materials to be used for grout backfill of test holes;
- (vi) the calibration certificates for each instrument installed;
- (vii) sample reports for each instrument installed; and
- (viii) a description of the baseline reading procedures employed for each instrument.

For the purposes of this Article 6.10.8(a), the 15 Business Day period referred to in Section 2.1(b) of Schedule 2 [Representatives, Review Procedure and Consent Procedure] shall be reduced to 10 Business Days.

- (b) In the event that Project Co replaces, moves or repairs any instrument installed pursuant to this Article 6.10 [Instrumentation and Monitoring], Project Co shall, within 24 hours of any damage to any instrumentation and, further, within five Business Days of any decision to replace, move or repair any instrumentation but prior to undertaking any such replacement, movement or repair, advise the Province's Representative in writing of the following:
 - (i) the type and location of the instrument that has been damaged or is to be replaced, moved or repaired;
 - (ii) the reason why the instrument is being replaced, moved or repaired;
 - (iii) the intended timeline for the replacement, movement or repair of any instrument;

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- (iv) for any replacement of an instrument:
 - A. the type, as-built location, and calibration sheets of the new instrument; and
 - B. the date on which the new instrument became operational;
- (v) for any instrument that is repaired:
 - A. the date on which the instrument is reinstalled and operational; and
 - B. the calibration sheets of the repaired instrument; and
- (vi) for any instrument that is moved:
 - A. the as-built location and calibration sheets of such instrument; and
 - B. the date on which such instrument became operational after being moved.

6.10.9 Quality Management of Instrumentation and Monitoring

- (a) In addition to the requirements set out in Schedule 6 [Quality Management], Project Co shall comply with the quality management requirements of this Article 6.10 [Instrumentation and Monitoring].
- (b) Project Co shall retain instrumentation specialists (each an “**Instrumentation Specialist**”) each of whom must be a person who is registered as a Professional Engineer or geoscientist with EGBC and who must have a minimum of five years’ experience designing, installing, and monitoring instrumentation systems similar to those required for the Project. Each Instrumentation Specialist may be an independent individual or employee of an engineering firm, testing laboratory, or similar organization, but shall not be an employee of Project Co. Project Co shall demonstrate each proposed Instrumentation Specialist’s experience by way of resume and references.
- (c) Project Co shall perform all instrumentation activities described in this Article 6.10 [Instrumentation and Monitoring], including procurement, installation and monitoring of the instruments, under the direct supervision of the Instrumentation Specialist(s).
- (d) Project Co shall perform all geotechnical and hydrogeological instrumentation surveying activities described in this Article 6 [Geotechnical] under the direct supervision of a professional land surveyor licensed with the Association of British Columbia Land Surveyors.

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- (e) Project Co shall carry out all surveying to tolerances of ± 2 mm relative to established, reliable, stable benchmarks located on competent ground, which benchmarks shall not be subject to deformations.
- (f) For the Guideway deformation monitoring instrumentation, Project Co shall take three independent sets of readings to establish an initial baseline reading, which readings shall be taken no less than 20 Business Days following installation of each instrument. Thereafter, Project Co shall carry out monitoring of the instrumentation, at intervals of no more than one month, until the Total Completion Date.

6.10.10 Calibration of Instrumentation

- (a) Project Co shall, in accordance with the instructions of and under the direct supervision of the Geotechnical Manager and/or the Instrumentation Specialist:
 - (i) perform all calibration in accordance with the instrument manufacturer's recommended methods;
 - (ii) all instruments shall be calibrated within one year prior to installation;
 - (iii) verify that calibration results are within the tolerances for the particular instrument as listed on the manufacturer's standard published data sheet for that instrument;
 - (iv) ensure that calibration equipment and standards are in compliance with the applicable standards of the Canadian Standards Association and are themselves in current calibration; and
 - (v) confirm the proper functioning of each instrument upon completion of installation.
- (b) Project Co shall not utilize any instruments with calibration results that do not fall within the manufacturer's standard tolerances for monitoring purposes.
- (c) Project Co shall submit evidence of compliance with and calibration to the standards set out in this Article 6.10.10 [Calibration of Instrumentation].

6.10.11 Province's Access to Instrumentation Activities

- (a) Except where such access will interfere with the Project Work, Project Co shall:
 - (i) permit the Province's Representative to observe all instrumentation activities; and
 - (ii) during the Access Period in respect of any part of the Project Site, make such part of the Project Site available to, and otherwise accommodate this observation activity by, the Province's Representative.

6.10.12 Post-Construction Monitoring

- (a) Effective as of the Total Completion Date, the Province or its designate will assume responsibility for the geotechnical and hydrogeological instrumentation required to monitor the performance of the Guideway and the Stations, including the causes and distribution of ground movements and deformations associated with the Guideway and the deformation tolerances of the Guideway. To facilitate this transfer of responsibility, Project Co shall:
 - (i) verify the transfer of such responsibility; and
 - (ii) provide the Province with all keys associated with such instrumentation.

- (b) In the event that the monitoring data collected by or on behalf of the Province during the General Project Work Defect Warranty Period or the Latent Project Work Defect Warranty Period shows that the performance objectives as set out in this Agreement are not being or will not be met, the Province shall be entitled to make a warranty claim in accordance with the provisions of Schedule 5 [Project Work Defects and Warranties] of this Agreement.

**BROADWAY SUBWAY PROJECT
PROJECT AGREEMENT
SCHEDULE 4 PART 2**



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following 30 pages
removed in their
entirety**

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Article 8. Utilities

8.1 General

8.1.1 Scope

- (a) This Article 8 [Utilities] specifies the requirements and criteria for the Design and Construction of Utility Work.
- (b) Without limiting any other provision of this Agreement, Project Co shall carry out the Design and Construction of all Utility Work in accordance with this Article 8 [Utilities].
- (c) The Province has identified a list of certain Utility Suppliers that operate Utilities within or in the vicinity of the Project Site, as set out in Attachment A [List of Utility Suppliers] to this Article 8 [Utilities].
- (d) The Province has compiled information on the location of existing Utilities within the vicinity of the Project Site, which the Province is aware of, through a combination of on-site investigation and desk-top studies. The results of these investigations are provided as Disclosed Data in the form of the Existing Utilities Base Map drawings.
- (e) The Province may not have identified all Utilities that Project Co may encounter as part of the Project Works.
- (f) The Province has contacted the Utility Suppliers listed in Attachment A [List of Utility Suppliers] in an effort to provide Project Co with information on these organizations, as set out in the Utility Information Sheets described in Article 8.11[Utility Information Sheets] and provided separately as Disclosed Data.
- (g) Project Co shall:
 - (i) undertake the relevant Utility Work in accordance with the Accommodation Agreement as further set out in Article 8.9 [Accommodation Agreement];
 - (ii) coordinate the Project Work with any work on Utilities undertaken by Utility Suppliers, including any such work contemplated in Article 6 [Work by Others], Part 1 of Schedule 4; and
 - (iii) undertake the Utility Work, including new Utilities required in connection with or as part of the Project Work, as identified by and agreed to by Project Co and the Utility Supplier.

8.1.2 Codes and Standards

- (a) Without limiting or derogating from any other requirement of this Agreement, Project Co shall ensure that all Utility Work complies with the requirements of:
 - (i) all Laws, including any regulations, specific to such Utility Work;

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- (ii) the Accommodation Agreement, as applicable;
 - (iii) relevant municipal design standards and construction specifications, including:
 - A. the City of Vancouver Construction Specifications;
 - B. the City of Vancouver's Engineering Design Manual;
 - C. the City of Vancouver Standard Detail Drawings; and
 - D. the Master Municipal Construction Documents (MMCD) Platinum Edition;
 - (iv) Utility Suppliers, where these need to take precedence over municipal standards to obtain necessary Utility Supplier approvals; and
 - (v) Part 7 of the BCBC.
- (b) In addition to the applicable requirements of Article 2.2.4.6 [Final Design Submissions for Non-Systems Components] of Part 3, Project Co shall ensure that all materials incorporated into the Final Design of Utility Work have been approved by the relevant Utility Supplier.
- (c) Project Co shall ensure that current technical standards, as applicable, are obtained from the relevant Utility Supplier and that the applicable details and materials are incorporated in the Final Design of Utility Work.

8.1.3 Design and Construction Principles

- (a) The Design and Construction of the Utility Work shall be undertaken by Project Co, at a minimum, based on a Like-for-Like basis and consistent with the current standards for materials or technology, as defined in the relevant documents referenced in Article 8.1.2 [Codes and Standards].
- (b) If the relevant Utility Supplier and the Province have agreed otherwise, the Like-for-Like basis for the relocation, replacement or repair of Utilities will not apply. This is contemplated under Article 8.8 [Utility Enhancements] and includes agreed enhancements as listed under Article 8.8.2 [Agreed Utility Enhancements].
- (c) If any component of the Project Infrastructure that is to be constructed, installed, altered, upgraded and/or augmented by the carrying out of the Project Work requires a connection to an existing Utility, Project Co shall undertake any studies which may be required by the applicable Utility Supplier to verify that the existing Utility has sufficient capacity to handle the additional demand placed on it by the Design or Construction of the Project, or the Operational Millennium Line in accordance with this Agreement. If the existing Utility has inadequate capacity to handle the requirements imposed on it by the Design or Construction of the Project, or the Operational Millennium Line in accordance with this Agreement, Project Co shall undertake, at its sole risk, cost and expense, any upgrades which may be required to accommodate

the additional service requirements imposed by the Design and Construction of the Project, and the Operational Millennium Line.

- (d) The Design and Construction of all Utility Work shall be subject to Part 3 [Certification and Completion] of Schedule 4.
- (e) Corrosion protection investigations and measures shall be taken as may be required by the relevant Utility Supplier and Good Industry Practice.

8.1.4 Utility Investigations

- (a) The Province has undertaken a program of investigations and enquiries with the Utility Suppliers, identified in Attachment A [List of Utility Suppliers] to this Article 8, to ascertain the relationship of existing Utilities to the Project Work. The results of these investigations are provided as Disclosed Data in the form of the Existing Utilities Base Map drawings, Supplementary Utility Database Information, and a technical memorandum describing the investigation and reporting process.
- (b) Project Co shall be responsible for verifying (including any further investigations required) the location, type, service, status, and function of Utilities to the level of accuracy that Project Co deem appropriate to plan and execute the Project Works.
- (c) Project Co shall undertake pre-construction and post-construction condition surveys of the gravity sewers to establish the condition of such Utilities within the zone of influence of the Project Work. Project Co will provide to the Province consistently formatted copies of these condition surveys within two weeks of the completion of each survey.

8.2 Utility Work

8.2.1 Work by Utility Suppliers

- (a) Project Co acknowledges that, during Construction, Utility Suppliers shall continue to maintain and operate their respective Utilities within, or in the vicinity of, the Project Site. Project Co, acting reasonably, shall provide the Utility Suppliers with access to such part of the Project Site, as required, to facilitate the Utility Suppliers' respective operations and maintenance and repair activities.
- (b) Project Co shall act reasonably with regards to any request by a Utility Supplier to construct or install any new Utilities not required by the Project but within the Project Site, or to make modifications, replacements or repairs to their Utilities. Project Co shall coordinate the scheduling and performance of the Project Work so as to accommodate the objectives of each Utility Supplier to operate, maintain, repair and replace its Utilities as required by the Utility Supplier, acting reasonably. Any costs incurred by Project Co related to new Utilities, and modifications, replacements or repairs to existing Utilities,

requested by a Utility Supplier, but not required by the Project, will be the responsibility of the Utility Supplier.

- (c) Without derogating from or limiting any other obligation of Project Co contained in this Agreement, Project Co shall make provisions for, coordinate, and not unreasonably hinder installation, maintenance, repair or replacement of Utilities by any Utility Supplier or its contractors.
- (d) Project Co, acting reasonably, shall permit any inspector designated by a Utility Supplier to inspect its Utilities within such part of the Project Site and any Utility Work which is performed with respect thereto, at such time or times as such Utility Supplier may require and as coordinated with Project Co. Where the performance of the Utility Work necessitates such inspections, Project Co shall pay to such Utility Supplier such fees and charges as such Utility Supplier may charge as a result of such Utility Work, based on the customary rates charged by it from time to time for such inspections, in accordance with the usual payment terms of such Utility Supplier.
- (e) If a Utility Supplier or its contractors perform any work with regard to the installation, construction, removal, alteration, relocation, abandonment, protection or tie-in of its respective Utilities as a result of the Utility Work, Project Co shall pay to such Utility Supplier such fees and charges as such Utility Supplier may charge, based on the customary rates charged by it from time to time for such work, in accordance with the usual payment terms of such Utility Supplier.
- (f) Project Co shall notify any Utility Supplier which requires access to the Project Site of the Health and Safety Program for the Utility Work for the Project Site and shall require the Utility Supplier and any of its employees and contractors which enter upon the Project Site to comply with the Health and Safety Program.

8.2.2 Utility Work by the Province

- (a) The Province intends to undertake or cause to be undertaken certain work on Utilities in advance of and during the performance of the Project Work as contemplated by Article 6 [Work by Others], Part 1 of Schedule 4.
- (b) Without derogating from or limiting any other obligation of Project Co contained in this Agreement, Project Co shall make provisions for, coordinate, and not unreasonably hinder the work on Utilities by others as contemplated by Article 6 [Work by Others], Part 1 of Schedule 4.

8.2.2.1 Advanced Utility Design

- (a) The Province has, in consultation with the City of Vancouver and Metro Vancouver, progressed specific pieces of utility relocation design in order to expedite their respective design and approvals process for Project Co. This work has been progressed to varying stages of planning through to conceptual

design, and the associated design documentation is provided in the Data Room as Disclosed Data. Specifically, utility investigations and concepts have been undertaken for the:

- (i) Capilano 4 water main (Metro Vancouver);
- (ii) Cambie Street combined sewer (Metro Vancouver); and
- (iii) Main Street combined sewer (City of Vancouver).

8.2.3 Utility Work by Project Co

8.2.3.1 General

- (a) Except as expressly provided otherwise in this Agreement, as between the Province and Project Co, all Utility Work shall be carried out by or under the supervision of and at the risk, cost and expense, including schedule risk, of Project Co, whether or not, as between Project Co and a Utility Supplier, such Utility Work is to be performed by or under the supervision of or at the risk, cost and expense of a Utility Supplier. Without limiting the generality of the foregoing, Project Co shall be responsible for:
 - (i) obtaining from the relevant Utility Supplier, any Relevant Authority and any other Interested Parties all rights of entry or access to the relevant Utilities that are necessary or expedient in connection with the Utility Work;
 - (ii) identifying all requirements in respect of such Utility Work, including determining with the Utility Supplier the most effective strategies for undertaking the Utility Work;
 - (iii) liaising, arranging and co-coordinating with relevant Utility Suppliers, Relevant Authorities and other Interested Parties 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 or causing to be obtained all necessary Permits required by applicable Laws in connection with the Utility Work, including preparing all required documentation in connection therewith;
 - (v) observing and complying with any instructions or directions relating to the Utility Work that may be issued by the Utility Supplier or any Relevant Authority which has jurisdiction over the Utility Work;
 - (vi) with the exception of Utilities of the City of Vancouver or Metro Vancouver, securing or causing to be secured the entry into or execution of all relevant construction agreements and other agreements required in connection with the Utility Work;
 - (vii) performing any warranty or corrective work required in respect of Utility Work;

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- (viii) ensuring that any Utility Work to be performed by a Utility Supplier is performed so as not to impair or delay performance by Project Co of any other element of the Project Work;
- (ix) giving written notice as required by the relevant Utility Supplier when any Project Work affecting a Utility or Utility Work is to be carried out, before commencing such Project Work or Utility Work, and when such work has been completed, calling for inspections and, where applicable, tie-ins;
- (x) ensuring that there is no disruption of any existing Utility caused by the Project Work unless approved in writing by the relevant Utility Supplier, and any such permitted disruption shall be subject to any terms or conditions imposed by such Utility Supplier; and
- (xi) identifying, designing, coordinating and constructing any upgrades to existing Utilities which may be required to accommodate the additional service requirements imposed by the Operational Millennium Line and Canada Line.

8.2.3.2 Utility Crossings

- (a) Project Co shall not install any new underground Utility crossings under the at-grade or above-grade Guideway, without the prior written approval of the Province, under the Consent Procedure.
- (b) All Utility relocates must be approved by the relevant Utility Supplier.
- (c) Where an existing Utility is relocated, Project Co shall undertake such relocation so as to ensure that any future maintenance of such Utility can be undertaken without any impact on the safety or operation of the Integrated SkyTrain System and the Canada Line.
- (d) Where the applicable Utility Supplier does not require the relocation of any existing underground Utility crossing of the Guideway at-grade, Project Co shall be responsible for providing protection of such Utility as set out in Article 8.6 [Access to and Protection, Abandonment, Removal, and Temporary Relocation of Utilities].
- (e) Where a Utility crosses the Guideway where the Guideway transitions from tunnel to elevated structure, such Utility shall be enclosed in a straight casing pipe for its length and shall be contained within the Permanent Project Lands. Project Co shall ensure that casing pipes:
 - (i) are designed to accommodate all loads and settlements imposed by both the at-grade, or above-grade, Guideway and the Trains of the Operational Millennium Line and Canada Line; and
 - (ii) have a design life of at least 100 years.
- (f) If the Province approves any new underground Utility crossing of the Guideway at-grade or above-grade, Project Co shall undertake the Design and

Construction of such crossing in accordance with the terms of such approval and subject to the requirements of the relevant Utility Supplier and all Relevant Authorities regarding protection of the Utility and minimization of adverse impacts on the future maintenance and operations of the Utility.

8.2.3.3 Utility Trenches

- (a) Permanent reinstatement of all trenches or excavations resulting from Utility Work shall be in accordance with Article 9 [Roads] of Part 2, Schedule 4.
- (b) Any temporary reinstatement of trenches or excavations resulting from Utility Work shall be the responsibility of Project Co to ensure that the safe and accessible use of the surface by all street users is not compromised as a result of the works, until such time that the permanent finishes are applied.

8.2.4 Service Connections

- (a) At properties adjacent to the Project Site, where there are existing buildings, Project Co shall maintain, or replace on a Like-for-Like basis, existing Utility Service Connections. Where these buildings have existing combined storm and sanitary service connections, Project Co shall provide 'Wye stubs' on reinstated sewers to accept future flows from separate storm and sanitary systems. Project Co shall propose sizes and locations based on existing conditions for approval by the City of Vancouver.
- (b) At properties adjacent to the Project Site, where there are no existing buildings, or where properties have been made vacant as a result of demolition undertaken as part of the Project Work, Project Co will not be required to provide or reestablish Service Connections, but shall demonstrate that future development Service Connections can be achieved with the proposed alignment and station box structure envelope.
- (c) Without limiting Article 8.2.3.1 [General], as part of the Utility Work, Project Co shall be responsible for all risk, cost and expense, arising from:
 - (i) the relocation of any Utility Service Connections in conflict with the Project Work; and
 - (ii) the provision of all new Service Connections required to be constructed, installed, altered, upgraded or augmented by the carrying out of the Project Work,whether such work is undertaken by Project Co or by the applicable Utility Supplier.
- (d) Project Co shall be responsible for undertaking its own investigations to confirm all Utility Service Connections, including their locations in the field, and to identify all conflicts with the Project Work.
- (e) Project Co shall ensure that all new Service Connections provided as part of the Utility Work are installed underground except where there are existing

overhead Service Connections from the Trolley Overhead poles, or as determined by the Utility Supplier. Drawings showing Trolley Overhead poles with third party attachments within the Project Site are included in the Data Room as Disclosed Data.

- (f) In advance of the provision of any Service Connections to Project Infrastructure, Project Co will provide, for approval by the respective Utility Supplier, documents confirming code compliance to the relevant design and construction codes and standards in relation to Project Infrastructure.
- (g) During Construction of the Project Work, Project Co shall ensure that Service Connections provide, subject to Article 8.6(a), continuous service to all properties.

8.3 Regulated Utilities

- (a) This Article 8.3 [Regulated Utilities] pertains only to Utility Work for Regulated Utilities.
- (b) Project Co will ensure that all Utility Work in respect of Regulated Utilities is undertaken by the relevant Regulated Utility Supplier unless such Regulated Utility Supplier agrees that Project Co is to undertake such Utility Work.
- (c) In the event that Project Co wishes to relocate or undertake modifications (other than protective work) to a transmission Regulated Utility to accommodate the Project Work, no such relocation or modification, as the case may be, shall be undertaken without the prior written approval of the Province and the Regulated Utility Supplier, in their discretion, and any such relocation or modification work shall be undertaken only in accordance with the terms of such approval.

8.4 Utilities owned by the City of Vancouver

- (a) As defined in Article 8.8.2 [Agreed Utility Enhancements], the Province has agreed to undertake enhancements of certain City of Vancouver sewers that will need to be relocated as part of the Project Work.
- (b) In addition to the requirements set out in Schedule 8 [Lands], elsewhere in this Article 8 [Utilities], and in Article 3 [Municipal Requirements], Part 1 of Schedule 4, Project Co shall be responsible for undertaking all Design and Construction reviews, scheduling and inspections with the City of Vancouver in respect of any Utility which is owned by the City of Vancouver in accordance with this Article 8.4 [Utilities owned by the City of Vancouver] or, where applicable, Attachment C of this Article [Engineering Principles and Requirements for City of Vancouver Utilities Work].
- (c) Project Co shall provide to the City of Vancouver the Project Schedule and any updates thereto from time to time as required.

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- (d) Whenever Project Co is required to issue or submit documentation or notice to the City of Vancouver under this Article 8.4 and Attachment C [Engineering Principles and Requirements for City of Vancouver Utilities Work], Project Co shall issue a copy of all such documentation and notice to the Province as well.
- (e) Following the opportunities for review and comment provided to the City of Vancouver as set out in Article 3 [Municipal Requirements], Part 1 of Schedule 4, including the opportunity to provide comments on the applicable part of the Project Schedule relating to the City of Vancouver Utility Work, Project Co will confirm to the City of Vancouver:
 - (i) the City of Vancouver Utilities likely to be affected by the Project Work;
 - (ii) the nature and extent of such City of Vancouver Utility Work, based on a review of alternatives, if any, compliance with the principles and requirements set out in Attachment C [Engineering Principles and Requirements for City of Vancouver of Vancouver Utility Work] and based on the principle of Like-for-Like (as defined in the Municipal Agreement); and
 - (iii) Project Co's proposed timetable for the commencement, performance and completion (including the various stages of work contemplated below in Articles 8.4(f) through (n)) and tie-in and integration of such City of Vancouver Utility Work so that it can be completed in compliance with the Project Schedule.
- (f) All City of Vancouver Utility Work undertaken by Project Co will be designed by, and all plans for City of Vancouver Utility Work undertaken by Project Co will be sealed by, a Professional Engineer.
- (g) The City of Vancouver will have review, comment and approval rights on work conducted by Project Co on City of Vancouver Utilities. Project Co will work with the City of Vancouver to develop a schedule for submissions, and any schedule updates, encompassing the various stages of Design and Construction of City of Vancouver Utilities as contemplated in this Article 8.4 [Utilities owned by the City of Vancouver]. When developing the schedule, Project Co will ensure that there is a minimum of 5 Business Days between each submission of designs or drawings, for the City of Vancouver to provide comments.
- (h) To facilitate prompt review and comment by the City of Vancouver, Project Co will:
 - (i) ensure that the timing of submission of each set of designs or drawings generally follows the Project Schedule and the schedule for submissions developed under Article 8.4(g);
 - (ii) ensure that the design or drawing meets or exceeds the requirements set out in this Article 8.4; and

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- (iii) respond in a timely manner to any reasonable questions from the City of Vancouver in respect of such designs or drawings.
- (i) Project Co will coordinate with and seek approval from the City of Vancouver for any temporary use of City of Vancouver Utilities during Construction pursuant to the City of Vancouver's usual practices in granting such use in connection with other construction projects, except that Project Co will not be required to obtain any permits as per Article 3.2 [Permits and Fees], Part 1 of Schedule 4. Project Co is responsible for reimbursing the City of Vancouver for any costs associated with such usage. For greater certainty, Project Co shall at its cost, obtain or cause to be obtained from the City, a waste discharge permit for any groundwater remediation and construction excavation sites (application as described at: <https://vancouver.ca/files/cov/waste-discharge-permit-app-construction.pdf>), in accordance with Article 8.2.3.1(a)(iv), Part 2 of Schedule 4 and Article 3.2(b)(i), Part 1 of Schedule 4.
- (j) City of Vancouver Utility Work undertaken by Project Co will be undertaken by Project Co at the sole cost of Project Co.
- (k) Project Co acknowledges and agrees that the City of Vancouver:
 - (i) may designate an inspector to inspect any work for City of Vancouver Utilities undertaken by Project Co at such time or times coordinated and agreed upon with Project Co, at Project Co's expense, at such rates as are ordinarily charged by the City of Vancouver for similar inspections; and
 - (ii) will have the right to inspect City of Vancouver Utilities from time to time for any other reason at no cost to Project Co, with reasonable prior notice to Project Co.
- (l) Upon completion of any part of the City of Vancouver Utility Work, Project Co shall provide notice of such completion to the City, together with:
 - (i) certification from the engineer-of-record of Substantial Completion together with a list of deficiencies; and
 - (ii) written confirmation by Project Co that the City of Vancouver may have access to:
 - A. all testing and inspection reports; and
 - B. a completed set of legible, marked up as-constructed prints and survey point file and all other information required for the production of Record Drawings,

and Project Co will make available such City of Vancouver Utility Work for a final post-construction inspection by the City, at a time and on a date coordinated by Project Co with the City. After conducting the final post-construction inspection, the City will provide Project Co with a letter listing any deficiencies. Project Co will promptly fix any deficiencies noted by the City in the City's letter following such final post-construction inspection, and will

arrange for a follow up inspection. Project Co and the City will repeat this process until the City of Vancouver Utility Work is complete without deficiencies and the City accepts the City of Vancouver Utility Work.

- (m) All City of Vancouver Utility Work constructed by Project Co will be transferred to the City of Vancouver once the deficiencies of the final post-construction inspection have been addressed by Project Co in accordance with Article 8.4(l), and the City of Vancouver delivers a letter to Project Co stating the City of Vancouver accepts that the specific element(s) of such Utility Work is substantially complete and ready for use for its intended purpose and that the City of Vancouver assumes responsibility of the specific element(s) of such Utility Work, or when it is determined through the dispute resolution process pursuant to the Municipal Agreement that such City of Vancouver Utility Work is complete and ready for use for its intended purpose.
- (n) For the City of Vancouver Utility Work completed by Project Co, Project Co will provide a warranty for a period of two years following acceptance by the City of Vancouver of the specific element(s) of such City of Vancouver Utility Work. However, if the City of Vancouver disputes that deficiencies have been addressed, and if it is resolved that Project Co's determination that all deficiencies have been addressed was not correct, then the date such dispute is resolved will be the date the two year warranty period commences.
- (o) In the case of an emergency in respect of a Utility owned by the City of Vancouver other than a water Utility, Project Co shall be authorized to take such action as it considers necessary and appropriate to address such emergency. In the event that Project Co takes any such action, Project Co shall, as soon as reasonably practicable, and in any event no later than two Business Days following the occurrence of such emergency, deliver a notice to the Province and the City of Vancouver confirming the nature of the emergency and details of the actions taken by Project Co in connection therewith. Project Co will, at its cost, repair any damage to the City Utilities caused by the City of Vancouver Utility Work or the Project Work, and will restore the City Utilities to a Like-for-Like condition (as such term is defined in the Municipal Agreement) prior to carrying out the City of Vancouver Utility Work or the Project Work.
- (p) If Project Co damages any Utility owned by the City, then Project Co will repair such damage as City Utility Work in accordance with this Article 8.4, at Project Co's expense, to the extent necessary to restore the Utility on a Like-for-Like (as such term is defined in the Municipal Agreement) basis.

8.5 Coordination

- (a) Project Co shall establish, to the satisfaction of each Utility Supplier, properly coordinated procedures to ensure that:

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- (i) all existing Utilities which may be affected by the Project Work and all new Utility Work are identified; and
 - (ii) appropriate measures are undertaken by both Project Co and the Utility Supplier to accommodate any potential impacts which the Project Work may have on such Utilities and Utility Work.
- (b) The procedures to be established by Project Co under Article 8.5(a) of this Part 2 shall include, as a minimum, the following steps:
 - (i) confirmation of existing utility locations by means of site investigations and, where required, by detailed survey;
 - (ii) organization of utility coordination meetings to be attended as necessary by the Utility Suppliers set out in Attachment A [List of Utility Suppliers], and the Province as an observer, and to be held at least every month, or as appropriate, to ensure coordination of the plans and activities of all parties;
 - (iii) notification of proposed Utility Work to the relevant Utility Supplier, Relevant Authorities and other Interested Parties;
 - (iv) preparation of preliminary utility base plans, drawings, sketches, profiles, specifications and other documents as required by the relevant Utility Supplier, Relevant Authorities and other Interested Parties to facilitate a review of the proposed Utility Work, and the incorporation of revisions which may be required as a result of the review;
 - (v) timing and coordination of delivery, review and approval of plans, drawings, sketches, profiles, specifications and other documents;
 - (vi) timing and coordination of inspections with relevant Utility Suppliers and Relevant Authorities, and sign offs by the relevant Utility Supplier and Relevant Authorities;
 - (vii) preparation of interim, final and issued-for-construction plans, drawings, sketches, profiles, specifications and other documents as required by the relevant Utility Supplier, Relevant Authorities and other Interested Parties to facilitate approvals of the proposed Utility Work; and
 - (viii) preparation of as-constructed plans and profiles, in accordance with the requirements of the Utility Supplier or the Relevant Authority for design and construction records.
- (c) If Project Co intends to undertake Project Work which is within proximity to any Utilities, Project Co shall notify the relevant Utility Supplier, all Relevant Authorities and other Interested Parties, in accordance with the notification requirements of the relevant Utility and all Relevant Authorities and other Interested Parties, that such Utilities may be impacted by such Project Work.

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- (d) Project Co shall ensure all Utility Work undertaken as part of the Project is coordinated, as far as reasonably practicable, with the future Broadway streetscape design, currently under development by the City of Vancouver, and which will continue to be progressed as plans for the Project develop. Concept sketches highlighting 'Utility Zones' within which tree and Trolley Overhead poles will be permitted, and therefore within which it will not be permitted to install new utilities, are shown on the Permanent Roadworks Drawings provided in Appendix A [Drawings]. Project Co shall provide connections on reinstated storm sewers to accept storm water run-off from areas of green infrastructure that may be provided within these zones.

8.6 Access to and Protection, Abandonment, Removal, and Temporary Relocation of Utilities

- (a) Project Co shall ensure that, except as may otherwise be agreed in writing by the relevant Utility Supplier in its discretion, all existing Utilities within the Project Site (including Utilities within any excavation) shall remain in service and be protected and preserved by Project Co during the performance of the Project Work. Any interruptions to Utility services shall be planned and executed in accordance with requirements set out in the Accommodation Agreement, MMCD, City of Vancouver design standards, or as agreed with Utility Suppliers.
- (b) Project Co shall obtain written approval from the relevant Utility Supplier prior to the installation of any temporary Utilities.
- (c) If a Utility Supplier determines that any of its Utilities are no longer required, such works may be abandoned or removed, on such terms and conditions as may be agreed by Project Co with the relevant Utility Supplier and all Relevant Authorities. Project Co will not be responsible for costs associated with the removal of utilities if their removal is not directly required in order to complete the Project Work.
- (d) For existing abandoned Utilities within the Project Site (including abandoned Utilities within any excavation) Project Co shall confirm the nature of the Utility with the Utility Supplier prior to removal.
- (e) Where access to a Utility is affected by the Project, Project Co shall be responsible for reaching agreement with the Utility Supplier and any Relevant Authorities regarding any departures from standards (for example required minimum clearances, alternative access arrangements or utility protection measures), such that maintenance of the Utility will not impact the safety or operation of the Integrated SkyTrain System and the Canada Line.

8.7 Responsibility for Utility Costs

- (a) Project Co shall:

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- (i) be responsible for all costs and expenses arising from or in connection with the Utility Work, save to the extent expressly otherwise provided in Article 8.10 [Province Assistance with Utility Matters] of this Part 2 and Section 8.10 [Sharing of Increased Recoverable Expenditures in Specified Circumstances] of this Agreement; and
 - (ii) contract directly with the relevant Utility Suppliers for the provision of all electricity, gas, water, sewer, telephone and communications services and other Utilities and services supplied to the Project Site and which is used or consumed in the performance of the Project Work, and Project Co shall pay for all costs and expenses of such Utilities and services, until Total Completion.
- (b) If the Province is invoiced for any such costs or expenses in relation to Utilities or Utility Work which are the responsibility of Project Co or, if such costs and expenses are otherwise charged directly to the Province, the Province may pay such costs and expenses and, upon demand, Project Co shall forthwith reimburse the Province for any amount so paid or, if the Province so elects, the Province may deduct any amount so paid or to be paid by the Province from any payments owing by the Province to Project Co in accordance with this Agreement.

8.8 Utility Enhancements

8.8.1 General

- (a) If a Relevant Authority or Utility Supplier requests to increase the capacity or functionality of Utilities within the Project Site, Project Co shall only undertake such enhancements subject to the following conditions, unless as otherwise defined under Article 8.8.2 [Agreed Utility Enhancements]:
- (i) such enhancements are agreed to by the Province;
 - (ii) such enhancements shall not form part of the Project Work;
 - (iii) such enhancements shall not increase the cost and expense of any part of the Project Work;
 - (iv) except to the extent that the Province has agreed in writing to contribute to the cost and expense, such upgrades shall, as between Project Co and the Province, be at the sole risk, cost and expense of Project Co;
 - (v) Project Co shall be solely responsible for reaching agreement with the Relevant Authority or Utility Supplier on the terms and conditions for any upgrades so undertaken, including scheduling, interactions with third parties, performance of any warranty or deficiency work associated therewith and collection of all amounts owing to Project Co in connection therewith;

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- (vi) where the Province has agreed to contribute to the cost and expense of any upgrade of Utilities, the terms and conditions of payment of the Province's contribution shall be subject to the approval of the Province, in its discretion;
- (vii) such upgrades shall not delay or otherwise negatively affect the performance of the Project Work or the overall Project Schedule;
- (viii) such upgrades shall not unduly affect other holders of rights of way or other Interested Parties; and
- (ix) such upgrades shall be located only within the scope of the existing rights of way or the legal rights of the Utility Supplier which has requested the upgrade.

8.8.2 Agreed Utility Enhancements

- (a) The Province has agreed to undertake enhancements of certain City of Vancouver sewers that will need to be relocated as part of the Project Works. Except where noted otherwise in this Agreement, Project Co shall be responsible for undertaking the necessary analysis to design these sewers, based on design inputs provided by the City of Vancouver, as set out in Attachment B [City of Vancouver Sewer Design Inputs], and in accordance with the relevant design standards, as follows:
 - (i) For sanitary sewers:
 - A. the City of Vancouver will provide design input in the form of population (residential, commercial and equivalent) and sanitary catchment area associated with the pipe to be relocated;
 - B. Project Co will use these design inputs, and through consideration of additional flows generated by the permanent Project proposals, Project Co shall undertake flow and hydraulic analysis required to determine the size of the pipe; and
 - C. provided the proposed pipe relocation directs flow to the same downstream system, Project Co will not be required to analyze pipes upstream or downstream of the proposed relocation and will be under no obligation to undertake any further analysis (e.g. through the use of hydraulic / network analysis software) other than that set out in the City of Vancouver Engineering Design Manual. If the relocation strategy redirects flow to other mains, Project Co will be responsible for further analysis.
 - (ii) For storm sewers:
 - A. the City of Vancouver will provide design input by identifying the catchment area associated with the pipe to be relocated. The extent of the catchment area will need to be agreed between the City, the Province and Project Co based on the proposed network configuration;

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- B. Project Co will use the agreed catchment as a basis of design, and Project Co will undertake the flow and hydraulic analysis required to determine the size of the pipe. Given the anticipated size of upstream catchments (less than 10ha), it is assumed that the Rational Method (as defined in the City's standards) will be used in this analysis; and
 - C. provided the proposed pipe relocation directs flow to the same downstream system, there will be no requirement for Project Co to use the Hydrograph Method (as defined in the City's standards) or to undertake analysis through the use of hydraulic / network analysis software. Project Co will also have no obligation to analyze pipes upstream or downstream of the proposed relocation. If the relocation strategy redirects flow to other mains, Project Co will be responsible for further analysis.
- (iii) For combined sewers:
- A. where practicable within the Project Site, Project Co shall redirect storm and sanitary service connections (that currently discharge to combined sewers) to storm and sanitary sewers;
 - B. where it can be verified through investigations within the Project Site that no live upstream connections remain; the combined sewer will be abandoned. In this scenario, no hydraulic analysis of the combined sewer will be necessary;
 - C. where the operational status of combined sewers cannot be verified through investigations within the Project Site, it is the responsibility of Project Co to engage the City of Vancouver to undertake these investigations on Project Co's behalf or provide design input in the form of storm and sanitary catchment characteristics, as described above under the respective headings for separate sewer systems. Project Co shall endeavor to abandon the length of combined sewer within the Project Site and connect any unverified upstream combined network to the sanitary sewer. In this scenario, Project Co shall size the sanitary sewer based on the total combined flow by summing the peak flows calculated from the agreed catchment characteristics. If this is not reasonably practicable, as a last resort, Project Co shall, in discussion with the City, reinstate the combined sewer on a Like-for-Like basis.
 - D. Project Co shall not be responsible for analyzing pipes upstream or downstream of the proposed abandonment, relocation, or reinstatement, and will be under no obligation to undertake any further analysis (e.g. through the use of hydraulic / network analysis software) other than that set out in the City of Vancouver Engineering Design Manual.

These design inputs are provided in Attachment B [City of Vancouver Enhancements – Sewer Design Inputs]. Further information on the limits of

the design responsibility and applicability of the City of Vancouver design standards are provided as Disclosed Data, together with a preliminary list of enhancements as advised by the City of Vancouver. Project Co shall treat the sizes provided in this list as indicative only and shall undertake independent analysis as described in Article 8.8.2(a) to verify the design of such relocated sewers. This list includes all City of Vancouver sewers that it is currently anticipated will need relocating as part of the Project Work.

- (b) For City of Vancouver water mains, Project Co shall reinstate on a Like-for-Like basis, but upsize where necessary to meet minimum size requirements per clause 3.4.2.2 *Size and Materials* of the City of Vancouver Engineering Design Manual. For all water mains that will be directly above or crossing underground Stations, the minimum size of all new or reinstated pipes shall be 300mm.

8.9 Accommodation Agreement

8.9.1 General

- (a) With respect to the Accommodation Agreement, a copy of which has been provided by the Province to Project Co in the Data Room, Project Co, at its own cost and expense:
 - (i) shall perform all obligations of the Province under the Accommodation Agreement (such that any reference in the Accommodation Agreement to "Province" will be read as reference to "Project Co", and reference to "the Contractor" or "Contractor's subcontractors" will be read as reference to "Project Co's Subcontractors"), except for those Province obligations set out in:
 - A. Section 2.6 [No Obligation on Province to Proceed];
 - B. Section 6.1 [Acquisition of Property Rights];
 - C. Section 16.1 [Province's Indemnification of MV Utilities]; and
 - D. Section 18 [Dispute Resolution],of the Accommodation Agreement, but the exception in Article 8.9.1(a)(i)C shall not amend, alter or derogate from Project Co's obligation to indemnify under the Agreement;
 - (ii) shall comply with, observe and abide by, and not do, or omit to do or permit to be done or omitted to be done, anything to cause the Province to be in breach of the Accommodation Agreement;
 - (iii) shall comply with, observe and abide by, and not do or omit to do, anything that would cause the Province to be in breach of, any site requirements applicable, or relevant, to the carrying out of the Utility Work; and

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- (iv) acknowledges the rights of MVRD under the Accommodation Agreement.

8.10 Province Assistance with Utility Matters

- (a) Provided that Project Co has taken and continues to take all reasonable efforts to obtain, and to satisfy any conditions or requirements for obtaining, from the relevant Utility Supplier, Relevant Authorities, Interested Parties and any private owner or other person, such rights of entry or access to any Utilities or other action which is necessary or expedient to carry out any Utility Work within a reasonable time and on reasonable terms, then Project Co may request the assistance of the Province (at the expense of Project Co) in obtaining such rights of entry or access or other action to allow Project Co to perform such Utility Work, in which event the Province, to the extent that it has the legal ability to do so under existing Laws, shall use reasonable efforts to provide such assistance.
- (b) For further clarity, the assistance which Project Co may request that the Province consider providing in accordance with and subject to the limitations of this Article 8.10 may include the facilitation by the Province of processes associated with and contemplated therein for the resolution of disputes or the acquisition or exercise of rights associated with Utility Work.
- (c) Notwithstanding Articles 8.10(a) and (b) of this Part 2 and without prejudice to the Province's rights to dispute what is reasonable on any other grounds, the Province may, in its discretion, determine that it is not reasonable for any assistance requested by Project Co pursuant to Articles 8.10(a) and/or 8.10(b) of this Part 2 to involve the Province initiating or participating in formal legal proceedings with any Utility Supplier, Relevant Authority, Interested Party and/or any private owner or other person.

8.11 Utility Information Sheets

- (a) The Province has contacted the Utility Suppliers listed in Attachment A [List of Utility Suppliers] to this Article 8 for information regarding the specific Utilities owned by them within parts of the Project Site that constitute Designated Project Lands (other than any Designated Project Lands acquired by the Province and/or BCTFA pursuant to Section 3.2 [Additional Lands for Utility Work] of Schedule 8 [Lands]). Specifically, the Province has requested each such Utility Supplier listed in Attachment A [List of Utility Suppliers] to this Article 8 to provide certain information, including:
 - (i) such Utility Supplier's standards and specifications applicable to the Utilities of the Utility Supplier;
 - (ii) such Utility Supplier's exceptions to those standards and specifications as required by the Utility Supplier;

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- (iii) such Utility Supplier's notification requirements regarding possible impact of the Project Work in relation to such Utility Supplier's infrastructure;
 - (iv) such Utility Supplier's requirements for documentation on Utility Work, including design, accommodation plan and construction schedule;
 - (v) such Utility Supplier's emergency response procedures;
 - (vi) the commitment by such Utility Supplier for review and response times and procedures in relation to documentation submitted to the Utility Supplier for review;
 - (vii) such Utility Supplier's requirements for onsite personnel at the time of relocation or tie-in;
 - (viii) such Utility Supplier's requirements regarding performance by it of Utility Work in connection with its Utility; and
 - (ix) such Utility Supplier's personnel costs for Utility Supplier involvement, including call out rates.
- (b) The Province has compiled the information that it has obtained from the Utility Suppliers listed in Attachment A [List of Utility Suppliers] to this Article 8 in the Utility Information Sheets, which have been provided as Disclosed Data.
- (c) Any information which the Province has compiled and made available to Project Co in any Utility Information Sheet is Disclosed Data. Without limiting or derogating from any other provision of this Agreement with regard to Disclosed Data or any disclaimer contained in any Utility Information Sheets, Project Co shall be responsible for undertaking its own investigation to confirm all information contained in the Utility Information Sheets, as well as the accuracy, completeness and sufficiency for Project Co's purposes of all such information.
- (d) Project Co shall not be entitled to compensation or relief from the Province under this Agreement or otherwise if a Utility Supplier fails to conform to the terms set out in a Utility Information Sheet.

8.12 Utilities Handover

- (a) With the exception of City of Vancouver Utilities, the hand-over procedure for which is set out in Article 8.4(m), Project Co shall establish a handover procedure for all Utility Work with each Utility Supplier on a basis which is acceptable to each such Utility Supplier. As part of such handover procedure, Project Co shall provide to each Utility Supplier all drawings and quality documentation which are required by such Utility Supplier, in accordance with its usual requirements, when required by such Utility Supplier.
- (b) Project Co shall provide to the Province written evidence of acceptance by each relevant Utility Supplier of all Utility Work as such Utility Work is completed

and handed over by Project Co, a copy of all Utility Handover documentation, and paper and electronic record drawings showing the final horizontal and vertical location of all existing, relocated and new utilities, in respect of other utilities, cadastral boundaries, existing properties, topographic features and the permanent Project and streetscape design.

8.13 Utility Work Warranties

- (a) Notwithstanding the durations of the General Project Work Defect Warranty Period and the Latent Project Work Defect Warranty Period, Project Co shall provide a warranty for the Design and Construction of each element of the Utility Work for the longer of:
 - (i) the period stipulated in any agreement between Project Co and the relevant Utility Supplier, including as between the Province and MVRD under the Accommodation Agreement, as applicable; and
 - (ii) the two year period following handover to, and acceptance by, a Utility Supplier of such element of Utility Work.
- (b) Project Co will perform warranty work for any Utility Work in accordance with Schedule 5 of this Agreement and any additional or more stringent warranty terms as may be agreed between Project Co and the relevant Utility Supplier for such Utility Work.

8.14 Groundwater Discharge to Sewers for Construction Excavation

- (a) Project Co shall submit to the Province written consent from the City of Vancouver or MetroVancouver to connect to City of Vancouver or MetroVancouver sewer infrastructure for the discharge of groundwater encountered during Project Works prior to making such connection.
- (b) As a requisite for consent, Project Co shall provide a groundwater management plan for any groundwater encountered. Any proposed groundwater dewatering or discharge during construction and excavation will need to be evaluated by the City of Vancouver or MetroVancouver. The process for managing the discharge of groundwater to City of Vancouver and MetroVancouver sewer infrastructure is provided as Disclosed Data.
- (c) Project Co shall contact the Environmental Assessment Office as soon as reasonable possible if groundwater extraction exceeds, or is forecast to exceed, 75 L/s.

**ATTACHMENT A TO PART 2 ARTICLE 8
LIST OF UTILITY SUPPLIERS**

Utilities with Utility Information Sheets

- BC Hydro [Electrical transmission and distribution] [Regulated Utility Supplier]
- Fortis BC (formerly Terasen Gas) [Gas transmission and distribution] [Regulated Utility Supplier]
- TELUS [Telecommunications] [Regulated Utility Supplier]
- Zayo (formerly MTS-Allstream) [Telecommunications] [Regulated Utility Supplier]
- Teraspan [Telecommunications] [Regulated Utility Supplier]
- Shaw Cable [Telecommunications] [Regulated Utility Supplier]
- City of Vancouver (Municipal utilities)
 - Sewer (storm, sanitary and combined)
 - Water distribution
 - Neighbourhood Energy Utilities (NEU)
 - VED
 - Traffic Signals
 - Street Lighting
- Metro Vancouver Utilities (formerly Greater Vancouver Regional District)
 - Greater Vancouver Sewerage and Drainage District [Regional drainage]
 - Greater Vancouver Water District [Water transmission]

Utilities without Utility Information Sheets or with contact information only

- Novus [Telecommunications] [Regulated Utility Supplier]
- Urban Communications [Telecommunications]
- Bell Canada [Telecommunications] [Regulated Utility Supplier]
- Rogers Communications [Telecommunications] [Regulated Utility Supplier]
- Creative Energy [Neighbourhood Energy]

Sewer Design Inputs

Sanitary Sewer Design Inputs						
Figure Number	Station	Pipe Segment	Catchment Area	Pop	Job	Equivalent Population
1	Arbutus – West Portion	2025 W Broadway to 2103 W Broadway	Refer to Figure 1 - Arbutus Station – West Portion	648	616	953
2	Arbutus – East Portion	1985 W Broadway to 1909 W Broadway	Refer to Figure 2 - Arbutus Sanitary – East Portion	594	409	796
3	South Granville	1470 W Broadway to 1428 W Broadway	Refer to Figure 3 – South Granville Station	623	669	954
4	Fairview - VGH	988 W Broadway to 916 W Broadway	Refer to Figure 4 – Fairview-VGH Station	2826	1327	3482
N/A	Broadway-City Hall	West side of Cambie - Cambie and W Broadway	As determined from an existing analysis, the new diameter of this segment will be 450mm.			
5	Broadway-City Hall	456 W Broadway to 438 W Broadway	Refer to Figure 5 – Broadway - City Hall Station	0	2649	1310
6	Mount Pleasant – West Portion	105 E Broadway to 142 E Broadway	Refer to Figure 6 – Mount Pleasant – West Portion	704	323	864
7	Mount Pleasant – East Portion	Main & E Broadway to 142 E Broadway	Refer to Figure 7 – Mount Pleasant – East Portion	6969	3904	8900
8	GNW	Earl Finning Way to 1 st Avenue	Refer to Figure 8 – GNW Station	0	2537	1255

In addition to the information provided above, please refer to the following sections of the City of Vancouver Engineering Design Manual:

- Section 4.2, Demands and Flows
- Section 4.3, Hydraulic Analysis
- Section 4.4, Design of Sanitary Sewer Components

Storm Sewer Design Inputs			
Figure Number	Station	Pipe Segment	Catchment Area
9	Arbutus – West Portion	2025 W Broadway to 2103 W Broadway	Refer to Figure 9 – Arbutus Station – West Portion
10	Arbutus – East Portion	1985 W Broadway to 1909 W Broadway	Refer to Figure 10 – Arbutus Station – East Portion
11	South Granville	1470 W Broadway to 1428 W Broadway	Refer to Figure 11 – South Granville Station
12	Fairview-VGH Station	988 W Broadway to 916 W Broadway	Refer to Figure 12 – Fairview-VGH Station
13	Broadway - City Hall	456 W Broadway to 438 W Broadway	Refer to Figure 13 – Broadway - City Hall
14	Mount Pleasant Station	104 E Broadway to 142 E Broadway	Refer to Figure 14 – Mount Pleasant Station
N/A	GNW	Pipe Expected to be Suspended in Place	

2100 IDF Curve - This curve is necessary for determining the Rainfall Intensity, which is an important component of Storm Sewer design. For reference, it can be found in section 5.2 of the City of Vancouver Engineering Design Manual.

In addition to the information provided above, please refer to the following sections of the City of Vancouver Engineering Design Manual:

- Section 5.2, Demands and Flows
- Section 5.3, Hydraulic Analysis
- Section 5.4, Design of Storm Drainage Components

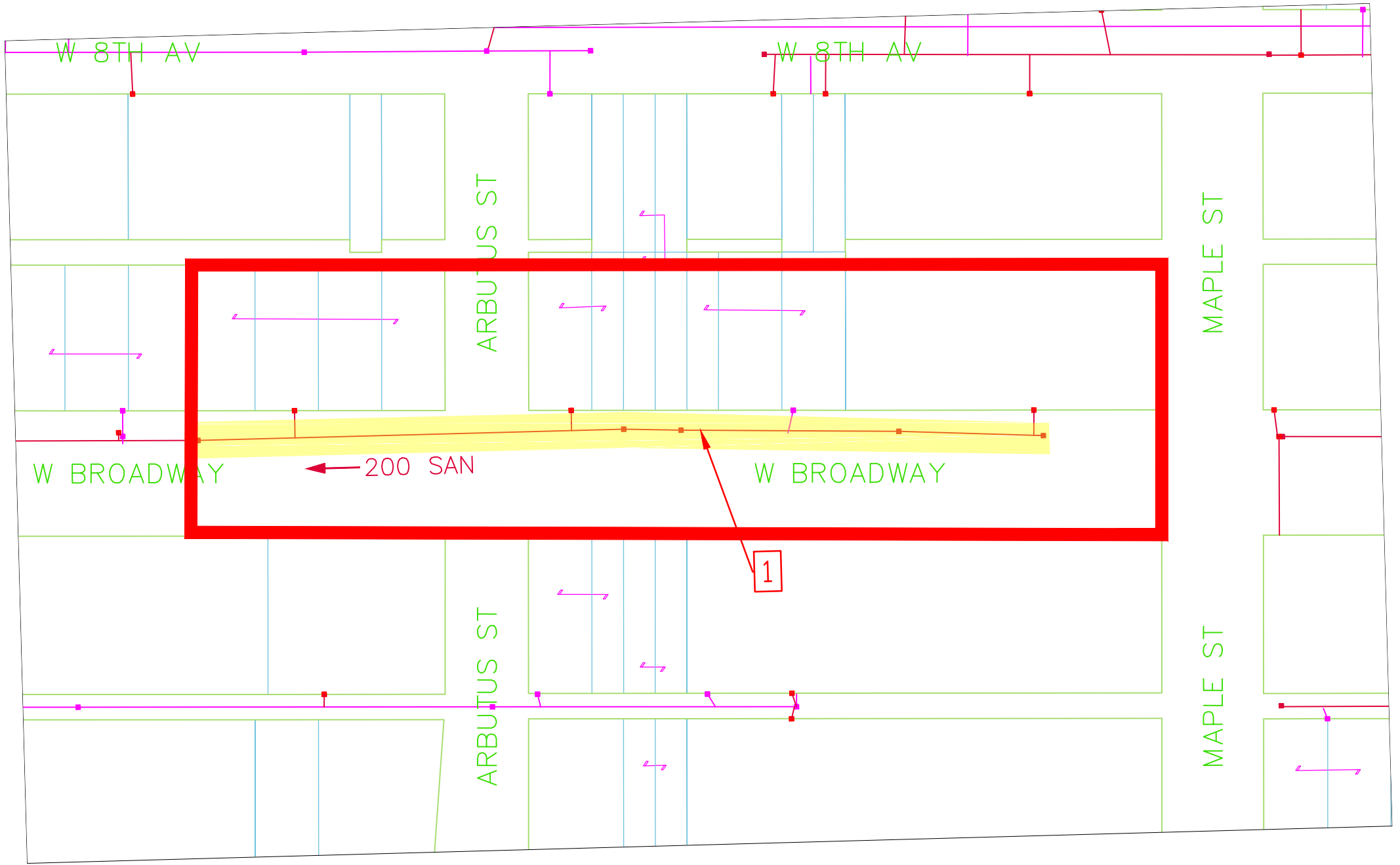


Figure 1
Arbutus Station – West Portion
Sanitary Catchment Area

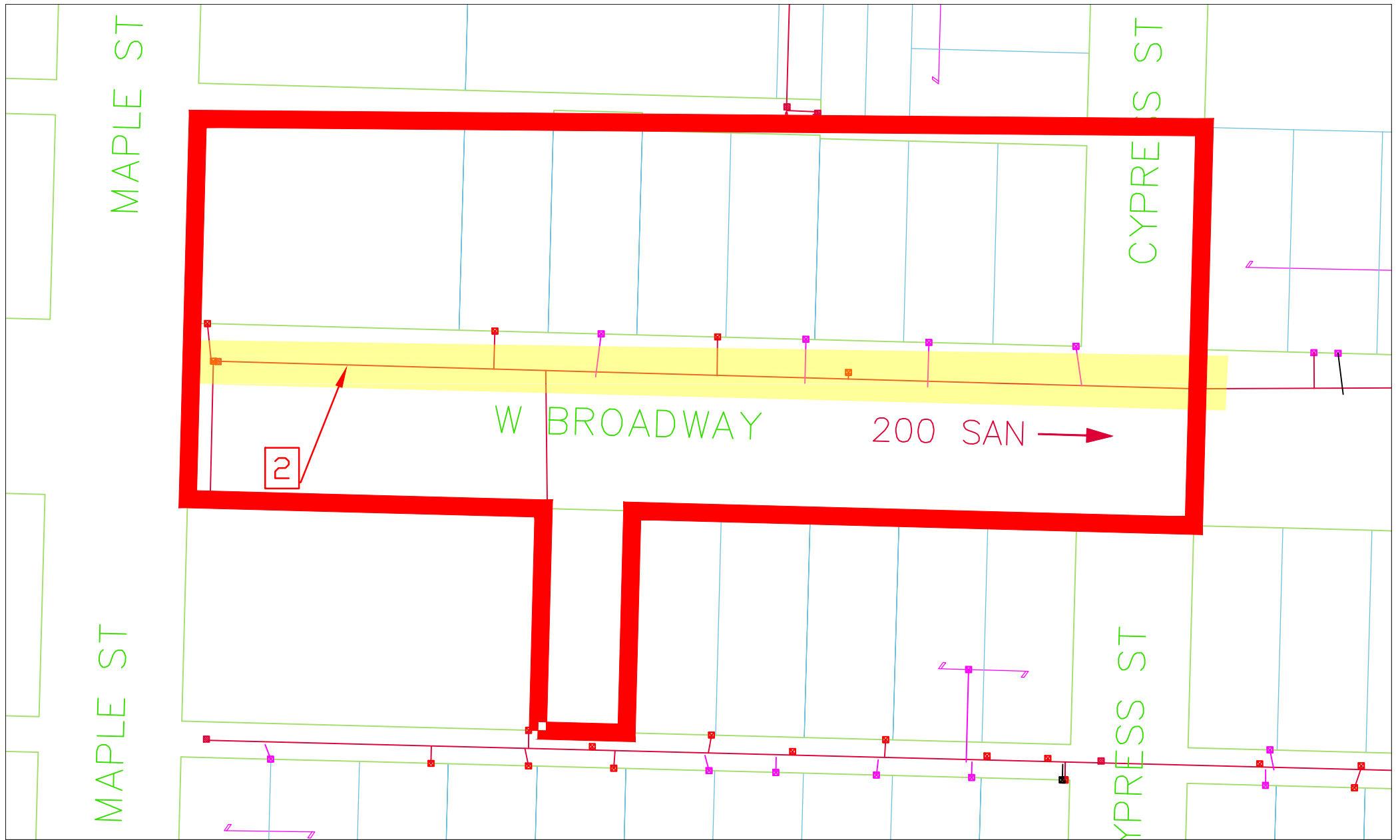


Figure 2
Arbutus Station – East Portion
Sanitary Catchment Area

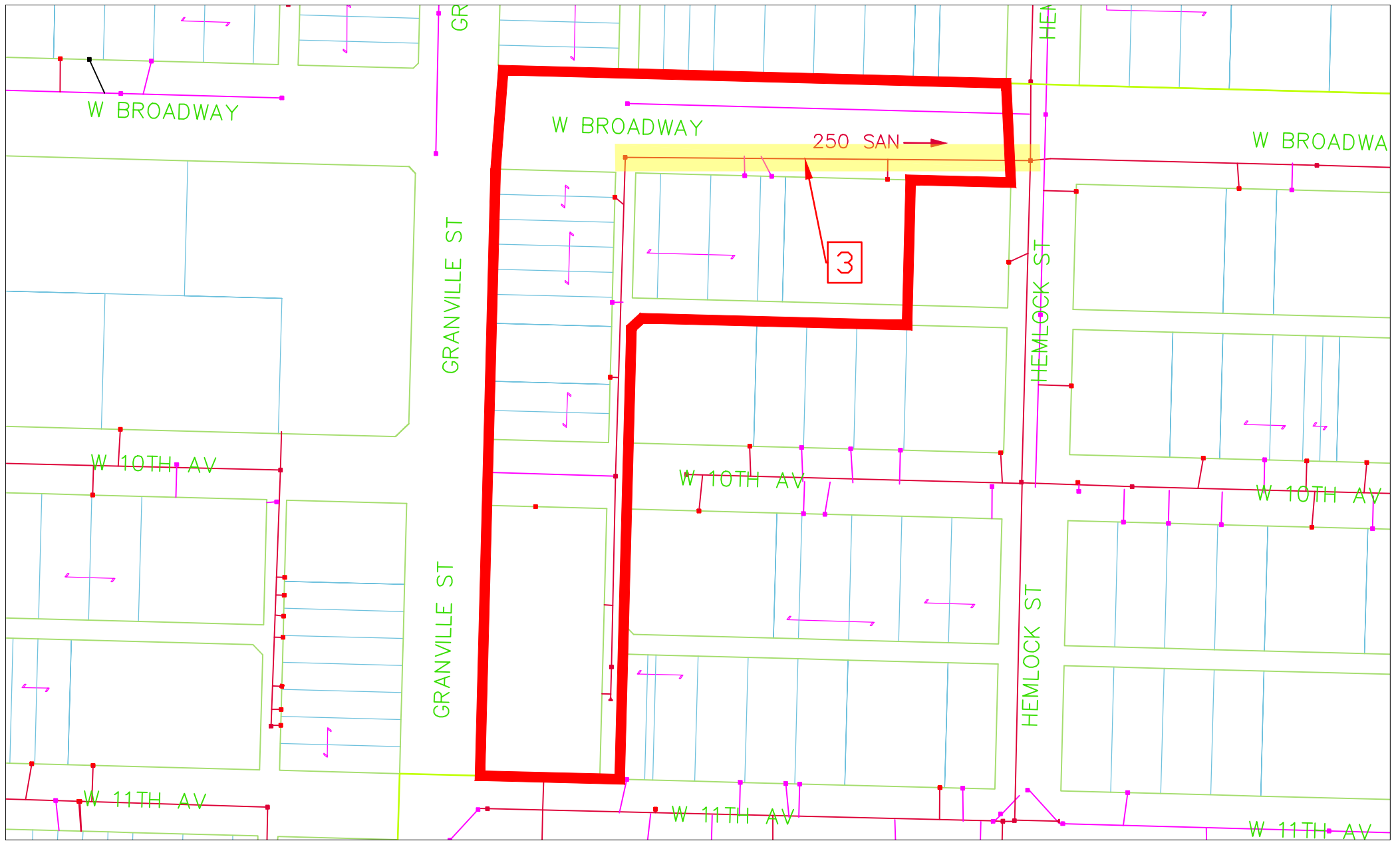


Figure 3
 South Granville Station
 Sanitary Catchment Area

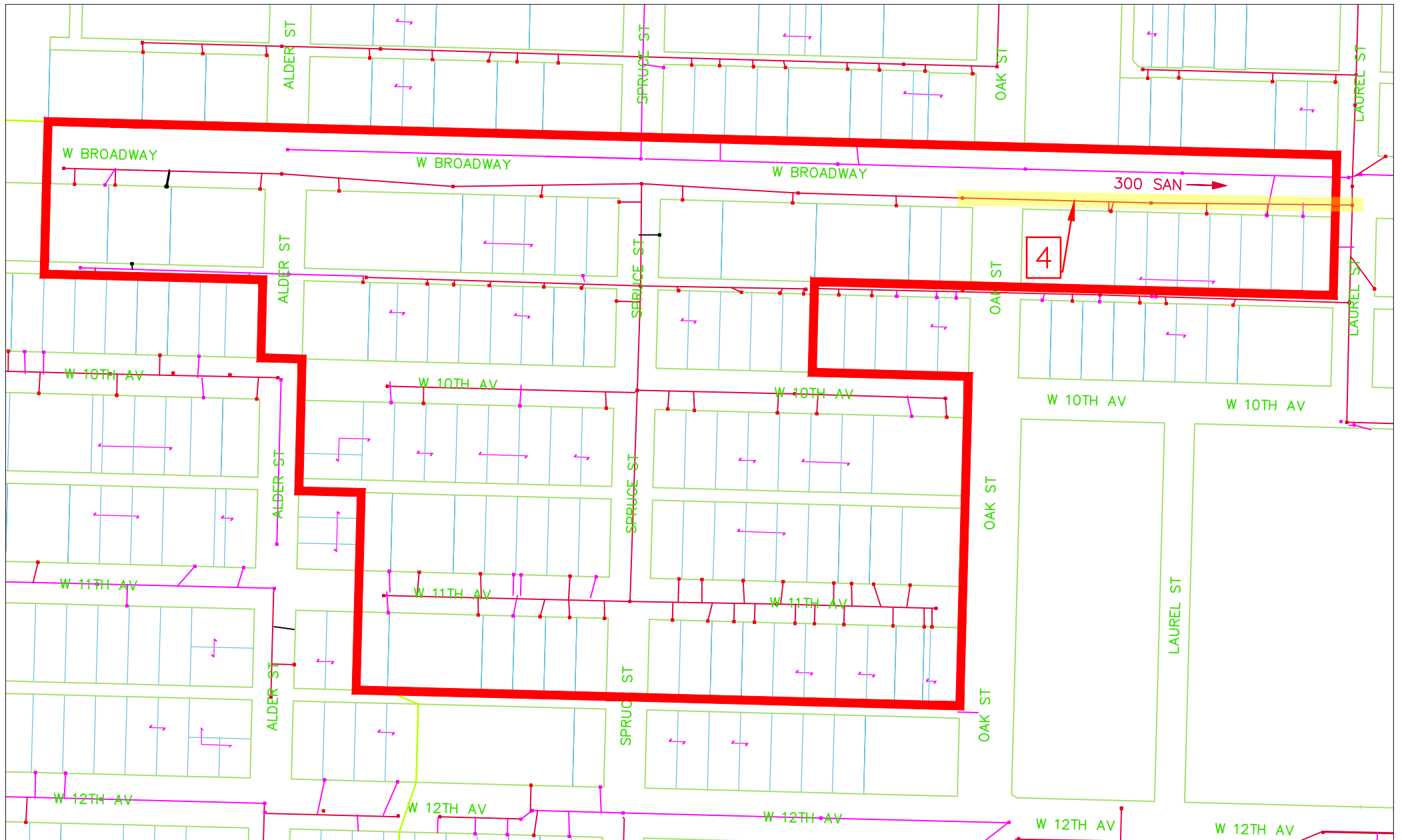


Figure 4
Fairview-VGH Station
Sanitary Catchment Area

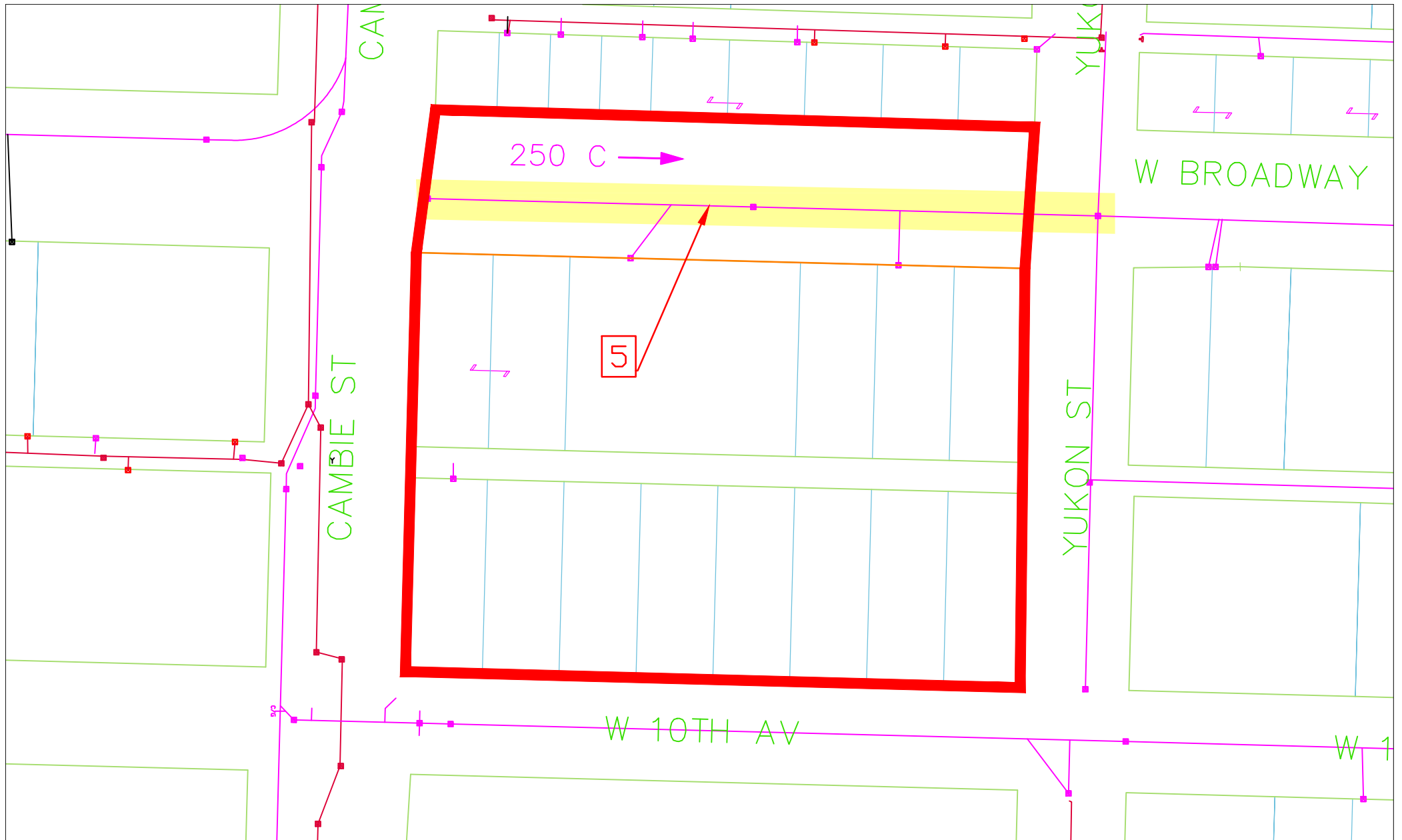


Figure 5
Broadway - City Hall Station
Sanitary Catchment Area

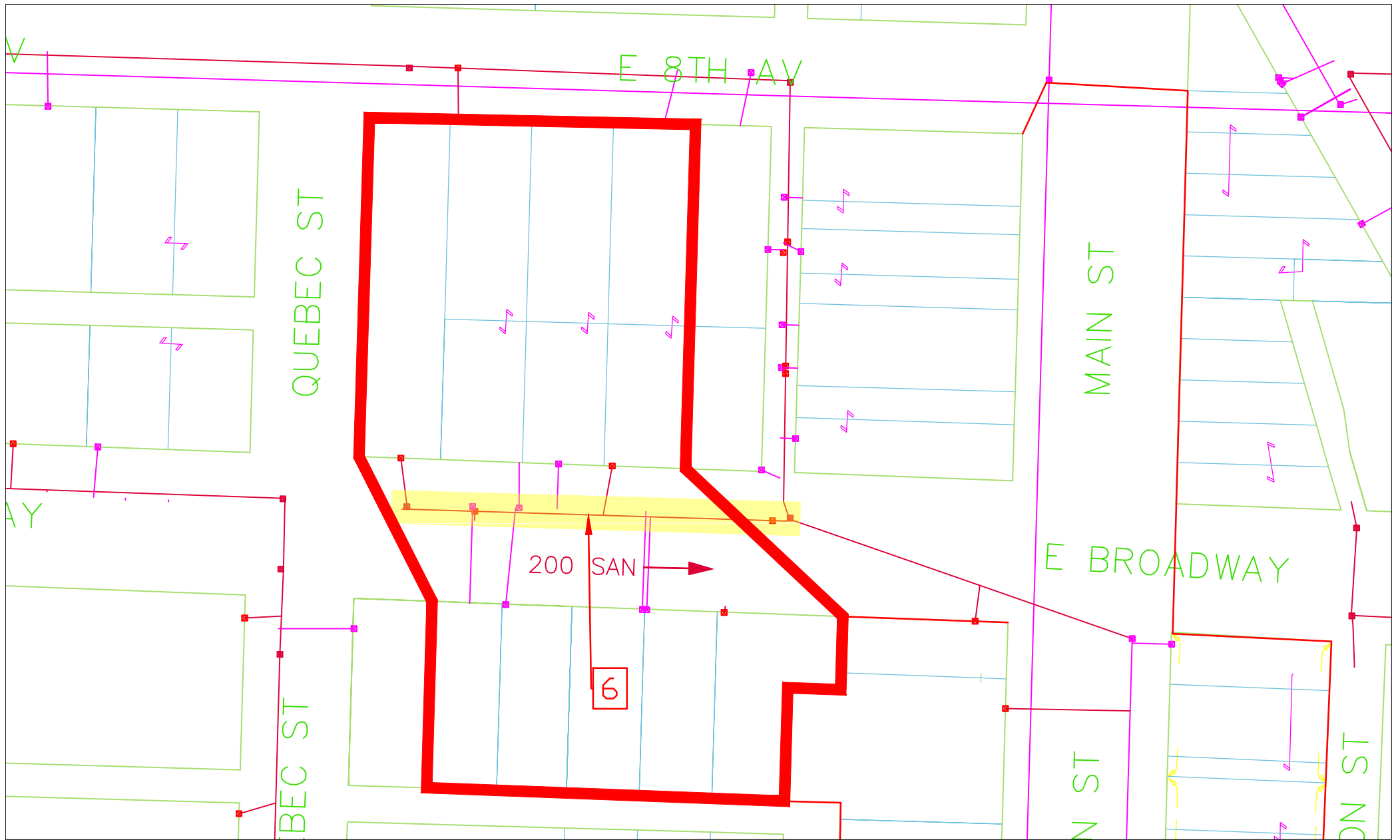


Figure 6
Mount Pleasant - West Portion
Sanitary Catchment Area

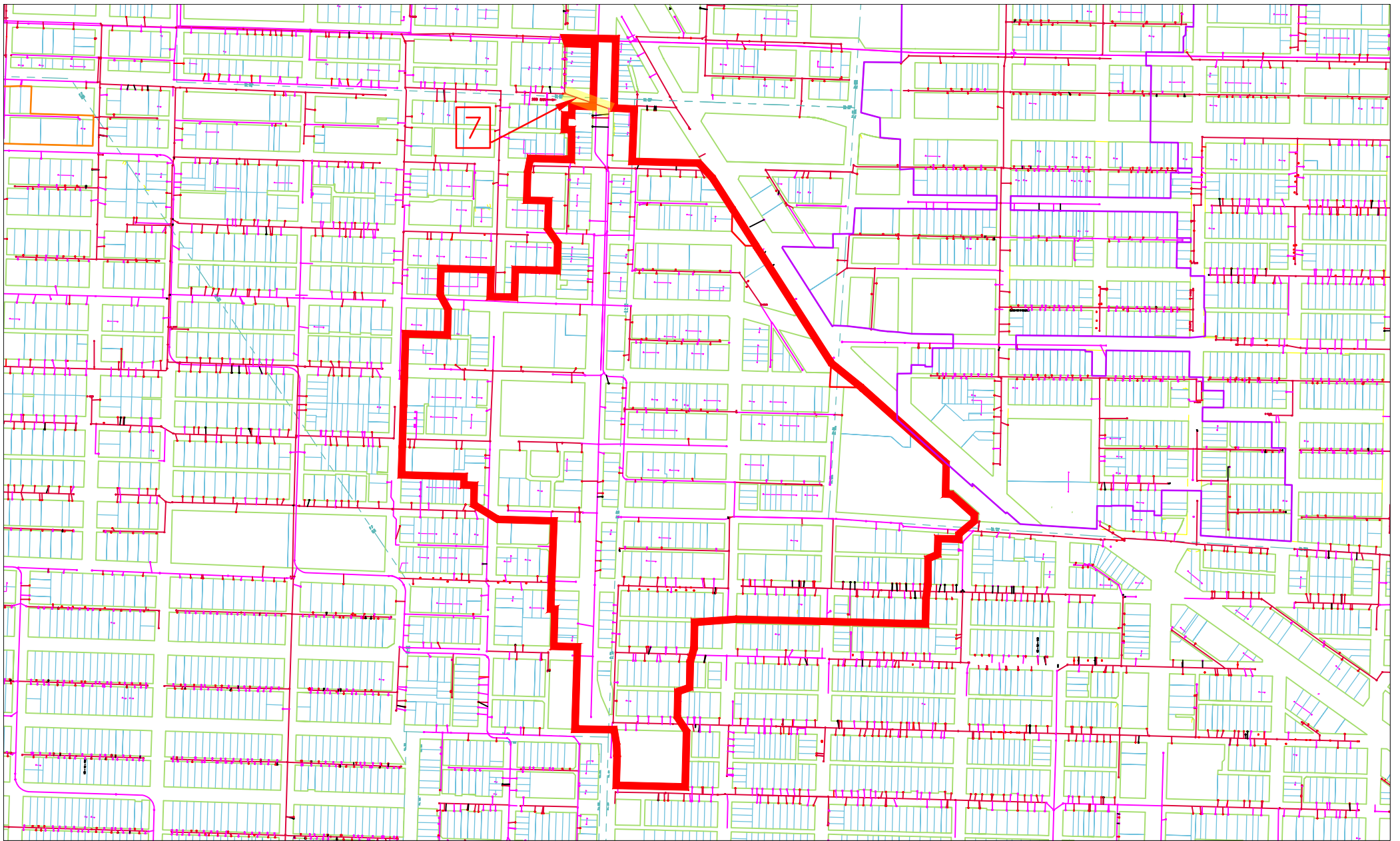


Figure 7
Mount Pleasant - East Portion
Sanitary Catchment Area

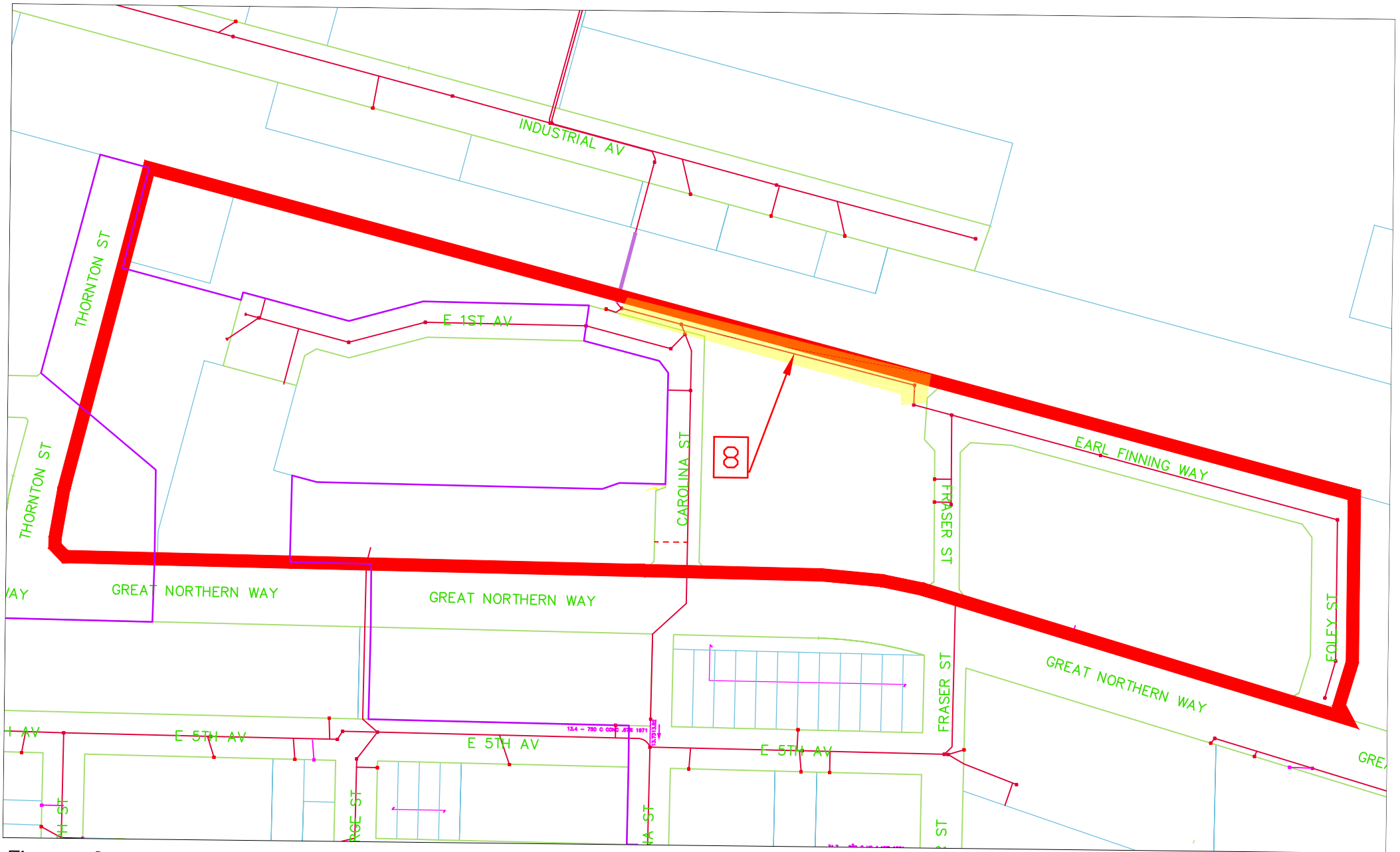


Figure 8
 GNW Station
 Sanitary Catchment Area

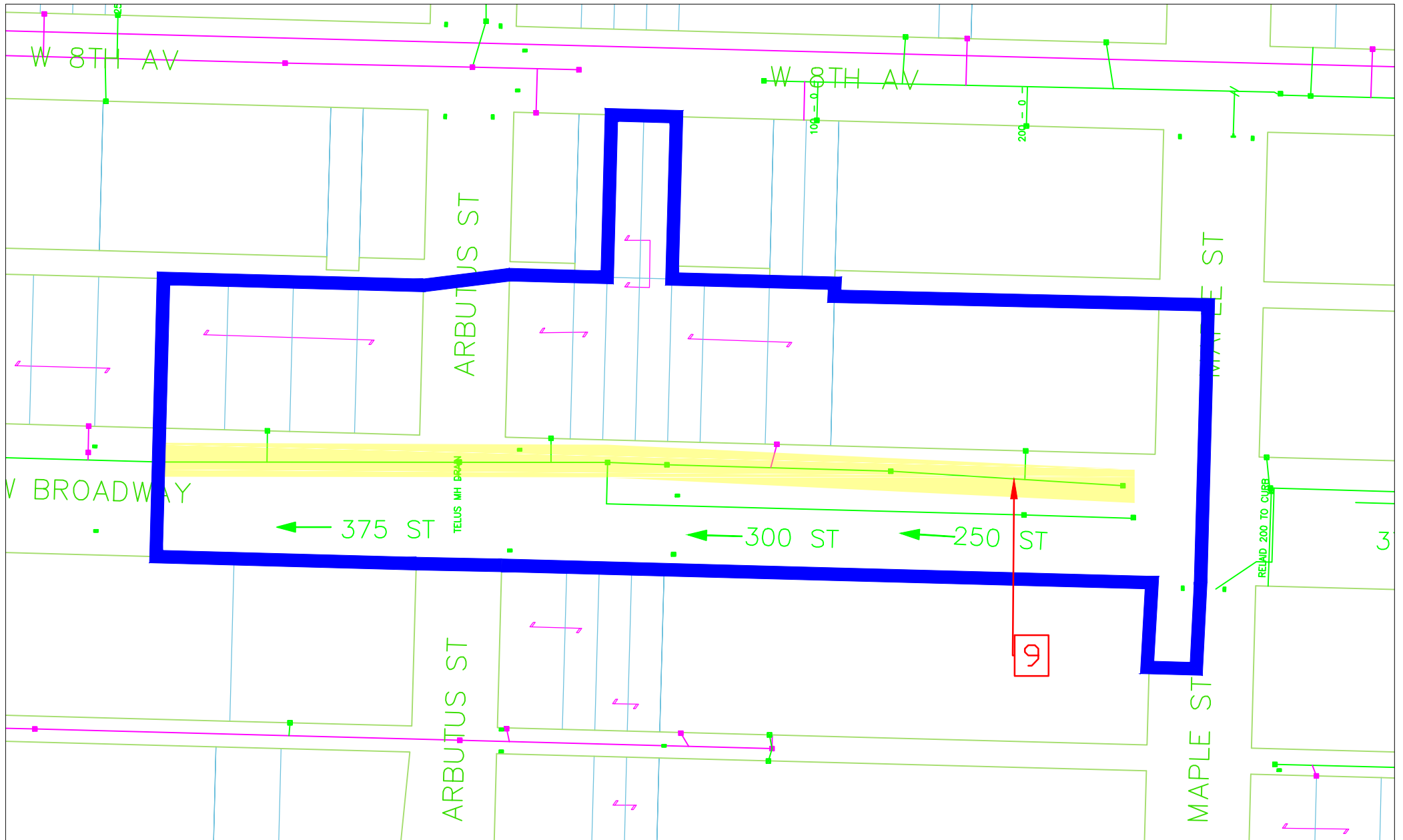


Figure 9
 Arbutus Station – West Portion
 Storm Catchment Area

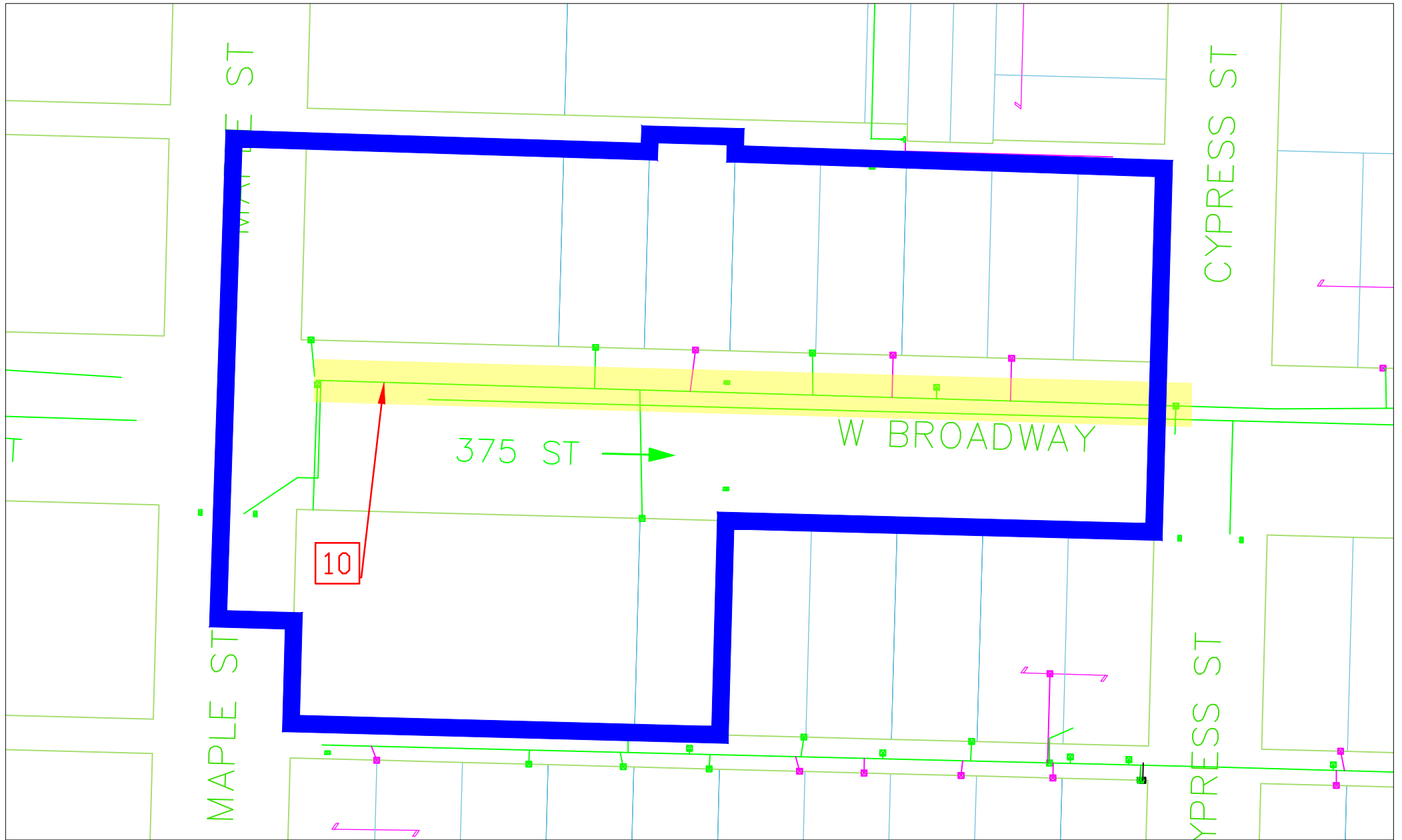


Figure 10
Arbutus Station – East Portion
Storm Catchment Area

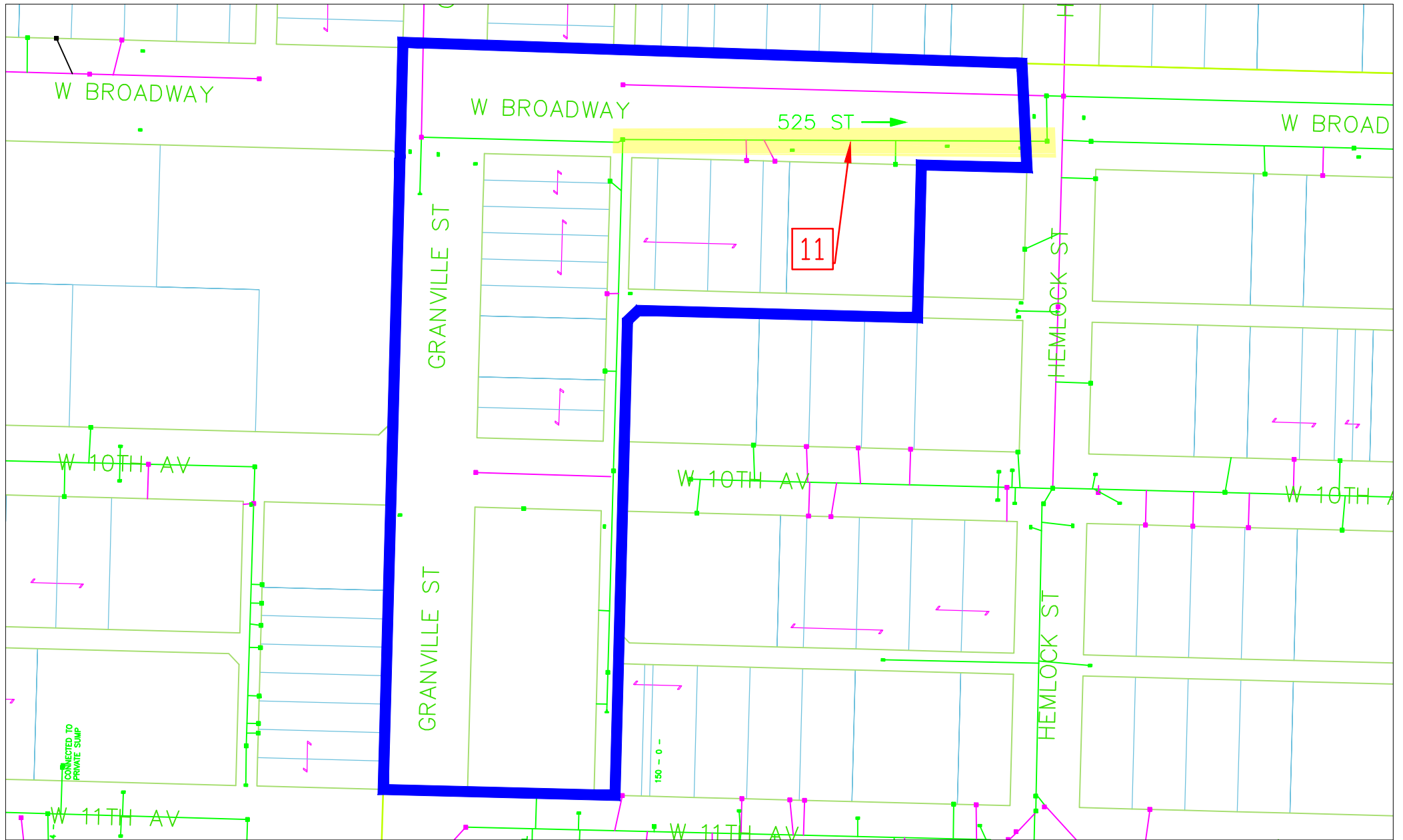


Figure 11
South Granville Station
Storm Catchment Area

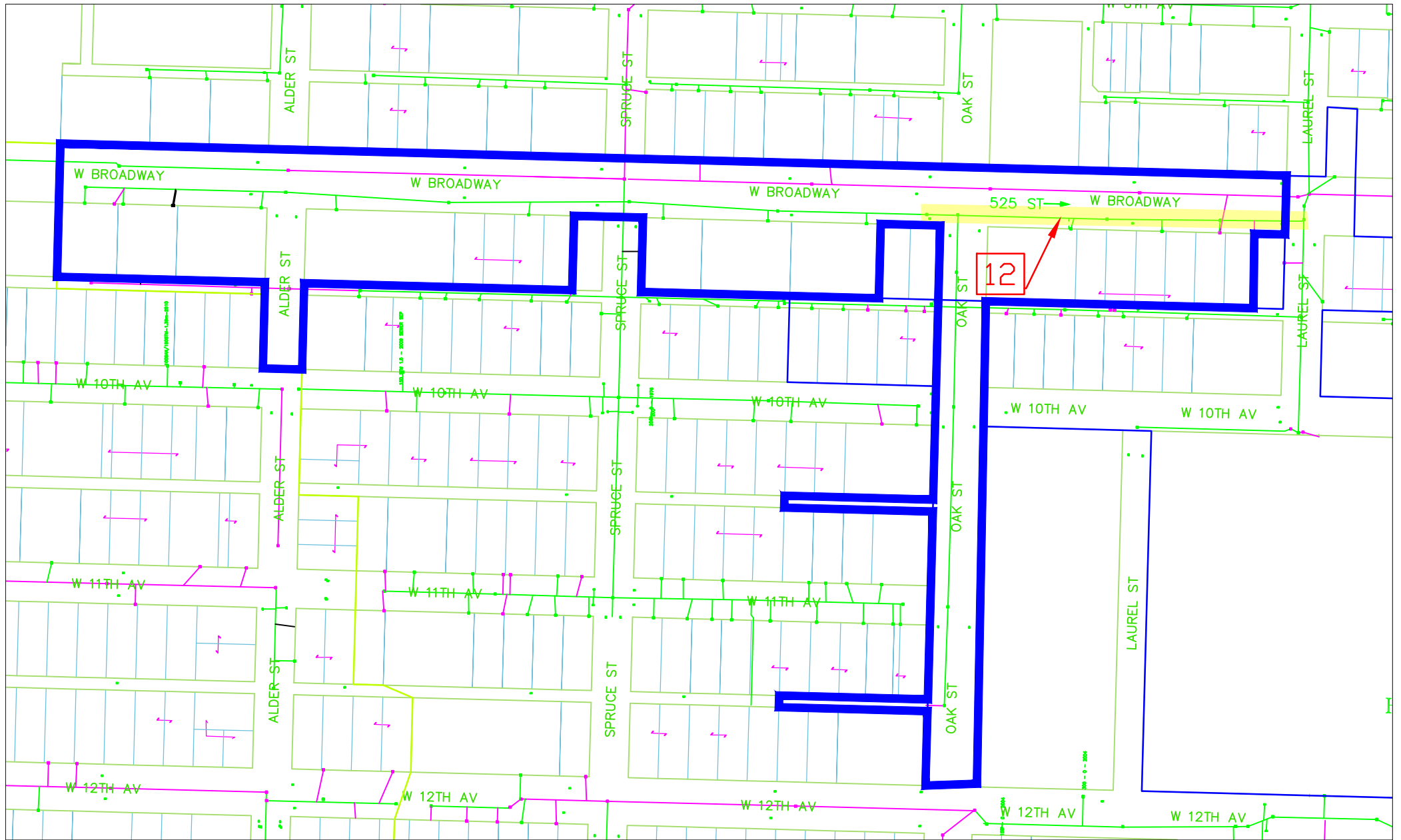


Figure 12
Fairview-VGH Station
Storm Catchment Area

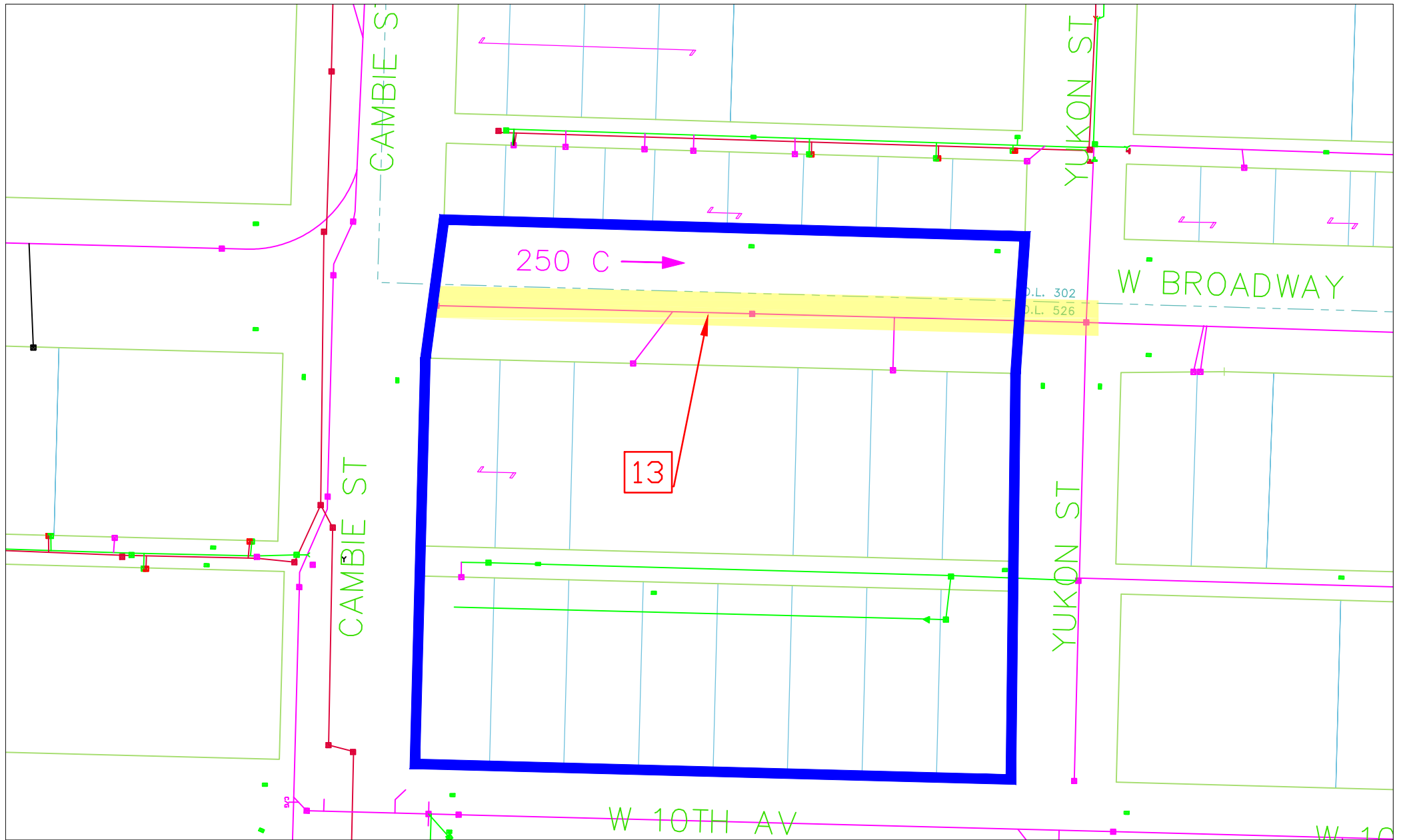


Figure 13
Broadway-City Hall Station
Storm Catchment Area

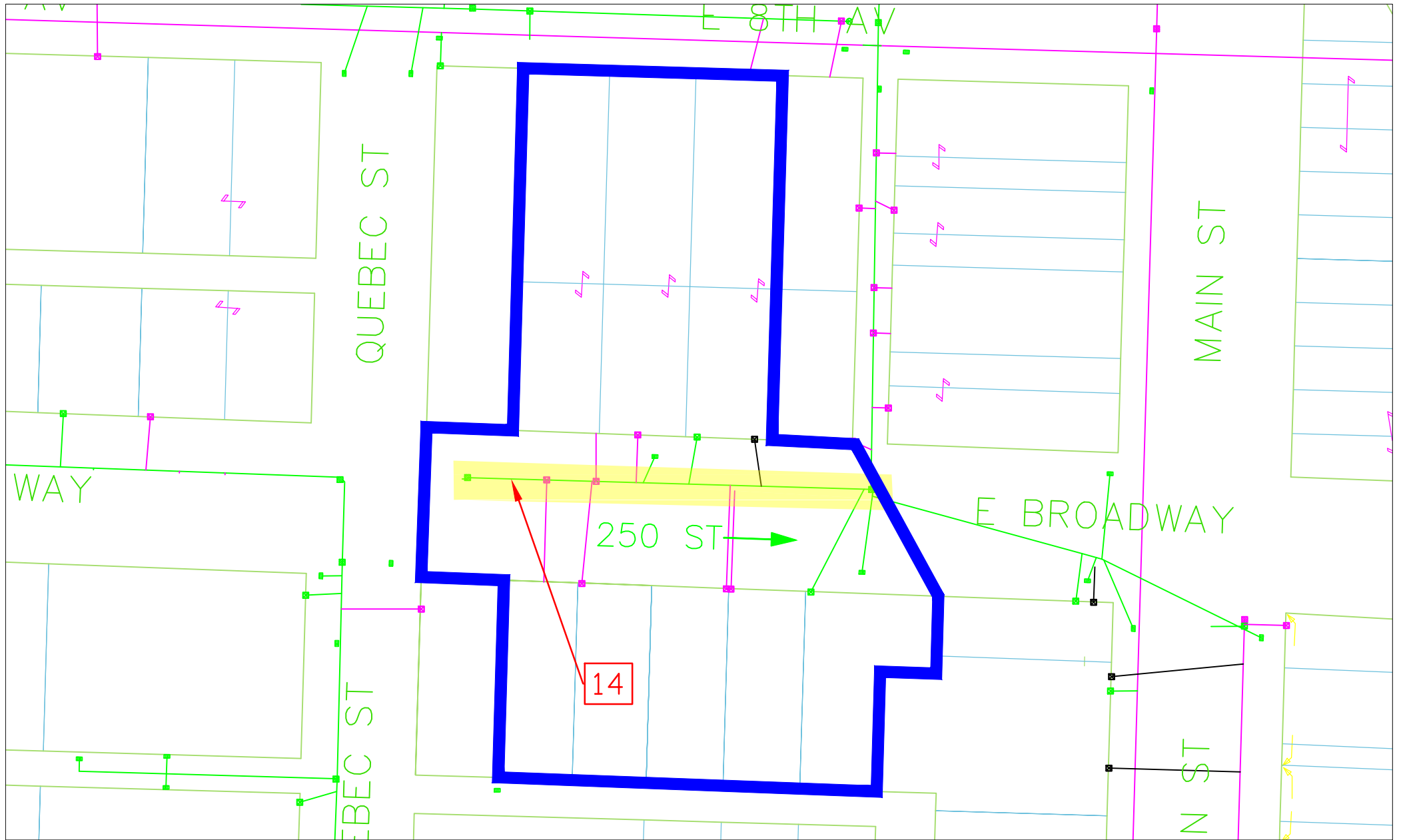


Figure 14
Mount Pleasant Station
Storm Catchment Area

Attachment C

Engineering Principles and Requirements for City of Vancouver Utilities Work

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GENERAL REQUIREMENTS

The following summarizes the general process for Project Work associated with City Utilities:

- Project Co will notify the City as soon as practical related to impacted City Utilities, with:
 - o The nature and extent of the work, and
 - o The proposed schedule for design and construction
- Project Co will receive comments from the City on the work and proposed schedule
- Project Co will attend regular meetings with the City to discuss details of work and schedule, and Project Co will ensure that at minimum, the following formal submissions are made:
 - o Interim Design Review (IDR) - IDR1 (Approx. 30%) for review and comment
 - o IDR2 (Approx. 60%) for review and comment
 - o Final Design Review (FDR) for review and comment
 - o Issued-For-Construction drawings for City records
 - o Record drawings for City records
- All designs and construction of municipal assets are to be in accordance with the City's:
 - o Engineering Design Manual,
 - o Standard Details Drawings, and
 - o Construction Specifications
- Project Co will submit an inspection and test plan prior to commencement of the Project Work on municipal assets and conduct pre- and post- construction surveys
- Project Co acknowledges and agrees that the City will have the right to conduct regular inspections during the construction of City Utilities
- Project Co will ensure that critical hold points, as defined during pre-construction meetings, are inspected by the City prior to backfilling of underground City assets.
- Project Co will bear all costs associated with design and construction of municipal assets, including works to be delivered by the City.
- If maintenance or repair of City assets is a result of the Project, such repair will be at Project Co's cost.

In all cases, Project Co will ensure that the Design and Construction of the tunneled section of the Guideway constructed by either boring or mining methodologies will be a minimum of 2.5 metres below any existing City Utilities.

WATERWORKS

In addition to the general standards and criteria above, the following applies to City of Vancouver waterworks:

- Project Co shall consider the vertical profiles for all Utilities along Broadway such that there is sufficient clearance between all Utilities and the Station envelope to accommodate a 300mm water service line crossing the street with a minimum cover of 0.9m and a minimum clearance of 300mm between utilities above and below the service connection.
- Project Co shall ensure that all reinstated water mains that are located above Station elements must be at a minimum 300mm in diameter.
- Project Co shall ensure that all Project Work that impacts the waterworks are conducted by, or directly supervised by, a certified Water Distribution Operator.
 - o Project Co shall submit documentation to the City which demonstrates that that an Environmental Operators Certification Program (EOCP) certified Water Distribution Operator will conduct all approved water service works is required (provide documentation with certification number on all records).
- Project Co shall maintain water service to properties at all times except for short durations during service line change overs (see Appendix A to this Attachment C for procedure requirements).
- Project Co will relocate water mains that will be removed to accommodate Construction for an extended period of time, with a temporary water main of existing capacity, or at least capable of supplying all domestic water demands and fire flow requirements for adjacent buildings serviced from the removed main, if this is less than existing.
- Some North/South water mains may be cut and capped without the need for a temporary relocation. A summary of mains that have been reviewed for potential cut and caps are shown in Appendix B to this Attachment C.
- Project Co will ensure that pressure and bacteriological testing is completed by a qualified independent 3rd party, and Project Co shall submit all test results to the City for acceptance prior to any tie-ins being completed.
- Project Co will submit a private property water disruption/shutoff procedure and communication plan for review by the City. Procedure and communication requirements are shown in Appendix A to this Attachment C.
- Project Co will manage communication related to water disruptions, including:
 - o Notifying the City in advance of any planned water disruptions to properties, and
 - o Notifying Vancouver Coastal Health of any restaurants, hotels, or community health or care facilities that will have a water disruption.
- For service connections and abandoned mains:
 - o At properties adjacent to the Project Site, where there are existing buildings, Project Co shall maintain, or replace on a Like-for-Like basis (as defined in the Municipal Agreement), existing utility service connections.
 - o For sites where properties are vacated due to demolition related to the Project work, service connections shall be re-established, unless agreed otherwise. If service connections need not be re-established, Project Co shall demonstrate to the City that service connections for future

development can be achieved with the proposed alignment and Station box structure.

- Upon disconnecting from the live system, Project Co may leave abandoned mains or service connections in place for water mains less than 450mm in diameter. Abandoned mains equal to or greater than 450mm in diameter shall be completely removed or filled by Project Co with Controlled Density Fill (CDF) if left in place.

City-Exclusive Works

The following are City-Exclusive Work (as defined in the Municipal Agreement) related to waterworks:

- Water main tie-ins to the City's live water system including tie-ins of new water mains, unless the City has provided site specific written approval for Project Co to complete work under inspection by the City.
- Conduct pre and post construction leak detection within 5 Business Days.
- Operate requested City main line valves within 2 Business Days.

SEWERS

The City's objective is to ensure that new sewers are sufficiently sized to last for at least a 100-year period (asset life of sewers). This means storm sewers should be designed accounting for potential climate change (2100 IDF curve) and sanitary sewers should be designed to meet the demand projected by regional and local growth demands.

Another City objective and Provincial mandate is to eliminate combined sewer overflows by the year 2050. As part of achieving this objective and as stated in the Metro Vancouver Liquid Waste and Resource Management Plan (LWMP), "Metro Vancouver will prohibit the construction of new combined sewer systems other than those functioning as part of a strategy to reduce combined sewer overflows or to manage stormwater quality". Therefore, if a combined sewer needs to be relocated, replaced, or eliminated, Project Co will endeavour to provide separated servicing.

In addition to the general standards and criteria above, the following applies to sewers (excluding service connections):

- For a storm sewer being suspended in place, an emergency response plan should be prepared in case the storm sewer leaks/breaks, and approved by the City of Vancouver prior to suspending the sewer
- Project Co will submit drawings illustrating what is proposed during excavation and Construction (e.g. temporary header pipes) to the City
- Project Co will conduct CCTV investigation of sewers post-Construction. In addition, Project Co should conduct CCTV investigations, before and after Construction, of the following areas:
 - o Impacted portions of pipe(s) which are suspended in place
 - o Pipe(s) immediately upstream of the impacted portions of pipe
 - o Pipe(s) immediately downstream of the impacted portions of pipe

The following are additional requirements for service connections and abandoned sewers:

- At properties adjacent to the Project Site, where there are existing buildings, Project Co shall maintain, or replace on a Like-for-Like (as defined in the Municipal Agreement) basis, existing utility service connections. Future storm/sanitary wyes are to be constructed for any lots that still have combined service.
- At properties adjacent to the Project Site, where there are no existing buildings, or where properties have been made vacant as a result of demolition undertaken as part of the Project Work, Project Co will not be required to provide or re-establish service connections, but shall demonstrate that future development service connections can be achieved with the proposed alignment and Station box structure envelope.
- Project Co is responsible for capping any abandoned services and removing abandoned service connections.
- Project Co will completely remove or fill abandoned mains in street with Controlled Density Fill (CDF).

**BROADWAY SUBWAY PROJECT
PROJECT AGREEMENT
SCHEDULE 4 PART 2 ARTICLE 8: UTILITIES
ATTACHMENT C**

***Commercial in Confidence
EXECUTION COPY***

City-Exclusive Works

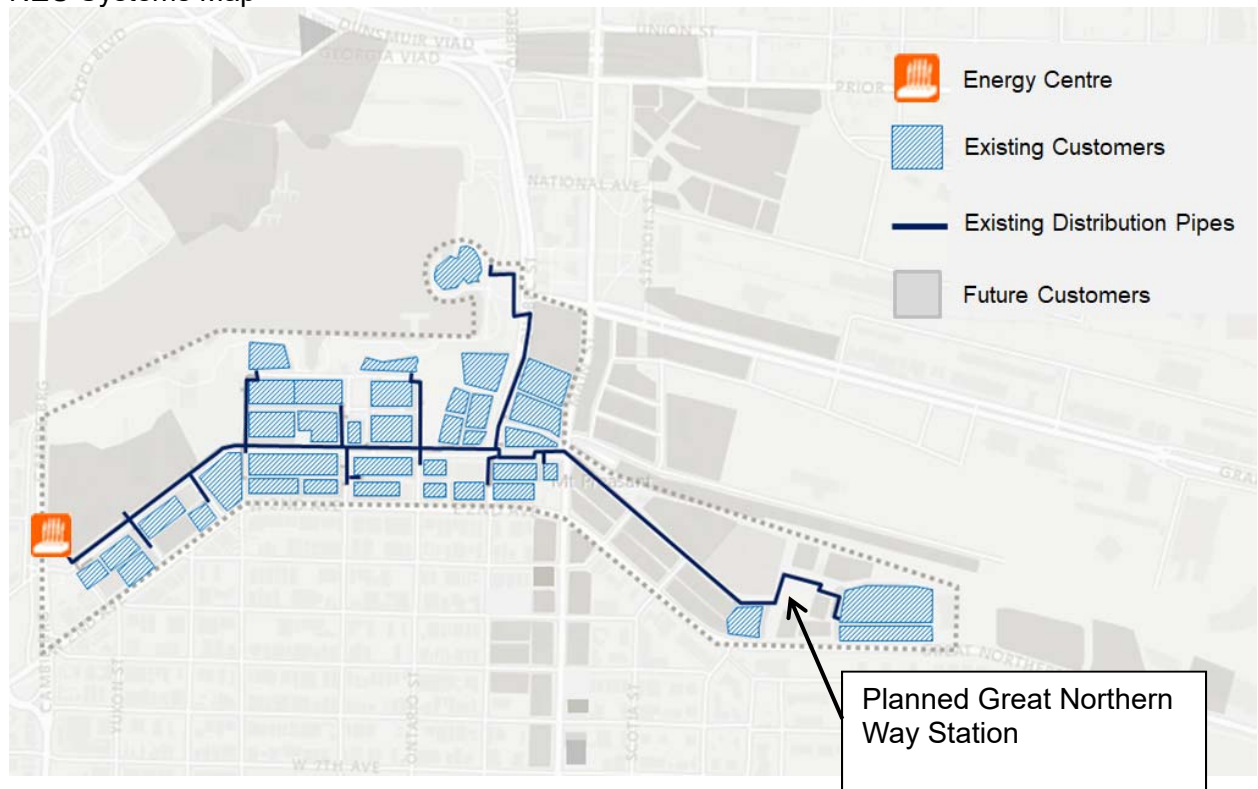
There are no "City-Exclusive Works" (as defined in the Municipal Agreement) related to sewer works.

NEIGHBORHOOD ENERGY UTILITIES (NEU)

In addition to the standard City Engineering Design Manual and City's Construction Specifications, Project Co shall carry out the Project Work in accordance with the NEU Distribution Piping Specifications.

The NEU is a district heating system which generates thermal energy from a centralized plant located underneath the Cambie Street Bridge to serve buildings in the False Creek area, including the Great Northern Way Campus Lands adjacent to the planned Broadway Subway station at Thornton Street (Great Northern Way Station). Thermal energy is distributed to buildings through a pressurized hot water piping network, and the energy is used for heating and hot water in the buildings.

NEU Systems Map



In the event that NEU hot water piping infrastructure is affected by the Project, the following summarizes the NEU's requirements, which Project Co shall comply with:

- Service to residential, institutional and commercial customer buildings must be maintained at all times.
 - o If a temporary shutdown of service is required, the following is required:
 - it must be limited to 6 hours, outside of peak use periods, as advised by the City of Vancouver
 - it cannot occur during the heating season (October-March)

- Project Co must notify the affected public and the City at least 1 week in advance of a temporary shutdown
- Project Co must coordinate the shutdown with NEU operators
- If necessary, a temporary boiler or temporary piping must be installed in order to prevent interruption of heat and hot water services to customer buildings.
- Project Co shall provide advance notification to the City when working within 2 m of NEU infrastructure to facilitate inspection of work
- Project Co shall expose NEU infrastructure with a hydro-excavator to confirm depth in advance of Construction
- If relocation of NEU infrastructure is required, Project Co shall submit an interim NEU servicing plan for City review, demonstrating how the NEU service will be maintained to all customers. Note that there is a long lead time required for NEU pipe working (~ 6 months) and a temporary boiler plant (~12-16months).
- Impacted infrastructure must be restored to its original condition upon project completion.
- All costs incurred to meet these requirements are to be borne by Project Co.

NEU design work shall be completed by a consultant demonstrating significant experience in district energy piping and/or energy generation. At a minimum, the consultant should demonstrate they have designed and acted as engineer of record on the installation of a minimum of:

- 2 km of logstor (or equivalent) district energy pipe
- 2 boiler plants (if a temporary plant is required)

If the installation of a boiler is required to ensure customer services are maintained, Project Co will be responsible for the capital cost, the installation, and the connection of the boiler, including connection of any necessary utilities to service the boiler plant (gas, hydro, water, sewer). The City will maintain the boiler at Project Co's expense. It is expected that the energy delivered meets the NEU's environmental performance target (currently 70% renewable energy). If using a gas boiler, this would be achieved by blending in renewable natural gas.

VANCOUVER ELECTRICAL DUCTS

Vancouver Electrical Duct (V.E.D.) is the City's communication system, including conduit, vaults, and fibre / copper cables which are connected to and integrated with the City's signal communications, CCTV system and other City amenities such as fire halls and community centres.

In addition to the standard City Engineering Design Manual and the City's Construction Specifications, specific requirements for V.E.D.s, which Project Co shall comply with, include:

- Conduits are to have no more than a 0.9m bend radius
- No more than 150m between maintenance holes
- submission of an inspection and test plan to the City prior to the commencement of work
- conduct reel testing prior to pulling the cable
- Service disruptions must not exceed 3 hours

Project Co shall ensure, at its own cost, that the following is performed by City crews by coordinating such work with the City:

- Splicing or tie-ins
- All testing, with the exception of reel testing

APPENDICES

Appendix A – Disruption to Private Property Water Service Procedure Requirements

The following requirements must be met by Project Co in order for permission to be granted by City for water disruption.

- The City must be provided with a proposed methodology, approximate schedule, and all required documentation listed below, a minimum of 10 Business Days prior to any work occurring on a water service.
- Submit a schedule to the City with details of expected water service interruptions, including
 - o address locations
 - o service materials and sizes
 - o expected date and duration of disruptions
- Proposed methodology to remove/adjust and reinstate water services.
- Proof that an Environmental Operators Certification Program (EOCP) certified Water Distribution Operator will conduct all approved water service works (provide documentation with certification number on all records).
- Documentation of all Project Co, Provincial, and City site contacts.

At a minimum Project Co's proposed methodology must include:

- Project Co must notify any affected residences and businesses, in writing, a minimum of 48 hours in advance of any interruption in Utility service. Businesses that will be significantly impacted (e.g. restaurants, dental offices) and large residential buildings should be notified directly 1 week in advance to ensure owners are able to take adequate steps to accommodate the disruption.
- Notify Vancouver Coastal Health of any restaurants, hotels, or community health or care facilities that will have a water disruption.
- Contact the City 3 Business Days in advance to schedule an inspector to be on site during all water related work
- Notify City (Water Dispatch) of any pre planned water disruptions 48 hours in advance or as soon as possible for emergency disruptions. Water Dispatch: 604 326-4803
- The day of disruption, before cutting off any specific water connection, knock on the doors of the affected residence, business, or building (as applicable) and attempt to notify them directly.
- Resume water service as soon as possible. Do not interrupt water service for more than 4 hours and confine this period between 0900 and 1600 hours unless otherwise coordinated with the property owner.
- Provide temporary servicing to those customers who cannot accommodate a service interruption during this period, such as restaurants, hair salons, hospitals, educational institutions, daycares, process industries, and photo labs, or schedule work so as to minimize disruption. Project Co is responsible for providing all temporary servicing materials and connecting the temporary servicing under the supervision of a City inspector.

- Flush and bleed the service line of air immediately after reconnecting the service line
- Have an EOCP certified Water Distribution operator conduct or directly supervise all approved works (provide documentation & record certification # on all records)
- Project Co will be responsible for any damages resulting from the turning on/off procedures
- If there are any complaints or concerns with respect to pressure or damage to or performance of the water connection after re-connection, any remedial action is Project Co's responsibility.

Appendix B – Potential Cut and Cap Locations

Note: A temporary cut and cap of each of the following mains were analyzed individually. If multiple mains are to be removed from service concurrently, additional analysis and approval from the City may be required.

Utility Description	Location Description	Comments
ELEVATED GUIDEWAY (WB STA 100+740 TO 99+950 APPROX.)		
300mm Water	Water main along utility easement crossing BNSF, 30m west of Carolina Street	Acceptable provided all hydrants remain in service and all service connections are maintained or temporarily serviced.
200mm Water	Water main along Fraser Street, north of Great Northern Way	Acceptable provided all hydrants remain in service and all service connections are maintained or temporarily serviced.
200mm Water	Water main along Foley Street, north of Great Northern Way	Acceptable provided all hydrants remain in service and all service connections are maintained or temporarily serviced.
200mm Water	Water main along Glen Drive, north of Great Northern Way	This main should not be capped. If it is crucial to cap this main, additional field work and analysis is required to determine if it is possible.
GREAT NORTHERN WAY STATION (STATION STRUCTURE: WB STA 101+070 TO 100+946)		
300mm Water	Water main along Thornton, north of Great Northern Way	Acceptable provided all hydrants remain in service and all service connections are maintained or temporarily serviced.
MOUNT PLEASANT STATION (STATION STRUCTURE: WB STA 101+920 TO 101+794)		
200mm Water	Water main along Quebec, at Broadway – N&S Legs	More information on the extents of a proposed cut and cap is required to determine if cut and capping this main is acceptable. At a minimum an additional hydrant may need to be installed on Broadway.
BROADWAY-CITY HALL STATION (STATION STRUCTURE: WB STA 102+804 TO 102+652 ; CROSS-OVER SHAFTS: WB STA 102+872 TO 102+860 and WB STA 102+610 TO 102+572)		
100mm Water	Water main along Cambie, at Broadway – N&S Legs	Acceptable. This main is intended to be abandoned prior to the start of BSP construction. If 500 W Broadway has not undergone redevelopment by prior to the start of construction then a temporary service connection may need to be provided to the property
600 mm Water	Water main along Yukon, at Broadway	This main may not be cut and capped or shutdown.
ARBUTUS STATION (STATION STRUCTURE C/W TAIL TUNNEL AND CROSS-OVER STRUCTURE : WB STA 105+640 TO 105+224)		
150mm Water / 200mm Water	Water main along Arbutus, at Broadway	Acceptable provided all hydrants remain in service, the hydrant N of Broadway is relocated, and all service connections are maintained or temporarily serviced.
150mm Water	Water main along Maple, at Broadway	Acceptable provided all hydrants remain in service and all service connections are maintained or temporarily serviced.

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Article 9. Roads

9.1 General

9.1.1 Scope

- (a) This Article 9 [Roads] specifies the requirements for the Design and Construction of:
 - (i) permanent new roads and roadway structures;
 - (ii) permanent restoration and modification of existing roads and roadway structures which form part of the Project Work;
 - (iii) hard and soft landscaping of certain roadway areas; and
 - (iv) the Arbutus Transit Exchange.
- (b) Without limiting any other provision of this Agreement, Project Co shall carry out the Design and Construction of the following in accordance with this Article 9 [Roads]:
 - (i) all permanent new roads and roadway structures;
 - (ii) permanent restoration and modification of existing roads and roadway structures;
 - (iii) hard and soft landscaping of certain roadway areas;
 - (iv) the Arbutus Transit Exchange; and
 - (v) coordination with the City and CMBC for the portion of the roadworks to be delivered by those parties in accordance with the scope split under Article 9.3 [Scope Split and Coordination with Other Roadwork] and Attachment A to this Article.
- (c) Traffic management, temporary road and detour requirements, and requirements for temporary signs, signals and Pavement Markings are set out in Part 4 [Traffic Management] of Schedule 4.
- (d) Road maintenance obligations of Project Co for all City roads are set out in Article 3 [Municipal Requirements], Part 1 of Schedule 4.
- (e) In addition to the green infrastructure required in Article 9.2 (b) (i) J. and Article 9.7.1 (e) (ii) in Schedule 4, Part 2, Article 9 [Roads], Project Co shall, in all other locations of the Project Work, install green infrastructure in accordance with Attachment C of this Article 9 [Roads], where there is no material cost or schedule impact to Project Co. If accommodation of the green infrastructure

requirements results in a material increase in Project Co's costs and schedule as compared to the requirements of this Agreement, including Article 9 [Roads], Article 4 [Structures], and Article 10 [Architecture] in this Part 2 of Schedule 4, Project Co shall prepare documentation detailing the incremental cost or schedule impact, for consideration by the Province to exercise a Province Change. Project Co shall coordinate with the City to complete the design and construction of any green infrastructure opportunity.

- (f) Project Co shall, in accordance with Article 2 [Design and Construction Certification Procedures], Part 3 of Schedule 4, submit to the Province's Representative the Interim Design documents related to Municipal Infrastructure work under the Review Procedure. Notwithstanding the requirements of Schedule 2 and Article 2, Part 3 of Schedule 4, Project Co shall ensure that with regard to the Interim Design or Final Design submission related to any Municipal Infrastructure, Project Co shall comply with the following:
 - (i) individual submissions are made for each Station Site;
 - (ii) a minimum of 5 Business Days between any Interim Design or Final Design submission.

9.1.2 Interpretation

- (a) For the purposes of this Article 9 [Roads], any reference to roads or roadway structures shall:
 - (i) include asphalt or concrete pavements, curbs and gutters, retaining walls, Pavement Markings, signage, sidewalks, pedestrian and roadway lights, street lighting, manhole and valve covers, fire hydrants, catch basins and catch basin leads, Street Furniture, surface water inlets and traffic and pedestrian control signs and Traffic Signals, Trolley Overhead poles and pole bases (excluding Trolley Overhead wires), and all other elements identified in Attachment A to this Article 9 [Roads], as they relate to public roadways; and
 - (ii) exclude Utilities.
- (b) Without limiting any other provision of this Agreement, if a road or roadway structure is disturbed or damaged during Construction, Project Co shall ensure that such road or roadway structure is restored on a Like-for-Like basis except as otherwise specified in Article 9.2 [Permanent Roadworks] of this Part 2.

9.1.3 Codes and Standards

9.1.3.1 Codes and Standards for On-Street Works

- (a) Project Co shall ensure that, unless otherwise specified in this Article 9 [Roads], the Design and Construction of new roads or roadway structures and changes to the configuration of existing roads and roadway structures which form part of the Project Work, conform to the:
 - (i) City of Vancouver Engineering Design Manual;
 - (ii) City of Vancouver Standard Detail Drawings;
 - (iii) City of Vancouver Construction Specifications - Supplementary Master Municipal Construction Documents (MMCD); and
 - (iv) TAC Manual of Uniform Traffic Control Devices for Canada (MUTCD).
- (b) If the City is unable or unwilling to provide the codes and technical standards which pertain to components of the roads and roadway structures within its jurisdiction, Project Co shall ensure that the Design and Construction of such components conform to the following, in decreasing order of precedence:
 - (i) TAC Geometric Design Guide for Canadian Roads;
 - (ii) the upper limit of the design domain values indicated in the TAC Geometric Design Guide, to the extent applicable to such components; and
 - (iii) Master Municipal Construction Documents (MMCD) Platinum Edition

9.1.3.2 Codes and Standards for Off-Street Works

- (a) Project Co shall ensure that the following are applied as appropriate to supplement the standards and specifications set out at Article 9.1.3(a) and 9.1.3.1(b) of this Part 2, as directed by the Province's Representative or as referred to in this Article 9 [Roads]:
 - (i) TransLink Bus Infrastructure Design Guidelines;
 - (ii) City of Vancouver Construction Specifications;
 - (iii) City of Vancouver Engineering Design Manual; and
 - (iv) the relevant Site Requirements regarding access to and egress from adjoining properties.

9.2 Permanent Roadworks

- (a) Project Co shall be responsible for the Design and Construction of all permanent roadworks necessary to accommodate the Project Work in accordance with this Schedule 4. and shall reinstate any disturbed road or roadway structure on a Like-for-Like basis except as otherwise specified in this Article 9 [Roads] and in particular, this Article 9.2(b) [Permanent Roadworks].
- (b) Project Co shall be responsible for the Design and Construction of the following permanent roadworks in accordance with the Permanent Roadworks Drawings and this Article 9 [Roads], including the following minimum requirements:
 - (i) Earl Finning Way from Fraser Street to Foley Street;
 - A. one eastbound lane and one westbound lane for general Traffic at a minimum width of 3.2m for each lane;
 - B. south sidewalk minimum width of 2.3m including 0.3m for back boulevard for offset from the southern property line, minimum 2.0m for sidewalk; the south side shall have a front boulevard for street trees with a minimum width of 1.35 m, except where required to accommodate guideway columns;
 - C. if a single column is used for the Guideway in this section, a greenway on the north side of the road shall be provided with a minimum width of 6.3 m, to include a 3.5m bicycle pathway, 0.6m buffer/separation, and 2.2m pedestrian pathway. The greenway on the north side shall have a minimum 1.35m wide boulevard, except where required to accommodate guideway columns;
 - D. if multiple columns, such as bent structures, are to be used for the Guideway, a greenway on the north side of the road shall be provided, and can be split with a minimum 2.2m wide pedestrian pathway placed north of the column, and a minimum 3.5 m wide bicycle pathway and a minimum 0.6m wide boulevard as a utility strip between the bicycle pathway and the westbound lane, placed south of the column. The greenway on the north side shall have a minimum 1.35m boulevard between the bicycle and pedestrian pathways, except where required to accommodate guideway columns;
 - E. remaining space in the road width is to be used to accommodate column placement and appropriate shy distances or shall be used for wider boulevards where not required;

- F. a single column for the Elevated Guideway is preferred, and the Province will allow flexibility for column placement and variations in minimum widths, in order to facilitate a single column configuration, to be submitted under the Consent Procedure;
 - G. maintain straight horizontal alignments for the pedestrian and bicycle pathways;
 - H. vertical clearances over the Early Finning Way roadway, pedestrian and cyclist connections, and intersection with adjoining streets, shall be as set out in Table 3.4.4 of Article 3 [Alignment] of this Part 2. Horizontal offsets from the Elevated Guideway columns shall be a minimum of 1m from the column to the travel lane; and
 - I. columns from the Elevated Guideway shall be clear of the north / south intersecting streets for the 20 m wide road width on Earl Finning Way including Fraser Street and Foley Street
 - J. provision of green infrastructure in Earl Finning Way, in a form and with specifications equivalent to the Attachment C [City of Vancouver - Green Infrastructure Requirements] of this Article; and
 - K. Existing utilities can remain in place, unless such utilities are in conflict with the Elevated Guideway columns. In addition, the Elevated Guideway columns must be located to provide a minimum of 5.0 m horizontal clearance to utility manholes, and a minimum 1.0 m clearance from column foundations to watermains, or relocation of these utility elements are required by Project Co to achieve these clearances.
- (ii) East 1st Avenue:
- A. one eastbound lane and one westbound lane for general Traffic at a minimum width of 3.2m for each lane;
 - B. single parking lane of 2.5m that can be located on the north or south side that does not conflict with the high rail access set out in Article 3.7.5 [High Rail Vehicle Access] of Part 2 of Schedule 4;
 - C. coordination of the roadworks with the high rail access onto the elevated Guideway from East 1st Avenue as set out in Article 3.7.5 [High Rail Vehicle Access] of Part 2 of Schedule 4;
 - D. restoration of the vehicle roundabout on East 1st Avenue, located approximately 60 metres east of Thornton Street, on a Like-for-

Like basis, while accommodating the grades requirements as set out in this Agreement; and

- E. connect East 1st Avenue to Thornton Street overtop of the proposed cut and cover Tunnel, while accommodating the grades requirements as set out in this Agreement;
- (iii) Thornton Street:
- A. restoration of Thornton Street, north of Great Northern Way on a Like-for-Like basis.
- (iv) Project Co shall restore the Broadway road corridor on a Like-for-Like basis, except at the Station locations, where Project Co will restore the road in accordance with the City's future Broadway concept plans as shown in Permanent Roadworks Drawings, including the following:
- A. Restoration of the curb location shall be at the existing curb locations, except for curbs which shall be moved to locations marked as revised curb, all as shown in the Permanent Roadworks Drawings;
 - B. Project Co shall carry out the Design and Construction of these sections of road generally with 6 lanes of Traffic, traffic lane widths, left turns bays, and sidewalk widths as shown in the Permanent Roadworks drawings.
 - C. The sidewalk shall be restored between the property line and revised curb, unless noted otherwise on the Permanent Roadworks and Zones drawing or Conditions of Access for that property provided as Disclosed Data
 - D. Project Co will coordinate the Design and location of poles, fire hydrants, Street Furniture, street trees, and other surface features into the utility strip of the sidewalk so as to maximize the clear width of the sidewalk.
 - E. Project Co shall coordinate the Design and Construction of the roads with the location of tunnel ventilation grilles and emergency exit stairwells located in the road, and with the DAP outlined in Article 10.1.4 [Design Advisory Process], and Appendix H [Design Advisory Process] of this Schedule 4.
 - F. The City is conducting a street design consultation process for the roads at the Station locations, and the City will have a street design concept completed by the end of 2020, and a finalized geometric design for these sections of road completed by July 31, 2021. Project Co shall coordinate the Design of the road with the

City, and incorporate the City's street design concept and finalized geometric design into the Design and Construction of the road where there is no material cost or schedule impact to Project Co. If accommodation of the City street design concept and finalized geometric design into the Design and Construction results in a material increase in Project Co's costs and schedule as compared to the Permanent Roadworks Drawings, Project Co shall prepare documentation detailing the incremental cost or schedule impact, for consideration by the Province to exercise as a Province Change.

- (v) Project Co shall be responsible for the Design and Construction of the permanent roadworks associated with Arbutus Station, including street modifications to Arbutus Street, 8th Avenue, and Broadway in accordance with the Permanent Roadworks Drawings and this Article 9.7 [Arbutus Transit Exchange].
- (c) Project Co may utilize the existing Pedestrian and Cyclist pathway located immediately east of Arbutus Street, between 8th Avenue and 10th Avenue, (the Arbutus Greenway) on a temporary basis to accommodate the Project Work in accordance with the requirements of Schedule 4, Part 4 [Traffic Management] and Schedule 8 [Lands]. Project Co will complete the Design and Construction of the permanent restoration of the Arbutus Greenway on a Like-for-Like basis unless otherwise specified in this Article 9 [Roads].
- (d) The existing Pedestrian and Cyclist pathways and facilities along Great Northern Way, Thornton Avenue, and East 1st Avenue are part of the pathway known as the Central Valley Greenway. The Central Valley Greenway adjacent to Thornton Avenue, between Great Northern Way and East 1st Avenue, will be closed off during construction. Project Co shall re-route the Central Valley Greenway along Great Northern Way (west of Thornton Street) and reconnect to East 1st Avenue via Scotia Street. The Central Valley Greenway shall be rerouted to accommodate the Project Work in accordance with the requirements of Schedule 4, Part 4 [Traffic Management]. Project Co shall provide wayfinding signage for any temporary Central Valley Greenway detours. Project Co shall be responsible for the Design and Construction of the permanent restoration of the Central Valley Greenway on a Like-for-Like basis along the alignment that existed as of the Effective Date.
- (e) Project Co will be responsible for completing all asphalt roadway restoration in accordance with the City's requirements and specifications set out in Article 9.1.3 [Codes and Standards], for all roadways removed or damaged during Construction. In addition to any asphalt restoration that Project Co shall provide as set out in the Permanent Roadworks Drawings or as required due to utility or

road work undertaken by Project Co during construction activities, Project Co shall, as a minimum:

- (i) mill and overlay asphalt roadway surfaces to provide crossfalls and grades for drainage and smoothness as necessitated by any road alignment or widening;
- (ii) install and perform adjustments to roadway surface elements, such as manholes, valve boxes, and other surface elements, to the final pavement elevation with asphalt ramping as required for traffic over the high base finish;
- (iii) mill and overlay roadways with asphalt at a minimum thickness of 50mm at the limits and locations shown in the Permanent Roadworks Drawings for the portions of the road beyond the asphalt roadway restoration. Project Co shall be responsible for all additional mill and overlay of roadways beyond the limits and locations set out in the Permanent Roadwork Drawings, where Construction, including temporary road modifications to accommodate Traffic Management Plans, have damaged or reduced the life of the road pavement, or for any section of the road where temporary pavement and paint markings have been installed for various Traffic Management Plans as part of the Project;
- (iv) notwithstanding the requirements set out in Articles 9.2(e)(i) through 9.2(e)(iii) of this Part 2, prior to the required asphalt mill and overlay, be responsible for addressing any localized areas exhibiting severe rutting through additional milling or asphalt levelling course; and
- (v) undertake pavement restoration for utility trenches and roadworks, in accordance with the pavement restoration requirements set out by the City's requirements and specifications set out in Article 9.1.3 [Codes and Standards], which shall include:
 - A. asphalt overlay over the restoration trench section or roadworks and adjacent existing pavement, such that the asphalt overlap over the existing pavement is at least 200mm in compliance with MMCD;
 - B. in the case of a roadway cut that is parallel to the lane lines, mill of the existing roadway with a finished asphalt surface to the centreline, or the full width of the travelled lane affected by such roadway cut, whichever is applicable. For the section of West Broadway between Cambie Street and Yukon Street, the sidewalk shall be restored between the property line and revised curb; and
 - C. the restoration of all cross utility cuts in compliance with MMCD.

- (vi) Project Co shall be responsible for all street trees and soft landscaping in accordance with this Article 9 [Roads], including Article 9.4.8 [Soft Landscaping].

9.3 Scope Split and Coordination with Other Roadwork

- (a) Without limiting Project Co's scope of work provided in Article 6 [Work by Others], Part 1 of Schedule 4, Project Co shall be responsible for the coordination of the Project Work required in this Article 9 [Roads] with any conflicting or adjacent roadworks which are not the responsibility of Project Co.
- (b) Project Co shall perform all portions of the roadwork removal works and coordinate all other roadwork removal works performed by the City, CMBC, and other parties, in accordance with the scope split matrix provided in Attachment A, and Attachment B of this Article 9 [Roads].
- (c) Project Co shall be responsible for the Design and Construction of all permanent road or road structure restoration on a Like-for-Like basis unless otherwise provided in this Article 9 [Roads].
 - (i) Project Co shall be responsible for the Design and Construction of all permanent road or roadway structure restoration identified under "Project Co" in the scope split matrix provided in Attachment A [Permanent Roadworks Scope Split for Traffic Signals, TSMS Fibre Communications and Street Lighting] of this Article. Project Co shall be responsible for coordinating with the City, CMBC, and other third parties when those parties are designated as the responsible party for any corresponding activity listed in Attachment A [Permanent Roadworks Scope Split for Traffic Signals, TSMS Fibre Communications and Street Lighting] and Attachment B [Permanent Roadworks Scope Split-Removals and Restoration] of this Article. For clarification, reinstatement of parking meters will be as set out in Attachment B of this Article, and Project Co shall be responsible for reinstating the parking meter sleeves (for individual meters or pay stations, as applicable) in coordination with the City.
 - (ii) Project Co shall be responsible for the Design and Construction of any underground conduits or electrical services to support the restoration of any street elements removed for Construction. Project Co shall be responsible for coordinating with the City and any other parties designated as the responsible party for any corresponding activity listed in Attachment A [Permanent Roadworks Scope Split for Traffic Signals, TSMS Fibre Communications and Street Lighting] of this Article.

- (iii) Project Co shall be responsible for the Design and Construction of all permanent Traffic Signal items identified under the “Project Co” column in the scope split matrix provided in Attachment A [Permanent Roadworks Scope Split for Traffic Signals, TSMS Fibre Communications and Street Lighting] of this Article. Project Co shall be jointly responsible for the Design and Construction of all new permanent Traffic Signal items identified under the “City and Project Co” column in the scope split matrix provided in Attachment A [Permanent Roadworks Scope Split for Traffic Signals, TSMS Fibre Communications and Street Lighting] of this Article. Project Co shall be responsible for coordinating with the City when the City is designated as the responsible party for any corresponding activity listed in Attachment A [Permanent Roadworks Scope Split for Traffic Signals, TSMS Fibre Communications and Street Lighting] of this Article.

9.4 Design Guidelines for Work by Project Co

9.4.1 Geometric Design

- (a) For the roads and roadway structures in which it is the Project Co’s responsibility to complete the geometric design, the Project Co shall ensure that the geometric design criteria for permanent roads and roadway structures, intersections, accesses, sidewalks, curbs and gutters are in accordance with the City of Vancouver Engineering Design Manual, unless otherwise specified in this Article 9 [Roads].

9.4.2 Transit Facilities

- (a) Without limiting Article 6 [Work by Others] of Part 1 of Schedule 4 and Article 18 [Integration with Existing Transit Facilities] of this Part 2, and, unless otherwise specified in this Article 9 [Road], Project Co shall ensure that the Design and Construction of all new or reconstructed on-street transit facilities which form part of the Project Work are in accordance with the TransLink Bus Infrastructure Design Guidelines and the City of Vancouver Engineering Design Manual, including accommodation of concrete Bus pads, and Bus shelter requirements for electrical services. Project Co shall be responsible for consulting with TransLink on any proposed permanent relocation of on-street Bus stops. Project Co shall submit any proposed permanent relocations of on-street Bus stops to the Province’s Representative for acceptance, acting reasonably, in accordance with the Consent Procedure.
- (b) Project Co shall restore, or shall cause CMBC to restore (as applicable), the roads and Trolley Overhead infrastructure as soon as possible to enable the completion

of the Trolley Overhead work by CMBC and the restoration of the trolley bus service on Broadway. Project Co shall coordinate the geometric road design with CMBC and the City as set out in Article 9.4.9 [Trolley Overhead Work] of this Part 2.

- (c) Project Co shall be responsible for the Design and Construction of the Arbutus Transit Exchange as specified in Article 9.7[Arbutus Transit Exchange] of this Part 2.

9.4.3 Pavement Structure Design

- (a) Project Co shall ensure that the Design and Construction of pavement restoration for existing roads and roadway structures which form part of the Project Work are undertaken on a Like-for-Like basis, unless otherwise specified in Article 9.2 [Permanent Roadworks] of this Part 2.
- (b) Project Co shall ensure that the Design and Construction of the pavement structure for all reconstructed and new roads undertaken as part of the Project Work, including changes to the configuration of existing roads, is undertaken in accordance with the City's requirements and specifications in Article 9.1.3 [Codes and Standards], including the pavement structure design requirements outlined in the City of Vancouver Engineering Design Manual.

9.4.4 Signs and Pavement Markings

- (a) Project Co shall, as the case may be, Design, install, affix or make all permanent Signs and Pavement Markings required for roads and roadway structures in accordance with the standards and specifications in Article 9.1.3 [Codes and Standards], unless otherwise specified in this Article 9 [Roads].
- (b) For the re-instatement of Bus stop signs, all signs will be fabricated by CMBC. Project Co will be responsible for the installation of bus stop post sleeves provided by CMBC and installed to CMBC's specifications.

9.4.5 Roadway Lighting

- (a) Project Co shall ensure that the Design and Construction of all roadway lighting which forms part of the Project Work is in accordance with the design guidelines, codes and standards of the City as provided in Article 9.1 [General], unless otherwise specified in this Article 9 [Roads]. Project Co shall provide roadway lighting to current City standards, including LED lighting. For certainty, roadway lighting includes both street and Pedestrian lighting along the road.
- (b) Project Co shall ensure that all roadway lighting provided as part of the Project Work operates independently from lighting provided for transit facilities.

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- (c) Project Co shall ensure that there is sufficient electrical power available for all roadway lighting and shall coordinate with the relevant power Utility Suppliers for all required servicing for any new or additional roadway lighting and, in this regard, Project Co shall provide a list of all electrical loads to the power Utility Suppliers, as required.
- (d) Project Co shall ensure that the Design and Construction of all roadway lighting for:
 - (i) new roads; or
 - (ii) existing roads, where the lighting levels have been impacted by the Project Work,complies with the requirements and specifications outlined in Article 9.1.3 [Codes and Standards].

9.4.6 Traffic Signals

- (a) Project Co shall:
 - (i) ensure that the Design and Construction of all permanent Traffic Signals which form part of the Project Work are in accordance with the design guidelines, codes and standards of the City, unless otherwise stated in this Article 9.4.6 [Traffic Signals], and in accordance with the scope split matrix for Traffic Signals in Attachment A [Permanent Roadworks Scope Split for Traffic Signals, TSMS Fibre Communications and Street Lighting] of this Article. Project Co shall be responsible for the coordination of the work to be performed by the City as provided in this Article and the Attachments to this Article; and
 - (ii) provide new Traffic Signals and upgrade Traffic Signals, all as identified in Article 9.3 [Scope Split and Coordination with Other Roadwork] of this Part 2.
- (b) Project Co shall consult with the City and the Province's Representative with regard to any permanent modifications that may be required to existing municipal Traffic Signals.
- (c) Project Co shall supply and install all Traffic Signal components required for all new or modified Traffic Signals, in accordance with the scope split matrix for Traffic Signals in Attachment A [Permanent Roadworks Scope Split for Traffic Signals, TSMS Fibre Communications and Street Lighting] of this Article,
- (d) Project Co shall coordinate all of the work to be undertaken by the City as identified in the scope split matrix for Traffic Signals in Attachment A [Permanent Roadworks Scope Split for Traffic Signals, TSMS Fibre

Communications and Street Lighting].Project Co shall obtain any additional traffic data that may be required for analysis and signal timing design purposes.

- (e) Project Co shall ensure that there is sufficient electrical power available for all new or upgraded Traffic Signals and shall coordinate with the relevant power Utility Suppliers for all required servicing for any new or additional Traffic Signals and, in this regard, Project Co shall provide a list of all electrical loads to the power Utility Suppliers, as required.
- (f) Project Co shall coordinate with the Province to ensure that the Province has an opportunity to inspect all work undertaken, or caused to be undertaken, by Project Co on Traffic Signal infrastructure and Traffic Control devices.

9.4.7 Pedestrian and Cycle Facilities

- (a) Project Co shall reinstate or replace all existing Pedestrian Facilities and Cycling Facilities disturbed by the Project Work on a Like-for-Like basis and to a standard that will provide service, including space requirements, accessibility and connectivity, at least equal to the condition thereof at the Effective Date, except as otherwise stated in this Schedule 4.

9.4.8 Soft Landscaping

- (a) Project Co shall restore soft landscape components on a like-for-like basis unless otherwise stated on the Permanent Roadworks Drawings ; and
- (b) For all soft landscaped areas to be constructed by Project Co in accordance with this Article 9 [Roads], Project Co shall be responsible for:
 - (i) providing all soft and hard landscaping in those soft landscape areas to be constructed by Project Co as part of the permanent roadworks restoration as set out in this Article, and on a Like-for-Like basis;
 - (ii) supplying and installing all soft landscaping, including street trees, in accordance with the City's standard(s) referenced in Article 9.1.3 [Codes and Standards] of this Part 2 and the additional requirements set out in Article 9.4.8[Soft Landscaping] of this Part 2. Where the City does not have standards for any specific component of the soft landscaping, the applicable standards shall be those set out in the Canadian Landscape Standard produced by the Canadian Society of Landscape Architects. Project Co shall be responsible for replacing street trees on value for value replacement basis that are a minimum of caliper size of 100 mm, and Project Co shall coordinate with the City to determine the tree species. Project Co shall be responsible for designing and installing street trees in

accordance with the City of Vancouver standards, including tree grates, root barriers, and growing medium;

- (iii) providing tree protection for street trees in accordance with the City tree protection requirements and specifications provided in Article 9.1.3 [Codes and Standards], for trees in the vicinity of the Construction, and may be susceptible to damage. Project Co will replace any street trees damaged by Construction;
- (iv) providing for watering and a 1 year survival warranty for the trees and landscaping installed by Project Co from substantial completion of the road, and shall replace any trees or landscaping that does not survive the 1 year warranty period;
- (v) consulting with the Province when developing the planting layouts of the various soft landscape areas, including the selection of the species of shrubs and trees to be planted; and
- (vi) unless otherwise agreed with the Province, supplying the following mix of soft landscaping within the new centre road medians and curb bulges on a Like-for-Like basis, unless otherwise specified in the Permanent Roadworks Drawings. Project Co shall co-ordinate with the City, and submit a planting plan layout to the Province, in accordance with the Review Procedure, for all soft landscape areas to be constructed by Project Co.

9.4.9 Trolley Overhead Work

9.4.9.1 General

- (a) The Trolley Overhead works includes the removal and reinstatement of Trolley Overhead infrastructure as set out in Article 6 [Work by Others] of Part 1 of Schedule 4. Trolley Overhead infrastructure includes trolley pole foundations, steel trolley poles, and Trolley Overhead wires to power trolley bus operation (which include the running wires, guy wires, switches, and DC feeder cables).

9.4.9.2 Trolley Overhead Removals

- (a) Trolley Overhead wire removals will be undertaken as Advance Work or Concurrent Works as described in Schedule 4 Part 1 Article 6 [Work by Others].
- (b) For the areas where CMBC has removed Trolley Overhead wires as per Article 9.4.9.2(a) above, Project Co shall be responsible for removal and disposal of the existing Trolley Overhead foundations and steel poles, as required to perform the Project Work in accordance with Articles 6.2.3.2(b) and 6.2.3.3 of Part 1 of Schedule 4. If Trolley Overhead poles are retained, the poles shall be maintained

in place without damage, and Project Co shall coordinate with CMBC regarding the suitability of reusing the poles during the reinstatement works. Project Co shall be responsible for replacement of any Trolley Overhead poles and foundations damaged by Project Co in the performance of the Project Work.

- (c) Project Co shall coordinate with the City and the appropriate third parties to ensure the timely removal or relocation of any City or third-party infrastructure currently accommodated on the poles, including in accordance with this Article 9 [Roads] and Article 8 [Utilities] of Part 2 of Schedule 4, and Article 1 [General Traffic Management Requirements] of Part 4 of Schedule 4. Drawings showing the existing poles that accommodate third party infrastructure and the Utility Information Sheets with utility company contact information are provided as Disclosed Data.

9.4.9.3 Trolley Overhead Reinstatement

- (a) Project Co shall reinstate Trolley Overhead poles and foundations on a Like-for-Like basis, including in the locations identified on the CMBC Trolley Overhead removal and retention drawings provided in Disclosed Data, in accordance with this Article 9 [Roads] of Part 2 of Schedule 4, and Article 6 [Work by Others] of Part 1 of Schedule 4.
- (b) Project Co shall be responsible for the Design of the permanent roadworks in accordance with Article 9.2 [Permanent Roadworks], including any modifications to the curb geometry on Broadway. As part of the IDR1 and IDR2 submissions for roadworks, Project Co shall be responsible for coordinating and incorporating input from the City and CMBC on the layout and size of the Trolley Overhead poles and foundations for the permanent road re-instatement. Project Co shall provide evidence of CMBC acceptance on the layout and size of the Trolley Overhead foundations and poles, as a requirement of the FDR submission of roadworks.
- (c) Trolley Overhead wire reinstatement will be undertaken as Concurrent Works as described in Schedule 4 Part 1 Article 6 [Work by Others]. Project Co shall be responsible for the supply, installation, and reinstatement of Trolley Overhead foundations and steel poles in accordance with Article 9.4.9.3(d) and 9.4.9.3(e) of this Part 2.
- (d) Project Co shall supply and install Trolley Overhead foundations, including anchor bolts and foundation cages, in the locations as described in Article 9.4.9.3(a) of this Part 2 unless modified by Article 9.4.9.3(b) of this Part 2. Project Co shall ensure the following conditions are met:
 - (i) site specific foundation design for the reinstatement works shall consider the CMBC loading nominated in CMBC standard foundation details, any

- third party infrastructure affixed to the trolley poles, and shall be suitable for the ground conditions on site (CMBC standard foundation details for the A3E, A7E, A20E, and A23E Trolley Overhead poles are provided as Disclosed Data). An integrated foundation design shall be provided by Project Co where the reinstatement location conflicts with the underground Station infrastructure or Utilities;
- (ii) grounding electrodes required for the Trolley Overhead foundation bases shall be procured from the City;
 - (iii) coordination is undertaken with the appointed CMBC survey representative to confirm Trolley foundation elevations and these shall be reflected on all submissions for roadworks;
 - (iv) foundation excavation and backfill shall be in accordance with the 2016 Standard Specifications for Highway Construction Volume 1 and 2. Foundation excavations shall be verified by a suitably qualified geotechnical engineer during Construction; and
 - (v) the top surface of the Trolley Overhead foundation shall be sloped away from the road and raked as described on the CMBC Trolley Overhead foundation drawings and the CMBC Foundation Rake Tables provided as Disclosed Data. Project Co shall verify the rake on the top surface of each foundation. CMBC may undertake a field review during construction to verify the rake on the top surface of each foundation. Project Co shall provide a minimum 24 hours' notice to CMBC prior to casting the Trolley Overhead foundations. Any remediation works as a result of the CMBC field review shall be undertaken by Project Co, at its cost, prior to casting.
- (e) Project Co shall supply and install Trolley Overhead poles in the locations as described in Article 9.4.9.3(a) of this Part 2 unless modified by Article 9.4.9.3(b) of this Part 2. Project Co shall ensure that Trolley Overhead poles shall be supplied with flanges to support any third-party infrastructure, such as streetlights, Traffic Signal masts, and Utilities. Project Co shall coordinate with the City and the appropriate third parties to ensure that restoration of infrastructure is in accordance with Article 8 [Utilities] of Part 2 of Schedule 4.
 - (f) Project Co shall plan its schedule to allow for procurement of any long lead items required for the reinstatement works. A minimum 9 month lead time is to be anticipated for the procurement of Trolley Overhead poles, and a minimum 3 month lead time for procurement of anchor bolts in the Trolley Overhead foundation cages.

9.5 Roads Crossing Over Structures

- (a) Project Co shall ensure that the Design and Construction of roadway crossings over the Guideway and the Station structures:
 - (i) provide for sufficient cover to separate the roadway from the transit structure so as to prevent reflective cracking;
 - (ii) allow for future road rehabilitation to be undertaken without damaging the Guideway or Station structure; and
 - (iii) provide for a minimum of 1.5m cover to separate the roadway from the Guideway or Station structure.
- (b) Project Co shall ensure that the total and differential settlement of pavement surfaces of roads crossing over the Guideway or Station structures over a 20 year period following Substantial Completion shall be such that:
 - (i) the smoothness of the vertical profile and cross-slope requirements are met; and
 - (ii) ponding and the sheeting of water is prevented.
- (c) Project Co shall ensure that any temporary structures used for Tunnel and Guideway construction and associated traffic management at the Station sites are removed.

9.6 Roadway Clearances from Structures

- (a) Project Co shall ensure that the Design and Construction of all roadways, including driveways, which cross under or are adjacent to the Guideway and other structures which form part of the Project Infrastructure to the extent that such infrastructure has been constructed, installed, altered, upgraded and/or augmented by the carrying out of the Project Work, satisfy the vertical and lateral clearance requirements set out in Article 3 [Alignment] of this Part 2.

9.7 Arbutus Transit Exchange

Arbutus Transit Exchange means the new bus exchange located on the north-east corner of Broadway and Arbutus Street, around the Arbutus Station headhouse (the “**Arbutus Transit Exchange**”). The bus exchange will serve as the eastern terminus of the 99 B-line bus service.

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- (a) Project Co shall be responsible for the Design and Construction of all Project Work associated with the Arbutus Transit Exchange as shown in the Reference Concept plan for the Arbutus Transit Exchange and the associated permanent road improvements in Permanent Roadworks and Zones Drawings, including the following:
 - (i) off-street bus exchange;
 - (ii) on-street improvements on Arbutus Street, West Broadway, and 8th Avenue, including the associated signal modifications; and
 - (iii) any additional requirements beyond the Station Plaza as set out in this Article.

- (b) Without limiting any other provision of this Agreement, Project Co shall carry out the Design and Construction of:
 - (i) all bus exchange infrastructure, including pavement, Bus pads, Bus shelters, furniture, lighting, signage, and Pavement Markings;
 - (ii) all permanent new roads and roadway structures;
 - (iii) permanent restoration of existing roads and roadway structures in accordance with this Article 9; and
 - (iv) hard and soft landscaping within the permanent works limit of the Arbutus Transit Exchange and Station Plaza as shown in Reference Concept Plan for the Arbutus Transit Exchange in Permanent Roadworks Drawings,

in accordance with this Article 9 [Roads].

- (c) Elements of the work to be completed by others are noted under Article 9.3 [Scope Split and Coordination with Other Roadwork] of this Part 2, and as noted in the Reference Concept plan for the Arbutus Transit Exchange.

- (d) The requirements in this Article 9 [Roads] supplement the requirements for Station plazas contained in Article 10 [Architecture] of this Part 2.

9.7.1 Off-Street Bus Exchange Requirements

- (a) Project Co shall be responsible for the Design and Construction of the off-street bus exchange, which shall be in accordance with the TransLink Bus Infrastructure Design Guidelines, and shall include the following:

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- (i) designed to accommodate the bus turning movements for a diesel articulated Bus with bike rack, and standard new flyer (non-articulated) bus with bike rack;
 - (ii) a pick up platform on the east side of the Arbutus Station to accommodate two articulated Buses, and to satisfy the requirements defined in Article 9.7.1(c) of this Part 2;
 - (iii) a drop off platform on the west side of the Arbutus Station within the Arbutus Street right of way to accommodate two articulated Buses, and to satisfy the requirements defined in Article 9.7.1(d) of this Part 2;
 - (iv) the east curb of the Arbutus Transit Exchange shall be a C4.1 Type A Concrete Curb detailed in the City of Vancouver Engineering Standard Detail Drawings. The east curb must be within the Permanent Project Lands, but the bus overhang can encroach onto the Arbutus Greenway beyond the Permanent Project Lands;
 - (v) the north curb of the Arbutus Transit Exchange shall be a C4.1 Type A Concrete Curb detailed in the City of Vancouver Engineering Standard Detail Drawings. The north curb must be set back from the north private property line sufficient to contain the bus turning movement overhang wholly within the private property parcel without encroaching onto the 8th Avenue road right-of-way;
 - (vi) a pedestrian fence along the northern boundary of the Arbutus Transit Exchange to prevent pedestrians from entering the bus loop other than at the designated crosswalks, and set back sufficiently to prevent damage from turning bus movements. The fence shall comply with the following requirements:
 - A. be a minimum of 1.2 metre in height;
 - B. the fence set out on the north boundary shall be offset from the north curb by a minimum 0.5 metre, provide a minimum 1 metre clearance around the vista vault on 8th Avenue, and be within the private property parcel;
 - C. the fence installed along the northern boundary will be equivalent to the specifications for the fence provided for the Burquitlam Bus Loop (drawings of which are provided as Disclosed Data), and shall be supplied and installed by Project Co;
- (b) The curb lines in the Reference Concept plan for the Arbutus Transit Exchange and the Permanent Roadworks and Zones Drawings have been field tested by Coast Mountain Bus Company (CMBC) to accommodate the bus turning movements outlined in Article 9.7.1(a) of this Part 2, and Project Co shall apply

and confirm the required turning templates for bus movements in the Design. Variations in the curb lines from the Reference Concept plan for the Arbutus Transit Exchange and the Permanent Roadworks and Zones Drawings will need to be submitted under the Consent Procedure, with supporting documentation including bus turn templates, and may need to have a CMBC field test of the design to confirm the bus movements. Any costs associated with additional field test shall be borne by Project Co.

- (c) Project Co shall be responsible for the Design and Construction of the Arbutus Transit Exchange, which shall include a bus pick up platform on the east side of the Arbutus Station in accordance with the following requirements:
- (i) a minimum width of 6.25 m between the Station headhouse and the curb to include:
 - A. 2.5 m clear zone from the Station headhouse (this includes a 1.5 m clear zone for Pedestrian circulation through space, and a 0.5 m shy distance on either side);
 - B. 3.0 m wide by 44.0 m long queue space (the queue area shall accommodate a 0.8 m wide base for a stand-alone shelter including 0.3 m deep leaning rails); and
 - C. 0.75 m shy distance from curb;
 - (ii) space for two articulated bus positions with independent departures, with the south position as the designated pick-up position for the Off-Street Bus Exchange;
 - (iii) provision for a bus passing lane with sufficient width to accommodate independent departure and arrival of either a standard or articulated bus passing a stopped standard or articulated bus in either bus bay position;
 - (iv) 3.0 m wide by 55 m long concrete bus pad, in accordance with CMBC's Concrete Pavement Specification;
 - (v) minimum pavement width of 8.35 m between the east and west curb faces to include the following:
 - A. 3.5 m wide stopping lane;
 - B. 3.5 m wide passing lane; and
 - C. 1.35 m for front of bus overhang'
 - (vi) as part of the Arbutus Station headhouse, in accordance with Article 10 [Architecture] of this Part 2, the provision of weather protection canopy such that the Station canopy extends to overlap the bus shelter canopy identified in Article 9.7.1(c)(vii) of this Part 2, and the overlap shall

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provide continuous weather protection to passengers and an angle of coverage at a minimum of 30 degrees from the vertical, as measured from the outside edge;

- (vii) the supply and installation of Bus shelters shall comply with the following minimum requirements:
- A. in a form and with specifications equivalent to that provided in the Arbutus 99-B-line Bus Shelter Detailing Drawing and the Commercial-Broadway 99 B-line Station IFT Drawings (both of which are provided as Disclosed Data), and to satisfy the functional requirements defined herein. RAL 9006 is the preferred paint colour for all steel work. Project Co shall demonstrate that TransLink has been consulted with on the design of the bus shelters, and shall provide the Province with evidence of such consultation;
 - B. column spacing shall be a minimum of 5 m and selected to provide adequate structural support to the canopy, accommodate passenger boarding and alighting movements, align with the queue indication ground markings, and be positioned such that the columns are equidistant for adjacent leaning rails. Reference is made to the Arbutus 99 B-line station queue marking Drawings provided as Disclosed Data;
 - C. a minimum canopy 4m wide by 44m long to provide weather protection to cover the queue length and width defined in Article 9.7.1(c)(i) of this Part 2;
 - D. provide a concealed stormwater pipe within each Bus shelter drainage pole, a minimum 100mm diameter and sufficient to ensure no ponding on the Bus shelter canopy. The stormwater pipe shall be connected into the network stormwater system;
 - E. shall incorporate lighting in a form with specifications equivalent to that provided in the TransLink LED Light Bar Drawing provided as Disclosed Data, and in accordance with the TransLink Bus Infrastructure Design Guidelines;
 - F. shall include leaning rails in a form and with specifications equivalent to that shown in the Commercial Broadway 99 B-Line Canopy IFT Drawings, provided as Disclosed Data;
 - G. shall include a multi-stream litter and recycling bin in a form and with specifications equivalent to that shown in the TransLink bus facility furniture standards and guidelines provided in Disclosed Data; and

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- H. shall include Pavement Markings for passenger queuing as specified on the Arbutus 99 B-line station queue markings drawing, provided as Disclosed Data, and installed to cover the queue length defined in Article 9.7.1(c)(i) of this Part 2;
- (viii) provide one bus passenger information display (B-PID) with a custom pole located at the start of the pickup platform as shown on the Arbutus 99 B-line station queue markings drawing provided as Disclosed Data. Project Co shall:
- A. supply and install a 32" double side monitor TFT LCD B-PID display unit as shown in the Teleste catalogue provided in Disclosed Data;
 - B. mount the B-PID in a portrait format, with the underside of the unit a minimum of 2.1m from grade; and
 - C. supply and install a custom steel pole to support the B-PID unit. Project Co shall consult with TransLink in the design of the B-PID pole, and shall demonstrate to the Province that such consultation has occurred;
- (ix) provide separate power and data conduits to the B-PID in the pickup area from the Arbutus Station electronic equipment room (EER) as follows:
- A. one (1) 4" x 4" junction box (JB) at the B-PID post and bus shelter electric column. JB to be buried in ground. Provide 25mm conduit with pull string to new 'JB-PWR' location in the EER at ACER #2; and
 - B. one (1) 4" x 4" junction box (JB) at B-PID post. JB to be buried in ground. Provide 35mm conduit with pull string to new 'JB-COMM' location in the EER at 3rd party communications room,
- Project Co shall complete the testing and commissioning of the B-PID, and shall provide support and coordinate with BCRTC to complete programming;
- (x) clear path for wheelchair users exiting the Station and transferring to the Bus;
- (xi) provision of a wheelchair pad with tactile surface to indicate priority loading area for mobility impaired users in accordance with the TransLink Bus Infrastructure Design Guidelines; and
- (xii) provision of a Pedestrian crosswalk along Broadway at the bus exchange exit.

- (d) Project Co shall be responsible for the Design and Construction of the Arbutus Transit Exchange, which shall include a bus drop off platform on the west side of the Arbutus Station headhouse in accordance with the following requirements:
 - (i) minimum width of 5.00 m between the Station headhouse and curb to include:
 - A. 3.0 m unloading space with provision for unloading a wheelchair, which includes a 0.75 m shy distance from curb;
 - B. 1.5 m clear zone for public sidewalk through space; and
 - C. 0.5 m shy distance from the Station head-house.
 - (ii) space for two articulated bus positions with independent departure;
 - (iii) provision for a standard or articulated bus to pass a stopped standard or articulated bus on the west side of the Station at the drop-off platform;
 - (iv) 3.0m wide by 55m long concrete bus pad along Arbutus Street, in accordance with C16.1 Reinforced Bus Slab detailed in the City of Vancouver Standard Detail Drawings for the bus positions;
 - (v) minimum northbound lane width of 7 m on Arbutus Street, between 35m north of the stop bar at Broadway and the northern end of the north bus stop position as shown in the Reference Concept plan for the Arbutus Transit Exchange;
 - (vi) a pedestrian crosswalk along Arbutus Street at the bus exchange entrance; and
 - (vii) a wheelchair pad to indicate priority loading area for mobility impaired users.
- (e) Project Co shall be responsible for the Design and Construction of the Arbutus Transit Exchange, which shall include the following requirements, in addition to the Station Plaza requirements set out in Article 10 [Architecture] of this Part 2:
 - (i) LED lighting shall be in accordance with Article 12 [Electrical], of this Part 2 and the TransLink Infrastructure Design Guidelines, and shall achieve the minimum lighting levels as specified in Table 9.7.1(e)(i) [Lighting Levels] below. Consideration shall be given to the local neighbourhood context in the lighting design, and to minimize light impact to adjacent buildings and properties. Lighting and power to the transit exchange shall be connected from the EER at ACER #2;

Table 9.7.1(e)(i) -Lighting Levels

Items	Requirements
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Area	Drive Areas
Horizontal Illuminance Level (Avg.)	20 LUX
Horizontal Illuminance Uniformity Ratio (Avg.:Min)	3.0:1
Area	Pedestrian Areas
Horizontal Illuminance Level (Avg.)	30 LUX
Vertical Illuminance Level (Avg.)	15 LUX
Horizontal Illuminance Uniformity Ratio (Avg.:Min)	2.0:1

- (ii) provision of green infrastructure between the east curb of the Arbutus Transit Exchange and the eastern boundary curb line with the Arbutus Greenway in a form and with specifications equivalent to the Attachment C [City of Vancouver - Green Infrastructure Requirements] of this Article.
- (iii) Project Co shall be responsible for the restoration of the balance of the Arbutus Greenway. Surface restoration shall be on a Like-for-Like basis, as recorded at the time of the Pre-Construction Condition Survey. In addition, for the Arbutus Greenway north of Broadway and between W. 8th Avenue, the geometric design of the 4 metre wide pathway shall be in accordance with the City of Vancouver Engineering Design Manual, and the landscape strip shall be installed over the remaining greenway width.
- (iv) grades in accordance with the TransLink Bus Infrastructure Design Guidelines, and shall be such that all areas are free draining but within the maximum of 2% in the passenger loading area and 3% in the plaza area.
- (v) supply and installation of all other Pavement Markings, in accordance with the Manual on Uniform Traffic Control Devices, TAC, and as specified in this Article 9 [Roads]; and
- (vi) provision of a HandyDart stop within the Arbutus Transit Exchange as shown in the Reference Concept plan for the Arbutus Transit Exchange.

9.7.2 On-Street Modifications

- (a) Project Co shall be responsible for the Design and Construction of all Project Work associated with the on-street modifications of Arbutus Street, West Broadway and 8th Avenue, as shown in the Reference Concept plan for the Arbutus Transit Exchange and the Permanent Roadworks and Zones Drawings, which includes the following:
 - (i) providing passenger pick-up and drop-off (PPUDO) locations as close as possible to the Station, including the south side of 8th Avenue, east of

Arbutus Street. The PPUDO shall not be located on Arbutus Street between 8th Avenue and West Broadway in an area that could restrict the use of curbside bus drop-off space for passenger loading;

- (ii) providing adequate and safe sight lines to crosswalks and sidewalk connections at the north-west and south-east areas of the bus exchange;
- (iii) coordinating with the City, and provide traffic signal analysis as required, to adjust the signal at the Arbutus Transit Exchange exit and the Arbutus Greenway to enable safe passage for pedestrians crossing east / west along the north side of Broadway as provided under Article 9.3[Scope Split and Coordination with Other Roadwork];
- (iv) providing a crosswalk /cross-bike in a location to serve Cyclists given the location of the bike parkade and the adjacent Arbutus Greenway. The crosswalk / cross-bike shall be located such that it minimizes delays for Buses, provides a safe, direct and intuitive route for the public, and minimizes conflicts with motor vehicle traffic and Pedestrians. Any crosswalks on the route between the bike parkade and Arbutus Greenway should also be marked as cross-bikes. Provision of Signs to ensure that the route from the bike parkade to the Arbutus Greenway is well signed;
- (v) ensuring that the Arbutus and Broadway lane configuration provides adequate and safe light lines to accommodate the Traffic Control changes, as detailed in the Table 9.7.2(a)(vii)below;
- (vi) ensuring that the overall road design of Broadway, Arbutus, the Arbutus Bus Exchange, the Arbutus Greenway including traffic lanes, pedestrian and bicycle crossings, and traffic signal modifications provides for the safe passage and movement of pedestrians, cyclist, buses, and vehicles; and
- (vii) providing modifications to Arbutus Street, Broadway and 8th Avenue to accommodate the requirements of the Arbutus Transit Exchange, as detailed in the Table 9.7.2(a)(vii)below.

Table 9.7.2(a)(vii)On Street Design Modifications

Item	Description
Arbutus Street	<ul style="list-style-type: none"> • Modification of the existing Arbutus Street traffic lanes and widths between Broadway and 8th Avenue to maintain two-way traffic on Arbutus Street with a single lane in the northbound direction and a shared through-left and shared through-right lane in the southbound direction.

Item	Description
	<ul style="list-style-type: none"> • These modifications require shifting the centre line of Arbutus Street to the west. Dimensions for the required lane widths and lane configuration is shown in the Reference Concept plan for the Arbutus Transit Exchange and the Permanent Roadworks and Zones Drawings. • Concrete bus pads on Arbutus Street for the bus drop-off bays shall be to the City of Vancouver standards for on-street bus stops as noted in Article 9.7.1(d)(iv).
West Broadway	<ul style="list-style-type: none"> • Extension of the eastbound left turn storage lane on Broadway to northbound Arbutus Street to at least 60.0 m in length, and accommodate 2 articulated buses. Detector loops shall be installed in accordance with the City of Vancouver Engineer Design Manual.
8th Avenue	<ul style="list-style-type: none"> • Provision of PPUDO spaces on 8th Avenue in accordance with the TransLink Bus Infrastructure Design Guidelines.
Traffic Control	<ul style="list-style-type: none"> • A dedicated left turn phase to the existing Traffic Signal from eastbound Broadway Street to northbound Arbutus Street • Add a new or modified Traffic Signal approximately 30m to the east of the existing Traffic Signal at Broadway and Arbutus Street to: <ul style="list-style-type: none"> (1) Hold general public Traffic at a red light when Buses are exiting from the Arbutus Transit Exchange to allow Buses to turn into the middle lanes on West Broadway; (2) Provide pedestrian control for people walking east / west on the north side of Broadway • Right turn on red will be prohibited for Buses exiting the bus exchange
Arbutus Street Sidewalk Space	<ul style="list-style-type: none"> • Width of the west sidewalk of Arbutus Street to be assessed in conjunction with the shift of the Arbutus Street centre line • East sidewalk will be integrated with the bus exchange drop off platform

9.8 Handover

- (a) Project Co shall handover all roads and roadway structures on which Project Co has undertaken any Project Work in accordance with this Article 9.8 [Handover] and all other applicable provisions of this Agreement. For clarity, handover for the Arbutus Transit Exchange off-street bus exchange will not be part of this Article 9.8, and shall be in accordance with Schedule 4 Part 3 [Certification and Completion] to be handed over as part of Substantial Completion.
- (b) Project Co shall establish and adhere to a handover procedure for all roads and roadway structures on a basis which is acceptable to the Province. Such handover procedure shall be submitted to the Province at least 65 Business Days prior to the Substantial Completion Date for review, acting reasonably, in accordance with the Review Procedure. As a minimum, such handover procedure shall include:
 - (i) a joint inspection survey of all such roads and roadway structures by Project Co and the Province in which the roads and roadway structures are located;
 - (ii) the issuance of quality documentation as required by Schedule 7 [Quality Management] that confirms that all relevant standards and specifications required by this Agreement in respect of such roads and roadway structures have been achieved;
 - (iii) issuance of a handover defect and deficiency list which identifies any proposed remedial works to be undertaken by Project Co or, by the Province, if the Province so determines at its discretion;
 - (iv) identification of a schedule for inspections and performance of any required remedial works;
 - (v) delivery dates for record drawings for all roads and roadway structures as required in accordance with Article 3 [Municipal Requirements], Part 1 of Schedule 4
 - (vi) schedule for the handover of roads, which shall not be piecemeal, but shall be handed over when all the permanent roadworks and restoration are completed for all roads around any Station Site;
 - (vii) a two year warranty for all permanent roadworks, and a one year warranty for soft landscaping in accordance with Article 9.4.8 (b)(iv) of Part 2 of Schedule 4 upon substantial completion of the roadworks and final sign-off by the Province; and
 - (viii) final sign-off by the Province.

- (c) In addition to the requirements set out in Article 3 [Municipal Requirements], Part 1 of Schedule 4, Project Co shall:
 - (i) ensure that, for Traffic Signals, clear dated records are kept in respect to signal timing plans and operational states of Traffic Control devices for handover; and
 - (ii) as part of the handover of Traffic Signals, allow the Province the opportunity to inspect and test the Traffic Signals.

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Attachment A

Permanent Roadworks Scope Split for Traffic Signals, TSMS Fibre Communications and Street Lighting

See separate document.

Attachment B

Permanent Roadworks Scope Split- Removals and Restoration

The scope split responsibility for removals and restoration of Permanent Roadworks, between Project Co, the City of Vancouver and a Third Party is as shown in the table. The responsibility for cost is presented in the Activity description for each item.

Activity	Project Co	City of Vancouver	Third Party
Removals - During Construction			
<ul style="list-style-type: none"> • Removal of roadworks elements required for the Project Work, including existing curb and gutters, sidewalk, pavement, Trolley Overhead foundations and poles, traffic signals, illumination, street trees and landscaping, unless otherwise specified in the Article 9 [Roads] of Part 2, or Article 1 [General Traffic Management Requirements] of Part 4, both of Schedule 4 and these shall be at Project Co's cost. 	X		
<ul style="list-style-type: none"> • Removal of red light cameras - Project Co to coordinate removal of red light cameras with ICBC at Project Co's cost. • Removal of postal boxes - Project Co to coordinate removal of postal boxes with Canada Post at Project Co's cost. • Removal and relocation of Bus stop ID signs by CMBC. • Removal of all other third party elements shall be coordinated by Project Co with the third party at Project Co's cost. 			X
<ul style="list-style-type: none"> • Removal of City Bus shelters, Street Furniture, parking meters, garbage bins, bike racks, newspaper boxes, street signs, benches, wayfinding signage, Public Bike Share Stations, litter cans, and recycling blue containers. Project Co to coordinate with the City for removal, which will be at Project Co's cost. Project Co is to provide with City with a minimum advance notification as follows: <ul style="list-style-type: none"> ○ Parking meters excluding sleeves -1 month (for general overall plan) ○ Public Bike Share Stations - 3 months ○ Bus Shelters - 4 months ○ Bike Racks - 1 month ○ Benches - 1 month ○ Wayfinding on Broadway at Oak and Cambie (street furniture contractor) - - 2 months ○ Litter Bins - 1 month 		X	

**BROADWAY SUBWAY PROJECT
PROJECT AGREEMENT
SCHEDULE 4 PART 2: ARTICLE 9: ROADS**

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Activity	Project Co	City of Vancouver	Third Party
<ul style="list-style-type: none"> ○ Recycling Bins - 1 month; and ○ Murals, Utility Art Wraps - 2 months 			
Permanent Restoration			
<ul style="list-style-type: none"> • Design and Construction of all roadworks elements, including curb and gutters, sidewalks, pavement, Trolley Overhead foundations and poles, traffic signals, illumination, street trees and landscaping, as specified in the Article 9 [Roads] of Part 2 of Schedule 4 and shall be at Project Co's cost. 	X		
<ul style="list-style-type: none"> • Restoration of red light cameras - Project Co to provide access and coordinate restoration of red light cameras with ICBC at Project Co's cost, including any conduits, foundation, and power requirements. • Restoration of postal boxes - Project Co to provide access and coordinate restoration of postal boxes with Canada Post at Project Co's cost. • Restoration and installation of permanent Bus stop ID signs by CMBC, at Project Co's cost. • Restoration of all other third party elements shall be coordinated by Project Co with the third party at Project Co's cost. 			X
<ul style="list-style-type: none"> • Re-installation of City Bus shelters, Street Furniture, parking meters, garbage bins, bike racks, newspaper boxes, traffic signs, benches, wayfinding signage, Bike Share Stations, litter cans, and recycling blue containers. Project Co to provide access and coordinate with the City for the restoration, which will be at Project Co's cost. Project Co is to provide with City with a minimum advance notification as follows: <ul style="list-style-type: none"> ○ Parking meters excluding sleeves - 1 month (for general overall plan) ○ Public Bike Share Stations - 3 months ○ Bus Shelters - 4 months ○ Bike Racks - 1 month ○ Benches - 1 month ○ Wayfinding on Broadway at Oak and Cambie (street furniture contractor) - 2 months ○ Litter Bins - 1 month ○ Recycling Bins - 1 month; and ○ Murals, Utility Art Wraps - 2 months 		X	

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Attachment C

City of Vancouver – Green Infrastructure Requirements

See separate document.

Attachment A

Permanent Roadworks Scope Split for Traffic Signals, TSMS Fibre Communications and Street Lighting

BSP - CITY OF VANCOUVER/PROJECT CO SCOPE SPLIT REGARDING PERMANENT TRAFFIC SIGNALS, TSMS FIBRE COMMUNICATIONS AND STREET LIGHTING

NOTES:

1. Within this Attachment A the following definitions apply:
 - **Advance Notice Requirement** means the advance notice required to be provided by Project Co to enable the City to plan any work related to Traffic Signals, fibre networks or street lighting;
 - **Implementation Time** means the estimated time required by the City to implement or perform any work related to Traffic Signals, fibre networks or street lighting;
 - **TSMS** means the City's centralized Traffic Signal Management System
2. Some of the City's record drawings are provided as Disclosed Data. These record drawings are provided "as-is" and may not be 100% accurate.
3. Project Co shall be responsible for the design, coordination and implementation of all permanent Traffic Signals, fibre communications and street lighting.
4. Project Co shall not be permitted to work on any energised or live City Traffic Signal and fibre communications infrastructure. The City will be solely responsible for energising, de-energising, cutover and tie in of all Project Co works connected to Traffic Signal and fibre communications infrastructure, except for street lighting. Project Co is permitted to work on any energised or live City street lighting infrastructure.
5. Project Co shall be present during any energising, de-energising, cutover and tie in of Project Co works by the City.
6. City inspection of works will be solely QC/QA of electrical components. All inspection of underground works such as conduit, pole base, controller base and kiosk base shall be by an electrical engineer retained by Project Co who shall be registered as a Professional Engineer, and who shall be the engineer of record for the electrical works described in this Attachment A.
7. Project Co shall be responsible for the reinstatement of all permanent Traffic Signal, fibre communications and street lighting modifications to conditions that existed as at the Effective Date, unless otherwise stated in this Agreement.
8. The City will have one dedicated electrical crew comprising two electricians and a bucket truck available to undertake Traffic Signal and street lighting field work requested by Project Co that is the responsibility of the City. The City may be able to provide additional electrical crews subject to availability and Project Co providing at least two (2) months advance written notification.
9. Project Co shall be responsible for coordinating Traffic Signal controller requirements with the City noting that there may be a lead time of five (5) months for the delivery of replacement controllers.
10. The table in this Attachment A to Article 9 [Roads] of Part 2 provides mandatory Advance Notice Requirements and indicative Implementation Times. Project Co shall be responsible for coordinating and scheduling all work to be undertaken by the City in accordance with this Attachment A.

SCHEDULE 4 PART 2: ARTICLE 9: ROADS: ATTACHMENT A: PERMANENT ROADWORKS SCOPE SPLIT FOR TRAFFIC SIGNALS, TSMS FIBRE COMMUNICATIONS AND ILLUMINATION

A-2

City Group	Activity	Scope Split			Responsibility for cost		Description	Advance Notice Requirement	Implementation Time
		City Exclusive	Project Co Scope	City and Project Co	City	Project Co			
Permanent Traffic Signal and TSMS Communication Systems									
Design	Provision of record drawing markup electrical infrastructure drawings	X			X		City to provide available record drawing markup electrical infrastructure drawings at City's cost.	3 Business Days per intersection	n/a
	Field verification of electrical infrastructure			X		X	Project Co to conduct field verification of electrical infrastructure with support from City at Project Co's cost.	5 Business Days per intersection	1 Business Day per intersection
	Preparation of design drawings		X			X	Project Co to prepare design drawings at Project Co's cost for review and acceptance by City, using a City-approved consultant.	10 Business Days for review per intersection	n/a
	Coordination with BC Hydro		X			X	City approved consultant to coordinate with BC Hydro at Project Co's cost.	n/a	n/a
	Traffic Signal timing design		X			X	Project Co to conduct Traffic Signal timing design and produce Traffic Signal Records based on standards to be provided by City at Project Co's cost, for review and acceptance by City.	10 Business Days for review per intersection	n/a
Signal shop	Build cabinet, test and install Traffic Signal Record in new controller	X				X	City to build cabinet, test and install Traffic Signal Record in new controller at Project Co's cost	10 Business Days per intersection. 5 month lead time for new cabinet/controller required.	20 Business Day per intersection
Traffic Signal	Install Traffic Signal infrastructure (excluding Traffic Signal cabinet)		X			X	Project Co to install de-energised Traffic Signal infrastructure at Project Co's cost.	n/a	n/a
	Install Traffic Signal cabinet	X				X	City to install controller cabinet at the site at Project Co's cost.	10 Business Days per intersection	3 Business Days per intersection
	Inspection of Project Co electrical work			X		X	City to conduct inspection of Project Co electrical work at Project Co's cost. Project Co will be in attendance during the inspection.	5 Business Days per intersection	1 Business Day per intersection
	Commissioning of new signal			X		X	City & Project Co to jointly conduct commissioning of new signal at Project Co's cost.	5 Business Days per intersection	2 Business Day per intersection
	Energising, de-energising, cutover and tie in of all Project Co works connected to Traffic Signal infrastructure			X		X	City to conduct energising, de-energising, cutover and tie in of all Project Co work connected to Traffic Signal infrastructure with support from Project Co at Project Co's cost. Project Co will be in attendance while the City conducts such work.	5 Business Days per intersection	2 Business Day per intersection corner
Communication	Install communications infrastructure		X			X	Project Co to install de-energised communications infrastructure at Project Co's cost.	n/a	n/a
	Inspection of Project Co electrical work			X		X	City to conduct inspection of Project Co electrical work at Project Co's cost. Project Co will be in attendance during the inspection.	5 Business Days per intersection	1 Business Day per intersection
	Energising, de-energising, cutover and tie in of all Project Co works connected to communications infrastructure			X		X	City to conduct energising, de-energising, cutover and tie in of all Project Co work connected to communications infrastructure with support from Project Co at Project Co's cost. Project Co will be in attendance while the City conducts such work.	5 Business Days per intersection	1 Business Day per intersection
Permanent Street Lighting									
Design	Provision of record drawing mark up electrical infrastructure drawings	X			X		City to provide available record drawing markup electrical infrastructure drawings at City cost.	3 Business Days per request	n/a
	Field verification of lighting infrastructure			X		X	Project Co to conduct field verification of lighting infrastructure with support from City at Project Co's cost.	5 Business Days per request	1 Business Day per request

SCHEDULE 4 PART 2: ARTICLE 9: ROADS: ATTACHMENT A: PERMANENT ROADWORKS SCOPE SPLIT FOR TRAFFIC SIGNALS, TSMS FIBRE COMMUNICATIONS AND ILLUMINATION

A-3

City Group	Activity	Scope Split			Responsibility for cost		Description	Advance Notice Requirement	Implementation Time
		City Exclusive	Project Co Scope	City and Project Co	City	Project Co			
	<i>Preparation of design drawings</i>		X			X	<i>City approved consultant to prepare design drawings at Project Co's cost for review and acceptance by City</i>	<i>10 Business Days for review per intersection</i>	<i>n/a</i>
Street Lighting	<i>Install lighting infrastructure</i>		X			X	<i>Project Co to install de-energised lighting infrastructure at Project Co's cost.</i>	<i>n/a</i>	<i>n/a</i>
	<i>Inspection of Project Co electrical work</i>			X		X	<i>City to conduct inspection of Project Co electrical work at Project Co's cost. Project Co will be in attendance during the inspection.</i>	<i>5 Business Days per intersection</i>	<i>1 Business Day per intersection</i>
	<i>Energising, de-energising, cutover and tie in of all Project Co works connected to street lighting</i>		X			X	<i>Project Co to conduct energising, de-energising, cutover and tie in of all Project Co work connected to street lighting, with support from City at Project Co's cost.</i>	<i>5 Business Days per intersection</i>	<i>2 Business Day per intersection</i>
Materials supply	<i>Traffic Signal Controllers and Cabinets</i>	X				X	<i>City to supply new Traffic Signal Controllers and Cabinets at Project Co's cost</i>	<i>5 months</i>	<i>n/a</i>
	<i>All other electrical equipment for signals, lighting and communications</i>		X			X	<i>Project Co will supply all other electrical equipment for Traffic Signals, lighting and communications in accordance with City standards and approved products.</i>	<i>n/a</i>	<i>n/a</i>

Attachment C

GREEN INFRASTRUCTURE REQUIREMENTS

1 General Requirements

In addition to the standard City of Vancouver Engineering Design Manual and Construction Specifications, the Project work will be in accordance with the most current versions of the following:

- Complete Streets Policy Framework (<https://council.vancouver.ca/20170516/documents/rr2.pdf>)
- Integrated Rainwater Management Plan (<https://vancouver.ca/home-property-development/city-wide-integrated-stormwater-management-plan.aspx>)
- Rainwater Management Bulletin (<https://bylaws.vancouver.ca/bulletin/bulletin-rainwater-management.pdf>)

Green infrastructure practices that may be implemented for Broadway Subway, and for which preliminary design concepts have been provided by the City include:

- Bioretention planters; and
- Bioretention Tree Planters / stormwater tree trenches

Additional green infrastructure practices that may be suitable, depending upon site conditions include:

- Blue-Green roofs that provide a rainwater management function;
- Absorbent landscaping;
- Infiltration trenches;
- Permeable pavers, porous asphalt, pervious concrete; and
- Proprietary treatment devices (certified by the WA State TAPE program or ISO 14034)

Section 6 of this Attachment C provides green infrastructure concepts and design guidance on how to manage rainwater from welcome mat areas.

2 Station Headhouses

For Station headhouses, Project Co shall endeavor to manage rainwater on-site via green infrastructure practices where feasible.

Where it is not feasible to accommodate on-site green infrastructure practices to manage runoff from the at-grade portions of the welcome mat, then runoff shall be collected via trench drains, catchbasin or other method into a piped connection to the combined or separated storm sewer. Project Co shall be responsible for providing a catchbasin or maintenance hole (located on private property) in lieu of the on-site green infrastructure practice upstream of the connection to the combined or separated storm sewer. The catchbasin shall be completed with stub-outs to permit future diversion of rainwater from the sewer to a City-constructed green infrastructure practice (such as a stormwater tree trench) that may be constructed at a future date.

3 Arbutus Transit Exchange

3.1 Overview

Project Co shall be responsible for the Design and Construction of green infrastructure at the Arbutus Transit Exchange in accordance with Article 9.7 of Part 2 of Schedule 4, which shall consist of a bioretention planter meeting the requirements of this Attachment C to Article 9 [Roads] of Part 2 of Schedule 4. The Arbutus Station and the Arbutus Transit Exchange will be located in a parcel that currently comprises approximately 1,000m² of pervious green space. It is foreseeable that post-construction, there will be a 1,000m² net increase of impervious area. The transit interchange is considered a high pollutant generating area and requires a green infrastructure practice as set out herein.

3.2 Bioretention planter specifications

The green infrastructure practice shall provide a water volume reduction by capturing 24mm of rainfall in 24 hours and water quality treatment for the first 48mm of rainfall to remove 80% of total suspended solids (TSS), as outlined in the City of Vancouver Rainwater Management Bulletin which is provided as Disclosed Data. This shall apply to a catchment area of approximately 1000m² calculated from existing pervious areas on 2096 W Broadway (PID 023-853-778), 2090 W Broadway (PID 015-191-931), Arbutus Greenway North (023-895-519), and the space between 2096 W Broadway and 2097 W Broadway. Project Co shall survey and confirm this catchment area as part of the design.

A bioretention planter shall be installed within the approximately 2.8m width available between the east curb of the Arbutus Transit Exchange and the eastern limit of the Permanent Project Lands which is also the boundary with the restored Arbutus Greenway. This bioretention planter shall capture, treat and manage storm water from the Arbutus Transit Exchange. A typical bioretention planter is shown in Figure 1 and 2. Project Co shall ensure that the design and construction of the planter is such that the residual width of the Arbutus Greenway, when measured from the eastern edge of the bioretention plant to the eastern property line for the Arbutus Greenway, can be maximised. Notwithstanding the above, the City's preferred residual width for the Arbutus Greenway is 9 metres.

Bioretention planters are stormwater management practices with vertical side walls and a flat planted filter soil. They can be open bottomed to the subsoil to allow for infiltration or they can be lined to provide filtration and detention. Project Co shall design the capacity of the bioretention planter to accommodate the rainwater criteria outlined above for the full catchment area. For any portion that cannot drain to the bioretention planter by means of surface sheet flow, the runoff shall be collected via trench drains or area drains into a piped connection to the bioretention planter. In this case, the ponding depth in the bioretention planter shall be increased from 150mm to 210mm to accommodate the lowered inflow elevation.

If it is not feasible to collect the full catchment area within the bioretention planter, then the remaining runoff shall be collected by proprietary treatment devices within the site before releasing into a storm sewer. A catch basin or maintenance hole shall be provided upstream of the connection to the storm sewer and shall come complete with stub-outs to allow for future diversion of rainwater from the sewer to any future City of Vancouver constructed Green Infrastructure practice. In the event that proprietary devices are required, these devices shall have adequate provision for oil-water separation, and shall be suitable to comply with current facility

stormwater regulations including the B.C. Regulation 168/94 “Petroleum Storage and Distribution Facilities Storm Water Regulation” and the American Petroleum Institute Publication 421 “Design and Operation of Oil-water Separators”.

If soil contamination is present on site, a non-infiltrating bioretention planter with a subsurface drain system must be utilized to manage stormwater volume and quality. Walled planters can be designed with an impermeable base or liner attached to all sides of the planter in order to prevent water from infiltrating.

The following sections provide estimated reference sizing and design specifications for the bioretention planter.

3.3 Estimated Reference Sizing

Assuming a 1,000m² of high pollutant impervious surface, a bioretention planter with a surface area of 100m² (nominal allowance of 10% of the catchment area) and total depth of approximately 1,600 mm is required to manage the targeted runoff.

The estimated reference sizing and dimensions are indicative and shall be confirmed by the Project Co as part of the design. The Metro Vancouver Stormwater Source Control Guide can be used as a reference.

1. Surface Area: min 100 m²
2. Ponding Depth: 150mm – 210mm (depth of water above soil level)
3. Freeboard Depth: 150mm (typical)
4. Soil depth : min 900 mm with trees
5. Granular base above sub-drain: 150mm
6. Granular base below sub-drain: 400mm

**SCHEDULE 4 PART 2: ARTICLE 9: ROADS: ATTACHMENT C: CITY OF
VANCOUVER – GREEN INFRASTRUCTURE REQUIREMENTS**

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7. Planter bottom should be no less than 1,200 mm to promote vegetation health and bioretention performance

3.4 Fencing

Safety railings to protect from falling shall be provided when the depth of the bioretention planter exceeds criteria as defined by the applicable codes and standards. These railings will need to be designed in coordination with the City of Vancouver and TransLink. Project Co shall demonstrate that the City and TransLink have been consulted in the design, and shall provide the Province with evidence of such consultation.

3.5 Drainage

Drainage requirements for bioretention planters are as follows:

1. A perforated pipe shall be installed at the base of the facility to collect the treated runoff.
2. Orifice control, sized at minimum of 15mm, shall be provided at the end of the pipe to regulate the rate at which water flows out of the system and to promote positive moisture levels for vegetation health. A simple cap with a 15 mm hole on the subdrain where it enters the overflow catchbasin shall be adequate.
3. Provide sheet flow from transit exchange to collect runoff and drainage scuppers shall be provided along the length of the east curb to drain runoff to the facility.
4. Sediment pads shall be provided at the inlets.
5. Planters capable of draining within 72 hours.

3.6 Vegetation

Tree requirements for bioretention planters are as follows:

1. Native planting suitable to handle seasonal flooding and drought and require no irrigation and maintenance is preferred.
2. Large trees shall be avoided given the limited width within the planter and the walled condition.
3. Avoid using tree species with large leaves to prevent clogging of the inlets and outlets. Trees shall be selected with smaller leaf types, or consider the use of evergreens.
4. Trees shall be set out from the east curb of the Arbutus Transit Exchange by a minimum of 0.6 metres. The selected trees shall not hang over the curb unless they are a minimum of 3.2 metres height to avoid conflict with the buses.
5. Trees shall be 6-7cm caliper OR a min. of 4m in height for multi-stem varieties.
6. The tree species and spacing shall be appropriate for the environment (soil type, infiltration rates, presence of liner) within which they are installed and to satisfy the parameters defined herein. As a minimum 1 tree per 10 m of linear planter is required.
7. The following is a list of tree species may be suitable for the bioretention planter design;
 - Fraxinus latifolia, 10-15 m spread
 - Crataegus douglasii *, 6 m spread
 - Malus fusca *, 10 m spread
 - Nyssa sylvatica, 10 m spread

* indicates the tree is found on the 'Native Plants of the Lower Mainland' list

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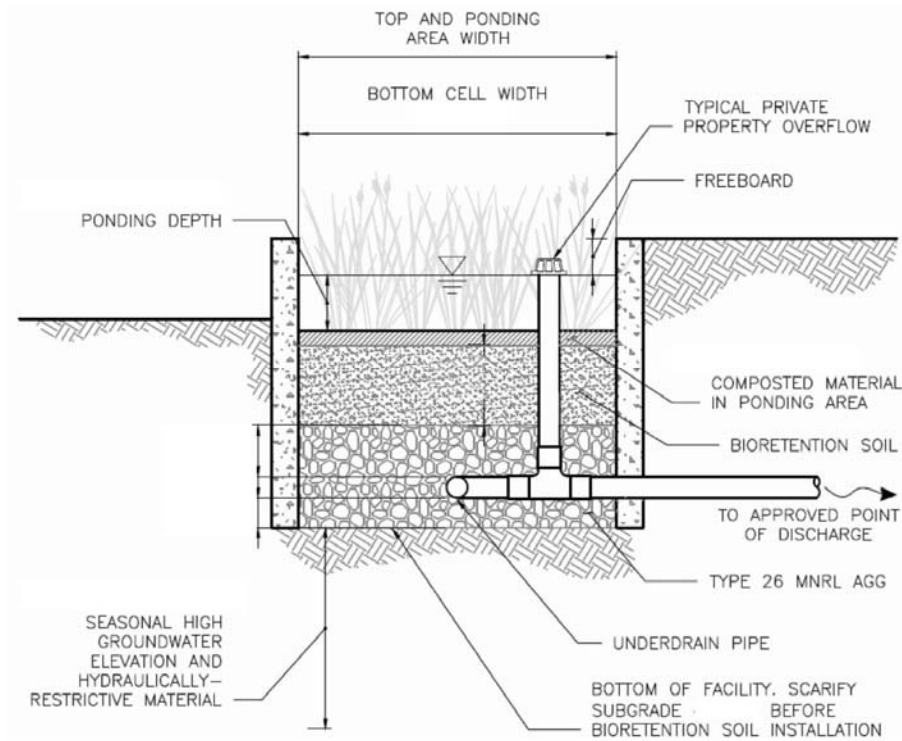


Figure 3-1 - Typical section, Bioretention Planter

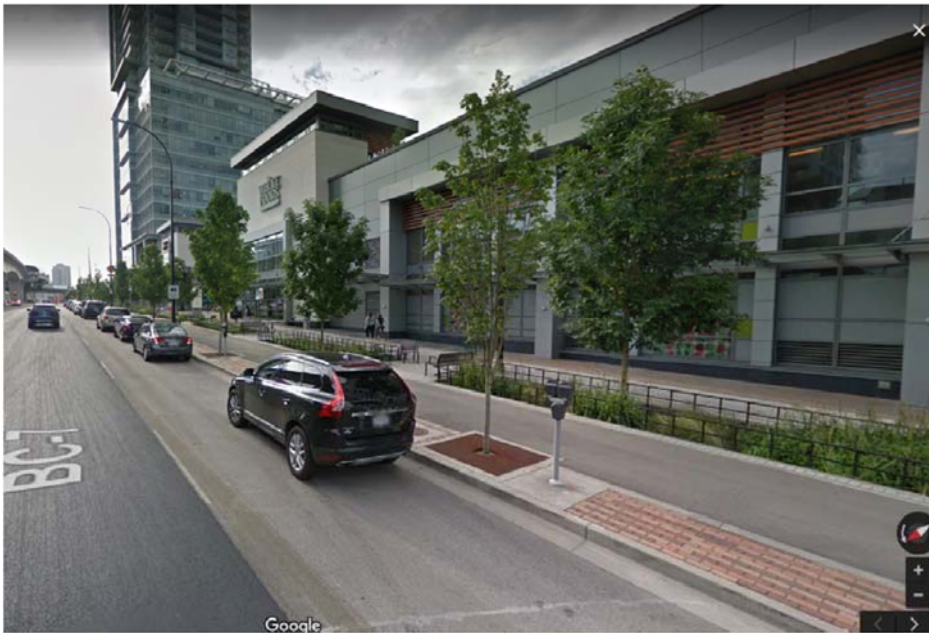


Figure 3-2 - Bioretention planter, Lougheed Highway

4 Elevated Guideway

Project Co shall incorporate green infrastructure, such as bioretention planter(s), bioswales, to retain and treat rainwater from the Elevated Guideway over Earl Finning Way.

5 Street right-of-ways

The City of Vancouver may explore opportunities for green infrastructure in the street right-of-way, particularly at Station Sites. The City of Vancouver will identify green infrastructure opportunities as part of the City’s street design concept described in Schedule 4 Part 2, Article 9 [Roads].

6 Green Infrastructure Concepts and Design Guidance

6.1 Bioretention planters

Where infiltration of rainwater into the ground is not feasible due to the underground station box, non-infiltrating bioretention planters with an underdrain may be utilized to manage rainwater volume from the station canopies.

The design shall meet the following requirements:

1. Site Consideration	<ul style="list-style-type: none">- Located in proximity to contributing canopies and shall be connected through a downspout, rain chain or other routing device.- The soil and drain rock layers must be contained by constructed walls.
2. Sizing	<ul style="list-style-type: none">- Surface area of the bioretention planter shall be no less than 5% of the catchment area (i.e., a 100m² catchment area requires a minimum 5m² bioretention planter surface area).
	<ul style="list-style-type: none">- Runoff from more than 500 sq m impervious area may be directed to several multiple interconnected bioretention cells. Multiple cells can be connected to maximize the total footprint.
3. Ponding Depth	<ul style="list-style-type: none">- Bottom width is no less than 600mm.
	<ul style="list-style-type: none">- Provide 150mm ponding depth.- Provide minimum 50mm freeboard for drainage area less than 100m² and 150mm freeboard for drainage area more than 100m².
4. Bioretention Soil	<ul style="list-style-type: none">- Provide minimum 450mm depth bioretention soil for flow control and water quality treatment. If trees are planted minimum bioretention soil depth is 900mm.
5. Plant Materials	<ul style="list-style-type: none">- Use suitable plant materials that can handle seasonal flooding or drought, and require minimal irrigation or maintenance.
6. Under Drain	<ul style="list-style-type: none">- Install underdrain near the base of the planter and place the underdrain pipe in aggregate with a minimum 600mm depth. Underdrain pipe to be placed 150mm above the base of the planter. Diameter of the pipe min 150 mm diameter.

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7. Overflow	- Overflow and cleanout device shall be provided. Outflow shall be conveyed to an approved sewer discharge point.
8. Other consideration	- If rainwater inflow entering the planter is concentrated, presettling technique (rock pad, flow dispersion weir) shall be incorporated.



Figure 6-1 - Bioretention Planter - Portland Director Park (stormwater planter watered by canopy runoff. Rain chains into planter with overflow spouts)

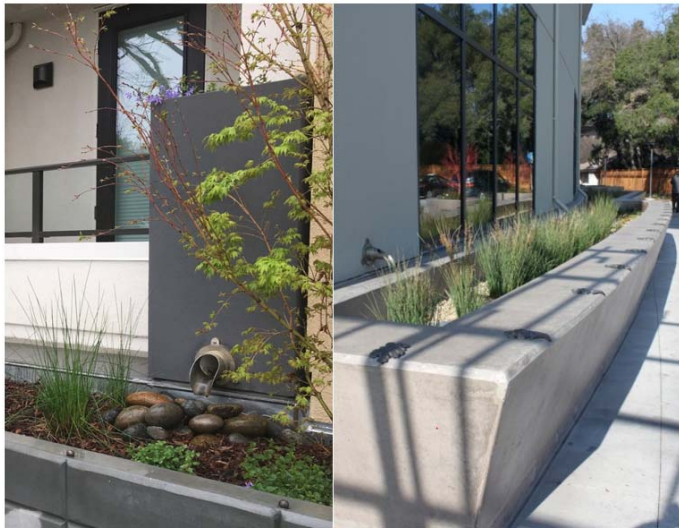


Figure 6-2 - Raised bioretention planter at building edge

C-8

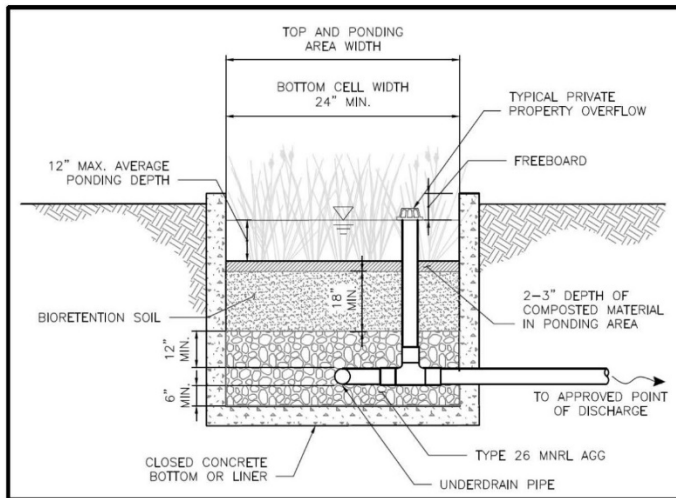


Figure 6-3 - Typical section, 'Sunken'-style Bioretention Planter

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6.2 Bioretention Tree Planters / Stormwater Tree Trenches

Trees that incorporate green infrastructure elements can also be implemented to capture and treat runoff from both raised canopy and sidewalk surfaces. Two variants are available based upon the structural loading requirements of the site:

- a. **Bioretention Tree Planters** – requires suspended concrete paving slab or metal tree grates at the surface or partially raised to accommodate seating edges; and
- b. **Stormwater Tree Trenches** – utilizes load bearing soils (‘structural soil’) or soil cells to transfer sidewalk loading of tree soil volume to improve rainwater capture.

6.2.1 Bioretention Tree Planter

Bioretention Tree Planters shall have appropriate separation from any structural slabs and can be used to collect and treat runoff from impervious surfaces onsite. If a high volume of foot traffic needs to be accommodated, planters may be depressed in an underground condition with a suspended concrete paving slab or metal tree grates at the surface or partially raised to accommodate seating edges.

Design of these planters shall meet the same requirements as the Bioretention Planters with the following additional considerations.

1. Provide an appropriate inlet to capture runoff and distribute to tree planters. This may be a trench drain leading to the tree planters or sub-surface piping system connecting overflow from other parts of the site and distributing water through the tree planters.
2. Planting street trees inside walled planters requires adequate width for a medium or large tree species to grow to maturity. Meet a minimum soil volume of 5 -30 m³ per tree with a minimum soil depth of 900mm.
3. Choose tree species based upon height clearance of branches and consider the expected need for pruning. Select tree species that provide adequate shade and can handle seasonal flooding or drought.
4. If paving is desired over the tree planter, provide adequate buildup above the building structural slab to accommodate the required depth (up to 1.8 m in total for bioretention tree planting, see bioretention planter sizing requirements for more details).

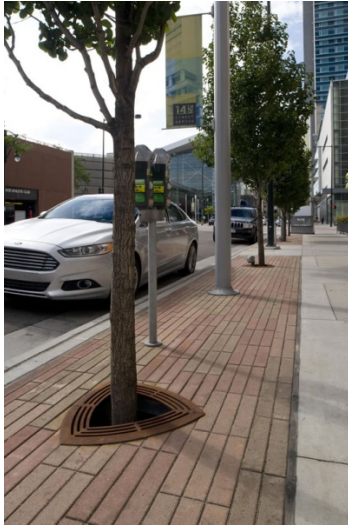


Figure 6-4 - Typical, Bioretention Tree Planter

6.2.2 Stormwater Tree Trenches

Stormwater tree trenches are linear tree boxes that usually have a subsurface system for distributing runoff among one or a series of trees. They receive stormwater runoff, retain and clean it within structural soil or a growing medium within soil cells. Maximized soil volumes benefit the street tree roots and encourage large canopies.

Stormwater tree trenches near the Stations can be utilized to treat street runoff, sidewalk runoff and overflow that cannot be handled by onsite green infrastructure solutions, including runoff from the uncovered welcome mat and overflow from the onsite bioretention planters.

The design shall meet the following requirements:

1. Site Consideration	- Stormwater tree trenches are often constructed in the sidewalk along back of the curbs.
2. Sizing	- Surface footprint of the stormwater tree trenches to be no less than 5% of the catchment area depending on the infiltration rate of the site. (i.e. 100 m ² catchment area requires minimum 5 m ² stormwater tree trench area).
	- If the infiltration rate is low, underdrain pipe and appropriate aggregate bedding should be provided to avoid oversaturation.
	- Surface width is no less than 1650mm from back of the curb.
	- Depth of growing medium is no less than 900mm at the tree locations.
3. Soil Volume	- To meet soil volume 5 -30 m ³ per tree with a minimum soil depth of 900mm at the tree location.
4. Structural Soil	- When structural soil is used, count no more than 50% of the structural soil volume toward above tree soil volume. Structural soil depth is no less than

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	450mm.
5. Soil Cell	- Proprietary soil cell products may be used in place of structural soil. Soil cells shall be designed in accordance with the Manufacturer's specifications.
6. Tree species	- Choose tree species based upon height clearance of branches and consider the expected need for pruning. Select tree species that provide adequate shade and can handle seasonal flooding or drought.
7. Others	- Cleanout device and inspection chamber shall be provided. Outflow shall be conveyed to an approved sewer discharge point.



Figure 6-5 - Stormwater tree trench with paving



Figure 6-6 - Stormwater tree trench with soil cells

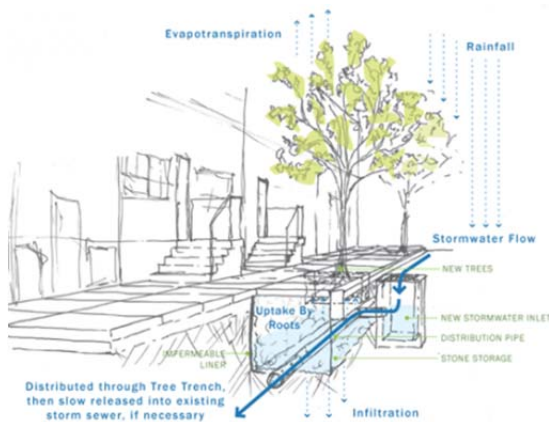


Figure 6-7 - Typical, Stormwater tree trench conceptual diagram

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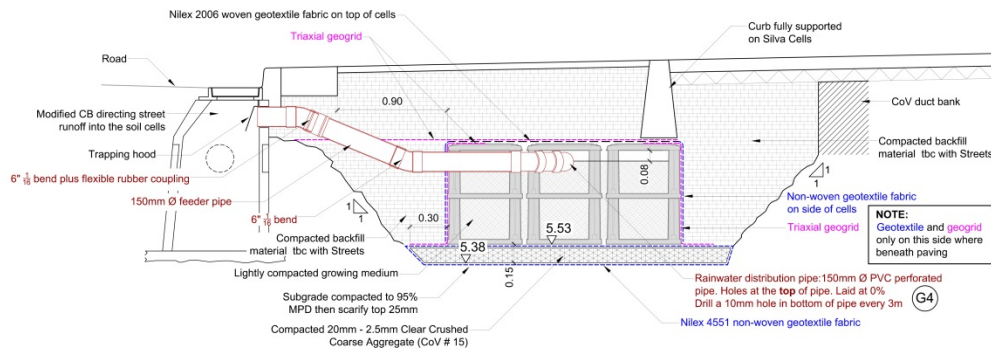


Figure 6-8 - Typical, Stormwater tree trench with soil cell

6.3 Welcome Mat Areas without Canopy Cover & Drainage Connection to Sewer

For portions of the welcome mat that do not have canopy cover, the first priority is for rainwater runoff from these surfaces be directed to an on-site Bioretention Tree Planter / Stormwater Tree Trench.

If it is not feasible to accommodate an on-site tree due to site constraints then runoff shall be collected via trench drains, catchbasin or method into a piped connection to the combined or separated storm sewer. A catchbasin or maintenance hole shall be provided upstream of the connection to the combined or separated storm sewer. The catchbasin shall come complete with stub-outs to permit future diversion of rainwater from the sewer to a City-constructed green infrastructure practice (such as a stormwater tree trench) that may be constructed at a future date.

**BROADWAY SUBWAY PROJECT
PROJECT AGREEMENT**

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next 370 pages
withheld in their
entirety

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Article 15. Vehicles

15.1 General

- (a) This Article 15 [Vehicles] sets out the requirements which must be achieved by Project Co in relation to Vehicles.
- (b) Project Co is not required to provide Vehicles. Vehicles will be made available to Project Co by TransLink for testing and commissioning and for Trial Running in accordance with the planning and scheduling procedures set out in Attachment C [TransLink and Project Co Resource Obligations] to Article 13 [Systems].
- (c) Project Co will be subject to the requirements of TransLink, if any, with regard to access to and use of Vehicles by Project Co and its Subcontractors, as set out in Attachment C [TransLink and Project Co Resource Obligations] to Article 13 [Systems].

15.2 Vehicle Specifications

- (a) TransLink currently operates 150 Mark I Vehicles, 108 Mark II Vehicles and 28 Mark III Vehicles on the Existing SkyTrain System.
- (b) TransLink has purchased 56 additional Mark III Vehicles which are expected to be in operation by the end of 2019.
- (c) The following technical specifications for the existing Vehicles described in Article 15.2(a) are available to Project Co as Disclosed Data:
 - (i) Greater Vancouver ALRT System Vehicle Fleet Extension Contract 700/800 Series Technical Specification (Schedule G);
 - (ii) Mark II Vehicles Contract: Schedule G Technical Specification;
 - (iii) Mark II 300/400 Series Vehicles Technical Specification; and
 - (iv) Innovia Metro 300 (Mark III 2500/2600/2700/2800 Series) Four Car Consist Vehicles Technical Specification.
- (d) TransLink plans to acquire future vehicles that are expected to operate in future trains longer than the existing 4-car Mark II Vehicle Trains and 4-car Mark III Vehicle Trains.
- (e) Project Co shall assume that the future trains will have the same passenger capacity, weight and dimensions of a 5-car Mark II Vehicle Train (2-car Mark II Vehicle Train that is coupled to a 3-car Mark II Vehicle Train) as described in the Mark II Vehicle specification referenced in Article 15.2(c)(iii).
- (f) Project Co shall assume that the future trains will have the same performance, noise, vibration, power consumption and electrical equipment characteristics as the existing Mark III Vehicles, as described in the technical specification referenced in Section 15.2(c)(iv).

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- (g) Project Co shall assume that the future trains will have a dynamic envelope that fits within the dynamic envelopes shown in the drawings included as part of Appendix B [Figures] to Schedule 4.

15.3 Work by Project Co

- (a) Project Co shall ensure that the Design and Construction of the BSP permits the operation of all configurations of Trains including Mark I Vehicles, Mark II Vehicles and Mark III Vehicles, and does not preclude the operation of the Reference Future Train.
- (b) Project Co shall complete software upgrades on the VOBCs of all Vehicles as required by Article 13 [Systems], Part 2 of Schedule 4.

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Article 16. Survey Control and Mapping

16.1 General

- (a) This Article 16 [Survey Control and Mapping] specifies the requirements and criteria for the survey control, ground surveys and mapping necessary for the Design and Construction of the Broadway Subway Project.
- (b) Project Co's survey and mapping, and the Design and the Construction shall be based on the BSP Coordinate System as set out in Article 16.3(b) of this Part 2.
- (c) Without limiting any other provisions of this Agreement, Project Co shall carry out all surveys, mapping and related activities necessary to perform the Project Work in accordance with the provisions of this Agreement, including this Article 16 [Survey Control and Mapping].

16.2 Codes and Standards

- (a) Project Co shall ensure that all survey and mapping requirements set out in this Article 16 [Survey Control and Mapping], and all aspects of the Project Work comprising of or connected with the surveying and mapping for the Design of the Guideway conform to the following codes and standards:
 - (i) Specifications and Recommendations for Control Surveys and Survey Markers, 1978, Natural Resources Canada.

16.3 Control Survey

- (a) Project Co shall use, as a basis for the Design and Construction of the BSP, the 'Millennium Line Broadway Extension Control Survey' prepared by McElhanney Consulting Services, provided in Appendix O [Project Control Survey] to Schedule 4 (the "**Project Control Survey**"). For clarity, any reference in Appendix O [Project Control Survey] of Schedule 4 to "Millennium Line Broadway Extension" or "MLBE" shall be deemed to refer to the BSP.
- (b) "**BSP Coordinate System**" is a local system established by the Project Control Survey and the conversions specified in Article 16.4 [Horizontal Control] and Article 16.5 [Vertical Control], both of this Part 2.
- (c) Project Co shall evaluate its requirements for a control survey and:
 - (i) satisfy itself as to the adequacy, accuracy, relevance and completeness of the Project Control Survey;
 - (ii) determine whether the Project Control Survey is sufficient for Project Co to complete the Project Work or if additional monuments or any other supplements, modifications or changes are required;

SCHEDULE 4 PART 2 ARTICLE 16: SURVEY CONTROL AND MAPPING

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- (iii) prepare and implement any supplements, modifications or changes required; and
- (iv) install all such additional monuments and survey such monuments to tie them into the BSP Coordinate System.
- (d) Project Co shall prepare a drawing of each additional survey monument that it installs and provide a copy of the drawing to the Province's Representative within 20 Business Days of the installation.
- (e) Project Co shall prepare a written description, and drawings where applicable, with respect to each supplement, modification or change Project Co determines is required in order to carry out the Project Work, and provide a copy of any such written description or drawings to the Province's Representative within 20 Business Days of Project Co having determined that any other supplement, modification or change is required.
- (f) Project Co shall be solely responsible for protecting and maintaining all existing and new control survey monuments, including verification of the coordinates of each monument prior to the commencement of the Project Work, and on an ongoing basis throughout the performance of the Project Work.
- (g) Any monuments that for any reason are damaged or require relocation shall be repaired or relocated by Project Co as part of the Project Work.

16.4 Horizontal Control

- (a) Project Co shall ensure that:
 - (i) the coordination of horizontal control points will be based on the Project ground coordinate projection; and
 - (ii) conversion from UTM Zone 10 NAD 83 CRS (UTMz10) to the BSP Coordinate System will be based on the calculations provided in the Project Control Survey.
- (b) Project Co shall ensure that all Design distances will be in BSP Coordinate System grid distances.
- (c) Project Co shall use the BSP Coordinate System to establish a control network (the "**Secondary Control Survey**") as a basis for all Design and Construction surveys for the Project.
- (d) Project Co shall ensure that the Secondary Control Survey will have a second order standard of accuracy, in compliance with the Specifications and Recommendations for Control Surveys and Survey Markers, 1978, Natural Resources Canada.
- (e) Project Co shall ensure that all surveys made for the Project will:

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- (i) be tied into monuments in the Secondary Control Survey and will be adjusted by holding the position of these monuments fixed; and
- (ii) have a third order standard of accuracy, in compliance with the Specifications and Recommendations for Control Survey Markers, 1978, Natural Resources Canada.

16.5 Vertical Control

- (a) Project Co shall ensure that all survey work carried out for the Project will be based on the vertical control network described as follows:
 - (i) the vertical control network has been established using the Canadian Spatial Reference System, Geodetic Survey Division, Natural Resources Canada, monumentation;
 - (ii) elevations are based on the high precision network (HPN) geodetic datum and PAVP monuments; and
 - (iii) elevations are in metres and conforms to the vertical datum provided in the Project Control Survey.
- (b) Project Co shall ensure that any additional vertical ground control and supporting surveys performed by Project Co will have a second order standard of accuracy, in compliance with the Specifications and Recommendations for Control Surveys and Survey Markers, 1978, as referenced in Article 16.2(a)(i) of this Part 2.

16.6 Millennium Line and Canada Line

- (a) Project Co should take into consideration the local project coordinate systems used on the Millennium Line and Canada Line as noted in the Project Control Survey when using record drawings and/or CAD data files from those projects.
- (b) The Project Control Survey has located control monuments used on the Millennium Line and Canada Line. These monuments have been tied into the BSP Coordinate System as reflected in the Project Control Survey. Notwithstanding any use of these survey control points, Project Co is responsible for undertaking its own field survey of existing Millennium Line and Canada Line infrastructure, as deemed necessary by Project Co to support the Design where BSP interfaces and/or integrates with these two projects, including as required verification of as-built conditions.

16.7 Miscellaneous Surveys

- (a) In addition to the surveys described elsewhere in this Article 16 [Survey Control and Mapping], Project Co shall carry out and provide any and all additional surveys required for the Project Work including:
 - (i) clearance field surveys to identify areas of tight clearance in the horizontal and vertical plane, which surveys shall be carried out and provided on an “as-needed basis”; and
 - (ii) topographic and planimetric field surveys to supplement aerial mapping in areas that need further definition, as determined by Project Co.

16.8 Right of Access for Surveys

- (a) Without limiting Project Co’s obligation to obtain permits in accordance with Section 4.18 [Permits] of the Agreement, prior to carrying out survey work, Project Co shall prepare or cause to be prepared, all applications, including any required attachments, needed to obtain all necessary Permits and access rights required to carry out the field surveys for the Project.

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Article 17. Drawings

17.1 General

- (a) Project Co shall produce all drawings in accordance with the requirements set out in this Article 17 [Drawings] of Part 2 and TransLink AutoCAD Drawing Standards Manual Rev. 0 dated Feb. 26, 2018 (the “**Drawing Manual**”), subject to any requirements set out elsewhere in Schedule 4, including Article 3.7 [Surveys, Inspections, Plans, Drawings and Other Information], Part 1 of Schedule 4. The Drawing Manual has been made available to Project Co as Disclosed Data.
- (b) In the event of any inconsistency between the requirements set out in the Drawing Manual and any requirements set out in this Article 17 [Drawings], the requirements set out in this Article 17 [Drawings] shall prevail.
- (c) For infrastructure belonging to Utility Suppliers or the City of Vancouver, Project Co will be responsible for providing the drawings of this infrastructure in accordance with the relevant Utility Supplier’s drawing standards, or the City of Vancouver’s drawings standards, as applicable. Where the relevant Utility Supplier or the City of Vancouver, as applicable, has no specific drawing standards, Project Co shall use the drawings standards set out in this Article for such infrastructure unless otherwise agreed by the Province’s Representative under the Consent Procedure. For clarity, Project Co shall use the drawing standards set out in this Article for all Province Infrastructure.
- (d) Project Co shall update all existing record drawings to reflect all modifications undertaken by Project Co to the existing Broadway – City Hall Canada Line Station to an acceptable standard agreed upon with ITBC.
- (e) Project Co shall include a proposed drawing structure as part of the Non-System Design Management Plan to address the Design of Broadway – City Hall Station, which comprises Broadway – City Hall Millennium Line Station (to be maintained and operated by BCRTC) and the existing Broadway – City Hall Canada Line Station (maintained and operated by ProTrans). Although the Broadway – City Hall Station will be considered as one integrated station, Project Co will develop its drawing structure for this station in consultation with both BCRTC and ProTrans.

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17.2 Drawing Planning

17.2.1 Drawing Software

- (a) Project Co shall use AutoCAD v2018 or a later standard version, in the preparation of all drawings.

17.2.2 Supplier/Shop Drawings

- (a) As required under this Agreement, Project Co shall provide electronic copies of supplier/shop drawings to the Province's Representative in PDF and (where available) AutoCAD format.
- (b) Project Co shall use SketchUp, version 2018 or a later standard version, in the preparation of three dimensional Station drawing files and imagery.

17.2.3 Drawing List

- (a) Project Co shall provide an initial list of all drawings as part of the Non-System Design Management Plan to be produced for the Project (the "**Drawing List**"), which list shall be updated by Project Co on regular basis as the production of the drawings advance. Project Co shall submit this Drawing List to the Province's Representative on a monthly basis in an electronic format such as an excel spreadsheet. The Drawing List must be structured such that a user of the list can easily search it for a drawing package. The Drawing List shall as a minimum include the drawing number, description of the drawing, revision number and date of issuance.
- (b) Project Co shall provide an updated Drawing List to the Province's Representative in accordance with Article 3.2.1 [Records Documentation], Part 3 of Schedule 4.

17.2.4 Drawing Numbering System

- (a) Project Co shall develop and provide as part of the Non-System Design Management Plan, a drawing tree indicating the organization and hierarchy of Project Co's drawings for the Broadway Subway Project (the "**Drawing Numbering System**"), which shall be similar to that used on the Evergreen Line but modified to incorporate the requirements set out in this Article 17 of Part 2 and the Drawing Manual. A sample project drawing numbering system is provided in Disclosed Data. The Drawing Numbering System shall include:
 - (i) the title block that is to be used on all drawings;

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- (ii) the contract number assigned to the Project by the Province, which must be included in the title block;
 - (iii) the graphic scale; and
 - (iv) the proposed engineering drawing coding.
- (b) Project Co shall provide an updated Drawing Numbering System to the Province's Representative in accordance with Article 3.2.1 [Records Documentation], Part 3 of Schedule 4.
- (c) Prior to submission of the Drawing Numbering System, which submission will be in accordance with Article 2.2.3.1 [Submission of Non-Systems Design Management Plan], Part 3 of Schedule 4, Project Co shall arrange an informal workshop with the Province's Representative and TransLink to discuss and review the proposed Drawing Numbering System, including if available Project Co's proposed draft drawing standards manual which ultimately will form part of the Design Manual. For clarity, the intent of this informal workshop is to ensure early consensus between Project Co and the Province on drawing standards and to minimize changes to drawings in the early design phase.

17.2.5 File Naming Convention

- (a) Project Co shall follow the file naming convention specified in the Drawing Manual with the exception that Project Co will propose project number(s) and location(s) that are compatible with the scope and extent of the Project. There shall be no duplication of drawing numbers.
- (b) Project Co shall endeavor to use the prefixes and location code identifiers provided in the Design Manual, but where applicable add and/or use the Station mnemonics identifiers set out in Table 1.3.1 [Station and Platform Names and Mnemonics] of Article 1 [General] of Part 2.
- (c) Project Co shall ensure that all drawings are numbered according to the Drawing Numbering System, which shall be similar to that shown on the sample drawings provided in Appendix A of the Drawing Manual. In general, the alphanumeric protocol for the drawing number shall be based on the following:
 - Project No. - Task Code - Location Identifier - Discipline - Sheet Series

17.3 Drawing Titles

- (a) Project Co shall ensure that drawing titles are clearly marked on each drawing and that all drawing titles are consistent with the drawing titles set out in the

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Drawing Numbering System. Any changes to drawing titles must be submitted to the Province's Representative for review pursuant to the Review Procedure.

17.4 Sheet Size

- (a) The standard for a full-size drawing shall be ANSI-D, which is 558mm x 863mm (22" x 34").

17.5 Drawing Organization

- (a) In addition to the requirements set out in the Drawing Manual, Project Co shall ensure that drawings are presented in the following sequence:
 - (i) the title blocks, scale and drawing number, including a reference to the Broadway Subway Project and the location as to where the drawings refer to;
 - (ii) cover page, site plan, key plan, drawing index, abbreviations & general notes;
 - (iii) section & detail numbering, symbols, legend;
 - (iv) general arrangements;
 - (v) plans and layouts;
 - (vi) elevations or profiles;
 - (vii) full or major sections;
 - (viii) partial enlarged plans;
 - (ix) sections and details;
 - A. show typical sections first. Show all typical information on these sections and do not duplicate;
 - B. show sections and details with exceptions next; and
 - (x) standard details and sections; and
 - (xi) design elements to be separate from background external references to allow easy extraction by TransLink's asset management program.
- (b) Project Co shall ensure the following in respect of drawing organization:
 - (i) all plans have a north arrow situated in the upper right corner of the drawing;

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- (ii) chainage increasing along control lines in order from left to right on the sheet;
- (iii) a sequence of plan drawings for a drawing set is uninterrupted;
- (iv) match lines are used for plans that extend over more than one sheet;
- (v) match lines are labeled with the chainage at the match line location;
- (vi) key plans appear on all plan type drawings and consist of a series of miniature drawing sheets arranged in the same configuration as the plans when matched together;
- (vii) a number is placed on the key plan next to the appropriate sheet indicating the current drawing number;
- (viii) major streets and major watercourses are shown on key plans;
- (ix) the key plan will be situated in the lower left corner of the sheet; and
- (x) a ¼ size north arrow will appear in the upper right corner of the key plan.

17.6 Project Coordinates

- (a) As set out in Article 16 [Survey Control and Mapping] of this Part 2, Project Co must ensure that the design drawings are done in the Broadway Subway Project Coordinate System and that the conversion factors to UTM Zone 10 are provided in the drawing notes. Unless stated otherwise in this Agreement, Project Co may be required to convert some record drawings to UTM Zone 10 to satisfy the requirements of the relevant Utility Supplier.
- (b) Project Co shall ensure that all drawing elements will be oriented geographically to the Broadway Subway Project Coordinate System.

17.7 Drawing Production

Project Co shall produce drawings in accordance with the Drawing Manual except as modified by this Article 17 of Part 2.

17.7.1 Scales

- (a) Unless otherwise approved by the Province's Representative acting reasonably, Project Co shall use the scales set out below, as applicable, for drawing production, and shall ensure that drawing scales are clearly shown on each drawing and that a graphic scale bar is included to allow scale verification when

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drawings are reduced or enlarged when printed. The scale bar shall list scale values to show the scale values at full size and half size.

Drawing type	Scale
block plans	1:2000; 1:1000
context plans	1:1000
site plans	1:500
architectural site plans	1:200
environmental site plans	1:500
plans, elevations and general sections	1:200; 1:250; 1:100
environmental plans, elevations and general sections	1:200; 1:250; 1:100
architectural floor plans, longitudinal sections, cross sections and building elevations	1:200; 1:150
specific areas or sections	1:50
architectural enlarged plans	1:50
architectural enlarged sections	1:20
architectural construction detail drawings	1:25; 1:20; 1:10; 1:5
sections and details	1:20; 1:25; 1:10; 1:5

17.7.2 Drawing Data Stamp

- (a) Project Co shall ensure that a drawing data stamp is placed into the bottom left margin outside of the title block. The drawing data stamp shall include the file name and date of the drawing.

17.7.3 Linework

- (a) Project Co shall ensure that all linework is “by layer” and conforms to the requirements and criteria specified in the Drawing Manual and conforms to Good Industry Practice. Project Co shall ensure that it uses consistent pen settings throughout the Design of the Project.

17.7.4 Baylines (Building Grid Lines)

- (a) Project Co shall ensure that baylines are designated alphabetically and numerically. The number designations shall be used in the long axis with letters being used in the short axis. Baylines shall be indicated using a centre line with a 12mm diameter balloon attached.

17.7.5 Sections

- (a) In addition to the Drawing Manual requirements, Project Co shall ensure that sections:
 - (i) are oriented looking 'up chainage'; and
 - (ii) titles are left justified under the section drawn.

17.7.6 Architectural Drawings

- (a) Project Co shall ensure the following with respect to all architectural sections, elevations, enlarged plans and detailed drawing:
 - (i) that all drawings contained within each sheet have an individual drawing title bubble bisected with a line extending through the bubble and generally the width of the individual drawing sufficient to clearly associate the title with its respective drawing. This requirement will apply to all individual drawings regardless of whether one or multiple individual drawings are arranged on a drawing sheet;
 - (ii) that the bubble is located on the left side of the associated title and the bubble contains the drawing number on the top half and the back reference sheet number is located on the bottom half;
 - (iii) that the drawing title is listed above the title line with the scale of the drawing listed below this line; and
 - (iv) that, where multiple back references are applicable, the most common generic reference of the group is referenced.

17.7.7 External Reference Files

- (a) Unless otherwise agreed by the Province's Representative, Project Co shall not bind the external reference files in the AutoCAD drawings that are to be submitted to the Province under this Agreement.

17.7.8 Digital Submissions

- (a) Project Co shall ensure the following in respect of digital submissions to the Province:
- (i) that all drawings submissions as detailed in Article 2 [Design and Construction Certification Procedures], Part 3 of Schedule 4, shall be provided on clearly labeled CD or DVD ROMs;
 - (ii) that compressed files are not used;
 - (iii) that one CD or DVD ROM containing only PDF files of drawing sheets is submitted;
 - (iv) that one CD or DVD ROM containing only design related files is submitted (i.e. xml files from Civil3D, etc.);
 - (v) that, from time to time, at the request of the Province's Representative, Project Co shall provide all related AutoCAD drawing files within five Business Days on a self-sufficient CD or DVD ROM's containing all the necessary support files and associated drawings. Drawings must be accessible directly from the CD or DVD ROM. Compressed files are not allowed. All files for a particular contract will reside in a single contract numbered directory;
 - (vi) that the CD or DVD ROM case label and disc surface are labeled with Project Co's name, "The Broadway Subway Project", contract number, submission status (i.e. 100%, etc.), and the date the CD or DVD ROM was prepared; and
 - (vii) the CD or DVD ROM volume label is non-blank.
- (b) Project Co shall compile all PDF and AutoCAD record drawing submissions as provided under Article 17.7.8(a) as well as the final updated Drawing List onto an external portable hard drive, which shall be provided to the Province's Representative. Project Co shall ensure that old record drawings are removed and superseded by revised record drawings on this portable hard drive, such that the hard drive contains all current record drawings at any given time.

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Article 18. Integration with Existing Transit Facilities

18.1 General

18.1.1 Scope

- (a) This Article 18 [Integration with Transit Facilities] specifies the requirements, criteria and restrictions for any Project Work conducted in and around the Existing Transit Facilities.

18.1.2 Access to Existing Transit Facilities

- (a) Project Co shall ensure that there is access at all times during the performance of the Project Work to all Existing Transit Facilities so that such facilities are capable of remaining fully operational at all times.

18.1.3 Reference Documents

- (a) In addition to any other requirements set out in this Article or imposed by the Transit Operators, Project Co shall ensure that:
 - (i) All Construction in and around the Existing SkyTrain System complies with BCRTC's safety, contractor training, and operation procedures and rules, including:
 - A. BCRTC Wayside Access & Monitoring, Project Manager Guide;
 - B. TransLink: SkyTrain Limits of Approach, Safety Requirements for Work Near Automated Trains and Infrastructure;
 - C. SkyTrain – Safety Policy and Procedure Manual;
 - D. SkyTrain – Safety Orientation – Stations, Trains and Track;
 - E. SkyTrain Rule Book;
 - F. SkyTrain Monitors Reference Guide;
 - G. SkyTrain Contractor Hazards, Working Safely Around SkyTrain;
 - H. Three-Week Look Ahead Planning Template; and
 - I. SkyTrain Work Impacting Customer Service Form.

All of the above documents have been provided as Disclosed Data.

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- (ii) all Construction in and around the existing Canada Line infrastructure complies with ProTrans current safety, contractor training, and operation procedures and rules, including:
 - A. Canada Line Limits of Approach Training for Contractors, Safety Requirements for Work Near Automated Trains and Infrastructure;
 - B. Working Safely around the Canada Line;
 - C. Work Permit and Restricted Area Procedure;
 - D. Health, Safety, Security and Environment Plan for Broadway Subway Project, Broadway-City Hall Station Integration; and
 - E. BSP Requirement for Monitoring Construction Impact.

Items in Articles 18.1.3(a)(ii)A to 18.1.3(a)(ii)C are provided as Disclosed Data. Items in Articles 18.1.3(a)(ii)D and 18.1.3(a)(ii)E are provided in Appendix P [Broadway-City Hall Canada Line Station] to Schedule 4.

- (iii) all Construction in and around existing TransLink bus infrastructure complies with Coast Mountain Bus Company (CMBC) current safety, contractor training, and operation procedures and rules, including:
 - A. Requirement of Employers when Planning work in Proximity to the Energized 600 VDC Trolley Overhead System; and
 - B. Trolley Overhead Limits of Approach, Safety Requirements for Work Near Trolley Overhead Infrastructure.

All of the above documents have been provided as Disclosed Data.

18.2 Project Work Within Existing Transit Facilities

18.2.1 General

- (a) Where any of the Project Work is undertaken within areas of Existing Transit Facilities, including where such Project Work could pose a danger to persons or to Existing Transit Facilities, and without limiting any other obligations of Project Co under this Agreement, Project Co shall ensure the following:
 - (i) workers do not enter Existing Transit Facilities until the applicable Transit Operator has provided confirmation that it is safe to do so and that applicable protections measures such as grounding straps, derailleurs and lock-out switches have been implemented by the Transit Operator;

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- (ii) all Project Work is arranged to the satisfaction of the applicable Transit Operator so that there is no unplanned disruption to existing transit operations and maintenance;
 - (iii) all Project Work to be undertaken on BCRTC sites is documented and submitted to BCRTC for approval in the three-week look ahead planning template, provided as Disclosed Data;
 - (iv) all three-week look ahead planning submissions for Project Work are to be completed in consultation with BCRTC to ensure all information is accurate and that submissions are made in a timely manner;
 - (v) all Project Work that could impact customer service will be documented in a "SkyTrain Work Impacting Customer Service Form", which is provided as Disclosed Data;
 - (vi) approved TCIs, FMIs, work permits and/or occupancy permits set out in this Article 18 have been obtained at least three weeks in advance from the applicable Transit Operator for such Construction activities;
 - (vii) prior to the end of each work shift, Project Co shall ensure that Existing Transit Facilities are meticulously cleaned and that no Construction materials, tools, debris or any other materials are left on the existing guideways and station;
 - (viii) if instructed by the applicable Transit Operator due to an emergency situation at an Existing Transit Facility, Project Co shall immediately cease all Project Work at the applicable Existing Transit Facility and clear the Existing Transit Facility of workers, equipment and all materials; and
 - (ix) Project Work is performed in a manner that precludes the risk of injury to persons on or about the Project Site and that preserves the security and safety of the existing operating systems.
- (b) Except as otherwise permitted by the Province's Representative or the applicable Transit Operator, Project Co shall, during the Project, erect temporary hoarding fencing to separate the Project Work from the operating areas of Existing Transit Facilities in accordance with the following:
- (i) temporary hoarding fencing shall be compliant with NFPA 241;
 - (ii) temporary fencing and hoarding shall be:
 - A. rigidly fixed and secured; and
 - B. designed so as to prevent any accidental movement of material, equipment or personnel into, onto or over the operating guideways;

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- (iii) the location and detailing of temporary hoarding fencing shall comply with the applicable TFCIP, work permits and occupancy permits;
 - (iv) temporary hoarding fencing shall not block CCTV cameras, signage, FLSS equipment and advertising. Any required relocation of these elements to accommodate temporary hoarding fencing must be coordinated by and paid for by Project Co; and
 - (v) temporary hoarding fencing shall be smooth and painted white, with no company logos, branding or advertising.
- (c) Prior to undertaking any Project Work adjacent to or within an Existing Transit Facility and without limiting any other obligations of Project Co under the Agreement, including Part 4 [General Obligations of Project Co], Project Co shall install appropriate warning signs to advise workers and other persons of the dangers and hazards of working or intruding upon areas adjacent to or within an Existing Transit Facility.

18.3 Configuration Changes to Existing Infrastructure

18.3.1 General

- (a) Project Co shall document all changes to Existing Transit Facilities in accordance with the requirements set out in this Article 18.
- (b) All changes to Existing Transit Facilities will be subject to review and acceptance by the applicable Transit Operator.
- (c) Project Co shall work closely with Transit Operators to develop and agree to the details of proposed changes to Existing Transit Facilities.
- (d) Project Co shall follow the process to develop, document and obtain acceptance of changes to existing SkyTrain infrastructure and existing Canada Line infrastructure as set out in this Article 18, and as illustrated in the flowcharts contained in Attachment A [Configuration Change Flowcharts].
- (e) Project Co shall follow the process to develop, document and obtain acceptance of changes to existing Trolley Overhead infrastructure as set out in Article 18.9 [Trolley Overhead Removals and Modifications].

18.3.2 Transit Facility Construction Integration Plans

18.3.2.1 General

- (a) Project Co shall develop a plan for each of the Existing Transit Facilities impacted by Construction activities (each a “**Transit Facility Construction Integration Plan**”) in accordance with this Article 18 [Integration with Transit Facilities]; and
- (b) Project Co shall develop TFCIPs in consultation with the Province’s Representative and the applicable Transit Operator. Project Co will be responsible for obtaining the applicable Transit Operator’s acceptance of the TFCIP.
- (c) Each TFCIP shall address the integration of the Project Work with the applicable Existing Transit Facility and as a minimum address the following:
 - (i) Construction scheduling of those parts of the Project Work that directly integrate with the applicable Existing Transit Facility as well as the Construction that will impact operations and maintenance;
 - (ii) Sequencing of Construction staging and temporary facilities, including placement of temporary hoarding and fencing to separate the Existing Transit Facilities operations and maintenance from the Project Work;
 - (iii) applicable Transit Operator’s safety and procedure requirements for working adjacent to and around Existing Transit Facilities as related to the various proposed Construction staging sequences;
 - (iv) Traffic and Pedestrian management, including emergency evacuation requirements;
 - (v) temporary signage plans to address construction safety and operations for the various construction staging sequences;
 - (vi) schedule and identification of the parts of Construction requiring work or occupancy permits as identified in Article 18.3.4 of this Schedule 4 Article 18 from the applicable Transit Operators;
 - (vii) without limiting the requirements of Article 6 [Work by others], Part 1 of Schedule 4, and Article 10 [Architecture] and Article 14 [Compass Card and Faregates], both of this Part 2 of Schedule 4, coordination of the Project Work with the Compass Card and Faregates Work and the temporary relocation of Compass Card and Faregate Equipment at Broadway-City Hall Station, if any; and
 - (viii) all other requirements and criteria set out in this Agreement, including this Article 18 [Integration with Transit Facilities], applicable to an Existing Transit Facility.

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- (d) Project Co shall submit each TFCIP to the Province's Representative under the Consent Procedure. Project Co shall demonstrate to the satisfaction of the Province's Representative at its discretion, that all of the Transit Operator's requirements have been reasonably addressed in the TFCIP.
- (e) Acceptance of a TFCIP by the Province's Representative does not constitute approval for Project Co to immediately start working in and around the Existing Transit Facilities. Project Co must meet the requirements imposed by the applicable Transit Operator, including submission and acceptance of FMIs and application for work and/or occupancy permits as set out in Article 18.3.3 [Field Modification Instructions] and Article 18.3.4 [Work and Occupancy Permits] [Work and Occupancy Permits] of this Part 2, Project Site inspection and/or the presence of a Transit Operator field monitor prior to start of the relevant Construction activity in and around the Existing Transit Facilities.
- (f) Project Co will submit a revised TFCIP under the Consent Procedure if, during Construction, a substantial change is proposed to Construction scope or staging.

18.3.3 Field Modification Instructions

18.3.3.1 Submission Requirements

- (a) Project Co shall document changes to existing BCRTC infrastructure or existing Canada Line infrastructure in Field Modification Instructions (FMI).
- (b) Project Co shall submit FMIs to BCRTC or ITBC, as applicable, that include the following:
 - (i) description of the Project Work, including:
 - A. relevant drawings and technical documentation;
 - B. code reviews and letters of assurance applicable to the proposed Project Work;
 - C. change in quantities of assets requiring maintenance as a result of the change; and
 - D. impact
 - (ii) reason for the change;
 - (iii) location of the Project Work;
 - (iv) configuration and condition of infrastructure before the change;
 - (v) infrastructure impacted by the Project Work, including:
 - A. each subsystem that is impacted;

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- B. identification of impacts on train and passenger service;
 - C. safety related impacts; and
 - D. temporary (during Construction) and permanent (after completion of Construction) impacts on existing advertising infrastructure;
- (vi) work methods, including:
 - A. detailed Project Site and hoarding plan with clearly identified access paths to Project Site entrances;
 - B. proposed changes to existing wayfinding signage; and
 - C. anticipated resources required from BCRTC or ITBC to support Project Co;
 - (vii) risk assessment of Project Work and proposed mitigation measures;
 - (viii) quality assurance plan and proposed inspection hold points;
 - (ix) identification of test procedures required to verify successful completion of the Project Work;
 - (x) software version description document for proposed changes to existing software; and
 - (xi) list of record documents related to the applicable change to be provided after Construction.
- (c) Each FMI must include sufficient details for each item listed above to allow BCRTC or ITBC to undertake a thorough review and not delay approval processes.

18.3.3.2 Review and Acceptance of FMIs by BCRTC

- (a) All changes to existing BCRTC infrastructure, including all changes to hardware and software are subject to review and acceptance by BCRTC, through its technical change instruction (TCI) process.
- (b) BCRTC may prepare TCIs based on the information provided in FMIs submitted by Project Co. Project Co's FMIs will typically be attached to and form part of TCIs prepared by BCRTC.
- (c) Project Co shall allow a minimum of three weeks for BCRTC to complete each TCI after BCRTC has received the applicable FMI, with all required content finalized and attachments included. BCRTC may request additional time for the review of any FMI, including where the FMI is voluminous or requires extensive

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review by BCRTC or its representatives, and Project Co will, in consultation with BCRTC, extend such time for any reasonable requests by BCRTC.

- (d) Project Co shall submit FMIs directly to BCRTC, with copies to the Province for information.
- (e) TCIs are subject to review and approval by BCRTC through its internal change review process.
- (f) Project Co may be required to attend BCRTC change review meetings to respond to questions and provide additional details about proposed changes to existing BCRTC infrastructure.
- (g) BCRTC will provide approved TCIs to Project Co and the Province's Representative.
- (h) Project Co shall not make any changes to existing BCRTC infrastructure without an approved TCI from BCRTC.

18.3.3.3 Review and Acceptance of FMIs by Canada Line

- (a) All changes to existing Canada Line infrastructure, including all changes to hardware and software are subject to review and acceptance by ITBC, through its FMI process, in accordance with the Health, Safety, Security and Environment Plan, provided in Appendix P [Broadway-City Hall Canada Line Station] to Schedule 4.
- (b) Project Co shall submit FMIs directly to ITBC, with copies to the Province for information.
- (c) FMIs will be reviewed and approved through ProTrans' internal change review process.
- (d) Project Co may be required to attend ProTrans' change review meetings to respond to questions and provide additional details about proposed changes to existing Canada infrastructure.
- (e) ITBC will provide written response of "no objection" to FMIs submitted by Project Co to Project Co and the Province's Representative.
- (f) Project Co shall not make any changes to existing Canada Line infrastructure without an acceptance letter for applicable FMIs.

18.3.4 Work and Occupancy Permits

- (a) All anticipated work permit and occupancy permit submissions related to the Project Work must be identified in Project Co's TFCIPs. Project Co must apply for work permits and/or occupancy permits from the applicable Transit Operator, as related to Project Co's specific Construction sequences and planned activities of Project Work.
- (b) The applicable Transit Operator may require, and Project Co will obtain, additional work permits or occupancy permits either due to a proposed change in Construction sequence or activity or if the proposed Construction activity, in the sole opinion of the Province's Representative or the applicable Transit Operator, is deemed to pose a risk or safety concern to the Existing Transit Facilities ongoing operations. For clarity, Project Work in and around the Existing SkyTrain System and Canada Line infrastructure will require permit submissions to BCRTC and ProTrans respectively.
- (c) It is imperative that Project Co work in close consultation with the applicable Transit Operator on permit applications to ensure that the required supporting documentation is provided to the Transit Operator at least three weeks before the relevant Project Work is scheduled to be undertaken.
- (d) For Project Work related to integration with the Existing SkyTrain System, Project Co shall attend all BCRTC operational planning meetings where permit applications are reviewed and approved.
- (e) For Project Work related to integration with the Canada Line, Project Co must attend all ProTrans operational planning meetings where permit applications are reviewed and approved.
- (f) Where the Project Work involves the operation of construction equipment within 3m of CMBC trolley overhead, Project Co shall provide a CMBC Trolley Overhead hazard advice notice, to be signed between Project Co and CMBC, a minimum of two weeks before the applicable Project Work is scheduled to begin. A sample Trolley Overhead hazard advice notice form is provided as Disclosed Data in the document titled "Requirement of Employers when Planning work in Proximity to the Energized 600 VDC Trolley Overhead System".

18.3.5 Updates to Existing Record Drawings

- (a) Project Co shall complete updates to existing BCRTC, Canada Line and CMBC record drawings to reflect all changes to existing infrastructure required to accommodate the Broadway Subway Project, in accordance with the requirements set out in Article 17 [Drawings].

18.3.6 Facilitating Concurrent Work

- (a) Without limiting the requirements of Article 6 [Work by Others], Part 1 of Schedule 4, Article 9 [Roads], Part 2 of Schedule 4 and Article 14 [Smart Card and Faregates Work], Part 2 of Schedule 4, Project Co shall be responsible for the scheduling and coordination of the Design and Construction of the Stations and adjacent areas with the design and construction of the work specified in Article 6 [Work by Others], Part 1 of Schedule 4.
- (b) Project Co will ensure that its Construction activities do not disrupt transit service during Construction at Broadway-City Hall Station and will coordinate work to be performed by ITBC to prevent disruption to existing transit passengers.
- (c) Project Co shall coordinate its Construction activities with CMBC and shall notify CMBC when Project Co has completed roadworks at any particular location sufficient to enable the installation of Trolley Overhead infrastructure by CMBC as soon as reasonably possible.
- (d) Project Co shall provide CMBC with access to the Project Site to complete the installation of Trolley Overhead infrastructure as described in Article 18.3.6(c).

18.4 Requests for Resources from Transit Operators

18.4.1 BCRTC

- (a) Project Co shall request Trains and staff resources from BCRTC to support the Project Work in accordance with the requirements set out in Attachment C [TransLink and Project Co Resource Obligations] to Article 13, of Part 2 of Schedule 4.

18.4.2 InTransitBC

- (a) Project Co shall request Trains and staff resources from ITBC to support the Project Work in accordance with the requirements set out in Appendix P [Broadway-City Hall Canada Line Station] to Schedule 4.

18.5 Not Used

18.6 Existing SkyTrain System

18.6.1 General

- (a) Without limiting section 4.12 [Project Co as Prime Contractor] of this Agreement, unless otherwise stated in this Article 18 [Integration With Existing Transit Facilities], Project Co acknowledges that, for the purposes of the WCA, BCRTC is the “Prime Contractor” within those portions of the Project Site that fall within the boundaries of the Existing SkyTrain System. Project Co shall ensure that its safety policies and procedures for all Project Work to be performed by Project Co within such portions of the Project Site comply with BCRTC’s safety policies and procedures, which, in addition to the requirements set out in this Article 18.6 [Existing SkyTrain System], include the requirements set out in Article 13 [Systems] of this Part 2, Schedule 4.
- (b) Project Co will be responsible for the cost of BCRTC resources to monitor safety for Project Work within the boundaries of the Existing SkyTrain System, where such costs exceed the base level of TransLink Resources set out in Attachment C [TransLink and Project Co Resource Obligations] to Article 13 [Systems] of this Part 2, Schedule 4.

18.6.2 Project Work Within Existing Millennium Line

- (a) In addition to the requirements set out in Article 18.2.1 [General], all Project Work shall be arranged such that:
 - (i) workers will not be permitted to enter existing guideways during Passenger Service hours and during maintenance activities; and
 - (ii) workers will not be permitted to enter non-public areas of VCC-Clark Station during Passenger Service hours and during maintenance activities, unless otherwise agreed with BCRTC.
- (b) Project Co shall connect the Broadway Subway Project with the Existing Millennium Line near VCC-Clark Station. The existing tail track to the west of VCC-Clark Station is a fully automated dual track that is used by BCRTC to store and/or turn back Trains. BCRTC frequently uses the existing turnout at switch #129 leading to the MOW track and the cross over located between switches #128 and #130 to turn back Trains on the Existing Millennium Line. A schematic layout of the existing tail tracks, MOW track and switches are shown in the Track Plan provided in Appendix B [Figures] to Schedule 4.

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- (c) As reflected in the record drawings for the Existing Millennium Line, the last approximately 50m of the Existing Millennium Line tail track is in spiral, which may require modification to accommodate the Alignment. Modifications to the Existing Millennium Line tail track and associated Structures required to complete the Project Work are subject to Project Co's consultation with BCRTC on the TFCIP. BCRTC may lockout the existing switches #128 and #130, and continue with current SkyTrain operations of turning Trains back using the existing turnout to the MOW track and returning back over the locked out cross over. In this situation, Project Co shall construct temporary hoarding or fencing to isolate the tail track guideway from ongoing SkyTrain operations, which may include hoarding or fencing between the MOW track and tail track guideways. However, as BCRTC will want to reinstate the current operational flexibility it has at this location as soon as possible, BCRTC may limit the duration of this temporary restriction on SkyTrain's operations. Project Co will plan its Construction activities in phases, or alternatively complete the Project Work, such that Project Co can reinstate the modified tail track guideway to meet BCRTC's temporary operational restriction duration.
- (d) When requested and whenever possible, Project Co will provide BCRTC with access to the MOW track guideway by crane and by the existing stairwell located near the end of the MOW track guideway. If immediate access is not possible, Project Co will provide access within 48 hours.

18.6.3 Project Work Within Operations and Maintenance Centre

- (a) Project Co shall work with BCRTC to prepare a TFCIP for Project Work to be carried out within the Operations and Maintenance Centre.
- (b) Project Co shall incorporate the following requirements, and applicable implementation measures, in the TFCIP for Project Work within the Operations and Maintenance Centre:
 - (i) ensure that all Project Work in the Control Room and the Computer Room is completed outside of Passenger Service hours;
 - (ii) comply with the timelines as provided by BCRTC and as incorporated into the applicable TFCIP for working within the Operations and Maintenance Centre; and
 - (iii) ensure that such Project Work does not impact the Existing SkyTrain System except as set out in the TFCIP.

18.7 VCC-Clark Station and Bus Exchange

18.7.1 VCC-Clark Station Operations

- (a) Project Co shall, in carrying out the Project Work at and adjacent to the VCC-Clark Station:
 - (i) comply with the timelines as provided by the Transit Operator and as incorporated into the applicable approved TFCIP for working on the Existing SkyTrain System; and
 - (ii) ensure that such Project Work does not impact the Existing SkyTrain System except as set out in the approved TFCIP.
- (b) If Project Co requires modifications or changes to the existing Guideway Structure or elements (ATC, power rail, reaction rail, running rail, etc.) Project Co will be responsible for all costs, including replacement and labour costs, to return to original functional state.
- (c) If any Project Work will cause disruptions at VCC-Clark Station, Project Co shall construct temporary diversions and facilities for passenger movement and emergency exiting to ensure that VCC-Clark Station is capable of remaining fully operational at all times during Construction.
- (d) Unless otherwise agreed upon with TransLink and incorporated into the applicable approved TFCIP and the Traffic Control Plans, Project Co shall ensure that, during Construction activities, transit passenger access to and from the Station house and the Bus exchange is available during existing SkyTrain System hours and Bus revenue service hours including unimpeded Pedestrian, bike and vehicle access to the road approaches.
- (e) Project Co shall replace or repair any infrastructure within the existing VCC-Clark Bus Facility damaged during Construction activities to the pre-construction condition as set out in the applicable Transit Facilities Pre-Construction Condition Survey or better. Unless otherwise permitted by the Province in its discretion, Project Co shall replace concrete bus pads, sidewalk panels and curb length sections that are partially damaged in their entirety.

18.8 Broadway-City Hall Station

18.8.1 Passenger Access

- (a) In accordance with the requirements set out in Article 18.3.2 [Transit Facility Construction Integration Plans] and the Canada Line Health, Safety, Security and

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Environment Plan (HSSE Plan) (provided in Appendix P [Broadway-City Hall Canada Line Station] to Schedule 4), Project Co shall provide a TFCIP for Broadway-City Hall Canada Line Station that ensures that, during Construction, the Station is capable of remaining fully operational and that there is passenger access to both the Canada Line train and the adjacent Bus services within Canada Line revenue service hours, as set out in Article 1 [General] of Part 2 of Schedule 4 Notwithstanding the foregoing, the applicable TFCIP prepared by Project Co shall reflect the actual Canada Line revenue service hours agreed upon by Project Co with TransLink and, during such hours, Project Co shall not disrupt and shall facilitate Canada Line passenger access to the Canada Line and connecting Bus services. Project Co shall also prepare and submit any other plans as required in the Canada Line HSSE Plan to ITBC for review and acceptance.

- (b) Subject to the applicable approved TFCIP, Project Co shall not disrupt Canada Line passenger access to Canada Line platforms or close Station entrances within Canada Line revenue service hours. TransLink may also require extension of these hours from time to time to accommodate special events extended train service. If TransLink requires an extension of Canada Line revenue service hours, Project Co shall schedule Construction activities so as to ensure that the Broadway-City Hall Station is capable of remaining fully operational, and that passenger access to both the Canada Line and connecting Bus service is maintained, during such extended hours.

18.8.2 Construction Monitoring

- (a) Project Co shall comply with the requirements set out in the Canada Line Technical Memo "BSP Requirement for Monitoring Construction Impact", provided in Appendix P [Broadway-City Hall Canada Line Station] to Schedule 4 for all Project Work undertaken directly adjacent to or underneath the Canada Line infrastructure.

18.8.3 Smart Card and Faregates Work

- (a) Modifications to existing Compass Card and Faregate Equipment, including removals and reinstallations of Compass Card and Faregate Equipment, at Broadway-City Hall Station shall be performed by the CFC, as set out in Article 14 [Compass Card and Faregates].
- (b) Project Co shall make all requests for removals and reinstallations of Compass Card and Faregate Equipment in writing to the Province no less than 105 Business Days before the required completion date of such removals and reinstallations. Project Co shall incorporate this notice period into the applicable approved TFCIP.

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- (c) Project Co shall be responsible for the cost of temporary relocations of Compass Card and Faregate Equipment at Broadway-City Hall Station, in accordance with the rates set out in Attachment C to Article 13 [Systems] of this Part 2.
- (d) Project Co shall ensure that any temporary arrangement of Compass Card and Faregate Equipment at Broadway-City Hall Station provides the same passenger capacity as the existing arrangement of Compass Card and Faregate Equipment.

18.8.4 Scope Split

- (a) The scope split matrix provided in Appendix P [Broadway-City Hall Canada Line Station] to Schedule 4 sets out the work to be performed by each of Project Co and ITBC, respectively, at Broadway-City Hall Station to integrate the new Broadway Subway Project with the Canada Line. This scope split matrix supplements the technical requirements set out elsewhere in this Schedule 4.
- (b) Project Co will perform the Design and Construction components allocated to Project Co in accordance with the relevant provisions of this Schedule 4.
- (c) Project Co will be responsible for the overall project management and scheduling of all work to be performed within Broadway-City Hall - Canada Line Station as related to BSP, including the work to be performed by ITBC forming part of BSP as set out in the scope split matrix provided in Appendix P [Broadway-City Hall Canada Line Station] to Schedule 4. Project Co shall work cooperatively with ITBC in this regard and provide both the Province and ITBC with a look ahead schedule (30 days ahead or as otherwise agreed with ITBC) of the works to be performed within Broadway-City Hall - Canada Line Station, including the specific works set out in the scope split matrix provided in Appendix P [Broadway-City Hall Canada Line Station] to Schedule 4, to be performed by ITBC which are integral to Project Co's scope of work. Project Co shall update the look ahead schedule on a weekly basis and provide this to both the Province and ITBC.
- (d) For those works shown in the scope split matrix to be performed by ITBC, Project Co shall work with and assist ITBC where required in terms of providing drawings and documents developed by Project Co that ITBC may need to complete their works. Project Co shall also review and comment on design drawings and documents provided by ITBC, and shall work with ITBC to ensure that the designs prepared by ITBC and the designs prepared by Project Co are properly coordinated, and that the designs do not conflict with one another. As part of Project Co's responsibility set out in this Article 18.8.4(d), Project Co shall, in consultation with ITBC, establish an agreed design submission review process for the submission and review of Project Co's and ITBC's design drawings and documents, which submission process must include the Province and TransLink

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being copied on all submissions and review comments between Project Co and ITBC.

- (e) In addition to the requirements set out in Article 18.8.4(c) and unless otherwise agreed by the Province's Representative, Project Co shall ensure that the Design of Project Co's scope of work required at BCH-CL Station is sufficiently advanced or finalized by no later than two years after the Effective Date so that ITBC may commence the design of ITBC's scope of work required at this Station, and that ITBC can thereafter proceed to finalize its design without requiring further design information from Project Co. Project Co shall also place importance on critical Design interfaces associated with obtaining an Occupancy Approval Certificate for the BCH Station such as tunnel ventilation and FLSS, in the event ITBC may require Project Co's design earlier.

18.9 Trolley Overhead Removals and Modifications

- (a) As provided in Article 6 [Work by Others] of Part 1, Schedule 4, certain Trolley overhead (TOH) wire removals (which includes the removal of the running wires, guy wires, switches and DC feeder cables) are part of the Advance Work and Concurrent Work to be completed by Advance Work Contractors and Concurrent Work Contractors, respectively.
- (b) Trolley buses will be rerouted by CMBC as per Schedule 4 Part 4 Article 1 [General Traffic Management Requirements].
- (c) The Advance Work Contractor and Concurrent Work Contractor shall complete TOH removals and retentions on Broadway as set out in Schedule 4, Part 1, Article 6 [Work by Others].
- (d) If additional TOH removals or modifications, such as relocation of active TOH wires associated with Traffic Control Plans on trolley bus routes crossing Broadway such as at Main, Cambie or Granville Streets, are required to maintain safe operations during Construction as per Article 18.2.1(a), or if utility poles supporting TOH need to be relocated, Project Co shall submit a request pursuant to the Consent Procedure with regard to the following:
 - (i) Project Co shall be responsible for all costs associated with changes to the TOH removals and retentions described in Article 6.2.3.2(a) of Part 1 Schedule 4, including the Transit Operator's project management costs. Project Co shall be responsible for removal and reinstatement of the Trolley Overhead foundations and poles in accordance with Article 9.4.9 [Trolley Overhead Work] of this Part 2;
 - (ii) Project Co shall identify the extent of additional TOH removals or modifications required in consultation with a CMBC representative and

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will include evidence satisfactory to the Province's Representative that all CMBC requirements have been reasonably addressed in such request;

- (iii) as identified in CMBC limits of approach documents (provided as Disclosed Data), only CMBC trades persons with appropriate training are permitted to make contact with and work on the TOH wires and DC feeder lines;
- (iv) if TOH pole removals include other utilities or City Traffic Signals on the same poles, Project Co will be responsible for contacting and coordinating work with each applicable Utility Supplier or agency;
- (v) if removals of in-service TOH are not feasible, short term, off-peak bypass routes may be permitted on a case-by-case basis; and
- (vi) CMBC will require a minimum six weeks' notice from Project Co to begin any additional TOH work required by Project Co under Article 18.9(d) of this Part 2.

18.10 Parking and Bike Locker Requirements

18.10.1 Broadway-City Hall Station

- (a) Project Co shall, during construction activities, be responsible for maintaining four emergency vehicle parking spaces, two for Metro Vancouver Transit Police and two for Canada Line service vehicles at Broadway-City Hall Station in the parking area immediately south of the Station between 10th Avenue, Cambie Street and Yukon Street. Project Co will coordinate the location of these spaces with, and obtain approval from, the Metro Vancouver Transit Police and ITBC.
- (b) Project Co shall relocate the TransLink bicycle lockers at the Broadway-City Hall Station to a location acceptable to ITBC, such location to provide safe and direct bicycle access from the 10th Avenue bike route and direct Pedestrian access to Broadway-City Hall Station. Project Co shall provide no less than four weeks' notice to ITBC and TransLink of the relocation.

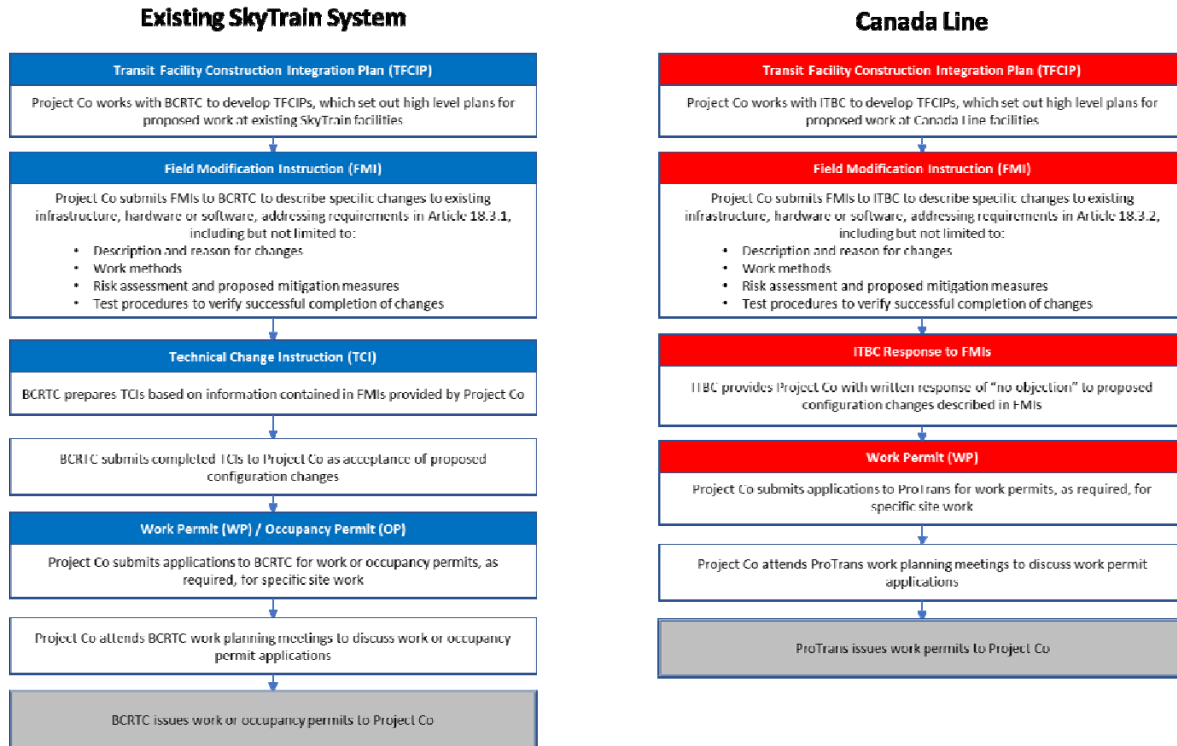
18.10.2 VCC-Clark Station

- (a) During Construction, Project Co shall either:
 - (i) maintain unobstructed access to the existing HandyDART stall, two service vehicle parking spaces and the bicycle lockers in close proximity to VCC-Clark Station, or
 - (ii) propose changes to the location or access to these amenities that are accepted in writing by TransLink, CMBC, BCRTC and Metro Vancouver

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Transit Police. Project Co shall provide no less than four weeks' notice to TransLink of any such change.

Attachment A – Configuration Change Flowcharts



Article 19. Province Infrastructure – Security and Protection 19-1

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Article 19. Province Infrastructure – Security and Protection

19.1 General

- (a) This Article 19 [Province Infrastructure – Security and Protection] specifies requirements and criteria for certain security and protection measures that Project Co shall design and construct to secure and protect the Guideway, the Tunnel, Stations and AARUs from damage and unauthorized access.
- (b) Nothing in this Article 19 [Province Infrastructure – Security and Protection] shall derogate from or diminish any responsibility or obligation of Project Co with respect to the safety and security of all temporary and permanent work or Province Infrastructure as contained in any other part of this Agreement.
- (c) Project Co shall ensure that all objections and issues identified by Technical Safety BC (TSBC) in respect of the permanent fencing and the hazard of trespass and unauthorized access onto any part of the Province Infrastructure, specifically the BSP as well as the Canada Line interface at Broadway - City Hall Station, that has been constructed, installed, altered, upgraded, and/or augmented by the carrying out of the Project Work are addressed to the satisfaction of TSBC.

19.2 Prevention of Unauthorized Access

- (a) Project Co shall, in accordance with this Article 19 [Province Infrastructure – Security and Protection], design, supply, construct and erect permanent fencing at all locations on the Permanent Project Lands, where required to prevent trespass and unauthorized access onto the Guideway or into the Tunnel portal or Stations and AARUs.
- (b) In addition to any requirements specified in Article 19.3 [Types of Permanent Fencing] of this Part 2, all permanent fencing supplied by Project Co shall, at a minimum, satisfy the following design criteria:
 - (i) be strong, secure and highly difficult to cut;
 - (ii) be highly difficult to climb, with the top of the fencing incorporating features to prevent cross over on to any Province Infrastructure that has been constructed, installed, altered, upgraded, and/or augmented by the carrying out of the Project Work;
 - (iii) be highly resistant to rust and corrosion;

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- (iv) be of durable, metal, vandal resistant construction;
 - (v) incorporate secure lockable access in accordance with all applicable requirements of NFPA 130;
 - (vi) incorporate equivalent security signage to that erected and maintained on the Existing SkyTrain System; and
 - (vii) meet or exceed the functionality of similar fencing in similar installations on the Existing Evergreen Line as shown the drawings provided as Disclosed Data.
- (c) At locations where permanent noise walls are to be provided by Project Co as set out in Article 20 [Noise and Vibration] of this Part 2, Project Co may integrate the security requirements set out in this Article 19 [Province Infrastructure – Security and Protection] with the permanent noise wall. Project Co shall ensure that that such integrations do not detract from the aesthetic look of the permanent noise wall more than is necessary to achieve the safety and security requirements set out in this Article 19 [Province Infrastructure – Security and Protection].
- (d) At each location where an AARU or self-contained energy storage unit is installed, Project Co shall supply and install access gates that contain a man-door gates that are lockable in similar installations on the Evergreen Line as shown in the drawings provided as Disclosed Data.
- (e) At the high rail access, Project Co shall supply and install a vehicle access gate and man-door gate. Project Co shall provide a solid-wall gate with sound absorption properties capable of meeting the requirements set out in Article 20 [Noise and Vibration] of this Part 2. Project Co may through engagement of the City of Vancouver’s Fire Rescue Services in accordance with Article 2 [Fire Life Safety Committee] be required to provide these emergency service providers with access to the Tunnel portal using the high rail access, which may require additional modifications to this gate.

19.3 Types of Permanent Fencing

19.3.1 General

- (a) The permanent fencing supplied, constructed and erected by Project Co pursuant to this Article 19 [Province Infrastructure – Security and Protection] shall be of the categories of fencing identified in this Article 19.3 [Types of Permanent Fencing] in those areas specified in this Article 19.3 [Types of Permanent Fencing].

- (b) Project Co shall prepare comprehensive Construction Specifications for all fencing materials and components that:
 - (i) meet the performance and prescriptive requirements set out in this Article of Part 2; and
 - (ii) incorporate equivalent or better materials and components specified in Appendix C [Minimum Considerations for Construction Specifications] of Schedule 4.

19.3.2 Type 1 - Chain Link Fencing

- (a) Unless otherwise specified in this Article 19 [Province Infrastructure – Security and Protection], Project Co shall supply and install Type 1 fencing, including at the following locations:
 - (i) near the end of VCC Clark tail track where additional land has been acquired from the BNSF Railway Company; and
 - (ii) at those property locations as set out in the Site Requirements, as required by Schedule 7 [Lands], Part 1 of Schedule 4.
- (b) Type 1 fencing shall be:
 - (i) comprised of black vinyl-coated chain link and black powder-coated steel posts; and
 - (ii) at least 2.4m in height, topped by three stands of galvanized barbed wire fixed to angled brackets mounted at the top of the posts, sufficient to prevent climbing over the fence.

19.3.3 Type 2 – Welded Wire Fencing

- (a) Project Co shall supply and install Type 2 fencing along the Guideway adjacent to public areas and at Stations where a higher standard of aesthetics is required, including at the following locations:
 - (i) the portal area near Great Northern Way Station, from the Tunnel portal up to the point at which the Guideway becomes elevated by at least 3.5m from adjacent ground surface to top of rail. The fencing at this location is to be mounted on top of the U-section walls, Tunnel portal wall and adjacent to the abutment structure until the difference between the adjacent ground surface and top of rail exceeds 3.5m. However, if a permanent noise wall is required at this location, as set out in Article 20 [Noise and Vibration] of this Part 2, and if Project Co selects to integrate the security requirements with the noise wall in accordance with Article 19.2(c) of this Part 2, Project Co is not required to supply and install the

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- Type 2 fencing on the Tunnel portal wall and south side of the U-section wall in accordance with this Article 19.3.3(a)(i) ;
- (ii) the area under the Elevated Guideway where the Guideway transitions from the Elevated Guideway to abutment structure. This fenced area is to prevent unauthorized access into the abutment structure, specifically the bearing pad area, as well as any access into the Elevated Guideway. Project Co shall provide a lockable man-gate to this fenced area for BCRTC access;
 - (iii) around the AARU or self-contained energy storage unit, as applicable, located at each of Mount Pleasant Station, Fairview-VGH Station, and Arbutus Station; and
 - (iv) any other areas where the potential for unauthorized access into the Guideway or Stations is identified by TSBC or the Province's Representative, which may include locations where access can be gained from adjacent Structures or existing buildings.
- (b) Type 2 fencing shall be:
- (i) comprised of a black powder-coated ornamental welded steel modular open fencing panel and post system, comparable to the Omega II Secure fence type system; and
 - (ii) at least 2.4m in height with specific features to prevent climbing, including angled extension arms carrying three strands of galvanized barbed wire attached to the top of the posts.
- (c) Project Co may propose an equivalent fencing that satisfies the requirements of this Article 19.3.3 [Type 2 - Welding Wire Fencing], which may be accepted by the Authority, in its discretion.

19.4 Prevention of Vehicle Impacts

- (a) Project Co shall assess the risks of vehicles impacting on or entering or intruding into any part of the Guideway and shall ensure that the Design and Construction of Province Infrastructure to the extent that such infrastructure is required to be constructed, installed, altered, upgraded, and/or augmented by the carrying out of the Project Work incorporates all measures reasonably necessary to ensure that vehicles cannot impact or, except in authorized circumstances, enter the Guideway.
- (b) Project Co shall ensure that the Design and Construction of the Province Infrastructure to the extent that such infrastructure is required to be constructed,

installed, altered, upgraded, and/or augmented by the carrying out of the Project Work:

- (i) addresses the risk of vehicles impacting the underside of the elevated Guideway or any other structure which projects into the vicinity of roadways; and
 - (ii) ensures that there is sufficient vertical and lateral clearance between the elevated Guideway or such other structure and the adjacent roadway.
- (c) Project Co shall supply and install concrete roadside barriers at locations along the alignment of the Guideway where there is a danger that a vehicle which leaves the roadway or adjacent area for any reason may impact on or intrude into any part of the Province Infrastructure to the extent that such infrastructure has been constructed, installed, altered, upgraded, and/or augmented by the carrying out of the Project Work, including the Guideway.
- (d) The concrete roadside barriers supplied and installed by Project Co shall comply with Section 941, Precast Reinforced Concrete Barriers of the Design Build Standard Specifications for Highway Construction (DBSS).
- (e) Roadside barriers of any type shall not be used at or within Station areas.
- (f) For the section of Guideway along Carolina Road, Project Co shall raise the retaining walls, including the Tunnel portal wall, to address the City of Vancouver's proposed future regrading of the Great Northern Way area, which includes partial raising of Carolina Road and construction of a new road next to the Tunnel portal as set out in the Site Requirements, all in accordance with the Conditions of Access requirements in Schedule 8 [Lands], of this Agreement. Project Co shall raise the U-walls and Tunnel portal wall above this future grading to prevent errant vehicles from entering the Guideway in accordance with the requirements set out in Section 4.7.1 of Article 4 [Underground Structures] of this Part 2. The Type 2 fencing set out in this Article 19.3.3 [Type 2 – Welding Wire Fencing] is to be mounted on top of the U-walls and Tunnel portal wall. Project Co may exclude the Type 2 fencing on the south side of the U-wall where a permanent noise wall is required as set out in Article 20 [Noise and Vibration] and where Project Co selects to integrate the security requirements with the noise wall in accordance with Article 19.2(c), both of this Part 2. Project Co shall ensure that the design of the top of the walls provides a symmetric profile on both sides of the Guideway to address aesthetic requirements.
- (g) Project Co shall supply and install removable lockable bollards at the high rail access to prevent an errant vehicle along Carolina Road from entering the Guideway at this location as well as to prevent vehicles from stopping within the

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high rail access and/or driving partially around the sidewalk letdown. Project Co shall provide and install at least three bollards and additional bollards as required to meet the requirements of this Section. Project Co shall provide removable bollards between the inbound and outbound tracks similar to the high rail access configuration provided on the Evergreen Line, which record drawings are provided as Disclosed Data.

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Article 20. Noise and Vibration

20.1 General

- (a) This Article 20 [Noise and Vibration] specifies the requirements and criteria for Design and Construction of the Project with respect to noise (including acoustical issues), vibration, construction lighting and hours of work for Construction activities.
- (b) Project Co shall comply with the requirements and criteria set out in this Article 20 [Noise and Vibration] with respect to noise (including acoustical issues), vibration and hours of work for Construction activities, unless otherwise accepted by the Province's Representative in accordance with the Consent Procedure.
- (c) At the Province's discretion, the Province may require Project Co to provide, at no cost to the Province, noise monitoring reporting to the Province in order to confirm compliance with the approved noise levels and hours of work in accordance with this Article 20 [Noise and Vibration].

20.2 Construction

20.2.1 Permitted Hours of Work and Noise Level Criteria

20.2.1.1 Emergency

- (a) Except in the case of an Emergency, an unanticipated construction activity that is time critical, or as specified in this Agreement, Project Co shall not undertake Construction activities outside the Core Hours of Work or exceed the noise levels permitted during the Core Hours of Work as set out in Article 20.2.1.2(b) of this Part 2, unless Project Co has received the acceptance of the Province's Representative in accordance with any of Articles 20.2.1.3(a), 20.2.1.3(c), 20.2.1.3(e), 20.2.1.4(a) or 20.2.1.4(b), all of this Part 2, as applicable.
- (b) If Project Co exceeds the noise levels or undertakes Construction activities outside of the hours permitted by this Article 20.2 [Construction] due to an Emergency, or an unanticipated construction activity that is time critical, Project Co shall notify the Province's Representative of such Emergency or activity in accordance with the protocols set out in the Noise and Vibration Management Plan.

20.2.1.2 Core Hours of Work

- (a) Except as otherwise provided in this Agreement, Project Co shall undertake Construction activities only during the Core Hours of Work.

- (b) During the Core Hours of Work, Continuous Noise from Construction activities, when combined with the existing ambient noise, shall not exceed 85 A-weighted decibels (dBA) when measured 15m from the noise source.

20.2.1.3 Shoulder Hours of Work and Night Hours of Work

- (a) If all of the requirements set out in Article 20.2.2 [Construction Noise Mitigation Requirements] of this Part 2 are met, subject to acceptance by the Province's Representative in accordance with the Consent Procedure, Project Co may, in addition to undertaking Construction activities during the Core Hours of Work, undertake Construction activities during the Shoulder Hours of Work. Project Co shall use all reasonable efforts to perform high-decibel work during Core Hours of Work, and only if necessary, perform such work during Shoulder Hours of Work or Night Hours of Work, as permitted in accordance with Article 20.2.1.3(c).
- (b) During the Shoulder Hours of Work, noise from Construction activities, when combined with the existing ambient noise, shall not exceed:
 - (i) 80 dBA for Continuous Noise; and
 - (ii) 85 dBA for Non-Continuous Noise, when measured 15m from the noise source.
- (c) If all requirements in Article 20.2.2 [Construction Noise Mitigation Requirements] of this Part 2 are met, and subject to acceptance by the Province's Representative in accordance with the Consent Procedure, Project Co may, in addition to undertaking Construction activities during the Core Hours of Work and, where accepted, the Shoulder Hours of Work, undertake Construction activities during the Night Hours of Work at any of the Night Hours of Work Locations.
- (d) During the Night Hours of Work, noise from Construction activities, when combined with the existing ambient noise, shall not exceed:
 - (i) 60 dBA for Continuous Noise; and
 - (ii) 70 dBA for Non-Continuous Noise, when measured 15m from the source.
- (e) Project Co shall submit requests to undertake Construction activities during:
 - (i) the Shoulder Hours of Work; or
 - (ii) the Night Hours of Work at any of the Night Hours of Work Locations, in writing to the Province's Representative in accordance with, as the case may be, Articles 20.2.1.3(a) or 20.2.1.3(c), both of this Part 2, under the Consent Procedure, in advance of the commencement of Construction activities during such extended hours of work, and such requests shall include the following information:
 - (iii) a description of the location(s) of the affected areas of the Project Site;

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- (iv) a description of the Construction activities and the source(s) of noise in respect of the Construction activities and the anticipated noise levels;
- (v) the rationale as to why such Construction activities should be undertaken during extended hours;
- (vi) the anticipated period of time and the duration the subject Construction activities will need to take place during the extended hours;
- (vii) a description of the mitigation measures that Project Co will undertake to minimize noise levels;
- (viii) a description of the public notification program, which shall include a radius of at least two blocks from the noise source and will require Project Co to provide public notification, issued at least 5 days in advance of the work; and
- (ix) a description of the specific mitigation measures that Project Co shall undertake to demonstrate how general and task specific lighting on construction sites will minimize light intrusions, spill and glare on adjacent buildings and properties, particularly residential properties, including addressing the following principles:
 - A. considering adjacent land uses prior to the design of construction site lighting plans;
 - B. managing on-site traffic to minimize vehicle related light spill on adjacent areas;
 - C. using directional lighting and focusing lighting on work sites and away from surrounding areas;
 - D. using motion and/or light activated lighting where possible to reduce the amount of light generated at construction sites;
 - E. appropriate use of screening to prevent light spill; and
 - F. placing task lighting as close to the work area as possible.

20.2.1.4 Requests for Exemptions to Permitted Construction Hours or Noise Level Criteria

- (a) If Project Co would like an exemption from the Core Hours of Work, the Shoulder Hours of Work, the Night Hours of Work, the Night Hours of Work Locations, and/or the applicable noise levels set out in Articles 20.2.1.2(b), 20.2.1.3(b) or 20.2.1.3(c), all of this Part 2, Project Co shall submit an exemption request to the Province's Representative for acceptance pursuant to the Consent Procedure, which request shall:
 - (i) be submitted in advance of the commencement of the Construction activities that are the subject of the exemption request; and
 - (ii) contain the information identified in Article 20.2.2 [Construction Noise Mitigation Requirements] of this Part 2 related to noise levels, construction hours of work, and Night Hours of Work Locations.

- (b) If Project Co wishes to undertake Construction activities near a Quiet Zone which are likely to result in noise levels above the applicable noise levels permitted by any of Articles 20.2.1.2(b), 20.2.1.3(b) or 20.2.1.3(d), all of this Part 2, for a period exceeding one month, Project Co shall submit the proposed measures to mitigate such noise levels to the Province's Representative for acceptance in accordance with the Consent Procedure.

20.2.1.5 Consultation regarding Proposed Exemption

- (a) Prior to granting acceptance of an exemption request under Articles 20.2.1.4(a) or 20.2.1.4(b) of this Part 2 related to noise levels, construction hours of work, or Night Hours of Work Locations, the Province may require that Project Co undertake specific actions, including the following:
- (i) organizing and leading special meetings involving affected communities and residents for the purpose of sharing information with, and receiving input from, residents in areas subject to high noise levels, with any such meetings to be held at least three days prior to commencement of the Construction activities referred to in the exemption request;
 - (ii) sending out notices via direct communications to potentially affected residents and businesses, including residents and businesses within a radius of at least two blocks from the noise source, regarding upcoming Construction activities that will result in noise levels above the specified noise level criteria, which notices must be issued at least 5 days in advance of the work and must also provide information regarding the timing and locations of neighbourhood meetings to be held by Project Co to discuss these issues; and
 - (iii) participating in discussions with the Province and the City for the purpose of identifying and implementing mutually acceptable mitigation measures to address noise impacts, unless no practical options exist.

20.2.1.6 Great Northern Way Station

- (a) Construction activity at Great Northern Way Station is permitted during the Core Hours of Work, the Shoulder Hours of Work, and the Night Hours of Work, but only in accordance with the following:
- (i) noise levels during the Core Hours of Work shall not exceed 85 dBA Continuous Noise when measured 15m from the noise source in accordance with Article 20.2.1.2 [Core Hours of Work];
 - (ii) during the Shoulder Hours of Work, noise from Construction activities, when combined with the existing ambient noise, shall not exceed:
 - A. 80 dBA for Continuous Noise; and
 - B. 85 dBA for Non-Continuous Noise;when measured 15m from the noise source in accordance with Article 20.2.1.3(b);

- (iii) during the Night Hours of Work, noise from Construction activities, when combined with the existing ambient noise, shall not exceed:
- A. 60 dBA for Continuous Noise; and
 - B. 70 dBA for Non-Continuous Noise;
- when measured 15m from the noise source in accordance with Article 20.2.1.3(d);
- (iv) Project Co shall submit a mitigation plan to the Province's Representative under the Consent Procedure, at least 3 months in advance of the commencement of Construction activities at Great Northern Way Station during such extended hours of work, and such submission shall include the following information:
- A. a description of the location(s) of the affected areas of the Project Site;
 - B. a description of the Construction activities and the source(s) of noise in respect of the Construction activities, and the anticipated noise levels;
 - C. the rationale as to why such Construction activities should be undertaken during extended hours;
 - D. the anticipated period of time and the duration the subject Construction activities will need to take place during the extended hours of work;
 - E. a description of the mitigation measures that Project Co will undertake to minimize noise and vibration levels, particularly for adjacent residential areas. In addition to mitigation measures in 20.2.2(f), Project Co shall, at a minimum, provide additional temporary noise barriers, temporary noise lids or canopy cover over the Great Northern Way Station site, and shall implement any other mitigation measures necessary to minimize noise levels during the Shoulder Hours of Work and Night Hours of Work, including reducing Construction activities related to tunneling, and reducing use of construction equipment such as ventilation fans, generators, and trucks, and other noisy activities;
 - F. a description of the public notification program, which shall include a radius of at least two blocks from the noise source and shall require Project Co to provide public notification, issued at least 20 days in advance of the work; and
 - G. a description of the specific mitigation measures that Project Co shall undertake to demonstrate how general and task specific lighting on construction sites minimize light intrusions, spill and glare on adjacent buildings and properties, particularly, residential properties, including addressing the following principles:

- (1) considering adjacent land uses prior to the design of construction site lighting plans;
- (2) managing on-site traffic to minimize vehicle related light spill on adjacent areas;
- (3) using directional lighting and focusing lighting on work sites and away from surrounding areas;
- (4) using motion and/or light activated lighting where possible to reduce the amount of light generated at construction sites;
- (5) appropriate use of screening to prevent light spill; and
- (6) placing task lighting as close to the work area as possible.

20.2.2 Construction Noise Mitigation Requirements

- (a) Prior to undertaking any Construction activities, Project Co shall conduct and submit the following to the Province under the Review Procedure:
 - (i) review the noise impact assessment completed by TransLink and included in Section 7.6 [Noise] of the BSP Environmental and Socio-economic Review (ESR) made available as Disclosed Data;
 - (ii) undertake a supplemental noise assessment of the Project Site and its vicinity to assess and describe the noise levels which will be generated by the vehicles and equipment to be used during Construction activities and the methods by which Construction activities are to be carried out over the levels contained in Section 7.6 [Noise] of the ESR. In preparing the supplemental noise assessment of the Project Site, Project Co shall use the ISO 9613 Standard implemented using 3-D noise modeling software (Cadna/A, SoundPlan, or equivalent), to predict construction activity noise levels. The supplemental noise impact assessment prepared by Project Co shall include the identification of the estimated noise levels at all anticipated Night Hours of Work Locations;
 - (iii) establish a dedicated phone line for the general public to report excessive noise or other complaints such as vibration or construction lighting; and
 - (iv) develop and implement a public notification program, which shall include a radius of at least two blocks from the noise source and shall require Project Co to provide public notification, issued at least 5 days in advance of the work.
- (b) Following a complaint from the general public, Project Co shall:
 - (i) provide a response within 48 hours of a call, email or any other form of public complaint notice;
 - (ii) record the complaint and the subsequent response in a tracking system, with a copy of the complaint submitted to the Province; and
 - (iii) take necessary steps to mitigate the issue(s) which prompted the call, and document and record such mitigation measures.

- (c) If the results of the supplemental noise impact assessment prepared by Project Co in accordance with Article 20.2.2(a) of this Part 2 indicate that any estimated noise level due to Construction activities, when combined with the existing ambient noise level, will exceed the specified noise level criteria identified in this Article 20.2 [Construction], Project Co shall provide and implement an appropriate noise mitigation strategy submitted to the Province under the Review Procedure, including the erection of temporary noise walls, as required. Project Co shall be responsible for proving any proposed noise mitigation strategy through both 3-D modelling software and ongoing field noise monitoring to ensure that the noise level criteria set out in this Article 20.2 [Construction] are not exceeded.
- (d) At least 45 Business Days prior to commencing any Construction activities, Project Co shall submit a Noise and Vibration Management Plan to the Province's Representative for acceptance in accordance with the Consent Procedure, which Noise and Vibration Management Plan shall:
 - (i) incorporate the acoustical criteria and requirements set out in this Article 20 [Noise and Vibration];
 - (ii) describe the results of the supplemental noise impact assessment undertaken pursuant to Article 20.2.2(a) of this Part 2;
 - (iii) detail the steps that Project Co proposes to take to minimize noise impacts during Construction activities, which steps shall include:
 - A. direct communication with potentially affected residents, businesses and property owners regarding any construction noise issues that may arise; and
 - B. the development of procedures for tracking and responding to any noise complaints;
 - (iv) identify Construction activities that may result in elevated noise levels (including activities to be conducted at the north and south portals of the Tunnel) and set out site-specific measures to mitigate noise-related impacts to local residents and businesses;
 - (v) describe the criteria, standards, and monitoring methodology to be used by Project Co to identify the need for noise attenuation barriers and related mitigation measures during construction; and
 - (vi) incorporate a construction noise monitoring program, which specifically addresses those areas of the Project Site proposed for Night Hours of Work Construction activities and/or that are located in proximity to Quiet Zone(s). During the course of Construction activities, Project Co shall expand the noise monitoring program as necessary to include those areas of the Project Site where noise complaints have been received or as directed by the Province's Representative.
- (e) Project Co shall make available to the Province, the results of the construction noise monitoring program obtained by Project Co, which shall be at least weekly, but may be increased or decreased as determined by the Province based on the

construction activity, proximity to Quiet Zones, complaints, and compliance issues. Notwithstanding the foregoing, if the monitoring program indicates noise levels in excess of those described in this Article 20.2 [Construction], Project Co shall immediately implement noise attenuation measures to the satisfaction of the Province.

- (f) Notwithstanding any other provision of this Article 20.2 [Construction], Project Co shall design and install temporary construction noise walls and other required noise mitigation measures at:
- (i) the east portal of the Tunnel, the Tunnel or TBM support site at Thornton Street, and Great Northern Way Station site;
 - (ii) the Mount Pleasant Station construction site; and
 - (iii) the Arbutus Station construction site,
- which temporary noise walls shall be:
- (iv) designed and constructed to achieve noise levels that are no greater than the maximum noise levels permitted for Night Time construction as provided in Article 20.2.1 [Permitted House of Work and Noise Level Criteria] of this Part 2;
 - (v) constructed using solid material, such as plywood, at least 3.0 m in height;
 - (vi) where reflected sound from the temporary noise walls is likely, lined with a sound absorptive material, such as 25mm to 50mm semi-rigid glass-fibre insulation; and
 - (vii) where possible, made wider and higher than the noise source.

20.3 Noise Monitoring during Operations

20.3.1 Guideway

- (a) Prior to testing and commissioning of the Broadway Subway, Project Co shall establish a baseline noise monitoring program along the length of the Broadway Subway, which program shall, include all 10 baseline noise monitoring sites listed in section 7.6 of the BSP ESR and any other potential areas that are prone to high operational noise levels, including track switch locations.
- (b) If noise levels measured 15m away from Trains operating on the Broadway Subway during testing and commissioning exceed 75 dBA and exceed the noise levels generated by the same Trains operating at comparable speeds and on comparable sections of the Existing SkyTrain System, Project Co shall take all required steps to rectify this issue at Project Co's sole cost.

20.4 Permanent Noise Barriers and Walls

20.4.1 Parapet Noise Barriers

- (a) In addition to dealing with excessive noise on the Guideway during testing and commissioning, for which Project Co is responsible pursuant to Article 20.3.1(b) of this Part 2, Project Co shall be responsible for the supply and installation of noise barriers, in accordance with Article 20.4.1 of this Part 2, and attaching the noise barriers for the Guideway onto the Guideway parapets and along the centre walkway handrail at the south side and centre of the Guideway between STA 100+120 and 100+705.
- (b) The proposed Guideway noise barrier and attachment brackets to be used by the Province shall be similar to those used on the Existing Millennium Line. Details of the Guideway noise barrier and attachments are shown on the Rapid Transit 2000 Millennium Line Noise Barrier Drawings and the Evergreen Line Parapet Noise Barrier Drawings provided as Disclosed Data. Project Co shall provide the Province with the Design of the Guideway noise barriers and their attachment brackets, and shall demonstrate that the noise barriers are not in conflict with the SkyTrain Vehicle dynamic envelope, and all other clearance requirements in Article 3 [Alignment] of Part 2 of Schedule 4. Project Co shall carry out the Design and Construction of the Guideway parapet and service walkways along the Broadway Subway to permit installation of Guideway noise barriers and their attachment brackets by Project Co.

20.4.2 Locations of Permanent Noise Walls

- (a) Project Co shall Design and construct permanent noise walls which comply with the requirements of Article 20.4.3 [Permanent Noise Wall Requirements] near the portal of the Tunnel along the south side of the Guideway beginning at the point where the top of rail is 3m above the existing grade and ending at the western limit of the U-section Structure, but shall not be less than between stations 200+700 and 200+818 (to the portal), and along the western end of the portal structure. The permanent noise wall shall accommodate the requirements for the high-rail at-grade access, and the high-rail access gates shall be designed to provide noise mitigation.
- (b) Project Co shall not construct permanent noise walls at any other location unless the design of such permanent noise walls, including specific locations and required height and length of noise walls at each location and other design parameters, is accepted by the Province's Representative, acting reasonably, in accordance with the Consent Procedure.

20.4.3 Permanent Noise Wall Requirements

- (a) Permanent noise walls designed and constructed by Project Co pursuant to Article 20.4.2(a) of this Part 2 shall, as a minimum, meet the following requirements:

- (i) be at least 3m in height;
- (ii) be constructed from products selected from the Recognized Products List and employ a surface finish using either an Ashlar stone (or comparable) on both sides, or a coordinated surface finish with any adjacent concrete guideway parapet walls or abutment walls as may be determined or modified in a concurrent and coordinated workshop and process as specified in Article 4.4.1(d) of Part 2 of Schedule 4. The design of the permanent noise walls, and in particular, the exposed surface finish, shall address aesthetics, long term maintenance, urban design and neighbourhood fit factors. To achieve these objectives, Project Co will arrange and conduct workshops as required, with the Province's Representative, the City of Vancouver, Emily Carr University and other relevant stakeholders, such as adjacent owners and tenants to discuss and present surface treatment options for the permanent noise walls. Project Co shall provide and present supporting drawings and sample materials at this workshop. Project Co shall conduct these workshops following the IDR1 submission, and shall incorporate the results of these workshops into the IDR2 and conclude the design solution prior to FDR submission. Project Co shall work cooperatively with the Province in the consultation with these adjoining owners and tenants to define the extent and type of treatment of the exposed surface for these permanent noise walls. Project Co shall allow for either high quality smooth concrete finish where the exposed permanent noise walls are to be used for artwork, or an Ashlar stone or comparable relief pattern finish, but with the understanding that the surface treatment may need to be modified based on the outcome of the workshop. Project Co shall provide the Province's Representative with the surface finish of the permanent noise walls for acceptance by the Province's Representative, acting reasonably, in accordance with the Consent Procedure, prior to finalizing the design and supply of the permanent noise walls;
- (iii) the noise walls shall consist of reinforced concrete or steel posts, panels and cap rail. Alternative materials may be considered by the Province's Representative, provided that the panels have a minimum surface weight of 20 kg/m². Project Co shall submit any proposed alternate materials for the permanent noise walls to the Province's Representative under the Consent Procedure for approval. The minimal weight requirement set out in this Article 20.4.3(a)(iii) is based on acoustical needs only and the actual weight and thickness shall be designed and selected as necessary for durability, structural performance, and wind resistance. In particular, panels shall be sufficiently thick and strong to prevent damage which could result in gaps or openings in the noise walls. In the event of damage, Project Co shall ensure that the replacement panels are readily available from the manufacturer and can be easily installed;
- (iv) the ground supporting the base panels of such permanent noise walls shall be stripped of topsoil and backfilled with nominal 20mm crush for a

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minimum width of 500mm, centred under the panel. Once installation is complete, the ground on at least one side of the panels shall be loaded with additional 20mm crush to a minimum depth of 75mm, measured up from the bottom of the panel;

- (v) if drains are required at some locations to permit storm runoff from one side of the permanent noise wall to the other, rather than removing above-grade sections of the panels, the drains shall consist of grates and drain pipe installed so as to pass beneath the noise wall;
- (vi) the panels of such permanent noise walls shall be designed and installed so that they mate together, forming an airtight joint in order to prevent leakage of sound. This may require both tongue and groove joints and acoustic caulking or gasketing. Joints between the panels and the cap rail, as well as between the planks and the vertical posts, shall be designed and installed in a similar manner to prevent sound leakage;
- (vii) sound absorptive surfaces shall be employed on both sides of such permanent noise walls with a sound absorptive facing which will provide a Noise Reduction Coefficient (NRC) of at least 0.80 when tested in accordance with ASTM C423, using Type "A" mounting per ASTM E795-92. Such sound absorptive facing shall be suitable for long-term exposure to the climatic conditions at the Project Site;
- (viii) Project Co shall ensure that manufacturer's and/or installer's shop and installation drawings, including details that indicate how airtight joints will be achieved between the various elements of such noise walls, are provided for the permanent noise walls, and shall submit these drawings to the Province under the Review Procedure;
- (ix) the design of such permanent noise walls adjacent to roadways shall accommodate snow loads associated with snow build-up and snow plough spray. Wherever permanent noise walls may be impacted by roadway vehicles, such noise walls shall either be protected or combined with a concrete roadside barrier. The complete permanent noise wall assembly shall be PL2-Rated satisfying CAN/CSA S6, including crash testing;
- (x) Project Co shall provide the Province with the Design of the permanent noise wall, including to demonstrate that the permanent noise walls are not in conflict with the SkyTrain Vehicle dynamic envelope, and all other clearance requirements in Article 3 [Alignment] of Part 2 of Schedule 4;
- (xi) permanent noise walls which are adjacent to roadways shall be designed and constructed such that any impact to the noise wall by a roadway vehicle will not result in any portion of the noise wall entering the Guideway; and
- (xii) permanent noise walls shall have a minimum design life of 75 years and shall resist rotting, mildew and fungus growth, rusting, warping, animal and insect nesting and infestation. Permanent noise walls shall not

display any significant deterioration, delaminating, disfigurement or failure for a minimum 10-year period.

20.5 Stations

20.5.1 General

- (a) This Article 20.5 [Stations] sets out design requirements for acoustics and noise control relating to the Stations and contains acoustic design requirements for maximum noise levels and provides guidelines for acoustic treatment within the Stations. Project Co shall:
 - (i) meet the acoustic design requirements set out in Article 20.5 [Stations] and Article 10.13 [Acoustics and Noise Control] of Part 2 of Schedule 4;
 - (ii) incorporate and integrate the treatments outlined in this Article 20.5 [Stations] into the design for the Stations;
 - (iii) provide an acoustic design report, from a qualified acoustical engineer acceptable to the Province, in accordance with Article 10.13 [Acoustics and Noise Control] of Part 2 of Schedule 4 as part of the Interim Design submissions and Final Design submissions in Article 2.2.3 of Part 3 of Schedule 4; and
 - (iv) include proper documentation showing compliance with these acoustic design requirements in its drawings and specifications.
- (b) The acoustic design requirements are to:
 - (i) minimize intrusion of noise from the Stations into the adjacent communities;
 - (ii) provide a comfortable environment for passengers within the Stations; and
 - (iii) permit intelligible communication, including public address (PA) systems, within the Stations.

20.5.2 Noise Intrusion to Communities

- (a) Sources of noise from the Stations shall be controlled to minimize disturbance to the adjacent communities. Any such noise shall not exceed the criteria set out in Table 20.5.2 [Maximum Exterior Noise Levels for Stations] of this Part 2 during the periods indicated.
- (b) Noise levels shall be measured at the nearest Point of Reception at a height of at least 1.2m using “slow response” on an approved sound pressure level meter unless otherwise noted. A-weighted noise levels can be read directly from a sound pressure level meter and correlate well with the subjective perception of noise. Project Co shall submit a noise a measurement report to the Province under the Review Procedure to confirm noise level into communities are within the limits specified in this Article 20.5.2.

Table 20.5.2 Maximum Exterior Noise Levels for Stations

Type of Noise	Maximum Noise Level (dBA) at Nearest Point of Reception			
	Quiet Zone		Activity Zone	
	Day Time	Night Time	Day Time	Night Time
Continuous Noise	55	45	60	55
Non-Continuous Noise	75	70	75	70
Noise with tonal components (e.g., electrical transformers, AARUs, HVAC fans)	50	40	55	50
Noise from periodic Day Time testing of emergency generators or TVS fans	65	n/a	80	n/a
Noise from communication or annunciator systems (e.g., PA systems, door chimes on trains)	Inaudible	Inaudible	Inaudible	Inaudible

- (c) The noise level emitting from fan and vent shafts shall be limited by Project Co in accordance with the criteria for Continuous Noise set out in Table 20.5.2 [Maximum Exterior Noise Levels for Stations] of this Part 2. The acoustic treatment of vent shaft noise reduction by Project Co may include installation of silencers for the fan, application of sound absorption treatment to the shaft walls and ceilings, and application of sound absorption treatment to the fan ventilation room. Project Co shall determine the extent of the acoustic treatment required to meet the requirements in Table 20.5.2 [Maximum Exterior Noise Levels for Stations] based on the noise level of the fan.
- (d) The noise levels generated from communication or annunciator systems which are emitted to nearby properties through the Station headhouses, vent shafts, and portals shall be 'Inaudible'. For the purposes of the BSP, Inaudible shall mean no more than the baseline levels for each location as indicated in the noise survey data provided as Disclosed Data, or an equivalent level of noise survey data provided by Project Co using an acceptable standard such as the "Noise Metric for Assessing Noise Impact at Residences" section in the BC MoTI Policy for Assessing & Mitigating Noise Impacts from New & Upgraded Numbered Highways. If Project Co provides an equivalent level of noise survey data, such noise survey data shall be submitted to the Province's Representative for acceptance under the Consent Procedure. At Night Time, a 10 dBA reduction to the criteria shall be applied to these levels.
- (e) The noise criteria in this Article 20.5.2 [Noise Intrusion to Communities] shall not be applicable during an Emergency.

20.5.3 Station PA Systems

- (a) The PA system for each Station shall include ambient noise compensation in accordance with the requirements set out in Article 13.6.8.10 [Public Address System] of this Part 2.
- (b) As required, the PA system shall be configurable to produce different sound levels at different times of day on different PA zones to meet the requirements in Article 20.5.2 [Noise Intrusion to Communities].

20.5.4 Reverberation Times

- (a) Although Reverberation Times (RT_{60}) are frequency dependent, Project Co shall use the Reverberation Time at 500 Hz for preliminary design purposes.

20.5.5 Station Platform

- (a) Project Co shall Design and Construct each Station so that the Reverberation Time on the Station platform does not exceed $RT_{60} = 1.5$ seconds (at 500 Hz). Project Co shall ensure that a minimum of 35% of the combined total wall and ceiling areas are sound absorptive. Project Co shall use reasonable efforts to place sound absorptive materials on Station ceilings to the greatest extent possible. Sound absorptive materials may be placed on Station walls as needed to comply with the requirements of this Article 20.5.5(a), provided that any sound absorptive materials placed on Station walls accommodate wall-mounted wayfinding signage and other wall-mounted equipment within the Stations. To reduce wheel and rail noise at those Stations which have overhanging platforms, Project Co shall ensure that sound absorptive treatment is applied to the underside of overhanging platforms. However, since this treatment has little effect on Reverberation Times, Project Co shall not include it in the calculation of the above minimum percentage of total area of wall and ceiling treatment for reverberation control.
- (b) Project Co shall ensure that total combined noise levels on the platforms of the Stations which are produced by mechanical and electrical systems shall not exceed 60 dBA.

20.5.6 Enclosed Concourse Areas

- (a) For the enclosed concourse areas of the Stations, that are newly constructed for the Broadway Subway (such as mezzanines, passageways, fare collection areas, stairs and escalators), Project Co shall Design and Construct the Stations such that the Reverberation Times do not exceed $RT_{60} = 1.2$ seconds.
- (b) Project Co shall ensure that total combined noise levels inside the Stations which are produced by mechanical and electrical systems shall not exceed 60 dBA in areas normally occupied by passengers or employees.

20.5.7 Sound Absorptive Finishes

- (a) Project Co shall select sound absorptive materials by taking the following factors into consideration:
 - (i) the amount of treatment required;
 - (ii) architectural considerations;
 - (iii) ability to withstand positive and negative pressure transient loading caused by incoming and outgoing Trains;
 - (iv) resistance to mechanical abuse;
 - (v) noncombustible material, as defined by TLBCC;
 - (vi) ability to withstand regular cleaning;
 - (vii) weatherproofing, as required; and
 - (viii) VBBL requirements.
- (b) Where sound absorptive finishes are vulnerable to damage, Project Co shall place such materials out of reach of passengers.
- (c) In those areas of the Stations that consist primarily of concrete construction, Project Co shall provide sound absorptive finishes consisting of suspended acoustic tile ceilings and/or acoustic insulation thicknesses of at least 50mm to provide sound absorption throughout the entire frequency range. In concourse areas constructed using stud partitions and that provide some low frequency sound absorption, Project Co may reduce acoustic insulation thickness to no less than 25mm.
- (d) If a continuous panel system or a suspended acoustic tile ceiling is used in the platform areas of the Stations, Project Co shall provide gaps or openings to permit free air flow between the panels and the structure behind to minimize loading of the acoustical panels by air pressure transients. All acoustic systems subject to air pressure transients shall be positively anchored in place. The Design of the anchoring system shall consider Trains skipping through Stations.

20.5.8 Room Shape

- (a) Project Co shall, in the Design of the Stations, avoid the use of concave walls and ceilings and, in particular, domed ceilings or any other architectural design which focuses sound and causes objectionable room acoustics or poor speech intelligibility.
- (b) If concave walls or domed ceilings are created a result of mined construction, Project Co shall incorporate additional mitigation measures to ensure acoustic and speech intelligibility requirements specified in this Agreement are still achieved.

20.5.9 Ancillary and Service Rooms

- (a) The ancillary and service rooms in the Stations shall be designed and constructed so that mechanical, transformer, electrical equipment, switch control rooms and washrooms are acoustically separated from public areas. Access to such ancillary and service rooms and any similarly noisy areas shall be via series doors with an appropriate sound rating, based on the parameters set out in this Article 20.5.9 [Ancillary and Service Rooms]. Transformer rooms adjacent to public spaces shall have an acoustical treatment, the extent of which shall be based on the noise levels and the volume of the room.
- (b) Noise levels inside staff occupied rooms, CRWR, CR, CRF, TSR, SO, PHB shall be maximum 50dBA.
- (c) Noise levels inside SWC, PWC, and GNWC shall be maximum 55dBA.

20.6 Tunnel Ventilation System


- (a) Project Co shall carry out the Design and Construction of the TVS such that the noise generated by the TVS does not exceed the following:
 - (i) during maintenance and non-emergency operations, the noise level from the TVS shall not exceed the criteria set out in Table 20.5.2 [Maximum Exterior Noise Levels for Stations], measured at the nearest Point of Reception;
 - (ii) during non-emergency operations, the noise level from the TVS shall not exceed the criteria set out in Article 20.5.5 of this Part 2 at platform level, and Article 20.5.6 [Enclosed Concourse Areas] of this Part 2 at concourse level;
 - (iii) during emergency testing, the noise level from the TVS shall not exceed the criteria set out in Table 20.5.2 [Maximum Exterior Noise Levels for Stations] as measured at the nearest Point of Reception;
 - (iv) the maximum sound pressure level during emergency operations shall not exceed the requirements in Article 21 [Tunnel Ventilation System]; and
 - (v) the maximum noise produced by the TVS during an emergency shall be coordinated with the PA and the ETEL system performance to ensure that both systems achieve their performance criteria during a fire incident in either a Station or the Tunnel.
- (b) Project Co shall implement noise mitigation measures if noise levels from the TVS exceed the limits set out in Article 20.6(a) of this Part 2. Noise mitigation measures by Project Co may include installation of silencers on the fan or provision of noise walls at affected locations.
- (c) All Equipment related to the TVS which produces vibration shall be vibration-isolated from the structure to which it is attached by springs or neoprene

isolators and all piping and ducts shall have flexible connections to isolate such vibration causing equipment.

20.7 Vibration

- (a) Project Co shall Design and Construct the Broadway Subway Project in accordance with the more stringent acceptable levels of vibration and ground-borne noise recommended in:
 - (i) the Transportation Research Board Report 57 - Track Design Handbook for Light Rail Transit; and
 - (ii) the United States Federal Transit Administration Report No. 0123, *Transit Noise and Vibration Impact Assessment Manual*, September 2018 (the “**FTA Manual**”). The design of the Broadway Subway Project shall address vibration effects of the Operational Millennium Line on adjacent lands and infrastructure.
- (b) Project Co shall conduct a vibration and ground-borne noise assessment and study, taking into consideration the vibration assessment approach in the FTA Manual, to be submitted to the Province with the Interim Design of the Guideway, to provide the modeled and predicted vibration levels, and the design approach to mitigate vibration levels to bring them into compliance with the vibration criteria in this Article 20. The vibration and ground-borne noise assessment and study shall include at least the following elements:
 - (i) assessment approach, methodology and assumptions;
 - (ii) identification of sites that are representative sensitive receivers;
 - (iii) vibration assessment for modeled and predicted vibration levels;
 - (iv) methods and program for measurement of vibration levels following construction of the tunnel and prior to tunnel fit out; and
 - (v) methods and program for measurement of actual vibration levels during testing and commissioning.
- (c) Project Co shall provide details of the vibration mitigation measures in the design, including base measures to be included in the design, and potential additional measures to be incorporated by Project Co as part of the Project Work should actual vibration measurements exceed the vibration criteria. Project Co shall submit an updated vibration and ground-borne noise assessment and study with the Final Design.
- (d) Project Co shall conduct vibration measurements during implementation, and testing and commissioning, and submit a report to the Province under Review Procedure to confirm that the actual vibration levels will meet the vibration criteria. Project Co shall implement additional vibration mitigation measures where required to bring the Project Work into compliance with the vibration criteria provided in this Article 20, if the actual measured vibration levels exceed the vibration criteria limits.

- (e) Project Co shall Design and construct the Project Work taking into account all vibration specifications, considerations, and requirements provided in this Agreement, including in the vibration criteria in the technical specifications for Vehicles, provided as Disclosed Data, and referenced in Article 15.2 [Vehicle Specifications] of Part 2 of Schedule 4.



This page and the following 34 pages withheld in their entirety

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Article 1. General

1.1 Scope

- (a) This Part 3 [Certification and Completion] specifies the certification procedures with respect to the Design and Construction of, and requirements for completion of, the Broadway Subway Project.
- (b) The certification procedures consist of three procedures:
 - (i) Systems General Requirements, as set out at Appendix G to Schedule 4;
 - (ii) Construction Approval Process, as set out at Appendix E to Schedule 4; and
 - (iii) Non-Systems Certification Procedure, as set out in Article 2.2 [Non-Systems Certification Procedure] of this Part 3,

(collectively the “**Design and Construction Certification Procedures**”).

1.2 No Limitation regarding Certification

- (a) Any requirement for certification or for any check or review pursuant to, and for purposes of, this Part 3 of Schedule 4 is in addition to, and does not in any way limit, qualify, replace or relieve Project Co from, the obligation to comply with any other certification, check or review requirement provided elsewhere in this Agreement, or pursuant to any applicable Laws, Good Industry Practice, professional standards or practices.

1.3 Satisfactory Completion of the Project Work

- (a) Without limiting any other provision of this Agreement, the satisfactory completion or achievement, as applicable, by Project Co, in accordance with this Agreement, of the Project Work and activities described in:
 - (i) Article 4.1.1 [Required Activities] of this Part 3 shall be a condition to achievement of Substantial Completion and the issuance of the Certificate of Substantial Completion; and
 - (ii) Article 4.2.1 [Required Activities] of this Part 3 shall be a condition to achievement of Total Completion and the issuance of the Certificate of Total Completion.

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Article 2. Design and Construction Certification Procedures

2.1 Application of Design and Construction Certification Procedures

2.1.1 General

- (a) Without limiting the generality of Project Co's obligations under this Agreement, Project Co shall carry out the Design and the Construction of the Project in accordance with this Part 3.

2.1.2 Systems Design and Construction Certification

- (a) Project Co shall comply with the requirements set out in Appendix G [Systems General Requirements] of Schedule 4, and Article 4.1.1(a)(ii) of this Part 3 of Schedule 4, to achieve the Design and Construction certification for the Systems.
- (b) In addition to the requirements in Article 2.1.2(a), the following aspects of the Systems will be treated as Non-Systems Components for the purposes of Part 3 of Schedule 4, and all of the terms of the Non-Systems Certification Procedure will apply to those aspects of the Systems:
 - (i) the mechanical systems described in Article 11 [Mechanical], Part 2 of Schedule 4;
 - (ii) the electrical systems described in Article 12 [Electrical], Part 2 of Schedule 4;
 - (iii) all rail (including running rail, LIM rail, and power rail); and
 - (iv) Guideway walkways.

2.1.3 Construction Approval Process (CAP) for Fire and Life Safety

- (a) Project Co acknowledges that it is aware of the requirements of the Vancouver Building Bylaw ("**VBBL**"), which is a City of Vancouver Bylaw which addresses safety, health, and accessibility for persons with disabilities, and fire protection of buildings and facilities. The VBBL does not contain any requirements that specifically address the Design and the Construction of the Guideway, the Tunnel or the Stations.
- (b) The NFPA 130 Standard for Fixed Guideway Transit and Passenger Rail Systems (NFPA 130) covers the requirements for life safety from fire and for fire protection for rapid transit systems, including enclosed or unenclosed stations, guideways, emergency ventilation systems, communications, and control system.

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- (c) As provided in Appendix F to Schedule 4, TransLink has developed the TransLink Building Code Criteria (“TLBCC”) as a bridging document between the VBBL and NFPA 130 with respect to the fire and life safety requirements of the Stations.
- (d) Project Co shall:
 - (i) comply with the TLBCC and apply the VBBL and NFPA 130, both as appropriate and as amended by the TLBCC, to the Design and the Construction of the Stations;
 - (ii) comply with the Construction Approval Process (CAP) as set out in Appendix E of Schedule 4 with respect to those facilities subject to the CAP;
 - (iii) obtain and provide confirmation from the relevant Architect or Professional Engineer that they are prepared to sign the form of Schedule B and Schedule C as set out in Appendix C of the CAP, prior to the start of the design by the relevant Architect or Professional Engineer;
 - (iv) develop and submit to the Province under the Consent Procedure, a Fire Safety Plan for each Station, which Fire Safety Plan shall:
 - A. comply with the requirements of the VBBL for a Station Fire Safety Plan;
 - B. include:
 - (1) comprehensive descriptions and diagrams of station configuration and fire-life safety systems;
 - (2) requirements for inspection, maintenance and training relative to the fire-life safety systems; and
 - (3) a description of roles, procedures and training relative to emergency response protocols determined in consultation with BCRTC; and
 - C. confirm that Project Co consulted with the BCRA and the City fire department regarding the content of the Station Fire Safety Plan, and demonstrate that comments received from the BCRA and the City fire department have been incorporated and addressed in the Station Fire Safety Plan; and
 - D. be similar in format and content, including that noted in Article 2.1.3(d)(iv)B of this Part 3 of Schedule 4 above, to that produced for the Evergreen Line stations, copies of which for Moody Centre and Inlet station are provided as Disclosed Data; and
 - (v) not apply for an Occupancy Approval Certificate (OAC) for a Station as set out in the Construction Approval Process (CAP) in Appendix E of Schedule 4, until the Fire Safety Plan for that Station has been accepted by the Province under the Consent Procedure.

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- (e) Notwithstanding Section 2.8 [Early Commencement of Work] of Schedule 2, Project Co shall not commence the Construction of a particular Station unless and until Project Co has received an ATPC from the AHJ in respect of that Station, the Final DAP Submission has been accepted by the Province's Representative under the Consent Procedure, and any requirements related to the DAP have been completed and incorporated in the Final Design, as applicable.
- (f) Project Co shall, within 60 Business Days after the Effective Date, retain and thereafter, at all times, maintain the retainer of a competent and qualified person to act as the building code review agent in connection with this Agreement (the "**Building Code Review Agent**" or "**BCRA**") having, at a minimum, the following qualifications:
- (i) registration in good standing as a Professional Engineer;
 - (ii) a specialty in code consulting; and
 - (iii) at least 15 years' direct experience with projects similar to the Project, with experience in the design and construction of railway and/or transit infrastructure and stations considered to be an asset.

The BCRA must be acceptable to the Province. Accordingly, Project Co will submit the qualifications of the proposed BCRA to the Province's Representative for acceptance under the Consent Procedure, allowing sufficient time for the Province to review and comment on the proposed BCRA, and for Project Co to retain the BCRA within the time period set out in this Article.

- (g) Project Co shall, within 60 Business Days after the Effective Date, retain and thereafter, at all times, maintain the retainer of a qualified co-ordinating registered professional (the "**Coordinating Registered Professional**" or "**CRP**") to perform the role of the CRP as set out in the CAP. The CRP shall have, at a minimum, the following qualifications:
- (i) registration in good standing as an Architect or as a Professional Engineer in the Province of British Columbia;
 - (ii) at least 15 years' direct experience in the design and construction of rail rapid transit infrastructure and stations on projects similar to the scope, complexity, and nature of the Project; and
 - (iii) experience in performing the services of the nature required for a coordinating registered professional in accordance with the relevant codes and standards applicable to the Stations, including the coordination of registered professionals for all architectural and engineering disciplines.

The CRP must be acceptable to the Province. Accordingly, Project Co will submit the qualifications of the proposed CRP to the Province's Representative for acceptance under the Consent Procedure, allowing sufficient time for the Province to review and comment on the proposed CRP, and for Project Co to retain the CRP

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- within the time period set out in this Article. The Province considers experience with codes and standards applicable to the Stations, including the TLBCC, to be an asset for a CRP, and will consider such experience in its review under the Consent Procedure.
- (h) The Province will, as indicated in the CAP, appoint a person to act as the Authority Having Jurisdiction (AHJ) for the Broadway Subway Project.
- (i) Project Co's retainer of the BCRA shall include the following provisions:
- (i) the BCRA shall act as an independent third party, providing advice to both the AHJ and Project Co. The BCRA shall be an independent consultant and shall not be, and shall not purport to be, a partner, joint venturer or agent of either of the Province or Project Co.
 - (ii) All communications, instructions and representations issued or made by either the AHJ or Project Co to the BCRA shall be simultaneously copied to the other, and both the AHJ and Project Co shall be entitled to attend all inspections performed by or meetings involving the BCRA.
 - (iii) The AHJ and Project Co shall provide the BCRA with any information the BCRA reasonably requires for the purpose of providing the services described in the CAP as set out in Appendix E of Schedule 4.
 - (iv) In performing the duties of the BCRA as described in this Article and in the CAP, the BCRA shall:
 - A. act fully, impartially, honestly and independently;
 - B. act reasonably and to the highest professional standards and in accordance with all Laws; and
 - C. act in a timely manner, so as to enable the AHJ and Project Co as applicable, to perform their respective obligations;
 - (v) The BCRA shall not be bound to comply with any opinions or representations made by Project Co, the Coordinating Registered Professional, the Registered Professionals of Record or any other Subcontractors in connection with any matter on which the BCRA is required to exercise its professional judgement.
 - (vi) The BCRA shall contemporaneously provide copies to each of Project Co, AHJ and the CRP of all reports, communications, certificates and other documentation that it provides to either Project Co, the AHJ or the CRP.
- (j) If the BCRA submits a recommendation to issue an ATPC or OAC (as applicable) for a Station and the AHJ does not, within 20 Business Days of receipt of such recommendation, provide its decision on whether to issue an ATPC or OAC (as applicable), it will be a Relief Event commencing on the day after the 20 Business Day period expires until the AHJ provides its decision on whether to issue an ATPC

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or OAC (as applicable), provided that Project Co shall only be entitled to a Relief Event in accordance with this Article 2.1.3(j) if:

- (i) Project Co has made all reasonable efforts to cooperate with the AHJ and advance the issuance of the ATPC or OAC (as applicable);
- (ii) Project Co has complied with its obligations under Appendix E [Construction Approval Process] of Schedule 4;
- (iii) Project Co has submitted all documents and information required by the AHJ in a timely manner having regard for the timelines reasonably required by the AHJ;
- (iv) the delay is caused solely by the AHJ and not by any factors resulting from the CAP, including those described in Article 2.1.3(k) and Article 2.1.3(l) of this Part 3; and
- (v) Project Co is delayed in performing the Design or Construction as a direct result of the delay by the AHJ in providing its decision on whether to issue an ATPC or OAC (as applicable).

Project Co will cause the BCRA to submit a maximum of three (3) recommendations to issue an ATPC or OAC (as applicable) within any rolling 20 Business Day period. If the AHJ receives more than three (3) recommendations to issue an ATPC or OAC in the aggregate within a rolling period of 20 Business Days, the AHJ's 20 Business Day review period for any additional recommendation submitted shall not commence to run until the AHJ has accepted or rejected at least one of the first three (3) recommendations.

- (k) If the AHJ rejects a recommendation by the BCRA to issue an ATPC or OAC for a Station (including where such rejection is due to deficiencies, ongoing and unresolved code compliance issues, or incomplete documentation for a Station which remains to be addressed and rectified), the time periods referred to in Article 2.1.3(j) of this Part 3 will terminate. Such time periods will restart when the BCRA submits a revised recommendation to issue an ATPC or OAC (as applicable) with revised supporting documentation as required.
- (l) If the AHJ has requested further or other information or data to be provided by Project Co, the CRP, or the BCRA to inform the AHJ's decision to issue an ATPC or OAC (as applicable), or if Project Co has proposed:
 - (i) an alternative method for complying with code requirements, through an RFAE (as defined in Appendix E [Construction Approval Process] to Schedule 4), and the AHJ requires further information to demonstrate that the alternative is equivalent or superior to code requirements in the Agreement; or

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- (ii) to allocate or assign responsibilities related to operational procedures within the Stations to a third party, and Project Co has not provided evidence or further information to the AHJ, as requested by the AHJ, to demonstrate that the third party has agreed to assume the allocated or assigned responsibilities,

then the time periods referred to in Article 2.1.3(j) of this Part 3 shall not begin to run until Project Co, the CRP, or the BCRA (as applicable) has submitted the requested information or data to the AHJ in satisfaction of the AHJ's request.

- (m) In the circumstances described in Article 2.1.3(l)(ii) of this Part 3, if:
 - (i) Project Co has not provided evidence or information to the AHJ which demonstrates that the third party has agreed to assume the allocated or assigned responsibilities; and
 - (ii) the AHJ determines that it is unlikely that the third party will agree to accept the allocated or assigned responsibilities,

the AHJ may reject the BCRA's recommendation to issue an ATPC or OAC (as applicable) and the 20 Business Day period will terminate and restart as described in Article 2.1.3(k) of this Part 3.

- (n) If the AHJ rejects an RFAE which is submitted as part of a recommendation to issue an ATPC or OAC (as applicable), including if such rejection is due to an RFAE not demonstrating that an alternative method is equivalent or superior to code requirements in the Agreement, the entire recommendation to issue an ATPC or OAC (as applicable) shall be rejected and the 20 Business Day period for such recommendation will terminate and restart as described in Article 2.1.3(k) of this Part 3.

2.1.4 Design and Construction Certification Procedure for Non-Systems

- (a) Without limiting Project Co's obligations under any other applicable Design and Construction Certification Procedures, Project Co shall undertake the Design and the Construction of all components of the Broadway Subway Project other than the Systems (the "**Non-Systems Components**") in accordance with the Non-Systems Certification Procedure as set out in Article 2.2 [Non-Systems Certification Procedure] of this Part 3.

2.1.5 Submission and Updating of Design Manual

- (a) Within 80 Business Days after the Effective Date, Project Co shall submit to the Province's Representative in accordance with the Review Procedure a complete design manual, covering all aspects of the engineering and architectural design of, and for, all the Systems and the Non-Systems Components of the Broadway Subway Project (collectively the "**Design Manual**").

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- (b) Without limiting the generality of Article 2.1.5(a) of this Part 3, the Design Manual shall include the following:
 - (i) the Design and Construction approach for all components of the Broadway Subway Project, listing all applicable criteria, codes and standards, key design assumptions, innovative design features, construction methodology and sequence of construction; and
 - (ii) the Initial Durability Report in accordance with Article 2.2.3.3 [Submission and Updating of Durability Report] of this Part 3.
- (c) Project Co shall provide the following updates to the Design Manual:
 - (i) Project Co shall provide an updated Design Manual at the end of the FDR, incorporating all changes to the Design Manual, including updates from the design development process, approved requests for variations, and all other changes; and
 - (ii) Project Co shall provide a record Design Manual in PDF and Word format as part of the Record Documentation submission, incorporating all changes to the updated Design Manual referenced in Article 2.1.5(c)(i) of this Part 3, including all changes arising from the Construction of the Project.

2.2 Non-Systems Certification Procedure

2.2.1 General

- (a) Project Co shall, with respect to the Design and the Construction of the Non-Systems Components, implement and enforce the procedures set out in this Article 2.2 [Non-Systems Certification Procedure] (collectively the “**Non-Systems Certification Procedure**”), together with the accepted Non-Systems Design Management Plan.

2.2.2 Non-Systems Certification Procedure in Emergency

- (a) In the case of an Emergency, Project Co may proceed with such measures as are immediately necessary for the protection of persons and/or property prior to complying with the applicable provisions of this Article 2.2 [Non-Systems Certification Procedure], provided that Project Co shall comply with the provisions of the Non-Systems Certification Procedure otherwise applicable to those measures as soon as reasonably possible under the circumstances.

2.2.3 Non-Systems Design Management Plan and Technical Appraisal Forms

2.2.3.1 Submission of Non-Systems Design Management Plan

- (a) Within 20 Business Days after the Effective Date, Project Co shall submit a design management plan for the Non-Systems Components (the “**Non-Systems Design**

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- Management Plan**) to the Province's Representative for acceptance, acting reasonably, in accordance with the Consent Procedure. The Non-Systems Design Management Plan shall include the following information in respect of the Design of the Non-Systems Components:
- (i) the organization chart for all design activities;
 - (ii) the procedures to be used for designing and checking the designs for all disciplines;
 - (iii) the identification of the members of the Checking Team(s) for Structures;
 - (iv) the contents and format of each of the Interim Design submissions and the Final Design submissions;
 - (v) a design review and audit schedule, indicating the dates that Project Co shall:
 - A. conduct Internal Audits of the design verification process;
 - B. submit the Interim Design submissions and the Final Design submissions; and
 - C. undertake review meetings in accordance with Article 2.2.3.4 [Non-Systems Review Meetings and Minutes] of this Part 3;
 - (vi) a drawing tree, indicating the organization and hierarchy of Project Co's drawings; and
 - (vii) appropriate metrics to measure the progress of the design for each discipline.
- (b) Project Co shall submit any subsequent amendments or updates to the Non-Systems Design Management Plan to the Province's Representative for acceptance, acting reasonably, in accordance with the Consent Procedure.

2.2.3.2 Compliance with Non-Systems Design Management Plan

- (a) Project Co shall, in connection with all Design Data prepared or adopted in connection with the Design, the Construction and any other construction activities related to the Non-Systems Components, implement and comply with:
- (i) the initial Non-Systems Design Management Plan; and
 - (ii) any subsequent amendments or updates to the initial Non-Systems Design Management Plan.

2.2.3.3 Submission and Updating of Durability Report

- (a) Within 60 Business Days after the Effective Date, Project Co shall submit to the Province's Representative in accordance with the Review Procedure a report (the "**Initial Durability Report**"), that addresses all aspects of the design life requirements of the Broadway Subway Project and the requirements of strength and serviceability as set out in Schedule 4 of the Agreement. The Initial Durability Report

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- will serve as the basis for further development in accordance with the requirements of Schedule 4 and is to include the following:
- (i) a description of how the specified design life and service life of the Tunnel and its components, as applicable, will be achieved including:
 - A. protection against any detrimental soil and ground water properties;
 - B. protection against contaminants in soil;
 - C. elements which cannot practically be accessed for maintenance or repair during the service life;
 - (ii) a description of how the specified design life and service life of each of the Guideway, Underground Structures, Tunnel, Structures, and retaining walls is expected to be achieved including:
 - A. a design response to address the durability guidelines given in CAN/CSA-S6, Section 2, but using the requirements for the design life set out in Article 4.3.2 [Applicability], Part 2 of Schedule 4;
 - B. protection of items which cannot be readily be repaired or replaced such as piles, caissons, rock/soil anchors, mechanically stabilized earth walls, and concrete embedded items;
 - C. fatigue provisions to meet the fatigue criteria set out in Article 4 [Structures] of Part 2 of Schedule 4 of the Agreement; and
 - D. joint sealing provisions to prevent water from staining super- or sub-structures;
 - (iii) a description of how the specified design life of each of the Station structures, ancillary and maintenance facilities, and their components, as applicable, will be achieved including:
 - A. proposed design approach, strategies, methods and materials that will be instrumental in meeting the 100, 50 and 25 year design life as specified in this Agreement;
 - B. listing of proposed key building components, materials and elements under each of the 100, 50 and 25 year design life categories that will meet the design life requirements, as specified in this Agreement; and
 - C. critical care and maintenance commitments of the operator to achieve durability and design life cycle requirements as specified in this Agreement.
- (b) Project Co shall submit to the Province's Representative for review in accordance with the Review Procedure, the updated durability report (the "**Updated Durability Report**"), which report shall:

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- (i) be an update of and expand upon the Initial Durability Report, submitted as design development and construction advances to reflect any changes and additional durability considerations that arise; and
- (ii) reflect any changes and additional durability considerations arising from advancement, through Interim Design and Final Design, of Project Co's durability analysis and the design for the Non-Systems Components.

2.2.3.4 Non-Systems Review Meetings and Minutes

- (a) Project Co shall, in accordance with the Non-Systems Design Management Plan, organize and attend review meetings with the Province's Representative for the purpose of reviewing the design submissions (the "**Non-Systems Review Meetings**").
- (b) Project Co shall:
 - (i) prepare minutes of the Non-Systems Review Meetings (the "**Non-Systems Review Meeting Minutes**"), which minutes shall include a record of all of the Province's Representative's comments regarding the design submissions discussed at the meeting; and
 - (ii) provide copies of the Non-Systems Review Meeting Minutes to the Province's Representative within 5 Business Days following the applicable Non-Systems Review Meeting.
- (c) For greater certainty, the Non-Systems Review Meeting Minutes, including any comments of the Province's Representative included and addressed therein, shall not, for the purposes of this Agreement, be considered as constituting a Province Change or a Project Co Proposal.

2.2.3.5 Technical Appraisal Submission Requirements

- (a) Project Co shall submit a completed Technical Appraisal Form (TAF) to the Province's Representative for review, acting reasonably, in accordance with the Review Procedure, with each Final Design submission submitted in accordance with the Non-Systems Certification Procedure.
- (b) Where the Final Design submission package in respect of a Non-Systems Component involves any mechanical or electrical engineering functions, or similar specialization, unrelated to the Systems, Project Co shall submit to the Province's Representative for review, acting reasonably, in accordance with the Review Procedure a separate TAF in respect of such data and functions.
- (c) Where the Project Work involves the complete or partial demolition of an Existing Facility, Project Co shall, as part of the Final Design submissions, submit to the

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Province's Representative for review, acting reasonably, in accordance with the Review Procedure a TAF in respect of such complete or partial demolition.

- (d) Where the Project Work involves the alteration of or an upgrade or augmentation to any Existing Facility, Project Co shall, as part of the Final Design submissions, submit to the Province's Representative for review, acting reasonably, in accordance with the Review Procedure, a TAF and an assessment certificate in the format shown in Certificate Form 7 [Assessment Certificate (Existing Facilities)], attached at Attachment A [Form of Certificates] to this Part 3, in respect of such alteration, upgrade or augmentation.

2.2.3.6 Technical Appraisal Form and Content

- (a) Each TAF submitted by Project Co pursuant to Article 2.2.3.5 [Technical Appraisal Submission Requirements] of this Part 3 shall:
 - (i) substantially be in the format shown in Attachment B [Sample Contents for a TAF] to this Part 3;
 - (ii) include the relevant design criteria, environmental and ground considerations, and interface requirements, together with a complete listing of the design documentation included in the design package accompanying the applicable Design Certificate; and
 - (iii) be signed by:
 - A. Project Co's Representative; and
 - B. the Designer(s) for the Non-Systems Components covered by the TAF.

2.2.3.7 Variation to Technical Appraisal Form

- (a) In the event that Project Co intends to vary any aspect of the Design or the Construction of any of the Non-Systems Components from that contained in a TAF that has previously been submitted to the Province's Representative for review, acting reasonably, in accordance with the Review Procedure, Project Co shall submit the proposed variation as an addendum to the original TAF to the Province's Representative for review, acting reasonably, in accordance with the Review Procedure.

2.2.4 Design Submissions, Review and Reports for Non-Systems Components

2.2.4.1 Format of Design Submissions for Non-Systems Components

- (a) When submitting the Interim Design submissions or the Final Design submissions in respect of Non-Systems Components in accordance with this Article 2.2.4 [Design Submissions, Review and Reports for Non-Systems Components], Project Co shall provide two hard copies and one electronic copy of the applicable submission.

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- (b) Prior to commencing design drawing production, Project Co shall confirm with the Province's Representative the drawing conventions and standards, including AutoCAD standards, title block and stationing convention, in accordance with Article 17 [Drawing Requirements], Part 2 of Schedule 4.
- (c) Notwithstanding Article 2.2.4.1(b) of this Part 3, Project Co shall prepare all drawings for:
 - (i) the Utilities to be constructed or modified by Project Co in accordance with the applicable standards of the relevant Utility Suppliers; and
 - (ii) the Municipal Works to be constructed or modified by Project Co in accordance with the current drawings standards of the City of Vancouver.

2.2.4.2 Preparation of Design Data for Non-Systems Components

- (a) Project Co shall prepare all Design Data in respect of the Non-Systems Components under the supervision of the Designer(s) responsible for the design of the applicable Non-Systems Component.
- (b) Prior to the submission of any Design Data by Project Co to the Province's Representative, the Designer(s) and, where applicable, the Checking Team(s), shall satisfy themselves that the Design Data meets the Design and Construction Requirements and otherwise complies with the requirements of this Agreement.

2.2.4.3 Construction Specifications for Non-Systems Components

- (a) Project Co shall, in accordance with the Review Procedure, submit to the Province's Representative for review, acting reasonably, a complete set of the Construction Specifications, representing the Design and the Construction of the Non-Systems Components. Project Co may submit Construction Specifications on a section by section basis, but each time Project Co submits a section (or an update to a section), Project Co will submit a full compiled set of all Construction Specifications prepared by Project Co as at that date. Project Co may not commence work to which the Construction Specifications are applicable until they have been submitted to the Province's Representative for review, and (subject to Section 2.8 [Early Commencement of Work] of Schedule 2 [Representatives, Review Procedure and Consent Procedure]) until such Construction Specifications have been endorsed by the Province as "received" or "received with comments".
- (b) In preparing the Construction Specifications for the Non-Systems Components, Project Co shall incorporate the requirements set out in Appendix C [Minimum Considerations for Construction Specifications] of Schedule 4 into such Construction Specifications. The following shall apply regarding the Minimum Considerations for Construction Specifications:

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- (i) the Minimum Considerations for Construction Specifications have been written as minimum specifications for Project Co to incorporate into Subcontracts for the Project Work covered by the Minimum Considerations for Construction Specifications. Project Co shall be responsible for complying with each requirement of the Minimum Considerations for Construction Specifications, whether such requirement is written as an obligation for a “supplier” or a “subcontractor” or another similar term, or is stated in the imperative form;
 - (ii) if there is any conflict between the Minimum Considerations for Construction Specifications and any other provision included in the Design and Construction Requirements, the other provision included in the Design and Construction Requirements will govern; provided, however, that in determining whether a conflict exists between the Minimum Considerations for Construction Specifications and any other provision included in the Design and Construction Requirements, to the extent that the Minimum Considerations for Construction Specifications includes additional requirements for higher standards, quality or performance or additional requirements for more extensive scope, work or services than otherwise required by the Design and Construction Requirements, no conflict will be deemed to exist and Project Co’s obligations will include compliance with such additional requirements;
 - (iii) where the Minimum Considerations for Construction Specifications includes requirements for:
 - A. extended service maintenance during initial running of the Equipment during revenue service; and/or
 - B. extended warranties beyond the General Project Work Defect Warranty Period,Project Co shall comply with Article 3.2.2 of Part 3 of Schedule 4 and Schedule 5 [Project Work Defects and Warranties] regarding assignment of such extended warranties and maintenance; and
 - (iv) Where the Minimum Considerations for Construction Specifications provide that equivalents are permitted, Project Co will submit the proposed equivalent to the Province’s Representative for its acceptance under the Consent Procedure before Project Co accepts the proposed equivalent.
- (c) Project Co shall:
- (i) submit the Construction Specifications to the Province’s Representative as part of the documents submitted for each of the Interim Design and Final Design reviews for the Non-Systems Components; and

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- (ii) with respect to the format of the Construction Specifications, follow MasterFormat 2018 as defined by the Construction Specifications Institute.

2.2.4.4 Interim Design Reviews for Non-Systems Components

- (a) Project Co shall, in accordance with this Article 2.2.4.4 [Interim Design Reviews for Non-Systems Components], submit to the Province's Representative the Interim Design documents for the Non-Systems Components, including:
 - (i) supporting information for the Design and the Construction of such components;
 - (ii) as a minimum, the following Interim Design Reviews (IDRs):
 - A. Interim Design Review 1 (IDR1), which design package shall represent approximately 30% level of the complete design; and
 - B. Interim Design Review 2 (IDR2), which design package shall represent approximately 60% level of the complete design; and
 - (iii) additional Interim Design Review requirements for the architectural discipline in accordance with Article 10.1.3 [Station Design Process] of Part 2 of Schedule 4; and
 - (iv) any design required in connection with any plans developed by Project Co in accordance with Schedule 6 [Environmental Obligations].
- (b) Project Co shall, as part of the Non-Systems Design Management Plan, define the design submissions to be submitted for review in the Interim Design submissions for Non-Systems Components, the schedules of timing and listing of such Interim Design submissions, and the scope of each Design submission package review.
- (c) The Interim Design submissions shall be submitted under the Review Procedure, with the following objectives:
 - (i) to review and obtain comments from the Province's Representative on the development of the Design of the Non-Systems Components; and
 - (ii) to provide an opportunity for a dialog with the Province's Representative regarding compliance with the Design and Construction Requirements as the design progresses.
- (d) The content of the Interim Design submissions for Non-Systems Components shall be appropriate to the subject and discipline and the information provided in such submissions shall be adequate to demonstrate to the Province's Representative that the design of the Non-Systems Components is proceeding in compliance with the Design and Construction Requirements and is taking into consideration the relevant construction activities.

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2.2.4.5 Final Design Review for Non-Systems Components

- (a) Project Co shall, in respect of the Non-Systems Components, submit the Final Design documents from all design disciplines to the Province's Representative for review, acting reasonably, in accordance with the Review Procedure, which submissions shall consist of the relevant TAF(s), together with all Final Design drawings, supporting Design Data and calculations required in accordance with this Part 3 [Certification and Completion] and other requirements of Schedule 4.

2.2.4.6 Final Design Submissions for Non-Systems Components

2.2.4.6.1 General

- (a) Project Co shall prepare the Final Design submissions for the Non-Systems Components in accordance with the following requirements:
 - (i) design folders shall be prepared for the Final Design submissions, which folders shall:
 - A. include the applicable TAF;
 - B. have indexes and sectional dividers;
 - C. contain pertinent correspondence;
 - D. be arranged by location, then by subject matter in chronological order;
 - E. include design calculations and backup information;
 - F. include copies of all approvals, design reports, correspondence and calculations; and
 - G. include the Final DAP Report, and the provision of details and confirmation that the Final Design submission incorporates all the requirements from DAP, or provide a rationale for any variations.
 - (ii) the Final Design drawings and the design reports shall be signed and sealed by the responsible engineer, who shall be a duly experienced Professional Engineer of an appropriate discipline;
 - (iii) the inclusion of a summary of the resolution of all issues identified during Interim Design reviews; and
 - (iv) the inclusion of a summary of any changes or deviations from the Interim Design submissions, including Construction Specifications.

2.2.4.6.2 Alignment Design

- (a) In addition to any other requirements identified in this Schedule 4, the Final Design submissions with respect to the design of the Alignment, including track alignment, shall include the following:
 - (i) complete plan and profile drawings, including details on the following:

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- A. all geometric design data;
 - B. the Station locations;
 - C. the tie-in to the Existing Millennium Line;
 - D. crossovers and special trackwork;
 - E. horizontal and vertical curve data;
 - F. horizontal and vertical clearances; and
 - G. speed profile along the Alignment;
- (ii) typical and working cross sections
 - (iii) Combined Services Drawings; and
 - (iv) relationship of the Alignment to adjacent structures, buildings, roadways and the Permanent Project Lands.

2.2.4.6.3 Guideway Design

- (a) In addition to any other requirements identified in this Schedule 4, the Final Design submissions with respect to the Guideway (which, for the purposes of this Article 2.2.4.6.3 [Guideway Design], includes all portions of the Elevated Guideway, Underground Structures, Tunnel, and special structures) shall include the following:
 - (i) all design drawings, including general arrangements, sub-structure and super-structure;
 - (ii) all geotechnical reports for the Guideway;
 - (iii) all relevant environmental mitigation;
 - (iv) any special provisions for the Construction of the Guideway;
 - (v) reinforcement layout drawings;
 - (vi) independent review of all submitted design calculations and drawings;
 - (vii) inspection and maintenance manual for all Guideways, including bearing replacement methods and future post-tensioning;
 - (viii) the design for casting, storage, and transportation of all structural components; and
 - (ix) the design for construction loads and equipment.

2.2.4.6.4 Roadway Design

- (a) In addition to any other requirements identified in this Schedule 4, the Final Design submissions with respect to all roadways which form part of the Project Work shall include the following:
 - (i) all drawings, including complete laning and geometrics, profiles, typical and template cross-sections, right-of-way acquisition and drainage;

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- (ii) stormwater management plan and drainage design report;
- (iii) geotechnical design recommendations for pavements;
- (iv) stakeholder issues, plans for utility relocations, critical constructability and traffic-handling considerations, all relevant environmental mitigation;
- (v) roadway electrical (including signals, lighting and telecommunications), signing and pavement marking plans;
- (vi) all design drawings related to Trolley Overhead;
- (vii) design drawings for all roadway electrical systems, which shall include the following:
 - A. electrical equipment and all associated support structure locations;
 - B. lighting calculations where appropriate;
 - C. service locations; and
 - D. schematics showing electrical wiring layout.

2.2.4.6.5 Traffic Engineering

- (a) In addition to any other requirements identified in this Schedule 4, the Final Design submissions with respect to traffic engineering shall include the following, as applicable:
 - (i) traffic engineering analysis and associated reports and files; and
 - (ii) Traffic Signal Records associated with the design of signalized intersections.

2.2.4.6.6 Retaining Wall Design

- (a) In addition to any other requirements identified in this Schedule 4, the Final Design submissions with respect to the retaining walls shall include the following:
 - (i) the final geotechnical report(s) for the retaining walls;
 - (ii) descriptions of the aesthetic treatment for all retaining walls;
 - (iii) descriptions of the maintenance considerations for retaining walls;
 - (iv) resolution of all issues identified during Interim Design reviews;
 - (v) the Final Design drawings for all retaining walls; and
 - (vi) a neat, bound, indexed set of design calculations for the retaining walls, initialled by the responsible engineer, who shall be a duly experienced Professional Engineer of the appropriate discipline.

2.2.4.6.7 Geotechnical Design

- (a) For the final geotechnical design submissions, Project Co shall prepare and submit a comprehensive geotechnical design report in accordance with Article 6.9.3(d) [Geotechnical Reports], Part 2 of Schedule 4.

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- (b) In addition to any other requirements identified in this Schedule 4, the final geotechnical design submissions shall include the following:
- (i) a summary of any additional work and subsurface investigations that have been completed by Project Co since the Effective Date;
 - (ii) final recommendations for foundation systems, allowable loads and estimates of total and differential settlements of foundations at 2, 5, 10, 20, 40 and 75 years following completion of Construction of the applicable Structure;
 - (iii) geotechnical design recommendations for retaining structures;
 - (iv) lightweight fill designs;
 - (v) estimates of total and differential settlement of the Guideways and the Stations at 2, 5, 10, 20, 40 and 75 years following completion of the Guideway or Station, as applicable;
 - (vi) requirements for ground improvement measures necessary to meet the static and Seismic Performance Level requirements for foundations, cut and fill slopes, and retaining structures;
 - (vii) reduced size (11" x 17") drawings showing the Alignment in plan and profile with drill hole locations shown on the plan and simplified summary logs shown on the profile and with design notes to be shown along the bottom of the drawings; and
 - (viii) a final geotechnical report for the Structures with reduced size (11" x 17") drawings, showing the general arrangements for the Structures in plan and profile, with drill hole locations shown in plan and simplified summary logs shown in profile.

2.2.4.6.8 Tunnel and Mined Structures Design

- (a) In addition to any other requirements identified in this Schedule 4, the Final Design submissions with respect to the design of the Tunnel and Mined Structures shall include the following, as applicable:
- (i) the reinforcement layout drawings;
 - (ii) permanent bolt and dowel size and strength;
 - (iii) the design of gaskets and seismic joints;
 - (iv) the design of waterproofing system of Mined Structures;
 - (v) the design of taper of Tunnel segmental pre-cast lining;
 - (vi) the design for demolding, handling, transportation and stacking of Tunnel pre-cast lining segments;
 - (vii) the design for construction loads;

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- (viii) the design and the details of concrete collar and any other connection to Structures;
- (ix) the design of the track slab;
- (x) the design of the Service Walkway slab, as applicable;
- (xi) the design of sump pumps;
- (xii) the design of initial lining and permanent lining of Mined Structures; and
- (xiii) the design of the Cross Passages fire doors.

2.2.4.6.9 Architectural Design

- (a) In addition to any other requirements identified in this Schedule 4, the Final Design submissions with respect to the architectural design shall include the following:
 - (i) a complete and comprehensive set of architectural, structural, electrical, mechanical and civil and utilities construction drawings and specifications, fully dimensioned, detailed, engineered and coordinated as required to document and construct the Final Design of the Stations;
 - (ii) all construction details of the Station building and attached components, engineering calculations, products, building systems, Equipment, materials, finishes, signage and furnishings to be provided as part of the Project Work;
 - (iii) finish and color materials samples of all major and prominent finish materials to be provided for all exterior and interior areas of all buildings; and
 - (iv) manufacturers' product literature on all building elements, products and Equipment to be provided for all areas of all buildings.

2.2.4.6.10 Utilities

- (a) In addition to any other requirements identified in this Schedule 4, the Final Design submissions with respect to the Utilities shall include the following:
 - (i) the design of the Utilities, containing sufficient details to meet the approval of the applicable Utility Supplier and to confirm that the design meets all requirements of Schedule 4; and
 - (ii) a master Utility plan that sets out all the information related to the Design and Construction of the Project Work to be carried out in respect of Regulated Utilities, Public Utilities, and any other utilities impacted by the Design and the Construction.

2.2.4.6.11 Transit Integration

- (a) In addition to any other requirements identified in this Schedule 4, the Final Design submissions for the integration of Existing Transit Facilities shall include the following:

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- (i) the design of:
 - A. the temporary and permanent modifications to the Existing Transit Facilities; and
 - B. the integration of Existing Transit Facilities, in accordance with Article 4 [Structures], Articles 10 [Architecture] and 18 [Integration of Transit Facilities], all of Part 2 of Schedule 4, with the Broadway Subway Project; and
- (ii) approval of TransLink and InTransitBC with respect to the integration of Existing Transit Facilities as set out in the Transit Facility Construction Integration Plan in accordance with Article 18 [Integration with Transit Facilities], Part 2 of Schedule 4.

2.2.4.6.12 Environmental Design

- (a) In addition to any other requirements identified in this Schedule 4 and in Schedule 6 [Environmental Obligations], the Final Design submission with respect to environmental design shall include the following:
 - (i) applicable construction drawings that address all archaeological features if present;
 - (ii) site-specific restoration plans, and areas prone to erosion or shallow slope movement;
 - (iii) all environmental Permits and notifications specific to the Design of the Project;
 - (iv) all environmental assessments, studies, surveys and monitoring reports specific to the Design of the Project; and
 - (v) a design criteria checklist that lists general environmental commitments.

2.2.4.7 Objection to Design Data for Non-Systems Components

- (a) If the Province's Representative objects to any Design Data submitted by Project Co for review, acting reasonably, in accordance with the Review Procedure, the Province's Representative shall so notify Project Co and, unless Project Co disputes the objection by the Province's Representative to such Design Data in accordance with the Dispute Resolution Procedure, Project Co shall either:
 - (i) cause to be made such alterations and additions as may be necessary such that the Design Data accords with the Design and Construction Requirements and all other requirements of this Agreement, all in accordance with the Review Procedure; or
 - (ii) subject to the other provisions of this Agreement, submit a Project Co Proposal pursuant to Section 7.2 [Project Co Proposals].

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2.2.4.8 Adherence to Design Data for Non-Systems Components

- (a) Project Co shall not, during the Construction of the Project, depart from any Design Data for Non-Systems Components which has been the subject of a Design Certificate that has previously been submitted to the Province's Representative in accordance with the Non-Systems Design Management Plan and the Non-Systems Certification Procedure and not rejected in accordance with the Review Procedure.

2.2.4.9 Issued for Construction Drawings for Non-Systems Components

- (a) Project Co shall submit, as and when prepared and issued by Project Co, copies of all drawings that are "issued for construction" to the Province's Representative and to the Independent Certifier.

2.2.4.10 No Construction

- (a) Project Co shall not commence, or permit the commencement of, construction activities in respect of a Non-Systems Component unless and until all applicable Design Data and applicable Design Certificates have been submitted by Project Co to the Province's Representative in accordance with the Non-Systems Design Management Plan and the Non-Systems Certification Procedure and, subject to Section 2.8 [Early Commencement of Work] of Schedule 2 [Representatives, Review Procedure and Consent Procedure], such Design Data and Design Certificates have been endorsed by the Province as "received" or "received with comments".

2.2.4.11 Designer Review During Construction of Non-Systems Components

- (a) Project Co shall ensure that, during the Construction of the Non-Systems Components, the Designer (responsible for the Design of the applicable Non-Systems Component) undertakes the examination of the Project Work in accordance with the procedures set out in the Non-Systems Design Management Plan and the relevant Quality Documentation and other Design and Construction Requirements, and satisfies itself that Non-Systems Components and every part thereof have been designed, constructed, completed, commissioned, tested and maintained in all respects so as to accord with:
 - (i) the Design Data in respect of which Design Certificates have been issued and submitted to the Province's Representative; and
 - (ii) all applicable Design and Construction Requirements,and otherwise to comply in all respects with the requirements of this Agreement.

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2.2.5 Checking of Structures

2.2.5.1 General

- (a) In addition to any other requirements identified in Schedule 4, Project Co shall comply with this Article 2.2.5 [Checking of Structures] with respect to the checking of the design of all Structures and of any structures existing on the Effective Date which will be incorporated into the Project Work.

2.2.5.2 Concept Review

- (a) Project Co shall undertake a Concept Review of all Structures and shall provide a copy of the Concept Review documentation to the Province's Representative with the Interim Design submissions.

2.2.5.3 Categories of Structures

- (a) Prior to submitting the Interim Design submissions, Project Co shall undertake a categorization of all Structures in accordance with this Article 2.2.5.3 [Categories of Structures], the purpose of which is to determine the degree of independence of checking of the Design Data that is required for each Structure.
- (b) Project Co shall place each Structure into one of the following four categories:
- (i) **Category 0** - minor individual Structures, provided the Structure conforms to one of the following:
 - A. a Structure with a single span of less than 10m and which is statically determinate;
 - B. a buried Structure less than 3m clear span/diameter;
 - C. a multi-cell buried Structure where the cumulative span is less than 5m and having more than 1m cover;
 - D. a retaining wall with less than 3m retained height; or
 - E. a facing-panel system less than 3m in height;
 - (ii) **Category I** - simple individual Structures, provided the Structure conforms to one of the following:
 - A. a retaining wall with at least 3m and less than 7m retained height;
 - B. a buried concrete box Structure with less than 8m span;
 - C. a Structure with a simply supported single span of less than 20m and having less than 25 degree skew;
 - D. a facing-panel system at least 3m, but less than 7m, in height; or
 - E. a noise wall that is at least 3m in height;

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- (iii) **Category II** - the Tunnel and any Structures not otherwise within the parameters of Categories 0, I or III; or
- (iv) **Category III** - any Structure which is:
 - A. a special structure for an elevated Guideway that is not a simple span;
 - B. an elevated Guideway with a split alignment;
 - C. an elevated Guideway with a span of greater than 50m; or
 - D. a Guideway foundation in liquefiable soil.

2.2.5.4 Existing Structures

- (a) Prior to submitting the Interim Design submissions, Project Co shall undertake a categorization assessment of any structures existing on the Effective Date which will be incorporated into the Project Work in accordance with the criteria set out in Article 2.2.5.3(b) [Categories of Structures] of this Part 3 and the renewal or strengthening work affecting structural integrity of existing structures shall be categorized on the basis of the structure as it existed on the Effective Date unless otherwise agreed by the Province's Representative.

2.2.5.5 Category Proposal

- (a) As soon as sufficient Design Data for a Structure or an existing Structure subject to categorization under Article 2.2.5.4 [Existing Structures] of this Part 3 has been prepared to allow the determination of the applicable category for the particular Structure, Project Co shall submit its proposed category for the Structure, together with such Design Data as necessary to support its proposal, to the Province's Representative for review, acting reasonably, in accordance with the Review Procedure.

2.2.5.6 Structure Checking Procedure

- (a) Project Co shall ensure that all Design Data, inclusive of calculations, assessments, drawings and bar schedules, relating to each Structure and to each existing structure subject to categorization under Article 2.2.5.4 [Existing Structures] of this Part 3, is checked as follows:
 - (i) Category 0 and Category I Structures require an independent check to be carried out by a Professional Engineer, which engineer may be from the original Design Team but shall not be the engineer who designed the Structure;
 - (ii) Category II Structures require a check to be carried out by a Checking Team, which may be from the Designer but shall be independent of the Design Team; and

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- (iii) Category III Structures require a check to be carried out by a Checking Team, appointed to perform an independent detailed check by experts in:
 - A. structural analysis and design of guideways similar to the Guideway; and
 - B. seismic design of guideway structures similar to the structures of the Guideway, but the engineer undertaking the check of the seismic design shall be from an organization not related to the Designer.
- (b) The Checking Team for Category III Structures shall report directly to Project Co.
- (c) Project Co shall, in addition to the checking procedures required under this Part 3, conduct all checking procedures required by APEGBC.
- (d) Project Co shall ensure, in addition to the requirements of Articles 2.2.5.6(a)(ii) and 2.2.5.6(a)(iii), both of this Part 3, that any Category II Structures or Categories III Structures are subject to an independent detail check by geotechnical experts in seismic design by an organization not related to the Designer.

2.2.5.7 Checking Teams

- (a) Project Co shall, in accordance with the Non-Systems Design Management Plan, submit to the Province's Representative for review, acting reasonably, in accordance with the Consent Procedure a proposal regarding the identity of the Checking Team, which proposal shall be supported by a resume for each member of the proposed Checking Team, the organizational structure of the Checking Team and the proposed terms and conditions of the team members' engagement.
- (b) Project Co shall ensure that the following responsibilities and expertise are required of and incorporated into the Checking Team for Category III Structures:
 - (i) the Checking Team shall be responsible for:
 - A. conducting design checks to ensure that the design of all Category III Structures meets the performance expectations outlined in this Agreement and that the design is carried out in accordance with Good Industry Practice;
 - B. undertaking supplementary analyses to independently verify and confirm the design methodologies and assumptions used for each Category III Structure; and
 - C. identifying deficiencies in the design and analyses, and notifying each of Project Co and the Province's Representative of any unresolved deficiencies during Final Design submissions; and
 - (ii) the Checking Team shall consist of persons with recognized expertise in the following:

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- A. seismic design and analysis of guideway structures or long-span bridges located in high seismic risk regions and in soils susceptible to liquefaction, similar to the Guideway;
- B. ground improvement methods to mitigate liquefaction;
- C. displacement-based design philosophy;
- D. the disciplines of geotechnical and structural engineering;
- E. hydrotechnical analysis and design for structures similar to the Structures;
- F. the analysis and design of all aspects of long span and complex structures similar to the Structures;
- G. the seismic design provisions in CAN/CSA-S6, BC Supplement to CAN/CSA-S6, AASHTO and all other applicable Reference Documents;
- H. the state-of-the-art geotechnical, structural, and soil-structure interaction modeling and software used for design and analysis of guideway and bridge foundations similar to the Guideway foundations; and
- I. the review of designs to ensure compliance with Environmental Laws and other environmental requirements.

2.2.5.8 Additional Structure Design Checking Responsibility

- (a) Each of the Design Team, the Designer and the Checking Team shall satisfy themselves as to the applicability and accuracy of all computer programs used in the design of the Structures and shall ensure the validity of the program for each application.
- (b) Each of the Design Team, the Designer and the Checking Team shall be responsible for its own interpretation of the relevant ground information.
- (c) Project Co shall issue a separate Design Certificate (Independent Check for Category III Structures) for each Category III Structure, which certificate shall be:
 - (i) on the Certificate Form 2 [Design Certificate (Independent Check for Category III Structures)], attached at Attachment A [Form of Certificates] to this Part 3;
 - (ii) signed and sealed by the responsible member of the Checking Team, who shall be a Professional Engineer; and
 - (iii) signed by Project Co's Representative.

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2.2.5.9 Independence

- (a) Project Co shall ensure that the independence of the Design Team and the Checking Team is maintained at all times.
- (b) Notwithstanding Article 2.2.5.9(a) of this Part 3, the Design Team, the Checking Team and Project Co may consult with each other to ensure that the results they are obtaining are directly comparable.

2.2.6 Design Certification for Non-Systems Components

2.2.6.1 Design Certificates

- (a) Project Co shall prepare and issue a separate Design Certificate for each submitted Final Design review package. All Design Certificates prepared and issued by Project Co shall be:
 - (i) on the applicable Certificate Form 1 [Design Certificate (General)] or Certificate Form 3 [Design Certificate (Environmental)], both attached at Attachment A [Form of Certificates] to this Part 3;
 - (ii) signed and sealed by the responsible professional, who shall be a Professional Engineer or an Architect, and a principal of the Designer; and
 - (iii) signed by Project Co's Representative or, in the case only of Design Certificates for environmental works incorporated into the Project Work, the Environmental Manager.
- (b) Project Co shall obtain and provide confirmation from the relevant Architect or Professional Engineer that they are prepared to sign Form 4 [Design Certificate], attached at Attachment A [Form of Certificates] to this Part 3, prior to the start of the design by the relevant Architect or Professional Engineer.
- (c) Any person who signs a Design Certificate shall clearly print his or her name and the position held in his or her organization on the Design Certificate.

2.2.6.2 Submission of Design Certificates

- (a) Project Co shall submit all Design Certificates, together with the supporting documentation, to the Province's Representative for review, acting reasonably, in accordance with the Review Procedure. The submitted Design Certificates shall have original signatures, seals and registration numbers and shall be in such form as to allow the Province's Representative to perform its review of such Design Certificate without delay.

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2.2.7 Construction Certificates for Non-Systems Components

- (a) Project Co shall, in accordance with the procedures set out in the Non-Systems Design Management Plan and the relevant Quality Documentation or other Design and Construction Requirements, submit Construction Certificates in respect of each substantially completed Non-Systems Component in the form set out as Certificate Form 4 [Construction Certificate], attached at Attachment A [Form of Certificates] to this Part 3, to the Province's Representative for review, acting reasonably, in accordance with the Review Procedure. Project Co shall obtain and provide confirmation from the relevant Architect or Professional Engineer that they are prepared to sign the form of the Form 4 [Construction Certificate], attached at Attachment A [Form of Certificates] to this Part 3, prior to the start of the Design by the relevant Architect or Professional Engineer.
- (b) In addition to the Construction Certificates submitted under Article 2.2.7(a), once all of the Non-Systems Components are totally complete, Project Co shall, in accordance with the procedures set out in the Non-Systems Design Management Plan and the relevant Quality Documentation or other Design and Construction Requirements, submit one Construction Certificate in respect of all totally completed Non-Systems Components, in the form set out as Certificate Form 4 [Construction Certificate], attached at Attachment A [Form of Certificates] to this Part 3, to the Province's Representative for review, acting reasonably, in accordance with the Review Procedure.
- (c) Project Co shall, in accordance with the procedures set out in the Non-Systems Design Management Plan and the relevant Quality Documentation or other Design and Construction Requirements, submit one Construction Certificate, in the form set out as Certificate Form 4 [Construction Certificate], attached at Attachment A [Form of Certificates] to this Part 3, in respect of all totally completed Non-Systems Components for any Reinstatement Work carried out by Project Co pursuant to Part 7 [Insurance, Damage and Destruction] of this Agreement in accordance with a Reinstatement Plan, to the Province's Representative for review, acting reasonably, in accordance with the Review Procedure.
- (d) Project Co shall submit all Construction Certificates to:
 - (i) the Province's Representative and to the Independent Certifier in respect of:
 - A. all substantially completed Non-Systems Components prior to Substantial Completion in accordance with Article 2.2.7(a);
 - B. totally completed Non-Systems Components for any Reinstatement Work in accordance with Article 2.2.7(c); and

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- (ii) the Province's Representative in respect of totally completed Non-Systems Components after Substantial Completion but prior to Total Completion in accordance with Article 2.2.7(b).
- (e) All Construction Certificates shall be:
 - (i) signed and sealed by the Designer;
 - (ii) signed by Project Co's Representative; and
 - (iii) signed by the Independent Certifier, acknowledging receipt.

Part 3. Certification and Completion

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Article 3. Completion Deliverables

3.1 Scope

- (a) Without limiting Project Co's obligations under this Agreement, Project Co shall deliver the deliverables set out in this Article 3 [Completion Deliverables] prior to Substantial Completion or as otherwise provided in this Article 3. All deliverables under this Article 3 [Completion Deliverables] shall be submitted in accordance with the Review Procedure, unless otherwise specified.
- (b) Any failure by Project Co to deliver a deliverable required by this Article 3 [Completion Deliverables] prior to Substantial Completion shall be deemed to be a deficiency in the Project Work and the Province shall be entitled to hold back from the Substantial Completion Payment the amount permitted by Section 3.1[Deficiency Holdback] of Schedule 10 [Payment and Performance Mechanism] on account of any such deficiency.

3.2 Records Documentation and Assignments

3.2.1 Records Documentation

- (a) Without limiting Project Co's obligations under this Agreement, Project Co shall, prior to Substantial Completion, compile a complete set of the Records Documentation, including record drawings.
- (b) Project Co shall, upon request by the Province's Representative, made prior to Substantial Completion, make available to the Province's Representative and the Independent Certifier the Records Documentation compiled by Project Co under this Article 3.2.1 [Records Documentation].
- (c) Project Co shall ensure that:
 - (i) the drawing numbers of the record drawings shall remain the same as the original design drawings; and
 - (ii) the Records Documentation consists of stand-alone documents, drafted in the format and to the standards of the original design drawings.

3.2.1.1 Record Drawings

- (a) Notwithstanding Article 3.2.1(b) of this Part 3, Project Co shall submit the record drawings in respect of the Project Work, including the record drawings for the Municipal Works, to the Province's Representative for review, acting reasonably, in accordance with the Review Procedure, which drawings shall comply with the following requirements:

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- (i) the record drawings shall be signed and certified by the applicable discipline professional as being a true representation of what was built to the best of the said professional's knowledge;
 - (ii) original paper drawings shall be accompanied by a CD or DVD and USB flash or hard drive containing the drawings in AutoCAD and pdf format
 - (iii) provide electronic copies of all supplier /shop drawings in pdf and (where available) AutoCAD format;
 - (iv) provide an index of all Record Drawings organized by location and subject matter, along with a compiled electronic set of all Record Drawings on a USB flash or hard drive containing the drawings in AutoCAD and pdf format; and
 - (v) the drawings shall be accompanied by all electronic data for survey, mapping, finished ground elevations, and three dimensional modeling to confirm as-built conditions.
- (b) In addition to the requirements of this Article 3.2.1 [Records Documentation], Project Co shall comply with the requirements of Article 3.7(c), Part 1 of Schedule 4, with respect to preparation of and delivery of record drawings in respect of Municipal Works.
- (c) Following receipt of confirmation from the Province's Representative that there is no objection to the record drawings submitted by Project Co in accordance with Article 3.2.1.1(a) of this Part 3, and when no further changes are required to be made to the record drawings, Project Co shall submit the finalized record drawings to the Province's Representative for record purposes.

3.2.1.2 Construction Specifications

- (a) Notwithstanding Article 3.2.1(b) of this Part 3, Project Co shall submit to the Province's Representative for review, acting reasonably, in accordance with the Review Procedure, a complete compilation of all Construction Specifications that have been developed in accordance with and in satisfaction of the requirements of this Agreement, including this Part 3, and that have been applied by Project Co in carrying out the Project Work.

3.2.1.3 Final Durability Report

- (a) Project Co shall update the Updated Durability Report prepared in accordance with Article 2.2.3.3 [Submission and Updating of Durability Report] of this Part 3 to reflect the as-built conditions of the Project (the "**Final Durability Report**") and shall submit the Final Durability Report to the Province's Representative for review, acting reasonably, in accordance with the Review Procedure.

3.2.1.4 Final Design Manual

- (a) Project Co shall update the updated Design Manual prepared in accordance with Article 2.1.5 [Submission and Updating of Design Manual] of this Part 3 to reflect the

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as-built conditions of the Project (the “**Final Design Manual**”) and shall submit the Final Design Report to the Province’s Representative for review, acting reasonably, in accordance with the Review Procedure, in both PDF and Word format.

3.2.2 Evidence of Assignments and Transfers of Property and Warranties

(a) Project Co shall deliver the following to the Province, or at the discretion of the Province to BCTFA or any other third party designated by the Province:

(i) complete indexed binder, in both hard copy and electronic copy, of all Subcontractor warranties which extend beyond the General Project Work Defect Warranty Period, including the following details and documents:

- A. description of the item, product or work that is contained in the Subcontractor warranty, including the warranty period, start date and end date;
- B. Subcontractor details, including supplier, vendor, or installer information such as the business name, address, and contact information;
- C. Subcontractor warranty documentation, including warranty certificates, warranty terms and conditions documentation, claims procedures; and
- D. incorporation and provision of Subcontractor warranty documents which demonstrate that the applicable Subcontractor warranty meets or exceeds any minimum warranty and maintenance requirements required under the Project Agreement, including Appendix C [Minimum Considerations for Construction Specifications] of Schedule 4.

(ii) written confirmations or acknowledgements:

- A. from each of the Principal Contractors and Subcontractors of the assignment of warranties as required by Section 2.8 [Assignment of Warranties to Province] of Schedule 5 [Project Work Defects and Warranties], including the warranties identified in Article 3.2.2(a)(i) of this Part 3 of Schedule 4 above;
- B. from Project Co and each of the Principal Contractors and Subcontractors that TransLink, including BCRTC, are third party beneficiaries to the warranties contained in the Project Agreement, Principal Contract or Subcontract, respectively, with the ability to administer and directly enforce these warranties; and
- C. from Project Co of, where not previously provided pursuant to Section 2.12 [Transfer of Title] of the Agreement, the transfer of any other assets required to be transferred prior to the Substantial Completion Date to the Province or any other person under the terms of this Agreement; and

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- (iii) copies of all materials comprising the Project Intellectual Property, and transfers, assignments and waivers in respect of same in accordance with the provisions of this Agreement.

3.3 Operations and Maintenance Manuals

3.3.1 Manual Delivery Plan

- (a) Project Co shall prepare and submit, as part of the Systems Management Plan set out in Section 1.6.3 [Systems Management Plan], Appendix G to Schedule 4, a plan for the delivery of manuals required under this Article 3.3 (the “**Manual Delivery Plan**”), which plan shall:
 - (i) list all manuals to be provided by Project Co under this Agreement; and
 - (ii) include a preliminary table of contents for each manual.

3.3.2 General Manual Requirements

- (a) Subject to Article 3.3.2(b) of this Part 3, for each item of Equipment, Project Co shall, in accordance with this Article 3.3 [Operations and Maintenance Manuals] and the Manual Delivery Plan, develop, as required, and deliver to each of the Province and TransLink:
 - (i) one indexed bound, hard copy;
 - (ii) one digitally indexed electronic copy in PDF format;
 - (iii) one digitally indexed electronic copy in Word format; and
 - (iv) an indexed compiled binder of the consolidated operations manual and the maintenance manual for each Station and all other Systems and Guideway elements, in both hard copy and electronic copy,of each of the operations manual and the maintenance manual. Project Co shall deliver the documents specified in this Article 3.3.2 [General Manual Requirements], in accordance with the Review Procedure.
- (b) Project Co shall not be required to provide an operations manual and a maintenance manual in respect of a piece of Equipment that is the same make and model as a piece of equipment that forms part of the Existing SkyTrain System, provided that such piece of Equipment will be used in the same manner as it is used on the Existing SkyTrain System as of the Effective Date.
- (c) Project Co shall ensure that the manuals delivered pursuant to this Article 3.3 [Operations and Maintenance Manuals] are:
 - (i) final, complete and in the English language;
 - (ii) written at a level of understanding at least equivalent to the standard of operations and maintenance manuals used by TransLink in connection with the Existing SkyTrain System; and

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- (iii) sufficient to enable persons knowledgeable in the operation and maintenance of the item of Equipment to understand the manual content, to effectively apply the content to the operation and maintenance of the item of Equipment, and to competently train other persons in the operation and maintenance of the item of Equipment.
- (d) Project Co shall, in developing the manuals required under this Article 3.3 [Operations and Maintenance Manuals], consider and incorporate information required to conduct the O & M Training.
- (e) Without limiting any rights granted to the Province under this Agreement, Project Co shall ensure that all Third Party IP, Project Intellectual Property and Background IP contained in any manual delivered to the Province pursuant to this Part 3, and any updates to same, shall be provided to the Province pursuant to a Complete License or a Limited License, as required by Sections 15.3 and 15.4 of the Agreement, in favour of the Province.

3.3.3 Operations Manuals

3.3.3.1 General Requirements

- (a) Project Co shall ensure that the operations manual for each item of Equipment includes, as applicable, the following information:
 - (i) a detailed description of the scope of the manual, as well as a listing of the specific item(s) of Equipment covered by the manual;
 - (ii) a complete and comprehensive table of contents and index;
 - (iii) summary descriptions of all modes of operation of the item(s) of Equipment, which descriptions will be sufficient to enable persons reasonably knowledgeable in the operation of the item(s) of Equipment to understand each mode of operation;
 - (iv) a detailed description of how each item of Equipment integrates with the Project, the Canada Line at the BCH Station, the Operational Millennium Line and the Integrated SkyTrain System, as applicable, and/or other items of Equipment covered by the manual;
 - (v) complete operating instructions and detailed operations procedures, relating to both normal and emergency operations, for each item of Equipment covered by the manual;
 - (vi) all operating limits and restrictions applicable to the item(s) of Equipment that are known to Project Co and/or the manufacturer or that are reasonably anticipated by application of Good Industry Practice;
 - (vii) clear and detailed illustrations to supplement written descriptions in the manual;
 - (viii) complete and accurate parts list(s) for the applicable item of Equipment, including spare parts lists, and illustrated parts catalogues;

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- (ix) name plate information pertaining to each part making up the item of Equipment, as available, including the make, model, date of manufacture, size, capacity, output, voltage and serial number;
- (x) the names, addresses and telephone numbers of all Subcontractors, manufacturers, and/or suppliers directly responsible for the provision of the applicable item of Equipment; and
- (xi) required configuration data as it relates to the BSP ATC System.

3.3.3.2 Systems Operations Manual Requirements

- (a) Project Co shall use the Existing SkyTrain System fault recovery policies and procedures, including system start-up, shutdown, transition and restart, as documented in BCRTC's "*SkyTrain Control Room Operations Manual*" and the SkyTrain ATC Operations Manual, both provided as Disclosed Data (collectively the "**Systems Operations Manuals**"), as amended in accordance with this Article 3.3.3.2 [Systems Operations Manual Requirements], for the Project.
- (b) Project Co shall propose changes to the Systems Operations Manuals as they apply to the Project, if required, to support the operation of the Integrated SkyTrain System.
- (c) Project Co shall, in accordance with Section 1.19.8 [Operation and Maintenance Deliverables] of Appendix G to this Schedule 4, submit to each of:
 - (i) the Province's Representative for review, acting reasonably, in accordance with the Review Procedure; and
 - (ii) TransLink,

a preliminary redline version of Systems Operations Manuals to document the proposed changes to these manuals required for the purposes of supporting the operation of the Integrated SkyTrain System.
- (d) Project Co shall, in accordance with Section 1.19.8 [Operation and Maintenance Deliverables] of Appendix G to this Schedule 4, deliver to each of the Province's Representative and TransLink a redline version of each of the Systems Operations Manuals that, in the discretion of the Province's Representative, clearly, comprehensively and accurately documents the changes required to be incorporated in each such manual to enable each manual to be appropriately applied to the Operational Millennium Line and the Integrated SkyTrain System, as applicable (the "**Final Redlined Version**"). TransLink shall be responsible for incorporating the Final Redlined Version into the Systems Operations Manuals.

3.3.4 Maintenance Manuals

- (a) Project Co shall ensure that the maintenance manual for each piece of Equipment includes, as applicable, the following information:

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- (i) a detailed description of the scope of the manual, as well as a listing of the specific item(s) of Equipment covered by the manual and any applicable manufacturer's warranty periods;
- (ii) a complete and comprehensive table of contents and index;
- (iii) a detailed description of how the applicable item of Equipment integrates with the Broadway Subway Project, the Canada Line at the BCH Station, the Operational Millennium Line and the Integrated SkyTrain System, as applicable, and/or other items of Equipment covered by the manual;
- (iv) complete and accurate parts list(s) for the applicable item(s) of Equipment covered by the manual, including spare parts lists, and illustrated parts catalogues;
- (v) a detailed and comprehensive procedure to safely service, inspect, maintain (both corrective and preventative maintenance), adjust, troubleshoot, repair, replace and overhaul each item of Equipment covered by the manual;
- (vi) a detailed description of all troubleshooting tips known to Project Co, its suppliers and/or the manufacturer or that are reasonably anticipated by application of Good Industry Practice, set out, whenever possible, in order of likely cause;
- (vii) clear and detailed illustrations to supplement written descriptions in the manual;
- (viii) name plate information pertaining to each part making up the applicable item of Equipment, as available, including the make, model, date of manufacture, size, capacity, output, voltage and serial number;
- (ix) the names, addresses and telephone numbers of all Subcontractors, manufacturers, and/or suppliers directly responsible for the provision and installation of the applicable item of Equipment;
- (x) detailed and comprehensive maintenance instructions for finished surfaces and materials of the applicable item of Equipment; and
- (xi) a clear and detailed recommended timetable for required maintenance activities.

3.4 Hardware, Finishes and Paint Schedules

- (a) Project Co shall, in respect of each Station, submit to the Province and TransLink a complete copy of each of the following:
 - (i) the finishes schedule, containing a comprehensive listing of the finishes;
 - (ii) the hardware schedule, containing a comprehensive listing of the hardware;and

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- (iii) complete paint schedules in respect of each item of Equipment, containing comprehensive listings identifying the paint type, colour, manufacturer and paint system build up.

3.5 Training and Orientation

3.5.1 Operations and Maintenance Training Plan

- (a) Project Co shall, in accordance with the Systems Management Plan and the Consent Procedure, prepare and submit to the Province's Representative for review, acting reasonably, a plan (the "**O & M Training Plan**") for the training of personnel from:
 - (i) TransLink with respect to the operations and maintenance of the Broadway Subway Project (the "**O & M Training**"); and
 - (ii) the Emergency Response Agencies with respect to the orientation of such agencies with the Broadway Subway Project for emergency response purposes (the "**Emergency Services Orientation**").
- (b) Project Co shall provide resources and support to personnel from TransLink and Emergency Services for operations preparedness activities in advance of Service Commencements, including providing Broadway Subway Project site meeting(s), and orientation of the facilities, emergency equipment and response points.
- (c) Project Co shall provide the O & M Training Plan at least one year prior to the Substantial Completion Target Date. The O & M Training Plan will detail the training activities such as original equipment training that will be provided in the 4 months prior to Service Commencement. The O & M Training Plan will include organizing the training by primary groups such as signalling, communications, power, elevators, escalators, and Plant. Project Co shall ensure that all operations and maintenance training included in the ATC Supply Contract is included in the O& M Training Plan.

3.5.2 Operations and Maintenance Training

- (a) Project Co shall deliver the O & M Training in accordance with the O & M Training Plan, and, in delivering the O & M Training, shall provide:
 - (i) all appropriate, necessary and fully qualified persons, materials, including training manuals, equipment, curriculum and documentation, for the purpose of facilitating and providing in-person instruction sessions by Project Co to personnel designated by TransLink; and
 - (ii) the training and instruction services and sessions described in this Article 3.5.2[Operations and Maintenance Training] of Part 3 in a competent, comprehensive, and professional manner by a trainer from the respective area of knowledge, sufficient to properly train all staff required for operations and maintenance of the Broadway Subway and the Operational

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Millennium Line, including Province and TransLink personnel, to properly use, operate, adjust, support and maintain the Equipment.

3.5.3 Emergency Services Orientation

- (a) Project Co shall deliver the Emergency Services Orientation in accordance with the O & M Training Plan, including conducting site orientation sessions.

3.6 Spare Parts and Station Spare Parts

3.6.1 Station Spare Parts

- (a) Project Co shall, at its own cost and expense, deliver the Station Spare Parts to the Province's Representative or, at the direction of the Province, to TransLink or another third party designated by the Province as follows:
 - (i) with respect to tiles, in accordance with Section 09310 Tiling of Appendix C [Minimum Considerations for Construction Specifications] to Schedule 4;
 - (ii) with respect to other fixtures and fittings, additional materials as follows based on the amount supplied and installed as part of the Design and Construction of the Stations:
 - A. 5% of total light fixtures, including ballasts;
 - B. 5% of stair nosing;
 - C. if used, 5% of ceiling tiles; and
 - D. where approved in accordance with Article 10 [Architecture], Part 2 of Schedule 4, 5% of any custom fixtures;
 - (iii) provide details of the unit rates and pricing details of the Station Spare Parts delivered by Project Co,

and such Station Spare Parts shall be delivered:

- (iv) neatly packaged in unopened containers, with protective covering for storage to prevent damage and with labels identifying the contents, manufacturer, product names, colour and pattern;
- (v) with documentation of the complete Station Spare Parts list with the unit rates and pricing details for each delivery; and
- (vi) to such location(s) designated by the Province or TransLink, as the case may be.

3.6.2 Spare Parts Lists, Spare Parts Plan and Provisioning Conference

- (a) Project Co shall, in accordance with the Systems Management Plan, this Article 3.6.2 [Spare Parts Lists, Spare Parts Plan and Provisioning Conference] and the Review Procedure, prepare and submit a plan for the development of the list of Spare Parts (the "**Spare Parts Plan**") within 120 Business Days from the Effective Date to the

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- Province's Representative for review, acting reasonably, which plan shall include the timing for:
- (i) the submission of the Preliminary Spare Parts List in accordance with Article 3.6.2(b) of this Part 3, which list shall be submitted in stages if required, to ensure that Project Co provides unit prices with a minimum 12-month price validity from the time any Preliminary Spare Parts List is submitted, and to allow BCRTC to order and purchase the Spare Parts and ATC Spare Parts at the same time as the applicable Equipment is purchased by Project Co for the Project;
 - (ii) the holding of the Provisioning Conference in accordance with Article 3.6.2(c) of this Part 3;
 - (iii) the finalization and submission of the Final Spare Parts List in accordance with Article 3.6.2(d) of this Part 3, which list shall be submitted in stages if required, to ensure that Project Co provides unit prices for Spare Parts (other than ATC Spare Parts) with a minimum 12-month price validity from the time any Final Spare Parts List is submitted, and to allow BCRTC to order and purchase the Spare Parts and ATC Spare Parts at the same time as the applicable Equipment is purchased by Project Co for the Project; and
 - (iv) the ordering and delivery schedule for Spare Parts.
- (b) Project Co shall, in accordance with the Review Procedure and the Spare Parts Plan, prepare and submit an initial list (the "**Preliminary Spare Parts List**") to the Province's Representative for review, acting reasonably, which list shall:
- (i) identify a stock of Spare Parts to ensure that, as worn or malfunctioning Equipment is removed from the Broadway Subway Project, replaced with the Spare Parts and then repaired or reconditioned, the On-Time Performance Demonstration requirements, as specified in Article 13.4.2 [On-Time Performance Demonstration], Part 2 of Schedule 4, are maintained on a continuing basis for a minimum of two years after the Substantial Completion Date;
 - (ii) determine the specific inventory of recommended Spare Parts, taking into account the following in developing the inventory:
 - A. cost;
 - B. availability;
 - C. supply process;
 - D. replacement/procurement lead times; and
 - E. special tools and test equipment.
 - (iii) identify the quantity and unit price (exclusive of GST, but inclusive of all other taxes) for each recommended Spare Part, which unit prices (other than

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- in respect of the Spare Parts to be provided pursuant to the terms of the ATC Supply Contract (the “**ATC Spare Parts**”)) shall be valid for a minimum of twelve months;
- (iv) for recommended Spare Parts which are not normally in inventory or commercially available, also identify any lower price available to such Spare Parts if the recommended number of Spare Parts or additional numbers of Spare Parts were ordered at an earlier date to take advantage of production runs;
 - (v) identify the ATC Spare Parts, which shall include special tools and test equipment. The unit prices for the ATC Spare Parts shall be determined in accordance with, and shall only be adjusted in accordance with, the terms of the ATC Supply Contract; and
 - (vi) the Preliminary Spare Parts List for the Spare Parts and ATC Spare Parts shall be submitted in stages if required, to ensure that Project Co provides unit prices for Spare Parts (other than ATC Spare Parts) with a minimum 12-month price validity from the time any spare parts list is submitted, and to ensure that BCRTC can order and purchase these spare parts at the same time as the equipment is purchased by Project Co for the Broadway Subway Project to achieve cost effective procurement. Project Co shall provide evidence from their suppliers regarding the price, price validity and timeframes to achieve cost efficiencies from the same production run as the Project Co procurement, including Project Co purchase orders and invoices. Project Co shall not apply a mark-up to the Spare Parts and ATC Spare Parts that exceeds 7.5%.
- (c) Project Co shall, at its cost and in accordance with the Spare Parts Plan, schedule, make all necessary arrangements for and host a provisioning conference to be attended by the Province, TransLink, Project Co and, if applicable, suppliers of each system, (the “**Provisioning Conference**”) to discuss the Preliminary Spare Parts List and the preparation of the Final Spare Parts List. During the Provisioning Conference, Project Co shall solicit comments from the Province and TransLink regarding the Preliminary Spare Parts List, including as to any adjustments to quantities and unit prices.
- (d) Following the Provisioning Conference, Project Co shall, in accordance with the Review Procedure and the Spare Parts Plan, prepare and submit to the Province’s Representative for review, acting reasonably, a final Spare Parts list (the “**Final Spare Parts List**”), which list shall:
- (i) reflect the comments, if any, provided by the Province and TransLink during the course of the Provisioning Conference with respect to the Preliminary Spare Parts List;
 - (ii) list the specific inventory of Spare Parts and ATC Spare Parts to be supplied by Project Co as determined at the Provisioning Conference, and include

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with respect to each category of Spare Parts (with the ATC Spare Parts to be separately identified from the other Spare Parts) to be supplied:

- A. the quantity and, subject to Articles 3.6.2(b)(iii) through (v) of this Part 3, the unit price (exclusive of GST, but inclusive of all other taxes); and
 - B. the anticipated delivery date(s), where they vary from the delivery date(s) in the Spare Parts Plan;
- (iii) identify the total cost (exclusive of GST, but inclusive of all other taxes) of the Spare Parts and ATC Spare Parts listed in the Final Spare Parts List, which cost shall reflect the quantity of each Spare Part and ATC Spare Part to be supplied by Project Co and the unit prices (exclusive of GST, but inclusive of all other taxes) for the Spare Parts and ATC Spare Parts.
 - (iv) the Final Spare Parts List for the Spare Parts and ATC Spare Parts shall be submitted in stages if required, to ensure that Project Co provides unit prices for Spare Parts (other than ATC Spare Parts) with a minimum 12-month price validity from the time any spare parts list is submitted, and to ensure that BCRTC can order and purchase these spare parts at the same time as the equipment is purchased by Project Co for the Broadway Subway Project to achieve cost effective procurement. Project Co shall ensure that the Spare Parts (other than ATC Spare Parts) on the Final Spare Parts List are available for purchase until Substantial Completion with price adjustments for escalation no more than once per year following this twelve month period. Project Co shall provide evidence from its suppliers regarding the price, price validity and timeframes to achieve cost efficiencies from the same production run as the Project Co procurement, including Project Co purchase orders and invoices. Project Co shall not apply a mark-up to the Spare Parts and ATC Spare Parts that exceeds 7.5%.
- (e) Subject to Article 3.6.2 (f) of this Part 3, Project Co will process the ordering of Spare Parts from Project Co's suppliers and Subcontractors for the items identified by TransLink from the Final Spare Parts List. The Province shall be responsible for issuing a Province Change to Project Co for the ordering of, the acceptance of delivery of, and payment for, any Spare Parts ordered from the Final Spare Parts List (it being acknowledged that TransLink shall not be obliged to order any Spare Parts identified on the Final Spare Parts List). Project Co shall not apply a mark-up to the Spare Parts that exceeds 7.5%.
 - (f) In relation to ATC Spare Parts identified on the Final Spare Parts List:
 - (i) Project Co shall deliver, at its own cost and expense, the ATC Spare Parts to TransLink in accordance with the Spare Parts Plan and the Final Spare Parts List, and in accordance with ATC Supply Contract;
 - (ii) out of the total cost of the ATC Spare Parts, the Province shall pay a maximum amount of \$784,817 (together with any applicable GST) in

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accordance with Schedule 10 [Payments and Performance Mechanism] on completion of the relevant hardware milestone; and

- (iii) the Province shall be responsible for issuing a Province Change to Project Co for the ordering of, the acceptance of delivery of, and payment for, any ATC Spare Parts that exceeds the value in Article 3.6.2 (f) (ii) of this Part 3 of Schedule 4. Project Co shall not apply a mark-up to the ATC Spare Parts related to this Province Change that exceeds 7.5%.

3.6.3 Delivery, Storage and Handling

- (a) Project Co shall deliver all Spare Parts, ATC Spare Parts and Station Spare Parts in accordance with the applicable manufacturer's recommended delivery, storage and handling procedures, which procedures shall be provided to the Province's Representative upon request.
- (b) All Spare Parts, ATC Spare Parts and Station Spare Parts shall be individually clearly identified, labeled and packaged for storage in accordance with the manufacturer's recommendations.

3.6.4 Defective Spare Parts and Replacements

- (a) Where any Spare Parts, ATC Spare Parts, or Station Spare Parts provided by Project Co do not conform with the requirements of Section 6.1 [Representation, Warranty and Covenant as to Work], including any substitutions by Project Co not properly approved and authorized, such Spare Parts, ATC Spare Parts, or Station Spare Parts shall be considered defective unless and until Project Co furnishes satisfactory evidence to the Province's Representative to demonstrate the kind and quality of such Spare Parts, ATC Spare Parts, or Station Spare Parts conforms with the requirements of Section 6.1 [Representation, Warranty and Covenant as to Work].
- (b) All replacements for:
 - (i) Spare Parts supplied by Project Co shall comply with Section 1.1 [Representation, Warranty and Covenant as to Project Work] in Schedule 5 [Project Work Defects and Warranties]; and
 - (ii) ATC Spare Parts supplied by Project Co shall comply with the terms of the ATC Supply Contract.

3.6.5 Spare Parts during the Project Work

- (a) Project Co shall, at its own cost, supply all Spare Parts (including testing equipment) which are required by Project Co for the performance of the Project Work, including during testing and commissioning of the Systems.

3.6.6 Spare Parts for Elevators and Escalators

- (a) Project Co is required to install elevators and escalators in accordance with Article 10 [Architecture] of Schedule 4, and the Minimum Considerations for Construction

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Specifications. When selecting a Subcontractor for elevators and/or escalators, Project Co will ensure that such Subcontractor(s) are acceptable to the Province's Representative in accordance with the Consent Procedure. As part of the submission under the Consent Procedure, Project Co will include documentation which demonstrates that the Subcontractor(s) are able to comply with the following requirements:

- (i) compliance with the requirements in the Minimum Considerations for Construction Specifications;
- (ii) having a sufficient stock of Spare Parts available locally for replacement or emergency purposes;
- (iii) making such Spare Parts referenced in Article 3.6.6(a)(ii) available for BCRTC to procure and install, if it chooses to perform such repair work, maintenance, or installation without the assistance of the Subcontractor's personnel; and
- (iv) having qualified personnel available locally to assist with the repair, maintenance, or installation of Spare Parts, if required by BCRTC.

3.7 Cleaning

3.7.1 The Project Site

- (a) Project Co shall:
 - (i) remove all surplus material, equipment, sanitary facilities and any other Construction Plant, and all waste, material, debris, and rubbish from the Project Site;
 - (ii) remove all temporary fences and roads from the Project Site; and
 - (iii) leave the Project Work, the Project Site and the Project Infrastructure to the extent that such infrastructure has been constructed, installed, altered, upgraded, and/or augmented by the carrying out of the Project Work in a safe and orderly condition, including by ensuring that such areas have been returned to their original condition, as applicable, or are 'broom clean' and graded to an even clean surface.
- (b) Notwithstanding Article 3.1(a) of this Part 3, Project Co shall, in respect of any relevant part of the Site in respect of which an Access Period Expiry Date applies that is prior to the Substantial Completion Date, comply with the requirements of Article 3.7.1(a) of this Part 3 by no later than the applicable Access Period Expiry Date.

3.7.2 Guideways and other Project Infrastructure

- (a) Project Co shall:
 - (i) clear the Guideways of all rail grindings and pockets of dirt;

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- (ii) flush clean all drainage systems on or in respect of the Guideways and any other Project Infrastructure that has been constructed, installed, altered, upgraded, and/or augmented by the carrying out of the Project Work; and
- (iii) remove all graffiti from the Guideways and any other Project Infrastructure that has been constructed, installed, altered, upgraded, and/or augmented by the carrying out of the Project Work.

3.7.3 Stations

- (a) Project Co shall wash clean the interior and exterior of all Stations, including associated paved areas, taking care to protect sensitive electrical and mechanical fixtures, and shall:
 - (i) remove all graffiti, stains, spots and other marks;
 - (ii) clean all mechanical and electrical fixtures and Equipment and replace any filters;
 - (iii) flush clean all gutters, drains and rainwater leaders;
 - (iv) polish all glass, mirrors, hardware, wall tile, stainless steel, chrome, panels and electrical and mechanical fixtures;
 - (v) wax, seal or otherwise complete all floor finishes in accordance with the requirements or recommendations of the applicable floor's manufacturer; and
 - (vi) vacuum all electric and electronic equipment rooms.

3.8 Keys, Codes and Passwords

- (a) Project Co shall:
 - (i) in respect of all locks, supply and coordinate the installation of permanent cores as follows:
 - A. Project Co is responsible for all temporary cores during testing and commissioning to secure the Project Site;
 - B. incorporation of any applicable minimum requirements in Appendix C [Minimum Considerations for Construction Specifications] of Schedule 4, including Section 087000 Finish Hardware;
 - C. submit a schedule with a list of BSP required permanent cores, including by Station, room name, door number, core type, and quantities;
 - D. coordinate with BCRTC for the ordering of the permanent cores, which will be supplied by a BCRTC-approved lock supplier directly to BCRTC, at Project Co's cost; and

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- E. Project Co will coordinate with BCRTC during Trial Running to schedule the removal of the temporary cores by Project Co, concurrently with the installation of the permanent cores by BCRTC.
- (ii) deliver the following keys to the Province or a third party designated by the Province:
- A. the permanent keys to all permanent cores installed under Article 3.8(a)(i) of this Part 3 ordered by BCRTC at Project Co's cost;
 - B. the keys to all traffic sign housings;
 - C. the lifting keys for all types of chamber covers; and
 - D. all other keys to all buildings forming part of the Project Infrastructure that has been constructed, installed, altered, upgraded, and/or augmented by the carrying out of the Project Work; and
- (iii) deliver the codes and passwords to all computers and computerized systems installed as part of the Project Work, control of which is required to be transferred to the Province or a third party designated by the Province.

**SCHEDULE 4 PART 3 ARTICLE 4: CERTIFICATION OF SUBSTANTIAL COMPLETION
AND TOTAL COMPLETION**

**ATTACHMENT A TO PART 3 [CERTIFICATION AND COMPLETION]
FORM OF CERTIFICATES**

Certificate Form No.	Name of Certificate Form
1	Design Certificate (General)
2	Design Certificate (Independent Check for Category III Structures)
3	Design Certificate (Environmental)
4	Construction Certificate
5S	Systems Engineer of Record Certificate
5	Certificate of Substantial Completion
6	Certificate of Total Completion
7	Assessment Certificate (Existing Facilities)
8	Certificate of Total Completion (Reinstatement Work)

**SCHEDULE 4 PART 3 ARTICLE 4: CERTIFICATION OF SUBSTANTIAL COMPLETION
AND TOTAL COMPLETION: ATTACHMENT A: FORM OF CERTIFICATES**

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Certificate Form 1

Certificate Ref No. []

DESIGN CERTIFICATE (GENERAL)

In respect of:..... (Provide details e.g. Guideway structure, tunnel, stations, geotechnical, etc.)

Project Agreement between the Province of British Columbia, BC Transportation Financing Authority and [Project Co] dated • (the "Project Agreement") relating to the Project. Capitalized terms and expressions used in this certificate have the same meanings described in the Project Agreement.

Form of Certificate to be used by the Designer and Project Co for certifying the Design of the Project Infrastructure components to the extent that such infrastructure components have been constructed, installed, altered, upgraded, and/or augmented by the carrying out of the Project Work or any other components in accordance with Article 2.2 [Non-Systems Certification Procedure], Part 3 of Schedule 4, to 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 Requirements.
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 Non-Systems Design Management Plan and 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 Requirements, as amended by the following:
[List, if any, the changes made by the issue of Change Certificates];
 - ii. complies with all applicable design requirements of the Project Agreement;
 - iii. complies with all applicable standards, codes and current Good Industry Practice; and
 - iv. accurately describes and depicts the Project Work to be undertaken.

**SCHEDULE 4 PART 3 ARTICLE 4: CERTIFICATION OF SUBSTANTIAL COMPLETION
AND TOTAL COMPLETION: ATTACHMENT A: FORM OF CERTIFICATES**

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SCHEDULE

[Include here drawing numbers and titles, reports, calculations, etc.]

Certified by:

Designer (Principal)

Name:

Title:

Date:

Professional Registration Number:

Affix Professional Seal

Signed:

Project Co

Per: Project Co's Representative

Name:

Date:

This Certificate is:

- i. received*
 - ii. received with comments as follows*
 - iii. returned marked "comments" as follows:*
- * delete as appropriate

Signed:

Province's Representative

Name:

Date:

**SCHEDULE 4 PART 3 ARTICLE 4: CERTIFICATION OF SUBSTANTIAL COMPLETION
AND TOTAL COMPLETION: ATTACHMENT A: FORM OF CERTIFICATES**

- 4 -

Certificate Form 2

Certificate Ref. No []

DESIGN CERTIFICATE (INDEPENDENT CHECK FOR CATEGORY III STRUCTURES)

Project Agreement between the Province of British Columbia, BC Transportation Financing Authority and [Project Co] dated • (the "Project Agreement") relating to the Project. Capitalized terms and expressions used in this certificate have the same meanings described in the Project Agreement.

Form of certificate to be used by the Checking Team and Project Co for certifying the Design of Category III Structures incorporated in the Project Work in accordance with Article 2.2 [Non-Systems Certification Procedure], Part 3 of Schedule 4, 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 and all relevant Design and Construction Requirements.
2. We certify that we have performed an independent check (as required in the Project Agreement for Category III 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 in accordance with all applicable requirements contained in the Non-Systems Design Management Plan and 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 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 by the issue of Change Certificates, and any Addenda to the foregoing Technical Appraisal Form];
 - ii. the Design, methodologies and assumptions are consistent with all applicable standards, codes and current Good Industry Practice; and
 - iii. the said Design Data accurately describes and depicts the Project Work to be undertaken.

**SCHEDULE 4 PART 3 ARTICLE 4: CERTIFICATION OF SUBSTANTIAL COMPLETION
AND TOTAL COMPLETION: ATTACHMENT A: FORM OF CERTIFICATES**

- 5 -

SCHEDULE

[Include here drawing numbers and titles and reports, calculations, etc.]

Certified by:

Checking Team (Principal)

Name:

Title:

Date:

Professional Registration Number:

Affix Professional Seal

Signed:

Project Co

Per: Project Co's Representative

Name:

Date:

This Certificate is:

- i. received*
 - ii. received with comments as follows*
 - iii. returned marked "comments" as follows:*
- * delete as appropriate

Signed:

Province's Representative

Name:

Date:

Certificate Form 3

Certificate Ref No. []

DESIGN CERTIFICATE (ENVIRONMENTAL)

Project Agreement between the Province of British Columbia, BC Transportation Financing Authority and [Project Co] dated • (the "Project Agreement") relating to the Project. Capitalized terms and expressions used in this certificate have the same meanings described in the Project Agreement.

Form of certificate to be used by the Designer and the Environmental Manager for certifying the Design of environmental works incorporated in the Project Work in accordance with Article 2.2 [Non-Systems Certification Procedure], Part 3 of Schedule 4, to 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 Requirements.
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 Non-Systems Design Management Plan and 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:
 - i. the said Design Data complies with all applicable Design and Construction Requirements, including Technical Appraisal Form No. [.....] dated [.....], as amended by the following:

[List, if any, the changes made by the issue of Change Certificates, and any Addenda to the foregoing Technical Appraisal Form];
 - ii. the said Design Data complies with all applicable design requirements of the Project Agreement;
 - iii. the said Design Data complies with all applicable standards, codes and current Good Industry Practice; and
 - iv. the said Design Data accurately describes and depicts the Project Work to be undertaken.

**SCHEDULE 4 PART 3 ARTICLE 4: CERTIFICATION OF SUBSTANTIAL COMPLETION
AND TOTAL COMPLETION: ATTACHMENT A: FORM OF CERTIFICATES**

- 7 -

SCHEDULE

[Include here drawing numbers and titles and reports, calculations, etc.]

Certified by:

Designer (Principal)

Name:

Title:

Date:

Professional Registration Number:

Affix Professional Seal

Signed:

Environmental Manager

Name:

Title:

Date:

Professional Registration Number:

Affix Professional Seal

This Certificate is:

- i. received*
- ii. received with comments as follows*
- iii. returned marked "comments" as follows:*

* delete as appropriate

Signed:

Province's Representative

Name:

Date:

**SCHEDULE 4 PART 3 ARTICLE 4: CERTIFICATION OF SUBSTANTIAL COMPLETION
AND TOTAL COMPLETION: ATTACHMENT A: FORM OF CERTIFICATES**

- 8 -

Certificate Form 4

Certificate Ref. No. []

CONSTRUCTION CERTIFICATE

Project Agreement between the Province of British Columbia, BC Transportation Financing Authority and [Project Co] dated • (the "Project Agreement") relating to the Project. Capitalized terms and expressions used in this certificate have the same meanings described in the Project Agreement.

Form of Certificate to be used by Project Co and the Designer for certifying, as applicable:

- (a) *the substantial completion of Construction activities in respect of those Non-Systems Components of the Project Work set out in paragraph 1 of this Construction Certificate;*
- (b) *the total completion of construction activities in respect of those Non-Systems Components of the Project Work set out in paragraph 1 of this Construction Certificate;*
or
- (c) *the total completion of construction activities in respect of all Non-Systems Components for any Reinstatement Work carried out by Project Co pursuant to Part 7 [Insurance, Damage and Destruction] of this Agreement in accordance with a Reinstatement Plan,*

in accordance with Article 2.2.7 [Construction Certificates for Non-Systems Components], Part 3 of Schedule 4, to the Project Agreement.

Project Co's Statement

1. We certify that **[name and element of construction of the Non-Systems Component(s) in respect of the Certificate of Substantial Completion][the construction activities in respect of all Non-Systems Components][the construction activities in respect of all Non-Systems Components for Reinstatement Work]** has been designed, constructed, **[substantially completed], [totally completed]**, commissioned and tested in all respects in accordance with: **[NTD: 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; and
 - (ii) the provisions of the Project Agreement, including all applicable Design and Construction Requirements **[as amended by the following Change Certificate(s): [.....]].**

Signed.....

Project Co

Per: Project Co's Representative

Name.....

Date.....

**SCHEDULE 4 PART 3 ARTICLE 4: CERTIFICATION OF SUBSTANTIAL COMPLETION
AND TOTAL COMPLETION: ATTACHMENT A: FORM OF CERTIFICATES**

Designer's Statement

2. We certify that we have examined the **[name and element of construction of the Non-Systems Component(s) in respect of the Certificate of Substantial Completion][the construction activities in respect of all Non-Systems Components][the construction activities in respect of all Non-Systems Components for Reinstatement Work]** in accordance with the requirements for examination of the Project Work contained in the Non-Systems Design Management Plan, 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 construction activities related to the Non-Systems Component][the construction activities related to the Non-Systems Components][the construction activities related to the Non-Systems Components for Reinstatement Work]** have been designed, constructed, **[substantially completed][totally completed]**, commissioned and tested in all respects in accordance with: **[NTD: 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; and
 - (ii) the provisions of the Project Agreement, including all applicable Design and Construction Requirements **[as amended by the Change Certificate(s) listed in paragraph 1.(ii) above]**.

Signed.....
Designer (Principal)
Name.....
Title.....
Date.....
Professional Registration Number:

Receipt of this Certificate is acknowledged.

Signed.....
Independent Certifier
Name.....
Date.....
Professional Registration Number:

Affix Professional Seal

**SCHEDULE 4 PART 3 ARTICLE 4: CERTIFICATION OF SUBSTANTIAL COMPLETION
AND TOTAL COMPLETION: ATTACHMENT A: FORM OF CERTIFICATES**

- 10 -

This Certificate is:

- i. received*
- ii. received with comments as follows*
- iii. returned marked "comments" as follows:*

* delete as appropriate

Signed:

Province's Representative

Name:

Date:

Certificate Form 5S

Certificate Ref No. []

SYSTEMS ENGINEER OF RECORD CERTIFICATE

Project Agreement between the Province of British Columbia, BC Transportation Financing Authority and [Project Co] dated • (the "Project Agreement") relating to the Project. Capitalized terms and expressions used in this certificate have the same meanings described in the Project Agreement.

Form of certificate to be used by Project Co's Systems Engineer of Record for certifying substantial completion of the Systems in accordance with Appendix G (Systems General Requirements) to Schedule 4 to the Project Agreement.

Systems Engineer of Record Statement

In accordance with Article 1.18 (Systems Certification) of Appendix G, the undersigned certifies that:

1. each System is ready for the BSP to carry passengers; and
2. the Integrated SkyTrain System to the extent within the scope of the Project Work is ready to carry passengers.

Signed.....

Name.....

Systems Engineer of Record

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:

**SCHEDULE 4 PART 3 ARTICLE 4: CERTIFICATION OF SUBSTANTIAL COMPLETION
AND TOTAL COMPLETION: ATTACHMENT A: FORM OF CERTIFICATES**

- 12 -

- i. received*
 - ii. received with comments as follows*
 - iii. returned marked "comments" as follows:*
- * delete as appropriate

Signed:

Province's Representative

Name:

Date:

**SCHEDULE 4 PART 3 ARTICLE 4: CERTIFICATION OF SUBSTANTIAL COMPLETION
AND TOTAL COMPLETION: ATTACHMENT A: FORM OF CERTIFICATES**

- 13 -

Certificate Form 5

Certificate Ref No. []

CERTIFICATE OF SUBSTANTIAL COMPLETION

Project Agreement between the Province of British Columbia, BC Transportation Financing Authority and [Project Co] dated • (the "Project Agreement") relating to the Project. Capitalized terms and expressions used in this certificate have the same meanings described in the Project Agreement.

Form of Certificate of Substantial Completion to be used by Independent Certifier in accordance with Article 4.1.2.6 [Issuance of Certificate of Substantial Completion], Part 3 of Schedule 4, to the Project Agreement.

The undersigned has fulfilled his/her obligations as the Independent Certifier pursuant to the Independent Certifier Contract and, pursuant to those obligations, advises that:

1. the Project Work has been Substantially Completed in accordance with the Project Agreement and all conditions to achievement of Substantial Completion as set out in Article 4.1 [Substantial Completion of the Project Work], Part 3 of Schedule 4 to the Project Agreement have been met;
2. Occupancy Approval Certificates for all of the Stations as described in Appendix E [Construction Approval Process] to Schedule 4 to the Project Agreement have been issued and are appended;
3. this document shall serve as the Certificate of Substantial Completion for the Project Work;
4. the Final Deficiency List signed by the Independent Certifier is appended; and
5. the Substantial Completion Date shall be **[date]**.

Signed.....

Independent Certifier

Name.....

Title.....

Date.....

Professional Registration Number:

Affix Professional Seal

**SCHEDULE 4 PART 3 ARTICLE 4: CERTIFICATION OF SUBSTANTIAL COMPLETION
AND TOTAL COMPLETION: ATTACHMENT A: FORM OF CERTIFICATES**

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Certificate Form 6

Certificate Ref. No. []

CERTIFICATE OF TOTAL COMPLETION

Project Agreement between the Province of British Columbia, BC Transportation Financing Authority and [Project Co] dated • (the "Project Agreement") relating to the Project. Capitalized terms and expressions used in this certificate have the same meanings described in the Project Agreement.

Form of Certificate of Total Completion to be used by the Province's Representative in accordance with Article 4.2.3 [Certification of Total Completion], Part 3 of Schedule 4, to the Project Agreement.

The undersigned advises that:

1. Total Completion has been achieved in accordance with the Project Agreement;
2. the Construction Certificate for the total completion of all Non-Systems Components , to which there has been no objection in accordance with the Review Procedure, was issued on [date] and is appended;
3. [the Province's Representative confirms that the Final Deficiency List Deficiencies have been satisfactorily completed by Project Co] **[NTD: Delete if not applicable.]**
4. this document shall serve as the Certificate of Total Completion; and
4. the Total Completion Date shall be **[date]**.

Signed:

Province's Representative

Name:

Title.....

Date.....

**SCHEDULE 4 PART 3 ARTICLE 4: CERTIFICATION OF SUBSTANTIAL COMPLETION
AND TOTAL COMPLETION: ATTACHMENT A: FORM OF CERTIFICATES**

- 15 -

Certificate Form 7

Certificate Ref. No. []

ASSESSMENT CERTIFICATE (EXISTING FACILITIES)

Project Agreement between the Province of British Columbia, BC Transportation Financing Authority and [Project Co] dated • (the "Project Agreement") relating to the Project. Capitalized terms and expressions used in this certificate have the same meanings described in the Project Agreement.

Form of Assessment Certificate (Existing Facilities) to be used by the Designer and Project Co in accordance with Article 2.2.3.5 [Technical Appraisal Submission Requirements], Part 3 of Schedule 4, to the Project Agreement.

We certify that, in assessing [.....] [**Name and Category of the Existing Facility to be altered, upgraded or augmented as part of the Project Work and list of all elements of the Existing Facility included in the assessment**] listed in the Schedule hereto and annexed we have complied with all applicable requirements contained in the Non-Systems Design Management Plan, the Design Quality Management Plan and the Construction Quality Management Plan and have utilized the standards of care, skill and diligence that, in accordance with the standards of our profession, are required of experienced professionals undertaking such assessments, and that in our professional opinion:

- (a) the said assessment complies with all applicable Design and Construction Requirements, including Technical Appraisal Form No. [.....] dated [.....], as amended by the following:

[List, if any, the changes made by the issue of Change Certificates and addenda to the foregoing Technical Appraisal Form];

and the said assessment complies in all other respects with the Project Agreement; and

- (b) the assessed capacity of each element of the Existing Facility is as follows:

[♦]

**SCHEDULE 4 PART 3 ARTICLE 4: CERTIFICATION OF SUBSTANTIAL COMPLETION
AND TOTAL COMPLETION: ATTACHMENT A: FORM OF CERTIFICATES**

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SCHEDULE

[Include here drawing numbers and title used for the assessment.]

Certified by:.....

Designer (Principal)

Name.....

Title.....

Date.....

Professional Registration Number:

Affix Professional Seal

Signed:

Project Co

Per: Project Co's Representative

Name:

Date:

This Certificate is:

- i. received *
 - ii. received with comments as follows*
 - iii. returned marked "comments" as follows:*
- * delete as appropriate

Signed:

Province's Representative

Name:

Title:

Date:

**SCHEDULE 4 PART 3 ARTICLE 4: CERTIFICATION OF SUBSTANTIAL COMPLETION
AND TOTAL COMPLETION**

Certificate Form 8

Certificate Ref. No. []

CERTIFICATE OF TOTAL COMPLETION (REINSTATEMENT WORK)

Project Agreement between the Province of British Columbia, BC Transportation Financing Authority and [Project Co] dated • (the "Project Agreement") relating to the Project. Capitalized terms and expressions used in this certificate have the same meanings described in the Project Agreement.

Form of Certificate of Total Completion (Reinstatement Work) to be used by Independent Certifier in accordance with Article 4.3 [Certification of Total Completion (Reinstatement Work)], Part 3 of Schedule 4, to the Project Agreement.

The undersigned has fulfilled his/her obligations as the Independent Certifier pursuant to the Independent Certifier Contract and, pursuant to those obligations, advises that:

1. the Reinstatement Work carried out by Project Co in accordance with the Reinstatement Plan, dated _____, has been totally completed in accordance with the Project Agreement;
2. one Construction Certificate for the total completion of the Non-Systems Components subject to the Reinstatement Work, to which there has been no objection in accordance with the Review Procedure, was issued on [date] and is appended;
3. this document shall serve as the Certificate of Total Completion (Reinstatement Work) for the Reinstatement Work carried out by Project Co in accordance with the Reinstatement Plan referred to in paragraph 1; and
4. the date of total completion of the Reinstatement Work carried out by Project Co in accordance with the Reinstatement Plan referred to in paragraph 1 shall be [date].

Signed:

Independent Certifier

Name:

Title.....

Date.....

Professional Registration Number:

Affix Professional Seal

**SCHEDULE 4 PART 3 ARTICLE 4: CERTIFICATION OF SUBSTANTIAL COMPLETION
AND TOTAL COMPLETION**

**ATTACHMENT B TO PART 3 [CERTIFICATION AND COMPLETION]
SAMPLE CONTENTS FOR A TECHNICAL APPRAISAL FORM**

Ref. No.....

- 1. DESCRIPTION OF DESIGN PACKAGE**
 - 1.1 List of design elements and disciplines covered by TAF.
- 2. PROPOSED DESIGN AND CONSTRUCTION ELEMENT(S) (e.g. GUIDEWAY, STATION, TUNNEL, UTILITY, ROAD)**
 - 2.1 Description of element and rationale for choice.
 - 2.2 Structural type.
 - 2.3 Foundation type.
 - 2.4 Proposed arrangements for inspection and maintenance.
- 3. DESIGN/ASSESSMENT CRITERIA**
 - 3.1 Live loading.
 - 3.2 List of relevant design documents.
 - 3.3 Proposed alternative proposals.
- 4. DESIGN ANALYSIS**
 - 4.1 Methods of analysis proposed for superstructure, substructure and foundations.
 - 4.2 Description and diagram of idealised structure to be used for analysis.
 - 4.3 Assumptions intended for calculation of structural element stiffness.
 - 4.4 Proposed earth pressure coefficients (k_a , k_o , or k_p) to be used in the design of earth retaining elements.
- 5. SEISMIC DESIGN**
 - 5.1 Seismic considerations with respect to Article 5 [Seismic], Part 2 of Schedule 4.
 - 5.2 Seismic design approach and methodology.
 - 5.3 Description of structural performance with respect to each of the Minimal Damage [Immediate Use] Performance Level, Repairable Damage [Service Limited] Performance Level and Probable Replacement [Life Safety] Performance Level.
 - 5.4 Liquefaction considerations and analysis.
- 6. GEOTECHNICAL**

**SCHEDULE 4 PART 3 ARTICLE 4: CERTIFICATION OF SUBSTANTIAL COMPLETION
AND TOTAL COMPLETION: ATTACHMENT B TO PART 3 [CERTIFICATION AND
COMPLETION] SAMPLE CONTENTS FOR A TECHNICAL APPRAISAL FORM**

- 2 -

- 6.1 Geotechnical considerations with respect to Article 6 [Geotechnical], Part 2 of Schedule 4.
- 6.2 Acceptance of interpretative recommendations of the soils report to be used in the design and reasons for any proposed departures.
- 6.3 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.
- 6.4 Differential settlement to be allowed for in the design of the Structure.
- 6.5 Anticipated ground movements or settlement due to embankment loading, mineral extraction, flowing water, and measures proposed to deal with these defects as far as they affect the Structure.
- 6.6 Anticipated ground movements or settlement due to seismic loading, measures proposed to deal with these impacts as far as they affect the Structure.
- 6.7 Proposed earth pressure coefficients (k_a , k_o , or k_p) to be used in the design of each retaining element.
- 7. ENVIRONMENTAL**
 - 7.1 Environmental considerations with respect to Schedule 5 [Environmental Obligations].
- 8. CHECKING**
 - 8.1 Name of Designer.
 - 8.2 Names of Checking Team members.
 - 8.3 Name of seismic design checker.
- 9. DOCUMENTATION**
 - 9.1 List of drawings (including numbers) and documents accompanying this submission.
- 10. THE ABOVE DESIGN AND CONSTRUCTION PROPOSALS ARE SUBMITTED FOR REVIEW.**

Signed:

Designer (Principal)

Name:

Engineering Qualifications:.....

Date:

**SCHEDULE 4 PART 3 ARTICLE 4: CERTIFICATION OF SUBSTANTIAL COMPLETION
AND TOTAL COMPLETION: ATTACHMENT B TO PART 3 [CERTIFICATION AND
COMPLETION] SAMPLE CONTENTS FOR A TECHNICAL APPRAISAL FORM**

- 3 -

Professional Registration Number:

Affix Professional Seal

Signed:.....

Project Co

Per: Project Co's Representative

Name:.....

Date:.....

11. THE ABOVE TAF IS:

- i. received*
 - ii. received with comments as follows:*
 - iii. returned marked "comments" as follows:*
- *delete as appropriate.

Signed:.....

Province's Representative

Name:

Date:.....

Part 3. Certification and Completion

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Article 4. Certification of Substantial Completion and Total Completion

4.1 Substantial Completion of the Project Work

4.1.1 Required Activities

- (a) The Project Work and activities referred to in Article 1.3(a)(i) [Satisfactory Completion of the Project Work] of this Part 3 are as follows:
- (i) the provision to TransLink, TSBC and the Province of such documentation, records, test results and other material related to the Design and Construction of the Project, to which there has been no objection in accordance with the Review Procedure or Consent Procedure as applicable, as are required to permit TransLink to make application for the issuance of the Operating Permit(s), or the modification of the existing Operating Permit, to allow Service Commencement;
 - (ii) the substantial completion of all Systems in accordance with the provisions of this Agreement and the delivery of a certificate of the Systems Engineer of Record in the form of Certificate Form 5S [Systems Engineer of Record Certificate], attached as Attachment A [Form of Certificates] to this Part 3, confirming such completion, to which there has been no objection in accordance with the Review Procedure, all in accordance with the provisions of this Agreement, including Section 1.18 [Systems Certification] of Appendix G to Schedule 4;
 - (iii) the issuance of the Occupancy Approval Certificates in respect of all Stations in accordance with Appendix E [Construction Approval Process] to Schedule 4;
 - (iv) the substantial completion of all Non-Systems Components in accordance with the provisions of this Agreement and the submission of the Design Certificates and the Construction Certificates in respect of the Non-Systems Components, to which there has been no objection in accordance with the Review Procedure, in accordance with Article 2.2.6 [Design Certification for Non-Systems Components] and Article 2.2.7 [Construction Certificates for Non-Systems Components], both of this Part 3;
 - (v) the provision of a code compliance report for all of the Guideway, sealed by a Professional Engineer with relevant knowledge and experience:
 - A. confirming that the completed Guideway is compliant with the relevant fire life safety codes and requirements set out in this agreement, including the TLBCC and NFPA 130, as may be amended by TLBCC;

**SCHEDULE 4 PART 3 ARTICLE 4: CERTIFICATION OF SUBSTANTIAL COMPLETION
AND TOTAL COMPLETION**

- 2 -

- B. details the scope and areas covered by the report, the conduct of field inspections to confirm compliance, the identification of any deficiencies identified, and resolutions of deficiencies, following a review of the completed Guideway;
 - (vi) written approvals from third parties, as applicable, as required by Article 4 [Existing Conditions] of Part 1 of Schedule 4;
 - (vii) the completion of all Utility Work in accordance with the provisions of this Agreement, including Article 4 [Existing Conditions], Part 1 of Schedule 4, and Article 8 [Utilities], Part 2 of Schedule 4;
 - (viii) written confirmation by the Emergency Response Agencies of the completion of the Broadway Subway orientation in accordance with Article 3.5.3 [Emergency Services Orientation] of this Part 3; and
 - (ix) the issuance of the certificate of completion by the Independent Engineer that the Project Work has been completed within the meaning of the *Builders Lien Act* (British Columbia).
- (b) Project Co shall, no less than 30 Business Days prior to the date upon which Project Co expects to achieve Substantial Completion, provide the Province with a detailed list of all documentation referred to in Article 4.1.1 (a) of Part 3 of Schedule 4. Project Co shall provide the documentation referred to in Article 4.1.1 (a) of Part 3 of Schedule 4 to the Province as it becomes available, and update the status of the list on a weekly basis. Project Co shall provide the Province with a complete index and compilation of all documentation referred to in Article 4.1.1 (a) of Part 3 of Schedule 4, in hard copy and electronic copy prior to and as a condition of Substantial Completion.

4.1.2 Certification of Substantial Completion

4.1.2.1 90 Business Days' Notice of Substantial Completion

- (a) Project Co shall, no less than 90 Business Days prior to the date upon which Project Co expects to achieve Substantial Completion, provide the Province's Representative with written notice of the expected Substantial Completion Date so as to provide TransLink with sufficient time to:
 - (i) plan and implement all required changes to the existing bus network; and
 - (ii) hire and train additional staff.
- (b) If Project Co has, at any time, reason to believe that such expected date for Substantial Completion will be delayed or achieved earlier by more than five Business Days than the date set out in a notice issued under Article 4.1.2.1(a) of this Part 3, it shall promptly issue a new written notice informing the Province's Representative of the new date expected for Substantial Completion.

**SCHEDULE 4 PART 3 ARTICLE 4: CERTIFICATION OF SUBSTANTIAL COMPLETION
AND TOTAL COMPLETION**

- 3 -

4.1.2.2 Deficiency Lists prior to Substantial Completion

- (a) Project Co shall:
- (i) no less than 60 Business Days prior to the date upon which Project Co expects to achieve Substantial Completion, prepare and submit to the Province's Representative and to the Independent Certifier for review, acting reasonably, in accordance with the Review Procedure, a preliminary list of any defects or deficiencies in the Project Work (the "**Preliminary Deficiency List**"), distinguishing in such list between (A) any defects or deficiencies in the Project Work that, in Project Co's opinion, will be required to be remedied as a condition of achieving Substantial Completion; and (B) any defects or deficiencies in the Project Work that, in Project Co's opinion, if not remedied by the relevant date, will not affect the achievement of Substantial Completion;
 - (ii) thereafter update the Preliminary Deficiency List by deleting any defects or deficiencies in the Project Work that are remedied by Project Co and by adding any defects or deficiencies in the Project Work that are newly noted; and
 - (iii) submit to the Province's Representative under the Review Procedure, and to the Independent Certifier an updated Preliminary Deficiency List at the beginning of each calendar month until Substantial Completion is achieved.

4.1.2.3 30 Business Days' Notice of Substantial Completion

- (a) Project Co shall issue to the Independent Certifier and the Province's Representative a written notice informing them at least 15 Business Days but no more than 30 Business Days prior to the date upon which Project Co expects to achieve Substantial Completion.
- (b) If Project Co has, at any time, reason to believe that such expected date for Substantial Completion will be delayed or achieved earlier by more than five Business Days than the date set out in a notice issued under Article 4.1.2.3(a) of this Part 3, it shall promptly issue a new written notice informing the Independent Certifier and the Province's Representative of the new date expected for Substantial Completion.

4.1.2.4 Final Deficiency List

- (a) At the same time that Project Co delivers a notice under Article 4.1.2.3(a) of this Part 3, Project Co shall submit to the Province's Representative and to the Independent Certifier, for review, acting reasonably, in accordance with the Review Procedure, an updated list of any defects or deficiencies in the Project Work (the "**Final Deficiency List**"), which list shall:

**SCHEDULE 4 PART 3 ARTICLE 4: CERTIFICATION OF SUBSTANTIAL COMPLETION
AND TOTAL COMPLETION**

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- (i) identify all outstanding defects or deficiencies in the Project Work that Project Co expects to remain outstanding as of Substantial Completion and required to be corrected by Project Co in order to achieve Total Completion;
- (ii) include Project Co's estimate of the cost to remedy each defect or deficiency (the amount of such costs being, if not objected to by the Province's Representative in accordance with the Review Procedure, or, if objected to, as agreed or determined in accordance with the Review Procedure or the Dispute Resolution Procedure, as the case may be, the "**Agreed Remedy Cost**"); and
- (iii) Project Co's proposed date for the remedy of each defect or deficiency, which date shall be no later than the Total Completion Target Date.

4.1.2.5 Inspection for Substantial Completion

- (a) Upon Project Co's issuance of a notice under Article 4.1.2.3 [30 Business Days' Notice of Substantial Completion] of this Part 3, and subject to the delivery to the Independent Certifier and the Province's Representative of all Construction Certificates in respect of substantial completion of the Non-Systems Components, the Occupancy Approval Certificates and the System Engineer of Record certification pursuant to Section 1.18 [Systems Certification] of Appendix G to Schedule 4, and all other relevant Certificates and supporting documentation in accordance with the Design and Construction Certification Procedures and the other provisions of this Agreement (where applicable, to which there has been no objection in accordance with the Review Procedure or Consent Procedure, as applicable), the Province's Representative and Project Co shall cause the Independent Certifier to commence, within ten Business Days after receipt of such notice, an inspection to determine:
 - (i) whether Substantial Completion has been achieved; and
 - (ii) whether the Final Deficiency List is correct.

4.1.2.6 Issuance of Certificate of Substantial Completion

- (a) The Province's Representative and Project Co shall cause the Independent Certifier, within 15 Business Days after the commencement of the inspection under Article 4.1.2.5 [Inspection for Substantial Completion] of this Part 3, to either:
 - (i) issue, subject to Article 4.1.2.6(c) of the Part 3 to the Province and Project Co:
 - A. the Certificate of Substantial Completion in the form of Certificate Form 5 [Certificate of Substantial Completion], attached at Attachment A [Form of Certificates] to this Part 3, which certificate shall append the Final Deficiency List signed by the Independent Certifier in accordance with Article 4.1.2.6(b)(i) of this Part 3; and

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- B. the Solemn Declaration/Certification of Substantial Completion in the form of Schedule D [Solemn Declaration/Certification of Substantial Completion] to the FCA; or
 - (ii) notify Project Co and the Province's Representative, of its decision not to issue both of the Certificate of Substantial Completion Solemn Declaration/Certification of Substantial Completion and state the reasons in detail for such decision, including what further work may be required to achieve Substantial Completion.
- (b) The Province's Representative and Project Co shall cause the Independent Certifier, within 15 Business Days after the commencement of the inspection under Article 4.1.2.5 [Inspection for Substantial Completion] of this Part 3, to either:
- (i) sign the Final Deficiency List to reflect the Independent Certifier's determination that the Final Deficiency List is correct; or
 - (ii) notify Project Co and the Province's Representative of its decision not to sign the Final Deficiency List and state the reasons in detail for such decision, including what further defects or deficiencies in the Project Work should be added to the Final Deficiency List.
- (c) If:
- (i) Project Co failed to comply with obligations in accordance with Article 14.2.9 [Coordination with TransLink, ProTrans and CFC], Part 2 of Schedule 4 with respect to the Compass Card and Faregates Work undertaken by TransLink and the CFC(s); and
 - (ii) the Compass Card and Faregates Work has not been completed on or before the date of the Substantial Completion in the Certificate of Substantial Completion contemplated in Article 4.1.2.6(a)(i) of this Part 3,

Project Co and the Province will cause the Independent Certifier to delay the issuance of a Certificate of Substantial Completion by the number of days equal to the number of days TransLink and the CFC were delayed in undertaking the Compass Card and Faregates Work as result of Project Co failing to comply with its obligations in accordance with Article 14.2.9 [Coordination with TransLink, ProTrans and CFC], Part 2 of Schedule 4.

4.1.2.7 Refusal to Issue Certificate of Substantial Completion or Sign Final Deficiency List

- (a) The Independent Certifier shall not issue the Certificate of Substantial Completion and the Solemn Declaration/Certification of Substantial Completion only if the Project Work is not Substantially Complete, or if any other requirements or conditions to the achievement of Substantial Completion under this Agreement have not been satisfied or complied with.

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- (b) The Independent Certifier shall not sign the Final Deficiency List only if the Independent Certifier does not agree that such list correctly sets out the defects or deficiencies in the Project Work as of Substantial Completion and that are required to be remedied in order to achieve Total Completion.

4.1.2.8 Completion of Further Project Work for Substantial Completion

- (a) In the event of service of a notice by the Independent Certifier under Article 4.1.2.6(a)(ii) or Article 4.1.2.6(b)(ii), both of this Part 3, Project Co shall issue to the Province's Representative and the Independent Certifier a written notice in not less than five Business Days but no more than ten Business Days prior to the date upon which Project Co expects to complete such further work or other measures necessary or appropriate to remedy or remove the cause of the Independent Certifier's refusal to issue both of the relevant Certificate of Substantial Completion Solemn Declaration/Certification of Substantial Completion or as the case may be, to sign the Final Deficiency List, in which case Project Co shall amend the Final Deficiency List to include:
 - (i) the further defects or deficiencies in the Project Work to be added to the Final Deficiency List;
 - (ii) Project Co's estimate of the cost to remedy each such further defect or deficiency (the amount of such costs being, if not objected to by the Province's Representative after review, acting reasonably, in accordance with the Review Procedure, or, if objected to, as agreed or determined in accordance with the Review Procedure or the Dispute Resolution Procedure, as the case may be, the Agreed Remedy Cost in respect of such defects or deficiencies); and
 - (iii) Project Co's proposed date for the remedy of each further defect or deficiency, which date shall be no later than the Total Completion Target Date.
- (b) Upon Project Co's written notification to the Independent Certifier and the Province's Representative that such further work or measures necessary or appropriate have been completed, subject to the delivery of any additional or amended documentation that is referred to in Article 4.1.2.5(a) of this Part 3 that is necessary to demonstrate the achievement of Substantial Completion or, as the case may be, the Final Deficiency List has been amended in accordance with Articles 4.1.2.8(a)(i) through (iii) of this Part 3, the Province's Representative and Project Co shall cause the Independent Certifier, if applicable, to commence, within 10 Business Days after receipt of such notice, an inspection of such further work or measures and to review the amended Final Deficiency List, and the provisions of Articles 4.1.2.4 [Final Deficiency List] through 4.1.2.8 [Completion of Further Work for Substantial Completion] inclusive, all of this Part 3, shall thereafter apply to such notice *mutatis mutandis*.

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4.1.2.9 Outstanding Project Work for Total Completion

- (a) The Province shall be entitled to hold back from the Substantial Completion Payment the amount permitted by Section 3.1 [Holdbacks for Final Deficiency List Deficiencies] of Schedule 10 on account of any defects or deficiencies in the Project Work as identified on the Final Deficiency List signed by the Independent Certifier pursuant to Article 4.1.2.6(b)(i) of this Part 3.
- (b) Notwithstanding the issuance of a Certificate of Substantial Completion and the Solemn Declaration/Certification of Substantial Completion in accordance with Article 4.1.2.6 [Issuance of Certificate of Substantial Completion] of this Part 3, Project Co shall promptly complete all outstanding defects or deficiencies as identified in the Final Deficiency List as soon as practicable and, in any event, no later than the Total Completion Target Date.

4.1.2.10 Submissions by Province's Representative regarding Substantial Completion or Final Deficiency List

- (a) The Province's Representative may, at any time following receipt of notice given by Project Co pursuant to Article 4.1.2.3 [30 Business Days' Notice of Substantial Completion] of this Part 3 and prior to the Independent Certifier issuing or notifying Project Co and the Province's Representative of its decision not to issue both of the Certificate of Substantial Completion and the Solemn Declaration/Certification of Substantial Completion and/or sign the Final Deficiency List, provide the Independent Certifier and Project Co with the Province's Representative's submissions as to whether the conditions for issuance of both of the Certificate of Substantial Completion and the Solemn Declaration/Certification of Substantial Completion have been satisfied and/or the Final Deficiency List is correct and, if applicable, any reasons as to why the Province's Representative considers that such Certificate of Substantial Completion and such Solemn Declaration/Certification of Substantial Completion should not be issued and/or the Final Deficiency List should not be signed by the Independent Certifier.
- (b) The Independent Certifier shall consider the Province's submissions pursuant to Article 4.1.2.10(a) of this Part 3 in determining whether to issue both of the Certificate of Substantial Completion and the Solemn Declaration/Certification of Substantial Completion or sign the Final Deficiency List.

4.2 Total Completion of the Project Work

4.2.1 Required Activities

- (a) The Project Work and activities referred to in Article 1.3(a)(ii) [Satisfactory Completion of the Project Work] of this Part 3 is the completion of the remedy of all Final Deficiency List Deficiencies.

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4.2.2 Remedy of Defects and Deficiencies in the Project Work

- (a) No later than three months after the Substantial Completion Date, Project Co shall submit to the Province's Representative for review, acting reasonably, in accordance with the Review Procedure, an updated Final Deficiency List, which list shall identify the Final Deficiency List Deficiencies remedied by Project Co in the period since the submission of the previous updated Final Deficiency List.
- (b) In undertaking its review of each updated Final Deficiency List, the Province's Representative shall confirm by way of his or her initials those Final Deficiency List Deficiencies that the Province's Representative considers to have been satisfactorily completed by Project Co in the period since the submission of the previous updated Final Deficiency List. For the purposes of this Article 4.2.2 [Remedy of Defects and Deficiencies in the Project Work], the 15 Business Day period referred to in Section 2.1(b) of Schedule 2 [Representatives, Review Procedure and Consent Procedure] shall be reduced to 10 Business Days.
- (c) In the event that Project Co fails to remedy any Final Deficiency List Deficiency by the Total Completion Target Date, the Province, in its discretion, may instead of permitting Project Co to remedy such deficiency, be entitled to irrevocably retain (or, if applicable, make a demand under any Deficiency Holdback Letter of Credit in) the amount equal to 200% of the Agreed Remedy Cost in respect of all such unremedied Final Deficiency List Deficiencies in accordance with Section 3.1 [Holdbacks for Final Deficiency List Deficiencies] of Schedule 10.

4.2.3 Certification of Total Completion

- (a) Project Co shall issue to the Province's Representative a written notice informing the Province's Representative at least five Business Days but no more than ten Business Days prior to the date upon which Project Co expects to achieve Total Completion.
- (b) Upon Project Co's issuance of a notice under Article 4.2.3(a) of this Part 3 and, subject to the delivery to the Province's Representative of the Construction Certificate for the total completion of the Non-Systems Components, the Province's Representative shall commence, within five Business Days of receipt of such notice, an inspection of the Project Work to determine whether Total Completion has been achieved.
- (c) The Province's Representative shall, within ten Business Days of the commencement of the inspection pursuant to Article 4.2.3(b) of this Part 3, either:
 - (i) issue the Certificate of Total Completion, in the form of Certificate Form 6 [Certificate of Total Completion], attached at Attachment A [Form of Certificates] to this Part 3, stating the Total Completion Date, to Project Co; or

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- (ii) notify Project Co of its decision not to issue the Certificate of Total Completion and state the reasons in detail for such decision, including the further work required in order to achieve Total Completion.
- (d) The Province's Representative may refuse to issue the Certificate of Total Completion only if the Project Work is not Totally Complete, or any other conditions or requirements under this Agreement to the achievement of Total Completion have not been satisfied or complied with in respect of the Project Infrastructure components to the extent that such infrastructure components have been constructed, installed, altered, upgraded and/or augmented by the carrying out of the Project Work.
- (e) In the event of service of a notice by the Province's Representative under Article 4.2.3(c)(ii) of this Part 3, Project Co shall issue to the Province's Representative a written notice not less than five Business Days, but no more than ten Business Days, prior to the date upon which Project Co expects to complete such further work or other measures necessary or appropriate to remedy or remove the cause of the Province's Representative's refusal to issue the Certificate of Total Completion.
- (f) Upon Project Co's notification to the Province's Representative that such further work or measures necessary or appropriate have been completed, in accordance with Article 4.2.3(e), and subject to the delivery of any additional or amended documentation that is referred to in Article 4.2.3(b) of this Part 3 that is necessary to demonstrate that Total Completion has been achieved, the Province's Representative shall commence, within five Business Days of receipt of such notice, an inspection of such further work or measures and the provisions of Articles 4.2.3(c) through 4.2.3(e), inclusive, all of this Part 3, shall thereafter apply to such notice *mutatis mutandis*.

4.3 Certification of Total Completion (Reinstatement Work)

- (a) In addition to the other provisions of this Part 3 other than Articles 4.1 [Substantial Completion of the Work] and 4.2 [Total Completion of the Work], both of this Part 3, this Article 4.3 [Certification of Total Completion (Reinstatement Work)] shall apply in respect of any Reinstatement Work carried out by Project Co pursuant to Part 6 [Insurance, Damage and Destruction] of this Agreement in accordance with a Reinstatement Plan.
- (b) Project Co shall issue to the Independent Certifier and the Province's Representative a notice informing them at least 15 Business Days, but no more than 30 Business Days, prior to the date upon which Project Co expects to totally complete all of the Reinstatement Work in a Reinstatement Plan.
- (c) Upon Project Co's issuance of a notice under Article 4.3(b) of this Part 3, and subject to the delivery to the Independent Certifier and the Province's Representative of all

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- Construction Certificates in respect of the totally completed Non-Systems Components subject to the Reinstatement Work, and all other relevant Certificates and supporting documentation in accordance with the Design and Construction Certification Procedures and the other provisions of this Agreement, the Province's Representative and Project Co shall cause the Independent Certifier to commence, within 10 Business Days of receipt of such notice, an inspection to determine whether the Reinstatement Work has been totally completed.
- (d) The Province's Representative and Project Co shall cause the Independent Certifier, within 25 Business Days following the commencement of the inspection under Article 4.3(c) of this Part 3, to either:
- (i) issue the Certificate of Total Completion (Reinstatement Work) to the Province and Project Co in the form of Certificate Form 8 [Certificate of Total Completion (Reinstatement Work)], attached at Attachment A [Form of Certificates] to this Part 3; or
 - (ii) notify Project Co and the Province's Representative, in writing, of its decision not to issue the Certificate of Total Completion (Reinstatement Work) and state the reasons in detail for such decision, including what further work may be required to totally complete the Reinstatement Work.
- (e) The Independent Certifier shall refuse to issue the Certificate of Total Completion (Reinstatement Work) only if the Reinstatement Work is not totally complete, or any other conditions or requirements under this Agreement regarding the Reinstatement Work have not been satisfied or complied with.
- (f) In the event the Independent Certifier serves the notice stipulated in Article 4.3(d)(ii) of this Part 3, Project Co shall issue to the Province's Representative and the Independent Certifier a written notice not less than five Business Days but no more than ten Business Days prior to the date upon which Project Co expects to complete such further work or other measures necessary or appropriate to remedy or remove the cause of the Independent Certifier's refusal to issue the relevant Certificate of Total Completion (Reinstatement Work).
- (g) Upon Project Co's notification to the Independent Certifier and the Province's Representative that such further work or measures necessary or appropriate have been completed, in accordance with Article 4.3(f), the Province's Representative and Project Co shall cause the Independent Certifier to commence, within 10 Business Days of receipt of such notice, an inspection of such further work or measures and the provisions of Articles 4.3(c) through 4.3(f) inclusive, all of this Part 3, shall thereafter apply to such notice *mutatis mutandis*.
- (h) The Province's Representative may, at any time following receipt of notice given by Project Co pursuant to Article 4.3(b) of this Part 3 and prior to the Independent Certifier issuing or notifying Project Co and the Province's Representative of its decision not to issue the Certificate of Total Completion (Reinstatement Work),

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provide the Independent Certifier and Project Co with the Province's Representative's submissions as to whether the conditions for issuance of the Certificate of Total Completion (Reinstatement Work) have been satisfied and, if applicable, any reasons as to why the Province's Representative considers that such Certificate of Total Completion (Reinstatement Work) should not be issued.

- (i) The Independent Certifier shall consider the Province's submissions pursuant to Article 4.3(h) of this Part 3 in determining whether to issue the Certificate of Total Completion (Reinstatement Work).

4.4 Effect of Issuance of Certificate

4.4.1 No Limitation regarding Issuance of Certificate

- (a) The issuance of the Certificate of Substantial Completion, the Solemn Declaration/Certification of Substantial Completion, the Certificate of Total Completion or a Certificate of Total Completion (Reinstatement Work), as applicable, shall be without prejudice to and shall not in any way limit the rights and obligations of the parties under and in accordance with this Agreement.

4.4.2 Disputed Certificate or Final Deficiency List

- (a) If there is any dispute between the parties as to the decision of the Independent Certifier:
 - (i) to issue or not to issue:
 - A. both the Certificate of Substantial Completion and the Solemn Declaration/Certification of Substantial Completion; or
 - B. a Certificate of Total Completion (Reinstatement Work); or
 - (ii) to sign or not sign the Final Deficiency List,in accordance with this Part 3, then either the Province's Representative or Project Co, as applicable, may refer such dispute for resolution under the Dispute Resolution Procedure.

4.4.3 Certificate Effective Pending Dispute

- (a) If the Independent Certifier has issued the Certificate of Substantial Completion, the Solemn Declaration/Certification of Substantial Completion or a Certificate of Total Completion (Reinstatement Work) or has signed the Final Deficiency List and the Province's Representative has referred a dispute in respect thereof for resolution under the Dispute Resolution Procedure pursuant to Article 4.4.2 [Disputed Certificate or Final Deficiency List] of this Part 3, then, for all purposes of this Agreement, the Certificate of Substantial Completion, the Solemn Declaration/Certification of Substantial Completion, a Certificate of Total Completion (Reinstatement Work) or the Final Deficiency List, as the case may be,

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shall be deemed not to have been issued or signed unless and until it is agreed by the parties or determined in accordance with the Dispute Resolution Procedure that the applicable certificate or declaration was properly issued or the Final Deficiency List was properly signed by the Independent Certifier in accordance with the terms of this Part 3 [Certification and Completion].

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Article 1. General Traffic Management Requirements

1.1 General

1.1.1 Scope

- (a) This Article 1 [General Traffic Management Requirements] of Part 4 specifies the requirements for Traffic Management and the development and implementation of the Master Traffic Management Plan as part of the Project Work.
- (b) In implementing its Traffic Management, Project Co may cause certain Traffic Disruptions set out in this Part 4 (including modifications, alterations, amendments, alternates, installations, temporary relocations, temporary closures, temporary realignment, temporary measures, alternate routes, or alternate measures to conditions existing as at the Effective Date), provided that such Traffic Disruptions:
 - (i) have been accepted by the Province's Representative in accordance with the Review Procedure or Consent Procedure, as applicable, under Article 2 [Permitted Traffic Disruptions] of this Part 4;
 - (ii) are not deemed non-permitted Traffic Disruptions under Article 3 [Non-Permitted Traffic Disruptions]; and
 - (iii) comply with the requirements set out in this Article 1, and this Part 4 generally.
- (c) Without limiting any other provision of this Agreement, Project Co shall carry out Traffic Management and the development and implementation of the Master Traffic Management Plan as part of the Project Work in accordance with this Part 4 [Traffic Management].
- (d) Project Co shall develop and implement Traffic Management in accordance with the following order of precedence:
 - (i) safety for all;
 - (ii) efficient movement of Emergency Response Vehicles;
 - (iii) efficient movement of Buses;
 - (iv) providing Access to Affected Local Businesses and Affected Property for all modes, including Trucks;

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- (v) efficient movement of Pedestrians;
 - (vi) efficient movement of Cyclists;
 - (vii) efficient movement of goods and commercial vehicles, including Trucks;
and
 - (viii) efficient movement of general public vehicles.
- (e) Project Co shall prepare and submit Traffic Management submissions to the Province's Representative as required in this Part 4 and these submissions shall be in accordance with the Review Procedure or the Consent Procedure as indicated in this Part 4. Where neither this Part 4 nor the Master Traffic Management Plan specifies whether a submission in this Part 4 is to be made under the Review Procedure or the Consent Procedure, such submission shall be submitted in accordance with the Review Procedure.
- (f) For Review Procedure submissions, Project Co shall not undertake any Construction activity that affects Traffic until at least 7 Business Days have elapsed since Project Co submitted the relevant Traffic Management submissions in accordance with this Part 4 of Schedule 4, including Traffic Control Plans, Traffic Advisory Sign Plans, Business Advisory Sign Plans and all supporting justification, Traffic Analysis, analysis and design, to the Province's Representative for review, in accordance with the Review Procedure. For the purposes of this Part 4, the 15 Business Day period referred to in Section 2.1(b) of Schedule 2 [Representatives, Review Procedure and Consent Procedure] shall be reduced to 7 Business Days, unless otherwise stated in this Part 4.
- (g) For Consent Procedure submissions, Project Co shall submit the relevant Traffic Management submissions in accordance with this Part 4 of Schedule 4, including Traffic Control Plans, Traffic Advisory Sign Plans, Business Advisory Sign Plans and all supporting justification, Traffic Analysis, analysis, design and evidence of consultation to the Province's Representative for review, in accordance with the Consent Procedure. For the purposes of this Part 4, the 20 Business Day period referred to in Section 2.2(b) of Schedule 2 [Representatives, Review Procedure and Consent Procedure] shall be reduced to 15 Business Days, unless otherwise stated in this Part 4.

1.1.2 Retaining Existing Geometry, Turning Movements and Traffic Capacities

- (a) Project Co shall retain the geometry, turning movements, Bus routes and Traffic capacities that exist as of the Effective Date at all times during Construction in respect of any part of the Traffic Site on all roads and at all intersections within

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such part of the Traffic Site except as otherwise provided for in this Part 4 [Traffic Management].

1.1.3 Maintenance of Municipal Road Infrastructure

- (a) Refer to Article 3 [Municipal Requirements] of Schedule 4, Part 1.

1.1.4 Variations to the Requirements

- (a) Project Co may request variations to the requirements of this Part 4 by submitting a request to the Province's Representative for acceptance in accordance with the Consent Procedure.
- (b) Project Co shall include in a request for a variation to the requirements of this Part 4 reasonable supporting documentation, including:
 - (i) traffic data;
 - (ii) analysis;
 - (iii) Traffic Analysis;
 - (iv) Traffic Control Plans;
 - (v) Traffic Advisory Sign Plans;
 - (vi) Business Advisory Sign Plans;
 - (vii) engineered design drawings;
 - (viii) the results of consultation with affected stakeholders, including the City of Vancouver, Emergency Response Agencies, TransLink, Bus Operators, Vancouver Coastal Health, Designated Traffic Stakeholders, Affected Local Businesses, Affected Property Owners and others, as required; and
 - (ix) in the event any of the foregoing documents listed in this Article 1.1.4(b) are not sufficient, any other documents that are requested by the Province's Representative.

1.1.5 Codes and Standards

- (a) Project Co shall ensure that Traffic Management relating to the Design and Construction of the Project and all plans and Sub-Plans required by this Article 1 conform to the requirements contained in this Part 4 and the current versions of the following:
 - (i) City of Vancouver Street and Traffic Bylaws, including Bylaw No. 2849;
 - (ii) City of Vancouver Engineering Design Manual;

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- (iii) City of Vancouver Transportation Design Guidelines: All Ages and Abilities Cycling Routes;
- (iv) TransLink Bus Infrastructure Design Guidelines;
- (v) BC Ministry of Transportation Traffic Management Manual;
- (vi) Highway Capacity Manual;
- (vii) Canadian Manual of Uniform Traffic Control Devices (MUTCD);
- (viii) Master Municipal Construction Documents (MMCD) Platinum Edition;
- (ix) City of Vancouver Standard Detail Drawings;
- (x) BC Ministry of Transportation Standard Specification for Highway Construction;
- (xi) BC Ministry of Transportation Design Build Standard Specifications;
- (xii) BC Ministry of Transportation Technical Circulars and Technical Bulletins;
- (xiii) BC Ministry of Transportation Manual of Standard Traffic Signs and Pavement Markings;
- (xiv) BC Supplement to TAC Geometric Design Guide;
- (xv) TAC Geometric Design Guide;
- (xvi) TAC Bikeway Traffic Control Guidelines;
- (xvii) National Association of City Transportation Officials Urban Bikeway Design Guide
- (xviii) NCHRP Report 350;
- (xix) BC Ministry of Transportation Guidelines for the Operation of Changeable Message Signs (CMSs) and Portable Changeable Message Signs (PCMSs);
- (xx) BC Ministry of Transportation Recognized Products List; and
- (xxi) City of Vancouver Construction Specifications.

1.2 Master Traffic Management Plan

1.2.1 Master Traffic Management Plan Requirements

- (a) The Project is a Category 3 Project as defined in the Traffic Management Manual.
- (b) Project Co shall prepare a Master Traffic Management Plan, which plan must be signed and sealed by the Traffic Engineer, in accordance with this Article 1

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[General Traffic Management Requirements] of Part 4, in respect of the Project Work and shall submit the Master Traffic Management Plan, including all Sub-Plans, supporting documentation and reports, to the Province's Representative for acceptance, in accordance with the Consent Procedure not later than 40 days after the Effective Date. For the purposes of this Article 1.2, the 20 Business Day period referred to in Section 2.2(b) of Schedule 2 [Representatives, Review Procedure and Consent Procedure] shall be increased to 30 Business Days.

- (c) Project Co shall prepare and submit the following as Sub-Plans to the Master Traffic Management Plan in accordance with the Traffic Management Manual where applicable and Article 1.3 [Master Traffic Management Sub-Plans] of this Part 4:
- (i) Master Traffic Control Plan;
 - (ii) Master Traffic Management Public Information Plan;
 - (iii) Master Incident Management Plan;
 - (iv) Master Implementation Plan;
 - (v) Master Bus Management Plan; and
 - (vi) Master Truck Management Plan.

(collectively, the "**Sub-Plans**") for all Construction activities that affect Traffic and Project Co shall include the Sub-Plans as part of the Master Traffic Management Plan.

- (d) Project Co shall perform an assessment to identify any risks or special conditions relating to Construction activities that affect Traffic that should be addressed through the Master Traffic Management Plan in accordance with the Traffic Management Manual.
- (e) As part of the Master Traffic Management Plan, Project Co shall describe in detail its approach to Traffic Management throughout the Traffic Site, including identifying all risks relating to Construction activities that affect Traffic and measures to be implemented to manage or eliminate such risks.
- (f) As part of the Master Traffic Management Plan, Project Co shall describe in detail its approach to performing Traffic Analysis in accordance with Article 4 of this Part 4 including the collection of additional Traffic data where required.
- (g) As part of the Master Traffic Management Plan, Project Co shall describe in detail the processes to ensure that Traffic Management Auditing is performed in accordance with Schedule 7 [Quality Management].

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- (h) As part of the Master Traffic Management Plan, Project Co shall describe in detail its approach to ensure that Access to Affected Local Businesses and Affected Property Owners will be retained during Construction.
- (i) As part of the Master Traffic Management Plan, Project Co shall describe in detail its understanding of the Traffic Management submission requirements in accordance with the Review Procedure and Consent Procedure, including the timelines for advance notification in accordance with Article 5 of this Part 4, and review times required by the Province's Representative.
- (j) As part of the Master Traffic Management Plan, Project Co shall describe in detail its approach to keeping accurate records documenting traffic control measures, activities, and Incidents in accordance with the Traffic Management Manual and this Part 4.
- (k) As part of the Master Traffic Management Plan, Project Co shall describe its approach to develop, implement and maintain a reporting system to inform and update the Province's Representative on Traffic Management matters as required by this Part 4.
- (l) As part of the Master Traffic Management Plan, Project Co shall provide samples of Daily Traffic Reports, Patrol Reports and Incident Reports as required by this Part 4.
- (m) Project Co shall ensure that the Master Traffic Management Plan references, interfaces and is coordinated with the Traffic Quality Management Plan, the Spill Prevention and Emergency Response Plan and the Railway Safety and Emergency Response Plan.
- (n) Project Co shall ensure that the Master Traffic Management Plan references interfaces and is coordinated with the requirements of Schedule 9 [Communications, Community Relations and Business Relations].
- (o) As part of the Master Traffic Management Plan, Project Co shall describe in detail how general Traffic, Buses, Emergency Response Vehicles, Pedestrians, Cyclists, Trucks and vehicular traffic generated by Construction activities will be managed.
- (p) As part of the Master Traffic Management Plan, Project Co shall reference, interface and coordinate with the Construction Environmental Management Plan and describe in detail how the following will be managed to reduce the environmental impacts associated with Project Co's construction vehicles and work activities:
 - (i) air quality, including dust;

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- (ii) noise and vibrations;
 - (iii) spills; and
 - (iv) light.
- (q) Project Co shall ensure that the Master Traffic Management Plan, the Sub-Plans, and all updates to the Master Traffic Management Plan and the Sub-Plans are consistent with, and comply with, all the requirements in this Part 4 [Traffic Management] and all other relevant provisions of this Agreement.
- (r) Project Co shall update the Master Traffic Management Plan at least annually by the anniversary of the Effective Date, and when making a material change to the Master Traffic Management Plan, and shall submit any and all changes to the Master Traffic Management Plan and the Sub-Plans to the Province's Representative for acceptance, under the Consent Procedure (and the review period set out in Section 2.2 of Schedule 2 [Representatives, Review Procedure and Consent Procedure]) will apply.

1.3 Master Traffic Management Sub-Plans

1.3.1 Master Traffic Control Plan

- (a) Project Co shall prepare a detailed Project-specific Master Traffic Control Plan in accordance with the requirements for a "Traffic Control Plan" as such term and requirements are referred to and set out in the Traffic Management Manual and other applicable codes and standards referred to in Article 1.1.5 [Codes and Standards] of this Part 4.
- (b) Project Co shall use the Master Traffic Control Plan to guide the development of Traffic Control Plans for the Project that are specific to individual sites and specific to the applicable Construction stages, in accordance with Article 1.4 [Traffic Control Plans] of this Part 4 with respect to all Construction activities that affect Traffic.
- (c) All Traffic Control Plans will be required to be submitted to the Province's Representative, under either the Review Procedure or Consent Procedure. Project Co shall ensure that the Master Traffic Control Plan shall define when and under what circumstances Traffic Control Plans are required to be submitted under the Review Procedure or Consent Procedure.
- (d) Project Co shall ensure that the Master Traffic Control Plan shall describe in detail what Project Co is required to submit to the Province's Representative as part of the site-specific Traffic Control Plan submissions.

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- (e) Project Co shall ensure that the Master Traffic Control Plan explicitly details how Project Co will manage parking for Project Co employees, contractors and suppliers in accordance with Article 1.24.2 of this Part 4.

1.3.2 Master Traffic Management Public Information Plan

- (a) Project Co shall prepare a detailed Master Traffic Management Public Information Plan in accordance with the requirements for a “Public Information Plan” (as such term and requirements are referred to and set out in the Traffic Management Manual), Schedule 9 [Communications, Community Relations and Business Relations] and this Part 4 Article 1 [General Traffic Management Requirements].
- (b) Project Co shall ensure that the Master Traffic Management Public Information Plan references and interfaces with Schedule 9 [Communications, Community Relations and Business Relations] including the requirements for Business Advisory Signs.
- (c) Project Co shall prepare and submit a proposed list of Traffic stakeholders, including BC Trucking Association, local business associations, cycling associations, BC Taxi Association, Port Metro Vancouver, school districts, and other groups that may have an interest in Traffic, to the Province’s Representative for review under the Review Procedure in advance of submitting the Master Traffic Management Public Information Plan. Once such list is endorsed “reviewed” under the Review procedure, the Traffic stakeholders on the list will be the Designated Traffic Stakeholders.
- (d) Project Co shall ensure that the Master Traffic Management Public Information Plan explicitly defines a process to routinely notify and inform the Province’s Representative, the City of Vancouver, TransLink, the Bus Operators, Emergency Response Agencies, Traffic Media, Designated Traffic Stakeholders, Affected Local Businesses, Vancouver Coastal Health, Affected Property Owners, and the general public, including Pedestrians and Cyclists, of any scheduled or unscheduled activities or Incidents affecting Traffic.
- (e) Project Co shall ensure that the Master Traffic Management Public Information Plan explicitly lays out a strategy to inform, consult and consider comments on proposed disruptions in accordance with Article 5 [Requirements to Inform of Traffic Disruptions] of this Part 4.
- (f) Project Co shall use the Master Traffic Management Public Information Plan to guide the development of Traffic Advisory Sign Plans for the Project that are specific to individual sites and the specific Construction stages that affect Traffic in accordance with Article 1.5 [Traffic Advisory Sign Plans] of this Part 4.

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- (g) Project Co shall ensure that the Master Traffic Management Public Information Plan explicitly defines a strategy for the placement and messaging of PDMSs and static Traffic Advisory Signs and Business Advisory Signs that are safe, visible and adhere with Project communications objectives in accordance with Schedule 9 [Communications, Community Relations and Business Relations].
- (h) Project Co shall ensure that the Master Traffic Management Public Information Plan includes a process whereby Project Co will schedule and record the locations, dates, times, and content of any Traffic Advisory Sign and Business Advisory Sign messages, as well as verify the validity of PDMS messages, on a routine basis.

1.3.3 Master Incident Management Plan

- (a) Project Co shall prepare a detailed Master Incident Management Plan that meets the requirements of Schedule 6 [Environmental Obligations] for spills and other environmental Incidents on the Project Site or a Traffic Site, and the requirements for “Incident Management Plans” as such term and requirements are referred to and set out in the Traffic Management Manual and this Part 4 [Traffic Management].
- (b) Project Co shall consult with its Communications Director, the City of Vancouver, TransLink, the Bus Operator, Emergency Response Agencies and Vancouver Coastal Health in developing the Master Incident Management Plan.
- (c) Project Co shall ensure that the Master Incident Management Plan explicitly:
 - (i) describes the process that Project Co will follow to consult with the Communications Director, the City of Vancouver, TransLink, the Bus Operator, Emergency Response Agencies and Vancouver Coastal Health and incorporate their requirements where applicable in the Sub-Plan;
 - (ii) specifies how Project Co will provide Access for Emergency Response Vehicles and provide assistance to Emergency Response Agencies within the Traffic Site;
 - (iii) specifies how Project Co will retain mobility for Buses including the process for keeping the Bus Operator informed of any impacts to Bus operations within the Traffic Site;
 - (iv) addresses access via the Traffic Site for Incidents or emergencies external to the Traffic Site but for which Emergency Response Agencies require passage through the Traffic Site;

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- (v) specifies how Project Co will ensure the safe and efficient Access for Emergency Response Agencies and the public at large to/from the Vancouver General Hospital;
- (vi) specifies how Project Co will respond when Incidents or Emergencies remote from the Traffic Site result in non-typical Traffic conditions within the Traffic Site;
- (vii) specifies how Project Co will accommodate the diversion of Traffic onto alternate routes in the event of Incidents or Emergencies;
- (viii) specifies how PDMSs provided as part of the Master Traffic Control Plan, the Master Traffic Management Public Information Plan and the Traffic Advisory Sign Plan, will be used to provide updated Incident information to the general public; and
- (ix) specifies the content of, the format and when Incident Reports will be generated and provided to the Province's Representative.

1.3.4 Master Implementation Plan

- (a) Project Co shall prepare a detailed Master Implementation Plan in accordance with the requirements for an "Implementation Plan", as such term and requirements are referred to and set out in the Traffic Management Manual and this Part 4 [Traffic Management].
- (b) Project Co shall ensure that the Master Implementation Plan explicitly:
 - (i) identifies each of the Traffic Control Supervisor, the Traffic Engineer, and the Traffic Manager along with the contact details, qualifications, experience and expected duties of those named individuals in accordance with Article 1.6 of this Part 4; and
 - (ii) defines processes to ensure that the Master Traffic Management Plan, including the Sub-Plans, is developed and implemented efficiently and appropriately and that it is kept up-to-date with required modifications during Construction activities.

1.3.5 Master Bus Management Plan

- (a) Project Co shall prepare a detailed Master Bus Management Plan that meets the requirements of Article 1.21 [Bus Management] and of this Part 4 [Traffic Management].
- (b) Project Co shall ensure that the Master Bus Management Plan explicitly:

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- (i) identifies all Bus routes to be accommodated in each stage of the Construction of the Project;
- (ii) demonstrates how Bus operations will be prioritized and what Bus priority measures will be implemented to reduce Bus Delays during each stage of Construction;
- (iii) identifies how and where Bus stops will be relocated to safely accommodate Bus passenger access and transfer movements between adjacent Bus routes and the Broadway-City Hall Canada Line Station as required during each stage of Construction;
- (iv) demonstrates how Pedestrian mobility and Bus passenger queuing requirements will be complied with at Bus stops and on sidewalks in the vicinity of Bus stops in accordance with Articles 1.19 [Pedestrian Management] and Article 1.21 [Bus Management] of this Part 4;
- (v) identifies how Pedestrian access to/from Bus and transit facilities will be retained during each stage of Construction;
- (vi) identifies the process and timelines that Project Co will follow in requesting and arranging any modifications to Bus routes, or Bus Facilities for each stage of Construction;
- (vii) recognizes and accommodates the timelines to inform in accordance with Article 5 of this Part 4; and
- (viii) Project Co shall ensure that the Master Bus Management Plan references and interfaces with Schedule 9 [Communications, Community Relations and Business Relations].

1.3.6 Master Truck Management Plan

- (a) Project Co shall prepare a detailed Master Truck Management Plan that meets the requirements of Article 1.22 [Truck Management] and this Part 4 [Traffic Management].
- (b) Project Co shall ensure that the Master Truck Management Plan describes in detail how Project Co's Trucks and Trucks in general will be managed during Construction including identifying:
 - (i) the classifications (as per TAC Geometric Design Guide) and numbers of Project Co Trucks that will be utilized at each work site within the Traffic Site;
 - (ii) the routes that Project Co Trucks will use to, from, within and outside the Traffic Site by time of day;
 - (iii) the entry and egress points from each work site within the Traffic Site;

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- (iv) the locations of Construction spoil sites and the routes to be followed by Trucks between the Traffic Site and the spoil sites;
 - (v) the locations and storage capabilities of Project Co Truck staging areas within and remote from the Traffic Site;
 - (vi) how Project Co Trucks will comply with applicable Laws, including City of Vancouver bylaws and Federal and Provincial laws and regulations relating to Trucks and trucking;
 - (vii) how oversize and overweight Trucks will be accommodated;
 - (viii) how designated Truck Routes will be retained;
 - (ix) how Trucks will be restricted to designated Truck Routes;
 - (x) how idling of Project Co Trucks will be minimized;
 - (xi) how noise from Project Co Trucks, including the use of back-up warning devices, will be mitigated or minimized, or what acceptable alternatives shall be provided;
 - (xii) how staging of Project Co Trucks will be contained within Truck staging areas to be provided by Project Co;
 - (xiii) how Project Co Trucks travelling past schools, playgrounds, daycares, public health facilities and other community areas frequented by children and the elderly will be minimized;
 - (xiv) how the number of Project Co Trucks travelling through residential areas will be minimized;
 - (xv) how the parking and stopping of Project Co Trucks in front of businesses will be minimized; and
 - (xvi) operational measures to minimize mud, gravel and other debris falling from Project Co Trucks and steps that will be taken to arrange clean up as required.
- (c) As part of the Master Truck Management Plan, Project Co shall develop a Truck Access and Truck routing plan to manage the movement and operations of Project Co Trucks within the Traffic Site during all stages of Construction, including the management of Pedestrians and Cyclists where they may interact with Project Co Trucks.
- (d) Project Co shall ensure that the Master Truck Management Plan references and interfaces with Schedule 9 [Communications, Community Relations and Business Relations] and how the management of Trucks will be communicated.

1.4 Traffic Control Plans

- (a) Project Co shall, in accordance with the Master Traffic Control Plan, prepare and implement Construction stage-specific Traffic Control Plan(s) for all Construction activities that affect Traffic within the Traffic Site.
- (b) Project Co shall submit Traffic Control Plans and the associated Traffic Advisory Sign Plans and Business Advisory Sign Plans developed in accordance with Schedule 9 [Communications, Community Relations and Business Relations] concurrently to the Province's Representative for any Construction activities that affect Traffic.
- (c) Project Co shall prepare detailed Traffic Control Plan(s) for all Construction activities that affect Traffic within the Traffic Site, including:
 - (i) any Construction activity that affects the Traffic patterns;
 - (ii) activation of newly constructed or realigned lanes, roads or intersections;
 - (iii) closure of lanes, roads or intersections;
 - (iv) modifications to existing Traffic Signals or new temporary Traffic Signals;
 - (v) modifications to On-Street Parking;
 - (vi) modifications to On-Street Loading;
 - (vii) modifications to Accesses;
 - (viii) modifications to Bus Facilities, and Bus routes;
 - (ix) modifications to Pedestrian Facilities or Cyclist Facilities;
 - (x) modifications to Truck Routes and Truck Staging Areas; and
 - (xi) lay-down areas.
- (d) Project Co shall be responsible for undertaking Traffic Analysis to evaluate the impacts of Traffic Management on Traffic Signals, and for developing Traffic Signal timings in accordance with the requirements of Article 4 of this Part 4. Project Co will include such Traffic Analysis and timing in its Traffic Control Plans.
- (e) Project Co shall continuously measure and improve the effectiveness of Traffic Control Plan(s) in accordance with the Traffic Quality Management Plan and in accordance with Schedule 7 [Quality Management] and, if a quality review indicates non-compliance with a Traffic Control Plan, Project Co shall immediately make corrections to comply with the Traffic Control Plan.

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- (f) Project Co shall ensure that each Traffic Control Plan includes a drawing that clearly delineates the boundaries of the Traffic Site.
- (g) Project Co shall ensure that where adjacent Traffic Sites or Traffic Control Plans overlap, Project Co complies with the specific requirements for each Traffic Site or Traffic Control Plan as specified in this Part 4.
- (h) Project Co shall ensure that detailed Traffic Control Plans include engineered design drawings for each Full Closure, Lane Shift and Lane Closure, and that such drawings indicate the locations and details of all Signs, PDMSs, Pavement Markings, Traffic Signals, Other Traffic Control Devices, Traffic Barriers, Traffic Control Persons, alternate routes, and protective works.
- (i) Project Co shall ensure that detailed Traffic Control Plans include drawings that indicate all changes to each Pedestrian Facility, Cyclist Facility, On-Street Parking, On-Street Loading, Bus Facility, Bus route and Access, and that such drawings indicate the locations and details of all Signs, PDMSs, Pavement Markings, Traffic Signals, Other Traffic Control Devices, Traffic Barriers, Traffic Control Persons, alternate routes and protective works.
- (j) Project Co shall ensure that:
 - (i) the Traffic Control Plans provide details of any adjustments to existing Traffic Signals and any new temporary Traffic Signal installations, including Traffic Signal Records, and are signed and sealed by the Traffic Engineer;
 - (ii) engineered electrical design drawings are prepared and submitted for any Traffic Signal or Illumination adjustments in accordance with the codes and standards set out in Article 1.1.5 [Codes and Standards] of this Part 4; and
 - (iii) all engineered electrical design drawings and specifications are signed and sealed by an electrical engineer that shall be registered as a Professional Engineer and shall have experience in Traffic Signal and Illumination design.
- (k) Without limiting Article 6 [Work by Others], Part 1 of Schedule 4, the Traffic Control Plans shall be coordinated with and take into account any construction work to be completed by others approved by the Province to work within the Traffic Site, or approved by the Province or a third party to work adjacent to the Traffic Site.
- (l) Project Co shall, in its Traffic Control Plans, take into account the locations of other Project Co work zones which are adjacent or in proximity to the areas which are the subject to such Traffic Control Plans.

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- (m) Project Co shall make adequate provision for all storage areas for equipment and materials required to perform the Project Work and access thereto in its development of Traffic Control Plans.
- (n) Project Co shall ensure that all detailed Traffic Control Plan(s) are signed and sealed by the Traffic Engineer.

1.5 Traffic Advisory Sign Plans

1.5.1 General

- (a) Project Co shall prepare and implement Traffic Advisory Sign Plans, as a sub-plan to the Master Traffic Management Public Information Plan, for each stage of Construction that affects Traffic in accordance with the Master Traffic Management Public Information Plan and the requirements of this Article 1 [General Traffic Management Requirements] of Part 4, Schedule 4 and Schedule 9 [Communications, Community Relations and Business Relations].
- (b) Project Co shall ensure that the Traffic Advisory Sign Plans are compatible with the Business Advisory Sign Plans that are to be developed in accordance with Schedule 9 [Communications, Community Relations and Business Relations].
- (c) Project Co shall submit Traffic Advisory Sign Plans and the associated Traffic Control Plans and Business Advisory Sign Plans concurrently to the Province's Representative for all stage-specific Construction activities that affect Traffic.
- (d) Project Co shall prepare Traffic Advisory Sign Plans for all Construction activities that affect Traffic within the Traffic Site, including:
 - (i) any Construction activity that affects the Traffic patterns;
 - (ii) activation of newly constructed or realigned lanes, roads or intersections;
 - (iii) any closure of lanes, roads or intersections;
 - (iv) any Stoppage that is longer than 10 minutes in duration;
 - (v) modifications to On-Street Parking.
 - (vi) modifications to On-Street Loading;
 - (vii) modifications to Accesses;
 - (viii) modifications to Bus Facilities, and Bus routes;
 - (ix) modifications to Pedestrian Facilities or Cyclist Facilities;
 - (x) modifications to Truck routes; and

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- (xi) modifications to Traffic turning movement restrictions at intersections.
- (e) Project Co shall ensure that Traffic Advisory Sign Plans lay out a strategy to effectively notify the general public in advance of scheduled or unscheduled Construction activities, Full Closures, Stoppages, Lane Closures, alternate routes, Incidents and any changes to Pedestrian, Cyclist, Bus, Access, On-Street Parking or On-Street Loading operations, including:
 - (i) the location of all Traffic Advisory Signs;
 - (ii) the types of Traffic Advisory Signs;
 - (iii) the dates and times that the Traffic Advisory Signs will be displayed; and
 - (iv) the messages on the Traffic Advisory Signs.
- (f) Project Co shall ensure that Traffic Advisory Sign Plans and Business Advisory Sign Plans do not contradict each other and that they provide complementary messaging.
- (g) The Traffic Advisory Sign Plans shall include a combination of static Traffic Advisory Signs and PDMSs, and shall not be combined with the Business Advisory Sign Plans.
- (h) The Traffic Advisory Signs shall not include business logos or any form of advertising.
- (i) Project Co shall ensure that each Traffic Advisory Sign Plan and Business Advisory Sign Plan is signed and sealed by the Traffic Engineer.

1.5.2 Portable Dynamic Message Signs (PDMSs)

- (a) Project Co shall provide, store and maintain five (5) fully functional PDMSs that shall be available on standby to be programmed and deployed by Project Co within or outside the Traffic Site in exceptional circumstances when directed by the Province's Representative in accordance with the following:
 - (i) the Province's Representative shall direct the messaging and locations of these PDMSs in consultation with the City of Vancouver; and
 - (ii) these PDMS(s) shall be deployed and operational within 60 minutes of Project Co being directed to deploy them.
- (b) In addition to the PDMSs referred to in Article 1.5.2(a), Project Co shall be responsible for providing and operating PDMSs to provide advance notification in accordance with the Master Traffic Management Public Information Plan, the Traffic Advisory Sign Plans, the Traffic Control Plans and the applicable codes,

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standards and guidelines listed in or required by Article 1.1.5 [Codes and Standards] of this Part 4.

- (c) Project Co shall place PDMSs, including flashers and other warning devices, at strategic upstream locations outside of the Traffic Site in order to effectively advance-warn drivers in accordance with Project Co's Traffic Advisory Sign Plans and allow them adequate opportunity to reroute to other collector and arterial roads prior to reaching the Traffic Site in advance of each Full Closure or Lane Closure.
- (d) Project Co shall place PDMSs, including flashers and other warning devices, at strategic locations within the Traffic Site in order to effectively advise drivers in accordance with Project Co's Traffic Advisory Sign Plans and allow them adequate opportunity to reroute to other collector and arterial roads in advance of each Full Closure, Lane Closure or Stoppage.
- (e) Project Co shall utilize PDMSs to provide effective notification of Incidents and unplanned traffic pattern changes, as required in accordance with the Master Incident Management Plan.
- (f) Project Co shall place PDMSs at strategic locations within and outside the Traffic Site to advise the public that Affected Local Businesses are open.
- (g) Project Co shall ensure that any messages displayed on PDMSs are current and applicable to prevailing conditions.
- (h) Project Co shall ensure that any PDMSs shall not impede the flow of Traffic, Pedestrians and Cyclists and shall not constitute a safety hazard.
- (i) Project Co shall ensure that, when in operation, the bottom of each PDMS shall be a minimum of 2m above the road surface and shall be level and capable of pivoting for visibility purposes.
- (j) Project Co shall use standard messages as provided in the BC Ministry of Transportation Guidelines for the Operation of Changeable Message Signs (CMSs) and Portable Changeable Message Signs (PCMSs), except Project Co may use other messages if the content of such messages is submitted to the Province's Representative for review and such content is approved by the Province's Representative, in accordance with the Review Procedure.
- (k) Project Co shall ensure that proposed PDMS locations and standard messages are included in the Master Traffic Management Public Information Plan, and details regarding PDMS actual locations and non-standard messages approved in accordance with Article 1.5.2(j) of this Part 4, are included in any Traffic

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Control Plan(s) and Traffic Advisory Sign Plan as required for each stage of Construction for submission to the Province's Representative.

1.6 Traffic Management Responsibilities

1.6.1 Project Co Responsibilities

- (a) Project Co shall be responsible for making and shall at all times during the Access Period, in respect of any part of the Traffic Site, make provision for Traffic to pass throughout such part of the Traffic Site in accordance with this Part 4 [Traffic Management], and ensure the safety and reasonable convenience of Traffic, the public and workers within the Traffic Site.
- (b) Project Co shall be responsible and shall at all times during the Access Period in respect of any part of the Traffic Site make provision for Emergency Response Vehicles to be given priority to pass through such part of the Traffic Site in accordance with this Part 4 [Traffic Management].
- (c) Without limiting Schedule 7 [Quality Management], Project Co shall be responsible for quality control and quality assurance of all activities governed by the Master Traffic Management Plan, including ongoing inspection and maintenance of all traffic control devices put in place during Construction.
- (d) Project Co shall ensure that the Traffic Quality Management Plan is compliant with Schedule 7 [Quality Management].
- (e) Project Co shall be responsible for keeping accurate and detailed records regarding Traffic Management measures and activities including the development, implementation and maintenance of a reporting system to inform and update the Province's Representative on Traffic Management matters including the following at a minimum:
 - (i) Incident Reports - to be submitted within 24 hours of each Incident;
 - (ii) Video Logs - to be available within 24 hours as required by Article 1.6.5 and 1.6.6 of this Part 4;
 - (iii) Daily Traffic Reports - to be submitted by 10:00 am every day for the previous day as required by Article 1.6.5 of this Part 4;
 - (iv) Patrol Reports - to be submitted by 10:00 am every day for the previous day as required by Article 1.6.6 of this Part 4.

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- (f) Project Co shall ensure that all personnel identified in the Master Traffic Management Plan are suitably qualified, experienced and licensed as specified in this Article 1.6, and that all Traffic Control Supervisors and Traffic Control Persons are qualified in accordance with the requirements of all applicable Laws, including the Workers Compensation Act.
- (g) Project Co shall be responsible for meeting the requirements of this Part 4 [Traffic Management] in any areas and spaces outside of the Traffic Site where Project Co places Project-related PDMSs or Traffic Advisory Signs.
- (h) Project Co shall be responsible for the Design, installation and maintenance of all Traffic Management measures including all Signs, Traffic Advisory Signs, Business Advisory Signs, PDMSs, Pavement Markings, Other Traffic Control Devices, Traffic Barriers, Traffic Control Persons, Traffic Signals and protective works. applicable
- (i) Project Co shall be responsible for coordinating with the City of Vancouver and the Bus Operator(s) for any adjustments to or installations of Bus Facilities, Signs, PDMSs, Pavement Markings, Other Traffic Control Devices, Traffic Barriers, Traffic Control Persons, Traffic Signals and protective works outside of a Traffic Site which might impact or contradict the application or operation of a Traffic Control Plan, or the safety requirements provided in the Traffic Control Plan, relevant to a particular Traffic Site. The City of Vancouver or the Bus Operator, as applicable, will perform the work described in this Article 1.6.1(i), and such work shall be paid for by Project Co.
- (j) Project Co shall be responsible for consulting with, and coordinating all work to be undertaken by, the City of Vancouver and the Bus Operator within the Traffic Site, including the procurement, supply and installation of equipment and materials, and the subsequent removal, in a timely manner that does not negatively impact Project Co's schedule.
- (k) Project Co shall be responsible for routine inspections and ongoing maintenance of all Project Co provided Signs, PDMSs, Traffic Advisory Signs, Business Advisory Signs, Pavement Markings, Traffic Barriers, Traffic Signals, Other Traffic Control Devices and protective works.

1.6.2 Traffic Manager

- (a) The Traffic Manager shall be a Key Individual and have sound knowledge of, and a minimum of 15 years' experience in, general Traffic Management procedures and processes in the Lower Mainland as well as specific experience in Traffic Management plan development and Traffic Management communications on major road transportation infrastructure projects.

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- (b) Until Substantial Completion, Project Co shall employ a full-time Traffic Manager whose duties shall be restricted solely to Traffic Management and shall not be combined with other Project functions.
- (c) The Traffic Manager shall be responsible for, but not limited to:
 - (i) liaising with the Province's Representative, as required;
 - (ii) providing notification and informing the Province's Representative, the City of Vancouver, TransLink, Bus Operators, Emergency Response Agencies, Vancouver Coastal Health, Traffic Media, Designated Traffic Stakeholders, Affected Property Owners, Affected Local Businesses, and the general public within the Site, including Pedestrians and Cyclists, of any planned or unplanned disruptions in accordance with Article 5 of this Part 4;
 - (iii) implementing and managing the Master Traffic Management Plan and Sub-Plans;
 - (iv) reviewing, submitting and receiving all Traffic Management submissions to/from the Province's Representative in accordance with the Review Procedure or Consent Procedure as required by this Part 4;
 - (v) ensuring the Traffic Quality Manager and Communications Director are kept informed of all upcoming traffic activities and any revisions to the Master Traffic Management Plan and Sub-Plans;
 - (vi) working with the Traffic Quality Manager and Communications Director, ensuring that appropriate modifications are made to the Master Traffic Management Plan and Sub-Plans if the specified traffic management measures are not achieving the desired effect;
 - (vii) without limiting Article 6 [Work By Others], Part 1 of Schedule 4, coordinating with adjacent work areas within the Traffic Site or outside of the Traffic Site, including cooperating with and facilitating work carried out by others;
 - (viii) documenting and reporting to the Province's Representative on traffic control measures, activities, and Incidents in accordance with the Master Traffic Management Plan;
 - (ix) participating and being an active member of the Fire and Life Safety Committee; and
 - (x) liaising with, and arranging, hosting, recording and distributing minutes (within 7 days) for biweekly traffic liaison meetings with affected stakeholders, including:
 - A. Province's Representative;

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- B. City of Vancouver;
- C. TransLink;
- D. Bus Operator;
- E. Communications Director;
- F. Emergency Response Agencies;
- G. Vancouver Coastal Health;
- H. Designated Traffic Stakeholders; and
- I. any other stakeholders as determined by the Province's Representative.

1.6.3 Traffic Engineer

- (a) The Traffic Engineer shall be a Key Individual, registered as a Professional Engineer, and shall have a minimum of 10 years' experience in general Traffic engineering as well as specific experience in Traffic Analysis, Traffic Signal operations, Bus Priority Measures, transit operations and Traffic Management Plan development. Until Substantial Completion, the Traffic Engineer shall, on behalf of Project Co, design, review, sign and seal the following as the Engineer of Record:
 - (i) Master Traffic Management Plan and associated Sub-Plans;
 - (ii) Traffic Control Plans;
 - (iii) Traffic Advisory Sign Plans;
 - (iv) Business Advisory Sign Plans;
 - (v) Traffic Analysis; and
 - (vi) Traffic Signal Records.
- (b) The Traffic Engineer shall be responsible for ensuring that all traffic engineering issues and requirements are addressed.
- (c) The Traffic Engineer will coordinate all aspects of Traffic Management with the Traffic Manager, the Traffic Quality Manager and the Communications Director to ensure that all aspects of the Master Traffic Management Plan and associated Sub-Plans are considered and implemented.
- (d) The Traffic Engineer will liaise with the Province's Representative, TransLink, the Bus Operator and other stakeholders as required.

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1.6.4 Traffic Quality Manager

- (a) The Traffic Quality Manager shall have sound knowledge and a minimum of five years' experience in general Traffic quality management procedures and processes in the Lower Mainland as well as specific experience in Traffic Management plans. The Traffic Quality Manager shall have expertise in a similar role on a similar successful project and shall have successfully completed an ISO9001 Lead Auditor course.
- (b) Until Substantial Completion, Project Co shall employ a Traffic Quality Manager who shall be responsible for, but not limited to:
 - (i) reporting to the Quality Director in accordance with Schedule 7 [Quality Management];
 - (ii) liaising with the Province's Representative, as required;
 - (iii) developing, implementing and managing the Traffic Quality Management Plan in accordance with Schedule 7 [Quality Management];
 - (iv) implementing the Master Traffic Management Plan and Sub-Plans in accordance with the Traffic Quality Management Plan; and
 - (v) undertaking Traffic Management Auditing and reporting in accordance with Schedule 7 [Quality Management];

1.6.5 Traffic Control Supervisors

- (a) Traffic Control Supervisors shall have sound knowledge and a minimum of five years' experience in general Traffic control procedures, standards and processes in the Lower Mainland as well as specific experience in Traffic Management plan implementation on large or similar projects.
- (b) Project Co shall designate one or more Traffic Control Supervisors, commensurate with active Construction activities as determined by Project Co, each of whom shall, on behalf of Project Co, 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 4 [Traffic Management].
- (c) Project Co shall not combine the duties of the Traffic Control Supervisor with other Project functions.
- (d) Project Co shall ensure that Traffic Control Supervisors:
 - (i) are on the Traffic Site at all times whenever active Construction is underway;

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- (ii) are available and can be on the Traffic Site within 60 minutes when active Construction is not underway;
 - (iii) have direct line authority over all of Project Co's Traffic Control Persons and activities related to Traffic on the Traffic Site; and
 - (iv) have no other duties except as provided in this Article 1.6.5 [Traffic Control Supervisors].
- (e) The duties of the Traffic Control Supervisors shall include the following:
- (i) implementing the requirements of the Traffic Control Plan(s) and Traffic Advisory Sign Plans;
 - (ii) supervising and managing all activities of all Traffic Control Persons on the Traffic Site;
 - (iii) prioritizing and ensuring the safe and efficient movement of all Traffic and in particular Buses and Emergency Response Vehicles through the Traffic Site;
 - (iv) directing all traffic control operations on the Traffic Site and, without limiting Article 6 [Work By Others], Part 1 of Schedule 4, coordinating with other contractors for any adjacent construction or maintenance operations in or outside of the Traffic Site;
 - (v) liaising with the Province's Representative, as required;
 - (vi) monitoring Traffic queue lengths in Active Construction Zones and implementing appropriate measures to reduce and manage queues or delays;
 - (vii) observing and recording Traffic and Bus operations as directed by the Traffic Manager;
 - (viii) recording and providing the actual duration and details of Planned Events, Lane Closures, Stoppages, Full Closures, Lane Shifts, Incidents, disruptions to Pedestrians, Cyclists, Buses, Access, Buses, On-Street Parking, and On-Street Loading, and unplanned events and activities that affect normal Traffic on a daily basis to the Province's Representative and the Communications Director;
 - (ix) recording and providing the actual duration and details of all PDMS and Traffic Advisory Sign messages on a daily basis to the Province's Representative and the Communications Director;
 - (x) completing and providing Daily Traffic Reports to the Province's Representative by 10:00 a.m. for the previous day, which includes information required by Articles 1.6.5(e)(vi) to 1.6.5(e)(ix) of this Part 4;

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- (xi) arranging and recording in-vehicle or dash-cam bi-directional Video Logs of the Traffic Site at a minimum of once during daylight hours and once during nighttime hours on each day during Construction and making the Video Logs available to the Province's Representative within 24 hours when requested. Each Video Log shall cover all Traffic Sites that are in effect on that day;
 - (xii) completing and providing Incident Reports to the Province's Representative within 24 hours of each Incident; and
 - (xiii) overseeing all requirements of the Agreement that contribute to the convenience, safety, and orderly movement of Traffic.
- (f) The Traffic Control Supervisor shall at all times have appropriate personnel and equipment available on call to perform Traffic Control for which he or she is responsible under this Article 1.6.5 [Traffic Control Supervisors].

1.6.6 Patrols

- (a) Notwithstanding Project Co's responsibilities to inspect and maintain all traffic control devices in place during Construction activities as required pursuant to Article 1.6.1 [Project Co Responsibilities] of this Part 4, Project Co shall ensure that at least one Traffic Control Person undertakes patrols of the Traffic Sites every eight hours during times when active Construction is not occurring in order to:
- (i) identify, respond to and report on any Incident encountered;
 - (ii) identify and rectify any failure of, deficiency of, or damage to Signs, PDMSs, Traffic Advisory Signs, Business Advisory Signs, Pavement Markings, Traffic Barriers, Traffic Signals, Other Traffic Control Devices and protective works; and
 - (iii) generally, deal with any other Construction-related Traffic issues identified during the patrol.
- (b) Project Co shall provide documentation in Patrol Reports, which will include photographs, to the Province's Representative confirming that the patrols are occurring as required by Article 1.6.6(a) of this Part 4 and providing details of all issues, activities and Incidents observed during such patrols. Patrol Reports shall be provided to the Province's Representative on a daily basis by 10:00 a.m. for the patrols occurring on the previous day.

1.7 Other Requirements

1.7.1 Traffic Management Auditing

- (a) Project Co shall be responsible for Traffic Management Auditing in accordance with Schedule 7 [Quality Management] and Schedule 10 [Payment Mechanism]. The Province's Representative may also undertake Traffic Management Auditing at its discretion in accordance with Schedule 7 [Quality Management].

1.7.2 Traffic Data

- (a) Traffic Data is provided in the Data Room.
- (b) Project Co shall be responsible for obtaining any data, in addition to the Traffic Data, that may be required by Project Co to perform its obligations under this Part 4 [Traffic Management] and Schedule 9 [Communications, Community Relations and Business Relations].
- (c) Project Co shall ensure that any data which is used in addition to the Traffic Data is current, appropriate and applicable for the purpose for which it is intended.

1.7.3 Province Adjustments to Traffic Requirements

- (a) The Province's Representative may adjust any of the requirements identified in this Part 4 [Traffic Management] in circumstances considered appropriate by the Province's Representative and may direct Project Co to remove, cease or adjust any or all Traffic Disruptions.
- (b) Upon receipt of a directive from the Province's Representative pursuant to Article 1.7.3(a) of this Part 4, Project Co shall:
 - (i) update the Traffic Control Plans, Traffic Advisory Sign Plans, and Business Advisory Sign Plans as required;
 - (ii) take all reasonable steps required to remove, cease or adjust any roadway Construction activities within the affected work zone within the Traffic Site as directed by the Province's Representative;
 - (iii) take all reasonable steps required to address any safety or Traffic issues as quickly as reasonably possible and within timelines prescribed by the Province's Representative; and
 - (iv) take all reasonable steps required to restore Traffic to regular flow conditions as quickly as reasonably possible and within timelines prescribed by the Province's Representative.

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- (c) Any adjustment to the requirements identified in this Part 4 [Traffic Management] by the Province's Representative, or direction by the Province's Representative pursuant to Article 1.7.3(a) of this Part 4 shall constitute a Compensation Event provided that the Traffic Disruption removed, ceased or adjusted under Article 1.7.3(a) of this Part 4 was approved under the Review Procedure or Consent Procedure in accordance with Schedule 4 Part 4 Article 2 [Permitted Traffic Disruptions].

1.7.4 Planned Events

- (a) Project Co shall plan for and accommodate the recurring Planned Events, as set out in Attachment B [Planned Events] to Article 1 of this Part 4, in the development and implementation of the Master Traffic Management Plan, Sub-Plans, and the Traffic Control Plans.
- (b) Project Co shall be responsible for confirming the actual dates, times and likely Traffic impacts of any new or recurring Planned Events with the City of Vancouver.
- (c) Project Co shall be responsible for informing the Province's Representative of upcoming Planned Events, at least 60 days in advance of each event.
- (d) The Province's Representative may direct Project Co, on at least 30 days' advance notice, to remove or cease any or all Traffic Disruptions for a period designated by the Province on the days of any Planned Event as set out in Attachment B [Planned Events] to Article 1 of this Part 4.
- (e) Project Co shall be responsible for informing the Province's Representative of any new upcoming events that are not Planned Events at least 60 days in advance of the events.
- (f) Project Co shall provide details regarding Planned Events and Project Co's approach to accommodate Planned Events in the Traffic Control Plans to be submitted to the Province's Representative for each stage of Construction.

1.7.5 Emergency Response Routes

- (a) Project Co shall either retain existing Emergency Response Routes and Disaster Response Routes within the Traffic Site or relocate the routes in the vicinity of such routes subject to the following:
 - (i) Project Co shall co-ordinate with the Communications Director;
 - (ii) Project Co shall consult with and obtain acceptance from relevant Emergency Response Agencies;

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- (iii) Project Co shall provide written confirmation of such acceptance to the Province's Representative; and
 - (iv) Project Co shall provide details regarding any modifications to Emergency or Disaster Response Routes in the Traffic Control Plans to be submitted to the Province's Representative.
- (b) Project Co shall be responsible for:
- (i) ensuring the safe and efficient movement of Emergency Response Vehicles within the Traffic Site generally, and more specifically to and from Vancouver General Hospital via Broadway, Oak Street and Laurel Street is required at all times;
 - (ii) prioritizing the movement of, and minimizing delays to, Emergency Response Vehicles, emergency personnel and emergency equipment at all times;
 - (iii) working with the Province's Representative and the Communications Director, developing and implementing plans to consult with the Emergency Response Agencies and Vancouver Coastal Health, prior to any impacts to Disaster Response Routes and Emergency Response Routes in accordance with Article 5 [Requirement to Inform of Traffic Disruptions] and Schedule 9 [Communications, Community Relations and Business Relations];
 - (iv) informing the Emergency Response Agencies and Vancouver Coastal Health of any actual or planned impacts to Emergency Response Routes or Disaster Response Routes in accordance with Article 5 [Requirement to Inform of Traffic Disruptions] and Schedule 9 [Communications, Community Relations and Business Relations]; and
 - (v) ensuring that Project Co staff and Traffic Control Persons in particular, assist drivers of general public vehicles carrying persons in need of medical assistance, where possible.

1.7.6 Notice of Traffic Disruptions

- (a) For each Traffic Disruption, Project Co shall provide advance notice in accordance with Article 5 [Requirement to Inform of Traffic Disruptions] of this Part 4 and Schedule 9 [Communications, Community Relations and Business Relations].

1.8 Traffic Control Devices

1.8.1 Modifications to Existing Traffic Signals

- (a) Project Co shall be responsible for the Design and implementation of all modifications to existing Traffic Signals to facilitate Construction within the Traffic Site.
- (b) Project Co shall Design all modifications to existing Traffic Signals including the design of Traffic Signal Timings in consultation with the City of Vancouver and shall submit final Designs to the Province's Representative as part of the Traffic Control Plan submissions.
- (c) Project Co shall coordinate with the City of Vancouver all components of Traffic Signal modifications that are the responsibility of the City of Vancouver in accordance with Attachment C [Traffic Signals and Street Lighting Scope Split] to this Article 1.
- (d) Project Co shall develop all proposals to modify existing Traffic Signals in accordance with the design guidelines, codes, standards and processes of the City of Vancouver, and with Article 1.1.5 [Codes and Standards] of this Part 4.
- (e) Project Co shall provide supporting Traffic Analysis for any proposed existing Traffic Signal modifications in accordance with Articles 2 and 4 of this Part 4.
- (f) Project Co shall be responsible for producing electrical design drawings in accordance with City of Vancouver standards for any proposed existing Traffic Signal modifications and ensuring that all drawings are signed and sealed by a suitably qualified and experienced Professional Engineer.
- (g) Project Co shall coordinate with the City of Vancouver to ensure the timely delivery, availability and implementation of all required Traffic Signal equipment including Traffic Signal controllers and cabinets.
- (h) Project Co shall be responsible for assessing the suitability of Traffic Signal phasing and timing at all intersections affected by Construction activities and, if Traffic Signal phasing or timing modifications are required for safety or operational reasons, Project Co shall be responsible for the Design and implementation of the modifications, including any Traffic Signal timing adjustments and optimization.
- (i) Project Co shall ensure that where left turn Traffic Signal phases are required, left turn vehicle detection is provided in accordance with City of Vancouver standards.

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- (j) Project Co shall ensure that existing Traffic Signal cycle lengths at all Traffic Signals as at the Effective Date shall be retained during Construction to facilitate Traffic Signal coordination.
- (k) Project Co shall be responsible for optimizing Traffic Signal timings at signalized intersections affected by Construction and ensuring that existing coordination with adjacent Traffic Signals is retained.
- (l) Project Co shall be responsible for the production of Traffic Signal Records that document any modifications to Traffic Signal timings in accordance with the City of Vancouver standards.
- (m) Project Co shall ensure that all Traffic Analysis and Traffic Signal Records are signed and sealed by the Traffic Engineer.
- (n) Project Co shall be responsible for confirming that any Traffic Signal modifications operate as intended by Project Co's Designs, are suitable for the prevailing Traffic patterns and flows, and shall arrange any adjustments that may be required.
- (o) Project Co shall include details of all modifications to existing Traffic Signals in the Traffic Control Plan(s) along with supporting design, Traffic Analysis and Traffic Signal Records and submit them to the Province's Representative.

1.8.2 Temporary Traffic Signals

- (a) Project Co shall be responsible for the Design and implementation of all new temporary Traffic Signals to facilitate Construction within the Traffic Site.
- (b) Project Co shall Design all new temporary Traffic Signals including the design of Traffic Signal Timings in consultation with the City of Vancouver and shall submit final Designs to the Province's Representative as part of the Traffic Control Plan submissions.
- (c) Project Co shall coordinate with the City of Vancouver all components of temporary Traffic Signal design and implementation that are the responsibility of the City of Vancouver in accordance with the Attachment C [Traffic Signals and Street Lighting Scope Split] to this Article 1.
- (d) Project Co shall develop all proposals for temporary Traffic Signals in accordance with the design guidelines, codes, standards and processes of the City of Vancouver, and with Article 1.1.5 [Codes and Standards] of this Part 4.
- (e) Project Co shall provide supporting Traffic Analysis for any proposed temporary Traffic Signal modifications in accordance with Articles 2, 3 and 4 of this Part 4.

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- (f) Project Co shall be responsible for producing electrical design drawings in accordance with City of Vancouver standards for any proposed temporary Traffic Signal modifications and ensuring that all drawings are signed and sealed by a suitably qualified and experienced Professional Engineer.
- (g) Without limiting any other provision of this Agreement, Project Co shall be responsible for all coordination with Utility Suppliers for all required servicing of temporary Traffic Signals and will provide a list of all electrical loads to the Utility Suppliers, as required.
- (h) Project Co shall coordinate preparation and submittal of service applications with the Province's Representative and provide notification to the City of Vancouver.
- (i) Project Co shall coordinate with the City of Vancouver to ensure the timely delivery, availability and implementation of all required Traffic Signal equipment including Traffic Signal controllers and cabinets.
- (j) Project Co shall be responsible for the Design of traffic signal timings at temporary Traffic Signals.
- (k) Project Co shall ensure that any temporary Traffic Signals are coordinated with adjacent existing or modified Traffic Signals utilizing common Traffic Signal cycle lengths.
- (l) Project Co shall be responsible for the production of Traffic Signal Records in accordance with the City of Vancouver standards.
- (m) Project Co shall ensure that all Traffic Signal Records are signed and sealed by the Traffic Engineer.
- (n) Project Co shall be responsible for confirming that any temporary Traffic Signals operate as intended by Project Co's Designs and are suitable for the prevailing Traffic patterns and flows and shall arrange any adjustments that may be required.
- (o) Project Co shall include details of temporary Traffic Signals in the Traffic Control Plan(s) along with supporting design, Traffic Analysis and Traffic Signal Records and submit them to the Province's Representative.
- (p) Project Co shall be responsible for the removal of any temporary Traffic Signals including all associated infrastructure, and the delivery of all removed traffic signal equipment to the City of Vancouver works yard. Project Co shall be responsible for the reinstatement of the road surface and sidewalks affected by the temporary traffic signal installation and removal.

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1.8.3 Signs

- (a) Project Co shall be responsible for the Design, supply, installation, relocation, maintenance, and removal of all Construction-related Signs within the Traffic Site and for the duration covered by the Traffic Control Plans, Traffic Advisory Sign Plans and Business Advisory Sign Plans, including regulatory, warning, guide, Traffic Advisory Signs and Business Advisory Signs.
- (b) Project Co shall be responsible for resolving any conflicts with City of Vancouver approved Signs to ensure that Construction-related Signs take priority.
- (c) Project Co shall ensure that all Construction-related Signs which are specific to any particular Construction activity or operation shall either be removed or be effectively covered so that their message is obscured whenever such Construction activity or operation is not in progress.
- (d) Project Co shall ensure that details regarding the location and type of each existing, relocated and proposed Sign shall be included in the Traffic Control Plans.

1.8.4 Pavement Markings

- (a) Project Co shall be responsible for the Design, supply, installation, maintenance and removal of all Pavement Markings and reflective devices within the Traffic Site and for the duration covered by the Project Co's Traffic Control Plans.
- (b) When traffic lanes are to be redefined for long-duration work (more than 72 hours), Project Co shall permanently eradicate all redundant temporary or permanent Pavement Markings that are not required for the intended traffic patterns and install revised markings and reflective devices in accordance with the Traffic Control Plan(s).
- (c) Removal of Pavement Markings and reflective devices by Project Co by grinding, milling or other means that could result in grooves in the pavement surface that may negatively impact drainage or Traffic safety or operations shall not be permitted.
- (d) Project Co shall ensure that any Pavement Markings and reflective devices that are applied to any Temporary Decking or other roadway or sidewalk surfaces shall safely fulfil their intended purpose.
- (e) Project Co shall ensure that details regarding the location and type of each existing, relocated and proposed Pavement Marking and reflective device shall be included in the Traffic Control Plans.

1.8.5 Other Traffic Control Devices

- (a) Project Co shall be responsible for the Design, supply, installation, maintenance and removal of all Other Traffic Control Devices within the Traffic Site and for the duration covered by the Project Co's Traffic Control Plans in accordance with the Project Co Traffic Control Plans.
- (b) Project Co shall ensure that details regarding the location and type of each existing, relocated and proposed Other Traffic Control Device shall be included in the Traffic Control Plans.

1.9 Traffic Barriers

- (a) Project Co shall supply, install and maintain Traffic Barriers in accordance with the Traffic Control Plans.
- (b) Project Co shall ensure that the Traffic Control Plans require that Traffic Barriers, which are appropriate or required in the circumstances, are installed on the Traffic Site to protect workers, the public, Traffic and the Construction Plant from adjacent Traffic hazards, including at a minimum:
 - (i) between Traffic and excavations/embankment construction;
 - (ii) between Traffic and pier construction;
 - (iii) to meet drop-off delineation requirements;
 - (iv) to control, direct and protect Traffic;
 - (v) to control, direct and protect Pedestrians and Cyclists; and
 - (vi) to protect Project Co equipment and personnel.
- (c) Project Co shall ensure that Traffic Barriers shall be continuous or adequately protected by terminals, flares, or impact attenuators in accordance with NCHRP Report 350.
- (d) Project Co shall ensure that Traffic Barriers shall have Signs and reflectors installed in accordance with the BC Ministry of Transportation Manual of Standard Traffic Signs and Pavement Markings.
- (e) Project Co shall ensure that adequate provision is made for effective drainage and removal of snow, ice, and debris along Traffic Barriers.
- (f) Project Co shall ensure that details of all Traffic Barriers are shown on the Traffic Control Plans.

1.10 Drop-Offs

1.10.1 Roadway Drop-Offs

- (a) Project Co shall perform the Construction to minimize any Roadway Drop-Offs left exposed to Traffic.
- (b) Unless otherwise specified in a Traffic Control Plan, Project Co shall ensure that Roadway Drop-Offs left exposed to Traffic as a result of Construction activities shall comply with the following:
 - (i) no drop-offs shall be permitted between adjacent lanes of Traffic;
 - (ii) drop-offs within the roadway or shoulder shall not cause or result in vehicles needing to reduce their operating speeds below the posted speed limit;
 - (iii) drop-offs within the roadway or shoulder greater than 50mm in height shall be delineated with appropriate traffic control devices and protected with:
 - A. a wedge of compacted stable material (meaning 25mm well graded base course aggregate or better) placed at a slope of 4:1 or flatter;
 - B. channelizing devices (meaning Type 1 barricades, plastic safety drums, or other devices 1m or more in height); or
 - C. temporary concrete Traffic Barriers, or another barrier acceptable to the Province's Representative; and
 - (iv) excavations within the road shall be backfilled and paved to match the adjacent roadway grade prior to returning the lanes to Traffic.
- (c) Project Co shall ensure that details of all Roadway Drop-Offs including Signs, Pavement Markings, Other Traffic Control Devices and protective works are included in the Traffic Control Plans.

1.10.2 Sidewalk Drop-Offs

- (a) Project Co shall perform the Construction to minimize any Sidewalk Drop-Offs left exposed to Traffic.
- (b) Unless otherwise specified in a Traffic Control Plan, Project Co shall ensure that Sidewalk Drop-Offs left exposed to Traffic as a result of Construction activities shall comply with the following:

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- (i) drop-offs up to 10mm in height will be permitted subject to the provision of appropriate traffic control devices alerting users of the condition;
 - (ii) drop-offs greater than 10mm but less than 50mm shall be delineated with appropriate traffic control devices and protected with a wedge of asphalt placed at a slope of 4:1 or flatter; and
 - (iii) any drop-off greater than 50mm shall be delineated with appropriate traffic control devices and protected with temporary fencing or barriers.
- (c) Project Co shall ensure that details of all Sidewalk Drop-Offs including Signs, Pavement Markings, Other Traffic Control Devices and protective works are included in the Traffic Control Plans.

1.11 Temporary Decking

- (a) Project Co shall ensure that any Temporary Decking required for Construction purposes that will be traversed by Traffic shall:
- (i) be designed by a Professional Engineer who shall sign and seal all associated drawings and documents;
 - (ii) perform its intended function in a safe manner without negatively impacting the safety, mobility and accessibility of Traffic;
 - (iii) not bend, flex or deform such that the safety, mobility and accessibility of Traffic is compromised;
 - (iv) be fixed in position such that there is no risk of it becoming dislodged;
 - (v) provide curb, railing or barrier separation between Pedestrians, Cyclists, and vehicular traffic, and delineation, including pickets or other delineation devices where required, between opposing traffic lanes;
 - (vi) have smooth and flush transitions between the Temporary Decking surface and the adjacent road or sidewalk surface in accordance with Article 1.10 of this Part 4;
 - (vii) be installed flush with the top of the wearing surface between adjacent spans or decks to provide a continuous running surface;
 - (viii) not have gaps exposed to Traffic with widths or spaces greater than 10mm;
 - (ix) not require vehicles to reduce speed to less than the posted speed limit to safely drive over it, subject to Article 1.17;

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- (x) provide a static coefficient of friction of not less than 0.5 as determined by ASTM D2047, F609 for all surfaces exposed to Traffic under all weather conditions;
 - (xi) have adequate slope and cross-fall to ensure draining and prevent water ponding or pooling at any point; and
 - (xii) be kept clean and free of lubricants or any other slippery agents which could cause a hazard to Traffic.
- (b) Prior to opening any Temporary Decking to Traffic, Project Co shall perform an initial inspection of the deck to confirm compliance with Article 1.11(a). After opening the Temporary Decking to Traffic, Project Co shall perform routine inspections of the Temporary Decking at 3-month intervals or less. Project Co shall provide copies of the inspection reports to the Province's Representative within 5 days of the reports being requested by the Province's Representative.
- (c) Project Co shall ensure that details of all Temporary Decking, including any associated protective works, design drawings, analysis, Signs, Pavement Markings, Other Traffic Control Devices and surface treatments are indicated on the Traffic Control Plans.

1.12 Illumination

- (a) Existing Illumination levels at all Traffic, Pedestrian, Cyclist and Bus Facilities within the Traffic Site as at the Effective Date are to be retained during Construction unless indicated otherwise in this Part 4.
- (b) Where Project Co proposes to undertake any Construction work that may affect Illumination levels lasting longer than 5 days at any existing Access, Traffic, Pedestrian, Cyclist or Bus Facilities, or proposes any new temporary Access, Traffic, Pedestrian, Cyclist or Bus Facilities requiring Illumination (which is permitted in accordance with Article 2 [Permitted Traffic Disruptions] of this Part 4), Project Co shall be responsible for:
- (i) designing, supplying, installing and maintaining new Illumination;
 - (ii) Designing all modifications to Illumination in consultation with the City of Vancouver and submitting final Designs that are acceptable to the City of Vancouver as part of the Traffic Control Plan submissions to the Province's Representative;
 - (iii) coordinating with the City of Vancouver all components of Illumination modifications that are the responsibility of the City of Vancouver in accordance with the Attachment C [Traffic Signals and Street Lighting Scope Split] to this Article 1;

- (iv) liaising and coordinating with BC Hydro, City of Vancouver, and the Bus Operator as required and obtaining all required approvals and permits for the associated work; and
 - (v) producing engineered Illumination electrical design drawings and associated Illumination analysis for each stage of Construction which shall be signed and sealed by a suitably qualified Professional Engineer.
- (c) Where Project Co proposes temporary short-term modifications to Illumination lasting less than 5 days, Project Co may be permitted to provide portable temporary lighting subject to Project Co demonstrating acceptable Illumination levels.
- (d) Project Co shall ensure that any modified or temporary Illumination does not negatively impact adjacent residences.
- (e) Project Co shall ensure that relevant Illumination electrical design drawings and associated analysis that have been previously accepted by the City of Vancouver, are signed and sealed by the Professional Engineer and are submitted to the Province’s Representative together with the associated Traffic Control Plans.

1.13 Lane Shifts and New Lanes

- (a) Project Co shall retain the number and alignment of all traffic lanes that existed as at the Effective Date during Construction, unless indicated otherwise in this Part 4, or as permitted by the Province pursuant to this Part 4.
- (b) Project Co shall Design, install and maintain roadway Lane Shifts and new lanes in accordance with this Agreement as required to facilitate Construction activities, and all such Lane Shifts and new lanes shall meet the requirements of Article 1.13 [Lane Shift Design Criteria] and this Part 4.
- (c) Project Co shall prepare a detailed engineered design for each Lane Shift or new lane that shall conform to the Design requirements prescribed in the following Table 1.13.1 [Minimum Lane Design Criteria]:

Table 1.13.1– Minimum Lane Design Criteria

Design Speed	Design speed of 50km/h unless reduced to 30km/h at specific locations in accordance with Article 1.17 of this Part 4
Design Vehicle	WB17, B12 or A-Bus as per City of Vancouver Design Criteria Manual

Vertical Clearance	The lesser of 5.0m or the existing vertical clearance above a travel lane
Lane Width (through or shared through/right or through/left turn lane adjacent to curb or barrier)	Minimum 3.2m (including gutter)
Lane Width (Bus Lane)	Minimum 3.2m (including gutter)
Lane Width (left turn, right turn, through, shared through/right, or shared through/left turn lane with no adjacent curb or barrier)	Minimum 2.9m
Lane Width (left or right turn lane adjacent to curb or barrier)	Minimum 2.9m (excluding gutter)
Lane Width at lane transitions or tapers	To accommodate design vehicle tracking requirements
Lane Width at lane shifts	To accommodate design vehicle tracking requirements and ensure that vehicles stay in their lane

- (d) Project Co shall ensure that all Lane Shifts and new lanes are paved and augmented with appropriate Pavement Markings, Signs, Other Traffic Control Devices and Traffic Signals.
- (e) Project Co shall ensure that the condition of the pavement used for all Lane Shifts and new lanes is adequate for its intended purpose and does not adversely impact the safety or intended function of such Lane Shifts.
- (f) Project Co shall provide Lane Shifts and new lanes with adequate drainage facilities to prevent pooling of water on and flow of water across the roadway.
- (g) Project Co shall schedule Construction activities such that no milled surface shall be open to Traffic for more than 5 days.
- (h) Project Co shall ensure that each milled surface open to Traffic shall be clean and allow adequate drainage.
- (i) Project Co shall ensure that details of all Lane Shifts and new lanes are included in the Traffic Control Plan(s).

1.14 Lane Closures

- (a) Project Co shall retain the minimum six lane cross section on Broadway between Station Traffic Sites, except at the Crossover Traffic Sites.

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- (b) Project Co shall ensure that all dedicated left turn and right turn lanes that exist on Broadway as at the Effective Date shall be retained unless indicated otherwise in this Part 4, or as is permitted by the Province pursuant to this Part 4.
- (c) Project Co shall ensure that the storage length of all temporary left turn and right turn lanes shall not be less than 30m.
- (d) Project Co shall ensure that the storage length of all left turn and right turn lanes that are reinstated as part of Construction shall not be less than the length existing as at the Effective Date.
- (e) Project Co shall ensure that the configuration of all lanes on streets that intersect with Broadway that exist as at the Effective Date shall be retained unless indicated otherwise in this Part 4, or as is permitted by the Province pursuant to this Part 4.
- (f) Project Co shall Design, install and maintain Lane Closures and associated Bus Lanes, lane tapers, merge areas, diverge areas, turn lanes, Signs, Pavement Markings, Traffic Signal modifications and other associated works to facilitate Construction activities in accordance with this Article 1.14 [Lane Closures] and this Part 4.
- (g) Project Co shall ensure that access to all service lanes for garbage collection, utility servicing, Emergency Response Vehicles, loading and Access to adjacent properties shall be available, or made available at all times, and shall be included as part of the Traffic Control Plans.
- (h) Project Co shall provide Traffic Control Persons, Traffic Signals or Bus Priority Measures to control Traffic at those locations where:
 - (i) single lane alternating traffic flow is implemented; or
 - (ii) Traffic, including Buses needs to be assisted through the Lane Closure area.
- (i) Project Co shall prepare a detailed engineered design for each Lane Closure.
- (j) Project Co shall ensure that details of all Lane Closures including detailed engineered design and appropriate Pavement Markings, Signs, Traffic Advisory Signs, Other Traffic Control Devices, Traffic Signals, Bus Priority Measures and protective works are included in the Traffic Control Plans.

1.15 Stoppages

- (a) Project Co shall ensure that Buses and Emergency Response Vehicles can travel through any Stoppage areas.
- (b) Project Co shall not implement a Stoppage that causes delays to Buses unless Project Co has consulted with, received responses from and made alternative arrangements in advance with the Bus Operator.
- (c) Project Co shall not implement a Stoppage that causes delays to Emergency Response Vehicles unless Project Co has consulted with, received responses from and made alternative arrangements in advance with the Emergency Response Agencies.
- (d) Project Co shall restrict Stoppages on Major Roads and Other Roads to the maximum durations by time of day as indicated in Table 1.15 below:

Table 1.15 - Maximum Durations of Stoppages

Road Classification	Time of Day						
	7:00-10:00	10:00-15:00	15:00-19:00	19:00-21:00	21:00-23:00	23:00-05:00	05:00-07:00
Major Road	No Stoppages	No Stoppages	No Stoppages	30 seconds	2 minutes	10 minutes	2 minutes
Other Road	30 second	2 minutes	30 second	2 minutes	5 minutes	20 minutes	2 minutes

- (e) Project Co shall fully remove any and all 23:00 to 05:00 Stoppages by 05:00.
- (f) Project Co shall provide Traffic Control Persons, Signs and Pavement Markings at each Stoppage location.
- (g) After a Stoppage has been implemented and removed, Project Co shall ensure that all queues resulting from the Stoppage are cleared before implementing another Stoppage at the same location.
- (h) Any Stoppage in excess of 20 minutes duration shall be considered a Lane Closure or Full Closure for the purposes of this Part 4.
- (i) Project Co shall only be allowed to implement Stoppages for the time needed to facilitate Construction and Stoppages shall be removed when no longer required.
- (j) Project Co shall ensure that details of all Stoppages including appropriate Pavement Markings, Signs, Traffic Advisory Signs, Other Traffic Control Devices, Traffic Signals, Traffic Control Persons and evidence of consultation and

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responses from the Bus Operator and Emergency Response Agencies are included in the Traffic Control Plans.

1.16 Full Closures

- (a) Full Closures shall not be permitted anywhere within the Traffic Site except as indicated otherwise in this Part 4, or as otherwise permitted by the Province in accordance with this Part 4.

1.17 Speed Limits

- (a) Project Co shall ensure that the existing posted speed limits as at the Effective Date are retained unless indicated otherwise in this Part 4.
- (b) Where Project Co wishes to adjust posted speed limits to facilitate Construction, Project Co shall ensure that:
 - (i) speed limits are adjusted in accordance with applicable Laws;
 - (ii) speed limits shall not be less than 30 km/h;
 - (iii) The length and duration of amended speed limit zones shall be minimized and localized;
 - (iv) Project Co consults with and submits written evidence of consultation with and responses from the Communications Director, the City of Vancouver and the Bus Operator; and
 - (v) Project Co shall undertake Traffic Analysis in accordance with Article 4 of this Part 4 to optimize Traffic Signal offsets.
- (c) Project Co shall include details of any changes in posted speed limits including Traffic Analysis in the Traffic Control Plan(s) submitted to the Province's Representative for each stage of Construction, along with evidence of consultation.

1.18 Alternate Routes

- (a) Project Co shall cooperate with the Province's Representative and the City of Vancouver in identifying any strategies or improvements that may be needed to accommodate Traffic that may detour from the Traffic Site onto alternate routes outside the Traffic Site during Construction.

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- (b) Where the Province's Representative has approved traffic detours or alternate routes in accordance with Article 2.4.1(e)(v) of this Part 4:
 - (i) Project Co shall be responsible for the Design, supply, installation and maintenance of any Signs, Pavement Markings, Other Traffic Control Devices, Traffic Advisory Signs, and Traffic Signals within the Traffic Site that may be needed to accommodate Traffic that detours within the Traffic Site and Traffic that detours from the Traffic Site onto alternate routes during Construction;
 - (ii) Project Co shall be responsible for the Design, supply, installation and maintenance of any Traffic Advisory Signs outside of the Traffic Site that may be needed to advise Traffic that that may need to detour within the Traffic Site or away from the Traffic Site onto alternate routes during Construction; and
 - (iii) Project Co shall be responsible for the Design, supply, installation and maintenance of any Traffic Advisory Signs and Business Advisory Signs that may be needed to advise Traffic that needs to detour to alternate routes due to Full Closures or service lane closures.
- (c) Project Co shall ensure that details of all Signs, Pavement Markings, Other Traffic Control Devices, Traffic Advisory Signs, Business Advisory Signs and PDMSs relating to alternate routes are included in the Traffic Control Plans for submission to the Province's Representative.

1.19 Pedestrian Management

- (a) Project Co shall ensure that access to each Pedestrian Facility within any part of the Traffic Site which is in existence prior to the commencement of Construction activities by Project Co shall be retained, except as permitted under Article 2 [Permitted Traffic Disruptions] of this Part 4, and provided that all Pedestrian Facilities will meet the requirements set out in this Part 4.
- (b) Project Co shall ensure that all Pedestrian Facilities operate in a safe, accessible and efficient manner during any Construction activities.
- (c) Project Co shall be responsible for the Design, installation and maintenance of any Pedestrian Facility that may need temporary relocation, as permitted in accordance with Article 2 [Permitted Traffic Disruptions] of this Part 4, onto alternate facilities during Construction, within or outside of the Traffic Site.
- (d) Project Co shall Design, install and maintain Pedestrian Facilities in accordance with this Agreement as required to facilitate Construction activities and all such

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Pedestrian Facilities shall meet the requirements of Article 1.19 [Pedestrian Management] and this Part 4.

- (e) Project Co shall ensure that the duration of any disruptions to Pedestrian Facilities shall be minimized as far as practically possible.
- (f) Project Co shall ensure that accessible Pedestrian Access to Affected Local Businesses is required at all times that the respective Affected Local Businesses are operational, unless otherwise approved by the Province's Representative in accordance with Article 2.4.1(e)(v) of this Part 4.
- (g) Project Co shall ensure that all Pedestrian Facilities can safely and efficiently accommodate persons with disabilities.
- (h) Project Co shall ensure that all Pedestrian Facilities are suitably surfaced and maintained to prevent slipping or skidding, and are kept clear of debris, gravel, mud, excessive water, ice and snow at all times.
- (i) Project Co shall provide Traffic Control Persons along any Pedestrian Facility where Construction activities negatively affect the safety or operations of the Pedestrian Facility, compared to conditions in existence as at the Effective Date, including locations with increased traffic, reduced facility widths, conflict points, and reduced sight lines.
- (j) Project Co shall ensure that Pedestrian Access to Accesses existing as at the Effective Date remain accessible throughout Construction, unless otherwise permitted by the Province's Representative in accordance with Article 2.4.1(e)(v) of this Part 4.
- (k) Project Co shall ensure that Project Co's equipment, vehicles, materials and protective works do not obstruct or negatively impact the safety or mobility of Pedestrians.
- (l) Project Co shall ensure that Project Co's equipment, vehicles, materials and protective works do not restrict sight lines of and for Pedestrians.
- (m) Project Co shall Design, supply, install and maintain all Signs, Pavement Markings, Other Traffic Control Devices, Traffic Signals and protective works on alternate routes related to Pedestrian Facilities.
- (n) Project Co shall provide and maintain Traffic Advisory Signs and Business Advisory Signs indicating all Pedestrian alternate routes that may be needed during Construction activities.

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- (o) Project Co shall include details of all Pedestrian Facilities, including associated design drawings, Signs, Pavement Markings, Other Traffic Control Devices, Traffic Signals, Traffic Advisory Signs, Traffic Control Personnel, Pedestrian and Cyclist alternate routes and protective works in the Traffic Control Plans.

1.19.1 Sidewalk Requirements

- (a) Project Co shall retain Clear Sidewalk Widths and street level Pedestrian storage areas existing as at the Effective Date at the accesses to the Broadway-City Hall Canada Line Station during Construction.
- (b) Project Co shall ensure that the Clear Sidewalk Widths between adjacent intersection crosswalks existing as at the Effective Date shall be retained during Construction unless indicated otherwise in this Part 4, or as otherwise permitted by the Province in accordance with this Part 4.
- (c) Project Co shall ensure that the Clear Sidewalk Width on the north side of Broadway between Quebec Street and Main Street shall not be reduced.
- (d) Where the Province's Representative has approved sidewalk closures in accordance with Article 2 of this Part 4, Project Co shall ensure, where sidewalks are closed or Pedestrians need to reroute, that direct, intuitive and signed alternate Pedestrian routes are provided and maintained by Project Co.
- (e) Project Co shall ensure that Pedestrians are capable of being accommodated on clear sidewalks without needing to walk in the road or through Bus passenger queue areas.
- (f) Project Co shall ensure that Bus passengers waiting at Bus stops do not impede Pedestrians on sidewalks.
- (g) Project Co shall provide Traffic Control Personnel where needed to control and guide Bus passengers and Pedestrians on sidewalks and at Bus stops.

1.19.2 Intersection Requirements

- (a) Project Co shall ensure that Pedestrian Facilities at intersections existing as at the Effective Date shall be retained during Construction, unless otherwise permitted in accordance with this Part 4.
- (b) Project Co shall design and implement Pedestrian storage areas to ensure that Pedestrians are capable of being accommodated at intersections without needing to wait or walk in the road or delay other Pedestrians on adjacent sidewalks.

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- (c) Project Co shall ensure that the Pedestrian Facilities for crossing across all legs of the Broadway/Cambie Street and Broadway/Granville Street intersections, existing as at the Effective Date, are maintained at all times throughout the Project. Closure of crosswalks at the Broadway/Cambie Street and Broadway/Granville Street intersections is not permitted in accordance with Article 3.3.2(b) of this Part 4.
- (d) Where the closure of a crosswalk at a signalized intersection (other than at Broadway/Cambie Street and Broadway/Granville Street) has been approved in accordance with Article 2 [Permitted Traffic Disruptions] of this Part 4, Project Co shall ensure that:
 - (i) Pedestrians shall be able to cross to and from all corners, either directly across one intersection leg or indirectly across multiple legs of the intersection unless indicated otherwise in this Part 4;
 - (ii) crosswalk widths are adequate to accommodate the volume of crossing Pedestrians without requiring Pedestrians to encroach outside of the crosswalk limits;
 - (iii) direct, intuitive and signed alternate Pedestrian routes shall be designed, installed and maintained; and
 - (iv) Pedestrians can access Bus stops in a safe, direct and intuitive way.
- (e) Project Co shall ensure that crosswalk widths are clearly demarcated with Pavement Markings.
- (f) Project Co shall provide Traffic Control Personnel where needed to control and guide Pedestrians at intersections.

1.20 Cyclist Management

- (a) Project Co shall ensure that access to each Cyclist Facility within any part of the Traffic Site which is in existence prior to the commencement of Construction activities by Project Co shall be retained, unless indicated otherwise in this Part 4, or permitted by the Province in accordance with this Part 4.
- (b) Project Co shall ensure that all Cyclist Facilities operate in a safe, direct and efficient manner during any Construction activities.
- (c) Project Co shall be responsible for the Design, installation and maintenance of any Cyclist Facility that may need temporary relocation, as permitted in accordance with Article 2 [Permitted Traffic Disruptions] of this Part 4, onto alternate Cyclist Facilities during Construction, within or outside the Traffic Site.

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- (d) Project Co shall Design, install and maintain Cyclist Facilities in accordance with this Agreement as required to facilitate Construction activities and all such Cyclist Facilities shall meet the requirements of Article 1.20 [Cyclist Management] and this Part 4.
- (e) Project Co shall ensure that the duration of any disruption to a Cyclist Facility shall be minimized as far as practically possible.
- (f) Project Co shall ensure that all Cyclist Facilities are suitably surfaced and maintained to prevent slipping or skidding, and are kept clear of debris, gravel, mud, excessive water, ice and snow at all times.
- (g) Project Co shall ensure that all alternate Cyclist Facilities, including alternate routes, are direct, intuitive, and provided with Signs, Traffic Advisory Signs and Pavement Markings.
- (h) Project Co shall provide Traffic Control Persons along any Cyclist Facility where Construction activities negatively affect the safety or operations of the Cyclist Facility, compared to conditions in existence as at the Effective Date, including locations with increased traffic on or crossing Cyclist routes, reduced facility widths, conflict points, and reduced sight lines.
- (i) Project Co shall retain Cyclist passage and access to existing City of Vancouver designated Cyclist Routes within the Broadway Traffic Site on Main Street, Ontario Street, Yukon Street, Heather Street, and Cypress Street including their connections at Broadway, as well as on 10th Avenue and 7th Avenue (which has sections on 5th, 6th and 8th Avenues), and such routes shall continue to operate with the same or better level of comfort and protection as at the Effective Date.
- (j) Project Co shall prohibit Cyclists from riding east/west on the road adjacent to active Station Traffic Sites and Crossover Traffic Sites on Broadway and shall design and provide alternate Cyclist Facilities which shall be designated with Signs, Pavement Markings and Traffic Advisory Signs.
- (k) Project Co shall ensure that Cyclists are not directed or encouraged to travel along sidewalks, unless appropriate Signs, Pavement Markings, Other Traffic Control Devices or protective works are provided to separate Cyclists and Pedestrians, or Signs are displayed requiring Cyclists to dismount and walk with their cycles.
- (l) Project Co shall ensure that Access to all property entrances and doorways by Cyclists existing as at the Effective Date is maintained, unless otherwise permitted in accordance with Article 2 [Permitted Traffic Disruptions] of this Part 4.

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- (m) Project Co shall ensure that where Cyclist parking is removed, as permitted in accordance with Article 2 [Permitted Traffic Disruptions] of this Part 4, to facilitate Construction, that alternative Cyclist parking including bike racks is provided within 100m of the original location.
- (n) Project Co shall ensure that Cyclists can safely cross or enter Broadway at all signalized intersections within a Traffic Site.
- (o) Project Co shall ensure that Project Co's equipment, vehicles, materials and protective works do not obstruct or negatively impact the safety of Cyclists.
- (p) Project Co shall ensure that Project Co's equipment, vehicles, materials and protective works do not restrict sight lines of and for Cyclists.
- (q) Project Co shall Design, supply, install and maintain all Signs, Pavement Markings, Other Traffic Control Devices, Traffic Signals, Traffic Advisory Signs and protective works on alternate routes related to Cyclist Facilities.
- (r) Project Co shall provide and maintain Traffic Advisory Signs and Business Advisory Signs indicating all Cyclist alternate routes that may be needed during Construction activities.
- (s) Project Co shall include details of all Cyclist Facilities, including associated design drawings, Signs, Pavement Markings, Other Traffic Control Devices, Traffic Signals, Traffic Advisory Signs, Traffic Control Personnel, Pedestrian and Cyclist alternate routes and protective works in the Traffic Control Plans.

1.20.2 Arbutus and Central Valley Greenways

- (a) Project Co shall ensure that the alignment, function and performance of the Arbutus Greenway and Central Valley Greenway that exist as at the Effective Date shall be retained except as indicated in this Article 1.20.2.
- (b) Where the Province's Representative has permitted the realignment of the Arbutus Greenway or the Central Valley Greenway in accordance with Article 2.4 [Permitted Traffic Disruptions – Consent Procedure] of this Part 4:
 - (i) Project Co shall be responsible for the Design and Construction of the realigned sections of the Arbutus Greenway and Central Valley Greenway in accordance with Attachment D [Arbutus Greenway and Central Valley Greenway Detour Routes] of this Part 4, and Article 9 [Roads] of Schedule 4 Part 2; and
 - (ii) Project Co shall ensure that the relocated sections of the Arbutus Greenway and Central Valley Greenway as per Article 1.20.2(b)(i) shall be

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designed and constructed in accordance with the City of Vancouver Transportation Design Guidelines: All Ages and Abilities Cycling Routes.

- (c) Project Co shall include details of all Arbutus Greenway and Central Valley Greenway routes, including associated design drawings, Signs, Pavement Markings, Traffic Signal modifications, Traffic Advisory Signs, Traffic Control Personnel and protective works in the Traffic Control Plans.

1.21 Bus Management

1.21.1 Interpretation

- (a) The requirements and criteria set out in this Article 1.21 of this Part 4 apply to Bus routes, stops, operations, scheduling and Bus Facilities within the Traffic Site and are in addition to the requirements and criteria for Project Work conducted in and around the Existing Transit Facilities as set out in Article 18 [Integration with Transit Facilities], Part 2 of Schedule 4.
- (b) Project Co shall not impact Bus routes, stops, operations, scheduling, Bus passenger transfers and Bus Facilities during Construction unless indicated otherwise in this Part 4, or otherwise permitted by the Province in accordance with this Part 4.
- (c) Project Co shall Design and install all temporary Bus routes, stops, and Bus Facilities, in accordance with TransLink's Bus Infrastructure Design Guidelines and this Part 4.
- (d) Project Co shall ensure that details of all impacts to Bus routes, stops, and Bus Facilities, including associated Signs, Pavement Markings, Traffic Control Persons, Other Traffic Control Devices, Bus Priority Measures, Bus passenger queueing areas, Bus stops, Bus passenger shelters and protective works are shown on the Traffic Control Plan(s), and Project Co shall provide any associated Bus Operator comments and technical analysis as required by this Part 4 to the Province's Representative with the applicable Traffic Control Plan(s).

1.21.2 Bus Routes

- (a) Project Co shall accommodate each Bus route, including each rerouted Bus route, within the Traffic Site, as shown in Attachment E [Bus Routes] to this Article 1 of Part 4, in a safe and efficient manner during Construction.
- (b) Project Co shall ensure that the Bus routes to be accommodated during Construction include:

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- (i) existing day and night time scheduled routes serviced by diesel and trolley Buses that are to be retained during Construction;
- (ii) existing day time scheduled routes serviced by diesel and trolley Buses that are to be relocated during Construction; and
- (iii) existing scheduled short-turn routes that are to be retained during Construction.

1.21.3 Trolley Overhead Infrastructure

- (a) Project Co shall refer to Article 6.2.3 of Part 1 of Schedule 4 regarding the Trolley Overhead along Broadway that is to be deactivated, removed or retained in place during Construction.
- (b) Trolley Overhead infrastructure shall be operational on those trolley Bus routes that cross or turn on/off Broadway at Kingsway, Main Street, Cambie Street and Granville Street, as per Attachment E [Bus Routes] to this Article 1 of Part 4.
- (c) Where Project Co considers it necessary to temporarily modify any additional Trolley Overhead infrastructure or service to accommodate Construction activities, Project Co shall follow the process set out in Article 18.9 of Schedule 4 Part 2.
- (d) Where Project Co proposes to suspend traffic Signs or other traffic control devices on deactivated Trolley Overhead infrastructure, Project Co shall:
 - (i) submit a proposal with supporting drawings, calculations and technical analysis as required by the Bus Operator;
 - (ii) obtain written comments on such proposal from the Bus Operator;
 - (iii) provide evidence of drawings, calculations and technical analysis and the Bus Operator's comments on such proposal and include all suspended traffic Signs and other traffic control devices in the Traffic Control Plan(s) for submission to the Province's Representative in accordance with the Review Procedure; and
 - (iv) install, maintain and operate such traffic Signs or other traffic control devices at Project Co's cost.

1.21.4 Bus Priority Measures

- (a) Project Co shall ensure that the efficient movement of Buses on Broadway shall at all times be prioritized over all other motorized modes of transport, except Emergency Response Vehicles.

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- (b) Project Co shall demonstrate in the Master Traffic Management Plan and the Traffic Control Plans how the efficient movement of Buses on Broadway will be prioritized at all times.
- (c) Project Co shall Design, supply, install and maintain all necessary Bus Priority Measures at the Station Traffic Sites and Crossover Traffic Sites to ensure that the movement of Buses is prioritized over all other motorized modes except Emergency Response Vehicles during each stage of construction, including the following Bus Priority Measures as applicable:
 - (i) Bus queue jumper lanes at intersections;
 - (ii) curbside Bus Lanes;
 - (iii) Traffic Control Persons to assist Buses to merge into or cross over traffic, or to exit Bus stops;
 - (iv) modifications to existing Traffic Signals or new Traffic Signals including the provision of Bus Signal Priority at signalized intersections;
 - (v) Yield to Bus Zones;
 - (vi) Diverge Zones;
 - (vii) Bus exemptions from turn restrictions at intersections; and
 - (viii) standard and customized Signs and Pavement Markings.
- (d) Project Co shall inform and consult with the City of Vancouver and the Bus Operator regarding the Design, implementation and maintenance of all Bus Priority Measures.
- (e) Project Co shall ensure that all Bus Priority Measures operate in a safe manner without compromising the safety of any modes of Traffic, Project Co Traffic Control Persons and the public at large.
- (f) Project Co shall Design, supply, install and maintain appropriate Bus Priority Measures at the Station Traffic Sites and Crossover Traffic Sites during each stage of Construction to ensure that Bus Delays do not exceed 20 seconds per Yield to Bus Zone where the zone is located between adjacent signalized intersections.
- (g) Project Co shall ensure that the design and implementation of a Yield to Bus Zone does not require Buses to merge into a general traffic lane less than 40m in advance of a signalized intersection, unless such merge is controlled by a Bus Signal Priority system or a special Bus Traffic Signal phase.

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- (h) Project Co shall ensure that the design and implementation of Diverge Zones prioritize the movement of Buses and facilitate the access of Buses to enter Bus stops or Bus Lanes.
- (i) Project Co shall be responsible for:
 - (i) the removal of On-Street Parking on both sides of Broadway within the Station Traffic Sites and Crossover Traffic Sites in accordance with Article 1.24(b) of this Part 4;
 - (ii) coordinating with the City of Vancouver for the design and timely implementation of full-time curbside Bus Lanes on Broadway outside the Station Traffic Sites and Crossover Traffic Sites; and
 - (iii) the integration of the Broadway full-time curbside Bus Lane design referred to in (ii) above, with appropriate Bus Priority Measures at the Station Traffic Sites and Crossover Traffic Sites to be provided by Project Co.
- (j) Project Co shall be responsible for the design, installation and maintenance of Bus Lane Signs, other traffic Signs, Other Traffic Control Devices, Traffic Signals and Pavement Markings within the Broadway Traffic Site in accordance with Project Co's Traffic Control Plans.
- (k) Project Co shall submit in its Traffic Control Plans detailed Design drawings, evidence of consultation and associated analysis to demonstrate the operations and efficiency of all Bus Priority Measures including compliance with the requirements of Article 1.21.4 (f) to the Province's Representative.

1.21.5 Bus Stops

- (a) Project Co shall ensure that all Bus stops serving the Bus routes within the Traffic Site, as shown in Attachment E [Bus Routes] to this Article 1, are accommodated in a safe and efficient manner during the Construction.
- (b) Project Co shall be responsible for the Design, installation, removal and maintenance of temporary or relocated Bus stops to facilitate Construction activities in accordance with the following:
 - (i) Project Co shall shall inform the Bus Operator in advance in accordance with Article 5 [Requirement to Inform] of Schedule 4, Part 4 of preferred temporary Bus stop locations to facilitate Bus Operator input into the design ;
 - (ii) Project Co shall inform and consult with the City of Vancouver and the Bus Operator regarding the Design, implementation, maintenance and removal of all Bus stops;

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- (iii) Project Co shall coordinate with the Bus Operator for the timely relocation, installation or removal of Bus stop signs and sign posts, and be responsible for the costs of relocation, installation and removal; and
 - (iv) Project Co shall Design and install all works associated with temporary Bus stops to facilitate construction, except for Bus stop signs and sign posts.
- (c) Project Co shall ensure that:
- (i) existing Bus stops that fall within the sections of Broadway where the traffic lanes may be temporarily reduced to 3 or 4 lanes in the vicinity of Station Traffic Sites in accordance with Article 2.3 of this Part 4, shall be:
 - A. temporarily removed and relocated in consultation with the Bus Operator; and
 - B. replaced in their original locations once active Construction at each Station Traffic Site is completed.
 - (ii) existing Bus stops that fall within the sections of Broadway where the traffic lanes may be temporarily reduced to 4 lanes in the vicinity of Crossover Traffic Sites in accordance with Article 2.3 of this Part 4, shall be:
 - A. temporarily removed and relocated in consultation with the Bus Operator for a maximum period of 8 months in accordance with Article 2.3.8(a)(i) of this Part 4; and
 - B. replaced in their original locations once the 8 month period referred to in 1.21.5(c)(ii)A. is completed.
 - (iii) Station Traffic Sites Bus passenger transfer distances between Bus stops on Broadway and the entrance to the Broadway-City Hall Canada Line Station shall be minimized and shall not exceed 100m;
 - (iv) Bus passenger transfer distances between Bus stops on Broadway and the Bus stops on intersecting streets where bus service is provided (Kingsway, Cambie Street and Granville Street) shall be minimized and shall not exceed 100m;
 - (v) Bus passenger transfer distances between Bus stops on Broadway and the Bus stops on Main Street shall not exceed 200m, except for during the 8 month period referred to in Article 2.3.3 (a) (i), when transfer distances shall not exceed 100m;
 - (vi) the spacing between #99 Bus stops in the same direction shall not exceed 1500m;

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- (vii) a westbound #99 Bus stop shall be required on Broadway between Kingsway and Main Street;
- (viii) the spacing between #3, #8, #9, #10, #15, #16, #17 and #19 Bus stops in the same direction shall not exceed 400m;
- (ix) the spacing between #84 Bus stops in the same direction shall not exceed 600m;
- (x) separate Bus stops for #9 and #99 Buses on Broadway are preferred, however, combination #9/#99 Bus stops as a single Bus stop are acceptable if the single Bus stop can accommodate two articulated Buses as defined in the TransLink Bus Infrastructure Design Guidelines;
- (xi) at temporary Bus stops, Project Co shall either:
 - A. Design, install and maintain reinforced concrete Bus slabs; or
 - B. maintain the existing pavement structure on a regular basis to remove any deformations or rutting and thus provide a smooth running surface;
- (xii) any reinforced concrete Bus slabs at temporary Bus stops shall be installed in advance of implementation of the Traffic Control Plans at the Station Traffic Site and Crossover Traffic Site that necessitated the Bus stop relocation;
- (xiii) any pavement rehabilitation or construction work at Bus stops shall be planned and scheduled to minimize disruptions to Buses;
- (xiv) Bus passenger queuing areas, including the provision of painted sidewalk queueing lines, other channelization devices and Traffic Control Personnel to guide passengers shall be required at all Bus stops where required:
 - A. to prevent Bus passenger queues from blocking the flow of Pedestrians on sidewalks; and
 - B. to prevent Bus passengers from queuing or waiting in the road;
- (xv) the sidewalk widths at all Bus stops shall not be less than 2.75m in order to accommodate Bus wheelchair ramps, except for the following:
 - A. at #99 Bus stops on Broadway, the minimum sidewalk width shall be 3.3m; and
 - B. at #99 Bus stops on Broadway at Cambie Street, the minimum sidewalk width shall be 6.6m; and
- (xvi) all Bus stops shall be accessible by all passengers including persons with disabilities and those using assistive devices.

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- (d) Project Co shall arrange with the City of Vancouver for the removal, storage and reinstallation of any Bus passenger shelters at existing Bus stops that may be directly impacted by Construction or are susceptible to being damaged during Construction, at Project Co's cost.
- (e) Project Co shall not be required to provide Bus passenger shelters at temporary Bus stops, or, remove existing Bus passenger shelters at Bus stops that are not operational during Construction.

1.22 Truck Management

1.22.1 General

- (a) Project Co shall ensure that all Project Co Trucks comply with the City of Vancouver Street and Traffic Bylaws and all associated restrictions regarding Trucks.
- (b) Project Co shall account for all applicable Laws, including the City of Vancouver Street and Traffic Bylaws, and associated Truck restrictions in the design of all Traffic Control Plans, Traffic Advisory Sign Plans and Business Advisory Sign Plans.
- (c) Project Co shall be responsible for developing and enforcing a Truck access and Truck routing plan, as part of the Master Truck Management Plan, to manage the movement and operations of Project Co Trucks during all stages of Construction, including providing details on:
 - (i) routes to be followed by Trucks between work zones within the Traffic Site and spoil sites; and
 - (ii) routes to be followed between Truck marshalling and Truck Staging Areas.
- (d) Project Co shall account for the WB17 Design Vehicle at a minimum, in addition to any other larger Project Co Trucks that may access the Traffic Site, in the design of all Traffic Control Plans, Traffic Advisory Sign Plans and Business Advisory Sign Plans.
- (e) Project Co shall ensure that Truck movements to and through the Traffic Site and Truck Access to Affected Local Businesses are retained or suitable alternatives are provided.
- (f) Project Co shall ensure that the use of Truck Routes, and transfers between Truck Routes, as at the Effective Date are not restricted, unless otherwise agreed to by the City of Vancouver.

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- (g) Project Co shall coordinate with the City of Vancouver for the temporary and timely modifications to Truck Routes to facilitate Construction in accordance with the following:
 - (i) Project Co shall demonstrate that Truck Routes can be retained either on existing routes or on alternate Truck Routes that are acceptable to the City of Vancouver;
 - (ii) Project Co shall demonstrate that relocated Trucks will be able to safely, legally and efficiently traverse the Traffic Site;
 - (iii) Project Co shall demonstrate that suitable provisions will be made for Truck Access to Affected Local Businesses;
 - (iv) Project Co shall provide details of the proposed amended Truck Access and Truck Routes and associated Signs on the Traffic Control Plans;
 - (v) Project Co shall provide details of Traffic Advisory Signs and Business Advisory Signs;
 - (vi) Project Co shall consult with, and submit written evidence of consultation with and responses by, the Communications Director, City of Vancouver and Affected Local Businesses;
 - (vii) Project Co shall submit all proposals to amend Truck Access and Truck Routes to the Province's Representative together with relevant Traffic Control Plans, Traffic Advisory Sign Plans, Business Advisory Sign Plans and evidence of consultation.
- (h) Project Co shall be responsible for performing and providing swept path or vehicle tracking analysis to demonstrate that WB17 Design Vehicles can complete turning movements without encroaching into opposing travel lanes.
- (i) Project Co shall evaluate the Traffic safety and operational impacts of proposed Truck tracking and present, design and implement a comprehensive strategy to mitigate such impacts where necessary.
- (j) Project Co shall be responsible for the provision of Traffic Control Persons to control and assist Project Co Trucks when entering, travelling through or departing the Traffic Site and all Project Co work zones.
- (k) Project Co shall be responsible for the Design, supply, installation and maintenance of all Signs, Pavement Markings, Traffic Signals, Other Traffic Control Devices, Traffic Advisory Signs and protective works needed to control and assist Trucks.
- (l) Without limiting Project Co's obligation to minimize mud, dirt, dust and debris arising out of trucking operations, Project Co shall provide and operate a high

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pressure, multi nozzle Truck wheel wash facility at the Great Northern Way Traffic Site to ensure that Project Co Trucks that exit the site do not carry dust, mud, dirt, gravel or other debris onto the public roads. Wheel wash facilities shall be capable of recycling and reusing water and be capable of 24/7/365 operations.

- (m) Project Co shall be responsible for the Design, provision, control and management of designated Truck Staging Areas within or outside the Traffic Site to be used by Project Co's Trucks.
- (n) Project Co shall be responsible for managing and controlling all Project Co Trucks to:
 - (i) restrict Project Co Trucks to designated Truck routes;
 - (ii) contain all Project Co Truck staging within Truck Staging Areas;
 - (iii) ensure compliance with relevant Bylaws and other Laws applicable to Trucks;
 - (iv) minimize and mitigate Project Co Truck idling;
 - (v) minimize and mitigate Project Co Truck noise;
 - (vi) ensure that noise emitting back-up warning devices are not used between 20:00 and 07:00 nightly;
 - (vii) minimize Project Co Truck staging on public streets except within Truck Staging Areas to be designated by Project Co; and
 - (viii) prohibit Project Co Trucks from staging in Bus lanes, On-Street Parking zones or On-Street Loading Zones.
 - (ix) prohibit Project Co Trucks from staging in front of schools, playgrounds, daycares, public health facilities and other community areas frequented by children and the elderly;
 - (x) minimize Project Co Trucks travelling through residential areas;
 - (xi) minimize parking and stopping of Project Co Trucks in front of businesses; and
 - (xii) minimize mud, gravel and other debris falling from Project Co Trucks and undertake clean up where needed.
- (o) Project Co shall Design, supply, install and maintain Traffic Advisory Sign and Business Advisory Sign plans related to Truck Access or Truck Route modifications.

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- (p) Project shall be responsible for designing and providing Project Co Truck Staging Areas, and shall demonstrate the following:
 - (i) Project Co shall provide evidence of any impacts to On-Street Parking or On-Street Loading due to proposed Truck Staging Areas;
 - (ii) Project Co shall provide evidence of how the Truck Staging Areas will be designated and Signed, and how Truck operations will be managed in accordance with the requirements in Article 1.22.1;
 - (iii) Project Co shall provide details of the proposed Truck Staging Areas in the Traffic Control Plans;
 - (iv) Project Co shall evaluate the Traffic safety and operational impacts of the proposed Truck Staging Areas and present, design and implement a comprehensive strategy to mitigate such impacts;
 - (v) Project Co shall consult with, and submit with its Traffic Control Plans written evidence of consultation with and responses by, the Communications Director, the City of Vancouver, Affected Property Owners, and Affected Local Businesses;
 - (vi) Project Co shall submit all proposals to create Truck Staging Areas to the Province's Representative together with relevant Traffic Control Plans and evidence of consultation described in Article 1.22.1(p)(v).
- (q) Project Co shall be responsible for developing and enforcing a Truck Access and Truck routing plan to manage the movement and operations of Project Co Trucks within the Great Northern Way Traffic Site during all stages of Construction, including the management of Pedestrians and Cyclists where they may interact with Project Co Trucks.
- (r) Project Co shall provide details of all Truck Routes, Truck Access and Truck Staging Areas, including Truck swept path analysis, Signs, Pavement Markings, Other Traffic Control Devices, Traffic Control Persons, protective works, Traffic Advisory Signs, and Business Advisory Signs in the Traffic Control Plan(s).

1.22.2 Oversize Vehicles and Loads

- (a) Project Co shall obtain and comply with the requirements of oversize and overweight permits as required by the City of Vancouver and the BC Ministry of Transportation and Infrastructure Commercial Vehicle Safety and Enforcement (CVSE) branch.
- (b) Project Co shall cooperate with operators of non-Project Co oversized or overweight vehicles to facilitate the passage of such vehicles through the Traffic Site whenever this can be reasonably accommodated by Project Co.

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- (c) Project Co shall provide details of routes and schedules to be followed by oversized and overweight Project Co Trucks on the Traffic Control Plan(s).

1.23 Access Management

- (a) Project Co shall ensure that existing Pedestrian and Cyclist Access to all properties in the Traffic Site, as at the Effective Date, shall be retained during Construction except as otherwise permitted by the Province in accordance with Article 2.4.1(e)(v) of this Part 4.
- (b) Project Co shall ensure that existing vehicular Access, including Truck and Emergency Response Vehicle Access, to all properties in the Traffic Site, as at the Effective Date, shall be retained during Construction except as indicated otherwise in this Part 4, or as otherwise permitted by the Province in accordance with Article 2 [Permitted Traffic Disruptions] of this Part 4.
- (c) Project Co shall ensure that existing vehicular Access to all loading areas and garbage pickup areas serving properties in the Traffic Site, as at the Effective Date, shall be retained during Construction except as indicated otherwise in this Part 4, or as otherwise permitted by the Province in accordance with Article 2 [Permitted Traffic Disruptions] of this Part 4.
- (d) Project Co shall be responsible for the provision of traffic control devices and Traffic Control Personnel as needed to provide safe and efficient access to existing and temporary Accesses within any part of the Traffic Site.
- (e) Where an Access may be amended, obscured, or temporarily relocated in accordance with this Part 4, Project Co shall Design, implement and maintain any temporary or relocated Accesses that are needed to provide Access.
- (f) If visibility of an Access will be obscured or an Access needs to be temporarily relocated or alternate routes need to be followed to and from an Access due to Construction activities, as permitted under Article 2 [Permitted Traffic Disruptions] of this Part 4, Project Co shall be responsible for supplying, installing and maintaining appropriate Traffic Advisory Signs and Business Advisory Signs to effectively direct Traffic to the affected property in accordance with Schedule 9 [Communications, Community Relations and Business Relations] and this Part 4.
- (g) Project Co shall provide details of all Access management measures including temporary Access arrangements, Signs, Pavement Markings, Other Traffic Control Devices, Traffic Control Personnel, Traffic Advisory Signs, Business Advisory Signs, and evidence of consultation in its Traffic Control Plans.

1.24 Parking Management

1.24.1 General

- (a) Project Co shall retain existing On-Street Parking within the Traffic Site, as at the Effective Date, except as indicated otherwise in this Part 4, or as otherwise permitted by the Province in accordance with this Part 4.
- (b) Project Co shall be responsible for the following to facilitate Construction:
 - (i) the removal of On-Street Parking on both sides of Broadway within the Broadway Traffic Site;
 - (ii) coordinating with the City of Vancouver for the timely removal of On-Street Parking outside of the Broadway Traffic Site; and
 - (iii) the removal of On-Street Parking within the Great Northern Way Traffic Site where necessitated by Project Co' Traffic Control Plans.
- (c) If On-Street Parking needs to be temporarily relocated or removed due to Construction activities, Project Co shall be responsible for supplying, installing and maintaining appropriate Traffic Advisory Signs and Business Advisory Signs where required in accordance with Schedule 9 [Communications, Community Relations and Business Relations] and this Part 4.
- (d) Project Co shall be responsible for coordinating with the City of Vancouver for the timely temporary removal, relocation, hooding and installation of all parking meters affected by the Construction. The City of Vancouver will perform the work related to the temporary removal relocation, hooding and installation of all parking meters affected by the Construction, and the work performed by the City of Vancouver will be paid for by Project Co.
- (e) Project Co shall be responsible for the Design, supply, installation and maintenance of all temporary On-Street Parking Signs, Traffic Advisory Signs, Business Advisory Signs, Pavement Markings and Other Traffic Control Devices, and the removal or covering of all conflicting existing On-Street Parking Signs and Pavement Markings within the Traffic Site.
- (f) Project Co shall reinstate On-Street Parking and arrange for re-installation of parking meters upon completion of the Construction activity that necessitated its removal, in accordance with Article 9 [Roads] of Schedule 4 Part 2.
- (g) Project Co shall ensure that details of all adjustments to On-Street Parking including details of associated Signs, Traffic Advisory Signs, Business Advisory Signs, Pavement Markings, Other Traffic Control Devices, parking meter

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removal, and evidence of consultation shall be included in the Traffic Control Plans.

1.24.2 Parking of Project Co's Vehicles

- (a) Project Co shall not allow the parking of any of Project Co's vehicles, including those of its employees, Principal Contractors, Subcontractors or suppliers, on any public street or public parking area within 1km of the Traffic Site.
- (b) Project Co shall establish and operate an employee transport system and associated facilities to transfer employees between employee parking areas provided by Project Co and the Traffic Site.
- (c) Project Co shall provide details of where Project Co and its employees will park their vehicles in the Master Traffic Control Plan.

1.25 On-Street Loading Management

- (a) Project Co shall retain existing On-Street Loading within the Traffic Site, as at the Effective Date, except as indicated otherwise in this Part 4 or permitted by the Province in accordance with this Part 4.
- (b) Project Co shall be responsible for the following to facilitate Construction:
 - (i) the removal of On-Street Loading on both sides of Broadway within the Broadway Traffic Site;
 - (ii) coordinating with the City of Vancouver for the timely removal of On-Street Loading outside of the Broadway Traffic Site; and
 - (iii) the removal of On-Street Loading within the Great Northern Way Traffic Site where necessitated by Project Co's Traffic Control Plans.
- (c) Project Co shall ensure that relocated On-Street Loading shall not be located more than 30m away from its existing location;
- (d) If On-Street Loading needs to be temporarily relocated or removed due to Construction activities, Project Co shall be responsible for supplying, installing and maintaining appropriate Traffic Advisory Signs where required in accordance with Schedule 9 [Communications, Community Relations and Business Relations] and this Part 4.
- (e) Project Co shall be responsible for the Design, supply, installation and maintenance of Signs, Pavement Markings, Other Traffic Control Devices and

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Traffic Control Personnel as needed to provide safe and efficient On-Street Loading to properties within the Traffic Site.

- (f) Project Co shall be responsible for the temporary removal or covering of all conflicting existing On-Street Loading Signs and Pavement Markings.
- (g) Project Co shall ensure that On-Street Loading facilities are not used by Project Co's vehicles, including those of its employees, Principal Contractors, Subcontractors or suppliers.
- (h) Project Co shall reinstate On-Street Loading upon completion of the Construction activity that necessitated its removal, in accordance with Article 9 [Roads] of Schedule 4 Part 2.
- (i) Project Co shall ensure that details of all adjustments to On-Street Loading including details of associated Signs, Traffic Advisory Signs, Pavement Markings, Other Traffic Control Devices, Traffic Control Personnel, and evidence of consultation shall be included in the Traffic Control Plans.

1.26 Street Furniture

- (a) Project Co shall retain all existing Street Furniture within the Traffic Site, as at the Effective Date, except as indicated otherwise in this Part 4 or permitted by the Province in accordance with this Part 4.
- (b) Where Project Co considers it necessary to relocate and remove Street Furniture to facilitate Construction, Project Co shall inform the City of Vancouver, and coordinate the necessary work in a timely manner, and pay for the costs of relocation.
- (c) Project Co shall coordinate with the City of Vancouver in a timely manner to reinstall Street Furniture once Construction is complete, and pay for the costs of reinstallation
- (d) Project Co shall ensure that all Street Furniture relocation is indicated on the Traffic Control Plan(s).

**BROADWAY SUBWAY PROJECT
PROJECT AGREEMENT
SCHEDULE 4 PART 4 ARTICLE 1: TRAFFIC MANAGEMENT**

***Commercial in Confidence
EXECUTION COPY***

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**ATTACHMENT A
NOT USED**

**ATTACHMENT B
PLANNED EVENTS**

NAME	Expected Approximate Date	Description
VANCOUVER SUN RUN	April	Full closure on Burrard Bridge/Street to 2 nd Avenue, 2 nd Avenue closed from Burrard St to Fir St, Fir St closed 2 nd Ave to 4 th Avenue, 4 th Ave/6 th Avenue closed Fir St to Cambie St
BMO VANCOUVER MARATHON	First weekend in May	Various streets - crosses Broadway at Cambie St.
BIKE TO WORK WEEK	May	Various locations along 10th Ave.
BIKE TO WORK WEEK CELEBRATION STATION	May	Broadway-City Hall Canada Line station on 10th Ave.
FESTIVAL D'ETE FRANCOPHONE DE VANCOUVER	June	On W 7th Avenue from Granville St to Fir St - full closure.
CAR FREE DAYS VANCOUVER - MAIN ST	June	On Main St from Broadway to E 33 rd St.
GEARUP4CF	June	Bike Route throughout Vancouver -various locations in the area.
GREEK DAY ON BROADWAY	June	Broadway closure from Macdonald St to Blenheim St.
SCOTIABANK VANCOUVER HALF-MARATHON & 5K	June	Closures affect Broadway area traffic.
KHATSAHLANO STREET PARTY	July	W 4th Ave closure from Burrard St to MacDonald St
HONDA CELEBRATION OF LIGHT	End of July / Beginning of August	Large event - Kits area closures affects Broadway traffic.
VANCOUVER MURAL FESTIVAL	August	On Main St - north and south of Broadway.
WALK FOR RECONCILIATION	September	No direct impact but a large event - contained to Downtown.
ST. PATRICK'S WALKATHON	September	Starts at 10th Ave/Main St.
CIBC RUN FOR THE CURE	September	Closure at Broadway on Cambie St.
KITSILANO FARMERS MARKET	Sundays, May to October	W 10th Ave at Trafalgar - Contained to Community Centre parking lot.
CHRISTMAS TREE LOT SALES	November to January	On private lot at W 8th Ave and Arbutus St.

**ATTACHMENT C
TRAFFIC SIGNAL AND STREET LIGHTING SCOPE SPLIT**

**ATTACHMENT D
ARBUTUS GREENWAY AND CENTRAL VALLEY GREENWAY REALIGNMENTS**

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ATTACHMENT E
BUS ROUTES

Attachment C

Traffic Signal and Street Lighting Scope Split

BSP - CITY OF VANCOUVER/PROJECT CO SCOPE SPLIT REGARDING TEMPORARY MODIFICATIONS TO TRAFFIC SIGNALS, TSMS FIBRE COMMUNICATIONS AND STREET LIGHTING, AND NEW TEMPORARY TRAFFIC SIGNALS

NOTES:

1. Within this Attachment C the following definitions apply:
 - **Advance Notice Requirement** means the advance notice required to be provided by Project Co to enable the City to plan any work impacting Traffic Signals, fibre networks or street lighting;
 - **Implementation Time** means the estimated time required by the City to implement or perform any City work impacting Traffic Signals, fibre networks or street lighting;
 - **TSMS** means the City's centralized Traffic Signal Management System
2. Some of the City's record drawings are provided as Disclosed Data. These record drawings are provided "as-is" and may not be 100% accurate.
3. Project Co shall be responsible for the Design, coordination and implementation of all temporary Traffic Signals, fibre communications and street lighting modifications.
4. Project Co shall not be permitted to work on any energised or live City Traffic Signals and fibre communications infrastructure. The City will be solely responsible for energising, de-energising, cutover and tie in of all Project Co works connected to Traffic Signal and fibre communication infrastructure, except for street lighting. Project Co is permitted to work on any energised or live City street lighting infrastructure.
5. Project Co shall be present during any energising, de-energising, cutover and tie in of Project Co works by the City.
6. The City's inspection of works will be solely QA/QC of electrical components. All inspection of underground works such as conduit, pole base, controller base and kiosk base shall be by an electrical engineer retained by Project Co who shall be registered as a Professional Engineer, and who shall be the engineer of record for the electrical works described in this Attachment C.
7. Project Co shall be responsible for the reinstatement of all temporary Traffic Signal, fibre communications and street lighting modifications to return them to the condition that existed as at the Effective Date, unless otherwise stated in this Agreement.
8. The City will have one dedicated electrical crew comprising two electricians and a bucket truck available to undertake the Traffic Signal and street lighting field work requested by Project Co that is the responsibility of the City. The City may be able to provide additional electrical crews subject to availability and Project Co providing at least two (2) months advance written notification.
9. Project Co shall be responsible for coordinating Traffic Signal controller requirements with the City noting that there may be a lead time of five (5) months for the delivery of replacement controllers.
10. The table in this Attachment C to Article 1 [General Traffic Management Requirements] of Part 4 provides mandatory Advance Notice Requirements and indicative Implementation Times. Project Co shall be responsible for coordinating and scheduling all work to be undertaken by the City in accordance with this Attachment C.

SCHEDULE 4 PART 4 ARTICLE 1: GENERAL TRAFFIC MANAGEMENT REQUIREMENTS ATTACHMENT C: TRAFFIC SIGNAL AND STREET LIGHTING SCOPE SPLIT

City Group	Activity	Scope Split			Responsibility for cost		Description	Advance Notice Requirement	Implementation Time
		City Exclusive	Project Co Scope	City and Project Co	City	Project Co			
Temporary Modification to Existing Traffic Signal and TSMS Communication Systems									
Design	Provision of record drawing markup electrical infrastructure drawings	X			X		City to provide available record drawing markup electrical infrastructure drawings at City cost.	3 Business Days per intersection	n/a
	Field verification of signal infrastructure			X		X	Project Co to conduct field verification of signal infrastructure with support from City at Project Co cost.	5 Business Days per intersection	1 Business Day per intersection
	Preparation of design drawings		X			X	Project Co to prepare design drawings at Project Co's cost for review and acceptance by City, using a City-approved consultant.	10 Business Days for review per intersection	n/a
	Traffic Signal timing design		X			X	Project Co to conduct Traffic Signal timing design and produce Traffic Signal Records based on standards to be provided by City, at Project Co's cost, for review and acceptance by City	10 Business Days for review per intersection	n/a
Signal shop	Implement Traffic Signal Record changes	X				X	City to implement Traffic Signal Record changes at Project Co's cost	5 Business Days per intersection	10 Business Days per intersection (no new controller)
	Installation of additional hardware inside the cabinet	X				X	City to install additional hardware inside the cabinet at Project Co's cost - only where required due to Project Co's work. Enhancements at City cost.	5 Business Days per intersection	3 Business Days per intersection
Traffic Signal	Modifications to Traffic Signal infrastructure (excluding Traffic Signal cabinet)		X			X	Project Co to modify de-energised Traffic Signal infrastructure at Project Co cost.	n/a	n/a
	Upgrading of existing controller cabinet to 332 or install new 332 controller cabinet at the site	X				X	City to upgrade existing controller cabinet to 332 or install new 332 controller cabinet at the site at Project Co cost - only where required due to Project Co works	5 months per intersection (for procurement)	20 Business Days per intersection (for cabinet build, program, test and install)
	Removal of existing Traffic Signal cabinet		X			X	Project Co to remove de-energised Traffic Signal cabinet and return to City works yard at Project Co cost.	n/a	n/a
	Inspection of Project Co electrical work			X		X	City to conduct inspection of Project Co electrical work at Project Co's cost. Project Co will be in attendance during the inspection.	5 Business Days per intersection	1 Business Day per intersection
	Energising, de-energising, cutover and tie in of all Project Co works connected to Traffic Signal infrastructure			X		X	City to conduct energising, de-energising, cutover and tie in of all Project Co work connected to Traffic Signal infrastructure with support from Project Co at Project Co's cost. Project Co will be in attendance while the City conducts such work.	5 Business Days per intersection	2 Business Days per intersection corner
Communication	Modifications to communications infrastructure		X			X	Project Co to modify de-energised communications infrastructure at Project Co cost.	n/a	n/a
	Inspection of Project Co electrical work			X		X	City to conduct inspection of Project Co electrical at Project Co's cost. Project Co will be in attendance during the inspection.	5 Business Days per intersection	1 Business Day per intersection
	Energising, de-energising, cutover and tie in of all Project Co works connected to fibre communications infrastructure			X		X	City to conduct energising, de-energising, cutover and tie in of all Project Co work connected to fibre communications infrastructure with support from Project Co at Project Co's cost. Project Co will be in attendance while the City conducts such work.	5 Business Days per intersection	1 Business Day per intersection
Installation of New Temporary Traffic Signal									
Design	Provision of record drawing markup electrical infrastructure drawings	X			X		City to provide available record drawing markup electrical infrastructure drawings at City cost.	3 Business Days per intersection	n/a

SCHEDULE 4 PART 4 ARTICLE 1: GENERAL TRAFFIC MANAGEMENT REQUIREMENTS ATTACHMENT C: TRAFFIC SIGNAL AND STREET LIGHTING SCOPE SPLIT

City Group	Activity	Scope Split			Responsibility for cost		Description	Advance Notice Requirement	Implementation Time
		City Exclusive	Project Co Scope	City and Project Co	City	Project Co			
	Field verification of electrical infrastructure			X		X	Project Co to conduct field verification of electrical infrastructure with support from City at Project Co cost.	5 Business Days per intersection	1 Business Day per intersection
	Preparation of design drawings		X			X	Project Co to prepare design drawings at Project Co cost for review and acceptance by City, using a City-approved Consultant.	10 Business Days for review per intersection	n/a
	Coordination with BC Hydro		X			X	Project Co. to coordinate with BC Hydro at Project Co cost, using a City-approved Consultant.	n/a	n/a
	Traffic Signal timing design		X			X	Project Co to conduct Traffic Signal timing design and produce Traffic Signal Records based on standards to be provided by City at Project Co cost, for review and acceptance by City.	10 Business Days for review per intersection	n/a
Signal shop	Build cabinet, test and install Traffic Signal Records in new controller	X				X	City to build cabinet, test and install Traffic Signal Record in new controller at Project Co cost	5 months per intersection (for procurement)	20 Business Days per intersection (for cabinet build, program, test and install)
Traffic Signal	Install Traffic Signal infrastructure (excluding Traffic Signal cabinet)		X			X	Project Co to install de-energised Traffic Signal infrastructure at Project Co cost.	n/a	n/a
	Install Traffic Signal cabinet	X				X	City to install controller cabinet at the site at Project Co cost.	10 Business Days per intersection	3 Business Days per intersection
	Inspection of Project Co electrical work			X		X	City to conduct inspection of Project Co electrical work at Project Co's cost. Project Co will be in attendance during the inspection.	5 Business Days per intersection	1 Business Day per intersection
	Commissioning of temporary Traffic Signal			X		X	City & Project Co to jointly conduct commissioning of temporary Traffic Signal at Project Co cost.	5 Business Days per intersection	1 Business Day per intersection
	Energising, de-energising, cutover and tie in of all Project Co works connected to Traffic Signal infrastructure			X		X	City to conduct energising, de-energising, cutover and tie in of all Project Co work connected to Traffic Signal Infrastructure with support from Project Co at Project Co's cost. Project Co will be in attendance while the City conducts such work.	5 Business Days per intersection	1 Business Day per intersection
Communication	Install communications infrastructure		X			X	Project Co to install de-energised communications infrastructure at Project Co cost.	n/a	n/a
	Inspection of Project Co electrical work			X		X	City to conduct inspection of Project Co electrical work at Project Co's cost. Project Co will be in attendance during the inspection.	5 Business Days per intersection	1 Business Day per intersection
	Energising, de-energising, cutover and tie in of all Project Co works connected to fibre communications infrastructure.			X		X	City to conduct energising, de-energising, cutover and tie in of all Project Co work connected to fibre communications infrastructure with support from Project Co at Project Co's cost. Project Co to be in attendance while the City conducts such work.	5 Business Days per intersection	1 Business Day per intersection
Temporary Modification to Existing Street Lighting									
Design	Provision of record drawing mark up electrical infrastructure drawings	X			X		City to provide available record drawing markup electrical infrastructure drawings at City cost.	3 Business Days per request	n/a
	Field verification of street lighting infrastructure			X		X	Project Co to conduct field verification of street lighting infrastructure with support from City at Project Co cost.	5 Business Days per request	1 Business Day per request
	Preparation of design drawings		X			X	Project Co to prepare design drawings at Project Co cost for review and acceptance by City, using a City-approved Consultant.	10 Business Days for review per request	n/a

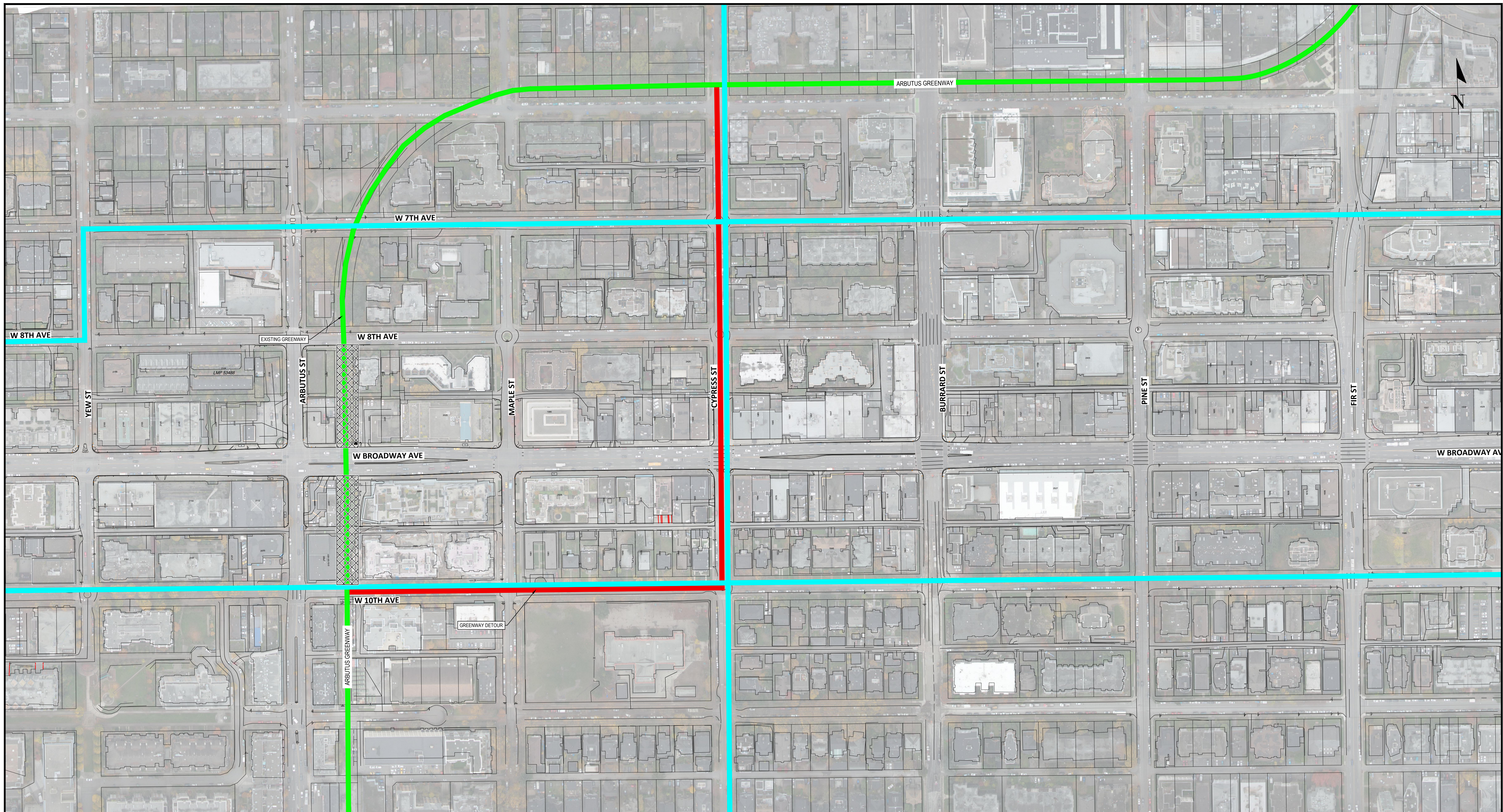
SCHEDULE 4 PART 4 ARTICLE 1: GENERAL TRAFFIC MANAGEMENT REQUIREMENTS ATTACHMENT C: TRAFFIC SIGNAL AND STREET LIGHTING SCOPE SPLIT

City Group	Activity	Scope Split			Responsibility for cost		Description	Advance Notice Requirement	Implementation Time
		City Exclusive	Project Co Scope	City and Project Co	City	Project Co			
Street Lighting	<i>Install street lighting infrastructure</i>		X			X	<i>Project Co to install de-energised street lighting infrastructure at Project Co cost.</i>	<i>n/a</i>	<i>n/a</i>
	<i>Inspection of Project Co electrical work</i>			X		X	<i>City to conduct inspection of Project Co electrical work at Project Co's cost. Project Co will be in attendance during the inspection.</i>	<i>5 Business Days per intersection</i>	<i>1 Business Day per intersection</i>
	<i>Energising, de-energising, cutover and tie in of all Project Co works connected to street lighting</i>		X			X	<i>Project Co to conduct energising, de-energising, cutover and tie in of all Project Co work connected to street lighting with support from City at Project Co cost.</i>	<i>5 Business Days per intersection</i>	<i>2 Business Days per intersection</i>
Materials supply	<i>Traffic Signal Controllers and Cabinets</i>	X				X	<i>City to supply new Traffic Signal Controllers and Cabinets at Project Co cost</i>	<i>5 months</i>	<i>n/a</i>
	<i>All other electrical equipment for Traffic Signals, lighting and communications</i>		X			X	<i>Project Co to supply all other electrical equipment for Traffic Signals, lighting and communications in accordance with City standards and approved products.</i>	<i>n/a</i>	<i>n/a</i>

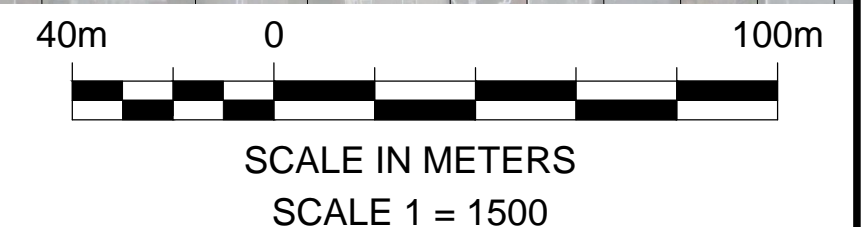
BROADWAY SUBWAY PROJECT

ATTACHMENT D: ARBUTUS GREENWAY & CENTRAL VALLEY GREENWAY DETOUR ROUTES

MARCH 7, 2019



- LEGEND:**
- EXISTING ARBUTUS GREENWAY
 - EXISTING BIKE ROUTES
 - RE-ROUTING ARBUTUS GREENWAY
 - CLOSURE OF ARBUTUS GREENWAY DURING CONSTRUCTION



DATE: 2019-03-07 2:15pm (s4formier)
 DRAWN: S.FOURNIER
 CHECKED: _____
 APPROVAL: _____
 LAYOUT: GL-TF-150

DESIGNED	D.ABAKUMOV	19-03-7
DATE		
DRAWN	S.FOURNIER	19-03-7
DATE		
CHECKED		DATE
APPROVAL		DATE

REFERENCE DRAWING		REVISIONS			
DWG No.	DESCRIPTION	DATE	BY	DESCRIPTION	REV
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		2019.03.07	SF	ISSUED FOR REVIEW	B

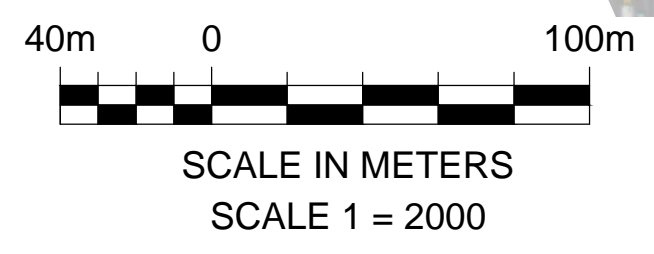


DRAFT
 FOR DISCUSSION ONLY
 NOT TO BE USED FOR CONSTRUCTION

PROFESSIONAL SEAL



BROADWAY SUBWAY PROJECT REFERENCE CONCEPT ARBUTUS GREENWAY - DETOUR ROUTE		
SCALE AS SHOWN	CONTRACT NO.	SUB CONSULTANT
DATE 19-03-7		PROJECT NO.
SHEET NO.	GL-TF-150	
	B	



- LEGEND:**
- █ EXISTING CENTRAL VALLEY GREENWAY
 - █ EXISTING BIKE ROUTES
 - █ RE-ROUTING CENTRAL VALLEY GREENWAY
 - CLOSURE OF CENTRAL VALLEY GREENWAY DURING CONSTRUCTION

DATE: 2019-03-12 09:14am (s404000000) 0:14am
 DRAWN: S.FOURNIER
 CHECKED: _____
 APPROVAL: _____
 LAYOUT: GL-TF-15

DESIGNED	D.ABAKUMOV	19-03-7
DATE		
DRAWN	S.FOURNIER	19-03-7
DATE		
CHECKED		
DATE		
APPROVAL		
DATE		

REFERENCE DRAWING		REVISIONS			
DWG No.	DESCRIPTION	DATE	BY	DESCRIPTION	REV
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		2019.03.07	SF	ISSUED FOR REVIEW	B



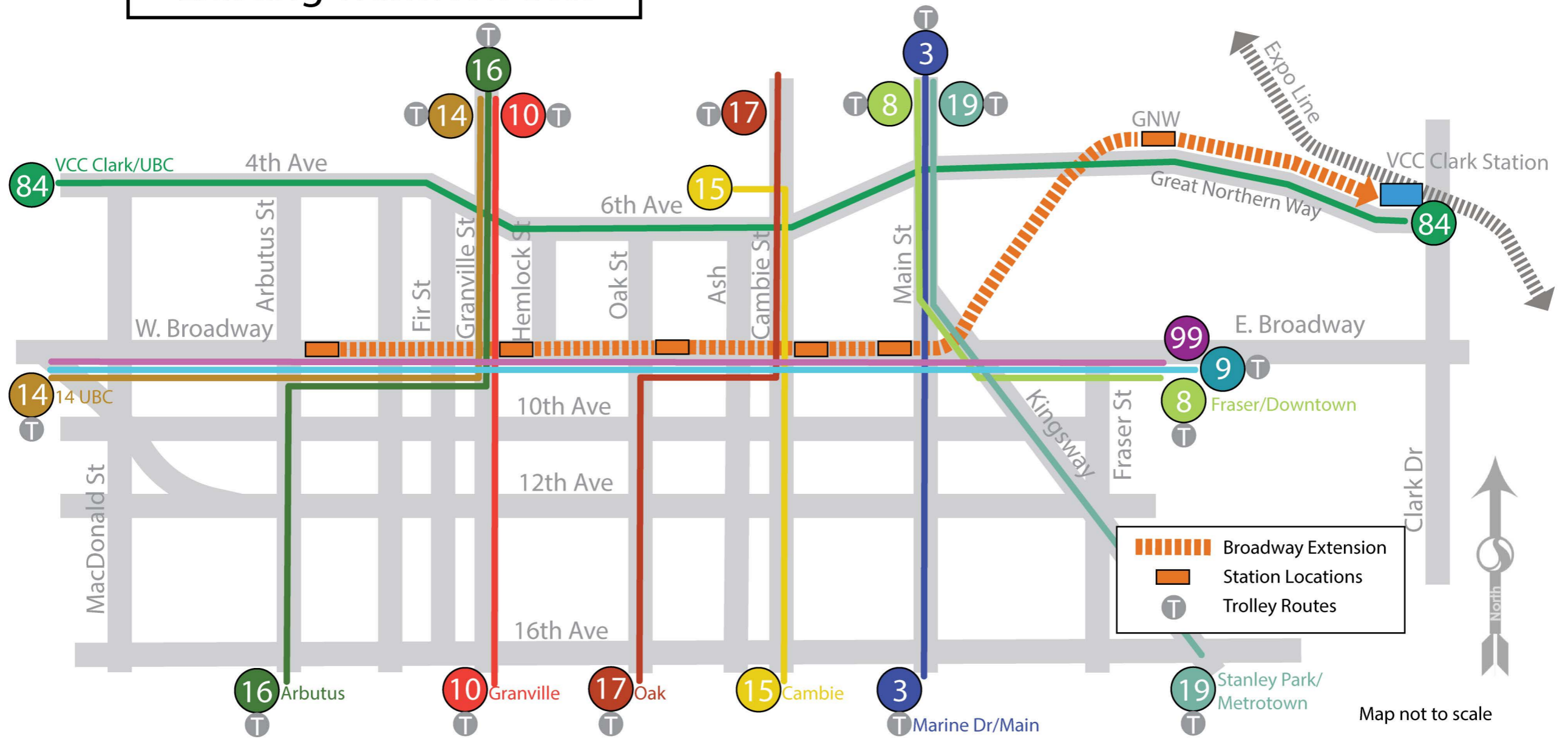
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 NOT TO BE USED FOR CONSTRUCTION

PROFESSIONAL SEAL

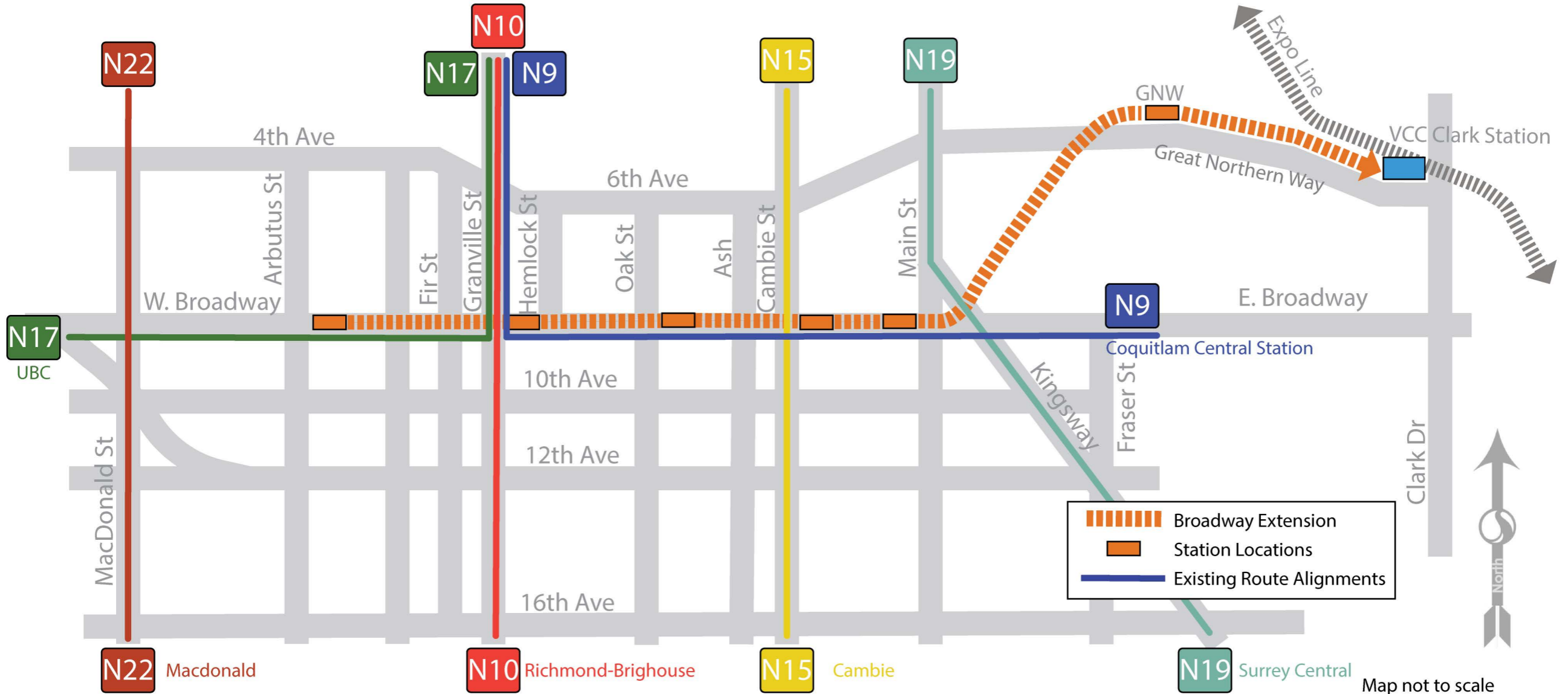


BROADWAY SUBWAY PROJECT REFERENCE CONCEPT CENTRAL VALLEY GREENWAY - DETOUR ROUTE		
SCALE AS SHOWN	CONTRACT NO.	SUB CONSULTANT
DATE 19-03-7		PROJECT NO.
SHEET NO.	GL-TF-151	
	B	

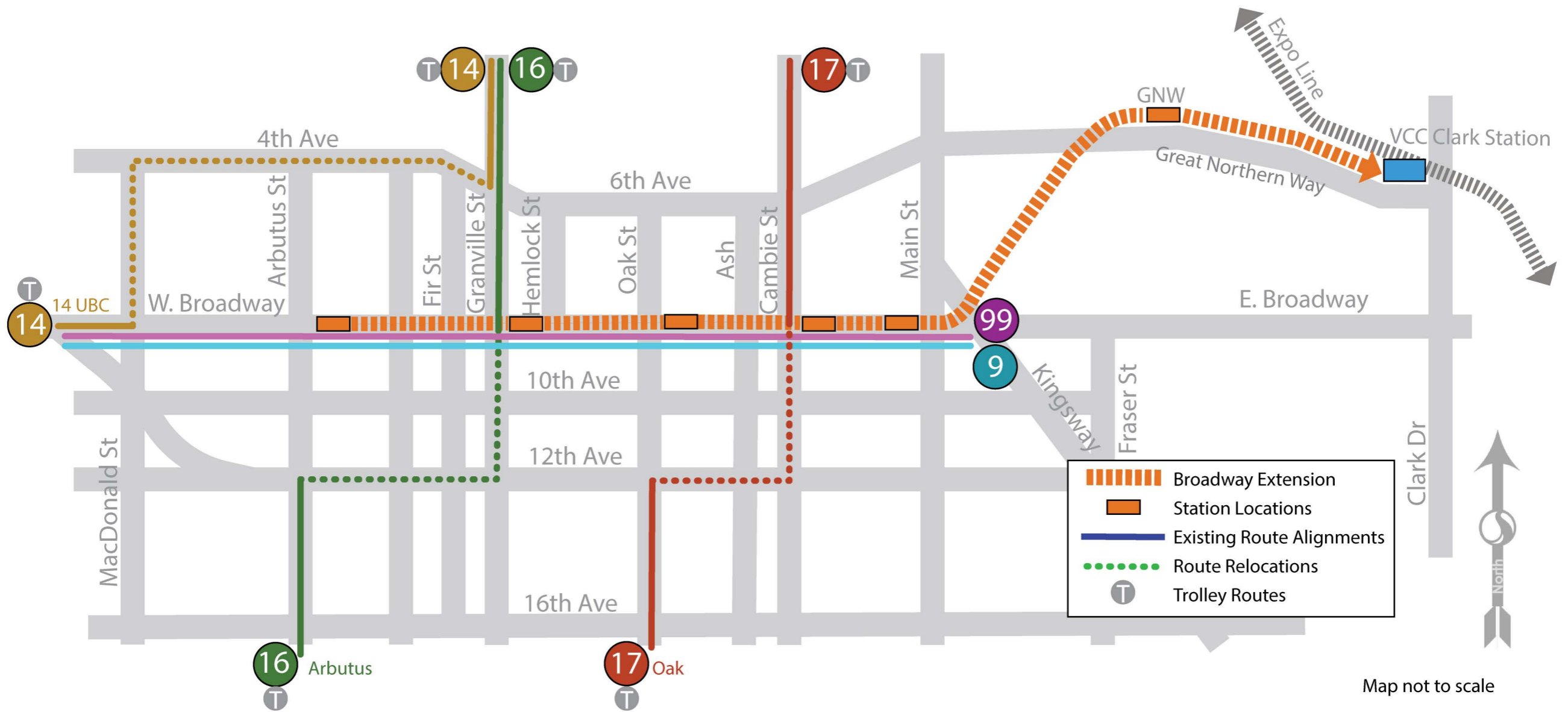
Attachment E1 Broadway Subway Existing Transit Routes



Attachment E2 Broadway Subway Night Bus Routes

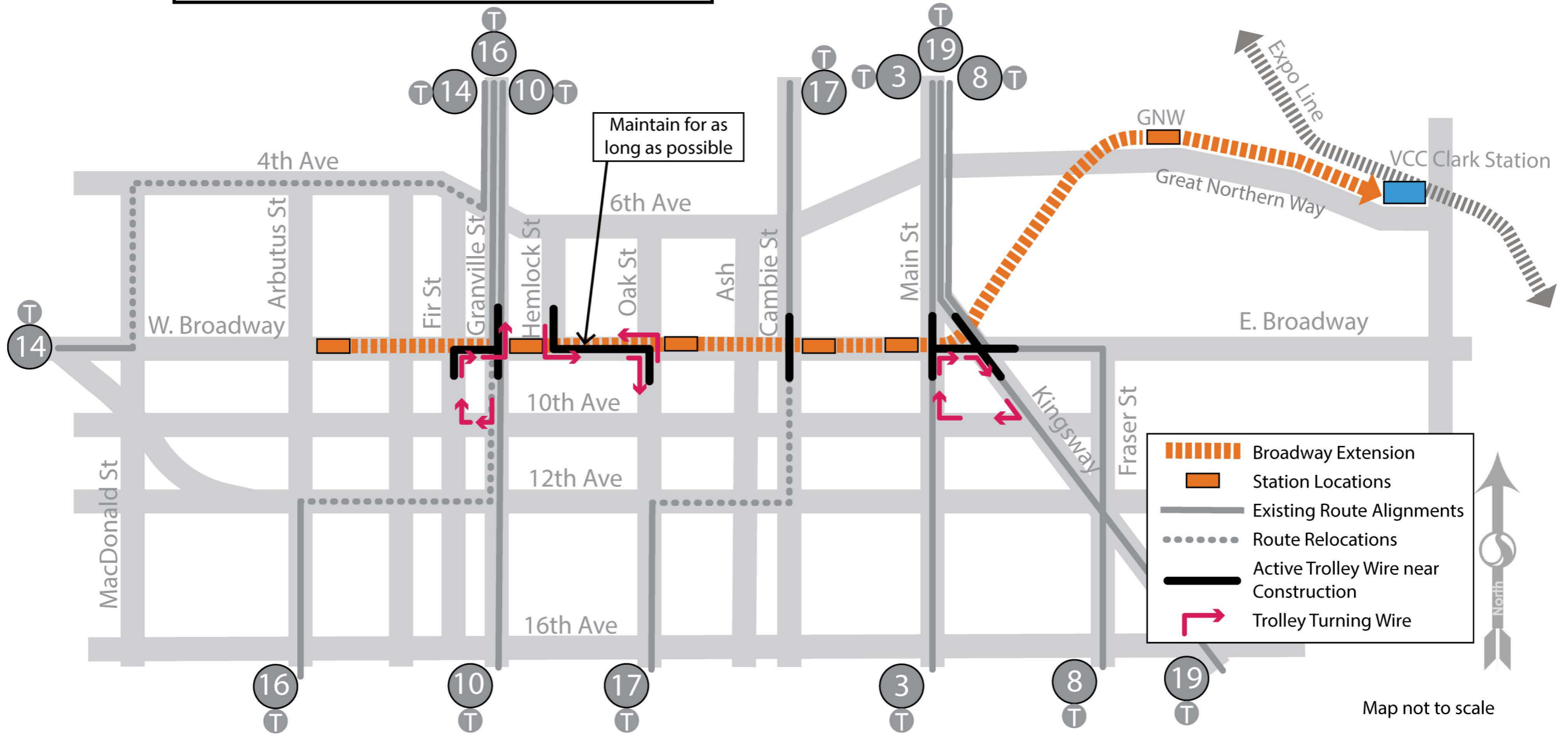


Attachment E3 Broadway Subway Route Relocations During Construction*



* To be viewed in conjunction with Attachment E1 which shows other existing transit routes being retained

Attachment E4 Broadway Subway Trolley Short Turn Routes



Part 4. Traffic Management

Article 2. Permitted Traffic Disruptions 2-1

- 2.1 Scope 2-1
- 2.2 General 2-1
- 2.3 Permitted Traffic Disruptions – Review Procedure 2-1
 - 2.3.1 Traffic Site 2-1
 - 2.3.2 Broadway Traffic Site 2-3
 - 2.3.3 Main Street Station Traffic Site 2-5
 - 2.3.4 Cambie Street Station Traffic Site 2-6
 - 2.3.5 Oak Street Station Traffic Site 2-8
 - 2.3.6 Granville Street Station Traffic Site 2-9
 - 2.3.7 Arbutus Street Station Traffic Site 2-10
 - 2.3.8 Crossover Traffic Sites 2-11
 - 2.3.9 Great Northern Way Traffic Site 2-12
 - 2.3.10 Undefined Traffic Sites 2-14
- 2.4 Permitted Traffic Disruptions – Consent Procedure 2-14
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 - 2.4.2 Broadway Traffic Site 2-19
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 - 2.4.4 Undefined Traffic Sites 2-21

Article 2. Permitted Traffic Disruptions

2.1 Scope

- (a) This Article 2 [Permitted Traffic Disruptions] specifies the Traffic Disruptions by Project Co for the purposes of facilitating Construction activities within the Traffic Site that shall be permitted, subject to acceptance by the Province's Representative under either the Review Procedure or the Consent Procedure as indicated herein.

2.2 General

- (a) Without limiting any other provision of this Agreement, Project Co shall carry out the Project Work in accordance with this Article 2 [Permitted Traffic Disruptions].
- (b) Unless otherwise permitted in accordance with this Agreement, Project Co shall not permit, cause or direct a Traffic Disruption except as permitted in accordance with this Article 2 [Permitted Traffic Disruptions].

2.3 Permitted Traffic Disruptions – Review Procedure

- (a) This Article 2.3 prescribes Traffic Disruptions for the purposes of facilitating Construction activities that will be permitted subject to acceptance by the Province's Representative in accordance with the Review Procedure.

2.3.1 Traffic Site

- (a) This Article 2.3.1 prescribes Traffic Disruptions for the purposes of facilitating Construction activities within the Traffic Site for which Project Co may request acceptance by the Province's Representative in accordance with the Review Procedure.
- (b) Project Co shall ensure that only proposed Traffic Disruptions that comply with the requirements of Article 1 of Part 4 or are permitted in accordance with this Article 2.3 are submitted to Province's Representative in accordance with the Review Procedure.
- (c) Project Co shall submit an application to the Province's Representative prior to causing or directing any of the following Traffic Disruptions:
 - (i) Modification to existing Traffic Signals;

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- (ii) Modification to Illumination;
 - (iii) Lane Shift or new lane;
 - (iv) Lane Closure;
 - (v) Stoppage;
 - (vi) speed limit modification;
 - (vii) Pedestrian Disruption;
 - (viii) Cyclist Disruption;
 - (ix) Truck Disruption;
 - (x) Access Disruption;
 - (xi) On-Street Parking Disruption;
 - (xii) On-Street Loading Disruption; or
 - (xiii) Modification to Street Furniture.
- (d) As part of such applications referenced in Article 2.3.1(c), Project Co will be required to submit relevant Traffic Control Plan(s), Traffic Advisory Sign Plan(s), Business Advisory Sign Plan(s) and associated schedules, drawings, Traffic Analysis, Traffic Signal Records, analysis, justification and evidence of consultation for each stage of Construction.
- (e) Project Co shall submit all proposals to modify existing Traffic Signals together with relevant Traffic Analysis, Traffic Signal Records, design drawings and details and information contemplated in this Article 2.3, Article 1.8.1 and Article 4 of this Part 4.
- (f) Project Co shall submit all proposals to modify Illumination together with relevant design drawings and details and information contemplated in this Article 2.3 and Article 1.12.
- (g) Project Co shall submit all proposals to modify the number or alignment of traffic lanes together with relevant Traffic Analysis, Traffic Signal Records, design drawings and details and information contemplated in this Article 2.3, Article 1.13 and Article 4 of this Part 4.
- (h) Project Co shall submit all proposals to implement Lane Closures together with relevant Traffic Analysis, Traffic Signal Records, design drawings and details and information contemplated in this Article 2.3, Article 1.14 and Article 4 of this Part 4.

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- (i) Project Co shall submit all proposals to implement Stoppages together with drawings, details and information contemplated in this Article 2.3 and Article 1.15 of this Part 4.
- (j) Project Co shall submit all proposals to amend posted speed limits together with drawings, details and information contemplated in this Article 2.3 and Article 1.17 of this Part 4.
- (k) Project Co shall submit all proposals affecting Pedestrian Facilities together with drawings, details and information contemplated in this Article 2.3 and Article 1.19 of this Part 4.
- (l) Project Co shall submit all proposals affecting Cyclist Facilities together with drawings, details and information contemplated in this Article 2.3 and Article 1.20 of this Part 4.
- (m) Project Co shall submit all proposals affecting Truck Access and Truck Routes, as permitted in Article 2.3, together with drawings, details and information contemplated in this Article 2.3 and Article 1.22 of this Part 4.
- (n) Project Co shall submit all proposals for Truck Staging Areas for use by Project Co Trucks, as permitted in Article 2.3, together with drawings, details and information contemplated in this Article 2.3 and Article 1.22 of this Part 4.
- (o) Project Co shall submit all proposals affecting Access, as permitted in Article 2.3, together with drawings, details and information contemplated in this Article 2.3 and Article 1.23 of this Part 4.
- (p) Project Co shall submit all proposals affecting On-Street Parking, as permitted in Article 2.3, together with drawings, details and information contemplated in this Article 2.3 and Article 1.24 of this Part 4.
- (q) Project Co shall submit all proposals affecting On-Street Loading, as permitted in Article 2.3, together with drawings, details and information contemplated in this Article 2.3 and Article 1.25 of this Part 4.
- (r) Project Co shall submit all proposals affecting Street Furniture together with drawings, details and information contemplated in this Article 2.3 and Article 1.26 of this Part 4.

2.3.2 Broadway Traffic Site

- (a) For the purposes of facilitating Construction activities in the Broadway Traffic Site, the following Traffic Disruptions shall be permitted subject to acceptance by the Province's Representative under the Review Procedure:

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- (i) Project Co shall be permitted to implement Lane Closures on Broadway at the Station Traffic Sites and Crossover Traffic Sites subject to the following:
 - A. a minimum of two general traffic lanes shall be open in the eastbound direction on Broadway between 5:00 and 23:00;
 - B. a minimum of one general traffic lane shall be open in the eastbound direction on Broadway between 23:00 and 5:00;
 - C. Yield to Bus Zones or other Bus Priority Measures are designed and implemented to merge the eastbound lanes in advance of or at the Station Traffic Sites and Crossover Traffic Sites, to safely and effectively prioritize Bus movements approaching the Station Traffic Sites and Crossover Traffic Sites in accordance with Article 1.21.4 of this Part 4;
 - D. Diverge Zones are designed and implemented downstream of the Station Traffic Sites and Crossover Traffic Sites to safely and effectively prioritize eastbound Bus movements departing the Station Traffic Sites and Crossover Traffic Sites in accordance with Article 1.21.4 of this Part 4;
 - E. a minimum of two general traffic lanes shall be open in the westbound direction on Broadway between 5:00 and 23:00;
 - F. a minimum of one general traffic lane shall be open in the westbound direction on Broadway between 23:00 and 5:00;
 - G. Yield to Bus Zones or other Bus Priority Measures are designed and implemented to merge the westbound lanes in advance of or at the Station Traffic Sites and Crossover Traffic Sites, to safely and effectively prioritize Bus movements approaching the Station Traffic Sites and Crossover Traffic Sites in accordance with Article 1.21.4 of this Part 4; and
 - H. Diverge Zones are designed and implemented downstream of the Station Traffic Sites and Crossover Traffic Sites to safely and effectively prioritize westbound Bus movements departing the Station Traffic Sites and Crossover Traffic Sites in accordance with Article 1.21.4 of this Part 4.
- (ii) Project Co shall be permitted to remove On-Street Parking on Broadway within the Station Traffic Sites and Crossover Traffic Sites.
- (iii) Project Co shall be permitted to remove On-Street Loading on Broadway within the Station Traffic Sites and Crossover Traffic Sites.

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2.3.3 Main Street Station Traffic Site

- (a) For the purposes of facilitating Construction activities specifically at the Main Street Station Traffic Site, the following Traffic Disruptions shall be permitted subject to acceptance by the Province's Representative under the Review Procedure:
- (i) Project Co shall be permitted to implement the following Lane Closures at the Main Street Station Traffic Site for a maximum duration of 8 months which can be subdivided into a maximum of 4 distinct periods, subject to the following:
- A. Lane Closures resulting in one general traffic lane in the westbound direction on Broadway adjacent to the Main Street Station Traffic Site shall be permitted;
 - B. the implementation of the lane reduction referred to in Article 2.3.3(a)(i)A shall not commence during the periods of August 15 to September 30, or November 15 to December 26, in any calendar year;
 - C. concurrently with Article 2.3.3(a)(i)A, the closure of the northbound left turn lane, removal of the northbound left turn Traffic Signal phase, and prohibition of the northbound left turn movement on Main Street at Broadway shall be permitted;
 - D. a Bus Signal Priority system shall be required at the Broadway/Main Street intersection to provide priority for westbound Buses to proceed through the Main Street Station Traffic Site; and
 - E. a westbound #99 Bus stop shall be provided on Broadway between Kingsway and Main Street.
- (ii) Project Co shall be permitted to implement the following Lane Closures at the Main Street Station Traffic Site subject to the following:
- A. the closure of the traffic lanes on Quebec Street between Broadway and the lane south of Broadway shall be permitted;
 - B. the Broadway connection to the service lane on the north side of Broadway between Quebec Street and Main Street can be closed subject to West 8th Avenue being available for Access, for Emergency Response Vehicles to use, and for loading and garbage pickup in the lane; and
 - C. a westbound #99 Bus stop shall be provided on Broadway immediately east of Scotia Street.

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- (iii) Project Co shall be permitted to implement Pedestrian Disruptions at the Main Street Station Traffic Site subject to the following:
 - A. closure of the crosswalk across the east leg of the Broadway/Quebec Street intersection shall be permitted; and
 - B. closure of the sidewalk on the east side of Quebec Street between Broadway and the lane south of Broadway shall be permitted.
- (iv) At the Main Street Station Traffic Site, Project Co shall be permitted to remove the On-Street Parking on Quebec Street between Broadway and the lane south of Broadway.

2.3.4 Cambie Street Station Traffic Site

- (a) For the purposes of facilitating Construction activities specifically at the Cambie Street Station Traffic Site, the following Traffic Disruptions shall be permitted subject to acceptance by the Province's Representative under the Review Procedure:
 - (i) Project Co shall be permitted to implement the following Lane Closures at the Cambie Street Station Traffic Site for a maximum duration of 12 months, which can be subdivided into a maximum of 2 distinct periods, and subject to the following:
 - A. the prohibition of the westbound right turn and eastbound right turn movement on Broadway at Cambie Street shall be permitted;
 - B. the closure of the westbound left turn lane and prohibition of the westbound left turn movement on Broadway at Cambie Street shall be temporarily permitted subject to:
 - I. a westbound left turn lane and left turn Traffic Signal phase being provided at the Broadway/Oak Street intersection;
 - II. a westbound left turn lane and left turn Traffic Signal phase being provided at the Broadway/Ash Street intersection; and
 - III. a westbound left turn lane and left turn Traffic Signal phase being provided at the Broadway/Yukon Street intersection;
 - C. the closure of the eastbound left turn lane and prohibition of the eastbound left turn movement on Broadway at Cambie Street may be temporarily permitted dependent on the temporary location of

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the nearside eastbound #99 Bus stop on Broadway at Cambie Street in accordance with Article 2.4.2(a)(ii) of this Part 4 and subject to:

- I. an eastbound left turn lane and left turn Traffic Signal phase being provided at the Broadway/Oak Street intersection; and
 - II. an eastbound left turn lane and left turn Traffic Signal phase being provided at the Broadway/Ash Street intersection;
- D. the closure of the eastbound left turn lane and prohibition of the eastbound left turn movement on Broadway at Yukon Street shall be permitted subject to an eastbound left turn lane and left turn Traffic Signal phase being required at the Broadway/Ash Street intersection.
- (ii) Project Co shall be permitted to implement Lane Closures at the Cambie Street Station Traffic Site subject to the following:
- A. the closure of the service lane between Ash Street and Cambie Street south of Broadway, at Cambie Street, shall be permitted subject to Access, Emergency Response Vehicle access, loading and garbage pickup being available in the closed section of the service lane;
 - B. the closure of the service lane between Cambie Street and Yukon Street south of Broadway, shall be permitted subject to Access, Emergency Response Vehicle access, loading and garbage pickup to the Broadway-City Hall Canada Line SkyTrain being available in the closed section of the service lane;
 - C. the temporary prohibition of the eastbound right turn movement on Broadway at Cambie Street will be permitted; and
 - D. the closure of the eastbound left turn lane and prohibition of the eastbound left turn movement on Broadway at Yukon Street shall be permitted subject to an eastbound left turn lane and left turn Traffic Signal phase being required at the Broadway/Cambie Street intersection.
- (iii) Project Co shall be permitted to implement the following Lane Closures at the Cambie Street Station Traffic Site for a maximum duration of 24 months, of which 12 months shall be concurrent with the Lane Closures referred to in Article 2.3.4(a)(i), and subject to the following;

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- A. the southbound laning on Cambie Street at Broadway can be reduced to two through lanes and a right turn lane; and
 - B. the northbound laning on Cambie Street at Broadway can be reduced to a through lane and a shared through/right turn lane.
- (iv) Project Co shall be permitted to implement Pedestrian Disruptions at the Cambie Street Station Traffic Site subject to the following:
- A. the minimum Clear Sidewalk Width of the sidewalk on the north side of Broadway between Cambie Street and Yukon Street shall be permitted to be reduced to no less than 2.0m; and
 - B. the closure of the sidewalk on the south side of Broadway between the entrance to the Broadway-City Hall Canada Line Station and Yukon Street, shall be permitted.
- (v) Project Co shall be permitted to remove On-Street Parking on Cambie Street between 8th Avenue and 10th Avenue.

2.3.5 Oak Street Station Traffic Site

- (a) For the purposes of facilitating Construction activities specifically at the Oak Street Station Traffic Site, the following Traffic Disruptions shall be permitted subject to acceptance by the Province's Representative under the Review Procedure:
- (i) Project Co shall be permitted to implement the following Lane Closures at the Oak Street Station Traffic Site for a maximum duration of 12 months, which can be subdivided into a maximum of 2 distinct periods, and subject to the following:
 - A. the closure of the westbound left turn lane and prohibition of the westbound left turn movement on Broadway at Oak Street shall be permitted subject to:
 - I. a westbound left turn lane and left turn Traffic Signal phase being provided at the Broadway/Granville Street intersection; and
 - II. a westbound left turn lane and Traffic Signal phase being provided at the Broadway/Cambie Street intersection.
 - (ii) Project Co shall be permitted to implement Lane Closures at the Oak Street Station Traffic Site subject to the following:

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- A. the closure of the north leg of the Broadway/Laurel Street intersection to vehicular traffic will be permitted subject to Access, Emergency Response Vehicle access, loading and garbage pickup being available within the closed section of Laurel Street and access to the lane north of Broadway being available; and
 - B. the reduction of the south leg of the Broadway/Laurel Street intersection to a single lane and restricting it to Emergency Response Vehicle use only, shall be permitted.
- (iii) Project Co shall be permitted to implement Pedestrian Disruptions at the Oak Street Station Traffic Site subject to the following:
- A. the minimum Clear Sidewalk Width on the north side of Broadway between Oak Street and Laurel Street shall be permitted to be reduced to no less than 2.0m;
 - B. the minimum Clear Sidewalk Width on the south side of Broadway between Oak Street and Laurel Street shall be permitted to be reduced to no less than 2.0m; and
 - C. the closure of the sidewalk on the west side of Laurel Street between Broadway and the lane south of Broadway, shall be permitted.
- (iv) Project Co shall be permitted to implement On-Street Parking Disruptions at the Oak Street Station Traffic Site subject to the following:
- A. the removal of On-Street Parking on Oak Street within 50m of Broadway, shall be permitted;
 - B. the removal of On-Street Parking on Laurel Street between Broadway and the lane south of Broadway, shall be permitted; and
 - C. the removal of On-Street Parking on Laurel Street between Broadway and the lane north of Broadway, shall be permitted.

2.3.6 Granville Street Station Traffic Site

- (a) For the purposes of facilitating Construction activities specifically at the Granville Street Station Traffic Site, the following Traffic Disruptions shall be permitted subject to acceptance by the Province's Representative under the Review Procedure:
- (i) Project Co shall be permitted to implement the following Lane Closures at the Granville Street Station Traffic Site for a maximum duration of 12 months, which can be subdivided into a maximum of 2 distinct periods, and subject to the following:

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- A. the closure of the westbound left turn lane and prohibition of the westbound left turn movement on Broadway at Granville Street shall be permitted subject to:
 - I. a westbound left turn lane and left turn Traffic Signal phase being provided at the Broadway/Oak Street intersection;
 - II. a westbound left turn lane and left turn Traffic Signal phase being provided at the Broadway/Hemlock Street intersection; and
 - III. a westbound left turn lane and left turn Traffic Signal phase being provided at the Broadway/Fir Street intersection.
- (ii) Project Co shall be permitted to implement Lane Closures at the Granville Street Station Traffic Site subject to the following:
 - A. eastbound and westbound right turn lanes on Broadway at Granville Street shall be required; and
 - B. a westbound right turn lane on Broadway at Hemlock Street shall be required.
- (iii) Project Co shall be permitted to implement Pedestrian Disruptions at the Granville Street Station Traffic Site subject to the following:
 - A. the closure of the sidewalk on the north side of Broadway between Granville Street and Hemlock Street, between east of the lane east of Granville Street and the western edge of 1401 W Broadway, shall be permitted; and
 - B. the minimum Clear Sidewalk Width of the sidewalk on the south side of Broadway between Granville Street and Hemlock Street shall be permitted to be reduced to no less than 2.0m.

2.3.7 Arbutus Street Station Traffic Site

- (a) For the purposes of facilitating Construction activities specifically at the Arbutus Street Station Traffic Site, the following Traffic Disruptions shall be permitted subject to acceptance by the Province's Representative under the Review Procedure:
 - (i) Project Co shall be permitted to implement the following Lane Closures at the Arbutus Street Station Traffic Site for a maximum duration of 12 months, which can be subdivided into a maximum of 2 distinct periods, and subject to the following:

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- A. the closure of the eastbound left turn lane and prohibition of the eastbound left turn movement on Broadway at Arbutus Street shall be permitted subject to:
 - I. an eastbound left turn lane and left turn Traffic Signal phase being provided at the Broadway/Macdonald Street intersection; and
 - II. an eastbound left turn lane and left turn Traffic Signal phase being provided at the Broadway/Burrard Street intersection.
 - B. the closure of the westbound left turn lane and prohibition of the westbound left turn movement on Broadway at Arbutus Street shall be permitted subject to:
 - I. a westbound left turn lane and left turn Traffic Signal phase being provided at the Broadway/Macdonald Street intersection; and
 - II. a westbound left turn lane and Traffic Signal phase being provided at the Broadway/Burrard Street intersection.
- (ii) Project Co shall be permitted to implement Pedestrian Disruptions at the Arbutus Street Station Traffic Site subject to the following:
- A. the minimum Clear Sidewalk Width of the sidewalk on the north side of Broadway between Arbutus Street and Cypress Street shall be permitted to be reduced to no less than 2.0m except at Bus stops where the minimum Clear Sidewalk Width shall be 2.75m; and
 - B. the minimum Clear Sidewalk Width of the sidewalk on the south side of Broadway between Arbutus Street and Cypress Street shall be permitted to be reduced to no less than 2.0m except at Bus stops where the minimum Clear Sidewalk Width shall be 2.75m.
- (iii) Project Co shall be permitted to remove On-Street Parking on Maple Street within 50m of Broadway.

2.3.8 Crossover Traffic Sites

- (a) For the purposes of facilitating Construction activities specifically in the Crossover Traffic Sites on Broadway, the following Traffic Disruptions shall be permitted subject to acceptance by the Province's Representative under the Review Procedure:

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- (i) Project Co shall be permitted to implement the following Lane Closures at each of the Crossover Traffic Sites for a maximum duration of 20 months at each Crossover Traffic Site, and subject to the following:
 - A. a minimum of two general traffic lanes shall be open in the eastbound direction on Broadway between 5:00 and 23:00;
 - B. a minimum of one general traffic lane shall be open in the eastbound direction on Broadway between 23:00 and 5:00;
 - C. a minimum of two general traffic lanes shall be open in the westbound direction on Broadway between 5:00 and 23:00;
 - D. a minimum of one general traffic lane shall be open in the westbound direction on Broadway between 23:00 and 5:00;
 - E. the closure of Maple Street to vehicular traffic between Broadway and the lane between Broadway and 8th Avenue, shall be permitted subject to Access, Emergency Response Vehicle access, loading and garbage pickup being available on the closed portion of Maple Street; and
 - F. the closure of Maple Street to vehicular traffic between Broadway and the lane between Broadway and 10th Avenue, shall be permitted subject to Access, Emergency Response Vehicle access, loading and garbage pickup being available on the closed portion of Maple Street.
 - G. all turning movements shall be provided for at the Broadway/Yukon Street intersection, except for the eastbound left turn movement on Broadway which can be prohibited in accordance with Article 2.3.4(a); and
 - H. the number of northbound and southbound lanes and cycle lanes on Yukon Street at Broadway as at the Effective Date shall be retained.

2.3.9 Great Northern Way Traffic Site

- (a) For the purposes of facilitating Construction activities specifically in the Great Northern Way Traffic Site, the following Traffic Disruptions shall be permitted subject to acceptance by the Province's Representative under the Review Procedure:
 - (i) Project Co shall be permitted to implement Lane Closures at the Great Northern Way Traffic Site subject to the following:

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- A. at a minimum, two traffic lanes in each direction shall be required on the E 6th Avenue/Great Northern Way/E 2nd Avenue corridor between Main Street and Clark Drive;
 - B. at a minimum, single traffic lanes in each direction shall be required on:
 - I. Glen Drive;
 - II. Foley Street;
 - III. Fraser Street;
 - IV. Carolina Street;
 - V. Brunswick Street;
 - VI. Scotia Street;
 - VII. E 1st Avenue west of Thornton Street; and
 - VIII. E 1st Avenue between Carolina Street and Emily Carr University loading/service access facility on East 1st Avenue located approximately 50 meters west of Carolina Street.
 - C. access to and from Earl Finning Way shall be required from or to either Foley Street or Fraser Street;
 - D. a southbound left turn lane on Foley Street at Great Northern Way shall be required; and
 - E. a southbound left turn lane on Carolina Street at Great Northern Way shall be required.
- (ii) Project Co shall be permitted to temporarily remove On-Street Parking and On-Street Loading on the north side of Great Northern Way between the Central Valley Greenway connection east of Thornton Street and Thornton Street, to create an on-street Truck Staging Area for the minimum time required for Construction;
 - (iii) Project Co shall be permitted to temporarily close Thornton Street between Great Northern Way and E 1st Avenue subject to:
 - A. Project Co ensuring access to Thornton Street north of E 1st Avenue is available via E 1st Avenue; and
 - B. Project Co consulting with, and submitting written evidence of consultation with and responses by, the Communications Director, the City of Vancouver, Affected Property Owners, Affected Local

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Businesses, Emergency Response Agencies and Designated Traffic Stakeholders.

2.3.10 Undefined Traffic Sites

- (a) For the purposes of facilitating Construction activities in Undefined Traffic Sites, Traffic Disruptions shall be permitted subject to the Traffic Disruptions complying with the requirements of Article 1 of this Part 4.

2.4 Permitted Traffic Disruptions – Consent Procedure

- (a) This Article 2.4 prescribes Traffic Disruptions for the purposes of facilitating Construction activities that may be permitted subject to acceptance by the Province’s Representative in accordance with the Consent Procedure.

2.4.1 Traffic Site

- (a) This Article 2.4.1 prescribes Traffic Disruptions for the purposes of facilitating Construction activities generally within the Traffic Site for which Project Co may request acceptance by the Province’s Representative in accordance with the Consent Procedure.
- (b) If Project Co wishes to cause or direct any Traffic Disruptions (other than those which are not permitted under Article 3 of Part 4) for the purposes of facilitating Construction activities that do not fully comply with the requirements of Article 1 and Article 2.3 [Permitted Traffic Disruptions – Review Procedure], both of Part 4, Project Co shall submit an application to the Province’s Representative in accordance with the Consent Procedure.
- (c) Notwithstanding the generality of Article 2.4.1(b), Project Co shall submit an application to the Province’s Representative in accordance with the Consent Procedure for any proposed Traffic Disruption that may cause any of the following:
 - (i) a Bus Disruption;
 - (ii) Modification to the Arbutus Greenway;
 - (iii) Modification to the Central Valley Greenway;
 - (iv) installation of a new temporary Traffic Signal;
 - (v) Modification or closure to a Pedestrian Crosswalk at an intersection that is not permitted in accordance with Article 2.3;
 - (vi) an Access Disruption that is not permitted in accordance with Article 2.3;

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- (vii) an On-Street Parking Disruption that is not permitted in accordance with Article 2.3;
 - (viii) an On-Street Loading Disruption that is not permitted in accordance with Article 2.3;
 - (ix) a Truck Disruption causing Project Co Trucks to travel along roads that are not designated Truck Routes; and
 - (x) creation and operation of a Truck Staging Area that is not permitted under Article 2.3.
- (d) As part of Project Co's submissions under this Article 2.4, Project Co will be required to submit relevant Traffic Control Plan(s), Traffic Advisory Sign Plan(s), Business Advisory Sign Plan(s) and associated schedules, drawings, Traffic Analysis, Traffic Signal Records, analysis, justification and written evidence of consultation with applicable stakeholders and their responses to each proposed disruption.
- (e) An application submitted under Article 2.4.1(c) must comply with the following:
- (i) Project Co will be required to:
 - A. provide advance notification in accordance with Article 5 of this Part 4;
 - B. provide justification and motivation for the proposed Traffic Disruption;
 - C. inform and consult with the Communications Director, City of Vancouver, Bus Operator, Emergency Response Agencies, Vancouver Coastal Health, Affected Local Businesses, Affected Property Owners and Designated Traffic Stakeholders as necessary and provide written evidence of consultation and responses to the proposed Traffic Disruption, to the Province's Representative;
 - D. demonstrate that the proposed Traffic Disruption meets the requirements of the Project;
 - E. undertake Traffic Analysis as required in Article 4 of this Part 4;
 - F. undertake design and associated analysis; and
 - G. Project Co shall perform the requirements set out in Articles 2.4.1(e)(i)A to 2.4.1(e)(i)F before submitting an application to the Province's Representative.

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- (ii) Where Project Co considers it necessary to temporarily modify any Bus Facility to facilitate Construction, Project Co shall submit an application to the Province's Representative subject to the following:
 - A. Project Co shall provide advance notification in accordance with Article 5 of this Part 4;
 - B. Project Co shall provide evidence of consultation with the Bus Operator in advance of preparing and submitting the application;
 - C. Project Co shall evaluate the impacts to Bus routes, stops, operations, scheduling and Bus Facilities and plan, design and implement a comprehensive strategy to mitigate such impacts;
 - D. Project Co shall submit a proposal with supporting drawings, calculations and technical analysis to the Bus Operator and obtain written responses to such proposal, which Project Co will provide with its application to the Province's Representatives; and
 - E. Project Co shall perform the requirements set out in Articles 2.4.1(e)(ii)A to 2.4.1(e)(ii)D before submitting an application to the Province's Representative.

- (iii) Where Project Co considers it necessary to install new temporary Traffic Signals, Project Co shall submit an application to the Province's Representative subject to the following:
 - A. Project Co shall provide advance notification in accordance with Article 5 of this Part 4;
 - B. Project Co shall provide evidence of consultation with the Bus Operator and City of Vancouver in advance of preparing and submitting the application;
 - C. Project Co shall perform Traffic Analysis in accordance with Article 4 of this Part 4;
 - D. Project Co shall produce engineered electrical and civil design drawings sealed by a Professional Engineer;
 - E. Project Co shall design Traffic Signal timings and produce Traffic Signal Records;
 - F. Project Co shall submit a proposal with supporting drawings, calculations and technical analysis to the City of Vancouver and obtain written responses to such proposal, which Project Co will provide with its application to the Province's Representative; and

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- G. Project Co shall perform the requirements set out in Articles 2.4.1(e)(iii)A to 2.4.1(e)(iii)F before submitting an application to the Province's Representative.
- (iv) Where Project Co considers it necessary to implement a Pedestrian Disruption requiring modification or closure of a Pedestrian Crosswalk at an intersection that is not permitted under Article 2.3, Project Co shall submit an application to the Province's Representative subject to the following:
- A. Project Co shall provide advance notification in accordance with Article 5 of this Part 4;
- B. Project Co shall provide evidence of consultation with the City of Vancouver in advance of preparing and submitting the application;
- C. Project Co shall submit a proposal with supporting drawings, calculations and technical analysis to the City of Vancouver and obtain written responses to such proposal, which Project Co will provide with its application to the Province's Representative; and
- D. Project Co shall perform the requirements set out in Articles 2.4.1(e)(iv)A to 2.4.1(e)(iv)C before submitting an application to the Province's Representative.
- (v) Where Project Co considers it necessary to amend an Access that is not permitted under Article 2.3, or where an Access will be obscured, or an Access needs to be temporarily relocated or alternate routes need to be followed to and from an Access due to Construction activities, Project Co shall submit an application to the Province's Representative subject to the following:
- A. Project Co shall provide advance notification in accordance with Article 5 of this Part 4;
- B. Project Co shall consult with, obtain and provide written responses to such proposal from the City of Vancouver, Affected Local Businesses and Affected Property Owners in advance of preparing and submitting the application; and
- C. Project Co shall perform the requirements set out in Articles 2.4.1(e)(v)A to 2.4.1(e)(v)B before submitting an application to the Province's Representative.
- (vi) Where Project Co considers it necessary to amend On-Street Parking that is not permitted in accordance with Article 2.3, Project Co shall submit an application to the Province's Representative subject to the following:

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- A. Project Co shall provide advance notification in accordance with Article 5 of this Part 4;
 - B. Project Co shall consult with, obtain and provide written responses to such proposal from the Communications Director, City of Vancouver, Affected Local Businesses and Affected Property Owners in advance of preparing and submitting the application; and
 - C. Project Co shall perform the requirements set out in Articles 2.4.1(e)(vi)A to 2.4.1(e)(vi)B above, Project Co shall submit an application to the Province's Representative.
- (vii) Where Project Co considers it necessary to amend On-Street Loading that is not permitted in accordance with Article 2.3, Project Co shall submit an application to the Province's Representative subject to the following:
- A. Project Co shall provide advance notification in accordance with Article 5 of this Part 4;
 - B. Project Co shall consult with, obtain and provide written responses to such proposal from the Communications Director, City of Vancouver, Affected Local Businesses and Affected Property Owners in advance of preparing and submitting the application; and
 - C. Project Co shall perform the requirements set out in Articles 2.4.1(e)(vii)A to 2.4.1(e)(vii)B before submitting an application to the Province's Representative.
- (viii) Where Project Co considers it necessary or requires to route Project Co Trucks on City of Vancouver streets that are not designated Truck Routes, Project Co shall submit an application to the Province's Representative subject to the following:
- A. Project Co shall provide advance notification in accordance with Article 5 of this Part 4;
 - B. Project Co shall consult with, obtain and provide written responses to such proposal from the Communications Director, City of Vancouver, Affected Local Businesses and Affected Property Owners in advance of preparing and submitting the application; and
 - C. Project Co shall perform the requirements set out in Articles 2.4.1(e)(viii)A to 2.4.1(e)(viii)B before submitting an application to the Province's Representative.

SCHEDULE 4 PART 4 ARTICLE 2: PERMITTED TRAFFIC DISRUPTIONS

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- (ix) Where Project Co considers it necessary to create and operate a Truck Staging Area that is not permitted in accordance with Article 2.3, Project Co shall submit an application to the Province's Representative subject to the following:
 - A. Project Co shall provide advance notification in accordance with Article 5 of this Part 4;
 - B. Project Co shall consult with, obtain and provide written responses to such proposal from the Communications Director, City of Vancouver, Affected Local Businesses and Affected Property Owners in advance of preparing and submitting the application; and
 - C. Project Co shall perform the requirements set out in Articles 2.4.1(e)(viii)A to 2.4.1(e)(viii)B before submitting an application to the Province's Representative.

2.4.2 Broadway Traffic Site

- (a) For the purposes of facilitating Construction activities in the Broadway Traffic Site, the Traffic Disruptions in Articles 2.4.2(a)(ii) and 2.4.2(a)(iii) may be permitted subject to acceptance by the Province's Representative under the Consent Procedure and subject to Project Co complying with the following:
 - (i) Project Co shall Design and implement all Bus Priority Measures on Broadway to meet the Yield to Bus Zone delay requirements in accordance with Article 1.21.4(f) for each stage of construction and in accordance with the following:
 - A. Project Co shall provide advance notification in accordance with Article 5 of this Part 4;
 - B. Project Co shall provide evidence of consultation with the Bus Operator and City of Vancouver in advance of preparing and submitting the application;
 - C. Project Co shall perform Traffic Analysis in accordance with Article 4 of this Part 4;
 - D. Project Co shall submit a proposal with supporting drawings, calculations and technical analysis to the Bus Operator and City of Vancouver and obtain written responses to such proposal; and
 - E. Project Co shall perform the requirements set out in Articles 2.4.2(a)(i)A to 2.4.2(a)(i)D before submitting an application to the Province's Representative.

SCHEDULE 4 PART 4 ARTICLE 2: PERMITTED TRAFFIC DISRUPTIONS

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- (ii) Project Co may be permitted to temporarily relocate the existing eastbound #9 and #99 Bus stops on Broadway at the Cambie Street Station Site for a maximum period of four months which can be subdivided into a maximum of 2 distinct periods, and subject to the following:
 - A. Project Co shall ensure that the temporarily relocated eastbound #9 and #99 Bus stops at the Cambie Street Station Site are reinstated on Broadway between Cambie Street and Yukon Street after the expiry of the four month period;
 - B. Project Co shall ensure that such reinstated Bus stops shall not be located in the general traffic travel lanes and that appropriate Bus Priority Measures are provided where required; and
 - C. Project Co shall comply with its obligations set out in Articles 2.4.1(e)(ii) and 2.4.2(a)(i).
- (iii) Project Co may be permitted to relocate sections of the existing Arbutus Greenway in the vicinity of the Arbutus Station Site in accordance with Article 1.20.2 of this Part 4 subject to the following:
 - A. Project Co shall provide advance notification in accordance with Article 5 of this Part 4;
 - B. Project Co shall consult with the City of Vancouver in advance of preparing and submitting the application;
 - C. Project Co shall submit a proposal with supporting drawings, calculations and technical analysis to the City of Vancouver and obtain written responses to such proposal, which Project Co will provide with its application to the Province's Representative;
 - D. Project Co shall perform the requirements set out in Articles 2.4.2(a)(iii)A to 2.4.2(a)(iii)C before submitting an application to the Province's Representative.

2.4.3 Great Northern Way Traffic Site

- (a) For the purposes of facilitating Construction activities specifically in the Great Northern Way Traffic Site, the following Traffic Disruptions may be permitted subject to acceptance by the Province's Representative under the Consent Procedure:
 - (i) Project Co may be permitted to temporarily realign a section of the Central Valley Greenway in accordance with Article 1.20.2 of this Part 4 to facilitate the temporary closure of Thornton Street subject to the following:

SCHEDULE 4 PART 4 ARTICLE 2: PERMITTED TRAFFIC DISRUPTIONS

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- A. Project Co shall provide advance notification in accordance with Article 5 of this Part 4;
 - B. Project Co shall provide evidence of consultation with the City of Vancouver in advance of preparing and submitting the application;
 - C. Project Co shall submit a proposal with supporting drawings, calculations and technical analysis to the City of Vancouver and obtain written responses to such proposal, which Project Co will provide with its application to the Province's Representative; and
 - D. Project Co shall perform the requirements set out in Articles 2.4.3(a)(i)A to 2.4.3(a)(i)C before submitting an application to the Province's Representative.
- (ii) Project Co may be permitted to install a temporary Traffic Signal on Great Northern Way to facilitate access to/from the construction site subject to Article 2.4.1(e)(iii).

2.4.4 Undefined Traffic Sites

- (a) For the purposes of facilitating Construction activities in Undefined Traffic Sites, Traffic Disruptions that do not comply with the requirements of Article 1 of this Part 4 may be permitted subject to acceptance by the Province's Representative under the Consent Procedure.

Part 4. Traffic Management

Article 3. Non-Permitted Traffic Disruptions..... 3-1

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- 3.2 General 3-1
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 - 3.3.1 Traffic Site..... 3-1
 - 3.3.2 Broadway Traffic Site..... 3-2
 - 3.3.3 Great Northern Way Traffic Site 3-2

Article 3. Non-Permitted Traffic Disruptions

3.1 Scope

- (a) This Article 3 [Non-Permitted Traffic Disruptions] specifies the non-permitted Traffic Disruptions by Project Co for the purposes of facilitating Construction activities.

3.2 General

- (a) As set out in the definition of “Non-Permitted Traffic Disruption Event” in Schedule 1, each Project Co initiated Traffic Disruption that is prohibited by this Article 3 [Non-Permitted Traffic Disruption] is a Non-Permitted Traffic Disruption Event.

3.3 Non-Permitted Traffic Disruptions

3.3.1 Traffic Site

- (a) This Article 3.3.1 prescribes Traffic Disruptions that shall not be permitted within a Traffic Site.
- (b) Project Co shall not be permitted to implement a Full Closure.
- (c) Project Co shall not be permitted to implement a Traffic Disruption that causes a delay or necessitates rerouting of an Emergency Response Vehicle without evidence of consultation with, and acceptance by the Emergency Response Agencies.
- (d) Project Co shall not be permitted to implement a Traffic Disruption during a Planned Event.
- (e) Project Co shall not be permitted to implement a Traffic Disruption at the Arbutus Greenway or Central Valley Greenway that results in conditions that do not comply with the City of Vancouver Transportation Design Guidelines: All Ages and Abilities Cycling Routes.
- (f) Project Co shall not be permitted to implement a Traffic Disruption that causes Bus Delays to exceed the maximum permissible values specified in Article 1.21.4(f) of this Part 4.

SCHEDULE 4 PART 4 ARTICLE 3: NON-PERMITTED TRAFFIC DISRUPTIONS

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3.3.2 Broadway Traffic Site

- (a) This Article 3.3.2 prescribes Traffic Disruptions that shall not be permitted within the Broadway Traffic Site.
- (b) Project Co shall not be permitted to implement a reduction in crosswalk width or a closure of a crosswalk at either of the Broadway/Cambie Street or Broadway/Granville Street intersections.
- (c) Project Co shall not be permitted to implement Lane Closures at the Crossover Traffic Sites outside of the 8 month period referred to in Article 2.3.8(a)(i) unless such Lane Closures are integral to an adjacent Station Traffic Site Traffic Control Plan.
- (d) Project Co shall not be permitted to install Bus stops on through lanes on Broadway where road sections may be temporarily reduced to either 3 or 4 through lanes through Station Traffic Sites or Crossover Traffic Sites in accordance with Article 2, except at the Main Street Station Site in accordance with Article 2.3.3(a)(i)E.

3.3.3 Great Northern Way Traffic Site

- (a) This Article 3.3.3 prescribes Traffic Disruptions that shall not be permitted within the Great Northern Way Traffic Site.
- (b) Project Co Trucks shall not be permitted to travel on:
 - (i) E 1st Avenue west of Thornton Street;
 - (ii) Carolina Street north of Great Northern Way; and
 - (iii) Fraser Street north of Great Northern Way.

Part 4. Traffic Management

Article 4. Traffic Analysis 4-1

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- 4.4 Great Northern Way Traffic Site Requirements..... 4-4

Article 4. Traffic Analysis

4.1 Scope

- (a) This Article 4 [Traffic Analysis] of Part 4 specifies the requirements and criteria for Traffic Analysis to be undertaken by Project Co in support of Project Co's Traffic Control Plan design, submission and implementation.
- (b) The requirements of this Article 4 of Part 4 pertain specifically to the Broadway Traffic Site and the Great Northern Way Traffic Site.
- (c) Notwithstanding Article 4.1(b), the Province's Representative may, at its sole discretion, require similar Traffic Analysis to be undertaken by Project Co at other intersections or locations affected by Construction, outside of the Broadway Traffic Site or Great Northern Way Traffic Site.

4.2 General Requirements

- (a) Project Co shall acquire and use the Synchro (V10) software to undertake the analysis of intersection traffic performance and assist in the development of new Traffic Signal timings.
- (b) Project Co will be required to undertake Traffic Analysis for each and every Project Co initiated modification to:
 - (i) the number, designation or alignment of a traffic lane at a signalized intersection;
 - (ii) the storage length of a left turn or right turn lane at a signalized intersection;
 - (iii) the location of a stop line at a signalized intersection;
 - (iv) the location, width, or length of a crosswalk at a signalized intersection;
 - (v) the Traffic Signal phasing at a signalized intersection; and
 - (vi) the posted speed limit on the approaches to, or between, signalized intersections.
- (c) Project Co will be required to undertake Traffic Analysis for each and every new temporary Traffic Signal proposed by Project Co.

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- (d) Project Co shall undertake Traffic Analysis to assist in the preparation of optimized Traffic Signal timings that shall be produced for all signalized intersections affected by each stage of Construction.
- (e) Project Co will be required to produce optimized Traffic Signal timings for each new or temporary Traffic Signal.
- (f) Project Co shall ensure that all Traffic Analysis and Traffic Signal Records are signed and sealed by the Traffic Engineer.
- (g) Project Co shall provide justification and documentation to support all assumptions included in the Traffic Analysis.
- (h) The Province's Representative may, upon request and justification by Project Co, waive the requirements to perform Traffic Analysis of a particular stage of Construction, if the Province's Representative determines, in its sole discretion, that:
 - (i) the particular stage is substantially similar to a stage of the Traffic Control Plan previously analyzed by Project Co; and
 - (ii) such Traffic Analysis was previously accepted by the Province's Representative.
- (i) For the purposes of this Article 4 of Part 4, the terms "**Level of Service**" and "**LOS**" shall be used to describe traffic delays using Highway Capacity Manual (HCM 2010) methodologies.

4.3 Broadway Traffic Site Requirements

- (a) The requirements of this Article 4.3 pertain specifically to the Broadway Traffic Site.
- (b) Project Co shall use the following Synchro "Base" Peak Period models (which are also provided in the Data Room) as the basis for the required Traffic Analysis:
 - (i) **Base AM Peak Period Model** - for any Traffic Analysis required in accordance with Article 4.2 that will be in effect between 06:00 and 09:00 on weekdays;
 - (ii) **Base Midday Peak Period Model** - for any Traffic Analysis required in accordance with Article 4.2 that will be in effect between 09:00 and 16:00 on weekdays;

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- (iii) **Base PM Peak Period Model** - for any Traffic Analysis required in accordance with Article 4.2 that will be in effect between 16:00 and 19:00 on weekdays.
- (c) Project Co shall not be required to undertake Synchro Traffic Analysis for time periods outside of the weekday 06:00 to 19:00 periods, but Project Co, and more specifically, the Traffic Engineer, will be required to apply engineering judgement and accept responsibility for any and all Traffic Signal modifications, including Traffic Signal timing adjustments, that are designed and implemented outside of the weekday 06:00 to 19:00 periods.
- (d) Project Co may update or modify the provided Synchro “Base” Peak Period models subject to Project Co providing justification and documentation to the Province’s Representative supporting such updates and modifications, including any changes made to the Synchro parameters included in the Base Peak Period models referred to in Article 4.3(b). Any updates or modifications to the provided Synchro “Base” Peak Period model requested by Project Co will be submitted in accordance with the Consent Procedure.
- (e) Project Co shall be responsible for the collection of all additional data that may be required as input into the Synchro models.
- (f) Project Co shall undertake Traffic Analysis of the proposed Traffic Control Plans that shall:
 - (i) represent the anticipated road and Traffic Signal conditions contemplated during each specific stage of Construction and for each weekday Peak Period referenced in Article 4.3(b) of this Part 4; and
 - (ii) incorporate all Project Co-initiated impediments to traffic throughout the model network area contemplated during such stages of Construction.
- (g) Project Co shall summarize and document the following Synchro traffic performance criteria at all signalized intersections affected by each stage of Construction and for each weekday Peak Period, as determined using the following Highway Capacity Manual (HCM 2010) methodologies:
 - (i) Intersection Level of Service;
 - (ii) through and turning movement Level of Service (LOS);
 - (iii) through and turning movement volume/capacity (v/c) ratio; and
 - (iv) through and turning movement 50th and 95th percentile queue lengths and noting any “upstream metering” and “volume exceeds capacity” issues as per standard Synchro output.

- (h) Project Co shall submit the Synchro models representing the Traffic Control Plans, and all supporting Traffic Analysis, Traffic Signal Records, assumptions, justification, documentation, results and reports to the Province's Representative in accordance with Article 2 of this Part 4.

4.4 Great Northern Way Traffic Site Requirements

- (a) The requirements of this Article 4.4 pertain specifically to the Great Northern Way Traffic Site.
- (b) Project Co shall be responsible for the development and use of Synchro models that shall be used to:
 - (i) assess and optimize Traffic Signal operations and timings at all signalized intersections affected by each stage of Construction;
 - (ii) assess operations at existing or new unsignalized intersections affected by each stage of Construction.
- (c) Project Co shall be responsible for determining the extent of the Synchro models and the road links and intersections to be included therein.
- (d) Project Co shall develop Synchro models for each of the weekday Peak Periods referred to in Article 4.3(b).
- (e) Project Co shall be responsible for the collection of all data required as input into the Synchro models.
- (f) Project Co's shall undertake Traffic Analysis of the proposed Traffic Control Plans that shall:
 - (i) represent the anticipated road and Traffic Signal conditions contemplated during each specific stage of Construction and for each weekday Peak Period referenced in Article 4.3(b) of this Part 4; and
 - (ii) incorporate all Project Co-initiated impediments to Traffic throughout the model network area contemplated during such stages.
- (g) Project Co shall document and provide all assumptions, input, and output pertaining to the Synchro models.
- (h) Project Co shall summarize and document the following Synchro traffic performance criteria at all intersections affected by each stage of Construction and for each weekday Peak Period, as determined using the following Highway Capacity Manual (HCM 2010) methodologies as applicable:

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- (i) Intersection Level of Service (LOS);
 - (ii) through and turning movement Level of Service (LOS);
 - (iii) through and turning movement volume/capacity (v/c) ratios; and
 - (iv) through and turning movement 50th and 95th percentile queue lengths and noting any “upstream metering” and “volume exceeds capacity” issues as per standard Synchro output.
- (i) Project Co shall submit the Synchro models representing the Traffic Control Plans, and all supporting Traffic Analysis, Traffic Signal Records, assumptions, justification, documentation, results and reports to the Province’s Representative in accordance with Article 2 of this Part 4.

Part 4. Traffic Management

Article 5. Requirement to Inform of Traffic Disruptions..... 5-1

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- 5.2 Planned Traffic Disruptions.....5-1
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Article 5. Requirement to Inform of Traffic Disruptions

5.1 General

5.1.1 Scope

- (a) This Article 5 [Requirement to Inform of Traffic Disruptions] specifies the requirements for informing and consulting with the Province's Representative and others identified in this Article 5 [Requirement to Inform of Traffic Disruptions] of disruptions to Traffic, Pedestrians, Cyclists, Buses, Accesses, On-Street Parking, On-Street Loading, Truck Routes, and Traffic Signals by Project Co for the purposes of facilitating Construction activities.
- (b) Without limiting any other provision of this Agreement, Project Co shall comply with its obligations under this Article 5 [Requirement to Inform of Traffic Disruptions].

5.2 Planned Traffic Disruptions

- (a) Project Co shall inform and consult with the Province's Representative, the Communications Director, the City of Vancouver, TransLink, Bus Operators, Emergency Response Agencies, Vancouver Coastal Health, Traffic Media, Designated Traffic Stakeholders, Affected Property Owners, Affected Local Businesses, and the general public within the applicable Traffic Site in advance of any planned Traffic Disruptions for the purposes of facilitating any Construction activities as required by this Article 5.
- (b) Project Co shall inform and consult with the persons and organizations listed in Article 5.2(a) in accordance with Project Co's Master Traffic Management Plan, Master Traffic Management Public Information Plan, Schedule 9 [Communications, Community Relations and Business Relations] and this Part 4.
- (c) For Traffic Disruptions that are to be submitted under the Consent Procedure in accordance with Article 2.4 of this Part 4, Project Co shall inform and consult with the persons and organizations listed in Table 5.1, in accordance with the minimum advance notice periods provided in that table. The minimum advance notice periods provided in Table 5.1 specify the minimum notice period to be provided prior to Project Co's submission of the particular Traffic Disruption application to the Province's Representative under the Consent Procedure.

**SCHEDULE 4 PART 4 ARTICLE 5: REQUIREMENT TO INFORM OF TRAFFIC
DISRUPTIONS**

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Table 5.1 – Requirement to Inform/Consult – For Consent Procedure

Traffic Disruption	Details	Minimum Advance Notice (Calendar Days)	Province's Representative	Communications Director	City of Vancouver	TransLink/Bus Operators	Emergency Response Agencies/Vancouver Coastal Health	Designated Traffic Stakeholders	Affected Property Owners	Affected Local Businesses	General Public and Traffic Media
Bus Route or Schedule Change	With no exceptions	180 days	X	X	X	X					
Bus Disruption excluding Bus Route or Schedule changes, but including Bus Facilities and Bus Priority Measures	The only exception is Route 99 EB at Cambie and WB at Main where 90 days are required	30 days	X	X	X	X					
Arbutus Greenway Modification	With no exceptions	30 days	X	X	X						
Central Valley Greenway Modification	With no exceptions	30 days	X	X	X						
Installation of new Temporary Traffic Signal	With no exceptions	30 days	X	X	X	X					
Modification to or closure of Pedestrian Crosswalk	Where not permitted in accordance with Article 2.3	5 days	X	X	X	X					
Access Disruption or amendment	Where not permitted in accordance with Article 2.3	10 days	X	X	X	X	X		X	X	
On-Street Parking Disruption or amendment	Where not permitted in accordance with Article 2.3	10 days	X	X	X	X			X	X	

**SCHEDULE 4 PART 4 ARTICLE 5: REQUIREMENT TO INFORM OF TRAFFIC
DISRUPTIONS**

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On-Street Loading Disruption or amendment	Where not permitted in accordance with Article 2.3	10 days	X	X	X	X			X	X	
Truck Staging Area	Where not permitted in accordance with Article 2.3	10 days	X	X	X	X					
Truck Route Disruption	With no exceptions	30 days	X	X	X	X	X	X	X	X	
Any Other Traffic Disruption	Where not permitted in accordance with Article 2.3	10 days	X	X	X	X	X		X	X	
Street Furniture	All	30 days	X	X	X	X	X		X	X	

- (d) For Traffic Disruptions that have been accepted by the Province’s Representative under either the Review Procedure or Consent Procedure in accordance with Article 2 of this Part 4, Project Co shall then inform the persons and organizations listed in Table 5.2, in accordance with the minimum advance notice periods provided in that table..

Table 5.2 – Requirement to Inform – Prior to Implementation

**SCHEDULE 4 PART 4 ARTICLE 5: REQUIREMENT TO INFORM OF TRAFFIC
DISRUPTIONS**

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5.3 Unplanned Traffic Disruptions

- (a) In the event of any unforeseen or unplanned events, activities, disruptions or Incidents affecting normal Traffic flows or patterns within the applicable Traffic Site, Project Co shall provide notification of such events to the persons or organizations identified in Table 5.2 as soon as practical.