SCHEDULE 4
DESIGN AND CONSTRUCTION

PART 1
GENERAL PROVISIONS

ARTICLE 1 REFERENCE DOCUMENTS

1.1 Application of DBSS

The Project Work shall be carried out in accordance with the DBSS, subject to Section 1.3 [Order of Precedence] of this Part and with the following amendments to the DBSS:

(a) Section 125 [Value Engineering – Proposal Guidelines] shall not apply;

(b) any and all reference to "approval by the Ministry Representative" in the DBSS, in terms of acceptance of materials, work methodology or end product, shall be construed as meaning "approval by the Designer";

(c) any and all reference in the DBSS to the submission of material to the Ministry Representative "for approval", "for acceptance", or other qualifying phrase with similar connotation, is to be construed as the Province's Representative retaining the right to object to the submission material as set out in the Review Procedure; and

(d) when required under the DBSS to submit for approval by the Ministry Representative samples of any products which are not included on the Recognized Products List, to the extent Project Co proposes to use any such products, Project Co shall submit such samples to the Province's Representative in accordance with the Review Procedure.

1.2 Reference Documents

Without limiting any other provision in the Agreement, the Reference Documents shall apply to the Project Work as described in this Schedule.

1.3 Order of Precedence

Unless otherwise expressly provided in this Schedule, if there is any conflict between any of the provisions of this Agreement and any of the Reference Documents, the following shall apply in descending order of precedence:

(a) the provisions of this Agreement;

(b) the DBSS; and

(c) any other applicable Reference Documents.

1.4 Province Design

The Province makes no representation or warranty whatsoever, express or implied, that the design or concepts for the Project Work developed by the Province comply with the Project Requirements and any use by Project Co of any or all aspects of the Province's design or concepts in performing the Project Work shall be entirely at Project Co's own risk.

ARTICLE 2 DESIGN AND CONSTRUCTION

2.1 Responsibility for Design and Construction

Project Co shall be responsible for the Design, the Construction, including completion, commissioning and testing of the New Project Infrastructure and completion of the Bridge Demolition, 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.

2.2 Design Standards

(a) The Design shall be in accordance with the recommended practices in the Manual of Aesthetic Design Practice, using a "Parkway" aesthetic classification as applicable to the site context, and as the recommended practices align with current best practices and with consideration for all modes of transportation, including pedestrians and cyclists.

(b) Except as otherwise provided in this Schedule, the Design shall be in accordance with Ministry Standards except for the following roadways:

(i) which shall be designed in accordance with the applicable standards of the City of Surrey:

(A) Bridge Road;

(B) Old Yale Road;

(C) 112A Avenue;

(D) 124 Avenue;

(E) 111A Avenue; and

(F) 112 Avenue; and

(ii) which shall be designed in accordance with the applicable standards of the City of New Westminster:

(G) Dufferin Street;

(H) Agnes Street;

(I) Wellington Street;

(J) Hastings Street;

(K) Coburg Street;

(L) Bushby Street;

(M) Leopold Place;

(N) Front Street; and

(O) Granville Street.

2.3 Design-Build Contractor Director

The Design-Build Contractor Director shall be a Key Individual subject to the requirements of Section 3.3(c) of Schedule 2 [Representatives, Review Procedure and Consent Procedure] and shall have extensive experience:

(a) directly overseeing large, complex transportation projects comparable to the Project through the design and construction phase;

(b) managing and coordinating the design and construction activities in projects of comparable scope, scale and complexity to the Project, including design-build projects;

(c) leading multi-disciplinary teams; and

(d) developing and implementing construction safety programs.

2.4 Long-Span Bridge Design Lead

The Long-Span Bridge Design Lead shall be a Key Individual subject to the requirements of Section 3.3(c) of Schedule 2 [Representatives, Review Procedure and Consent Procedure] and shall have extensive experience:

(a) directly overseeing the design of long-span, complex bridges; and

(b) leading, managing and coordinating multi-disciplinary design teams for the design of bridges of comparable scope, scale and complexity to the Project, including design-build projects.

2.5 Design Manager

The Design Manager shall be a Key Individual subject to the requirements of Section 3.3(c) of Schedule 2 [Representatives, Review Procedure and Consent Procedure] and shall have extensive experience managing and coordinating multi-disciplinary design teams on the design of transportation projects in urban environments and of comparable scope, scale and complexity to the Project, including design-build projects.

2.6 Province Project Office and BCIB Facilities

(a) Project Co shall make available to the Province, from 30 days after the Effective Date until 30 days after the SC2 Substantial Completion Date, at Project Co's sole cost and expense, a minimum of 5,000 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:

(i) one boardroom;

(ii) four enclosed offices;

(iii) 12 secure parking stalls; and

(iv) dedicated kitchen facility, including sink, fridge, microwave and dishwasher.

(b) Project Co shall make available to the Province, from 30 days after the SC2 Substantial Completion Date until 30 days after the SC3 Substantial Completion Date, at Project Co's sole cost and expense, a minimum of 3,000 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:

(i) one boardroom;

(ii) two enclosed offices;

(iii) six secure parking stalls; and

(iv) dedicated kitchen facility, including sink, fridge, microwave and dishwasher.

(c) The Project office provided by Project Co pursuant to Sections 2.6(a) and 2.6(b) of this Part shall be within reasonable walking distance to the Project Site and SkyTrain and shall include sufficient office furnishings and equipment, including data connection but excluding internal computer and telephone network systems, to permit the use thereof by the Province.

(d) Project Co shall make available to BCIB, from 30 days after the Effective Date until 30 days after the SC3 Substantial Completion Date, at Project Co's sole cost and expense, a minimum of 520 square feet of office space in close proximity to the Project Co persons responsible for employee relations matters on site, providing BCIB with secure, unrestricted access and including the following:

(i) two enclosed offices;

(ii) one boardroom;

(iii) two secure parking stalls; and

(iv) access to kitchen and washroom facilities.

(e) The Project office provided by Project Co pursuant to Section 2.6(d) of this Part shall include sufficient office furnishings and equipment, including data connection but excluding internal computer and telephone network systems, to permit the use thereof by BCIB.

ARTICLE 3 INDEPENDENT CERTIFIER

3.1 Selection of Independent Certifier

The parties shall cooperate to select as the Independent Certifier an independent qualified firm of Professional Engineers that is acceptable to the Province and Project Co, that is without bias or conflict of interest, is experienced in respect of projects of the nature and scope of the Project and has acted as an engineer on projects similar to the Project, to carry out services of the nature required of an engineer to

certify the Substantial Completion of the Primary Infrastructure Components, the Completion Components and the Bridge Demolition, and Total Completion.

3.2 Independent Certifier Contract

The Province and Project Co shall, within 120 days following the Effective Date, enter into the Independent Certifier Contract with the Independent Certifier substantially in the form set out in Appendix A [Form of Independent Certifier Contract] to this Schedule. The Province and Project Co acknowledge and agree that the Independent Certifier Contract remains subject to modification following review by the Independent Certifier, with any such modifications to be agreed to by the Province and Project Co, each acting reasonably.

3.3 Independent Certifier Services

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

3.4 Changes in Terms

Neither the Province nor Project Co shall without the other's prior written approval (not to be unreasonably withheld or delayed):

(a) waive, settle, compromise or otherwise prejudice any rights or claims which the other may from time to time have against the Independent Certifier; or

(b) vary the terms of the Independent Certifier Contract or the services performed or to be performed by the Independent Certifier.

3.5 Performance of Obligations

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

3.6 Cooperation

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. All 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.

3.7 Information

Project Co and the Province shall provide the Independent Certifier with any information the Independent Certifier reasonably requires for the purpose of providing the services described in the Independent Certifier Contract.

3.8 Access to Project Site

Project Co and the Province shall permit the Independent Certifier to have access to the Project Site and to all documents and records relating to the Project Work (other than records and communications which are

legally privileged), as the Independent Certifier reasonably requires to carry out its responsibilities under the Independent Certifier Contract.

3.9 Replacement Independent Certifier

In the event of the Independent Certifier's appointment being terminated for any reason, the Province and Project Co shall cooperate with each other in order to appoint a suitably qualified and experienced replacement firm of Professional Engineers to act as the Independent Certifier as soon as reasonably practicable. The identity of any such replacement shall be as agreed by the Province and Project Co in writing and the terms of the appointment shall, unless otherwise agreed by the parties in writing, be substantially as set out in the Independent Certifier Contract.

3.10 Failure to Agree on Replacement

In the event the Province and Project Co fail to agree upon a replacement Independent Certifier within seven days of the original Independent Certifier's appointment being terminated, then a replacement Independent Certifier shall be chosen as follows:

(a) each of the Province and Project Co shall within seven days thereafter select three suitably qualified and experienced replacements that would be acceptable to that party, and shall provide notice thereof to the other party, with a ranking of preference for replacements;

(b) if the replacement candidate ranked highest by both the Province and Project Co is the same firm, that firm shall be the Independent Certifier; and

(c) if the parties have not selected a common replacement, then the determination of the new replacement shall be determined by the British Columbia International Commercial Arbitration Centre.

ARTICLE 4 MUNICIPAL REQUIREMENTS

4.1 Scope

(a) Project Co shall perform the Design and Construction of the Project in accordance with the requirements in this Article 4 [Municipal Requirements], the PBR Urban Integration Requirements, and this Agreement.

(b) Except where specifically provided otherwise in this Agreement, the bylaws, codes, processes and policies of the relevant Municipality do not apply to the Design and Construction of the Project Work.

(c) Project Co shall comply with Environmental Laws of the relevant Municipalities, excluding the following:

(i) City of New Westminster Construction Noise Bylaw No. 6063, 1992; and

(ii) City of Surrey Bylaw No. 7044.

4.2 Construction Noise and Hours of Work

(a) Project Co shall not undertake construction activities which disturb the quiet, peace, rest, enjoyment, comfort or convenience of the neighbourhood or of persons in the vicinity of the Project Site as follows:

(i) in the City of Surrey, on any weekday and Saturday outside of the hours from 7:00 a.m. to 10:00 p.m.;

(ii) in the City of New Westminster and for any instream works or work over the Fraser River:

(A) on any weekday outside of the hours from 7:00 a.m. to 8:00 p.m.; and

(B) on a Saturday outside of the hours from 9:00 a.m. to 6:00 p.m.; and

(iii) in both the City of Surrey and the City of New Westminster, and for any instream works or work over the Fraser River, on a Sunday or on a public holiday.

(b) Requests for variations to the requirements of Section 4.2(a) of this Schedule shall be submitted to the Province's Representative pursuant to the Consent Procedure.

4.3 Utilities Owned by a Municipality

(a) For greater certainty, a Municipality that owns Utilities is a Utility Supplier for the purposes of this Agreement.

(b) Without limiting or derogating from any other requirement of this Agreement, Project Co shall ensure that all Utility Work in relation to Utilities that are owned by a Municipality complies with applicable standards of the relevant Municipality (whether set out in a municipal bylaw or in another document).

(c) Unless otherwise required by this Agreement, all Utilities owned by a Municipality that require relocation or replacement by Project Co shall be replaced on a like-for-like basis.

(d) At the same time as the submission of any Design in relation to Utility Work by Project Co to a Municipality, such Design shall also be submitted to the Province's Representative in accordance with the Review Procedure.

4.4 Municipal Infrastructure

(a) All infrastructure owned by a Municipality other than the Infrastructure and Utilities referred to in this Schedule that requires relocation or replacement by Project Co shall be replaced with systems, fixtures and facilities which are of equal quality and capacity on a like-for-like basis.

(b) Where Project Co has decommissioned, abandoned or closed any municipal infrastructure on the Project Lands referred to in paragraph (a) above, Project Co shall offer the relevant Municipality the opportunity to accept such removable municipal infrastructure, and Project Co shall deliver such municipal infrastructure to the Municipality's public work yard unless otherwise agreed with the Municipality.

(c) The City of New Westminster will be placing an advertising sign within the area bounded by, and offset 2.0 metres from, the Bridge Connector, Royal Avenue and the Royal Avenue entrance ramp. Project Co shall not design or construct any temporary or permanent Infrastructure within this area. Project Co shall not place Infrastructure in a location that obstructs the view of the relocated sign without the prior consent of the Province.

(d) The existing digital advertising sign located adjacent to the Bridge Connector will be relocated by others to a location within the area bounded by the Bridge Connector, McBride Boulevard and the Royal Avenue and southbound McBride Boulevard exit ramp. Project Co shall accommodate the relocated sign in the Design. Project Co shall not design or construct any temporary or permanent Infrastructure within 3 metres of the sign without the prior consent of the Province. Project Co shall not place Infrastructure in a location that obstructs the view of the relocated sign without the prior consent of the Province.

(e) Project Co shall protect all digital advertising signs and tri-face advertising signs in their current locations or as relocated such that they remain in service during the performance of the Project Work. For further clarity, all advertising signs shall be considered Municipal infrastructure and the requirements as set out in Section 4.8 (Damage to Municipal Infrastructure) of this Part shall apply.

4.5 Permits and Fees

Project Co is not required to obtain any Permits or to pay Permit fees, development charges or other municipal fees or charges to any Municipality in connection with the Project Work except as required in relation to:

(a) Utility Work;

(b) construction, demolition, and or modification of any residential, commercial, industrial, institutional, or multi-family buildings;

(c) use of fire hydrants and water fill stations;

(d) any fieldwork undertaken by the relevant Municipality on behalf of Project Co, including inspections and testing;

(e) repairs and/or fieldwork undertaken by the relevant Municipality in dealing with an emergency caused or contributed to by the work of Project Co;

(f) testing and inspection of traffic signals that are owned by a Municipality; and

(g) repairs and/or modification to the heritage wall and to any other heritage components located at 9 E. Columbia Street (former Woodlands site).

4.6 Cooperation, Schedule and Work Priority

Project Co acknowledges that the Municipalities 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 Project and, as such, where municipal utility work or roadworks resulting from any municipal development approval is required on the Project Lands, Project Co shall:

(a) co-operate reasonably with the relevant Municipality and the land owner of the development, as applicable, to accommodate such municipal utility work or roadworks; and

(b) be responsible for coordinating such municipal utility work or roadworks with the relevant Municipality and land owner of the development, as applicable, where these works are either in conflict with the Design and Construction of the Project, or where these works fall within any part of the Project Site where construction activities are being carried out.

4.7 Surveys, Inspections, Plans, Drawings and Other Information

(a) Prior to commencing construction activities within a Municipality, Project Co shall conduct a pre-construction condition survey of all Infrastructure owned by a Municipality, including the City of Surrey's Dike system, 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, to the Province's Representative.

(b) Project Co shall provide all information, documentation and other assistance, including cooperation, reasonably requested by the Province to resolve any dispute between the relevant Municipality and the Province, as applicable, relating to the Project Work.

(c) Project Co shall conduct pre-construction and post-construction condition surveys in respect of pavement quality on roads owned by a Municipality and used for Construction access to and egress from any of the Project Lands, to a distance of 1 km outside of the Project Lands.

(d) All pre-construction and post-construction condition surveys shall be conducted by a Professional Engineer.

4.8 Damage to Municipal Infrastructure

If it is determined, whether pursuant to a post-construction condition survey in accordance with Section 4.7(a) of this Part, or otherwise, that Project Co has damaged any Infrastructure that is owned by a Municipality in the performance of the Project Work, then such damage shall constitute a Project Work Defect and Project Co shall remedy such Project Work Defect in accordance with Section 2.3 [Correction of Project Work Defects] of Schedule 5 to the extent necessary to restore the damaged Infrastructure on a like-for-like basis.

ARTICLE 5 UTILITIES

5.1 Project Co Responsibility

Project Co shall not construct, install or permit the construction or installation of any Utilities on, in, under or over the Project Site or any part thereof without the prior consent of the Province (which consent may be given or withheld in the discretion of the Province); provided that Project Co shall not be in default under this Section as a result of the exercise by a Utility Supplier of its rights under a Utility Agreement or as a result of any Utility Work carried out in compliance with Section 5.5 [Utility Work] of this Part and any other relevant provisions of this Agreement. Without limiting the generality of the foregoing, at no time shall Project Co use or permit the use of the Project Site or any Project Infrastructure for gas, oil or other petroleum product pipelines or infrastructure in connection therewith (other than those (if any) existing on the Effective Date) without the prior written consent of the Province (which consent may be given or withheld in the discretion of the Province).

5.2 Protection of Utilities

Except for Utility Work carried out in compliance with Section 5.5 [Utility Work] of this Part and any other relevant provisions of this Agreement, all Utilities located as at the Effective Date or thereafter on, in, under or over the Project Site (including Utilities within any excavation) are to remain in service and be protected and preserved by Project Co during and after the performance of the Project Work and any other works carried out in the course of the Project.

5.3 Location

Project Co shall be responsible for confirming the actual locations of all Utilities now or hereafter located on, in, under or over the Project Site and the Project Infrastructure and ensuring that its Principal Contractors and Subcontractors and employees of any of them are made aware of such locations as necessary to ensure compliance at all times with the provisions of this Schedule. Project Co shall not rely on location plans, as-built drawings supplied by Utility Suppliers or other similar documents for confirming locations of Utilities.

5.4 Utility Policy Manual

Project Co shall abide by, observe, comply with and perform and cause its Principal Contractors, Subcontractors and employees of any of them to abide by, observe, comply with and perform the terms of Sections 8, 9, 10, 11, 12 and 14 of the Utility Policy Manual.

5.5 Utility Work

(a) Project Co shall be responsible for securing all temporary and permanent Utilities required in connection with or as part of the Project Work, and for all Utility Work to be carried out in connection with or as part of the Project Work.

(b) Subject to the rights of Utility Suppliers under the Utility Agreements, all Utility Work shall be carried out by or under the supervision of and at the risk and expense of Project Co and without limiting the generality of the foregoing, Project Co shall be responsible for:

(i) obtaining from the relevant Utility Supplier, any Relevant Authority or any other Interested Party 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 the Utility Work, including determining the most effective strategies for undertaking the Utility Work;

(iii) liaising, arranging, co-ordinating and entering into all necessary agreements 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) ensuring that all Permits in connection with the Utility Work are obtained, including preparing all required documentation in connection therewith and ensuring that such Permits are maintained and, to the extent necessary, updated following completion of any Construction;

(v) observing and complying with any instructions or directions relating to the Utility Work that may be issued by the Province, including where issued by the Province expressly on behalf of a relevant Utility Supplier, Relevant Authority or other Interested Parties;

(vi) securing or causing to be secured the entry into or execution of all relevant construction and maintenance agreements, service contracts, and other agreements in connection with the Utility Work; and

(vii) when any Utility Work affecting Utilities referred to in a Utility Agreement are to be carried out, Project Co shall, prior to commencing such Utility Work and in accordance with any notice requirements provided under the relevant Utility Agreements, give written notice to the relevant Utility Supplier confirming that the Utility Work is being carried out by or on behalf of Project Co pursuant to this Agreement.

(c) The Utility Work to be carried out by Project Co shall include the following:

(i) Provision, across the New Fraser River Bridge, of the following conduit, associated splice chambers and terminal vaults, in accordance with the requirements of the associated future ducting owner. Terminal vaults shall be installed at both ends of the New Fraser River Bridge for each ducting owner:

Future Ducting Owner	**Conduit Quantity**
Telus	3 - 100mm conduit
Shaw	2 - 100mm conduit
Zayo	1 - 100mm conduit
Ministry	12 - 100mm conduit

(ii) Provision of the infrastructure required to relocate the telecom utilities from the Existing Pattullo Bridge to the terminal vaults associated with the New Fraser River Bridge and identified in Section 5.5(c)(i) of this Part, in accordance with the requirements of the Utility Suppliers. The work will permit full relocation of telecom utilities from the Existing Pattullo Bridge to the New Fraser River Bridge to the satisfaction of the Utility Supplier.

(iii) Provision, on the New Fraser River Bridge, of the following conduit, associated splice chambers and terminal vaults, in accordance with the requirements of CN Rail. Terminal vaults shall be installed at both ends of each duct run:

Ducting Purpose	**Conduit Quantity**
Facilitate power and communications feed to Railway Bridge operators shack	2 - 100mm conduit
Facilitate power and communications feed to Railway Bridge swing span	2 - 100mm conduit

(iv) Provision of the infrastructure required to relocate the Railway Bridge power and communications feeds from the CN Rail maintenance yard in New Westminster to the terminal vaults associated with the New Fraser River Bridge and identified in Section 5.5(c)(iii) of this Part, in accordance with the requirements and to the satisfaction of CN Rail. Installation and commissioning of the Railway Bridge power and communications feeds shall be by others.

(v) All new and existing utility chambers shall be provided, at all times, with vehicle access to a point directly adjacent to the utility chamber.

(vi) Project Co shall Design and construct a new 400mm diameter watermain under Bridge Road, from Old Yale Road to 112th Avenue, in accordance with the PBR Bridge Road Watermain.

(vii) Project Co shall relocate the existing City of New Westminster overhead electrical Utilities and existing telecommunication Utilities to underground, in the following locations:

(a) overhead City of New Westminster electrical Utilities and telecommunication Utilities on Royal Avenue from Dufferin Street to McBride Boulevard;

(b) overhead City of New Westminster electrical Utilities and telecommunication Utilities at the intersection of Bushby Street and Royal Avenue to the first pole on Bushby Street; and

(c) overhead City of New Westminster electrical Utilities from McBride Boulevard north side of Columbia Street to the existing underground electrical crossing below the Existing Pattullo Bridge on the south side of Columbia Street.

(viii) Project Co shall relocate all impacted municipal overhead electrical and communication Utilities to underground.

(ix) Project Co shall construct a new 100 mm diameter fibre optic conduit on Royal Avenue, connecting from the existing fibre optic line on Granville Street to the existing fibre optic line on McBride Boulevard..

(x) In the event that the Design of the East Columbia Street Entrance Ramp, to the New Fraser River Bridge, includes a loop ramp configuration, Project Co shall relocate existing municipal Utilities to the outside of the loop ramp.

(xi) Project Co shall design and construct a new 250mm diameter storm sewer from a new 1050mmm diameter manhole at Granville Street under Royal Avenue to a new 1050mmm diameter manhole at Dufferin Street and extending under Dufferin Street to the existing system at the end of Dufferin Street via a new 1050mmm diameter manhole.

(xii) Project Co shall replace two existing 200mm diameter combined sewers with two 200mm diameter PVC pipes under Royal Avenue from the two manholes under Granville Street to the manhole under Dufferin Street.

5.6 Project Co Responsible for Utility Costs

(a) Project Co shall:

(i) contract directly with the relevant suppliers for all electricity, gas, water, sewer, telephone and communications services and other Utilities and services supplied to the Project Site and/or used or consumed in the conduct of the Project Work and pay for all costs and expenses of such Utilities and services;

(ii) in addition to paragraph (a)(i) above, be responsible for all electricity costs in relation to electricity circuits along Highway 17 that are metered through MOTI electrical meter numbers 6-1, 6-2, 6-3 and 6-4; and

(iii) notwithstanding any contrary provisions in existing Utility Agreements related to payment responsibilities, but subject to paragraphs (b) and (c) below, be responsible for all costs and expenses arising from or in connection with the Utility Work,

and if either the Province or BCTFA is invoiced or otherwise charged directly for any such costs or expenses, the Province or BCTFA (as the case may be) may pay such costs and expenses and Project Co, upon demand, shall forthwith reimburse the Province or BCTFA, as applicable, for any amount so paid.

(b) Until such time as the aggregate amounts (the "**Specified Utilities Inspection Work Amounts**") payable by Project Co for the testing and inspection by the applicable Utility Supplier of Utility Work carried out by Project Co, in accordance with paragraph (a)(iii) above, pursuant to the following:

(i) section 11.11 (b) of the Municipal Agreement between the Province and The City of New Westminster;

(ii) section 10.12 (b) of the Municipal Agreement between the Province and the City of Surrey; and

(iii) section 2.5 (a) of the Utility Agreement to be entered into between the Province and the Greater Vancouver Water District and the Greater Vancouver Sewerage & Drainage District,

exceed $250,000, Project Co shall be responsible for the payment of all such Specified Utilities Inspection Work Amounts. The Province and Project Co will share the responsibility equally for the payment to the applicable Utility Suppliers of any Specified Utilities Inspection Work Amounts that exceed the aggregate amount of $250,000, subject to Project Co's obligations under Section 4.10 [Mitigation By Project Co] and provided that Project Co will be solely responsible for the payment of any such additional Specified Utilities Inspection Work Amounts that result from the occurrence of a Project Work Defect. If the total of the aggregate Specified Utilities Inspection Work Amounts is less than $250,000, Project Co shall pay to

the Province, on or before the SC3 Substantial Completion Date, the amount of such difference.

(c) Until such time as the aggregate amounts (the "**Specified Utilities Communications Work Amounts**") payable by Project Co, in accordance with paragraph (a)(iii) above, pursuant to the following:

(i) items 4.2.1, 4.2.2, 5.3.1 (except for Utility Work on Highway 17) and 5.3.2 (except for Utility Work on Highway 17) of Schedule B [Scope and Cost of Services] of the Utility Agreement to be entered into between the Province and Telus Corporation Inc.;

(ii) items 4.2.1, 4.2.2, 5.3.1 (except for Utility Work on Highway 17) and 5.3.2 (except for Utility Work on Highway 17) of Schedule B [Scope and Cost of Services] of the Utility Agreement to be entered into between the Province and Shaw Communications Inc.; and

(iii) items 4.2.1, 4.2.2, 5.3.1 (except for Utility Work on Highway 17) and 5.3.2 (except for Utility Work on Highway 17) of Schedule B [Scope and Cost of Services] of the Utility Agreement to be entered into between the Province and Zayo Canada Inc.,

exceed $500,000, Project Co shall be responsible for the payment of all such Specified Utilities Communications Work Amounts. The Province will be responsible for the payment to the applicable Utility Suppliers of any Specified Utilities Communications Work Amounts that exceed the aggregate amount of $500,000, subject to Project Co's obligations under Section 4.10 [Mitigation By Project Co] and except if and to the extent that the requirement for the payment of any such additional Specified Utilities Communications Work Amounts results from the occurrence of a Project Work Defect. If the total of the aggregate Specified Utilities Communications Work Amounts is less than $500,000, Project Co shall pay to the Province, on or before the SC3 Substantial Completion Date, the amount of such difference.

5.7 Province Assistance with Utility Matters

(a) Without prejudice to Section 5.10 [New and Amended Utility Agreements] of this Part, and provided Project Co has taken and continues to take all reasonable steps to obtain and to satisfy any conditions or requirements for obtaining from the relevant Utility Supplier, Relevant Authority, private owner or other person the rights of entry or access to any Utilities, or any other action, necessary or expedient to carry out any Utility Work required for the conduct of the Project 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, access or other action, in which event the Province, to the extent it has the legal ability to do so under existing Laws, shall use reasonable efforts to provide such assistance.

(b) In the event of a dispute between Project Co and a Utility Supplier as to whether Project Co is entitled to the benefit of or to exercise rights under any Utility Agreement which dispute, despite the reasonable and diligent efforts of Project Co, has not been resolved within a reasonable period of time, the Province, at the request and expense of Project Co, shall use reasonable efforts subject to the scope of the Province's legal rights under the terms of the

relevant Utility Agreement to assist Project Co in taking the benefit of or exercising the relevant rights under the Utility Agreement.

(c) 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 Section 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 or Utility Agreements, and may also include, where permitted in accordance with the terms of any Utility Agreement without the consent of the relevant Utility Supplier, the assignment of rights under such Utility Agreement to Project Co.

5.8 Utility Agreements

In the exercise of its rights and performance of its obligations under this Agreement Project Co agrees to comply with, observe and abide by and to cause its Principal Contractors and Subcontractors and employees of any of them to comply with, observe and abide by the terms of all Utility Agreements (whether existing on the Effective Date or entered into or amended thereafter in accordance with Section 5.10 [New and Amended Utility Agreements] of this Part). Project Co shall not do or omit to do or permit to be done or omitted anything that would result in the Province or BCTFA being in default of any terms of the Utility Agreements.

5.9 Rights under Utility Agreements

Unless otherwise expressly set out in this Agreement, Project Co shall be responsible for satisfying itself as to the extent to which it is entitled to take the benefit of or exercise rights under any Utility Agreement and, without limiting any other disclaimer or release of liability provided herein, the Province makes no representation or warranty whatsoever in that regard.

5.10 New and Amended Utility Agreements

The Province and BCTFA may enter into new Utility Agreements or amendments to existing Utility Agreements (which may include the grant of new Encumbrances or the amendment of existing Encumbrances affecting the Project Site or any part thereof) after the Financial Submittal Date to permit or facilitate the design, construction, installation, operation, repair, management, maintenance, rehabilitation, reconstruction and/or relocation of any existing or new Utilities. If the Province or BCTFA enters into any such new Utility Agreement or amendment that affects the Project Site or the conduct of the Project Work, the Province shall:

(a) give notice to Project Co and provide Project Co with particulars of the effect of the new Utility Agreement or amendment as it relates to the Project Site and the conduct of the Project Work;

(b) use or cause to be used reasonable efforts to include provisions in the new Utility Agreement or amendment requiring the Utility Supplier to use reasonable efforts in exercising its rights thereunder as they relate to the Project Site so as to avoid or, if unavoidable, minimize physical disruption to the operation of the Project Infrastructure or physical damage to the Project Infrastructure; and

(c) unless such new Utility Agreement:

(i) was entered into to facilitate the Project Work as part of or for the purposes of the acquisition of Province Lands pursuant to Schedule 8 [Lands]; or

(ii) is a Utility Agreement entered into by the Province with any of the Greater Vancouver Water District and the Greater Vancouver Sewerage & Drainage District, Telus Corporation Inc., Shaw Communications Inc. or Zayo Canada Inc. and is substantially in accordance with the terms of the respective drafts thereof included in the Data Room as of the Effective Date,

issue in respect of such new Utility Agreement a Province Change and the provisions of Part 7 [Province Changes and Project Co Proposals] shall apply accordingly.

5.11 Indemnity by Project Co

Project Co shall indemnify and hold harmless the Province and the Province Indemnified Persons, and each of them, in respect of any and all Direct Losses and Claims (except only to the extent such Direct Losses and Claims are caused directly by a Province Non-Excusable Event), which the Province and the Province Indemnified Persons, or any of them, may suffer or incur arising as a result of the provision of any assistance by the Province to Project Co in accordance with either Section 5.7(a) or Section 5.7(b) of this Part, regardless of whether or not Project Co ultimately obtains the relevant rights of entry, access or other action, or is able to take the benefit of or exercise any rights under the relevant Utility Agreement, as the case may be.

ARTICLE 6 OPERATION AND MAINTENANCE

6.1 Responsibility for Operation and Maintenance - General

Project Co shall carry out the operation and maintenance of the Project Infrastructure (the "**Operation and Maintenance**") in accordance with the requirements set out in this Article 6 in such a manner as to comply with this Agreement from the Effective Date to the SC2 Substantial Completion Date or, if earlier, the Termination Date.

6.2 Operation and Maintenance - Clarifications

(a) Project Co shall not be responsible for the following Operation and Maintenance on Highway 17:

(i) routine winter maintenance on roadways open to the public as specified in the Highway 17 Winter Maintenance Specifications.

(b) Project Co shall not be responsible for the following Operation and Maintenance of Project Infrastructure within the City of New Westminster:

(i) each traffic signal and traffic control device, until such time that such traffic signal or traffic control device is first modified, reconfigured, relocated or replaced by Project Co;

(ii) Front Street;

(iii) Drainage Appliances as defined in Maintenance Specifications – Service Area 6, except for catchbasins; and

(iv) the digital advertising sign adjacent to McBride Boulevard and the tri-faced advertising signs adjacent to the Royal Avenue overpass in their current or relocated locations.

(c) Project Co shall not be responsible for the following Operation and Maintenance of Project Infrastructure within the City of Surrey:

(i) each traffic signal and traffic control device, until such time that such traffic signal or traffic control device is first modified, reconfigured, relocated or replaced by Project Co;

(ii) existing dike along the Fraser River;

(iii) Drainage Appliances as defined in Maintenance Specifications – Service Area 6, except for catchbasins; and

(iv) the digital advertising sign adjacent to King George Boulevard.

(d) Project Co shall not be responsible for the following Operation and Maintenance of the SRY Rail crossing of Highway 17:

(i) the grade crossing surface components situated between the limits of asphalt paving on either side of the track; and

(ii) the associated SRY rail crossing components including signs, signals, gates, and electrical conduit.

(e) Project Co shall be responsible for Operation and Maintenance, including routine winter maintenance of permanent new roads and associated Project Infrastructure open to the public, including the New Fraser River Bridge, until Substantial Completion of the Primary Infrastructure Components or the Completion Components, as applicable.

(f) Project Co shall be responsible for snow removal in the Construction work zone, behind temporary barriers or other devices, including removal of snow or ice placed within Project Co's Construction work zones as a result of winter maintenance activities by the Province.

(g) For any roadway which is disturbed by Project Co such that the roadway condition requires a change to the winter maintenance methodology and results in increased costs for the Province to undertake routine winter maintenance, Project Co shall be responsible for the routine winter maintenance.

(h) Project Co shall be responsible for the maintenance of temporary and permanent Pavement Markings in accordance with Article 8 [Signing and Pavement Marking Design Criteria] of Part 2, and Part 4 [Traffic Management] of this Schedule.

6.3 Operation and Maintenance - Specifications

Project Co shall carry out Operation and Maintenance in accordance with Maintenance Specifications – Service Area 6 with the following amendments:

(a) Any and all references to "Contractor" are to be construed as Project Co.

(b) Any and all references to "Highway" are to be construed as any roadway within the Project Site.

(c) Section 1.2, Services, b) Quantified Maintenance Services is revised to the following:

"Consist of the planned maintenance, repair, replacement or new installation of all infrastructure identified as Quantified Maintenance Services in Schedule 1 Specifications and includes work activities that are reasonably predictable or seasonal, that are of a minor restorative nature."

(d) In reference to Schedule 1, Specifications, the following shall not apply:

(i) Section 1.2 Services, c) Additional Maintenance Services;

(ii) Section 2 Routine Maintenance Services Cap; and

(iii) Section 3 Warranty.

(e) Section 1.4, Specification Format, the 6th bullet, Routine Maintenance Service Cap and the 7th bullet, Warranty, shall not apply.

(f) Section 1.5, Interpretation, clause e) is revised to the following:

"When the statements "as directed by the Province", "as approved by the Province", or "as determined by the Province" are used, this means the Province may provide the direction, approval or determination from the Province's Representative in accordance with the Consent Procedure."

(g) The Section 6, General Specifications, that shall apply (Included) and shall not apply (Excluded) are set out in Table 6.3a as follows:

Table 6.3a

Schedule 1 Specifications Section 6 General Specifications	**Routine Maintenance Services**	**Quantified Maintenance Services**
1 Surface Maintenance		
1.01 Asphalt Pavement Maintenance	Included	Included
1.02 Surface Treatment	Not Specified	Excluded
1.03 Highway and Shoulder Grading and Re-Shaping	Not Specified	Excluded
1.04 Dust Control and Base Stabilization	Not Specified	Excluded

Schedule 1 Specifications Section 6 General Specifications	Routine Maintenance Services	Quantified Maintenance Services
1.05 Surface and Shoulder Gravelling	Not Specified	Excluded
1.06 Road Base Maintenance	Not Specified	Excluded
1.07 Surface Cleaning	Included	Included
1.08 Debris Removal	Included	Not Specified
1.09 Cattle Guard System Maintenance	Excluded	Excluded
1.10 Raised Hard Surfaced Infrastructure and Safety Device Maintenance	Included	Included
1.11 Railway Crossing Approach Maintenance	Included	Not Specified
2 Drainage Maintenance		
2.01 Ditch Maintenance	Included	Included
2.02 Drainage Appliance Maintenance	Included	Included
2.03 Shore, Bank and Watercourse Maintenance	Included	Included
3 Winter Maintenance		
3.01 Highway Snow Removal	Included	Included
3.02 Snow and Ice Bonding Prevention and Control	Included	Included
3.03 Other Snow Removal and Ice Control	Included	Included
3.04 Snow Avalanche Response	Excluded	Excluded
4 Roadside Maintenance		
4.01 Vegetation Control	Not Specified	Included
4.02 Brush, Tree and Danger Tree Removal	Not Specified	Included
4.03 Litter Collection and Graffiti Removal Maintenance	Included	Not Specified
4.04 Rest Area Facility Maintenance	Excluded	Not Specified
4.05 Fence Maintenance	Not Specified	Included
4.06 Roadside Catchment Appurtenances Maintenance	Not Specified	Included
5 Traffic Maintenance		
5.01 Sign System Maintenance	Included	Included
5.02 Temporary Pavement Markings and Eradication	Included	Included
5.03 Traffic Management	Excluded	Not Specified
6 Structures Maintenance		
6.01 Bridge Deck Maintenance	Included	Included
6.02 Structures Cleaning Maintenance	Included	Not Specified
6.03 Structures Drainage Maintenance	Included	Not Specified
6.04 Bridge Joint Maintenance	Included	Included

Schedule 1 Specifications Section 6 General Specifications	Routine Maintenance Services	Quantified Maintenance Services
6.05 Bridge Bearing Maintenance	Included	Included
6.06 Bailey and Acrow Bridge Maintenance	Excluded	Not Specified
6.07 Structure Minor Coating	Not Specified	Included
6.08 Concrete Structure Maintenance	Included	Included
6.09 Steel, Aluminum and Multi-plate Structure Maintenance	Included	Not Specified
6.10 Bridge Piling Maintenance	Included	Included
6.11 Retaining Wall Maintenance	Not Specified	Included
6.12 Bridge Railing Maintenance	Included	Not Specified
6.13 Timber Truss Bridge Maintenance	Excluded	Excluded
6.14 Timber and Log Bridge Maintenance	Excluded	Excluded
7 Network Management		
7.01 Highway Incident Response	Included	Not Specified
7.02 Major Event Response	Included	Not Specified
7.03 Highway Inspection	Included	Not Specified
7.04 Highway Safety Patrol	Included	Not Specified
7.05 Communications	Included	Not Specified

(h) Schedule 1, Section 6, General Specifications, Clause 2.01.3 (f) is revised to the following:

"Overpasses, interchanges and the New Fraser River Bridge are to be maintained without affecting underlying roads, Lands or railways, and snow shall not be disposed of in the Fraser River and on the underlying lands."

(i) The Section 7, Highway Maintenance Specifications, that shall apply (Included) and shall not apply (Excluded) are set out in Table 6.3b as follows:

Table 6.3b

Schedule 1 Specifications Section 7 Local Area Specifications	Routine Maintenance Services	Quantified Maintenance Services
1 LOWER MAINLAND		
1.01 Definitions		
1.02 Tunnel Traffic Monitoring / Control – George Massey Tunnel	Excluded	Not Specified
1.03 Tunnel Traffic Monitoring / Control – George Massey Tunnel Bridge	Excluded	Not Specified
1.04 Bridge Hard Surfaced Apron / Revetment Cleaning	Excluded	Not Specified

Schedule 1 Specifications Section 7 Local Area Specifications	Routine Maintenance Services	Quantified Maintenance Services
1.05 Bridge Traveller Maintenance – Alex Fraser Bridge and Port Mann Bridge	Excluded	Not Specified
1.06 Bridge Cable Stayed Snow and Ice Control – Alex Fraser Bridge	Excluded	Not Specified
1.07 Bridge Cable Stayed Snow and Ice Control – Port Mann Bridge	Excluded	Not Specified
1.08 Highway Crossing Infrastructure	Excluded	Excluded
1.09 Invasive Plants Management	Included	Included
1.10 Lane Closures	Excluded	Not Specified
1.11 Movable Barrier Transfer System Operations and Maintenance – Alex Fraser Bridge	Excluded	Not Specified
1.12 Movable Bridge Operations and Maintenance – Middle Arm South and Annacis Channel Swing Bridges	Excluded	Not Specified
1.13 Pavement Surface Reflectors	Not Specified	Excluded
1.14 Salt Containment Infrastructure Maintenance	Excluded	Not Specified
1.15 Sound Wall Maintenance	Not Specified	Excluded
1.16 Traffic Patrol - Bridges and Tunnel	Excluded	Not Specified
1.17 Traffic Patrol – Port Mann Highway 1	Excluded	Not Specified
1.18 Traffic Management – Pacific Highway Truck Crossing	Excluded	Not Specified
1.19 Traffic Management and Support – Port Mann Highway 1 Structures Inspections	Excluded	Not Specified
1.20 Vehicle Inspection Station Maintenance	Excluded	Excluded

(j) The following Schedules shall not apply:

2. Quantified Maintenance Services;
3. Additional Maintenance Services;
4. Cost Plus Rates;
5. Maintenance Services Fee;
6. Annual Adjustment Process;
7. Rates for Changes to Infrastructure;
8. Infrastructure;
9. Service Area;
10. Automated Weather Stations;

13. Gravel License;
14. Repeater System;
15. Dispute Resolution Protocol;
16. Prime Contractor Designation;
17. Bonds;
18. Insurance Requirements;
19. Insurance & Securities (Renewal Term);
20. Privacy Protection; and
21. Contractor Detail.

(k) The Summer Classification shall be "1" and the Winter Classification shall be "A".

(l) Project Co shall commission the Bridge Snow and Ice Removal Components by the earlier of:

(i) 30 days prior to permitting traffic on to the New Fraser River Bridge in accordance with Part 4 [Traffic Management] of this Schedule; and

(ii) the date set out in Section 6.4(a) of Part 3 [Design and Certification Procedure] of this Schedule.

(m) Project Co shall operate and maintain the Bridge Snow and Ice Removal Components under the instruction of the Province.

6.4 Operation and Maintenance - Electrical Specifications

Project Co shall carry out Operation and Maintenance of electrical infrastructure in accordance with Electrical Maintenance Specifications – Service Area 6 with the following amendments:

(a) Any and all references to "Contractor" are to be construed as Project Co.

(b) Any and all references to "Ministry Representative" are to be construed as Province's Representative.

(c) Section 3, Materials, Clause 3.2 shall not apply.

(d) The electrical specifications as listed in the "Electrical Maintenance Specifications Listing" that shall apply (Included) and shall not apply (Excluded) are set out in Table 6.4a as follows:

Table 6.4a

Electrical Maintenance Specifications Listing	Maintenance Services
E-110 TRAFFIC AND PEDESTRIAN SIGNAL MAINTENANCE	Included
E-120 ILLUMINATED PEDESTRIAN CROSSING SIGNS AND SPECIAL CROSSWALK SIGNS MAINTENANCE	Included
E-130 FLASHING BEACON MAINTENANCE	Included

Electrical Maintenance Specifications Listing	Maintenance Services
E-140 ACTUATED RAILWAY WARNING SIGN MAINTENANCE	Included
E-160 ONE WAY BRIDGE SIGNAL MAINTENANCE	Excluded
E-180 FIRE SIGNAL MAINTENANCE	Excluded
E-190 UNINTERRUPTIBLE POWER SUPPLY (UPS) MAINTENANCE	Included
E-210 POST MOUNTED FLASHER MAINTENANCE	Included
E-220 WARNING SIGNS WITH FLASHERS MAINTENANCE	Included
E-230 AVIATION, NAVIGATIONAL AND PIER LIGHTING MAINTENANCE	Excluded
E-310 STREET, ROADWAY, AREA AND SIGN LIGHTING MAINTENANCE	Included
E-320 HIGHMAST LIGHTING MAINTENANCE	Excluded
E-330 TUNNEL AND SNOWSHED LIGHTING MAINTENANCE	Excluded
E-340 PEDESTRIAN AND CYCLIST TUNNEL LIGHTING MAINTENANCE	Excluded
E-350 ARCHITECTURAL AND ORNAMENTAL LIGHTING	Included
E-410 SHORT DURATION TRAFFIC COUNTER STATION MAINTENANCE	Included
E-420 PERMANENT TRAFFIC COUNTER STATION MAINTENANCE	Included
E-510 OPEN / CLOSED SIGN MAINTENANCE	Excluded
E-520 ELECTRONIC MESSAGE SIGN MAINTENANCE	Included
E-530 OVERHEIGHT DETECTION SYSTEM MAINTENANCE	Excluded
E-610 WEB CAMERA MAINTENANCE	Excluded
E-700 HIGHWAY ELECTRICAL INFRASTRUCTURE INCIDENT AND VANDALISM RESPONSE	Included
E-710 TRAFFIC CONTROLLER EQUIPMENT DISPOSAL	Included
E-800 ELECTRICAL PATROL	Included
E-900 WEIGH SCALES	Excluded

(e) The following schedules in the Electrical Maintenance Specifications – Service Area 6 shall not apply:

2 Local Area Specifications;

3 Electrical Service Area (Map Reference);

4 Inventory;

5 Fee;

6 Cost for Changes to Inventory;

7 Annual Adjustment Process;

8 Additional Services;

9 Prime Contractor Designation Highway Construction Projects;

10 Dispute Resolution Protocol;

12 Repeater System;

13 Provincial Material List;

14 Bonds;

15 Insurance;

16 Insurance Securities (Renewal Term);

17 Privacy Protection; and

18 Contractor Details.

6.5 Operation and Maintenance Manager

(a) Project Co shall designate an Operation and Maintenance Manager (the "**Operation and Maintenance Manager**"), who shall be responsible for:

(i) day-to-day Operation and Maintenance of Project Infrastructure;

(ii) incorporating local user and stakeholder input into the Operation and Maintenance of highways and municipal roadways; and

(iii) coordinating and planning Operation and Maintenance activities with adjacent operators.

(b) The Operation and Maintenance Manager shall have the following experience:

(i) directly overseeing the operation and maintenance, during construction, of transportation infrastructure comparable to the Project Infrastructure;

(ii) managing the day-to-day operations of highway and municipal facilities; and

(iii) managing maintenance resources, including labour, equipment, material, facilities, suppliers and subcontractors.

6.6 Operation and Maintenance Plan

Project Co shall develop, implement and update an operation and maintenance plan (the "**Operation and Maintenance Plan**") that demonstrates compliance with the requirements of this Article and this Agreement. The Operation and Maintenance Plan shall be submitted to the Province's Representative, no later than 60 days from the Effective Date, in accordance with the Consent Procedure and shall include at a minimum:

(a) detailed description of the roads including road name, length;

(b) mapping that displays the road locations and extents of the Project Site;

(c) Project Co's specific approach, processes, resources, work programming, facilities and activities for meeting its Operation and Maintenance responsibilities;

(d) applicable specifications for the Operation and Maintenance activities performed;

(e) organizational structures, including Principal Contractors and Subcontractors, for achieving the Operation and Maintenance work;

(f) format of Operation and Maintenance Records; and

(g) relevance to and interface with other relevant documents and management plans.

6.7 Operation and Maintenance of the Existing Pattullo Bridge

For greater clarity, prior to the SC1 Substantial Completion Date, Project Co shall not be required to carry out the following in relation to the Existing Pattullo Bridge:

(a) operation and maintenance of the Existing Pattullo Bridge;

(b) routine nightly lane closures on the Existing Pattullo Bridge;

(c) daily closures of the East Columbia Street Entrance Ramp;

(d) operation and maintenance of traffic data collection and CCTV cameras; and

(e) operation and maintenance of seismic warning and wind monitoring system.

ARTICLE 7 INTERFACE WITH TRANSLINK INFRASTRUCTURE

7.1 General

(a) Project Co shall coordinate with TransLink and BCRTC and carry out the Design and Construction in such a manner as to comply with the requirements of TransLink and BCRTC, including compliance with this Article 7, this Agreement and all other applicable Project Requirements.

(b) Project Co shall:

(i) accommodate work by others on the Existing Pattullo Bridge including other Infrastructure as described in Section 6.7 [Operation and Maintenance of the Existing Pattullo Bridge] of this Part;

(ii) ensure access is maintained to all existing SkyTrain facilities including the SkyTrain Tunnel and tunnel ventilation shafts;

(iii) protect and preserve the seismic monitoring infrastructure operated by TransLink in relation to the Existing Pattullo Bridge, which shall remain in service until such time that the Existing Pattullo Bridge becomes permanently closed to public use;

(iv) in consultation with the applicable emergency responders, maintain access at all times to SkyTrain facilities including:

(A) existing or relocated fire hydrants, standpipes, and associated vehicle accesses;

(B) emergency exit and stairway, located at the SkyTrain Tunnel portal at the south terminus of McBride Boulevard; and

(C) platforms on the SkyTrain Bridge accessed from Highway 17;

(v) comply with the following Reference Documents:

(A) SkyTrain Limits of Approach; and

(B) TransLink - Adjacent and Integrated Development Consent Process; and

(vi) provide copies to the Province of documents and reports that Project Co produces or receives in its coordination with TransLink and compliance with this Article 7.

PART 2
DESIGN AND CONSTRUCTION REQUIREMENTS

ARTICLE 1 LANING AND GEOMETRICS DESIGN CRITERIA

1.1 Order of Precedence

The Design for the laning and geometrics shall be in accordance with the criteria contained in this Article and the following codes and standards, and if there is any conflict between criteria contained in this Article and any of the Reference Documents, the following shall apply in descending order of precedence:

(a) the criteria contained in this Article;

(b) the applicable Ministry Technical Circulars and Ministry Technical Bulletins;

(c) BC Supplement to TAC;

(d) TAC Geometric Design Guide; and

(e) the applicable documented standards of the relevant Municipality.

1.2 General Requirements

(a) Project Co's Design for the Project Infrastructure shall be based foremost on good engineering practices, with the traffic performance of the Design verified in accordance with the requirements of Section 1.6 [Traffic Engineering] of this Article.

(b) The minimum laning and geometrics design criteria for the Project Infrastructure are set out in this Article.

(c) For the purposes of this Schedule, the roadway names are as identified in Appendix C [Project Road Names] of this Schedule.

(d) The Design in New Westminster shall comply with the PBR Urban Integration Requirements.

1.2.1 TAC Design Domain Parameters

The BC Supplement to TAC and TAC Geometric Design Guide give a range of design domain parameters that shall be used for various components of the Design of the New Infrastructure. The TAC design domain value ranges for the various design parameters were established based on assumed variable operating speeds of the New Infrastructure. For the purposes of the Design of the New Infrastructure, operating speeds for the various roadways shall be deemed to be no less than the design speed stated in the Design Criteria tables shown in Section 1.3 [Geometric Design Criteria] of this Article. Consequently, unless specified otherwise, the design of the New Infrastructure shall be based on the upper limit of the design domain values indicated in the BC Supplement to TAC and TAC Geometric Design Guide, whenever either guide is applicable and subject to the order of precedence under Section 1.1 [Order of Precedence] of this Article.

1.2.2 General Laning

(a) As a minimum the number, location and configuration of lanes, including sequence of merges and diverges, for all roadways shall be in accordance with the PBR Laning Schematic, except as otherwise provided in the PBR Urban Integration Requirements.

(b) The incorporation of counterflow (reversible) lane configurations shall not be permitted.

(c) Transitions and interfaces with existing roadways shall be, at a minimum, consistent with ambient conditions.

(d) Where existing roads are truncated, cul-de-sac turning areas shall be provided.

(e) The following connection configurations shall not be permitted:

(i) rotaries or roundabouts;

(ii) diverging diamond interchanges; and

(iii) single-point diamond interchanges.

1.2.3 Entrance and Exit Ramps

(a) All entrance and exit ramp movements shall be free flow with no traffic signals.

(b) All ramps shall incorporate single-exit configurations except for dual lane exit ramps identified in the PBR Laning Schematic.

(c) The use of left-side exit and entrance ramps shall not be permitted.

(d) Except as otherwise provided in this Article, all entrance ramps shall be designed as add lanes or as parallel entrance ramps. Parallel entrance ramps shall have a minimum parallel lane length of 105m where connecting to Highway 17 and 50m in other locations**.**

(e) Spiral parameters at entrance and exit ramps shall be the larger of the values in Chapter 10 of the TAC Geometric Design Guide and Chapter 300 of the BC Supplement to TAC.

(f) Access to and egress from entrance and exit ramps shall not be permitted, except where required for Utility access.

1.2.4 Intersections

(a) Intersections shall be designed in accordance with Chapter 700 of the BC Supplement to TAC except as otherwise provided in this Article.

(b) Intersection configurations which incorporate left and/or right turn movements of more than two lanes (per movement) shall not be permitted.

(c) Signalized intersection designs shall be in accordance with Article 6 [Electrical, Signals and Lighting Design Criteria] of this Part.

(d) Double lane channelized right turn movements at signalized intersections shall be signal controlled.

1.2.5 Access to Properties

(a) Existing accesses to and egresses from affected properties from and to the road network shall be maintained.

(b) Direct accesses from properties to and from the New Fraser River Bridge, the Bridge Connector, King George Boulevard, and Highway 17 shall not be permitted.

(c) Accesses to existing Utilities and any associated facilities shall be provided in the Design.

1.2.6 Weaving Sections

(a) The capacity analysis of weaving sections shall be determined using procedures in the Highway Capacity Manual and as specified in this Article.

(b) Weaving sections shall be designed as Type "A or B" weaving sections in order to maintain the principles of "lane balance" as per the TAC Geometric Design Guide.

(c) Weaving sections shall have a minimum weave length of 300 m, defined as the distance between painted gores.

1.2.7 Vertical Curves

(a) Low points in the design profiles shall not occur on Bridges and shall be located a minimum of 5 m beyond any abutments except as otherwise provided in this Article.

(b) Vertical curves shall comply with the criteria in this Article with consideration of long-term settlement.

1.2.8 Stopping Sight Distance

Minimum stopping sight distances are provided in this Article and are based on TAC Geometric Design Guide Table 2.5.2. The increased stopping sight distance values shown in TAC Geometric Design Guide Table 2.5.3 shall be used where applicable.

1.2.9 Bus Stops/Bays

All existing bus stops and bus bays shall be retained. Any bus stops that will be impacted by Construction shall be reconstructed in accordance with the TransLink Bus Infrastructure Design Guidelines, including accessibility requirements and wheelchair pads at each bus stop.

1.2.10 Detours and Temporary Roadways

The design criteria for detours and other temporary roads shall be in accordance with the requirements of Part 4 [Traffic Management] of this Schedule.

1.2.11 Traffic Barriers

(a) Traffic barriers shall be placed in accordance with the TAC Geometric Design Guide and the AASHTO Roadside Design Guide.

(b) Bridge end parapets, traffic barriers with ends protected by terminals, flares, or impact attenuators, shall be in accordance with NCHRP Report 350, Test Level 3, or AASHTO MASH, Test Level 3.

(c) Roadside barrier warrants shall be in accordance with the BC Supplement to TAC.

(d) Positive drainage shall be maintained at all times, including where traffic barriers without holes or scuppers are installed.

(e) Traffic barriers shall be concrete, of a consistent surface texture and colour, and free of lifting holes and apparatus.

1.2.12 Rail Interface

(a) Rail crossings shall be designed and constructed in accordance with all relevant permits, standards and agreements including the CN Rail Master Agreement, Railway Crossing Agreements, the applicable rail authority requirements, the Bridge Standards and Procedures Manual, CTA Cost Apportionment Guidelines and the Transport Canada Railway Clearance Standard, and be consistent with the Grade Crossing Regulation and the Grade Crossing Standards.

(b) All rail crossings shall be grade separated, except for the following crossings:

(i) Highway 17 at SRY Rail Line - SR-TIM-0.31; and

(ii) Bridge Road at SRY Rail Line - SR-TIM-0.32.

(c) The following vertical distances shall be added to the vertical clearances required by the Railways and Transport Canada Railway Clearance Standards, at the following crossings:

(i) additional 4.0 m over the CN Rail line on the northeast approach to the Railway Bridge;

(ii) additional 1.0 m over the CN Rail line on the southeast approach to the Railway Bridge; and

(iii) additional 0.3 m over the SRY rail line on the south approach to the Railway Bridge.

(d) At-grade crossings shall include provision for cyclists in accordance with the TAC Geometric Design Guide and to the satisfaction of SRY. Multi-use paths shall permit cyclists to cross at-grade railway tracks at right angles.

(e) Project Co shall ensure the Highway 17 eastbound approach to the SRY at-grade crossing is designed to give advanced warning, based on the operating speed of Highway 17.

1.2.13 Noise Mitigation

(a) Project Co shall carry out all works required to achieve the mitigation requirements where warranted under the Noise Policy. Mitigation measures considered shall be implemented within the Project Lands. For the purposes of applying the Noise Policy to the Project, the following roads shall be treated as numbered highways:

(i) King George Boulevard;

(ii) New Fraser River Bridge mainline, entrance and exit ramps;

(iii) Bridge Connector;

(iv) Royal Avenue;

(v) Columbia Street;

(vi) East Columbia Street; and

(vii) McBride Boulevard.

(b) As a minimum, noise mitigation works shall include provision of 450 m of piled concrete noise walls, at a height of 4 m above the travelled portion of the roadway adjacent to the noise wall.

(c) Prior to commencing Construction, Project Co shall conduct a traffic noise impact assessment specific to the Design that shall include re-establishment of baseline noise levels at all noise monitoring sites employed during the Environmental Assessment Application. Project Co shall also establish additional monitoring sites as may be required to adequately define the baseline noise levels for the purposes of assessing Project noise impacts and mitigation requirements at all relevant locations as provided in the Noise Policy. Baseline noise measurements shall allow sufficient accuracy to permit prediction of the applicable mitigation requirements.

(d) Project Co shall conduct a traffic noise impact assessment to predict operational Project noise (using 2033 traffic volume estimates provided in the Environmental Assessment Application), and verify that its noise mitigation Design is expected to meet the requirements of the Noise Policy and this Article. Project Co shall use highway noise modeling consistent with Good Industry Practice in its impact assessment. Noise modeling for future traffic noise levels shall be based on traffic (24 hours per day) traveling at the posted speeds.

(e) Prior to commencing Construction, a noise impact assessment to predict construction-related noise shall be conducted by Project Co using current US Federal Highway Administration software or equivalent and shall include site-specific consideration, including, but not limited to, construction staging, night work, and the Construction Plant. The results of this assessment shall be submitted to the Province's Representative prior to Construction.

(f) Where Project construction-related noise levels are predicted to exceed L_d 80 dBA and L_n 65 dBA, as measured at the property line of any affected residence, noise mitigation works shall be implemented prior to commencing all other Construction in the affected areas.

(g) Within one year following the SC2 Substantial Completion Date, Project Co shall conduct post-construction noise monitoring at all noise monitoring sites including those listed in the Environmental Assessment Application and those established by Project Co. Post-construction noise monitoring shall be conducted when noise generated by Bridge Demolition will not affect results.

(h) If the results of post-construction noise monitoring indicate that noise mitigation works for the Project fail to achieve the performance standard identified in this Article, Project Co shall assess and recommend additional noise mitigation measures to the Province.

1.3 Geometric Design Criteria

1.3.1 General

(a) In this Schedule, it has been assumed for description purposes that the alignment across the river from the Bridge Connector in New Westminster to King George Boulevard in Surrey follows a north – south alignment.

(b) The geometric design criteria shall be as provided in this Section 1.3, except as otherwise provided in the PBR Urban Integration Requirements.

1.3.2 Roadway Cross Slopes

(a) The Design and Construction shall prevent standing water within the travelled lanes.

(b) Where more than 3 lanes are sloped in the same direction, the Design shall consider the risk of hydroplaning.

1.3.3 New Fraser River Bridge

Table 1.3.3 provides the geometric design criteria that are to be applied for the Design and Construction of the New Fraser River Bridge. Site specific additional requirements and/or exceptions (if any) to these requirements are addressed in Section 1.5 [Specific Design Requirements by Project Section] of this Article.

Table 1.3.3

Geometric Design Criteria	NFRB Mainline	Highway 17 westbound Exit Ramp	East Columbia Street Exit Ramp	East Columbia Street Entrance Ramp
Design Classification(1)	Urban Arterial Divided (UAD)	Ramp	Ramp	Ramp
Posted Speed	50 km/h	40 km/h	40 km/h	40 km/h
Design Speed	60 km/h	40 km/h	40 km/h	40 km/h
Number of Basic Lanes(2)	4 Lanes (2 per direction)	1	1	1
Minimum Radius	130 meters	55 m	55 m	55 m
Minimum K Factor Sag	9	4	4	4
Minimum K Factor Crest	13	4	4	4

Geometric Design Criteria	NFRB Mainline	Highway 17 westbound Exit Ramp	East Columbia Street Exit Ramp	East Columbia Street Entrance Ramp
Maximum Grade	5.5%	7.0%	7.0%	7.0%
Minimum Grade	0.5%	0.5%	0.5%	0.5%
Maximum Superelevation	6.0%	6.0%	6.0%	6.0%
Minimum S.S.D.(3)	85 m	45 m	45 m	45 m
Minimum D.S.D.	235 m	160 m	160 m	160 m
Lane Width(4) (5)	3.6 m	4.8 m	4.8 m	4.8 m
Shoulder Width Outside(5) (6)	2.0 m(11)	2.5 m	2.5 m	2.5 m
Shoulder Width Inside(5) (6)	1.0 m	1.0 m	1.0 m	1.0 m
Shoulder Treatment(7)	Barrier	Open Shoulder	Curb and Gutter	Curb and Gutter
Minimum Median Width(8)	2.6 m	--	--	--
Minimum Sidewalk Width(9) (10)	--	--	--	--
Minimum Multi Use Path Width(9) (10)	3.5 m	3.5 m	4.0 m	4.0 m
Design Vehicle(1)	WB20	WB20	WB20	WB20

Notes:

(1) Design Classification and Design Vehicle terms have the meaning given thereto in the TAC Geometric Design Guide.
(2) The number of basic lanes to be provided shall be in accordance with the PBR Laning Schematic.
(3) Stopping sight distances listed are for passenger vehicles. Stopping sight distances for truck operations, exceeding the listed S.S.D. shall be considered in the Design.
(4) Lane width does not include the width of the gutter pan.
(5) Lane and shoulder width superseded by design vehicle turning template where applicable.
(6) The clear distance between barriers or obstructions on either side of a single lane ramp shall not be less than 7.5m.
(7) Shoulder treatment superseded by barrier warrant where applicable.
(8) Median width is defined as the separation between through lanes in opposing directions, including any shoulder treatment.
(9) Refer to Schedule 4, Part 2, Article 10 for multi-use path and sidewalk requirements.
(10) The minimum sidewalk and multi-use path widths are defined at the wearing surface.
(11) The Outside Shoulder Width shall be a minimum of 1.9m in the Future Six Lane Configuration.

1.3.4 New Westminster Section

Tables 1.3.4a, 1.3.4b, and 1.3.4c, provide the geometric design criteria to be applied for the Design and Construction of roads in New Westminster. Site specific additional requirements are addressed in Section 1.5 [Specific Design Requirements by Project Section] of this Article.

Table 1.3.4a

Geometric Design Criteria	Bridge Connector	McBride Boulevard (Bridge Connector to Royal Avenue)	McBride Boulevard (Royal Avenue to Columbia Street)	Royal Avenue (east of Overpass)
Design Classification(1)	Urban Arterial Divided (UAD)	Urban Arterial Undivided (UAU)	Urban Arterial Undivided (UAU)	Urban Arterial Divided (UAD)
Posted Speed	50 km/h	40 km/h	50 km/h	50 km/h
Design Speed	50 km/h	40 km/h	50 km/h	50 km/h
Number of Basic Lanes(2)	4	1	Varies (2-3)	Varies (3-4)
Minimum Radius	130 m	55 m	80 m	150 m
Minimum K Factor Sag	9	4	6	6
Minimum K Factor Crest	11	4	7	7
Maximum Grade	6.5%	6.5%	Ambient Conditions	5.0%
Minimum Grade	0.5%	0.5%	0.5%	0.5%
Maximum Superelevation	6.0%	4.0%	4.0%	4.0%
Minimum S.S.D.(3)	85 m	65 m	85 m	85 m
Minimum D.S.D.	235 m	160 m	205 m	205 m
Lane Width(4) (5)	3.5 m	3.95 m lane (8.75 m total road width)	3.5 m	3.5 m
Shoulder Width Outside(5) (6)	--	--	--	--
Shoulder Width Inside(5) (6)	--	--	--	--
Shoulder Treatment(7)	Curb and Gutter	Curb and Gutter	Curb and Gutter	Curb and Gutter
Minimum Median Width(8)	1.2 m	--	--	3.8 m
Minimum Sidewalk Width(9) (10) (11)	--	2.0 m + 2.0 m boulevard (west side only)	2.0 m + 2.0 m boulevard (west side only)	2.0 m + 2.0 m boulevard (north side only)
Minimum Multi Use Path Width(9) (10) (11)	--	4.0 m + 2.0 m boulevard (east side only)	4.5 m + 2.0 m boulevard (east side only)	4.0 m + 2.0 m boulevard (south side only)
Design Vehicle(1)	WB20	WB20	WB20	WB20

Notes:

(1) Design Classification and Design Vehicle terms have the meaning given thereto in the TAC Geometric Design Guide.

(2) The number of basic lanes to be provided shall be in accordance with the PBR Laning Schematic.

(3) Stopping sight distances listed are for passenger vehicles. Stopping sight distances for truck operations, exceeding the listed S.S.D. shall be considered in the Design.

(4) Lane width does not include the width of the gutter pan.

(5) Lane and shoulder width superseded by design vehicle turning template where applicable.

(6) The clear distance between barriers or obstructions on either side of a single lane ramp shall not be less than 7.5m.

(7) Shoulder treatment superseded by barrier warrant where applicable.

(8) Median width is defined as the separation between through lanes in opposing directions, including any shoulder treatment.

(9) Refer to Schedule 4, Part 2, Article 10 for multi-use path and sidewalk requirements.

(10) The minimum sidewalk and multi-use path widths are defined at the wearing surface
(11) Sidewalk and MUP boulevards are not required to extend onto Bridges.

Table 1.3.4b

Geometric Design Criteria	Royal Avenue (Overpass and west)	East Columbia Street	Columbia Street	Royal Avenue Entrance Ramp
Design Classification(1)	Urban Arterial Undivided (UAU)	Urban Arterial Undivided (UAU)	Urban Arterial Undivided (UAU)	Ramp
Posted Speed	50 km/h	50 km/h	30 km/h	40 km/h
Design Speed	50 km/h	50 km/h	30 km/h	40 km/h
Number of Basic Lanes(2)	3	Varies (3-4)	Varies (3-4)	1
Minimum Radius	150 m	150 m	80 m	55 m
Minimum K Factor Sag	6	6	6	4
Minimum K Factor Crest	7	7	7	4
Maximum Grade	8.0%	7.0%	7.0%	10.0%
Minimum Grade	0.5%	0.5%	0.5%	0.5%
Maximum Superelevation	4.0%	4.0%	4.0%	6.0%
Minimum S.S.D.(3)	85 m	85 m	65 m	65 m
Minimum D.S.D.	205 m	205 m	205 m	160 m
Lane Width(4) (5)	3.5 m	3.5 m	3.5 m	4.8 m
Shoulder Width Outside(5) (6)	--	--	--	2.5 m
Shoulder Width Inside(5) (6)	--	--	--	1.0 m
Shoulder Treatment(7)	Curb and Gutter	Curb and Gutter	Curb and Gutter	Curb and Gutter
Minimum Median Width(8)	--	--	--	--
Minimum Sidewalk Width(9) (10) (11)	2.0 m + 2.0 m boulevard	2.0 m (north side only)	--	--
Minimum Multi Use Path Width(9) (10) (11)	--	--	4.0 m + 2.0 m boulevard (north side only)	--
Design Vehicle(1)	WB20	WB20	WB20	WB20

Notes:

(1) Design Classification and Design Vehicle terms have the meaning given thereto in the TAC Geometric Design Guide.
(2) The number of basic lanes to be provided shall be in accordance with the PBR Laning Schematic.
(3) Stopping sight distances listed are for passenger vehicles. Stopping sight distances for truck operations, exceeding the listed S.S.D. shall be considered in the Design.
(4) Lane width does not include the width of the gutter pan.
(5) Lane and shoulder width superseded by design vehicle turning template where applicable.
(6) The clear distance between barriers or obstructions on either side of a single lane ramp shall not be less than 7.5m.
(7) Shoulder treatment superseded by barrier warrant where applicable.
(8) Median width is defined as the separation between through lanes in opposing directions, including any shoulder treatment.
(9) Refer to Schedule 4, Part 2, Article 10 for multi-use path and sidewalk requirements.
(10) The minimum sidewalk and multi-use path widths are defined at the wearing surface.

(11) Sidewalk and MUP boulevards are not required to extend onto Bridges.

Table 1.3.4c

Geometric Design Criteria	Southbound Bridge Connector to Royal Avenue Ramp	Royal Avenue and southbound McBride Boulevard Exit Ramp
Design Classification(1)	Ramp	Ramp
Posted Speed	40 km/h	40 km/h
Design Speed	40 km/h	40 km/h
Number of Basic Lanes(2)	1	Varies (2-3)
Minimum Radius	55 m	55 m
Minimum K Factor Sag	4	4
Minimum K Factor Crest	4	4
Maximum Grade	7.0%	7.0%
Minimum Grade	0.5%	0.5%
Maximum Superelevation	6.0%	6.0%
Minimum S.S.D.(3)	65 m	65 m
Minimum D.S.D.	160 m	160 m
Lane Width(4) (5)	4.8 m	3.5 m
Shoulder Width Outside(5) (6)	--	--
Shoulder Width Inside(5) (6)	--	--
Shoulder Treatment(7)	Curb and Gutter	Curb and Gutter
Minimum Median Width(8)	--	--
Minimum Sidewalk Width(9) (10) (11)	--	--
Minimum Multi Use Path Width(9) (10) (11)	--	--
Design Vehicle(1)	WB20	WB20

Notes:

(1) Design Classification and Design Vehicle terms have the meaning given thereto in the TAC Geometric Design Guide.
(2) The number of basic lanes to be provided shall be in accordance with the PBR Laning Schematic.
(3) Stopping sight distances listed are for passenger vehicles. Stopping sight distances for truck operations, exceeding the listed S.S.D. shall be considered in the Design.
(4) Lane width does not include the width of the gutter pan.
(5) Lane and shoulder width superseded by design vehicle turning template where applicable.
(6) The clear distance between barriers or obstructions on either side of a single lane ramp shall not be less than 7.5m.
(7) Shoulder treatment superseded by barrier warrant where applicable.
(8) Median width is defined as the separation between through lanes in opposing directions, including any shoulder treatment.
(9) Refer to Schedule 4, Part 2, Article 10 for multi-use path and sidewalk requirements.
(10) The minimum sidewalk and multi-use path widths are defined at the wearing surface.
(11) Sidewalk and MUP boulevards are not required to extend onto Bridges.

1.3.5 Surrey Section

Tables 1.3.5a and 1.3.5b provide the geometric design criteria to be applied for the Design and Construction of roads in Surrey. Site specific additional requirements are addressed in Section 1.5 [Specific Design Requirements by Project Section] of this Article.

Table 1.3.5a

Geometric Design Criteria	King George Boulevard	112 Avenue	Bridge Road	Old Yale Road
Design Classification(1)	Urban Arterial Divided (UAD)	Urban Local Undivided (ULU)	Urban Local Undivided (ULU)	Urban Collector Undivided (UCU)
Posted Speed	60 km/h	50 km/h	50 km/h	50 km/h
Design Speed	60 km/h	50 km/h	50 km/h	50 km/h
Number of Basic Lanes(2)	Varies (4-5)	2	2	2
Minimum Radius	130 m	30 m	90 m	90 m
Minimum K Factor Sag	9	6	6	6
Minimum K Factor Crest	13	7	7	7
Maximum Grade	5.5%	8.0%	8.0%	6.0%
Minimum Grade	0.5%	0.5%	0.5%	0.5%
Maximum Superelevation	6.0%	4.0%	4.0%	6.0%
Minimum S.S.D.(3)	85 m	65 m	65 m	65 m
Minimum D.S.D.	235 m	145 m	160 m	160 m
Lane Width (5)	3.5 m (4)	4.0 m lane	4.5 m	4.0 m
Shoulder Width Outside(5) (6)	--	--	--	--
Shoulder Width Inside(5) (6)	--	--	--	--
Shoulder Treatment(7)	Curb and Gutter	Curb and Gutter	Curb and Gutter	Curb and Gutter
Minimum Median Width(8)	2.6 m	--	--	--
Minimum Sidewalk Width(9) (10) (11)	--	2.0 m (east side only)	NA + 1.5 m boulevard (south side only)	2.0 m + 2.5 m boulevard (east side only)
Minimum Multi Use Path Width(9) (10) (11)	3.2 m	4.0 m + 2.0 m boulevard (west side only)	4.0 m + 3.2 m boulevard (north side only)	4.0 m + 2.5 m boulevard (west side only)
Design Vehicle(1)	WB20	WB20	WB20	WB20

Notes:

(1) Design Classification and Design Vehicle terms have the meaning given thereto in the TAC Geometric Design Guide.

(2) The number of basic lanes to be provided shall be in accordance with the PBR Laning Schematic.

(3) Stopping sight distances listed are for passenger vehicles. Stopping sight distances for truck operations, exceeding the listed S.S.D. shall be considered in the Design.

(4) Lane width does not include the width of the gutter pan.

(5) Lane and shoulder width superseded by design vehicle turning template where applicable.

(6) The clear distance between barriers or obstructions on either side of a single lane ramp shall not be less than 7.5m.

(7) Shoulder treatment superseded by barrier warrant where applicable.

(8) Median width is defined as the separation between through lanes in opposing directions, including any shoulder treatment.
(9) Refer to Schedule 4, Part 2, Article 10 for multi-use path and sidewalk requirements.
(10) The minimum sidewalk and multi-use path widths are defined at the wearing surface.
(11) Sidewalk and MUP boulevards are not required to extend onto Bridges.

Table 1.3.5b

Geometric Design Criteria	Highway 17	Highway 17 Distributor Road	Bridgeview Drive
Design Classification(1)	Rural Arterial Divided (RAD)	Rural Arterial Divided (RAD)	Urban Arterial Divided (UAD)
Posted Speed	50 km/h	50 km/h	50 km/h
Design Speed	80 km/h	50 km/h	50 km/h
Number of Basic Lanes(2)	4	1/2	4
Minimum Radius	250 m	90 m	90 m
Minimum K Factor Sag	16(32) (3)	6(13) (3)	6
Minimum K Factor Crest	36	7	7
Maximum Grade	5.0%	7.0%	8.0%
Minimum Grade	0.0%(4)	0.0%(4)	0.5%
Maximum Superelevation	6.0%	6.0%	4.0%
Minimum S.S.D.(5)	140 m	65 m	65 m
Minimum D.S.D.	230 m	145 m	200 m
Lane Width(6) (7)	3.6 m	3.6 / 4.8 m(8)	3.3 m
Shoulder Width Outside(7) (9)	2.5 m	2.5 m	N/A
Shoulder Width Inside(7) (9)	0.5 m	0.5 m	N/A
Shoulder Treatment(10)	Open Shoulder	Open Shoulder	Curb and Gutter
Minimum Median Width(11)	1.6 m	--	Match Existing
Minimum Sidewalk Width (12) (13) (14)	--	--	1.5 m
Minimum Bike Lane Width(12) (13) (14)	2.5 m(15)	2.5 m	1.8 m
Design Vehicle(1)	WB20	WB20	WB20

Notes:

(1) Design Classification and Design Vehicle terms have the meaning given thereto in the TAC Geometric Design Guide.
(2) The number of basic lanes to be provided shall be in accordance with the PBR Laning Schematic.
(3) Bracketed values shown are the minimum K values for sag curves based on headlight control and shall apply where the roadway is unlit. Where the roadway is fully illuminated, the unbracketed values, which are the minimum K values based on comfort control, shall apply.
(4) The minimum gradient is 0.0% except where the cross slope is less than 0 50%, or the shoulder treatment is curb and gutter. In these two cases, a minimum longitudinal gradient of 0.50% shall be achieved.
(5) Stopping sight distances listed are for passenger vehicles. Stopping sight distances for truck operations, exceeding the listed S.S.D. shall be considered in the Design.
(6) Lane width does not include the width of the gutter pan.

(7) Lane and shoulder width superseded by design vehicle turning template where applicable.
(8) 3.6 m lane width for two lane roadways; 4.8 m lane width for single lane ramps.
(9) The clear distance between barriers or obstructions on either side of a single lane ramp shall not be less than 7.5m.
(10) Shoulder treatment superseded by barrier warrant where applicable.
(11) Median width is defined as the separation between through lanes in opposing directions, including any shoulder treatment
(12) Refer to Schedule 4, Part 2, Article 10 for bike lane and sidewalk requirements.
(13) The minimum sidewalk and bike lane widths are defined at the wearing surface.
(14) Sidewalk and bike lane boulevards are not required to extend onto Bridges.
(15) Bike lanes on Highway 17 shall be as described in Article 10 of this Part.

1.4 Future Six Lane Configuration

(a) The Design and Construction shall accommodate the future widening of the New Fraser River Bridge to six lanes and two multi-use paths (the "**Future Six Lane Configuration**") within the Project Lands and in accordance with the PBR Laning Schematic – Future Six Lane Configuration.

(b) Project Co shall develop a Design report for the Future Six Lane Configuration (the "**Future Six Lane Configuration Report**") in accordance with Article 1 [Laning and Geometrics Design Criteria] and Article 3 [Structural Design Criteria] of this Part and submit such report to the Province's Representative in accordance with the Review Procedure:

(c) Project Co shall demonstrate within the Future Six Lane Configuration Report, how the Design for the Future Six Lane Configuration would be achieved, including as a minimum:

(i) how the Design of the New Fraser River Bridge, Bridge Connector, Royal Avenue entrance ramp and East Columbia entrance ramp shall accommodate reconfiguration without modification to Structures except as provided in Article 3 [Structures] of this Part, to allow both the Royal Avenue entrance ramp and the East Columbia entrance ramp to function as add lanes;

(ii) how the Design of the East Columbia exit ramp shall accommodate reconfiguration to function as a drop lane exit from the New Fraser River Bridge without modification to Structures, except as provided in Article 3 [Structures] of this Part;

(iii) how the Design of the Highway 17 westbound exit ramp shall accommodate reconfiguration to function as a drop lane exit from the New Fraser River Bridge without modification to Structures, except as provided in Article 3 [Structures] of this Part;

(iv) how the Design of the New Fraser River Bridge mainline and King George Boulevard shall accommodate an additional northbound lane without modification to Structures except as provided in Article 3 [Structures] of this Part, or impacts to 112 Avenue or 111A Avenue;

(v) the widths of medians, lanes and shoulders as specified in Section 1.3 [Geometric Design Criteria] of this Article;

(vi) addition of two new 4.0m wide multi-use paths to the outside of, and at the same elevation as, the six lane vehicle deck; and

(vii) how the Design of the Future Six Lane Configuration shall minimize impacts to utilities, street lighting and drainage and shall preclude catchbasins in vehicle lanes.

1.5 Specific Design Requirements by Project Section

1.5.1 New Fraser River Bridge Section

The New Fraser River Bridge section consists of the mainline excluding the ramps (the "**NFRB Mainline**") and the New Fraser River Bridge entrance and exit ramps (the "**NFRB Ramps**"). The following section provides the minimum requirements for the Design for the NFRB Mainline.

(a) The NFRB Mainline shall connect King George Boulevard to the Bridge Connector west of Bushby Street.

(b) Provide an entrance ramp from westbound Columbia Street or westbound East Columbia Street.

(c) Provide an exit ramp to eastbound East Columbia Street.

(d) Provide an exit ramp to westbound Highway 17 Distributor.

(e) A single low point in the vertical profile is allowed provided it is a minimum of 10 m from expansion joints.

(f) Provide a median barrier to separate opposing lanes of traffic.

(g) Provide fixed barrier separated multi-use paths in accordance with Article 10 [Cycling and Pedestrian Facilities].

(h) Manholes or utility covers shall not be allowed on the New Fraser River Bridge.

(i) Carryout a study of traffic headlights with traffic in the Future Six Lane Configuration and mitigate any light pollution from headlights on adjacent properties.

(j) In addition to regulatory speed limit signs, active messaging signs including digital "Your Speed" signs, will be placed as follows:

(i) on the New Fraser River Bridge in each direction of travel;

(ii) at northbound exit to the City of New Westminster; and

(iii) on each entrance ramp.

1.5.2 New Westminster Section

This section outlines the minimum requirements for the Design in New Westminster.

1.5.2.1 Reconfiguration and Modification to Existing Streets

(a) As a minimum, reconfigure and modify the following as required:

(i) the road linking the NFRB Mainline and McBride Boulevard (the "Bridge Connector");

(ii) McBride Boulevard;

(iii) Royal Avenue;

(iv) East Columbia Street;

(v) Columbia Street;

(vi) the Royal Avenue entrance ramp;

(vii) the Southbound Bridge Connector to Royal Avenue Ramp; and

(viii) the Royal Avenue and Southbound McBride Boulevard exit ramp.

(b) Provide a channelized, free flow, connection onto Royal Avenue westbound as an add lane from the Northbound Bridge Connector.

(c) The Royal Avenue entrance ramp shall be a drop lane from Royal Avenue.

(d) Contact and coordinate with Outfront Media Inc., the City of New Westminster's digital advertising sign and tri-face advertising sign supplier, for the removal and transportation of the three tri-face advertising signs in the City of New Westminster to a storage location within 10 km of its current location as directed by the Province, to be carried out by Project Co at Project Co's cost.

(e) Provide a vehicle enforcement and refuge pull-out on the outside of the northbound Bridge Connector lanes. The pull-out shall be 4 m wide by 25 m long, with additional 1:5 entrance and exit tapers.

(f) Provide a paved pull-out suitable for a tow truck with direct access to the New Fraser River Bridge southbound. The pull-out shall be 3 m wide by 10 m long, with additional 1:5 entrance and exit tapers.

(g) Provide a 2.4 m wide parking lane on both sides of McBride Boulevard from Royal Avenue to the Bridge Connector

(h) Impacts to the Metro Vancouver Sapperton Main No. 1 Junction Chamber shall not be permitted.

(i) New manholes or utility covers shall not be permitted in travel lanes.

(j) Only the following Project Work shall be permitted within the portion of PID # 026-566-516 identified as Project Lands:

(i) westbound right turn from East Columbia Street to McBride Boulevard; and

(ii) landing and connection of the multi-use path northbound from the New Fraser River Bridge over East Columbia Street.

1.5.2.2 Intersections

(a) The following signalized intersections shall be provided in accordance with the PBR Laning Schematic:

(i) Provide a signalized intersection at Royal Avenue and McBride Boulevard with turn lane lengths as follows:

(A) Eastbound left (Royal Avenue to McBride Boulevard): 40 m;

(B) Northbound left (McBride Boulevard to Royal Avenue): 40 m; and

(C) Southbound left (McBride Boulevard to East Royal Avenue): 40 m.

(ii) Provide a signalized intersection at McBride Boulevard and Columbia Street / East Columbia Street with turn lane lengths as follows:

(A) Westbound right (East Columbia Street to McBride Boulevard): 60 m; and

(B) Southbound left (McBride Boulevard to East Columbia Street): 40 m.

Sightlines shall meet all applicable standards without the need for signage.

(iii) Provide a signalized intersection at Royal Avenue and the Southbound Bridge Connector to Royal Avenue Ramp with turn lane lengths as follows:

(A) Southbound left (Southbound Bridge Connector to Royal Avenue Ramp to Royal Avenue): 20 m.

(b) The following intersections shall be provided:

(i) A right in / right out only intersection at Leopold Place and Royal Avenue, with Leopold Place stop controlled.

(ii) An all movement intersection at Granville Street and Royal Avenue, with Granville Street stop controlled.

(iii) A right in only intersection from Royal Avenue to Coburg Street.

(iv) An all movement intersection at Bushby Street and Royal Avenue with Bushby Street stop controlled.

1.5.3 Surrey Section

This section outlines the minimum requirements for the Design in Surrey.

1.5.3.1 Reconfiguration and Modification to Existing Streets

(a) Reconfigure and modify the following streets as required:

(i) King George Boulevard;

(ii) 112 Avenue;

(iii) Bridge Road;

(iv) Old Yale Road;

(v) 128 Street;

(vi) Bridgeview Drive; and

(vii) 126A Street.

(b) Provide a free flow right turn from Bridgeview Drive to northbound King George Boulevard including modifications to laning on King George Boulevard in accordance with the scope and configuration as shown on the PBR Bridgeview Intersection. As a minimum these works shall provide new pavement surfacing and road markings.

(c) Provide a paved pull-out suitable for a tow truck with direct access to the New Fraser River Bridge northbound. The pull-out shall be 3 m wide by 10 m long, with additional 1:5 entrance and exit tapers.

(d) New manholes or utility covers shall not be permitted in travel lanes.

(e) Provide a dedicated right turn lane from King George Boulevard to 126A Street which accommodates a medium single-unit (MSU) truck. The right turn lane shall have a storage length of 50 m and a taper length of 50 m. 126A Street, between King George Boulevard and the laneway between King George Boulevard and 112A Avenue, shall be reconfigured to provide a single lane width of 3.5 m with 1.0 m wide shoulders on both sides. A 1.8 m wide sidewalk shall be provided to connect the sidewalk on King George Boulevard to the existing pedestrian overpass located adjacent to 126A Street.

1.5.3.2 112 Avenue

(a) Provide a 2 m wide parking lane on the west side of 112 Avenue.

(b) Provide low-profile curbs at driveway accesses.

(c) Where possible, and at minimum south of PID 003-919-897, provide a 2 m wide parking lane on the east side of 112 Avenue.

(d) Where possible, and at minimum south of PID 003-919-897, provide a 2 m wide seeded boulevard on the east side of 112 Avenue between the sidewalk and the parking lane identified in Section 1.5.3.2(c) of this Part.

(e) Provide a 0.3 m buffer between the edge of the sidewalk and the property lines.

1.5.3.3 Highway 17

Project Co shall ensure the following within the Design and Construction of Highway 17:

(a) Modify Highway 17 as required by this Schedule.

(b) A barrier separated collector-distributor road (the "**Highway 17 Distributor Road**") is provided to accommodate weaving traffic from the New Fraser River Bridge exit ramp and traffic exiting to Tannery Road.

(c) Highway 17 is grade separate over Old Yale Road, while maintaining Old Yale Road at its current elevation.

(d) Highway 17 Distributor Road is grade separate over Old Yale Road, while maintaining Old Yale Road at its current elevation.

(e) Existing manholes or utility covers shall not be permitted in wheel paths and new manholes or utility covers shall not be permitted in travel lanes.

1.5.3.4 Intersections

(a) The following intersections shall be provided:

(i) an unsignalized, all movements intersection at Old Yale Road and Bridge Road, with Bridge Road stop controlled; and

(ii) a signalized all movements intersection at Bridgeview Drive and King George Boulevard.

(b) The Design and Construction of the Highway 17 and Old Yale overpass shall not preclude the future signalization of the Old Yale Road and Bridge Road intersection. Project Co shall provide a preliminary Design for a future signalization of the Old Yale Road and Bridge Road intersection and submit to the Province's Representative in the Interim Design and the Final Design submissions.

1.6 Traffic Engineering

1.6.1 General Requirements

(a) Project Co's Design shall meet the traffic engineering requirements specified in this Section 1.6.

(b) Project Co shall submit a report (the "**Traffic Engineering Report**") to the Province's Representative in accordance with the Review Procedure providing analysis to demonstrate the Design complies with this Section 1.6.

(c) Project Co shall use a VISSIM microsimulation model to demonstrate the applicable requirements specified in this Section 1.6 are met by the Design. Project Co shall submit the

microsimulation model to the Province's Representative in accordance with the Review Procedure.

1.6.2 Design Hour Traffic Volumes

(a) The AM and PM design hour traffic volumes are provided in the PBR Design Hour Traffic Volumes and the PBR KGB/BD Design Hour Traffic Volumes. The volumes in the PBR Design Hour Traffic Volumes shall solely dictate the traffic engineering Design for the Project except the volumes in the PBR KGB/BD Design Hour Traffic Volumes shall be used for the Design of the intersection between King George Boulevard and Bridgeview Drive/128th Street. Traffic volumes provided in other documentation shall not be used for traffic engineering analysis and Design.

(b) For all Design traffic analysis, the "Peak Hour Factor", as defined in the Highway Capacity Manual, shall be 0.94 for the AM peak period and 0.95 for the PM peak period. For the MD peak period, Project Co shall use the actual observed Peak Hour Factor or 0.92 whichever is lower.

1.6.3 Traffic Engineering Design and Performance Criteria

(a) Project Co shall undertake the necessary traffic engineering analysis to demonstrate that the geometric design and configuration of weave sections, merges and diverges shall accommodate the AM and PM design hour traffic volumes in accordance with the following minimum traffic performance criteria, as defined in and determined using the methodology prescribed in the Highway Capacity Manual:

(i) LOS D,

provided that the following movement shall be excluded from the requirements of (i) of this subsection:

(ii) the merge of the East Columbia Street Entrance Ramp and the NFRB.

(b) For the purposes of Section 1.6.3 of this Article, the separation between a merge or diverge shall be measured at the nose location.

(c) Project Co shall demonstrate through the use of a VISSIM microsimulation model that for the Design:

(i) vehicle speeds are similar on the merging lane and the adjacent lane, or each of the weaving lanes as applicable;

(ii) queues from signalized intersections do not spill back onto the NFRB, Bridge Connector, or Highway 17 lanes;

(iii) queues from weaving sections, merges and diverges do not spill back onto the New Fraser River Bridge or Highway 17 lanes; and

(iv) queuing at intersections meets the requirements of this Article.

1.6.4 Traffic Signals

(a) Traffic signal coordination shall be implemented on all roadways where signalized intersection spacing is less than 200 metres.

(b) Project Co shall consider municipal traffic signals in the traffic signal coordination scheme. Project Co shall define the coordination scheme and seek approvals from the relevant Municipality. As a minimum, Project Co shall consider traffic signal operations for the following intersections:

(i) Intersections part of the Project Infrastructure;

(ii) Royal Avenue from Eighth Street to First Street;

(iii) McBride Boulevard from Tenth Avenue to Memorial Drive;

(iv) East Columbia Street from Brunette Avenue to Front Street;

(v) Tannery Road at Highway 17;

(vi) Scott Road from Tannery Road to King George Boulevard;

(vii) 128 Street at 111 Avenue;

(viii) King George Boulevard from Scott Road to Bridgeview Drive; and

(ix) Bridgeview Drive from 112B Avenue to Highway 17.

(c) Project Co shall coordinate with the relevant Municipalities with regard to any modifications that may be required at municipal traffic signals during Construction and following Construction. Proposed modifications shall be supported by traffic engineering analysis, traffic engineering checklists, signal timing sheets, and other Municipal requirements.

(d) Traffic engineering checklists and signal timing sheets for the Design of all signalized intersections within the New Infrastructure within provincial jurisdiction shall be developed in accordance with the Electrical and Traffic Engineering Manual and submitted to the Province's Representative in accordance with the Consent Procedure.

(e) Project Co shall design and install all temporary signal timings that may be required during Construction. For temporary signal timings for traffic signals within provincial jurisdiction, traffic engineering checklists and signal timing sheets shall be submitted to the Province's Representative in accordance with the Consent Procedure.

(f) Project Co shall design and implement new signal timing plans to accommodate opening day traffic at all intersections within the New Infrastructure. At a minimum, four signal timing plans (AM, PM, Midday, and off peak) shall be designed and implemented for each signalized intersection. Project Co shall be responsible for estimating opening day traffic volumes for midday and off-peak hours. A sensitivity analysis shall be performed by increasing the volumes of each movement by 20 percent and testing the proposed signal timing plans. Estimated traffic volumes, traffic engineering checklists and signal timing sheets for signals

within provincial jurisdiction shall be submitted to the Province's Representative in accordance with the Consent Procedure.

(g) The design of signal timing plans shall accommodate the AM and PM design hour traffic volumes in accordance with the following minimum traffic performance criteria, as defined in and determined using the methodology prescribed in the Highway Capacity Manual, except for the intersection of King George Boulevard and Bridgeview Drive where signal timing plans shall be designed to achieve the best traffic performance possible for the intersection:

(i) LOS D for the overall intersection;

(ii) no movement shall have a LOS below LOS D; and

(iii) no movement shall have a v/c below 0.85.

(h) Following the SC2 Substantial Completion Date, Project Co shall review the traffic signal operations at the intersections set out in Section 1.6.4(b) of this Article, as a minimum. These reviews shall be conducted at:

(i) one week;

(ii) one month;

(iii) six months; and

(iv) one year,

each as calculated from the SC2 Substantial Completion Date. As part of each review, Project Co shall undertake traffic counts and develop and implement new signal timing plans to meet the performance criteria of this Article. Updated signal timing sheets and supporting analysis shall be submitted to the Province's Representative in accordance with the Consent Procedure whenever signal timings are to be adjusted.

(i) All traffic engineering checklists and signal timing sheets shall be signed and sealed by the responsible engineer, who shall be a Professional Engineer of the appropriate discipline.

(j) Project Co shall be responsible for obtaining all traffic data that may be required for analysis and signal timing design purposes.

ARTICLE 2 PAVEMENTS

2.1 Pavement Design Criteria

Pavement design shall be in accordance with Technical Circular T-01/15, except that where Technical Circular T-01/15 refers to the Ministry's Standard Specifications for Highway Construction, the corresponding sections of the DBSS shall apply. The use of alternate pavement design methodologies such as the mechanistic empirical design method is not precluded.

2.2 General Requirements

(a) The construction of pavements shall be in accordance with the DBSS.

(b) Short sections of roadway with varying pavement types (for example asphalt and concrete) are not permitted unless otherwise specified.

(c) All paved surfaces, within the Project Lands, shall be new.

2.3 Asphalt Pavements

(a) For asphalt paving, the payment adjustments given in DBSS Section 502 shall not apply.

(b) All new roadway shall be designed to "Pavement Structure Type A".

(c) All widened areas of existing roadway shall be designed to "Pavement Structure Type A" except the following roads shall be designed to Municipal standards:

(i) East Royal Avenue, Granville Street, Bushby Street, Leopold Place, Albert Crescent, Dufferin Street, Agnes Street, and Wellington Street; and

(ii) 124 Street, Musqueam Drive, 112A Avenue, 112 Avenue, 111A Avenue, 128 Street, Old Yale Road and Bridge Road.

(d) All existing and retained asphalt pavements, within the Project Lands, shall have a mill and fill treatment.

(e) Asphalt overlays and mill and fill shall have a minimum thickness of 50 mm.

(f) Prior to asphalt overlay or mill and fill placement, any obvious defects in the roadway shall be repaired.

(g) In addition to the requirements of paragraphs (b), (c), and (d) of this Section, asphalt paving shall have an overlay of OGFC in all locations except for the following:

(i) Highway 17, 124 Street, Musqueam Drive, 112A Avenue, 112 Avenue, 111A Avenue, Bridgeview Drive, 128 Street, Old Yale Road and Bridge Road;

(ii) East Royal Avenue, Granville Street, Bushby Street, Leopold Place, Albert Crescent, Dufferin Road, Agnes Road, Hastings Street, and Wellington Street; and

(iii) multi-use paths and bike lanes.

(h) For new construction on Structures, asphalt shall have a minimum thickness of 100 mm, including the OGFC overlay.

(i) Graded aggregate seal coat is not permitted.

(j) Sulphur asphalt is not permitted.

(k) River sand shall not be used within 1.0 m of the underside of the asphalt, except on Highway 17 where the existing pavement structure is being retained.

(l) Asphalt cement shall be Group A, having a penetration grade of 80 – 100 and meeting the requirements of DBSS 952.

(m) An antistrip additive, from the Recognized Products List, shall be added to all asphalt mixes.

2.4 Concrete Pavements

(a) Predicted noise levels generated by traffic on concrete surfaces shall be of the same level or less than those generated by traffic on conventional asphalt surfaces.

(b) The surface skid resistance of concrete surfaces shall be of the same level or greater than that of conventional asphalt surfaces.

(c) Roller Compacted Concrete is not permitted.

2.5 Roughness

(a) The roughness for all bike lanes on Highway 17, multi-use paths on the New Fraser River Bridge and all travel lanes shall have an IRI measured in accordance with the DBSS of:

(i) less than or equal to 1.6 m/km in 71%; and

(ii) less than or equal to 2.1 m/km in 100%.

(b) Contrary to the DBSS, excluded surfaces shall be limited to:

(i) pavement surfaces within 3 m of a Bridge joint; and

(ii) Shoulders not on the New Fraser River Bridge.

(c) All pavements must be smooth, free of bumps, and obvious defects.

(d) Acceptance criteria for roughness testing shall apply for both asphalt and concrete pavements.

2.6 Pavement Structural Capacity

In addition to the requirements outlined in DBSS 502, the following shall apply to new roadway designed to "Pavement Type A":

(a) A pavement surface deflection survey shall be carried out using either a Benkelman Beam or Falling Weight Deflectometer (FWD) at a frequency of 50 m along each travel lane. The test points shall be staggered by 25 m along adjacent lanes.

(b) Benkelman Beaming shall be carried out according to ASTM D4695. FWD testing shall be carried out according to ASTM D4694, with a series of four load applications will be applied to the pavement surface. The first application is a "seating" load to confirm the FWD load plate is firmly resting on the pavement surface. The next three loads will be approximately

26, 40, and 55 kN. The representative rebound deflection calculated as per the Asphalt Institute MS-17, Chapter 6 shall not exceed 0.65 mm.

2.7 Pavement Design

A design report (the "**Pavement Design Report**") shall be submitted to the Province's Representative as part of the Interim Design submission and the Final Design submission. The Pavement Design Report shall contain, without limitation, the following:

(a) results of field investigations, soils sampling, and laboratory testing;

(b) rationale for the design parameters selected in developing the pavement design;

(c) methodology used as set out in this Article;

(d) assumptions made in the design to support the rehabilitation and lifecycle predictions being proposed by Project Co; and

(e) design details at the interface between OGFC and road infrastructure including bridge deck drainage, bridge expansion joints, catch basins, barriers and curb and gutters.

ARTICLE 3 STRUCTURAL DESIGN CRITERIA

3.1 Order of Precedence

The Design and Construction of Structures shall be in accordance with the criteria contained in this Article and the following codes and standards, and if there is any conflict between the criteria contained in this Article and any Reference Documents, the following shall apply in descending order of precedence:

(a) the criteria contained in this Article;

(b) Bridge Standards and Procedures Manual, including the BC Supplement to CAN/CSA-S6;

(c) the DBSS;

(d) CAN/CSA-S6;

(e) AASHTO LRFD Bridge Design Specifications;

(f) AASHTO LRFD Bridge Construction Specifications; and

(g) BS EN Eurocodes.

3.2 General Requirements

The following general requirements apply to all Structures.

3.2.1 Acceptable Products

All products used on the Project shall meet the applicable Project Requirements and shall be in accordance

with the intent of the Recognized Products List. The use of products that are not on the Recognized Products List requires written acceptance from the Province's Representative in accordance with the Consent Procedure. Acceptance shall be subject to Project Co demonstrating sufficient experience with the proposed product and acceptable performance for the proposed product under conditions and applications similar to those existing for this Project.

3.2.2 Unacceptable Products, Materials and Systems

The following are excluded from use in or under the completed Structures:

(a) stay-in-place metal formwork, including steel decking;

(b) aluminium, steel grid or composite sandwich decking;

(c) impressed current cathodic protection systems;

(d) Bridge deck heating systems;

(e) timber components, except for timber compaction piles placed below a known low water level;

(f) proprietary composite steel/concrete girders;

(g) discontinuous spans between substructure elements;

(h) MSE walls with dry cast concrete facing blocks;

(i) mechanically stabilised earth walls with polymeric reinforcement used as abutments except where the abutment is supported on piles;

(j) fibre reinforced polymer structural products;

(k) welded shear keys for precast concrete beams and slabs;

(l) asphalt plug joints;

(m) moveable bridges; and

(n) previously used materials.

3.2.3 Structure Identification Numbers

Structure identification numbers, as assigned by the Province's Representative, shall be incorporated into the Structures in accordance with Ministry standard practices. Project Co shall supply Bridge numeral forms and imprint identification numbers on Bridges.

3.2.4 Structure Parameters Data

As part of the Final Design submission, Project Co shall submit a spreadsheet including all structure parameters data for Structures as identified in Structure Parameters for Delivery by Engineers-of-Record on Ministry Projects. In addition, the spreadsheet shall include structural parameters for cable-stayed bridge

components.

3.2.5 Bridge Architect

(a) Project Co shall engage a bridge architect in the Design of Structures and urban integration (the "**Bridge Architect**"), who shall have the following qualifications:

(i) a minimum of 15 years of experience as a bridge architectural designer; and

(ii) experience as lead architectural designer for bridges, having collaborated with bridge engineers on at least three major bridge projects of comparable scale, prominence, and complexity.

(b) In consultation with the Bridge Architect, Project Co shall develop and provide renderings of the New Fraser River Bridge, multi-use overpasses in the City of New Westminster and other drawings and supporting information to the Province, as requested from time to time.

(c) Project Co shall engage the Bridge Architect in the Design of lighting in relation to Structures, including feature lighting required in accordance with the PBR Urban Integration Requirements and this Agreement.

(d) Project Co shall engage the Bridge Architect to develop a plan (the **"Urban Integration Architectural Plan"**) that demonstrates how the Design addresses the urban integration intent of the PBR Urban Integration Requirements. Project Co shall submit the Urban Integration Architectural Plan to the Province's Representative in the Interim Design and, in accordance with the Review Procedure, in the Final Design.

3.2.6 Indigenous Cultural Recognition Features

3.2.6.1 General

(a) Project Co shall be responsible for the detailed Design and Construction required to incorporate specific indigenous cultural recognition features (the "**ICR Features**") in accordance with the requirements of this Article.

(b) Project Co shall coordinate with and provide technical information and technical meetings to support the Province during development of artist designs for the ICR Features. For greater certainty, Project Co is not responsible for developing artist designs for the ICR Features.

(c) Project Co shall protect ICR Features and related materials during handling, transportation, storage and Construction. Project Co shall be responsible for all costs and expenses arising from necessary repairs or replacements to ICR Features and related materials.

3.2.6.2 Potential ICR Features

The following potential ICR Features are contemplated.

(a) ICR Features on NFRB towers, including:

(i) stainless steel art on each NFRB tower leg; and

(ii) feature lighting to highlight the stainless steel art;

(b) concrete embossed surfaces for the following:

(i) abutment walls, tower legs, and pile caps of the NFRB;

(ii) abutment walls of overpasses;

(iii) vertical surfaces on retaining walls;

(iv) parapets of overpasses; and

(v) noisewalls;

(c) incorporation of artist patterns into the NFRB safety and security fence; and

(d) other ICR Features, including:

(i) stainless steel or other metal railing on top of the parapets of overpasses;

(ii) thermoplastic pavement marking patterns;

(iii) incorporation of metal embeds, metalwork, tiles or other similar art designs on Project Infrastructure; and

(iv) interpretive signs.

3.2.6.3 Development of ICR Features

(a) Within seven days following the Effective Date, Project Co shall organize a coordination meeting with the Province regarding the development and implementation of ICR Features.

(b) Within seven days following the coordination meeting referred to in paragraph (a) above, Project Co shall prepare and submit a comprehensive list of potential ICR Features, developed in consultation with the Province, to the Province's Representative in accordance with the Consent Procedure.

(c) Within 30 days following the acceptance of the list referred to in paragraph (b) above in accordance with Consent Procedure, Project Co shall prepare and submit a plan (the "**ICR Features Implementation Plan**"), developed in consultation with the Province, to the Province's Representative in accordance with the Consent Procedure. The ICR Features Implementation Plan shall include as a minimum:

(i) the accepted list of the potential ICR Features;

(ii) Project Co's process for the detailed Design and Construction of ICR Features, including a process for coordinating and providing technical information to support the Province during development of artist designs;

(iii) design parameters, of sufficient detail to allow for the development of artist designs by the Province, for each potential ICR Feature;

(iv) the projected dates by which Project Co requires draft and final artist designs from the Province for each potential ICR Feature;

(v) key dates by which a decision by the Province is required; and

(vi) a preliminary cost estimate, developed in accordance with the principles set out in Section 2.2 [Preliminary Estimate of Impacts of Province Change] of Schedule 11, for each potential ICR Feature.

(d) The Province may, at any time and in its discretion, elect not to proceed with the artist design and implementation of any one or more potential ICR Features included on the list referred to in paragraph (b) and/or in the ICR Features Implementation Plan.

(e) Within 14 days of receiving a final ICR Feature artist design from the Province, Project Co shall submit, in accordance with the Consent Procedure and in accordance with the principles set out in Sections 2.3 [Preparation of Change Report] and 2.4 [Valuation of Change in Costs] of Schedule 11, a cost estimate for the Change in Costs specifically applicable to the detailed Design and Construction, including materials, fabrication and installation, required for Project Co to incorporate such ICR Feature in the Project Work and including, if requested by the Province, the cost to transport the ICR Feature, artist designs, or related materials from the artist workshop or other location to Project Co's secure storage location.

(f) If the Province, in its discretion, decides to proceed with any ICR Feature, the Province shall issue a Province Change, and the provisions of Part 7 [Province Changes and Project Co Proposals] will apply accordingly, except that, until such time as the aggregate Change in Costs for all such ICR Features determined in accordance with the foregoing (the "**Aggregate ICR Feature Change in Costs**") exceeds $3,000,000, Project Co shall bear all such Change in Costs. The Province shall pay to Project Co, in accordance with the provisions of Article 7 [Province Changes and Project Co Proposals], the amount by which the Aggregate ICR Feature Change in Costs exceeds $3,000,000 or, if the Aggregate ICR Feature Change in Costs for all ICR Features is less than $3,000,000, Project Co shall pay to the Province, on or before the SC3 Substantial Completion Date, the amount of the difference.

3.3 New Structures - General

This section includes the requirements for all new Structures required for the Project. Additional requirements for the New Fraser River Bridge are provided in Section 3.4 of this Article.

3.3.1 Design Loads

In addition to the requirements of this Schedule, the following requirements shall apply to the new Structures:

(a) The live load classification shall be BCL 625.

(b) For fatigue design, the greater of site specific traffic forecasts over the Design Life of the Structure and Class A Highway AADT shall be used.

3.3.2 Design Life

(a) Non-replaceable components shall have a minimum Design Life of 100 years. Non-replaceable components of Structures will, as a minimum, include:

(i) Foundations, including piles, pile caps and footings;

(ii) Substructures, including piers, pier caps, abutments, retaining walls, ground anchors, tie backs and soil reinforcing elements of mechanically stabilized earth walls; and

(iii) Superstructures, including primary and secondary structural members and decks, for roadway Superstructures.

(b) Trial mixes shall be used to demonstrate that Design Life of concrete elements can be achieved. Concrete mixes shall undergo an accelerated testing program to confirm their scaling resistance.

(c) Replaceable components shall include, as a minimum, the components given in Table 3.3.2 below and shall have the corresponding Design Life given in Table 3.3.2.

Table 3.3.2 – Design Life for Replaceable Components

Component	Design Life (years)
Bearings	50
Joints	40
Joint seals, sliders and springs	15
Shock transmission units	30
Steel coating systems	30
Hand rails, fencing and barriers	40
Deck Wearing Surface System	30
Drainage systems	40
Sign support Structures	75
Stay cables and tie-down cables, including sheaths	60
Stay cable dampers	30
Structural Health Monitoring System	20
Elevators, travellers, inspection gantries	50
Ladders, platforms, handrails, doors, hatches	50
Dehumidification system	40
Stay Cable Snow and Ice Removal System	20

3.3.3 Materials and Durability

(a) Design for durability shall meet the Design Life requirements of this Article.

(b) For certainty, the Design of components shall meet all applicable durability requirements of the BC Supplement to CAN/CSA-S6.

(c) For components for which durability requirements are not provided in the BC Supplement to CAN/CSA-S6, with surfaces exposed to soil, De-icing Chemicals, seepage, runoff, or which are at the interface with the water table or otherwise subject to a corrosive environment, Project Co shall determine the Design required to meet the Design Life using the specific analyses given in this Article for concrete components and as prescribed by a corrosion specialist for other materials.

3.3.3.1 Steel

(a) If the mechanism to address corrosion of steel exposed to groundwater is to add thickness, then the following are minimum acceptable design losses:

(i)	Galvanization loss:	15 micrometres/year for first two years
		4 micrometres/year for subsequent years
(ii)	Carbon steel loss:	12 micrometres/year after zinc depletion

(b) Structural steel shall have a nominal yield strength of 350 MPa, as a minimum, except as otherwise provided in this Article.

(c) All welding and weld inspection shall be in accordance with CAN/CSA-S6, CAN/CSA-W59, CAN/CSA-W47.1 and AASHTO/AWS D1.5M.

(d) Miscellaneous steelwork (including steel upstands at the road deck, base plates, expansion joint components, railings, deck joints, restrainer bolts, anchor bolts, drains, embedment in concrete and fencing) and non-structural steelwork shall be protected with metallic coating systems, either by minimum 150 microns hot-dip galvanizing or 200 microns aluminium metalizing, in accordance with DBSS.

(e) As a minimum, the interior of closed box girders shall be coated using a SS 1, 3 or 4 coating system.

(f) Hatches and doors exposed to the external environment shall be made from acid proof stainless steel.

(g) Bolts less than M12 shall be made from stainless steel grade and in accordance with ASTM A193.

(h) In addition to the requirements of ASTM A123, galvanized surfaces, except bolts ≥ M12, shall keep a minimum dry film thickness of 125 microns.

(i) Cast in steel shall be coated with inorganic zinc rich primer to a minimum of 100 microns for a minimum distance of 100 mm on both sides of the concrete interface.

3.3.3.2 Concrete

(a) Requirements for steel-concrete composite members include:

(i) Faces that are covered by a structural steel plate at least 8 mm thick need not be considered external if Project Co demonstrates that the steel-concrete interface does not provide a route for chloride penetration.

(ii) Free edges of steel plate extending beyond a line of shear studs shall not be considered to cover the concrete and, in all circumstances, the part of the concrete face behind shall be considered external.

(b) Requirements for stainless steel reinforcement include:

(i) Where stainless steel reinforcement is used, all tying wire shall be of stainless steel.

(ii) Stainless steel reinforcement shall be used with due attention paid to any situations requiring electrical isolation of the stainless steel from other metals.

(iii) Stainless steel reinforcement shall be cut and bent using equipment and procedures to ensure that bar surfaces are not contaminated with deposits of iron and non-stainless steel.

(iv) Coupling of bars using stainless steel connectors is permitted. However, Project Co shall submit to the Province's Representative, pursuant to the Review Procedure, test data to demonstrate adequate mechanical properties and fatigue resistance.

(v) Welding of stainless steel reinforcement is not permitted.

(vi) Stainless steel reinforcement shall be stored clear of the ground and separately from carbon steel reinforcement.

(c) Galvanized steel reinforcement shall not be permitted.

(d) Epoxy coated reinforcement shall not be used.

(e) Design and Construction shall prevent abrupt transitions between approach roadways and new Bridge Structures, with special attention paid to interface areas between different material types.

3.3.4 Access for Operations, Inspection, Maintenance and Replacement

(a) Project Co's Design shall provide for access, over the Design Life, in consideration of and for, but not limited to, the following:

(i) inspection and maintenance of the interior and exterior of all non-replaceable components, including cleaning and coating of all steel surfaces; and

(ii) inspection, maintenance, removal and replacement of all replaceable components.

(b) Access shall meet the following requirements:

(i) Access shall be in compliance with all applicable Health and Safety Laws.

(ii) Access points shall be placed in practical locations so as to avoid interference with traffic, including vehicles, cyclists and pedestrians.

(iii) Access shall be provided to voided elements (including but not limited to box girder decks, voided piers, other voided members and enclosures) to allow inspection, maintenance, repairs and similar activities. Permanent lighting and permanent power supply shall be provided for this access and in these voids. Access points and access ways within voids shall be suitably sized and designed to allow for the evacuation of an injured worker.

(iv) Where access is required into a Structure, specific emergency routes and exits shall be identified clearly by signs, and emergency lighting shall be provided along emergency routes and at emergency exits.

(v) All inspection and maintenance access points shall be located and detailed so as to minimize their visibility to passing traffic.

(vi) All access equipment shall be capable of withstanding the prevailing environmental conditions, including ingress of dust and water.

(vii) Permanent access ladders or stairways shall be provided at changes in level along access routes.

(viii) All walking surfaces shall be provided with a non-slip surface coating, shall be self-draining and shall avoid details which create a risk of tripping.

(ix) Warning notices and signs shall be provided for all electrical panels where the operation may affect the safety of persons using voids in the Structures.

(x) All access points shall be secured from public and other unauthorized access by means of heavy duty lockable steel doors and a monitored security system.

(xi) Access and sufficient headroom for an upright worker shall be provided to modular Bridge joints to allow inspection, maintenance, repairs and similar activities. Access points and access ways shall be suitably sized and designed to allow for the evacuation of an injured worker.

3.3.5 Inspection, Operation, Maintenance and Replacement Plans and Procedures

(a) Project Co shall develop inspection, operation, maintenance and replacement plans and procedures for replaceable components for all Bridges. Project Co shall develop inspection,

operation, and maintenance plans and procedures for non-replaceable components for all Bridges. These plans and procedures shall include procedures for critical elements including but not limited to anchorages, tie downs, end floor beams and the Snow and Ice Removal Components. These plans and procedures shall be presented in structure-specific plans for each Bridge and shall be submitted to the Province's Representative as part of the Interim Design and included in the Final Design submission. Project Co shall incorporate the plans and procedures, to which there has been no objection by the Province in accordance with the Review Procedure, into an operation and maintenance manual (the "**Operation and Maintenance Manual**") for the Project.

(b) The plans and procedures for the inspection, maintenance and replacement of replaceable components, and inspection and maintenance of non-replaceable components, shall include, at a minimum:

(i) health and safety considerations;

(ii) detailed procedure for inspection, maintenance and replacement operations;

(iii) frequencies;

(iv) equipment requirements;

(v) access for inspection, maintenance, and replacement;

(vi) traffic management considerations; and

(vii) any relevant reference documentation.

3.3.6 Clearances

(a) Horizontal and vertical clearances for new Structures, as set out in this Agreement, shall be provided for the Design Life of the relevant replaceable and non-replaceable components in accordance with this Article, and the requirements of other Relevant Authorities having jurisdiction. The required clearances shall be provided after accounting for all long term and short term effects.

(b) Notwithstanding the requirements of this Article, clearances shall be determined with due regard to requirements for other considerations, including but not limited to safety, highway design, ventilation, fire, signage and illumination.

(c) Horizontal and vertical clearance requirements for air and marine traffic shall be established and implemented by Project Co in accordance with the requirements of Relevant Authorities and, for greater certainty, Project Co shall obtain all Permits associated with air and marine traffic clearances.

(d) Project Co shall establish and implement the required vertical and horizontal clearances for Railways in consultation with the affected Railway and all Relevant Authorities.

(e) The Design of Structures located adjacent to each other shall ensure a suitable gap is placed between them. Contact between adjacent Structures during any seismic event or any ULS load

case is not permitted. Gaps of less than 3.0 m between adjacent structures shall be infilled to prevent persons from falling.

3.3.7 Hydraulic Design

(a) Project Co shall undertake all hydrotechnical and hydraulic analyses and design for Structures, including; EGBC Climate Change – Resilient Design, FHWA HEC-18, FHWA HEC-20 and FHWA HEC-23. This shall include all hydrotechnical modelling, analysis and design to ensure that all Foundations, adjacent facilities, Utilities, river banks and the river bottom are properly protected from scour and sediment accumulation.

(b) Project Co shall identify, design and construct all scour protection, erosion control, and river stabilization necessary to prevent damage to Structures, roadways, the banks of watercourses or any property affected by the Project Work.

(c) Riprap material shall be tested for acid rock drainage (ARD) or metal leaching (ML) in accordance with Technical Circular T-04/13. Construction of riprap shall be in accordance of DBSS 205.

(d) The Design of new Bridge piers, scour protection, erosion control and river stabilization shall prevent ice dams from forming and accumulation of debris.

(e) The design discharge shall be based on the Fraser River flood of record (1894) and climate change considerations including sea level rise.

3.3.8 Animal and Bird Access Protection

Project Co shall incorporate features to prevent animal or bird access to, or the roosting or habitation in or on, hidden or enclosed spaces, including bearing locations, Structure components directly over pedestrian or cyclist facilities, or areas where vehicles or marine vessels may frequently be stationary.

3.3.9 Aesthetics

(a) Bridges shall be designed in accordance with the guidelines in the Manual of Aesthetic Design Practice as well as CAN/CSA-S6, using a “Parkway” classification.

(b) Steel sheet pile walls, concrete stacking block wall systems and extended piles shall not be permitted where they are readily visible by the public.

(c) Structural steel and concrete interfaces shall be detailed or protected such that no rust staining of the concrete occurs.

(d) Design of Structures in New Westminster shall comply with the PBR Urban Integration Requirements.

(e) Retaining walls that are visible from a public roadway, sidewalk, or multi-use path will require aesthetic considerations. Aesthetic considerations may include, where practical, a curvilinear wall form (both horizontal and vertical); considerations of colour, texture, and accents; and custom design handrails.

3.3.10 Foundations

(a) Structures shall be designed such that all Foundation deformations, clearances and other performance requirements in this Agreement are met over the Design Life of the Structure. The Design shall ensure that the required vertical and horizontal clearances are met over the Design Life of the Structures without additional intervention such as jacking.

(b) Project Co's Design, as part of the Interim Design and Final Design submissions, shall provide predictions of Foundation deformations for new Structures at two years, five years, 10 years, 20 years, 40 years, 75 years and 100 years after the SC1 Substantial Completion Date.

(c) Pile driving, and PDA records, including raw data in digital format, shall be submitted with the Construction Records. BC MOTI Form H0053 shall be used.

(d) If drilled shafts are used, Project Co shall clean out the shafts in accordance with the AASHTO LRFD Bridge Construction Specifications.

(e) When pile Foundations are less than or equal to 20 m in length, driven piles shall require at least one dynamic load test per driven pile type, per pile group, per pier and per abutment element to demonstrate that the ultimate pile carrying capacity has been achieved. When pile Foundations are more than 20 m in length, driven piles shall require at least two dynamic load tests per driven pile type, per pile group, per pier and per abutment element, to demonstrate that the ultimate pile carrying capacity has been achieved.

(f) Piles installed using vibratory techniques shall be completed by top driving and shall require dynamic load testing as per the requirements for driven piles.

(g) Where static load testing of piles is carried out, testing shall be in conformance with ASTM D1143 for compressive load or ASTM D3689 for tensile load requirements.

(h) A static load test frame is available for use by Project Co, at Project Co's sole risk and cost, including dismantling and transportation from, and return to, its location south of the Fraser River at the George Massey Tunnel. If so used by Project Co, such static load test frame shall be included in the Infrastructure that is subject to Section 2.14(b) as if it had been located on the Project Site.

(i) If Project Co elects to carry out a static load test for the NFRB Design, pursuant to Table 6.2a of the BC Supplement to CAN/CSA-S6 only one static load test is required irrespective of the distance between the NFRB piers. This test shall be performed either in the Fraser River or in Surrey north of Highway 17.

(j) As a minimum, noise shrouds or an equivalent noise mitigation method shall be used to limit noise measured above water 15 m from pile driving to Leq 95 dB.

(k) Pile splices shall be made such that the finished piles are straight from end to end.

(l) For steel piles, the following are required:

(i) All welding, including shop and field welding, shall conform in quality and workmanship to CAN/CSA-W59.

(ii) All welding, including shop and field welding, shall be undertaken by a company approved by the Canadian Welding Bureau to the requirements of CAN/CSA-W47.1, Division 2 or better.

(iii) Sufficient lengths of pile above cut-off shall be allowed so that no part of the pile damaged during installation is used in the permanent Infrastructure.

(iv) Steel shall comply with API 5L Grade X42 as a minimum.

(m) Pile caps, located in watercourses, shall meet the following:

(i) all edges shall extend a minimum of 0.5 m above the higher high water level;

(ii) prevent the entrapment of vessels and/or persons under the pile cap during tidal changes; and

(iii) be sloped at the top of the Foundation to prevent accumulation of debris.

(n) Pier caps will not be permitted to extend beyond the drip line of the Bridge Deck for the Opening Day Configuration.

(o) Substructures shall not be installed on or under Railway Lands.

3.3.11 Piers, Abutments, Wing Walls and Return Walls

(a) Water ingress into or onto the Substructures or abutment wall backfill from the Superstructure above shall be prevented. Joints between the Superstructure or end diaphragm and the Substructure shall be waterproofed.

(b) The requirements provided in this Schedule for retaining walls also apply to abutments and wing walls.

(c) All exposed portions of piers, abutments, wing walls and return walls shall be reinforced concrete construction and as specified in Table 8.11.2.1.7 of the BC Supplement to CAN/CSA-S6.

3.3.12 Deck Wearing Surface Systems

(a) The deck wearing surface system (the "**Deck Wearing Surface System**") is the replaceable surface and waterproofing elements that protect the Bridge Deck from abrasion and the ingress of water and chlorides.

(b) A Deck Wearing Surface System shall be provided on all Bridges.

(c) Deck Wearing Surface Systems shall consist of a hot applied rubberized asphalt waterproofing membrane, plus 100mm of asphalt in two 50mm lifts.

(d) The skid resistance of the Deck Wearing Surface Systems shall comply with this Agreement.

(e) The material, supplier and installer of the deck surfacing and waterproofing system(s) shall all have a documented history of successful applications under similar operating conditions, including similar climate, roadway gradient, use of abrasive de-icing materials and truck traffic.

3.3.13 Bridge Decks

Project Co shall ensure that Bridge decks, including the interaction of deck concrete, concrete cover, reinforcement, Deck Wearing Surface System, joints and deck drainage details, is such that the Bridge Deck meets the Design Life requirements of the Project.

3.3.13.1 Concrete Decks

(a) The design of concrete Bridge Decks shall consider the following parameters:

(i) seasonal fluctuations in temperature and moisture;

(ii) concrete cover;

(iii) type of rebar; and

(iv) laboratory established concrete properties for chemical composition, porosity, ionic diffusion coefficients, water diffusivity coefficient, compressive strength, air-void ratio, shrinkage, chloride permeability and freeze-thaw durability.

3.3.13.2 Steel Orthotropic Decks

(a) The Design of welded orthotropic steel decks for strength shall be carried out in accordance with CAN/CSA-S6. The structural action of the wearing surface acting compositely with the deck plate shall not be taken into account in this regard. Stresses in the deck plate and the stiffeners under local wheel loads shall be evaluated in detail using suitable analysis software. Combined stresses in the deck plate surface due to longitudinal beam action, transverse bending under wheel loads and any axial compression shall be checked at the serviceability limit state to ensure that under specified load combinations, stresses in extreme fibres do not exceed the allowable limit.

(b) Orthotropic deck details and configuration shall be designed so that all components have a calculated fatigue life in accordance with the Project Requirements. The methodology given in CAN/CSA-S6 shall be supplemented with a detailed quality control and quality assurance plan for orthotropic steel deck details that includes the requirements for a full scale sectional mock-up incorporating all weld details. The specific quality control and quality assurance plan shall be an individual section in the Construction Quality Management Plan. The procedures, processes and results of the orthotropic steel deck quality control and quality assurance plan shall be reviewed and approved by the Designer.

(c) Detailing of orthotropic steel decks shall be in accordance with BS EN Eurocodes.

3.3.14 Bridge Deck Joints

(a) Bridge Decks shall be designed to minimize the occurrence of joints.

(b) Bridge Deck joints shall be dimensioned and detailed to allow enough space for joints to be inspected, maintained and replaced without permanent modifications to the Structure

(c) Integral and semi-integral abutments shall make provision for movement at the interface between the approach slab and the approach roadway pavement structure.

(d) Modular expansion joints shall be designed for fatigue and live loads and such that all components can be individually replaced without damaging the joint primarily from a location underneath the deck.

(e) Joints shall only be located over piers or abutments. In-span and mid-span expansion joints shall not be permitted.

(f) Where Bridge Deck sections flare to accommodate more or fewer lanes, expansion joints shall be carried across the full width of the deck.

(g) All deck joints shall provide for safe passage of cyclists and pedestrians.

(h) Expansion joints shall be protected by surface and sub-surface drainage.

(i) Expansion joints shall be detailed to accommodate snow ploughing.

(j) Expansion joints shall include secondary seals and secondary drainage collection.

(k) Expansion joints shall be tested and proven watertight.

3.3.15 Deck Drainage

(a) Bridge runoff shall be evaluated using the rational method with runoff coefficient = 0.9, and rainfall intensity based on a ten-year (10) design storm, maximum 5-minute rainfall intensity. Discharge through Bridge Deck drains shall be assessed based on the FHWA Circular No. 21.

(b) Runoff water from all Bridges shall be discharged in accordance with the drainage and environmental requirements of this Agreement. Direct discharge, including into watercourses, is not permitted. Runoff water shall be conveyed from Structures to treatment or drainage systems.

(c) The diameter of drain pipe to be installed shall not be less than 200 mm.

(d) Box girders and other members with internal voids shall be detailed to ensure no standing water accumulates.

(e) Deck drainage pipes shall not be run through the voids of hollow structural members.

(f) Drainage pipes shall not be encased in concrete.

(g) Catch basins shall be placed up-gradient and close to expansion joints to limit water flow over the joint.

(h) Drainage water from any Structure shall not be discharged to a drainage layer behind a Substructure or Foundation.

(i) The drainage system shall:

(i) be sufficiently robust to resist damage during cleaning and shall resist commonly occurring chemical spillages;

(ii) as a minimum, incorporate clean outs every 200 m along a drainage run and at all bends;

(iii) incorporate thermal movements joints; and

(iv) ensure all pipe and pipe clamps are galvanised.

3.3.16 Approach Slabs

Approach slabs shall be provided at all abutments and be designed to mitigate anticipated fill settlements, including those resulting from both static and seismic loading conditions. Approach slabs shall be completely supported by fill.

3.3.17 Slope Protection

Slope paving shall be provided for slopes under end spans of Bridges.

3.3.18 Traffic Barriers, Crash Barriers and Bicycle Fences

(a) Traffic barriers shall be fixed to the deck and provided on both sides and the median of the bridge roadway to separate the traffic in each direction and to reduce the consequences of vehicles leaving the designated roadway.

(b) Standard bicycle fence or bicycle combination barriers in conformance with the BC Supplement to CAN/CSA-S6 shall be used for sidewalks and multi-use paths. Except where otherwise required in this Agreement:

(i) Where SkyTrain is present under a new Bridge a fence shall be provided on the new Bridge in accordance with the requirements of TransLink.

(ii) All Structures with pedestrian access over roadways shall provide debris fencing on the side(s) associated with pedestrian access.

(iii) Where Railways are present under a new Bridge a fence shall be provided in accordance with the requirements of the affected Railway owner.

3.3.19 Bearings

(a) Enough space and strength shall be provided for bearings to be inspected, maintained and replaced without modification to the Structure. Replacement of bearings shall be possible without interruption to traffic flow.

(b) Bearings shall be restrained from "walking".

(c) Proper drainage of bearing shelves shall be provided.

(d) Bearings comprised of stainless steel sliding surfaces, PTFE or mechanical components shall be protected by means that can be easily removed for inspection.

(e) For the bearings and any other seismic load management devices, Bridges shall be designed to withstand loading due to inspection, maintenance and repair activities. Jacking points and jacking loads shall be identified on the Design and record drawings.

(f) Steel reinforced elastomeric bearings shall be tested for concentric compression in accordance with paragraph (i) below. Steel reinforced elastomeric bearings used to resist seismic forces shall be tested for concentric compression and combined compression and shear in accordance with paragraphs (i) and (ii) below:

(i) Concentric Compression Tests:

Each bearing shall be tested as follows using a concentric compression load:

(A) The testing machine used shall have platens at least 20 mm greater in both plan dimensions than the bearing under test.

(B) At least two dial gauge micrometers shall be positioned at the centres of opposite sides of the bearing to measure deformation. When bearings are tested in single vertical stacks, a steel plate shall separate the bearings and a set of dial gauge micrometers shall be installed for each bearing.

(C) The load shall be applied at the rate of 1.5 MPa/minute to a load of 7.5 MPa multiplied by the gross plan area. The deformations shall be recorded after each 1 MPa increment.

(D) The load shall be reduced at the same rate until the pressure on the bearing is 1.5 MPa, and the deformations shall be recorded.

(E) The load on the bearing shall be maintained at 1.5 MPa for fifteen minutes and the deformations shall be recorded.

(F) The bearing shall be reloaded as in step (C), and steps (D) and (E) shall be repeated.

(G) The bearing shall be reloaded to 10 MPa with deformations being recorded after each 1 MPa increment.

(H) The compressive stress of 10 MPa shall be maintained for one hour. The deformations shall be recorded at 10 minute intervals within this one-hour period.

(I) A graph of the pressure versus average deformation with data recorded shall be constructed.

(J) The rates of loading specified in steps (C) and (D) also apply to steps (G) and (H).

(ii) Combined Compression and Shear Tests:

(A) After completion of the compression tests, all bearings used to resist seismic forces shall be tested in combined compression and shear deflection. Each sample shall be loaded in compression to the applicable combined "Dead Load Other Than Wearing Surface" plus "Dead Load Due to Wearing Surface" in addition to "Vertical Seismic Load".

(B) The compression load shall be maintained while the bearing is subjected to five complete reversed cycles of loading from 0 to + 100% shear strain to 0 to – 100% shear strain. Shearing in both longitudinal and transverse directions at the same time is not required.

(C) A continuous plot of the shear load and shear deflection shall be recorded to permit an evaluation of bearing shear stiffness.

(iii) A bearing shall be rejected if any of the following deficiencies is shown:

(A) if the bearing displays bulging patterns under compression load which indicate laminate placement which does not satisfy design criteria and manufacturing tolerances or poor laminate bond;

(B) if the bearing has more than three surface cracks which are greater than 2 mm long and 2 mm deep;

(C) if the compressive deformation exceeds 7% of the total elastomeric thickness of the bearing due to the application of the load of 8.0 MPa multiplied by the gross plan area;

(D) if lack of rubber to steel bond occurs under combined compression and shear tests; or

(E) if the shear stiffness differs by more than 15% from the calculated value.

3.3.20 Prestressed and Post-tensioned Concrete

(a) Unbonded prestressing is not permitted.

(b) Pre-stressing strands on the exposed face of structural members are not permitted.

(c) For all post-tensioning duct work and grouting operation the performance level shall achieve, as a minimum, tendon protection level PL2 in accordance with PTI/ASBI M50.3.

(d) Grouting of post-tensioning ducts shall be in accordance with the requirements of the FHWA Post-Tensioning Tendon Installation and Grouting Manual and PTI M55.1.

3.3.21 Road Tunnels

Tunnels are not permitted.

3.3.22 Elevated and Double Decked Roads and Viaducts

(a) The detrimental effects of vehicular exhaust emissions and road spray containing De-icing Chemicals on the soffits and Substructures of elevated deck Structures shall be addressed in the Design of the Structure to ensure that the required Design Life can be achieved. Emission levels shall be established based on 2000 vehicles per hour per lane under the elevated roadway.

(b) Fire on the lower deck of a double decked road shall be considered in the design of elevated roadways.

(c) Vertical clearance between the decks of a double decked Structure shall meet the requirements of this Schedule and shall be sufficient to install overhead signs.

3.3.23 Suspension Bridges

(a) Suspension Bridges shall be designed and constructed in accordance with, in descending order of precedence:

(i) the provisions of this Schedule;

(ii) BC Supplement to CAN/CSA-S6; and

(iii) CAN/CSA-S6.

(b) As part of the Design of suspension Bridges, a deck replacement method shall be established by Project Co. The details of the deck replacement methodology shall be documented and provided to the Province's Representative as part of the Design submission.

(c) In addition to the requirements of this Schedule, the following requirements apply to suspension Bridges:

(i) Suspension cables and hangers shall comprise an assembly of high strength steel;

(ii) Loads in cables induced by prestressing to adjust for a lack of fit in the Structure shall be included in the ultimate limit state of the Structure.

(iii) All anchorages shall be designed to carry the breaking load of the cables and the hangers;

(iv) Design of hangers shall allow for the effects of rotation at the anchorages under both static and dynamic loads.

(v) Combined tension and bending in the cables and hangers shall be checked at the ultimate limit state to ensure that under the specified load combinations stresses in extreme fibres do not exceed the yield strength of individual wires.

(vi) Hangers and their anchorages shall be designed to be replaceable and shall be accessible along their full length for inspection.

(vii) The Structure shall be designed to account for anchor pull out and cable creep.

(viii) Further to Clause 3.10.5 of CAN/CSA-S6, wind tunnel testing shall be performed in accordance with the requirements given in this Article for cable-stayed Bridges.

(ix) Cable saddles and anchorages shall be accessible for inspection and maintenance.

3.3.24 Segmental Concrete Bridges

Segmental concrete Bridges shall be designed and constructed in accordance with, in descending order of precedence:

(a) the provisions of this Schedule;

(b) BC Supplement to CAN/CSA-S6;

(c) CAN/CSA-S6; and

(d) AASHTO Specifications for Segmental Bridges.

3.3.25 Cable-Stayed Bridges

3.3.25.1 General

(a) In addition to the requirements of this Schedule and the applicable codes and standards, the Design and Construction of cable-stayed Structures shall conform to the requirements and guidelines of, in descending order of precedence:

(i) PTI DC45.1 and PTI M50.2;

(ii) AASHTO LRFD Bridge Design Specifications; and

(iii) the ASCE Guidelines.

(b) The Structure including stay cables shall be aerodynamically stable throughout the Design Life and during Construction. Stay cables shall be provided with damping to prevent vibrations from occurring, with the ability for modification to permit increased levels of damping, if required.

(c) Rotation on the cable-stayed Bridge Deck about the longitudinal axis of the bridge centerline shall be evaluated for all ultimate load combinations. The maximum factored deck rotation measured from horizontal at any point along the Bridge span shall be limited to 3.0 degrees.

(d) The effects of creep and shrinkage are to be included for cable-stayed bridges as a permanent load for all limit states.

3.3.25.2 Towers

(a) Exposed bolts required for splicing steel are not permitted on the outside of the tower.

(b) The effects of the slenderness of the tower shall be fully allowed for in the calculation of design load effects and resistance.

(c) Analyses of the tower taking account of second order deformations shall be undertaken. The section properties used in the analysis shall be appropriate to the level of stress in the section (cracked or uncracked). Tension stiffening shall be included or excluded, whichever is the most conservative for the load effect under consideration. The analysis shall consider Foundation flexibility.

(d) In addition to other loads, allowance for notional errors in plumb and straightness of the tower columns shall be included in all load combinations. For Design purposes, the notional errors at height H shall at a minimum be taken as:

(i) for error in plumb over the height of the tower: H/1000;

(ii) for sinusoidal deviation of straightness relative to a straight line drawn between the tower top and tower base: maximum of H/1500 at mid height.

(e) The above notional errors shall be applied in the most severe direction for the load combination being considered.

(f) When evaluating slenderness, the above notional errors shall be applied in addition to any variation from plumb and straightness as a result of the erection sequence and creep and shrinkage of the tower.

(g) Partial load coefficients shall not be applied to the above notional geometrical errors.

3.3.25.3 Cable and Tie Down Systems

(a) Cable and tie down systems are defined to include all anchorage components, steel anchor guide sleeves, shims, wedges, bearing plates, sheathing, boots, bolts, steel clamping bands, temporary and permanent corrosion protection provisions, strand sheathing and coating, main tension elements, corrosion barriers, sealing, stay cable vibration suppression system, and stressing and erection.

(b) Requirements for cable-stayed Structures include the following:

(i) Stay cables are not permitted over travelled lanes, shoulders and multi-use paths except where access is provided from a multi-use path to a viewing platform.

(ii) Stay cables shall be parallel strand with individual high density polyethylene (HDPE) coated seven-wire galvanized steel strands inside an HDPE stay cable outer pipe. Steel for stay cables shall be 15.24 mm or 15.7 mm diameter low relaxation strands, weldless, seven-wire strand conforming to ASTM A416, Grade 1860.

(c) The following exceptions to the PTI DC45.1 and PTI M50.2 shall apply:

(i) High strength bars shall not be used for the main tension elements of the stay cables.

(ii) Steel pipe cable sheathing shall not be used for stay cables except for additional mechanical protection at roadway level.

(iii) Epoxy coated wires are not permitted.

(iv) Portland cement grout is not permitted as a corrosion protection barrier.

(d) Stay cables and tie downs shall be verified for the stress effects due to combined axial loads and bending with a resistance factor of $\phi = 0.78$. This resistance factor shall also apply to accidental, seismic and cable loss load cases.

(e) In addition to the requirements for the Future Six Lane Configuration cable anchorages shall be sized and detailed to accommodate a minimum of 5% additional number of strands for future needs.

(f) Cable vibrations and their effects shall be addressed in the Design. A sufficiently detailed cable vibration analysis (including modal analysis of the cable system) must be performed as part of the bridge design to identify the potential for cable vibration. The following factors must be examined:

(i) dynamic properties of the stay cables;

(ii) dynamics of the structural system;

(iii) geometry of the cable layout;

(iv) cable spacing;

(v) exposure conditions; and

(vi) estimated scruton numbers (Sc).

(g) In addition to considering the thermal effects and thermal gradient effects in accordance with CAN/CSA-S6 for structural design, temperature differential between stay cables and deck, stay cables and towers, and different tower structures must be considered. A minimum of 10°C temperature differential shall be applied for white stays and 20°C for black stays.

(h) Design for stay cables and the Structure shall include effects of rain and ice build-up on stay cables, including the effects on cable vibrations and fatigue life.

(i) All stay cables shall terminate inside the tower using appropriate anchorages. Saddles shall not be used.

(j) Cable connections and adjacent components shall be designed to exceed the design resistance of the stay cables at the ultimate limit state as defined in Section 3.3.25.3(d) of this Part.

(k) Design of cable stays shall allow for the effects of rotation at the anchorages under both static and dynamic loads.

(l) Combined tension and bending in stays shall be checked at the ultimate limit state to ensure that under the design load combinations, stresses in extreme fibres do not exceed the yield strength of individual wires.

(m) Stay cables and anchorages shall be designed against fatigue failure allowing for combined tension and bending (concurrent longitudinal and transverse bending). Fatigue design loads for the stay cables shall be established from a test program meeting the requirements of CAN/CSA-S6 and PTI DC45.1. Design of the cable anchorage zones shall be based on local stresses determined by a finite element analysis. The fatigue resistance of each anchorage shall not be less than that of the corresponding cable.

(n) Stay cables and anchorages shall be designed to permit strand-by-strand removal and replacement of their cable stays. Cable stays shall be accessible for inspection along their full length.

(o) Corrosion protection for cable systems shall meet the Design Life requirements of this Article.

(p) Tie-down systems shall be designed to permit the removal and inspection of a reference strand in each tie-down cable without affecting the tie-down capacity. Tie-down systems shall have redundancy to permit replacement without closure of the Bridge.

(q) Stay cables and tie-down systems shall be corrosion protected using a three phase system consisting of:

(i) galvanizing of individual wires;

(ii) a corrosion resistant blocking medium surrounding the wires and filling the space inside the strand sheathing; and

(iii) an outer protective sheathing resistant to the effects of weather and ultraviolet light. The sheathing shall also cover the socket cable entry area. Sheathing shall be black high density polyethylene pipe (HDPE) conforming to ASTM D3035 or ASTM F714. Grey coloured HDPE pipe may be used if Project Co can demonstrate to the Province's Representative that the selected pipe has demonstrated ultra-violet resistance equal to or better than black pipe.

(r) The corrosion protection system shall provide protection during construction, installation of the stay cables and during the Design Life of this Article.

(s) Steel pipe sheathing shall not be used except as required to harden the lower parts of the stay cables.

(t) Fire protection shall be provided to a height of 10m above deck for all cable stays and vandalism protection shall be provided to a height of 3 m above deck for all cable stays.

3.3.25.4 Wind design and tunnel testing

(a) All wind tunnel tests shall be carried out at a wind tunnel laboratory experienced with doing the required type of aerodynamic test. The laboratory shall have a proven record for both section model tests and full aeroelastic tests at similar scale and for cable stayed bridges.

(b) The tunnel used for the wind tunnel test shall be either a closed circuit wind tunnel or a closed tunnel with reverse flow outside the tunnel. Open test sections shall not be allowed.

(c) A section model test of the Bridge Deck shall be conducted at a geometric scale of 1:100 or greater (e.g. 1:50). The test shall include all Bridge Deck appurtenances and other structural components relevant for the wind load on the Bridge Deck. The test shall include both construction phases and final stage. Both static and dynamic test shall be carried out. The dynamic test shall cover full scale wind speed in the range of 4-25 m/s for vortex induced vibration measurements. For wake buffeting response measurements, the maximum wind speed in the tunnel shall correspond to 110% of the design wind speed at Bridge Deck level and in addition to this the dynamic test shall be used to determine the critical flutter wind speed provided it is below 100 m/s. If test and numerical analysis shows that the critical flutter wind speed exceeds 100 m/s it shall only be determined based on numerical analysis.

(d) The section model test for the completed Bridge shall include traffic on the Bridge in addition to the test for no traffic.

(e) A full aeroelastic test shall be carried out for the completed Bridge and at the most critical Construction stage(s). The scale of the model shall be 1:150 or greater and for the Construction stage test(s) all relevant Construction equipment shall be included in the test (e.g. lifting gantries, tower cranes, underslung working platforms and containers on the Bridge Deck). Both smooth and turbulent flow

shall be tested. The turbulence intensity and wind profile for the turbulent flow shall be based on analysis of the local wind conditions at the site.

(f) From the section model test the static force coefficients (drag, lift and moment), as well as the derived values of the lift and moment coefficient, shall be determined for angle of attack between +/- 10 degrees. The aerodynamic derivatives shall be calculated based on the section model test in turbulent flow, and both the section model test and full aeroelastic model test shall be used to assess the risk of vortex induced vibration. The results of the full aeroelastic test shall be verified based on numerical analysis of dynamic behaviour of the Bridge using the results from the section model test as input parameters for the analysis.

(g) All results of the wind tunnel test and wind design shall be reported in an aerodynamic test report (the "**Aerodynamic Test Report**") and each test setup shall be documented by photos and videos of all dynamic tests.

3.4 New Fraser River Bridge

In addition to the requirements of this Schedule, additional requirements for the New Fraser River Bridge are provided in this Section 3.4.

3.4.1 Restrictions to Project Work

(a) The New Project Infrastructure shall be limited to a maximum of four piers, including foundations, within the Fraser River as defined by the high water level.

(b) The Fraser River shorelines shall not be realigned.

(c) In addition to the requirements of this Agreement, and until Total Completion, the Project Work shall not preclude access by CN Rail and its contractors to both sides of the Railway Bridge, including but not limited to access for a barge approaching from upstream that is suitably sized to support a 300 tonne barge mounted crane and associated support vessels.

(d) Project Co's Design and Construction shall not impact the operational requirements of the Railway Bridge as determined and approved by CN Rail and Relevant Authorities, unless Project Co obtains approval in writing from CN Rail and Relevant Authorities. Project Co shall be responsible, at its own cost and risk, for all mitigation requirements required by any such approvals.

(e) Notwithstanding any other provision of this Agreement, New Project Infrastructure shall not be placed within the existing sightlines from the operator's house on the Railway Bridge. The limits of the existing sightlines shall be defined by the coordinates and azimuths identified in the CN Sightlines Drawing and the vertical clearance elevations identified in the PBR Navigation Clearance Drawing.

(f) Project Co shall not construct, any New Project Infrastructure, with the exception of aerial portions of the New Fraser River Bridge, in the areas identified as "No Pier Zone" in New Westminster in the PBR Works Restrictions.

(g) Temporary Works within the CN Rail operations yard, bounded by the existing fence and gate, within the areas identified as "No Pier Zone" in New Westminster on the PBR Works Restrictions, shall not be permitted unless Project Co obtains approval in writing from CN Rail and any other Relevant Authorities.

(h) The following restrictions shall apply to the New Project Infrastructure and Construction within the areas identified as "Restricted Area" in Surrey on the PBR Works Restrictions:

(i) New Project Infrastructure is limited to the following:

(A) the NFRB Mainline shall have no more than seven piers including foundations;

(B) the New Fraser River Bridge off ramp to Highway 17 shall have no more than two piers including foundations;

(C) the minimum infrastructure required to relocate the telecom utilities from the Existing Pattullo Bridge to the New Fraser River Bridge;

(D) a single oil grit separator and associated direct drainage connections; and

(E) a fenced Snow and Ice Compound and access road in accordance with this Article. Excavations for the Snow and Ice Compound shall not be permitted;

(F) the NFRB southbound multi-use path that passes under the Highway 17 westbound exit Ramp shall have no more than four piers;

(G) a maximum area of 300 m^2 of ground improvements shall be permitted within 20 m and to the south of the high water line; and

(H) fish habitat off-setting, in accordance with Section 2.6 of Schedule 6, shall be permitted to the south of the high water line and north of PID 009-213-546 within the area identified as "Restricted Area" in Surrey on the PBR Works Restrictions.

(ii) The depth of excavations for pile caps shall be no more than 1.0m below existing grade.

(iii) Ground disturbance is not permitted other than as described in this Article.

(iv) All Temporary Works shall be installed and removed without disturbance to the ground. Temporary use and accesses shall be physically separated from existing ground with a geotextile or similar and located above existing grade and removed without disturbance to the ground.

(i) Prior to the Specified Handover Date for the "South Approach Area" identified in the PBR South Approach Area, Project Co may, as required, prepare and submit to the Province's Representative in accordance with the Consent Procedure a request for access to such property to undertake the following activities:

(i) access and access road construction;

(ii) survey; and

(iii) geotechnical investigations.

(j) Three Business Days following the Effective Date, Project Co shall prepare and submit to the Province's Representative in accordance with the Review Procedure drawings that identify the actual locations and physical extents of the proposed Project Infrastructure within the areas identified as "Restricted Area" in the PBR Works Restrictions (the "**Restricted Area Infrastructure Footprint - Surrey**") and including the following information:

(i) the coordinates, dimensions and elevations of the ground improvement, piles, pile caps and associated excavations;

(ii) the coordinates, dimensions, plans and elevations of ramps and multi-use paths on the property with PID: 009-057-765;

(iii) the coordinates, dimensions and elevations of the oil grit separator and associated excavations;

(iv) the coordinates, dimensions and elevations of the Snow and Ice Compound and access road; and

(v) the coordinates, dimensions and elevations of all potential Utility vaults and associated excavations, provided that the exact coordinates, dimensions and elevations of all Utility vaults shall be submitted to the Province's Representative in accordance with the Review Procedure, as a revision to the Restricted Area Infrastructure Footprint – Surrey, no later than 90 days following Effective Date.

3.4.2 Future Six Lane Configuration

(a) The New Fraser River Bridge shall be designed to accommodate the Future Six Lane Configuration. The New Fraser River Bridge shall be constructed such that on opening day only the six lane vehicle deck shall be provided and configured for four lanes of traffic and two multi-use paths using traffic barriers and pavement markings (the "**Opening Day Configuration**"). All barriers shall be fixed to the deck.

(b) The Opening Day Configuration shall include everything necessary for the Future Six Lane Configuration such that the Future Six Lane Configuration is achievable by only the following modifications:

(i) relocation of barriers, decommissioning redundant drainage required for the Opening Day Configuration, and safety and security fencing;

(ii) modification of pavement markings;

(iii) re-stressing of cable stays;

(iv) addition of two new multi-use paths to the outside of, and at the same elevation as, the six lane vehicle deck; and

(v) management of traffic during construction of the expansion in accordance with Article 2 [Pattullo Mainline] of Part 4 of this Schedule.

(c) The Future Six Lane Configuration Report shall be provided, in the Interim Design and the Final Design submissions for the New Fraser River Bridge and in addition to the requirements of Article 1 [Laning and Geometrics Design Criteria] of this Part, shall include, as a minimum:

(i) structural drawings required for construction of the modifications to achieve the Future Six Lane Configuration, signed and sealed by a Bridge Structural Engineer;

(ii) all specifications and special provisions required for construction of the modifications to achieve the Future Six Lane Configuration, in the format and detail required for inclusion in a Ministry Major Works Contract; and

(iii) construction staging drawings and report narrative to demonstrate how the required highway and structural modifications will be constructed including, how traffic will be maintained in accordance with this Schedule.

3.4.3 General Requirements

(a) The New Fraser River Bridge shall be located upstream of the existing Railway Bridge.

(b) Any openings or voids present along the length of the New Fraser River Bridge deck shall be infilled to prevent persons from falls.

(c) Project Co shall Design the New Fraser River Bridge to achieve a smooth blended visual transition between the Structure types incorporated in the New Fraser River Bridge. The Design shall not include abrupt transitions with attention paid to the interface between different material types.

(d) Changes in the bridge tower cross-section will be gradual with smooth transitions, and not increase in size towards the top of the tower.

(e) Stay Cables on the New Fraser River Bridge shall not encroach further north than the northern edge of Columbia Street.

3.4.4 Design Loads

(a) All design loads shall account for the Opening Day Configuration and Future Six Lane Configuration.

(b) Ice loads shall be developed by Project Co based on the requirements of Clause 3.12 of CAN/CSA-S6 and studies of the ice thicknesses and the ice regime in the area.

(c) The New Fraser River Bridge shall be designed to survive, without collapse or failure of the structure, a fire ignited from a gasoline tanker truck collision or spill on the roadway resulting in a 200 m^2 pool of burning gasoline. The failure scenario shall account for fire damage to stay cables. Repairable local damage is acceptable. The specified fire scenario shall be considered as an extreme accidental or intentional event. The combined effects of collision and fire as described above shall be considered where applicable.

(d) The New Fraser River Bridge shall be designed for vessel collision in accordance with the requirements of a Class I bridge pursuant to CAN/CSA-S6. The following shall apply:

(i) The derivation of design vessel impact loads is the responsibility of Project Co for their specific Bridge and pier configurations and vessel collision protection measures. The design vessel shall have a minimum of 38,500 DWT (Dead Weight Tonnage).

(ii) The Design shall not preclude future modification to the NFRB to accommodate a design vessel of 60,000 DWT.

(iii) Within 60 days following the Effective Date, Project Co shall prepare and submit to the Province's Representative in accordance with the Review Procedure a Design report for the future vessel impact modifications (the "**Future Vessel Impact Modifications Report**") to accommodate a design vessel of 60,000 DWT in accordance with this Article.

(iv) Project Co shall demonstrate within the Future Vessel Impact Modifications Report how the Design for the future vessel impact modifications would be achieved, including as a minimum:

(A) how the Design of the New Fraser River Bridge shall accommodate the modifications without impacting the stability and usability of the NFRB; and

(B) how the Design of the New Fraser River Bridge shall accommodate the modifications without infringing on the Project Navigation Protection Zone Boundary as shown on the PBR Navigation Clearance Drawing, in the future.

(v) All data necessary for Project Co's Design is the sole responsibility of Project Co to obtain, validate and incorporate.

(vi) Vessel impact design of structural components shall consider direct and oblique impacts including sideways impacts. Vessel impact scenarios consistent with marine traffic travelling upstream and downstream shall be considered. Tidal variations on the zone of impact shall also be considered.

(e) The New Fraser River Bridge shall be designed to allow replacement of any stay cable or tie down. A longitudinal strip of roadway up to 3.0 m wide adjacent to the cable (or above the tie down) being replaced may be considered to be closed as a result of temporary Traffic Management measures and temporarily not loaded by traffic. If this design assumption is made then it shall be recorded in the Design Data and on the Design and record drawings and Project Co shall ensure that the Operation and Maintenance Manual, includes temporary Traffic Management procedures consistent with the Design.

(f) The New Fraser River Bridge shall be designed to withstand the sudden loss of any stay cable (or pair of stay cables, if used in pairs) or tie down in an elastic manner. The cable loss dynamic force (CLDF) shall be taken as a minimum of 2.0 times the static force in the cable prior to the sudden loss event or a lower value not less than 1.5, if determined by dynamic analysis of

the Structure. For the purposes of computing the CLDF, live load shall be positioned to maximize the tension force in the cable prior to loss.

(g) In addition, the New Fraser River Bridge shall be designed to survive the loss of one stay cable (or pairs of stay cables, if used in pairs) immediately adjacent to the first lost stay cable (or pair of stay cables) without the collapse of the Structure. In this situation, the Structure shall be required to carry 10% of the design factored vehicle live load with a dead load factor of 1.1. Repairable local damage is acceptable. The cable loss dynamic force shall be considered for only one of these two adjacent stay cables (or pairs of stay cables, if used in pairs) at a time. The loss of two adjacent stay cables (or pairs of stay cables, if used in pairs) shall be considered as an extreme accidental or intentional event.

(h) The stay cable forces shall not be less than 10% of the tension dead load under all load cases.

(i) The Design shall consider dynamic effects, amplification from synchronous motion and rhythmic loads from pedestrians.

3.4.5 River Hydraulics

3.4.5.1 River Hydraulic Requirements

(a) In addition to the requirements of Section 3.3.7 [Hydraulic Design] of this Article, the Design shall be in accordance with this Section and this Agreement.

(b) For greater certainty, the requirements of this Section 3.4.5 shall apply to all stages of Construction and the post-demolition state of the Fraser River, including upstream and downstream structures, river banks and river bed.

3.4.5.2 River Hydraulic Design Requirements

Project Co shall undertake the Design of the Project Work to meet the following requirements.

(a) River hydraulic analyses for scour and sedimentation, as minimum, shall use the design flow conditions as identified in the PBR Hydraulic Design Criteria and the following conditions:

(i) construction conditions - worst case conditions during construction including consideration of the construction of CN Rail seismic retrofit of the Railway Bridge;

(ii) final conditions – with the NFRB and following Demolition; and

(iii) other conditions that may govern the Design and Construction.

(b) Design criteria for scour are as follows:

(i) Design discharge at the Existing Pattullo Bridge and water level at the SkyBridge shall be as identified in the PBR Hydraulic Design Criteria for scour; and

(ii) the elevations of the river bed, at any point, shall not be lower than the corresponding points of the River Bed Elevation Criteria as identified in the PBR Hydraulic Design Criteria for scour.

(c) Design criteria for sedimentation are as follows:

(i) Design discharge at the Existing Pattullo Bridge shall be as identified in the PBR Hydraulic Design Criteria for sedimentation; and

(ii) the elevations of the river bed, at any point, shall not be higher than the corresponding points of the River Bed Elevation Criteria as identified in the PBR Hydraulic Design Criteria for sedimentation.

(d) There shall be no sedimentation that would impede navigation, including access, at the locations shown in the PBR Hydraulic Model Nodes.

(e) There shall be no changes in volume of flow at existing river channel splits upstream and downstream of the New Fraser River Bridge or the Existing Pattullo Bridge.

(f) There shall be no changes, across the width of the river, in the distribution of depth-averaged water velocities or water surface velocities, upstream and downstream of the New Fraser River Bridge or the Existing Pattullo Bridge.

(g) As a minimum, the hydraulic analyses shall incorporate morphodynamic modelling, 3D computational fluid dynamic modelling and physical hydraulic modelling.

(h) Project Co shall use the Specified Hydrotechnical Laboratory for physical hydraulic modelling. Project Co's schedule shall accommodate the physical model testing durations identified in the PBR Hydraulic Design Criteria. Only one model test shall be run at a time.

(i) The Province will provide Project Co with the first seven physical model tests performed by the Specified Hydrotechnical Laboratory. Thereafter, any additional physical model tests performed by the Specified Hydrotechnical Laboratory ("**Additional Tests**") will be at Project Co's sole cost and expense, and Project Co shall pay to the Province all reasonable and proper costs and expenses incurred by the Province in connection with any Additional Tests. Project Co shall pay to the Province the sum of $80,000 per Additional Test, to be held by the Province on account of Project Co's obligations to pay under this Section 3.4.5.2(i) in respect of each such Additional Test.

(j) The physical model shall be a 1:80 mobile bed model that covers the full width of the Fraser River. The extent of the model up and down stream of the NFRB shall be such that the flow patterns at the NFRB are accurately represented. The extent of the model shall, as a minimum, be one kilometre up and downstream of the Existing Pattullo Bridge.

(k) River hydraulic analysis modelling shall be run long enough to show long-term impacts to river bed elevations.

(l) Physical model tests for the design flow conditions as identified in the PBR Hydraulic Design Criteria shall be performed until a compliant Design has been demonstrated for all conditions in accordance with this Article, prior to completion of the in river NFRB Foundation Design and prior to Construction of the in river NFRB Foundations.

3.4.5.3 River Hydraulics Management Plan

(a) Within 60 days following the Effective Date, Project Co shall prepare and submit to the Province's Representative in accordance with the Consent Procedure a river hydraulics management plan (the "**River Hydraulics Management Plan**") for all phases of the Project Work, which will define and include, but not be limited to the following:

(i) a Design management plan for hydraulic analyses (the "**Design Management Plan for Hydraulic Analyses**") including:

(A) analyses methods;

(B) scenarios and conditions to be considered in the analyses including rationale for selected construction scenarios;

(C) definition of hydrotechnical modelling parameters required for these analyses;

(D) milestone schedule for physical modelling in accordance with the durations identified in the PBR Hydraulic Design Criteria; and

(E) the scope and details of the proposed physical modelling program.

(ii) a river monitoring program (the "**River Monitoring Program**") in accordance with this Article;

(iii) a scour and sedimentation intervention program (the "**Scour and Sedimentation Intervention Program**") in accordance with this Article; and

(iv) a documented review of each component of the River Hydraulics Management Plan by the Checking Team for Category III Structures, including all comments and responses to address comments from the Checking Team.

(b) Physical model testing shall not commence prior to acceptance of the Design Management Plan for Hydraulic Analyses in accordance with the Consent Procedure.

(c) All updates to the River Hydraulics Management Plan shall be reviewed by the Checking Team for Category III Structures, updated to address comments from the Checking Team, and submitted to the Province's Representative in accordance with the Consent Procedure with all comments and responses attached.

3.4.5.4 Hydraulic Design Report

(a) Project Co shall prepare and submit to the Province's Representative in the Interim Design and, in accordance with the Review Procedure, with the Design Data in the Final Design a hydraulic design report (the "**Hydraulic Design Report**") that demonstrates that the Design and Construction meet the requirements of this Article.

(b) The Hydraulic Design Report shall include the results of the physical model testing referred to in Section 3.4.5.2(l) of this Part.

(c) The Hydraulic Design Report shall be reviewed by the Checking Team for Category III Structures, updated to address comments from the Checking Team, and submitted to the Province's Representative in the Interim Design and in accordance with the Review Procedure with the Design Data in the Final Design with all comments and responses attached.

3.4.5.5 River Monitoring Program

Project Co shall develop, implement and update the River Monitoring Program that shall, as a minimum, include:

(a) in order to provide early warning of changes to river flows, monitoring of river conditions at the Mission gauge and contributing factors to flows in the Fraser River including, for example, snow melt. At a minimum the following shall be considered with regard to contributing factors to flows in the Fraser River:

(i) Fraser River WARNS 10-day forecast, (http://bcrfc.env.gov.bc.ca/freshet/warns/2019_FraserForecast.pdf)

(ii) Lower Fraser River water level forecast (https://www2.gov.bc.ca/assets/gov/environment/research-monitoring-and-reporting/monitoring/river-forecast-centre/fraser_gauges.pdf

(iii) Snow Conditions and Water Supply Bulletin https://www2.gov.bc.ca/gov/content/environment/air-land-water/water/drought-flooding-dikes-dams/river-forecast-centre/snow-survey-water-supply-bulletin)

(b) continuous monitoring during Construction of water velocities, river bed elevations and flow distribution in the Fraser River in the vicinity of the NFRB to determine if the Design requirements of this Article are being achieved. Project Co shall inform the Province's Representative immediately if monitored conditions exceed those permitted in this Article. The results of this monitoring shall be available to the Province in real time.

3.4.5.6 Scour and Sedimentation Intervention Program

(a) Project Co shall develop, implement and update the Scour and Sedimentation Intervention Program that will be implemented during Construction and until Total Completion. The Scour and Sedimentation Intervention Program will include actions and interventions that will be implemented by Project Co if:

(i) there is early warning of changes to river flows resulting from the monitoring of contributing factors in accordance with Section 3.4.5.5(a) of this Article;

(ii) the behavior of the river bathymetry is different from the river bed elevations described in the PBR Hydraulics Design Criteria; or

(iii) Project Co becomes aware of any potential threat to the safety of the public and/or the stability of an instream structure or river banks.

(b) All materials, agreements and permits required for implementation of the Scour and Sedimentation Intervention Program shall be in place during Construction and until Total Completion.

3.4.5.7 Required Interventions

PDC3.4.5.7a Project Co shall promptly, and in any event within 12 hours, notify the Province's Representative if any intervention is required to be implemented in accordance with the Scour and Sedimentation Intervention Program (a "**Required Intervention**").

(b) Project Co shall prepare and submit to the Province's Representative pursuant to the Consent Procedure a plan for the carrying out of any Required Intervention and, following the acceptance of such plan by the Province, or sooner if required by the Province or as required to protect the safety of the public and/or the stability of instream structures or river banks, Project Co shall commence and complete such Required Intervention, provide the Province's Representative with full information with respect to any such Required Intervention, and comply with the reasonable requirements of the Province with respect to any such Required Intervention.

(c) The carrying out of such Required Intervention in accordance with the plan referenced in Section 3.4.5.7(b) of this Article shall be carried out by Project Co, and if the Project has been constructed in accordance with the Design and if the construction scenarios as described in the River Hydraulics Management Plan have been followed then the Province shall issue a Province Change for the carrying out of the Required Intervention and the provisions of Part 7 [Province Changes and Project Co Proposals] shall apply accordingly.

3.4.6 Durability Plan

(a) Project Co shall develop and implement a detailed durability plan for the Design of the New Fraser River Bridge, including all replaceable and non-replaceable components (the

"**Durability Plan**"). Project Co shall include the Durability Plan in the Interim Design and with the Design Data in the Final Design submissions for the New Fraser River Bridge.

(b) At a minimum, the Durability Plan shall include:

(i) a Design approach to ensuring that all non-replaceable components will be able to achieve their Design Life;

(ii) identification of each structural component with the corresponding environmental exposure conditions for each component, including the following conditions: buried, submerged, exposed to atmosphere, and exposed to corrosive chemicals;

(iii) identification of relevant degradation and protective mechanisms for each structural component;

(iv) quantification of time-to-degradation, including corrosion, fatigue, creep and chloride ingress, for the identified degradation mechanisms and resistances to these mechanisms with respect to time. The quantification models used shall be listed in the plan. Models shall, at a minimum, use a probabilistic approach to evaluate the time-related changes in performance depending on the component, environmental conditions, and any proposed protective measures;

(v) confirmations of standards used in the Design;

(vi) demonstration of the expected Design Life of each structural component, based on the proposed material, exposure condition, relevant degradation mechanism, and any proposed protective measures, taking into account the planned inspection and maintenance schedule;

(vii) a statement that the New Fraser River Bridge has been designed and constructed to accommodate the use of De-icing Chemicals or materials (as identified in the Recognized Products List) and abrasive grit materials while conforming to the Project requirements. Project Co shall assume the use of De-icing Chemicals in verification of the required Design Life for components;

(viii) details of any corrosion allowances and thresholds used;

(ix) details of the level of reliability or probability of the Design Life of each component as well as the expected interval of replacement or renewal of the protective measures within the Design Life (including thickness of coats and the number of times to re-coat paint that protects steel members);

(x) explanation of what will be done during Construction to ensure that suitably high quality products are achieved (including uniformity of compaction of the concrete, maintaining air entrained voids during placement and finishing, adequacy of concrete cover, proper curing for the element, and temperature control, inspection and testing of steel);

(xi) explanation of specific measures taken to enhance the reliability and robustness of single load path structures;

(xii) list of the manufacturers of all proposed coatings, inhibitors, sealers, and membranes;

(xiii) schedule for corrosion inspection of the structural components;

(xiv) demonstration of how cable stays, tie downs and corresponding sheaths will achieve their required Design Life.

(xv) identification of and proposed maintenance schedule for items and materials that are potentially vulnerable to corrosion;

(xvi) identification of and proposed maintenance schedule for items and materials that are potentially vulnerable to degradation due to environmental factors, including ultraviolet radiation, freeze-thaw cycles and abrasion; and

(xvii) drawings signed and sealed by a Bridge Structural Engineer showing how components can be maintained and how components can be replaced.

3.4.7 Access for Operations, Inspections and Maintenance

3.4.7.1 Access - General

As a minimum, the following access shall be provided for the New Fraser River Bridge:

(a) elevator and stair access in all tower legs;

(b) stair access in all hollow piers/columns greater than 10 m in height and ladder access for heights between 10 m and 3 m;

(c) inspection and maintenance shuttle access along the inside of box girders used for the main span;

(d) under bridge access for inspection, maintenance and re-coating of the Bridge Superstructure;

(e) gantry access to inspect the full length of all cable stays;

(f) rope access to the inside and outside surfaces of towers, the outside of cable anchorages and for operation of the Stay Cable Snow and Ice Removal System;

(g) perimeter edge of the top of all towers shall be enclosed by fencing with galvanised perforated steel mesh infill and handrails, with the handrails being designed to allow for rope access over the handrail;

(h) walkways between the legs of each tower to facilitate access to the Stay Cable Snow and Ice Removal System without having to cross travelled lanes; and

(i) walkways, ladders and platforms suitable to access, maintain and replace all cable anchorages, shock transmission devices, bearings, joints, lighting and other components needing inspection and maintenance.

3.4.7.2 Access Equipment

All access equipment shall meet the following requirements:

(a) Access equipment shall meet all Health and Safety Laws including CSA standards applicable to the use and environmental conditions where the equipment will be stored and used.

(b) Access equipment shall be fully powered for all movements. The equipment shall be controllable by a single operator for all functions. Controls shall be ergonomically located.

(c) As a minimum, all access equipment shall have the following safety features:

(i) clearly labelled load capacity; and

(ii) overload sensing system;

(iii) emergency stop devices, including brakes accessible by the operator;

(iv) emergency telephone, accessible by the operator; and

(v) operational and emergency lighting.

3.4.7.3 Tower Elevators

The following requirements apply to tower elevators required for the New Fraser River Bridge:

(a) All elevators shall be rack and pinion type.

(b) Elevators shall have a variable speed with speeds between 0 m/s and 1.2 m/s. The maximum speed shall be achievable at all locations.

(c) Elevators shall have 700 kg pay-load capacity.

(d) Elevator cars shall be sized for at least 4 passengers and have a minimum internal floor plan area of 1.05 m^2.

(e) As a minimum, landing enclosures shall be required for each elevator to access tower base, deck level, crossbeams and each anchorage platform.

(f) An access control system shall be installed to restrict access to and use of the elevator by authorized persons only.

(g) The elevator shall not be used for Construction.

(h) Where ladders and platforms are in proximity to the operating envelope of the elevator, removable protective barriers shall be provided to prevent injury from collision between lift and personnel.

(i) Elevators shall have a centrifugal brake that can be operated from inside the car to allow the car to be manually lowered to the next landing in case of a power failure.

(j) Elevator cars shall be equipped with an escape access through the roof of the car and a protective barrier around the perimeter of the roof of the car.

(k) Elevator design shall be in accordance with ASME A17.1/CSA B44. Each elevator shall have appropriate safety certification.

(l) Elevators shall have selective collective automatic operation controls as defined in ASME A17.1/CSA B44.

3.4.7.4 Stairs, Ladders and Platforms

(a) Stair access shall be provided in each tower leg and in all hollow piers used for the New Fraser River Bridge. Where there is insufficient space for stairs, ladders shall be provided. Access doors shall be provided at the base of each pier.

(b) Platforms shall be provided for stairs and ladders at a spacing that meets the requirements of Good Industry Practice and all applicable Health and Safety Laws.

(c) At each cable anchorage level, a permanent platform shall be provided inside the tower.

(d) Hand rails and fall arrest systems shall be provided for all stairs, ladders and platforms.

(e) Access to deck level cable anchorages shall be provided with suitable ladders and platforms.

(f) Access to the top of piers, bearing locations and shock transmission devices shall be provided with suitable ladders and platforms, including sufficient space around the bearings and shock transmission devices for replacement and safe inspection and maintenance, to permit maintenance without having to bend or crawl under the superstructure and without modification to the Structure.

3.4.7.5 Snow and Ice Removal Operations

(a) Access shall be provided for the operation of the Stay Cable Snow and Ice Removal System. This access shall include sufficient space to allow rope access technicians to work overhead and to allow retrieval and re-loading of collars without interference with traffic.

(b) An enclosed area shall be provided within each tower leg. These areas shall be heated and include sufficient space to accommodate seating for three people and two lockers to store rope access equipment;

(c) A fenced compound (the "**Snow and Ice Compound**"), of minimum size 20m x 30m with lockable gate and granular base, shall be provided for the operation of the Stay Cable Snow and Ice Removal System and include a building for operators

(the "**Snow and Ice Removal Operations Building**"). The Snow and Ice Compound shall have vehicle access from a public road. Vehicle access for a light single unit truck shall be provided to and from the northbound and southbound multi-use path on the NFRB in the City of Surrey and the City of New Westminster. Vehicle access to the multi-use path shall be through a lockable gate to limit use to authorised personnel only.

(d) The Snow and Ice Compound shall be located under the NFRB or the NFRB approaches in Surrey, south of the CN Rail trestle and north of Bridge Road. Direct access shall be provided from the pier closest to the Snow and Ice Compound, to the NFRB northbound and southbound multi-use paths. If access through the security fence is necessary then a lockable gate shall be provided in the security fence.

(e) At a minimum, the Snow and Ice Removal Operations Building shall accommodate a twelve-person crew and be provided with the following:

(i) insulation and heating;

(ii) ventilation;

(iii) power;

(iv) lighting;

(v) potable water;

(vi) high-speed internet connection;

(vii) control system to operate the Stay Cable Snow and Ice Removal System;

(viii) furnished with new chairs, tables, fridge, microwave and kettle;

(ix) change rooms with single tier metal lockers; and

(x) washroom facilities.

(f) The Snow and Ice Removal Operations Building shall be designed to meet the requirements of the BC Building Code.

3.4.7.6 Shuttle

(a) Box-type Superstructures used for the main span of the New Fraser River Bridge shall be furnished with one motorized shuttle per box running on rails inside the box. The shuttle shall be capable of carrying a minimum of 2 persons and a total payload of at least 500 kg over the entire length of the span.

(b) Shuttles shall be designed and constructed in conformance with Health and Safety Laws.

(c) Shuttles shall have an electric variable speed drive (varying from 0 to 4 m/s). A lockable speed limiter shall be provided to allow the maximum speed to be reduced if required.

(d) Shuttles shall be powered by one or more standard rechargeable traction (truck) type batteries. All cables, plugs, transformers and other components necessary to recharge the battery from the 110V electrical power points provided within the Superstructure shall be provided.

(e) Shuttles shall be fitted with headlights at both ends and with an operating audible alarm. The headlights and alarm shall automatically be activated whenever the shuttle is in motion.

(f) Shuttles shall be fitted with a motor brake, mechanical brake, dead-man's pedal and all safety devices required by applicable regulations.

(g) Shuttles shall be provided with an automatic stop at the ends of the running rails (if running rails are required). The rails shall have sufficient overrun beyond the automatic stop to prevent the shuttle reaching the end of the rail.

3.4.7.7 Under Bridge Access

(a) Project Co shall develop and provide under-bridge access to the soffit of the cable-stayed spans of the New Fraser River Bridge to allow inspection, maintenance, repairs and re-painting. This access shall be provided by a movable permanent gantry or gantries.

(b) Permanent gantries shall meet the following requirements:

(i) An inspection gantry shall consist of a minimum 2 m wide platform with sufficient vertical clearance to allow inspections and be self-propelled with master controls within the gantry platform, be easily accessible from the top of the Bridge Deck and be able to reach full length and full width of the New Fraser River Bridge Superstructure.

(ii) Gantries shall have a minimum carrying capacity of not less than 10 persons and a 1500 kg point load at any location on the platform.

(iii) Corrosion protection for the gantries, rails and attachment points shall be galvanised.

(iv) Design shall consider and accommodate for the Future Six Lane Configuration on the New Fraser River Bridge.

(v) Inspection gantry and components shall be certified and ready for use prior to the SC1 Substantial Completion Date.

3.4.7.8 Stay Cable Inspection Gantry and Unmanned Inspection Device

(a) An unmanned inspection system shall be provided for use for routine inspections of the stay cables.

(b) A cable cradle inspection gantry shall be provided to allow visual inspection of all stay cables. The gantry shall not be permanently mounted on the stay cables.

(c) The cable cradle inspection gantry shall run the full length of any cable.

(d) All components, fixings and facilities of the inspection systems shall be replaceable.

(e) The gantry cradle shall be of sufficient size for two inspection persons plus relevant hand tools and equipment.

(f) The gantry shall have a variable travelling speed between zero and nine metres per minute.

(g) The gantry shall carry its own generator to power the hoist and shall also supply 13A 110v sockets for small electrical tools.

(h) Distance sensors or other appropriate sensors shall be provided for the gantry to instantaneously detect and show the real-time position of the gantry relative to the tower. This information shall be shown on the display of the gantry control panel.

(i) The gantry shall be provided with an automatic stop at the top and bottom ends of the stay cables.

(j) The superimposed safe working load of the cradle shall be a minimum 300 kg.

(k) The gantry shall be designed to operate in a wind speed of 15 m/s whilst fully loaded. An anemometer shall be provided on the gantry to measure the wind speed. An audible and visual warning signal shall be given when the wind speed reaches 10 m/s.

3.4.7.9 Rope Access and Hoists for Towers

(a) All necessary equipment and installations for rope access shall be provided such that the following locations are accessible:

(i) locations for all components of the Stay Cable Snow and Ice Removal System;

(ii) external concrete surfaces of each tower leg; and

(iii) external concrete surfaces of each pier.

(b) All structural anchors shall be in stainless steel to grade A4-80 complying with ASTM F738 (with a minimum molybdenum content of 2.5%).

(c) Fixed access for inspection of structural anchors shall be provided and the structural anchors shall be positioned in easily accessible locations.

(d) Project Co shall submit to the Province's Representative, in accordance with the Review Procedure, a detailed rope access strategy plan for the locations listed above. The plan shall include the following details for each location:

(i) access to the rope access dropping point;

(ii) type and location of structural anchors; and

(iii) inspection and maintenance record of anchors.

(e) The rope access system shall be designed with consideration of safety and emergency response planning, particularly in relation to rescuing persons in the event of a fall. The Design shall be coordinated with and informed by emergency response planning and the associated plans developed by Project Co in accordance with this Agreement.

(f) A fall arrest system shall be provided at cross beams and across the top of each pier, except for those areas designated as emergency exit points, in which case, a permanent handrail system shall be provided.

(g) Towers shall be provided with permanent motorized hoists and access hatches to allow jacks to be positioned in the towers for re-jacking of the cable stays and operation of the Stay Cable Snow and Ice Removal System. Hoists shall be installed to accommodate lifting of equipment from deck level up to all Stay Cable Snow and Ice Removal System rope access points.

3.4.8 Structural Health Monitoring System

(a) Project Co shall design, supply, install and commission a system for monitoring the structural health of the New Fraser River Bridge (the "**Structural Health Monitoring System**" or the "**SHMS**"). The SHMS shall be an integral part of the operation and maintenance strategy for the New Fraser River Bridge.

(b) The Structural Health Monitoring System shall be designed by a team lead by a Professional Engineer who is a Bridge Structural Engineer with expertise in structural health monitoring.

(c) All sensors shall be placed in locations where measurements can be taken unaffected by other structural components.

(d) The SHMS shall allow all data to be collected and stored on a continuous basis and the SHMS shall allow for reports to be generated based on stored data, either automatically at specified intervals or upon a user request basis. The SHMS shall include a graphical display which displays the real time values of the various sensors and where measured value can be plotted against each other.

(e) The SHMS shall include, as a minimum, the requirements specified in Appendix G [British Columbia Smart Infrastructure Monitoring System and BC Strong Motion Network Requirements] to this Schedule.

(f) The SHMS shall be installed to not interfere with other New Fraser River Bridge components, including the Stay Cable Snow and Ice Removal System.

3.4.9 British Columbia Smart Infrastructure Monitoring System and BC Strong Motion Network Requirements

Project Co shall use the components of the SHMS specified in this Schedule, including those in Appendix G [British Columbia Smart Infrastructure Monitoring System and BC Strong Motion Network Requirements], to provide continuous and uninterrupted data for the British Columbia Smart Infrastructure Monitoring System and the BC Strong Motion Network.

3.4.10 Navigation Clearances

(a) Horizontal and vertical clearances for the New Fraser River Bridge shall be in accordance with the PBR Navigation Clearance Drawing for all load considerations including the Future Six Lane Configuration.

(b) New Project Infrastructure shall not be placed within the Project Navigation Protection Zone Boundary as shown on the PBR Navigation Clearance Drawing except for scour protection which may be placed such that the top of the scour protection is at or below EL -10 m GSC and outside of the existing navigation channel.

(c) The NFRB shall be designed such that, in the future, the scour protection placed as part of the Project Work may be relocated to be outside of the Project Navigation Protection Zone as shown on the PBR Navigation Clearance Drawing without modification to the NFRB. The Final Design submission shall include drawings showing the location of scour protection placed as part of the Project Work and the future location of the scour protection placed outside of the Project Navigation Protection Zone.

3.4.11 New Fraser River Bridge Erection

(a) In addition to other requirements for submission of erection procedures, Project Co shall develop and submit to the Province's Representative, in accordance with the Review Procedure, erection procedures to demonstrate all aspects of the erection of the New Fraser River Bridge. These erection procedures will include, among other things:

(i) provisions to eliminate the possibility of damaging existing infrastructure during Construction of the New Fraser River Bridge, including the erection of bridge components over the Fraser River;

(ii) special Traffic Management requirements to ensure public safety during overhead work;

(iii) provisions for the management and safety of marine traffic; and

(iv) provisions to comply with the Railway Agreements.

3.4.12 Deck Drainage

(a) Discharge through deck drains on the New Fraser River Bridge and the approach Structures shall be collected, treated and discharged in accordance with the drainage and environmental requirements of this Agreement.

(b) The Design and Construction of the Deck drainage shall be for the Future Six Lane Configuration.

(c) Deck drainage shall be designed for the Opening Day Configuration and for the Future Six Lane Configuration with catch basins located in the shoulder of the Future Six Lane Configuration. Barriers required for the Opening Day Configuration shall not contain scuppers.

(d) As a minimum, Project Co shall incorporate clean outs at the centre of the NFRB, and longitudinally every 200m along a drainage run and at all bends.

3.4.13 Multi-Use Paths

Multi-use paths shall be provided on either side the New Fraser River Bridge in accordance with Article 10 of this Part.

3.4.14 Traffic Barriers, Safety and Security Fences, and Wind Barriers

(a) All traffic barriers shall be designed in conformance with BC Supplement to CAN/CSA-S6 and CAN/CSA-S6.

(b) All exterior sides of the New Fraser River Bridge, including associated multi-use paths, shall be provided with a non-climbable safety and security fence. The fence shall be designed in conformance with BC Supplement to CAN/CSA-S6 and CAN/CSA-S6, with a minimum height of 3 m and vertical pickets at a maximum clear opening of 100 mm. The fence shall be designed to prohibit the climbing of Bridge elements. If located on the inside of the stay cables, access openings a minimum of 600 mm x 600 mm, complete with locks, shall be provided for cable inspection and maintenance at a spacing of no more than 200 m. The safety and security fence shall extend from abutment to abutment.

(c) In addition to installation of a safety and security fence, Project Co shall install ten yellow emergency telephones on the New Fraser River Bridge, including one at each tower leg, one at mid span and one on either approach, in both directions. The emergency telephones will be connected by Project Co to the appropriate crisis call centre and shall include appropriate signage.

3.4.15 Services

The following services shall be provided on the New Fraser River Bridge:

(a) auxiliary power suitable for running all elements of the New Fraser River Bridge that require power, including SHMS, the Snow and Ice Removal Operations Building and the Stay Cable Snow and Ice Removal System, in accordance with Article 6 [Electrical Lighting, Signs and Lighting].

(b) permanent lighting with permanent power supply for access routes and access chambers;

(c) emergency lighting along all emergency routes; and

(d) Utilities and empty conduit, in accordance with this Agreement.

3.4.16 Expansion Joints

Bridge Deck expansion joints shall comply with the following:

(a) The number of expansion joints shall be minimized.

(b) Expansion joints shall:

(i) minimize the noise generated by the passage of traffic, including the use of sinus plates, insulation, noise blankets or the use of other noise muffling devices;

(ii) be able to be inspected and maintained without modifications to the Structure;

(iii) be able to be removed and replaced without permanent modifications to the Structure;

(iv) incorporate a waterproofing system across the full width to prevent ingress of water; and

(v) be safe for cyclists and as close to 90 degrees, to the direction of travel, as possible with small gaps, smooth ,and non-slip in all conditions.

3.4.17 Bridge Snow and Ice Removal

3.4.17.1 General

(a) Project Co shall develop and provide bridge components to prevent snow or ice from falling from the stay cables, tower cross beams and other bridge elements of the New Fraser River Bridge onto the traffic lanes and multi-use paths (the "**Bridge Snow and Ice Removal Components**"). The Bridge Snow and Ice Removal Components shall include:

(i) use of a Stay Cable Snow and Ice Removal System;

(ii) methods to remove snow and ice from or prevent the accumulation of snow and ice on overhead elements including but not limited to stay cables, towers and tower cross beams;

(iii) live high-definition video with pan, tilt and zoom features for monitoring of stay cables, tower cross beams, snow depth measuring device and other overhead elements;

(iv) predictive environmental modelling and forecasting including a weather station compatible with the Ministry road weather information system (RWIS);

(v) installation of a snow depth measuring device on the tower top supporting the weather station in accordance with the Snow Depth Measuring Device Requirements; and

(vi) operation and maintenance procedures for Bridge Snow and Ice Removal Components shall be included in the Operation and Maintenance Manual.

(b) Project Co shall provide and commission a live, electronic, internet-based system to monitor the Stay Cable Snow and Ice Removal System and associated infrastructure and components, including cameras and weather stations. The system shall:

(i) provide live access to current information on the status of Stay Cable Snow and Ice Removal System activities to the Regional Transportation Management Centre;

(ii) collect data and provide reports of Stay Cable Snow and Ice Removal System actions taken, including confirmation that collars have reached the collar attenuators and how many collars are available to drop for each cable; and

(iii) be located such monitoring equipment is accessible for maintenance without disrupting traffic.

3.4.17.2 Stay Cable Snow and Ice Removal System Requirements

(a) Project Co shall provide a system for the removal of snow and ice accretion from stay cables (the "**Stay Cable Snow and Ice Removal System**"), as consistent with the system identified in the Port Mann Bridge Snow Removal and Ice Management System Reference Document, including the corresponding electrical, instrumentation and control systems. The system shall be supplied with a full complement of collars and an additional 10% for storage. The system shall be designed to travel the length of each cable from the tower anchorage to a location no greater than 3 m above the deck anchorage.

(b) Actuators shall have a minimum IP code of IP66S, as defined in CAN/CSA-C22.2 No. 60529.

(c) The control systems shall be able to report in real time, the exact number of collars available to be dropped at any given time.

3.4.18 Deck Wearing Surface System Replacement

As part of the Design of the NFRB, Project Co shall establish a Deck Wearing Surface System replacement method. The details of the Deck Wearing Surface System replacement methodology shall be documented and provided to the Province's Representative as part of the Interim Design submission and the Final Design

submission.

3.5 Monitoring of Specified Existing Structures during Construction

(a) As a minimum the following shall be monitored; Railway Bridge, Existing Pattullo Bridge, SkyTrain Tunnel, SkyBridge and elevated SkyTrain guideway in Surrey (the **"Specified Existing Structures").**

(b) Project Co shall develop and implement a Structure monitoring program to monitor the behaviour of the Specified Existing Structures during Construction. The Structure monitoring program shall be documented in a plan (the **"Structure Monitoring Plan"**) and shall include, as a minimum:

(i) the establishment of thresholds of behaviours of the Specified Existing Structure, including but not limited to movements at all joints, vibrations in roof slabs, walls and floors, and water ingress, to ensure the continued serviceability of the Specified Existing Structures;

(ii) the real-time measurement of behaviours of the Specified Existing Structures with alarms when thresholds are reached;

(iii) the requirement that when thresholds are reached Project Co shall stop all work affecting the Specified Existing Structures to assess work methods and shall adjust work methods as required to prevent any loss of service to the Specified Existing Structures;

(iv) the reporting of all monitored behaviour of the Specified Existing Structures within one hour, when requested by the Province's Representative;

(v) the identification of any interventions required to ensure the continued serviceability of the Specified Existing Structures; and

(vi) any emergency measures to be implemented if any of the Specified Existing Structures becomes unsafe for use.

3.6 Existing Bridges and Major Culverts

The following requirements apply to existing Bridges and Major Culverts:

(a) As a minimum, Project Co shall replace the Superstructure on the Royal Avenue overpass.

(b) New structural components added to existing Bridges and Major Culverts shall be designed in accordance with the BC Supplement to CAN/CSA-S6 and CAN/CSA-S6, using the requirements for new Structures.

(c) Existing Bridges and Major Culverts shall be evaluated using CAN/CSA-S6 Section 14 for live load capacity using the BCL 625 non-permit vehicle loading and the Ministry's 85-tonne GVW special permit vehicle loading. Load posting of Bridges and Major Culverts is not permitted and the Structures found to be substandard with regard to live load capacity shall be

upgraded. Load rating evaluation and strengthening strategies shall be documented in a report and submitted as part of the Design submission.

(d) Existing Bridges and Major Culverts shall be seismically retrofitted to meet the design requirements of new Bridges. Seismic assessment and retrofit strategies shall be documented in a report and submitted as part of the Design submission. Where the Structure comprises both new and existing portions, the portions must be seismically compatible.

(e) Barriers on existing Bridges and Major Culverts shall be upgraded to meet the requirements of the BC Supplement to CAN/CSA-S6 and CAN/CSA-S6. The same type of barrier shall be used on each side of the Structure.

(f) The hydraulic opening of Major Culverts shall be upgraded to meet the requirements given in the codes and standards listed in Section 3.1 [Order of Precedence] of this Article.

3.7 New and Existing Retaining Walls

The following shall apply to new and existing retaining walls:

(a) Additional anchors, tie-backs and soil straps shall be installed for new retaining walls or modifications of existing retaining walls to allow for future inspections and testing by the Province. The number of additional elements provided for in each Structure shall be equal to 2% of the number required by design but not less than 2 additional elements shall be provided.

(b) Reinforced soil slopes steeper than 45 degrees shall also be considered as Retaining Structures.

(c) The retaining wall systems and abutment wall types in the Recognized Products List shall be used for the Project Work except that the following retaining wall systems and abutment wall types are not permitted:

(i) mechanically stabilized earth walls with dry cast concrete block facings;

(ii) metal bin walls;

(iii) steel sheet pile walls in areas that are visible to pedestrians, cyclists or road traffic; and

(iv) walls with wire facings, in areas that are visible to pedestrians, cyclists or road traffic or that are subject to spray or surface runoff containing De-icing Chemicals.

(d) Walls required to retain Bridge embankments adjacent to Bridge Foundations shall be considered abutment walls.

(e) Geotextiles are not permitted for use as soil reinforcement.

(f) Wire used in wire facing or soil reinforcing components of all MSE walls shall be galvanized and shall have a minimum thickness determined in accordance with this Part.

(g) Structural design shall be performed in accordance with this Schedule, the BC Supplement to CAN/CSA-S6 and CAN/CSA-S6.

(h) For MSE walls, items not covered by the AASHTO LRFD Bridge Design Specifications shall meet the requirements of the FHWA Guidelines.

(i) For MSE abutment walls and wing walls, precast concrete facing panels shall be used and a precast concrete coping shall be used along the top of the walls. The minimum soil reinforcement length for walls influenced by the abutment footings shall be the greater of 60% of the distance from the top of the levelling pad to the road surface plus two metres or the minimum length required by the AASHTO LRFD Bridge Design Specifications. Any strap within a 1:1 slope of an abutment footing or pile cap shall be considered as influenced by the footing.

(j) The tops of the retaining walls shall be finished in straight-line segments.

(k) Adequate drainage shall be provided for all retaining walls. Existing walls with substandard drainage shall be retrofitted to provide proper drainage.

(l) The aesthetics of retaining walls shall be in accordance with the general guidelines in the Manual of Aesthetic Design Practice (for a "Parkway" classification) and in accordance with Section 3.3.9 [Aesthetics] of this Article and Article 9 [Landscape and Site Restoration Design Criteria] of this Part.

(m) The following shall apply to existing retaining walls modified by the Project:

(i) Existing walls shall be considered as Major Route Structures, as defined in CAN/CSA-S6, and shall be provided with a seismic retrofit to meet the design criteria for new walls.

(ii) If existing walls are lengthened, then the new portion of the wall shall be designed as a new wall and all design criteria for new walls shall be met.

(iii) If the height or load on an existing wall is increased, then the existing wall shall be retrofitted to meet the design criteria for new walls.

(iv) If ground conditions in front of an existing wall are changed, then the existing wall shall be retrofitted to meet the design criteria for new walls.

(v) If there is an increase in loading behind the wall, then the existing wall shall be retrofitted to meet all design criteria for new walls.

(n) For soil nail walls, the Design shall be in accordance with FHWA Circular No. 7 and shotcrete shall be in accordance with Section 209 of the DBSS.

(o) Rigid traffic and combination barriers at or above retaining walls shall be considered to be a structural component of the wall and shall meet the requirements for Structures under this Article.

3.8 Sign, Traffic Signal, Lighting, and ITS Structures

(a) Project Co shall design, fabricate and install Structures for Signs, traffic signals, lighting, and ITS Equipment in accordance with the BC Supplement to CAN/CSA-S6, CAN/CSA-S6, and

the Electrical and Signing Materials Standards. Levelling nuts below the base plates shall not be permitted.

(b) Existing Sign Structures may be re-used provided the structural components have been inspected and certified by a structural Professional Engineer as meeting the Project Requirements for ongoing use and provided all clearance requirements are met as per new Sign Structures. All equipment to be re-used shall be power washed clean prior to re-use.

(c) Undamaged aluminium sign extrusions may be re-used with new sign faces applied.

(d) Sign Structures shall be designed and constructed as "Other Structures" for seismic design in accordance with the BC Supplement to CAN/CSA-S6 and CAN/CSA-S6.

3.9 Noise Walls

Noise walls shall be designed and constructed to the following specifications:

(a) A noise mitigation system on the Ministry's Recognized Products List in the category "Sound Attenuation Wall Systems" with sufficient density to provide a minimum sound transmission loss of 25 decibels at a frequency of 500 Hz shall be acceptable, where required to meet the requirements of Article 1 [Noise Mitigation] of this Part.

(b) The noise reduction coefficient of "Sound Absorption Walls" shall be better than 0.8.

(c) Noise walls shall be designed and constructed in accordance with the BC Supplement to CAN/CSA-S6 and CAN/CSA-S6.

(d) Noise walls shall have a minimum Design Life of 50 years.

(e) Noise walls on roadside or median barriers shall:

(i) meet crash test requirements for TL3 of NCHRP Report 350;

(ii) be designed for TL4 loads at 1070 mm height; and

(iii) be a system used by other highway jurisdictions, with proven acceptable performance in service.

(f) Noise walls on Bridges and Structures shall:

(i) meet crash test requirements for TL4 of NCHRP Report 350; and

(ii) be a system used by other highway jurisdictions and with a proven acceptable performance in service.

ARTICLE 4 SEISMIC DESIGN CRITERIA

4.1 General Requirements and Order of Precedence

Project Co shall comply with the seismic requirements of this Article, and the following codes and standards and if there is any conflict between criteria contained in this Article and any of the Reference Documents, the following shall apply in descending order of precedence:

(a) the criteria contained in this Article;

(b) Earthquake Scenario Technical Memorandum (seismic inputs);

(c) Bridge Design and Procedures Manual, including the BC Supplement to CAN/CSA-S6;

(d) CAN/CSA-S6;

(e) AASHTO Seismic Guide Specifications;

(f) ATC-32;

(g) ATC-49; and

(h) AASHTO LRFD Bridge Design Specifications.

4.2 Seismic Inputs

(a) The Site Class C (as defined in CAN/CSA S6) ground motion time-histories provided in the Earthquake Scenario Technical Memorandum shall be used for the Design. This data includes fifteen sets of firm-ground time-history records and the associated uniform hazard response spectrum for each of the following three design earthquake events (the "**Design Earthquake Events**"):

(i) 10% in 50 years;

(ii) 5% in 50 years; and

(iii) 2% in 50 years.

(b) For the purposes of this Article, "firm ground" is defined as Site Class C soils with an average shear wave velocity of 450 m/s as per the National Building Code.

(c) For the purposes of this Article, a set of records is comprised of two orthogonal horizontal records and the relevant vertical record.

(d) The fifteen sets of time-history records are subdivided into three input source categories, representing shallow crustal earthquake motion, deep in-slab earthquake motion, and subduction interface earthquake motion, respectively, with each category containing five sets of records. All fifteen sets of time-history records shall be used in analyses for the Design.

(e) The firm-ground motion time-histories for a given Design Earthquake Event shall be uniformly scaled using the ratios of peak firm ground accelerations for the location of the Structures to the corresponding peak firm ground accelerations provided in the Earthquake Scenario Technical Memorandum.

(f) The peak firm ground horizontal accelerations for the location of the Structures shall be obtained from the Geological Survey of Canada website for specific site locations (http://www.earthquakescanada.nrcan.gc.ca/hazard-alea/zoning-zonage/NBCC2015maps-en.php).

(g) The firm ground vertical ground motion time-histories and the response spectra provided in the Earthquake Scenario Technical Memorandum shall be used for the Design and shall be scaled to the location of the NFRB.

(h) Site-specific ground motions shall be developed using generally accepted ground response analysis methods for sites where no firm ground exists at the surface. Use the horizontal firm ground records uniformly scaled for the locations of the Structures as Seed Records.

(i) To develop site-specific response spectra, the following steps shall be taken:

(i) For a given Design Earthquake Event, assemble the results of site response analysis separately for each of the three seismic input sources (i.e. crustal, in-slab and interface). Then calculate the mean of each of the five sets of responses.

(ii) The maximum response of the mean (acceleration) at a given period from the three seismic input sources shall be used for the Design.

(iii) Repeat the above two steps for each of the Design Earthquake Events described in Section 4.2 of this Article.

(iv) Site-specific response spectra for each of the Design Earthquake Events shall not be less than 80% of the code-based spectra for the applicable site class using non-liquefied soil properties.

(j) Spatial and geometric coherency and incoherency shall be included in the Design.

4.3 System Level Seismic Performance Criteria

(a) The New Fraser River Bridge shall comply with the performance criteria specified in CAN/CSA-S6 for Lifeline bridges and the BC Supplement to CAN/CSA-S6 for Lifeline bridges. All Structures, embankments and slopes upon which the Lifeline performance of the New Fraser River Bridge is dependent, shall comply with the performance criteria specified in CAN/CSA-S6 for Lifeline bridges and the BC Supplement to CAN/CSA-S6 for Lifeline Bridges.

(b) Slopes, embankments and retaining walls in Close Proximity to the New Fraser River Bridge shall match the service performance level of the New Fraser River Bridge. The retaining walls shall not collapse under the 2% in 50 years design earthquake event.

(c) All Structures other than those defined in paragraphs (a) and (b) above shall comply with the performance-based design criteria for Major Routes. Slopes, embankments, and retaining walls shall meet the following requirements:

(i) Those Structures upon which the performance of Major Route Bridges are dependent shall be designed such that the performance requirements for these Major Route Bridges are met.

(ii) Those Structures in Close Proximity to Major Route Bridges shall be such that 100% of the travelled lanes are available for use following the 10% in 50 years design earthquake event; and 50% of the travelled lanes, but not less than one, are available for use following the 5% in 50 years design earthquake event.

(iii) Those Structures not in Close Proximity to Major Route Bridges shall be such that at least 50% of the travelled lanes, but not less than one, are available for use following the 10% in 50 years design earthquake event.

(d) Retaining walls shall not collapse under the 2% in 50 years design earthquake event. The seismic retrofit of the Royal Avenue overpass shall meet the design requirements of new Major Route Bridges.

4.4 Component Level Design Criteria

4.4.1 General Requirements

(a) Project Co shall design structural components for new Structures using a "capacity design" approach, as described in CAN/CSA-S6.

(b) Moment-curvature analysis shall be used to determine maximum strains and shall consider the effects of confinement, concrete spalling, reinforcement strain-hardening and reinforcement rupture.

(c) Inelastic static response curves and non-linear analyses shall account for P-delta effects.

(d) Expected design material properties shall be used for the proportioning of structural components in accordance with BC Supplement to CAN/CSA-S6 and CAN/CSA-S6.

(e) Capacity protected elements shall be designed to resist over strength force demands.

(f) The stay cable forces shall not be less than 10% of the tension dead load under all load cases.

(g) The global seismic analysis model for the cabled-stayed spans of the New Fraser River Bridge shall include at least one approach span, but not less than 210 m of approach Structure.

(h) The maximum Rayleigh damping for nonlinear time-history analysis for foundations shall not exceed 8% and for other elements shall not exceed 5%.

(i) Sensitivity studies using appropriate bounds on soil, foundation, and structure parameters including the assumed depth to firm ground (site class C) shall be carried out during design to exclude unacceptable failure modes or performance of the foundations or structure.

4.4.2 Foundations

(a) The Design of foundations and corresponding effects on the Structure shall address the effects of inertial loading from the Structure and the kinematic loading from ground displacements due to seismic shaking and soil liquefaction. Direction of ground displacement shall be determined by geotechnical analysis.

(b) Displacements resulting from liquefaction of soils shall be identified and addressed in the Design.

4.4.3 Retaining Walls

Dynamic soil-structure interaction analysis shall be performed for retaining walls supporting 5 m or more of soil. Analysis software and soil models shall meet the requirements specified in the BC Supplement to CAN/CSA-S6 and shall be capable of taking into consideration non-linear soil and Structure behaviour and the input ground motion described in this Schedule to demonstrate that the seismic performance criteria are satisfied. The analyses shall be carried out for the tallest wall section for each representative subsurface soil profile.

4.4.4 Liquefaction

(a) The potential for liquefaction and its consequences and effects on the design of Structures slopes and embankments shall be based on 2D nonlinear analysis addressing pre-triggering, triggering, and post-triggering aspects of liquefaction. Simplified liquefaction triggering analysis using 1D equivalent analysis with non-liquefied soil properties and simplified consequence analysis shall be conducted for comparison of liquefaction triggering and consequences. For the simplified liquefaction comparisons, the earthquake magnitude for subduction interface earthquakes shall be M = 8.4. Notwithstanding other requirement in this Schedule, for Category III Structures liquefaction analyses and results shall be reviewed by the Checking Team for Category III Structures.

(b) Liquefaction effects shall include ground movements such as settlements and lateral displacements due to flow liquefaction or cyclic mobility, cyclic degradation effects and flow slide potential, seismic soil-structure interaction including kinematic and inertial interactions where appropriate, seismic induced earth pressures on earth retaining walls, and seismic induced pore pressure build up and pore pressure redistribution.

(a) If lateral flow or lateral spreading is predicted to occur, the foundations shall be designed to resist the forces generated by liquefaction induced ground movements.

(b) No in-ground plastic hinging of piles is permitted.

(c) For sites where liquefaction can occur around Structures, the analysis and design shall meet the following conditions:

(i) Non-liquefied condition: Design for inertial loading, assuming no liquefaction or cyclic mobility occurs, using the design response spectrum for Elastic Design Analysis ("**EDA"**) and Inelastic Static Push-over Analysis ("**ISPA"**) or earthquake ground motions for Nonlinear Time-History Analysis ("**NTHA"**) appropriate for the site soil conditions in a non-liquefied state.

(ii) Liquefied condition: Design for inertial loading as described in (i) above shall be checked using resistance parameters such as P-y curves, modulus of subgrade reaction, and/or t-z curves appropriate for liquefiable or cyclically mobile soil conditions. The design response spectrum (for EDA and ISPA analysis) or earthquake ground motions (for NLTH) shall be the same as that used in a non-liquefied condition.

(iii) The Designer shall verify whether or not soil liquefaction will result in higher spectral acceleration than the equivalent non-liquefied case. The design shall be based on the worst case.

(iv) The effects of kinematic loading from inelastic ground deformations on the structure shall be evaluated and combined with the displacement and other effects of inertial loading using the combination of 100% kinematic demands ± 50% inertial demands. Inertial demands shall be obtained from worst case demands in items (i), (ii), and (iii) above.

(v) In cases where soil softening does not reduce the inertial effect, then an assessment shall be undertaken to develop additional appropriate combination of inertial plus the applicable kinematic effects. As a minimum, the effects of kinematic loading from inelastic ground deformations on the structure shall be evaluated and combined with the displacement and other effects of inertial loading using the combination of 50% kinematic demands ± 100% inertial demands.

(d) For sites where liquefaction can occur around slopes and embankments, the design shall meet the performance requirements for both liquefied and non-liquefied conditions. For the non-liquefied condition, the inertial loading shall be determined assuming no liquefaction or cyclic mobility occurs and using the design response spectrum analysis or earthquake ground motions appropriate for the site soil conditions in a non-liquefied state.

4.4.5 Slopes and Embankments

(a) The requirements of the BC Building Code and the EGBC Landslide Guidelines shall be met for slopes and embankment in the proximity of residential and commercial structures.

(b) Where existing cut and fill slopes are modified, all functional and performance requirements specified in this Article shall be met.

(c) All new or modified cut and fill slopes shall be provided adequate protection against erosion and shallow slope movement. Except in the case of slopes under the end spans of overpass and underpass Bridges, design of such protection shall be in accordance with the Manual of Control of Erosion and Shallow Slope Movement.

(d) For slopes and embankments in Close Proximity to Lifeline Structures, seismic loading-induced deformation analysis shall be performed. The input ground motion time-histories as described in this Article shall be used in seismic deformation analysis taking into consideration the anticipated reductions in shear strength and stiffness of the soil due to strong shaking. These analyses shall be performed using a computer code that is capable of taking into consideration the non-linear soil behaviour, pre- and post-liquefaction stress-strain-strength behaviour of soils, soil-structure interaction effects, and time domain base input excitations.

The computer codes and soil models shall meet the requirements specified in the BC Supplement to CAN/CSA-S6 for NTHA.

4.5 Base Isolation

If base isolated Structures are adopted, detailed non-linear dynamic analyses using seismic inputs corresponding to all specified return periods, including soil-structure interaction and potential non-linear behaviour in soils and structural components, shall be used to demonstrate that performance levels are met. Notwithstanding the use of base isolation, substructure components shall be designed to possess a level of ductility comparable to that provided in BC Supplement to CAN/CSA-S6 and CAN/CSA-S6 for ductile substructures.

4.6 Seismic Analyses

(a) As a minimum, Project Co shall perform the seismic analyses as specified in BC Supplement to CAN/CSA-S6- and CAN/CSA-S6

(b) In all cases, analyses shall be focused on determining the expected seismic deformations and the performance of the Structures.

(c) If displacement-based design is used, appropriate allowances shall be made for expected damage, Structure irregularity, higher mode effects and global damping. Damping levels shall be consistent with the deformations and inelastic behaviour expected in the relevant Foundations and Structures and shall be supported by relevant analyses and experimental evidence.

(d) Regardless of the member sizing approach, the performance demonstration shall be in accordance with BC Supplement to CAN/CSA-S6 and CAN/CSA-S6.

(e) Effects of soil liquefaction, scour, and other impacts that may occur during seismic shaking shall be considered in the modeling, analyses, proportioning and seismic detailing of Structures. Failure probabilities of these combined effects shall be consistent with those provided in the BC Supplement to CAN/CSA-S6 and CAN/CSA-S6.

(f) Foundations, soil-structure interaction and hydrodynamic effects shall be included in Structure analyses. Explicit account shall be made for non-linearity in soils and Structures with particular attention to the effects of elastic or inelastic soil deformations and other sources of flexibility on local ductility demands of components.

4.7 Seismic Design Strategy Memorandum

(a) Within 60 days following the Effective Date, Project Co shall prepare and submit to the Province's Representative in accordance with the Review Procedure a seismic design strategy memorandum (the "**Seismic Design Strategy Memorandum**" or "**SDSM**") for the New Fraser River Bridge, associated ramps, and all Bridges, retaining walls, and Structures that support the New Fraser River Bridge or upon which the function of the New Fraser River Bridge is dependent, including:

(i) how the seismic design criteria will be addressed in the Design;

(ii) details of subsurface and groundwater conditions;

(iii) drawings to illustrate the anticipated performance and damage levels for the New Fraser River Bridge;

(iv) geotechnical and structural analysis methods; and

(v) results, assumptions, load paths, special technology and geotechnical energy dissipation and ductility considerations.

(b) Within 90 days following the Effective Date the SDSM shall be reviewed by the Checking Team for Category III Structures, updated to address comments from the Checking Team, and submitted to the Province's Representative in accordance with the Review Procedure with all comments and responses attached.

ARTICLE 5 GEOTECHNICAL DESIGN CRITERIA

5.1 General

The provisions of the BC Supplement to CAN/CSA-S6-14, CAN/CSA-S6-14 Section 6 (Foundations and Geotechnical Systems) and EGBC Landslide Guidelines, shall apply unless otherwise provided in this Article.

5.2 Slope Stability

(a) The factor of safety for slope stability analysis of new or modified cut and fill slopes, including approach embankments not in close proximity to Structures, shall meet the requirements of the BC Supplement to CAN/CSA-S6-14.

(b) Where existing slopes are modified, all functional and performance requirements specified in this Schedule shall be met.

(c) For seismic design of all new or modified slopes or embankments refer to Article 4 [Seismic Design Criteria] of this Part.

(d) All new or modified slopes shall be provided adequate protection against erosion and shallow slope movement. Except in the case of slopes under the end spans of overpass and underpass Bridges, the Design of such protection shall be in accordance with the Manual of Control of Erosion and Shallow Slope Movement. For slopes under the end spans of overpass and underpass Bridges, slope protection shall be provided in accordance with Article 3 [Structure Design Criteria] of this Part.

5.3 Settlement

(a) Foundations for Structures shall be designed such that their total and differential settlements are compatible with the function and performance requirements of the Structures over their Design Life.

(b) Foundations for Bridges shall be designed such that their total settlements after Substantial Completion are less than 50 mm over their Design Life.

(c) Foundations for the New Fraser River Bridge shall be deep foundation piles extending into till or bedrock as follows:

(i) Foundation piles in New Westminster shall extend into till or bedrock; and

(ii) Foundation piles in the Fraser River and in Surrey shall be installed to effective refusal and extend into very dense till or bedrock. Very dense till is defined as the soil layer consistent with that observed at borehole locations SH19-01, SH19-02, and SH19-03 and at a depth of 94.2m, 99.2m, and 105.8m, respectively, as noted in Golder Associates Ltd.'s report titled "Pattullo Bridge Replacement Project (PBRP) Additional Site Investigation" and dated June 2019. For certainty, a driven pile is deemed to have reached effective refusal when a single blow on a 914mm diameter pile, with a wall thickness of 19 mm, by an APE D138-42 diesel hammer, at maximum fuel, results in a pile movement of 1mm or less. If a different type of pile driving equipment or pile diameter is used by Project Co, Project Co shall prepare and submit to the Province's Representative in accordance with the Consent Procedure analysis to demonstrate how the minimum effective refusal requirement is achieved.

(d) The Design shall account for differential settlements of road embankments, approach slabs and Bridges such that the original profile is maintained to within 0.5%.

(e) The Design shall account for total and differential settlements of road embankments and pavement surfaces, over a 75 year period following the SC1 Substantial Completion Date such that the Infrastructure remains safe for use and smoothness and cross-slope requirements are met, ponding and sheeting of water is prevented, pavement drainage is maintained and the function of culverts and ditches is preserved.

(f) Embankments and Structures that are not Bridges shall be designed such that their total settlements after the SC1 Substantial Completion Date are less than 150 mm over their Design Life.

(g) On Highway 17 for embankments greater than 2m in height, the Design shall use Expanded Polystyrene ("**EPS**") and/or timber piles.

5.4 Lightweight Fills

(a) All lightweight fills shall be adequately protected in terms of wheel loads, ground water, road salts, weather and fire resistance, flotation under flood conditions and fuel spills.

(b) Where walls are used to contain flammable lightweight fills, the walls shall provide a minimum 2-hour fire rating.

(c) Foundation systems (sign or abutment foundations for example) or landscaping above the lightweight fills shall be designed such that protective membrane covers required to protect the lightweight fill are not compromised.

(d) Flotation forces corresponding to inundation of the fill to the flood of record (1894) flood level shall be considered in the design of lightweight fills, regardless of any flood protection provided for the area in which the fill is to be constructed.

(e) Shredded rubber tires shall not be used.

(f) Pumice shall not be used.

(g) Hog fuel (wood waste) shall not be used.

(h) Lightweight fill shall have a minimum 1.2 m clean granular material cover.

(i) Expanded Polystyrene (EPS) lightweight fills shall meet the following requirements:

(i) EPS shall be supplied in the form of blocks. It shall be classified as to surface burning characteristics in accordance with CAN/ULC-S102.2-03-EN, having a flame spread rating not greater than 500.

(ii) The minimum compressive strength, measured in accordance with ASTM D1621 shall be 125 kPa at a strain of not more than 5%.

(iii) The density of EPS shall not be less than 22 kg/m³.

(iv) EPS blocks shall be fully wrapped with a black polyethylene sheeting with a minimum thickness of 0.254 mm (10-mil).

(v) Polyethylene sheeting joints shall be overlapped by a minimum of 0.5 m and sealed.

(j) EPS shall not be used to support the following roads unless approved by the City of Surrey:

(i) Bridge Road;

(ii) 112 Avenue;

(iii) 111A Avenue;

(iv) 124 Street; and

(v) Old Yale Road.

5.5 Use of Timber Piles

(a) Timber piles must be installed permanently below groundwater level. Timber piles shall not be used as Foundations supporting Bridges, utility poles or highway sign bases.

(b) Timber piles shall be founded in the underlying sand layer.

(c) If timber piles are used, then a load distribution platform shall be incorporated in the design.

5.6 Geotechnical Investigation Plan for the New Fraser River Bridge

(a) Within 60 days following the Effective Date, Project Co shall prepare and submit to the Province's Representative in accordance with the Review Procedure a geotechnical

investigation plan (the "**Geotechnical Investigation Plan**" or "**GIP**") which shall describe the geotechnical investigation and tests that Project Co will carry out in connection with the Design and Construction of the New Fraser River Bridge, including:

(i) the location and type of tests;

(ii) the qualification requirements for geotechnical testing staff;

(iii) the identification, qualification and certification of laboratories conducting the tests; and

(iv) reference to relevant Quality Documentation.

(b) Within 90 days following the Effective Date the GIP shall be reviewed by the Checking Team for Category III Structures, updated to address comments from the Checking Team, and submitted to the Province's Representative in accordance with the Review Procedure with all comments and responses attached.

5.7 Geotechnical Design

(a) Project Co shall prepare comprehensive geotechnical reports for the Project, including geotechnical investigation reports and geotechnical design reports. The geotechnical investigation reports shall cover existing geotechnical information and known site conditions, new geotechnical investigations performed for the Project and geotechnical test results. The geotechnical design reports shall include geotechnical engineering analysis, geotechnical design assumptions, design parameters (and the basis for these), and geotechnical design recommendations. The geotechnical design reports shall also include foundation settlements, pile capacities, seismic ground response analysis and design response spectra. All assumptions used in analyses shall be clearly documented in the reports.

(b) The geotechnical reports shall be submitted to the Province's Representative at the Interim Design review.

(c) The geotechnical reports associated with any Category III Structures shall be reviewed by the Checking Team for Category III Structures prior to Project Co submitting the Interim Design.

ARTICLE 6 ELECTRICAL, SIGNALS AND LIGHTING DESIGN CRITERIA

6.1 Order of Precedence

The Design for all electrical, lighting, signals, electronic signs and systems shall be in accordance with the criteria contained in this Article and the following codes and standards, and if there is any conflict between criteria contained in this Article and any of the Reference Documents, the following shall apply in descending order of precedence:

(a) the criteria contained in this Article;

(b) Electrical and Traffic Engineering Manual and applicable Technical Bulletins included in the Reference Documents;

(c) Electrical and Signing Materials Standards;

(d) Standard Electrical Equipment Maintenance Manual;

(e) Traffic Management Manual;

(f) Pedestrian Crossing Control Manual;

(g) the applicable documented specifications of the relevant Municipality; and

(h) MMCD.

6.2 Recognized Products List

All electrical products used in the Project are to be selected from the Recognized Products List. The use of electrical products not on the Recognized Products List requires written acceptance from the Province's Representative in accordance with the Consent Procedure.

6.3 Power Distribution

(a) Electrical equipment on this Project that will be within jurisdictions other than future Provincial jurisdiction shall be provided with separate power sources from those under Provincial jurisdiction.

(b) City of New Westminster, City of Surrey and Highway 17 electrical equipment shall be on separate circuits and meters from the other Project Infrastructure within future Provincial jurisdiction.

(c) Project Co shall undertake all coordination with power Utility Suppliers for all required servicing and shall provide a list of all electrical loads to the power Utility Suppliers, as required. Project Co shall coordinate preparation and submittal of service applications with the Province's Representative. Project Co shall provide copies of all service applications to the Province's Representative at the time of submission to the power Utility Suppliers.

6.4 Bridge Electrical Systems

The following electrical systems shall be provided for the New Fraser River Bridge.

6.4.1 NFRB Power Distribution

All electrical power supplies to the New Fraser River Bridge and Ramps shall be provided directly from a BC Hydro source.

6.4.2 Navigation Lighting

(a) Project Co shall provide marine and aerial navigation lighting, signage and other navigation aids to satisfy the requirements of Transport Canada, the Port Authority and all other Relevant Authorities.

(b) Navigation lighting shall have LED lamps unless approval to use this technology is denied by Transport Canada.

(c) Up lighting shall be provided at deck and pile cap level at each tower location.

(d) Project Co shall provide lightning protection for the towers and stay cables in accordance with CAN/CSA-B72-M87.

6.4.3 Electrical Back-Up Power and Redundancy

Project Co shall provide redundant power supplies to ensure navigation lighting, elevators, the Stay Cable Snow and Ice Removal System (including associated cameras and lighting), weather station equipment and seismic equipment remain energized and shall obtain any Permits associated with such redundant power supplies. Redundant power supply shall have the capacity to operate for 48 hours without intervention.

6.4.4 Maintenance Lighting and Electrical

Project Co shall provide maintenance lighting and power receptacles inside the towers and any structural voids where access is required. The Design of the maintenance lighting shall meet the requirements of the following:

(a) Canada Occupational Health and Safety Regulations; and

(b) ASME A17.1-2013/CSA B44-13.

6.5 Roadway Lighting

(a) All lighting shall be dark sky compliant. Light trespass and disability glare for drivers shall be minimized.

(b) Unless otherwise provided in this Article, all lighting shall be LED technology.

(c) Lighting shall be continuous along all roads within the Project Infrastructure except on Highway 17.

(d) Highmast lighting is not permitted.

(e) Luminaires on Structures shall have safety cables designed to meet ANSI C136.31 requirements for vibration.

(f) All permanent roadway lighting levels shall meet or exceed the appropriate standard for the roadway classification and adjacent land use.

(i) Lighting shall be provided for all connections (i.e. intersections and interchanges) and the lighting level shall meet or exceed the design criteria outlined in the Electrical and Traffic Engineering Manual.

(ii) Lighting on municipal roads shall meet the applicable standards of the relevant Municipality.

(iii) Where applicable, lighting within New Westminster shall meet the requirements of the PBR Urban Integration Requirements.

(g) All roadways, and pedestrian and cyclist routes shall be illuminated and meet or exceed the applicable standard.

(h) All equipment to be re-used from the Project Lands shall be power washed clean prior to re-use. Luminaire poles to be re-used shall meet current Ministry Standards and be inspected and certified for re-use by a structural Professional Engineer.

6.6 Traffic Signals

6.6.1 General Requirements

(a) Existing traffic signal equipment, poles and Foundations (provided the Foundation is not re-located) installed later than 2010 may be re-used provided they are in good condition, meet Ministry Standards, and are certified structurally sound by a structural Professional Engineer.

(b) Project Co shall provide the Province with a list of equipment proposed for disposal prior to removing any electrical equipment. The Province may direct Project Co to return some of the to be removed equipment such as luminaire poles, signal poles, sign poles, service equipment and traffic controllers to the Ministry Electrical Maintenance Contractor Yard. All other removed equipment shall be properly disposed of off-site by Project Co.

(c) Two 50 mm conduits shall be installed between all traffic controller cabinets that are located within 200 m of each other to accommodate hardwire interconnection.

6.6.2 Ministry Traffic Signals

(a) New traffic signals shall be designed and installed in accordance with the Electrical and Traffic Engineering Manual.

(b) Project Co shall be responsible for modifying existing traffic signals in accordance with Part 4 [Traffic Management] of this Schedule. This shall include, but not be limited to, modifications to signal timing design, phasing, signal poles, signal head, cabling, inductive loop detectors, hardware and software. Modifications are to be in accordance with the Electrical and Traffic Engineering Manual.

(c) Traffic engineering checklists and signal timing sheets shall be prepared for all new and modified signals and submitted to the Province with the Final Design submission in accordance with Article 1 [Laning and Geometrics Design Criteria] of this Part.

(d) All traffic signals shall be equipped with emergency pre-emption as specified by the appropriate municipality and shall have uninterruptible power supplies.

(e) All traffic signals shall be programmed by Project Co.

(f) A subsurface pathway shall connect all traffic controllers to the ITS Equipment network.

(g) Project Co shall provide and install NEMA TS2 Type 2 NTCIP compliant traffic signal controllers at all new and temporary signal installations.

(h) Project Co shall supply and install NEMA TS-2 Type 1 traffic controller cabinets compliant with the Ministry's "1110 Traffic Controller Cabinet Assembly Specifications – NEMA TS-2 TYPE 1" for all new signals.

(i) Existing traffic signal controllers and controller cabinets not required by Project Co shall be removed and delivered to the Ministry Electrical Maintenance Contractor Yard.

(j) All traffic signals shall be equipped with countdown pedestrian signals, audible pedestrian signals and bicycle pushbutton posts where applicable.

(k) Queue detection loops shall be installed on the NFRB exit ramp to McBride Boulevard.

6.6.3 Municipal Traffic Signals

Project Co shall be responsible for liaising and coordinating with the Municipalities for any modifications that may be required to municipal traffic signals.

6.7 Power, Control Cabinets, and Electrical Kiosks

Project Co may retain or re-use existing control cabinets and kiosks provided that Project Co can demonstrate that they meet the same requirements as new cabinets, were installed later than 2010 and are certified structurally sound by a structural Professional Engineer. New cabinets and kiosks shall meet the following requirements:

(a) provide enclosures that meet the requirements of Section 402 of the Electrical and Signing Materials Standards;

(b) supply enclosures manufactured by Ministry approved suppliers;

(c) in addition to the requirements outlined in Section 402 of the Electrical and Signing Materials Standards, provide extruded polystyrene insulated walls, door and ceiling for each cabinet. The insulation shall have a minimum "R" rating of 4.5;

(d) provide a fold down shelf permanently fastened to each door for holding testing equipment or documentation;

(e) provide adequate power supplies to accommodate equipment; and

(f) supply all cabinets with a complete set of their respective as-built design drawings in the plan pouches.

6.8 Temporary Lighting During Construction

(a) All existing lighting shall be maintained in operational order during Construction until such time as replacement temporary or permanent lighting is energized.

(b) Temporary illumination shall be provided for the roadways and pedestrian and cyclist routes to accommodate traffic detours.

ARTICLE 7 DRAINAGE DESIGN CRITERIA

7.1 Order of Precedence

Drainage Design and Construction shall be in accordance with the criteria contained in this Article and the following codes and standards and, if there is any conflict between the criteria contained in this Article and any of the Reference Documents, the following shall apply in descending order of precedence:

(a) the criteria contained in this Article;

(b) BC Supplement to CAN/CSA-S6;

(c) CAN/CSA-S6;

(d) BC Supplement to TAC;

(e) TAC Geometric Design Guide;

(f) Environmental Best Management Practices for Highway Maintenance Activities;

(g) Culvert and Fish Passage Fact Sheet;

(h) the applicable documented standards of the relevant Municipality;

(i) Stormwater Planning Guidebook;

(j) Stormwater Design Guidelines – MV;

(k) Urban Stormwater Guidelines.

7.2 Specific Design Requirements

In addition to the requirements of the Reference Documents listed above, the overall Design of the drainage system shall meet the following requirements:

(a) Project Co shall develop and implement a stormwater management plan, which shall be in accordance with the Reference Documents.

(b) Design parameters:

(i) The design storm shall have a return period as defined in the applicable Reference Documents, and be a 30-minute, 6-hour, or 24-hour duration storm event, whichever generates critical hydraulic conditions in the impacted drainage system that is within the watershed(s) either upstream or downstream of the Project Infrastructure (an "**Impacted Drainage System**").

(ii) The final drainage Design shall not require the use of additional pumps.

(iii) The Design boundary condition for each of the storm events referred to in Section 7.2(b)(i) of this Part is a tidal surge event when the highest water surface elevations at the outfalls coincide with the peak of the design storm event.

(iv) At a minimum, the capacity of existing ditches and culverts shall be maintained.

(c) Performance Criteria:

(i) The existing maximum water surface elevations within the Drainage Structures shall not increase.

(ii) Ditch and culvert invert elevations shall not be raised from existing conditions except where it can be proven that increase does not negatively impact drainage and irrigation in the Impacted Drainage System.

(iii) Project Co shall be responsible for demonstrating the total volume of discharge at system outfalls and pumps is within the capacity of the outfall or pump.

(d) Project runoff shall not increase erosion potential in receiving systems.

(e) Where drainage discharge points change from an existing location, Project Co shall be responsible for new or improved Infrastructure to convey the collected runoff to and through the receiving system.

(f) In New Westminster, with the exception of East Columbia Street east of McBride Boulevard, drainage from the Project Infrastructure shall be collected in a separate catchment, treated, and discharged through a new outfall, separate to the existing City of New Westminster drainage system.

(g) Pedestrian and cycling facilities shall be designed with adequate drainage such that no ponding occurs during a 5-year return period design storm. A minimum of 2% cross-fall shall be applied to all travelled pedestrian and cycling surfaces.

(h) Project Co shall demonstrate the hydraulic performance of the Impacted Drainage System with industry standard software using combined hydrologic and hydraulic one-dimensional unsteady state analysis.

(i) Use of the rational method shall be limited to the design of Drainage Structures with a catchment area less than 1.0 km^2.

(j) Description of the performance and performance criteria of the proposed drainage system shall be provided in a drainage design report (the "**Drainage Design Report**").

(k) It is the responsibility of Project Co to provide documentation to and consult with the owner and/or operator of the conveyance systems to which the discharge of stormwater runoff from the Project Site is made. The Design of the drainage systems shall comply with the criteria of the owner of the receiving systems.

(l) The storm water carrier pipe to be installed along the length of McBride Boulevard, connecting to the new outfall, shall have a minimum internal diameter of 600mm and be designed to

accommodate an additional future flow rate of 0.77 m3/s from the northern limit of the Project Lands.

(m) Drainage shall not be conveyed by combined sewers**.**

7.3 Stormwater Management Details

(a) Project Co shall meet the performance objectives for the Erosion and Sediment Control Plan as outlined in the Construction Environmental Management Plan required under Schedule 6 [Environmental Obligations] of this Agreement.

(b) The drainage system shall incorporate a stormwater collection and distribution system for the New Fraser River Bridge and other Project Infrastructure that shall convey and discharge stormwater runoff to appropriate Infrastructure for proper treatment (including stormwater detentions ponds, oil grit separators, or bio filtration swales) before discharging to any receiving aquatic environment.

(c) The drainage system shall incorporate stormwater quality treatment that maintains or improves existing water quality in the receiving system.

(d) The drainage system shall incorporate spill containment features prior to discharging into the municipal drainage/irrigation system.

(e) Project Co shall manage water quality at or before discharge points into watercourses supporting existing fish or fish habitats (Class A or A(O) fish or fish habitat) through the use of stormwater management facilities and current water quality Best Management Practices.

(f) Design of new or replacement culvert crossings and other stormwater management Infrastructure shall take into account requirements in relation to Schedule 6 [Environmental Obligations] of this Agreement in relation to length, material, bottom treatments, ability to pass fish or provide for wildlife passage, and other relevant features considered necessary by Environmental Authorities.

(g) Project Co shall design the stormwater management Infrastructure so that there is no reduction in base flows to watercourses that currently support existing fish or fish habitats.

ARTICLE 8 SIGNING AND PAVEMENT MARKING DESIGN CRITERIA

8.1 Order of Precedence

Signing and pavement marking shall be designed and installed in accordance with the criteria contained in this Article, the requirements of DBSS and the following codes and standards, and if there is any conflict between the criteria contained in this Article and any of the Reference Documents, the following shall apply in descending order of precedence:

(a) the criteria contained in this Article;

(b) PBR Directional Signage Strategy;

(c) the DBSS;

(d) applicable Technical Bulletins included in the Reference Documents;

(e) applicable Technical Circulars included in the Reference Documents;

(f) Manual of Standard Traffic Signs and Pavement Markings;

(g) Catalogue of Standard Traffic Signs;

(h) Standard Highway Sign Specifications;

(i) Manual of Uniform Traffic Control Devices; and

(j) relevant Municipal standards.

8.2 Materials

(a) Sign sheeting for all overhead guide signs shall have a reflectivity level of ASTM Type 9/9. Sheeting for all Shoulder mounted guide signs shall have a reflectivity level of ASTM Type 9/3. The text and graphics used on all guide signs shall be cut from ASTM Type 9 sheeting. Signs shall not be lighted.

(b) All signs shall be new except with the prior written consent of the Province.

(c) Standard signs shall be from the Catalogue of Standard Traffic Signs.

(d) The final sign records to be used for the manufacture of any custom signing shall be provided by the Province.

8.3 Guide Signing

(a) Guide signing shall be in accordance with the Reference Documents, the PBR Directional Signage Strategy, and, where applicable, incorporate existing messaging.

(b) All text fonts for guide signs shall be "Clearview Type Fonts". Text and graphics shall be sized to meet the following standards:

(i) urban high volume freeway standards shall apply to Highway 17, King George Highway, New Fraser River Bridge and the Bridge Connector; and

(ii) urban conventional highway standards shall apply to all other roads except font size shall be as per Table 8.3.

Table 8.3

	Font/Letter Type	
Message/Design Detail	**Overhead**	**Shoulder Mount**
Main Destination / Name (i.e. Community Name, Route Name, Cross Street, Major Airport)	400mm (16") U/L Case	325mm (13") U/L Case

	Font/Letter Type	
Message/Design Detail	**Overhead**	**Shoulder Mount**
Font Type - Messaging	ClearviewHwy 5W Series	ClearviewHwy 5W Series
Route Number in Shield	400mm (16")	325mm (13")
Font Type - Route Number in Shield	Helvetica Medium	Helvetica Medium
Cardinal direction	300mm (12") Upper Case	244mm (9.75") Upper Case
Exit tab number - "123" or A,B,C etc.	400mm (16")	325mm (14")
Exit tab - "EXIT"	225mm (9") Upper Case	200mm (8") Upper Case
ASTM Retro-Reflectivity	Type 9/9	Type 9/3

Notes:
1) The above values are based on a sign displaying messages with nine conceptual units (CU) or major words or less.
2) If the message on the guide sign does not fit on the sign due to restricted sign space, then a narrower series font may be used to condense the message. One line of text, within two or three lines of text message, may be reduced, but not by more than one font series. Reducing the font by more than one font series would cause the smaller text to look out of place.
3) ClearviewHwy font software is available from the developer of the Clearview font type system. "For further information on the ClearviewHwy font, please refer to the website: clearviewhwy.com"

(c) All custom guide signs shall be erected over the applicable traffic lanes.

(d) Exit markers shall be used.

(e) Project Co shall liaise with the Province through the Interim Design submission process to initiate the involvement of the Ministry's sign program.

(f) The final guide sign messages shall be submitted for acceptance to the Province's Representative in accordance with the Consent Procedure.

8.4 Regulatory and Other Signing

Standard regulatory signage, and warning, information, and service and attraction signs shall be designed and installed in accordance with the Reference Documents.

8.5 Pavement Markings

(a) Pavement markings shall meet the requirements of the Manual of Standard Traffic Signs and Pavement Markings and the relevant Ministry Technical Circulars and Technical Bulletins.

(b) Pavement marking materials shall be listed on the Recognized Products List and be installed when the condition of the road surface is appropriate to the material being applied in accordance with the manufacturer's specifications.

(c) Pavement marking materials on Highway 17 shall be consistent with existing.

(d) Inlaid pavement markings are an acceptable alternative to painted markings.

(e) Under dry conditions the retro-reflectivity of any marking, when measured in accordance with ASTM D6359, shall exceed:

(i) 175 millicandela m-2 lux-1 for yellow markings; and

(ii) 250 millicandela m-2 lux-1 for white markings

(f) Testing shall be done under dry conditions by an independent third party testing agency. The retro-reflectivity shall be measured by a Mirolux 30 retro-reflectometer or equivalent retro-reflectometer.

8.5.2 Post Mounted Delineators

Project Co shall supply and install post mounted delineators on open Shoulder sections in accordance with the Manual of Standard Traffic Signs and Pavement Markings. The post mounted delineators shall be equipped with reflectors made from ASTM Type 9 sheeting. Flexible post mounted delineators are an acceptable alternative to rigid post mounted delineators.

8.5.3 Reflectors on Barriers

Raised pavement markings shall be of a type listed on the Recognized Products List and installed at the spacing in the Manual of Standard Traffic Signs and Pavement Markings. Reflectors shall be mounted on top of barriers and reflectors designed only for top mounting shall be used. Spacing for reflectors shall be 12.5 m on median barrier, and 25.0 m on roadside barrier.

8.5.4 Raised Pavement Markings

Raised pavement markings shall be of a type listed on the Recognized Products List and installed at the spacing in the Manual of Standard Traffic Signs and Pavement Markings. Raised pavement markings are to be surface mounted and not placed in a slot in the pavement nor in snow-plowable housings.

ARTICLE 9 LANDSCAPE AND SITE RESTORATION DESIGN CRITERIA

9.1 Order of Precedence

Project Co shall design and implement landscaping and site restoration works in accordance with the criteria contained in this Article, the requirements of DBSS and the following codes and standards, and if there is any conflict between the criteria contained in this Article and any of the Reference Documents, the following shall apply, in descending order of precedence:

(a) the criteria contained in this Article;

(b) the DBSS;

(c) Manual of Aesthetic Design Practice; and

(d) Landscape Policy and Design Standards.

9.2 Landscaping Classification and Objectives

(a) Project Co shall be responsible for the identification, top soiling and grass seeding of all landscaping areas. The planting of the landscaping areas shall not be the responsibility of Project Co.

(b) The landscaping areas shall be designed to meet the requirements of the PBR Urban Integration Requirements.

9.3 Landscaping Requirements

(a) The Design and Construction of the landscaping and site restoration works shall comply with the criteria set out in this Schedule and Schedule 6 [Environmental Obligations].

(b) All seeded areas that show a thin application or bare spots shall be re-treated with the specified materials at the earliest opportunity, weather and season permitting.

(c) Project Co shall provide the necessary ducting infrastructure to facilitate the installation of a high efficiency automated irrigation system that meets the requirements of Section 9.3.6(b)(iii) of this Part and City of New Westminster irrigation standards without the need to damage the Project Work. These provisions will be identified on the landscape and site restoration drawings.

(d) The high efficiency automated irrigation system as detailed in D2 – Special Provisions of the PBR Urban Integration Requirements shall be provided by others. For clarity, the ducting provisions details in Section 9.3 (c) of this Part still apply.

9.3.1 Conservation of Existing Vegetation

(a) Project Co shall preserve native trees and understory plants in areas outside the actual roadwork footprint that do not present traffic safety concerns or affect Infrastructure integrity. Where trees must be removed in areas adjacent to the roadway footprint Project Co shall implement "close cut clearing/no grubbing" practices to retain the existing vegetation roots, to minimize soil disturbance, and to encourage re-growth of the plants.

(b) Project Co shall protect and preserve the trees (each, a "**Protected Tree**") identified in the PBR Protected Trees.

(c) Project Co shall prepare and implement a tree protection and preservation plan (the "**Tree Protection Plan**") which shall, as a minimum, identify the location of Protected Trees within and adjacent to the Project Lands, including the size of such Protected Trees, the location of proposed tree protection zones for each Protected Tree, and the type of tree protection. The Tree Protection Plan shall be prepared by a qualified arborist and shall be submitted to the Province's Representative in accordance with the Consent Procedure within 60 days following Effective Date

and no later than 30 days prior to commencement of activity for which tree protection work is required.

(d) Project Co acknowledges that the Protected Trees are an important element of the New Westminster urban landscape and as such if any of the Protected Trees are not protected in a manner as required by this Agreement, the Province will not be obtaining the level of Project Work assumed to be included in the payments to be made to Project Co hereunder, may suffer losses and damages associated with the Project Work that are difficult to quantify in advance and that are reflected in the payments set out in Section 9.3.1(e) below.

(e) In the event that, prior to the Total Completion Date, any Protected Tree incurs Tree Damage as a result of the Project Work, such Tree Damage shall be a Non-Compliance Event and Project Co shall pay to the Province in respect of such Tree Damage the amount of $250,000 for each instance of such Tree Damage.

(f) As a minimum, tree preservation in the City of New Westminster shall be carried out in accordance with the technical requirements of the City of New Westminster Tree Protection Bylaw, including the inspection of tree protection barriers by a certified arborist.

(g) In the City of New Westminster, trees removed as part of the Project Work will be replaced at a minimum ratio of 2:1, and for greater certainty, a "tree" has the same meaning as a "protected tree" as defined in the City of New Westminster Tree Protection Bylaw.

(h) As a minimum, tree preservation in the City of Surrey shall be carried out in accordance with the technical requirements of the City of Surrey Tree Protection Bylaw.

(i) In the City of Surrey, trees removed as part of the Project Work will be replaced at a minimum ratio of 2:1.

9.3.2 Integration of "Hard" and "Soft" Landscape Elements

Project Co shall design and construct the landscape areas and site restoration such that the earthworks, seeding and Infrastructure blends with the profile of the adjacent terrain and not impact the safe operation of the road network.

9.3.3 Retaining Walls, Noise Walls and Hardscape Surfacing

(a) Where visible from a public roadway, sidewalk or multi-use path, Project Co shall provide a 1m minimum retained strip in front of walls for future screening purposes, these strips shall be filled with topsoil of sufficient depth to support tree growth. The topsoil shall be seeded.

(b) Where visible from a public roadway, sidewalk or multi-use path, Project Co shall provide a 1m minimum retained strip in front of sound attenuation installations, including aesthetic noise walls and berms for future screening purposes, these strips shall contain 150 millimetres of topsoil. The topsoil shall be seeded.

(c) Hardscaped areas shall have pleasing surface texturing, patterning, and/or relief appropriate for the situation. Design treatments shall follow a consistent theme for the particular section of roadway, and if suitable, for the entire Project Lands.

(d) Wire basket type walls or mechanically stabilized earth "green walls" with vegetated facing shall only be used in areas where an appropriate landscape vegetation treatment for screening them can be successfully implemented. Such walls shall require substantial terracing to accommodate soil and support vegetation directly on them.

(e) In the City of Surrey, boulevards with a width of 2m or greater shall be top soiled and seeded. Boulevards with a width of less than 2m will have a stamped and colourised concrete treatment.

9.3.4 Landscape and Restoration Planting

(a) Where planting is proposed for environmental reasons such as riparian vegetation restoration/enhancement, habitat compensation, Project Co shall suitably seed the area, in accordance with this Schedule.

(b) Areas previously containing old road surfaces or Structures that are not retained as part of the New Infrastructure shall be decompacted and covered with a minimum of 100 millimetres of topsoil and seeded, in accordance with this Schedule.

(c) Where there is sporadic existing desirable vegetation growing in areas designated for landscaping, the vegetation shall be retained.

(d) Invasive plants growing in areas to be designated for landscaping shall be removed prior to installation of topsoil, using either mechanical excavation ensuring all roots have been removed, or herbicide application where permitted. These areas will remain free of invasive plants until the SC2 Substantial Completion Date.

(e) All herbicide application must be pre-approved by the Province and shall be conducted by Certified Pesticide Applicators in accordance with the Province's Integrated Pest Management Plan and the BC Integrated Pest Management Act and Regulations.

(f) Invasive knotweed species shall be treated using chemical methods only, unless the site can be excavated completely at least 2m deep and 15m around the knotweed patch to ensure all root material has been removed. Any excavated knotweed and knotweed contaminated soil shall be disposed of at a facility that accepts knotweed contaminated soil, or within the project footprint in an area that will not be disturbed and is at least 10m away from all water sources.

(g) If Invasive Knotweeds are found anywhere within the project footprint, Project Co shall follow best management practices when in close proximity to knotweed infested soil and plant matter. The infested area shall be defined as 20m in all directions from the outside edge of the visible knotweed patch. If the infested area cannot be avoided during construction, any soil that must be excavated within 20m of the knotweed patch shall be treated as contaminated material. Any above ground plant matter that is disturbed during construction must be disposed of at an incineration facility.

(h) All soil within the infested area shall be considered contaminated with knotweed root matter. Knotweed infested soil must be disposed of at a facility accepting knotweed material or at a location provided by the Ministry. All construction equipment that comes in contact with knotweed infested soil shall be cleaned thoroughly before it leaves the worksite, including

personal tools, equipment, footwear and vehicles. Paving shall not occur over knotweed infested areas without excavating the site.

(i) Remnants of existing piers in Brownsville Park shall be covered with a minimum of 300 millimetres of topsoil, graded to blend with existing ground and seeded.

9.3.5 Revegetation Seeding

(a) The default treatment for mitigating surface soil erosion shall be the establishment of grass by the hydraulic application of seed with wood fibre mulch, fertilizer, and tackifier onto existing soils. Contrary to DBSS Table 757.1, the wood fiber mulch shall be applied at the manufacture's specified rate for the site conditions being seeded.

(b) All seeding shall be conducted in accordance with DBSS 757, using the Vancouver Island/South Coast seed mixture.

(c) All disturbed ground that is to be revegetated shall be promptly re-graded and seeded. All areas of existing soils shall be suitably scarified prior to seeding.

(d) Further to DBSS 165, temporary erosion control shall be employed to adequately protect the site until grass has been established.

(e) Areas impacted by the Project Work shall be graded and seeded promptly after removal of the materials.

9.3.6 Landscape Design Submissions

(a) Project Co shall submit the landscape and site restoration Design drawings to the Province's Representative as part of the Interim Design and Final Design submissions.

(b) The landscape and site restoration Design drawings shall show the following:

(i) location of the designated landscape areas.

(ii) sufficient detail to convey an understanding of the various landscaping requirements and future planting needs as specified in the PBR Urban Integration Requirements; and

(iii) identify a conceptual high efficiency landscape irrigation system Design that meets the requirements of the City of New Westminster irrigation standards and could be installed in the future using the ducting installed as part of the Project Work without modifying the Project Work.

ARTICLE 10 CYCLING AND PEDESTRIAN FACILITIES

10.1 Order of Precedence

Project Co shall design and implement cycling and pedestrian facilities including multi-use paths for cyclists and pedestrians on the New Fraser River Bridge and associated road network in accordance with the criteria set out in this Article and the following codes and standards. If there is a conflict between the

criteria contained in this Article and any of the Reference Documents, the following shall apply in descending order of precedence:

(a) the criteria contained in this Article;

(b) Pedestrian Crossing Control Manual;

(c) Grade Crossing Standards;

(d) Road/Railway Grade Crossings Technical Standard;

(e) Technical Bulletin TE-2002-07;

(f) Bicycle Traffic Control Guidelines;

(g) BC Supplement to TAC;

(h) TAC Geometric Design Guide;

(i) TAC Bikeway Traffic Control Guidelines;

(j) TransLink Wayfinding Guidelines;

(k) NACTO Urban Bikeway Design Guide;

(l) the applicable documented standards of the relevant Municipality; and

(m) Design Manual for Bicycle Traffic.

10.2 General Requirements

(a) In addition to the requirements of this Article, multi-use paths, sidewalks and corresponding connections shall be provided in accordance with PBR Pedestrian and Cyclist Facilities and the PBR Urban Integration Requirements. Where an alignment has not been specified in the PBR Urban Integration Requirements the most direct alignment shall be provided.

(b) In the City of New Westminster multi-use path overpasses shall only be permitted at the locations shown in the PBR Urban Integration Requirements.

(c) For the purpose of this Article, all greenways including the BC Parkway, Central Valley Greenway, Scott Greenway and Agnes Greenway are considered multi-use paths.

(d) The multi-use path connection from Agnes Greenway to the Central Valley Greenway shall be in an east to west orientation passing under the new Bridge Connector prior to connection with the Central Valley Greenway. A maximum grade of 5.5% is permitted for this multi-use path connection.

(e) All multi-use paths on Structures shall be barrier separated from vehicle travel lanes.

(f) Cyclists shall be accommodated on all segments of Highway 17, including intersections and interchange ramps.

(g) Pedestrian facilities shall not be permitted along any part of Highway 17 and associated ramps.

(h) Where the scope of pedestrian and cycling requirements is not specifically defined, Project Co shall, as a minimum, maintain or reinstate existing pedestrian and cycling facilities and maintain continuity along routes.

(i) The required clear width shall be maintained at all sections of a multi-use path, bike lane, and sidewalks. Multi-use paths, bike lanes, and sidewalks shall not be interrupted by any obstacles including poles and signs or accesses including manholes, electrical vaults, valve covers or catch basin covers.

(j) Unless otherwise expressly noted in this Article, multi-use paths shall accommodate bi-directional pedestrian and cyclist movements.

(k) Multi-use paths shall widen out near the ends of long downhill runs.

(l) The Design shall consider the speed of cyclists to ensure the safety of all users.

(m) Expansion joints in Bridges shall be safe for cyclists and as close to 90 degrees to the direction of travel as possible, with small gaps, smooth and non-slip in all conditions.

(n) Catch basin and manhole covers shall be bike friendly.

(o) Multi-use paths shall cross railways at 90 degrees to the direction of travel, shall be safe for cyclists and shall have a smooth and continuous crossing surface.

(p) Grades shall not exceed 5% and where possible the grade shall not exceed 3% except as otherwise provided in this Article or as provided in the PBR Urban Integration Requirements. Rest zones and wider sections to allow passing shall be provided for long uphill grades.

(q) Existing multi-use paths, bike lanes, cycle tracks and sidewalks on King George Boulevard (east of 124th Street), Bridgeview Drive and 128th Street shall only be altered if required due to adjacent Project Work.

(r) The maximum multi-use path grade on the NFRB Mainline shall not exceed that specified in Section 1.3.3 [New Fraser River Bridge] of this Part.

(s) Multi-use paths on Ramps shall not exceed a grade of 5%.

(t) Elevation changes shall be minimized.

(u) Access for first responders shall be provided to all parts of a path.

(v) Lighting shall be provided for all paths to meet functional and security requirements.

(w) CPTED (Crime Prevention Through Environmental Design) principles shall be implemented.

(x) Multi-use paths and bike lanes shall be designed to avoid the accumulation of surface debris, including gravel, garbage and snow, and shall be free-draining.

(y) Multi-use paths shall be designed for access by maintenance equipment.

(z) Multi-use paths and bike lanes shall be provided with a skid resistant surface.

(aa) Sidewalks shall be provided with a concrete surface.

(bb) All multi-use paths and bike lanes shall be surfaced with a minimum 75 mm thick asphalt layer underlain by compacted well-graded crush granular base in not less than 150 mm thickness, underlain by sub-base material as per the design recommendations of Project Co's geotechnical engineer. All granular materials shall be constructed as per Section 202 of the DBSS. All gravel surfaces to be asphalt surfaced shall have an emulsified asphalt primer. If any vehicle use is anticipated, appropriate adjustments to the pavement structure shall be made.

(cc) The acceptable pedestrian comfort criteria shall be computed and be in accordance with A.2.4.3.2 of BS EN Eurocodes where multi-use paths, walkways, and bicycle paths are susceptible to vertical vibration induced by passing trucks.

10.3 Design Requirements

10.3.1 Design for All Ages and Abilities

Multi-use pathways and sidewalks will be designed for people of all ages and abilities, in accordance with current best practices, and with primary considerations for the Design and Construction being the safety, security, and comfort for the users, including:

(a) curb ramps and accessible tactile surface tiles will be provided at intersection crossings in accordance with MMCD;

(b) green coloured pavement and bike pavement markings will be provided at multi-use path intersection and driveway crossings. Intersections with greenways will be designed to allow for safe pedestrian and cyclist maneuverability in accordance with current best practices;

(c) multi-use paths and sidewalks will be free of obstructions and will transition smoothly into the applicable existing infrastructure;

(d) new sidewalks that are concrete will be broom finished and have saw cut joints; and

(e) where practical and unconstrained by existing utilities and structures, new multi-use paths and, sidewalks on existing truck routes, will be buffered from moving traffic by a 2m wide landscaped boulevard / utility strip.

10.3.2 Intersections

Provision shall be made for cyclists and pedestrians at signalized and stop-controlled intersections. Such provisions shall include but are not limited to, crosswalks, pedestrian signal heads, pushbuttons, coloured pavement, and pavement markings.

10.3.3 Transitions

(a) Transition sections are to be provided to match to existing facilities.

(b) Where no existing cycling facilities exist, Project Co shall assume that cyclists operate on both sides of the road in the direction of traffic.

10.3.4 Ramp/Road Crossings

(a) Multi-use paths shall be direct, continuous, safe, and convenient. The use of spiral ramps and switchbacks shall be avoided, where possible.

(b) At-grade multi-use path crossings of roads and ramps are not permitted, except as follows:

(i) as shown in the PBR Urban Integration Requirements;

(ii) the intersection of Bridge Road and Old Yale Road;

(iii) on Old Yale Road, mid-block at the Highway 17 bike lane eastbound on and off ramps; and

(iv) on 112 Avenue.

(c) At-grade pedestrian crossings of roads and ramps are not permitted, except as follows:

(i) as shown in the PBR Urban Integration Requirements;

(ii) 112 Avenue, mid-block, north of 124 Street;

(iii) the intersection of 112 Avenue and 124 Street; and

(iv) at 112 Avenue and Bridge Road.

(d) At-grade multi-use path and pedestrian crossings of roads and any ramps shall be signal controlled for pedestrians and cyclists, except for:

(i) Old Yale Road and Bridge Road;

(ii) 112 Avenue and 111A Avenue;

(iii) Royal Avenue at Bushby Street; and

(iv) Royal Avenue at Leopold Place.

(e) Where pedestrian and cycling movements interact with traffic movements, safety elements shall be included to improve driver awareness of crossing pedestrians and cyclists including crossing of ramp terminals and free right turns. Such safety elements shall include, but are not limited to, additional signage, lighting, advanced warning flashers, and pavement markings.

10.3.5 Design Speeds

(a) Multi-use paths and bike lanes shall be designed to safely accommodate pedestrians and cyclists travelling at the following speeds:

(i) Flat grade - 35 kilometres per hour;

(ii) Downhill grade - 50 kilometres per hour;

(iii) Uphill grade - 30 kilometres per hour; and

(iv) Where the Design is constrained by property - 20 kilometres per hour, provided that, where a design speed of 20 kilometres per hour can not be accommodated a reversal of direction (switchback) may be used with a minimum outside radius of 4.5 m.

10.3.6 Cross Sections

(a) Table 10.3.6 describes the minimum clear-width requirements for cycling and pedestrian facilities except as otherwise provided in this Article.

Table 10.3.6

Cycling and Pedestrian Facility	**Minimum Clear Width**
Sidewalk	2.0 m
Highway 17 Outside Shoulder Bike Lane	2.5 m (1)
Multi-use path (at grade)	4.0 m (2)
Multi-use path (on New Fraser River Bridge Mainline and connections from the NFRB Mainline to the Bridge Road multi-use path and to the 111A Avenue multi-use path)	3.5 m (configured as a 1.8 m bike lane + 1.7 m sidewalk) (1)
Multi-use path (connections from the NFRB mainline to and from the Central Valley Greenway and to the 112 Avenue multi-use path)	4.0 m (1)
Bike Lane (unidirectional)	2.0 m

Notes:
(1) Additional horizontal clearance at obstructions is not required on the Highway 17 outside shoulder bike lanes, and on the New Fraser River Bridge and connecting or associated ramps.
(2) Except as modified in the PBR Urban Integration Requirements.

(b) The following additional horizontal clearances shall be added to the clear widths set out in Table 10.3.6 for multi-use path, sidewalk and bike lane facilities:

(i) 0.2 m of clearance for each lateral obstruction with a height between 100 mm and 750 mm above the grade of the path; and

(ii) 0.5 m of clearance for each lateral obstruction with a height greater than 750 mm above the grade of the path.

(c) An additional 1 m of clear width is required for sidewalk, bike lane, and multi-use paths in underpasses or tunnels, in addition to horizontal clearance requirements.

(d) Any existing sidewalk within the Project Site shall be widened to a minimum clear width of 2.0 metre providing the sidewalk widening does not result in additional structural (including retaining walls) or property impacts.

10.3.7 Railings and Fencing

(a) Railings shall be provided in accordance with the BC Supplement to TAC.

(b) A security fence in accordance with Section 3.4 of this Part shall be provided on both sides of the New Fraser River Bridge.

(c) Where Project Work is located within the limits of approach of TransLink infrastructure a security fence shall be provided in accordance with the SkyTrain Limits of Approach.

10.3.8 Cyclist Signage/Pavement Marking

Wayfinding signage and pavement markings shall provide positive guidance in accordance with the TransLink Wayfinding Guidelines. The wayfinding signage shall include, but not be limited to the following destinations:

(a) Scott Road SkyTrain Station;

(b) BC Parkway;

(c) Agnes Street Greenway;

(d) Central Valley Greenway;

(e) Scott Greenway;

(f) Bridge Road multi-use path;

(g) Highway 17 bike lanes;

(h) Queens Park;

(i) City of New Westminster;

(j) Downtown City of New Westminster;

(k) City of Surrey; and

(l) Royal Columbia Hospital.

10.4 Specific Requirements

This Section describes the requirements for the Design that shall be provided for cycling and pedestrian facilities in specific areas.

10.4.1 Multi-use paths on the New Fraser River Bridge

(a) A multi-use path shall be provided on each side of the New Fraser River Bridge. Each path shall be configured to accommodate a unidirectional bike lane on the inside in the direction of traffic, adjacent to a bidirectional pedestrian sidewalk on the outside. Pavement markings and appropriate signage shall be provided to separate the unidirectional bike lane and the bidirectional pedestrian sidewalk.

(b) Viewing platforms shall be provided outside of the multi-use paths and provide an unobstructed viewscape. Viewing platforms shall be provided on both sides of the NFRB at the high point of the NFRB and on the river facing side of each tower leg. Each viewing platform at the high point of the NFRB shall have minimum plan dimensions of 3.5 m wide by 5.0 m long. Each viewing platform at the tower legs shall have a minimum plan dimension of 3.5 m wide by the length of the tower leg and shall be accessed at either end by a 3.5 m wide multi-use path.

(c) The most direct connection shall be provided from the southbound multi-use path on the NFRB to the Bridge Road multi-use path without crossing Highway 17.

(d) Catch basins located on the multi-use paths of the NFRB shall be designed and oriented to prevent conflicts with cyclists.

10.4.2 Multi-use Paths in New Westminster

The most direct connection between the New Fraser River Bridge multi-use paths to the Central Valley Greenway in New Westminster shall be provided.

10.4.3 Multi-use Path Underpasses in New Westminster

(a) Multi-use path underpasses in the City of New Westminster shall meet the requirements of this Article and include:

(i) a minimum vertical clearance of 3.5 m measured from the top of finished grade to the underside of the underpass soffit;

(ii) a minimum length to width ratio of 11 to 1 shall be used for the transition between multi-use path widths where the width changes at underpasses;

(iii) a minimum backslope for cut sections of 3h:1v;

(iv) continuous illumination; and

(v) the location of all lighting and drainage appurtenances outside of the clear width.

(b) Where used, wing walls shall be placed at 45 degrees to the face of the underpass and extend a minimum of 150mm above the adjacent ground slope.

10.4.4 Multi-use Paths in Surrey

Multi-use paths in the City of Surrey shall meet the requirements of this Article including:

(a) a new multi-use path along the east side of 111A Avenue and south side of 124 Street, connecting to the multi-use paths on the NFRB and 112 Avenue, and the existing Scott Road SkyTrain Station pathway on 124 Street;

(b) a minimum 3.2 m wide topsoil and seeded boulevard between the new multi-use path and 111A Avenue and between the new multi-use path and 124 Street;

(c) a new multi-use path between 112 Avenue and the 112A Avenue cul-de-sac;

(d) a new bidirectional bike lane connecting the Highway 17 eastbound bike lane to the new multi-use path between 112 Avenue and the 112A Avenue cul-de-sac. The bike lane connection shall be in the vicinity of 112 Avenue;

(e) a new multi-use path along the west side of 112 Avenue connecting to:

(i) the multi-use paths on the New Fraser River Bridge

(ii) 111A Avenue multi-use paths; and

(iii) the multi-use path connecting to 112A Avenue;

(f) a minimum 2.0 m wide topsoil and seeded boulevard along 112 Avenue, separating 112 Avenue and the multi-use path;

(g) a new multi-use path along the north side of Bridge Road connecting to the existing Scott Greenway and the east side of the access to the property with PID 012-816-493. Signage shall be provided to direct cyclists to share the road with vehicular traffic;

(h) a minimum 3.2 m wide topsoil and seeded boulevard along Bridge Road, separating Bridge Road and the multi-use path where possible;

(i) the lighting of all walkways, pathways and multi-use paths, shall be Designed to a ‘high pedestrian activity’, as defined by the City of Surrey Design Criteria Manual.

(j) a connection from the southbound multi-use path on the NFRB directly to the 111A Avenue multi-use path;

(k) barrier separation of the multi-use paths connecting the NFRB to 112 Avenue and 111A Avenue;

(l) a connection from the northbound multi-use path on the NFRB directly to the 112 Avenue multi-use path;

(m) if a localised reduction to the width of a multi-use path and/or boulevard is necessary due to property constraints, the reductions will be applied in the following descending order:

(i) reduce boulevard width to a minimum of 1.5m;

(ii) reduce multi-use path width to minimum of 3m; or

(iii) eliminate boulevard altogether, with appropriate treatments for placement of lighting and utilities; and

(n) if a localised reduction to the width of the cross section of Bridge Road is necessary, due to the constraints of the SRY overhead structure, then the lane widths on Bridge Road may be reduced to a minimum of 3.7m and the multi-use path may be reduced to 3.6m, local to the structure.

10.4.5 Sidewalks in Surrey

Sidewalks in the City of Surrey shall include:

(a) a new sidewalk on the east side of 112 Avenue connecting to the multi-use paths on the NFRB, 112 Avenue multi-use path, and the existing sidewalk on the east side of 112 Avenue at 124 Street;

(b) on 112 Avenue, a minimum 2.0 m wide topsoil and seeded boulevard shall be provided between the sidewalk and the roadway, where possible, and at a minimum a boulevard shall be provided from PID 003-919-897 to 124 Street;

(c) a new sidewalk on the east side of Old Yale Road with a 2.5m wide topsoil and seeded boulevard between the north side of the Bridge Road right of way and the south side of the Highway 17 right of way; and

(d) if a localised reduction to the width of a sidewalk and/or boulevard is necessary due to property constraints, the reductions will be applied in the following descending order:

(i) reduce boulevard width to a minimum of 1.5m;

(ii) reduce sidewalk width to minimum of 1.5m; or

(iii) eliminate boulevard altogether, with appropriate treatments for placement of lighting and utilities.

10.4.6 Shoulder Bike Lanes on Highway 17

(a) Shoulder bike lanes on Highway 17 shall include the following:

(i) Reinstatement of all shoulder bike lanes on Highway 17 impacted by the Project Work.

(ii) A unidirectional bike lane to connect the Highway 17 westbound bike lane to Bridge Road at 112 Avenue. The Highway 17 bike lane shall be closed at the connection to Bridge Road. A cross walk shall be provided across Bridge Road.

(iii) A westbound bike lane shall be provided from the Scott Greenway at Old Yale Road to the shoulder bike lane on the exit ramp to Tannery Road.

(iv) A unidirectional bike lane to connect the Highway 17 eastbound bike lane to the Scott Greenway on the west side of Old Yale Road.

(v) A unidirectional bike lane entrance to connect the Scott Greenway to the Highway 17 eastbound bike lane on the east side of Highway 17.

(b) Bike lanes shall not be permitted to cross entry and exit ramps on Highway 17.

ARTICLE 11 DIKE PROTECTION, RESTORATION AND ENHANCEMENT CRITERIA

11.1 Order of Precedence

Project Co shall implement Dike protection, restoration and enhancement in accordance with the criteria set out in this Article and the following codes and standards, and if there is any conflict with the criteria contained in this Article and any of the Reference Documents, the following shall apply in descending order of precedence:

(a) the criteria contained in this Article;

(b) *Dike Maintenance Act* (British Columbia);

(c) requirements and guidelines set by the Inspector of Dikes, as that term is defined in the *Dike Maintenance Act* (British Columbia);

(d) the applicable documented standards of the City of Surrey and the City of New Westminster; and

(e) Seismic Design Guidelines for Dikes.

11.2 General Requirements

(a) At all times, Project Co shall comply with the requirements of the *Dike Maintenance Act* (British Columbia).

(b) Project Co shall coordinate with the Municipalities and Relevant Authorities to ensure flood protection operations are not impacted.

(c) Project Co shall not disturb, impact or influence any ground or excavate or remove any material of the existing Dikes or ground area of the existing Dikes or place any equipment or machinery on the existing Dikes. Project Co shall only cross the existing Dikes in the areas of the existing Dike openings.

(d) In the event of an incident resulting in non-compliance with Section 11.2 (c) of this Article whereby Project Co disturbs, impacts or influences the existing Dikes and/or the ground area of the existing Dikes, Project Co shall:

(i) restore and enhance the Dikes and affected areas to comply with current standards;

(ii) consult with the Municipalities regarding any proposed Dike restoration and enhancement; and

(iii) obtain written approval from the Deputy Inspector of Dikes regarding any proposed Dike restoration and enhancement.

(e) Project Co shall develop, implement, maintain and update a plan (the "**Dike Protection Plan**") which includes, as a minimum the following:

(i) demonstrates compliance with this Article;

(ii) identifies Construction in the vicinity of the Dike and provides a work plan including specific measures to address and meet the requirements of this Article;

(iii) maintaining access for operation and maintenance by Municipalities; and

(iv) emergency response plan in the event of an incident.

(f) Project Co shall consult with the Municipalities in the development of and updates to the Dike Protection Plan.

(g) Project Co shall, within 120 days following the Effective Date and, in any event, no later than 20 days in advance of construction in the vicinity of the Dike, submit the Dike Protection Plan, to the Province's Representative in accordance with the Review Procedure. Any subsequent amendments or updates to the Dike Protection Plan shall be submitted to the Province in accordance with the Review Procedure.

ARTICLE 12 INTELLIGENT TRANSPORTATION SYSTEMS (ITS)

12.1 Order of Precedence

The Design for all ITS Equipment shall be in accordance with the criteria contained in this Article and the following codes and standards, and if there is any conflict between criteria contained in this Article and any of the Reference Documents, the following shall apply in descending order of precedence:

(a) the criteria contained in this Article;

(b) Electrical and Traffic Engineering Manual; and

(c) applicable Technical Bulletins included in the Reference Documents.

If there is any conflict between criteria contained in this Article and any of the Reference Documents, the criteria contained in this Article shall take precedence.

12.2 ITS Equipment

(a) The intelligent transportation systems equipment to be provided by Project Co in accordance with this Agreement (the "**ITS Equipment**") comprises the equipment specified in this Article for the following systems:

(i) ITS communications system;

(ii) network equipment;

(iii) camera system;

(iv) vehicle detection system;

(v) traffic measurement equipment; and

(vi) pedestrian and cyclist counting equipment.

(b) The ITS Equipment shall provide accurate data on a real-time basis and be accessible and controllable by the Province through the Provincial fibre network 24 hours a day, 7 days a week.

(c) Except for network equipment detailed in Section 12.7 [Network Equipment] of this Part, Project Co shall design, procure, construct, install and test the ITS Equipment and all associated devices to ensure all systems are complete and functional. Project Co shall be responsible for providing all equipment, materials and cabling necessary to make the systems fully operational.

(d) Project Co shall, no less than 30 days prior to the required order date, submit a list of required equipment and suppliers to the Province's Representative in accordance with the Consent Procedure.

(e) Project Co shall ensure that no ITS Equipment installed is discontinued by its manufacturer before the SC2 Substantial Completion Date. All ITS Equipment shall be new production products with the latest versions of hardware and software at the time of installation.

(f) Project Co shall provide the Province with manufacturer's warranties for all ITS Equipment. The warranties shall be a minimum three years in length, commencing at the SC2 Substantial Completion Date.

(g) ITS Equipment shall be located to minimize the need to close traffic lanes for maintenance purposes.

(h) Support Structures for the ITS Equipment shall meet the requirements of Article 3 [Structural Design Criteria] of this Part and shall meet the minimum clearance requirements over the roadway in accordance with this Schedule.

12.3 Systems Engineering

(a) Within 180 days following the Effective Date, Project Co shall submit a plan (the "**ITS Implementation Plan**") to the Province's Representative pursuant to the Review Procedure. The ITS Implementation Plan shall be in accordance with the Systems Engineering Process.

(b) Project Co shall complete the following stages of the Systems Engineering Process:

(i) High-Level Design;

(ii) Detailed Design;

(iii) Field Installation;

(iv) Unit/Device Testing; and

(v) Subsystem Verification.

(c) At each stage of the Systems Engineering Process Project Co shall submit to the Province's Representative pursuant to the Review Procedure the following, including but not limited to:

(i) High-Level Design

(A) ITS Equipment: device key plan; and

(B) ITS Equipment: system overview diagram.

(ii) Detailed Design

(A) Site plans, elevations and other drawings and documented as required by the Electrical and Traffic Engineering Manual;

(B) ITS Equipment: network diagrams;

(C) ITS Equipment: hardware spreadsheet (make, model number, quantity). For network equipment, a description of the physical location, quantity and type of ITS equipment connected to each network device shall be provided;

(D) ITS Equipment: unit/device test plans (factory acceptance);

(E) ITS Equipment: unit/device test plans (field installation);

(F) ITS Equipment: sub-system verification plan;

(G) ITS communications system: conduit riser diagrams;

(H) ITS communications system: fibre optic cable riser diagrams;

(I) ITS communications system: fibre optic splice diagrams;

(J) ITS communications system: fibre strand assignment spreadsheets; and

(K) ITS communications system: conduit riser diagram.

(iii) Field Installation

(A) ITS Equipment: all vendor specific software; and

(B) ITS Equipment: all vendor specific shop drawings, product data sheets and user manuals.

(iv) Unit/Device Testing

(A) ITS Equipment: unit/device test reports (factory acceptance);

(B) ITS Equipment: unit/device test reports (field installation); and

(C) ITS communications system: fibre optic cable test results.

(v) Subsystem Verification

(A) ITS Equipment: sub-system verification

(d) Project Co shall coordinate with the Province at the following stages of the System Engineering Process:

(i) At detailed design, Project Co shall request from the Province the list of accepted Network Equipment.

(ii) At Detailed Design, Project Co shall submit the ITS Equipment: hardware spreadsheet to the Province's Representative for approval via the Consent Procedure**.**

(iii) Project Co shall complete subsystem verification and provide the Province access to the ITS Equipment for ATMS system integration at least 60 days prior to the SC1 Substantial Completion Date.

(iv) Project Co shall support the Province during ATMS system integration for ITS Equipment.

12.4 Technology Guidance

Project Co shall review the requirements in this section and implement the technology where available. Where not available, Project Co shall provide the closest technology substitute at the Detailed Design stage.

(a) Sensors

(i) Sensors deployed shall be based on open-standards implementation to provide future expandability.

(ii) Sensors shall not retain data long term and only until the data is transmitted or [in the case of edge processing] until the data is processed and then transmitted.

(iii) Any temporary storage of data that impacts privacy or security shall be encrypted.

(iv) The Ministry shall have the ability to connect to the raw data if required (from individual sensors).

(v) Sensor communications shall not use a proprietary protocol and shall instead use a standardized protocol (e.g., OPC-UA, MODBUS, BLE, ULE, LoRA, LwM2M, MQTT).

(b) Networks

(i) Networks shall provide adequate bandwidth to accommodate all types of sensor collection, processing and transmission (e.g., traffic, road surface, weather, seismic).

(ii) Networks shall provide the ability to segregate traffic on the structure and prioritize traffic.

(iii) Device frequencies shall not interfere with one another (ex. weather radio shall not cause interference with seismic sensor).

(iv) Networks shall include network equipment that supports future Connected-Autonomous Vehicle (CAV) technology (e.g., DSRC, WLANp).

(c) Gateways

(i) Edge gateways that collect the data, process, and provide edge analytics shall be based on open-standard implementation when possible.

(ii) Gateways shall not retain data long term and only keep data until the data is transmitted (after being processed).

(iii) Any temporary storage of data that impacts privacy or security shall be encrypted.

(iv) The Ministry shall have the ability to connect to the raw data on the gateway if required.

(v) The gateway shall allow for:

(A) Publish / Subscribe – it shall not require polling of the roadside resource.

(B) Security – X.509 certificates is a common industry practice for IoT security.

(C) Remote Command / Control – shall be able to control polling / timings and configuration remotely. Equipment shall be able to expand and support command control (e.g., gates, signals, signs) from a remote interface.

(D) Remote Maintenance – device/sensor health monitoring and notifications, shall have the ability to remotely push updates.

(E) Accessible Data – The data shall be accessible to the Ministry and be of open-source implementation and not proprietary.

(F) Edge Processing – A gateway capable of edge processing and transmitting current data shall be provided, and shall have the ability to accept and transmit new data formats.

(G) Remote transmission capabilities – a gateway shall transmit all data to a central Ministry facility such as the Regional Transportation Management Centre or a Provincial Government Centre as soon as possible (i.e., without storing at the site).

(d) Technology solutions shall accommodate integration with other Ministry solutions. These include, but are not limited to:

(i) advanced traveller information systems;

(ii) closed loop sensor-data logger-sign solutions;

(iii) closed loop PLC-based solutions;

(iv) traffic management solutions; and

(v) event management solutions.

(e) Spatial mapping

(i) Project Co shall provide an HD Map.

(ii) Project Co shall provide a LiDAR scan/map of the final road area with data that can be transformed into an HD Map in the future.

(f) Procurement

(i) Project Co shall consider 10 year total cost of ownership as part of its proposed technology solution.

(ii) Project Co shall ensure its technology solution aligns with the BC Office of the Chief Information Office (OCIO) and the Ministry network, security and operational management standards and policies.

12.5 ITS Communications System

Project Co shall provide backbone and distribution ITS communications system on the Project, for the exclusive use of the Province. The requirements for the ITS communications system are as follows:

(a) The design of the ITS communications system shall be in accordance with, and in order of precedence, the Electrical and Traffic Engineering Manual, and ANSI/TIA-758-B.

(b) For the backbone ITS communications system, conduits shall be placed laterally and continuously along a single side of the highway right of way. The conduits shall not cross the roadway or be placed within the roadway median without acceptance from the Province in accordance with the Consent Procedure.

(c) Conduits shall enter and leave vaults in a consistent location.

(d) For the backbone ITS communications system, a vault shall be installed at the extents of each conduit run, in the locations listed below:

(i) the northern extent of the Project Lands on McBride Boulevard;

(ii) the eastern extent of the Project Lands on East Columbia Street;

(iii) the western extent of the Project Lands on Columbia Street;

(iv) New Fraser River Bridge – north tower (deck level);

(v) New Fraser River Bridge – south tower (deck level);

(vi) the western extent of the Project Lands on Highway 17; and

(vii) the southern extent of the Project Lands on King George Boulevard.

(e) The vaults shall be designed to accommodate thirty metres of cable slack for each of the conduit runs required in Section 12.5(d) of this Part.

(f) The vaults shall be secured against physical access and vandalism.

(g) Each vault shall be designed to accommodate a minimum of three fibre optic splice cases.

(h) Each vault shall be designed to accommodate management of the required number of cable slack loops and splice cases. Individual cables and splice cases should be freely accessible and removable from the vault without impediment from other cables or splice cases.

(i) The backbone ITS communications system shall be designed to accommodate fibre optic cables with a nominal outside diameter of 22 millimetres. The number of fibre optic cables to be accommodated between vaults is as follows:

From ITS Communications Vault Located at:	**To ITS Communications Vault Located at:**	**Number of Fibre Optic Cables to accommodate:**
New Fraser River Bridge – north tower (deck level)	New Fraser River Bridge – south tower (deck level)	9

From ITS Communications Vault Located at:	To ITS Communications Vault Located at:	Number of Fibre Optic Cables to accommodate:
New Fraser River Bridge – north tower (deck level)	the western extent of the Project Lands on Columbia Street	3
New Fraser River Bridge – north tower (deck level)	the eastern extent of the Project Lands on East Columbia Street	3
New Fraser River Bridge – north tower (deck level)	the northern extent of the Project Lands on McBride Boulevard	3
New Fraser River Bridge – south tower (deck level)	the western location extent of the Project Lands on Highway 17	6
New Fraser River Bridge – south tower (deck level)	the southern extent of the Project Lands on King George Boulevard	3

(j) Project Co shall install one 144C fibre optic cable in the backbone ITS communication system between the location listed in Section 12.5(d)(iv) of this Part and the location listed in Section 12.5(d)(vi) of this Part. This fibre optic cable is for the exclusive use of the Province.

(k) Project Co shall install one 144C fibre optic cable in the backbone ITS communication system between the location listed in Section 12.5(d)(iii) of this Part and the location listed in Section 12.5(d)(vii) of this Part. This fibre optic cable is for the exclusive use of the Province.

(l) Project Co shall provide a distribution ITS communications system to support connectivity between all Network Equipment. The distribution ITS communications system shall provide redundant communication between network equipment so that the failure of any single device will not impact the ability of the Province to access all ITS Equipment.

12.6 Existing Communications Systems

(a) An ITS communications systems exists along Highway 17 within the Project Lands. Within the ITS communications system, the Province and third parties own fibre optic cables that support business critical communications systems.

(b) Project Co shall coordinate the Project Work with third parties to minimize disruption of existing communications systems.

(c) Project Co shall not cause interruptions to the Province's existing ITS communications system without prior approval. Project Co shall submit requests for interruptions to the Province's existing ITS communications system to the Province's Representative in accordance with the Consent Procedure.

(d) Project Co shall not reduce the capacity of the Province's existing ITS communications system within the Project Lands.

12.7 Network Equipment

(a) Project Co shall connect to the Province network, at a point on Highway 17, within the Project Lands.

(b) Prior to Interim Design, Project Co shall, in consultation with the Province, determine a location to provide access to the Province network within the Project Lands and submit to the Province's Representative in accordance with the Consent Procedure.

(c) The Province shall provide a list of IP address and configuration parameters for all ITS Equipment to Project Co to implement.

12.8 Camera System

Project Co shall design and construct the ITS Equipment for the camera system to comply with the following minimum requirements:

(a) Full coverage of the Project Work shall be provided. Full coverage includes all travel lanes and Shoulder areas (median and roadside) in both directions of travel, all on and off ramps including ramp terminals (freeway and surface street), all connecting highways and arterials throughout each interchange and all pedestrian and cycling routes. At interchanges and intersections, coverage of the camera system shall include connecting highways and arterials within the interchange area as well as along the connecting roadways for a distance of at least 300 metres on the approaches to the interchanges and intersections.

(b) A clear view of the conditions of the roadway under all lighting conditions to confirm incidents and traffic conditions shall be provided.

(c) Video images shall be a minimum of HD 1080P resolution, full motion (minimum of 30 frames per second), colour and free from vibration.

(d) At full zoom, no camera shall require a field of view of more than 10 metres wide while focusing on any area within the zone of coverage requirements.

(e) Clear video images shall be provided in all lighting conditions, 24 hours a day.

(f) Pre-positioning for both the lens and the pan/tilt unit shall be provided.

(g) Variable speed control of the pan and tilt operation shall be provided.

(h) Relative movement of the pan and tilt operation shall be provided.

(i) All cameras shall use internet protocol communications protocol and support unicast or multicast streaming video in MJPEG and H.264 format.

(j) Camera systems communication must be Ethernet based. Analog signal to digital format conversion devices shall not be used.

(k) Cameras shall be ONVIF compliant. The camera is permitted to include its manufacturer's propriety communication protocol. Project Co shall supply to the Province the fully

documented communications protocol(s) of the camera control receiver/driver unit without restriction on its use by the Province.

(l) Cameras shall be located to minimize the need to close traffic lanes for maintenance purposes.

(m) The video streams from all cameras shall be accessible from the Province network simultaneously.

(n) Support Structures for cameras shall meet the requirements stated in Article 3 [Structural Design Criteria] of this Part.

12.9 Vehicle Detection System

12.9.1 General

(a) The vehicle detection system shall be designed to collect and summarize traffic data throughout the Project Work, including all entrance and exit ramps utilizing vehicle detectors. Vehicle detection stations shall be located at a spacing that is appropriate to the ITS application

(b) Project Co shall not cut the pavement or deck surface of Bridges in order to install the vehicle detection system.

12.9.2 Data Requirements

(a) The vehicle detection system is required to collect traffic volume (counts), average speed, lane occupancy, headway, gap, speed bins (distribution of speed) and length classifications following the FHWA 5-Bin system in each lane at each vehicle detection station. This data shall be collected in real time and processed at a rate determined by the Province with the ability to modify the processing rate within a range from three times per minute to once every five minutes. The data shall be available to the Province network immediately upon collection and processing. The data shall be provided with a location, time and date stamp in compliance with the traffic detector data message structure and data elements from the ITE Data Dictionary and the ITE Message Set. Project Co shall provide the data in a format compatible with that currently used by the Province to provide traffic data to the Advanced Traffic Management System ("**ATMS**") and shall submit the data in accordance with the Review Procedure.

(b) Data shall be preserved locally for an indefinite period to minimize the impact of a power failure. The local memory shall have the capacity to store a minimum of one month of data.

12.9.3 Performance

The real-time vehicle detection data provided shall meet the following performance requirements in all environmental, lighting and traffic conditions on the Project Infrastructure.

(a) *Volume*: The maximum error on a per lane volume count over a five-minute period shall be less than 5%.

(b) *Occupancy*: The maximum error on a per lane occupancy over the sampling period shall be less than 10%.

(c) *Speed*: The maximum error on a per lane average speed over the sampling period shall be less than 10% or 3km/h, whichever is greater.

12.10 Traffic Measurement Equipment

12.10.1 General Requirements

(a) Project Co shall provide and install traffic measurement equipment at the locations specified in this Article. The Province shall provide site numbering for the data collection locations. Traffic Data shall be collected for all travel lanes at the traffic counting location.

(b) Traffic measurement equipment shall be installed, tested and commissioned at least one month prior to the SC1 Substantial Completion Date.

12.10.2 Technology and Locations

(a) The Province shall have direct remote access to the Traffic Data from the permanent counters.

(b) Traffic measurement equipment shall be capable of reprogramming to permit changes to the parameters of the data types.

(c) Project Co shall install one permanent traffic counting station at the south abutment of the New Fraser River Bridge and one permanent traffic counting station at the end of the ramp to Highway 17.

(d) Project Co shall not cut the pavement, the deck surface of Bridges or Tunnels in order to install the vehicle counting systems. Pre-formed sensor technologies that are installed at least 100 mm below the road surface prior to final pavement placement are not precluded.

12.10.3 Performance

(a) The traffic measurement equipment provided by Project Co shall collect data continuously and record totals at 15 minute intervals for each lane. Required data types include the total number of vehicles:

(i) counted in the period;

(ii) classified according to vehicle length based on the binning system used by the Province; and

(iii) classified by speed bands.

(b) The traffic measurement equipment shall record the year, date and time period measured for each binned data element.

(c) Permanent counter stations shall collect data continuously.

(d) Each traffic monitoring site shall have a single data collection access point that connects to all sensors for the location and is accessible for data collection.

(e) Traffic Data generated by the traffic monitoring equipment must be in a format that is acceptable to the Province. The Province currently uses Golden River M660 and IRD TCC540 classifiers.

12.11 Pedestrian and Cyclist Counting Equipment

12.11.1 General Requirements

(a) Project Co shall provide and install pedestrian and cyclist counting equipment at the locations specified in this Article. Pedestrian and cyclist count data shall be collected bi-directional at each location.

(b) Pedestrian and cyclist counting equipment shall be installed, tested and commissioned at least one month prior to the SC1 Substantial Completion Date.

12.11.2 Technology and Locations

(a) The Province shall have direct remote access to the pedestrian and cyclist data from the pedestrian and cyclist counters.

(b) Pedestrian and cyclist counting equipment shall be capable of reprogramming to permit changes to the parameters of the data types.

(c) Project Co shall install pedestrian and cyclist count stations on the multi-use paths on the New Fraser River Bridge.

(d) Project Co shall not cut the pavement, the deck surface of Bridges or Tunnels in order to install the pedestrian and cyclist counting equipment.

(e) Pedestrian and cyclist counting equipment proposed by Project Co to be used in the Project shall be submitted for approval through the Consent Procedure.

12.11.3 Performance

(a) The Pedestrian and cyclist counting equipment provided by Project Co shall collect data continuously and record totals at 15 minute intervals for each multi-use path. Required data types include the total number of pedestrians and cyclists:

(i) counted in the period;

(ii) classified according to user type (pedestrian or cyclist); and

(iii) classified by direction of travel.

(b) The pedestrian and cyclist counting equipment shall record the year, date and time period measured for each binned data element.

ARTICLE 13 ROAD SAFETY AUDIT

13.1 Order of Precedence

Project Co shall conduct Road Safety Audits in accordance with the criteria set out in this Article and the following codes and standards, and if there is any conflict with the criteria contained in this Article and any of the Reference Documents, the following shall apply in descending order of precedence:

(a) the criteria contained in this Article;

(b) Technical Circular T-02/04 and Road Safety Audit Guidelines; and

(c) the TAC Road Safety Audit Guide.

13.2 Road Safety Audit Team

The Road Safety Audit Team shall consist of a minimum of two auditors. Each team member shall meet the following minimum criteria:

(a) five years relevant experience in road safety, traffic engineering and geometric design;

(b) participated in at least five road safety audits; and

(c) completed at least one Road Safety Audit per year in the last two years.

13.3 Project Co's Responsibility

(a) Project Co shall be responsible for:

(i) scheduling, initiating, and managing the Road Safety Audit process at the appropriate times during the course of the Project;

(ii) providing all necessary design drawings and supporting documentation for the Road Safety Audit Team to conduct the audits;

(iii) ensuring that the Road Safety Audits are conducted to a high quality standard;

(iv) receiving and reviewing the audit reports;

(v) responding to the audit reports and documenting the response;

(vi) conducting any re-design as a result of the Road Safety Audits;

(vii) highlighting any significant changes to the required Design drawings resulting from the Road Safety Audits; and

(viii) providing all documentation related to the Road Safety Audits to the Province's Representative.

(b) All costs associated with the Road Safety Audits, including any re-design costs or increased Construction costs that result from the Road Safety Audits, are the responsibility of Project Co.

(c) After each Road Safety Audit, except as otherwise expressly agreed in writing by the Province's Representative, Project Co shall address all recommendations made by the Road Safety Audit Team.

13.4 Road Safety Audit Process

13.4.1 General Requirements

(a) The Road Safety Audit process shall be carried out in accordance with Part 3 [Design and Certification Procedure] of this Schedule.

(b) The Road Safety Audit Team shall prepare an audit report to document the audit findings. Road Safety Audit reports shall be submitted to Project Co's Design Team for the stages identified below.

(c) The Road Safety Audit reports shall clearly identify safety hazards that need to be addressed by Project Co along with recommendations for remediation. Project Co shall respond to the identified hazards and recommendations with remediation counter-measures.

(d) Road Safety Audits reports shall be provided to the Province's Representative for review, in accordance with the Review Procedure, at three stages, as identified below.

13.4.2 Stage 1: Interim Design Road Safety Audit

A Stage 1 Road Safety Audit shall be conducted immediately before submission of the Interim Design in accordance with Part 3 [Design and Certification Procedure] of this Schedule. This Road Safety Audit shall undertake a detailed review of the Interim Design drawings to identify any potential safety-related enhancements that might have an impact on the New Infrastructure. Issues considered shall include:

(a) Design consistency;

(b) horizontal and vertical alignment;

(c) cross section Design;

(d) interchange/intersection configuration;

(e) access locations;

(f) stopping sight distance and turning sight distance;

(g) operation of public transport;

(h) pedestrian and cyclist facilities;

(i) maintenance safety;

(j) clearances to roadside objects;

(k) safety barriers; and

(l) provision for vulnerable road users.

13.4.3 Stage 2: Final Design Road Safety Audit

A Stage 2 Road Safety Audit shall be conducted at Final Design in accordance with Part 3 [Design and Certification Procedure] of this Schedule. The audit shall undertake a detailed review of the Final Design drawings to identify any potential safety-related enhancements that might have an impact on the operational safety of the New Infrastructure. Issues considered shall include:

(a) signing and pavement markings;

(b) traffic signal configuration;

(c) interchange and intersection details;

(d) drainage;

(e) lighting;

(f) fencing;

(g) clearances to roadside objects;

(h) safety barriers;

(i) surface standards;

(j) landscaping;

(k) provision for vulnerable road users;

(l) accommodation of design vehicles; and

(m) any Stage 1 items affected by the Final Design.

13.4.4 Stage 3: Post Construction Road Safety Audit

(a) Prior to opening for traffic operation, a Stage 3 Road Safety Audit shall be carried out on each of the completed Relevant Components to identify potential safety enhancements that may reduce the frequency of collisions.

(b) Stage 3 Road Safety Audits shall take place in respect of each of the Relevant Components prior to and as a condition of the issuance of:

(i) in respect of the Primary Infrastructure Components, the Certificate of Substantial Completion for the Primary Infrastructure Components; and

(ii) in respect of the Completion Components, the Certification of Substantial Completion for the Completion Components.

(c) For the purposes of completing a Stage 3 Road Safety Audit required in respect of any Relevant Components pursuant to paragraphs (a) and (b) above, the Road Safety Audit Team shall fully examine such Relevant Components, including:

(i) meeting with the Project team to review any Construction related issues, in particular Design changes that may affect the safety of such Relevant Components;

(ii) checking to ensure that safety issues identified in the Design audits are addressed and the resulting Design changes do not create a further safety problem;

(iii) reviewing any Design changes that occurred during the relevant Construction to ensure they do not create a safety problem; and

(iv) conducting a field review of such Relevant Components, under both daytime and nighttime conditions, to observe the operation of the Relevant Components from the perspective of the user.

13.5 Temporary Traffic Control (Design) Road Safety Audit

(a) For each phase of Construction, Road Safety Audits shall be conducted during Design for temporary traffic control set-ups that meet any of the following criteria:

(i) the duration of a temporary traffic control set-up or lane shift that is two weeks or longer. The set-up does not necessarily have to be in place for the entire time but can be one of a number of repeating set-ups that are active at different times; and

(ii) a temporary traffic control set up whose complexity exceeds that of the standard templates used in the Traffic Management Manual.

(b) Each such Road Safety Audit shall be completed prior to the implementation of the temporary traffic control set-up unless otherwise agreed to by the Province's Representative.

13.6 Temporary Traffic Control (On-site) Road Safety Audit

(a) For each phase of Construction, Road Safety Audits shall be conducted on the Project Site, following implementation, for temporary traffic control set-ups that meet any of the following criteria:

(i) two or more individual temporary traffic control set-ups that influence the traffic operation of the other;

(ii) the duration of a temporary traffic control set-up or lane shift that is two weeks or longer. The set-up does not necessarily have to be in place for the entire time but can be one of a number of repeating set-ups that are active at different times; or

(iii) a temporary traffic control set-up whose complexity exceeds that of the standard templates used in the Traffic Management Manual.

(b) Each such Road Safety Audit shall be completed within two days after implementation temporary traffic control set-up unless otherwise agreed to by the Province's Representative.

(c) The Road Safety Audit Team shall follow a check list based on the ITE Temporary Traffic Control Guidelines. The Road Safety Audit shall include a review of both daytime and nighttime temporary traffic control set-up and where applicable the accommodation of vulnerable users.

13.7 Certificates

After each of the three stages of the Road Safety Audit process and where required for temporary traffic control in accordance with Section 13.5 [Temporary Traffic Control (Design) Road Safety Audit] of this Part, Project Co shall submit to the Province's Representative a Road Safety Audit Certificate.

ARTICLE 14 DEMOLITION, REMOVALS AND DISPOSAL

14.1 General Requirements

The following general requirements apply for all Project Work associated with demolition of Project Infrastructure.

14.1.1 Demolition

(a) Project Co shall comply with the requirements of Schedule 6 [Environmental Obligations] of this agreement, the terms and conditions of all environmental Permits and approvals, and any terms and conditions set out in the Environmental Assessment Certificate and the Port Project and Environmental Permit.

(b) Project Co shall prepare and submit demolition plans and any updates to the Province's Representative in accordance with the Review Procedure for any Project Infrastructure, excluding the Existing Pattullo Bridge, a minimum of 120 days in advance of the commencement of the implementation of such plan.

(c) Demolition shall include backfilling excavations, grading and landscaping of demolition sites upon completion of the demolition work.

(d) Project Co shall demolish structures to a minimum depth of 0.5 m below the finished grade, excluding the Existing Pattullo Bridge, which shall be demolished in accordance with the requirements of Section 14.2 [Removal of the Existing Pattullo Bridge] of this Part.

(e) Portions of roadway that are not retained as part of the New Infrastructure shall be removed and restored in accordance with this Article and Article 9 [Landscape and Site Restoration Design Criteria] of this Part.

(f) Project Co shall retain, secure and relocate to a location in the Project Site as directed by the Province's Representative, the existing commemorative Pattullo Bridge plaques.

(g) All removals, waste materials, and installations not retained or incorporated in the New Infrastructure shall become the property of Project Co and shall be removed from the Project Lands.

(h) Excavations within Brownsville Park are not permitted.

(i) Project Co shall dispose of all contaminated, hazardous or dangerous material, including elements of the existing Infrastructure, in accordance with the regulations of relevant Governmental Authorities.

14.1.2 Removal of Existing Electrical Equipment

Project Co shall remove and dispose from the Project Site all existing electrical equipment, including underground boxes, foundations and wiring, not incorporated into the New Infrastructure.

14.1.3 Removal of Existing Utilities

(a) Project Co shall remove from the Project Site or decommission any abandoned pipe situated beneath permanent Travelled Lanes. Decommissioning shall be achieved by completely filling the void in the pipe with a controlled density fill and sealing both ends. Controlled density fill shall be designed to have a minimum unconfined compressive strength of 1 MPa at 28 days and be designed to minimize shrinkage. All mix designs shall be signed and sealed by the responsible engineer, who shall be a duly experienced Professional Engineer of an appropriate discipline.

(b) Project Co shall remove and dispose of exposed portions of any abandoned Utilities.

14.2 Removal of the Existing Pattullo Bridge

In addition to the requirements of this Schedule, the following apply to the removal of the Existing Pattullo Bridge:

(a) Following the SC1 Substantial Complete Date, Project Co shall remove the Existing Pattullo Bridge including all associated roadways and structures not incorporated into the New Infrastructure.

(b) Project Co shall remove the Existing Pattullo Bridge, including:

(a) decommissioning and removal of mechanical and electrical systems;

(ii) removal of all abandoned Utilities; and

(iii) decommissioning and removal of the Existing Pattullo Bridge structure including the superstructure, substructure, foundations, and abutments;

(c) At least one year prior to the SC1 Substantial Completion Target Date, Project Co shall submit to the Province's Representative a plan for the demolition of the Existing Pattullo Bridge (the "**Bridge Demolition Plan**") in accordance with the Review Procedure. The Bridge Demolition Plan shall include specific details of and procedures for the demolition including but not limited to:

(i) demolition schedule;

(ii) traffic management, including both road, marine and railway;

(iii) communications strategy;

(iv) marine users group coordination;

(v) removal of Utilities located on the Existing Pattullo Bridge;

(vi) Hazardous Substances management;

(vii) decommissioning and removal of mechanical and electrical systems;

(viii) disassembly, removal and disposal of all bridge components;

(ix) coordination and interface with railway operations to facilitate removals above and in close proximity to railway lines;

(x) demonstration that the components of the Existing Pattullo Bridge remaining after Bridge Demolition will not affect the long-term performance of the New Fraser River Bridge over its Design Life;

(xi) process and procedures for river hydraulic analysis, Design, engineering, management and monitoring in accordance with Article 3 of this Part;

(xii) proposed restoration of lands affected by demolition and removal; and

(xiii) reference to and interface with other relevant documents and management plans.

(d) The foundations and substructures of the Existing Pattullo Bridge shall be demolished as follows:

(i) Outside of the Fraser River, as defined by the higher high water elevation: to a minimum of 0.5 m below existing ground elevation, except in Surrey, where the Existing Pattullo Bridge south approach shall be removed to ground level, with no excavation.

(ii) Within the Fraser River, to the lowest elevations of:

(A) the underwater portion of the Project Navigation Protection Zone Boundary as shown on the PBR Navigation Clearance Drawing;

(B) the top of existing riprap; and

(C) the requirements of this Schedule.

(e) Elements of the Existing Pattullo Bridge that are not removed from the Project Site after decommissioning shall be considered and stable under all Design and Construction conditions, and taking into consideration observations during Construction.

ARTICLE 15 CLIMATE CHANGE ADAPTATION

15.1 General Requirements

(a) Project Co shall comply with Technical Circular T-04/19.

(b) As guidelines, Project Co shall consider the EGBC Professional Practice Guidelines, Developing Climate Change – Resilient Designs for Highway Infrastructure in British Columbia and the Engineers Canada PIEVC Engineering Protocol for Infrastructure Vulnerability Assessment and Adaptation to a Changing Climate, Principles and Guidelines.

15.2 Climate Data

(a) Project Co shall determine the appropriate climate data to be used in the Design to account for anticipated climate change. The climate data used shall:

(i) be data from southwest coastal British Columbia or derived for the southwest coastal British Columbia area;

(ii) consider at a minimum, temperature, rain, snow, ice, fog, hail, frost, humidity, ice accretion, wind, floods, extreme temperatures and extreme precipitation, and storms of various intensities; and

(iii) rely on climatological modelling analysis that is consistent with current climate science and relevant to the southwest coastal area of British Columbia.

15.3 Climate Vulnerability Risk Analysis

Project Co shall conduct a risk analysis which assesses climate change and extreme weather vulnerability. The vulnerability risk assessment shall:

(a) consider at minimum, climate/design parameters related to extreme weather events involving such things as temperature, rain, snow, ice, fog, hail, frost, humidity, ice accretion, wind, floods, extreme temperatures and precipitation, storms of various intensities, and combinations of these factors;

(b) assess how these vulnerability risks are anticipated to change over the Design Life of each component of the Project Infrastructure; and

(c) assess potential impacts to Project Infrastructure components from climate change and extreme weather events and identify a proposed action where an impact is determined to be present and, for further clarity, climate change is accounted for within the clearance requirements of Section 3.4.10 [Navigation Clearances] of this Part.

15.4 Climate Change Adaptation Report

Within 90 days following the Effective Date, Project Co shall prepare and submit to the Province's Representative, in accordance with the Review Procedure, a climate change adaptation report (the "**Climate Change Adaptation Report**") demonstrating the following:

(a) how the requirements of Technical Circular T-04/19 and this Article have been met; and

(b) how the requirements of the EGBC Climate Change – Resilient Design have been met.

PART 3
DESIGN AND CERTIFICATION PROCEDURE

ARTICLE 1 DESIGN MANAGEMENT PLAN AND TECHNICAL APPRAISAL FORMS

1.1 Submission of Design Management Plan

Within 30 days following the Effective Date, Project Co shall submit a Design Management Plan to the Province's Representative in accordance with the Consent Procedure. The Design Management Plan shall include:

(a) the organization chart for all design activities;

(b) the procedures to be used for designing and checking each of the designs and the form of review to be undertaken;

(c) the identification of the Checking Team for Structures;

(d) the contents and format of Interim Design and Final Design submissions;

(e) processes and schedule for design checking, internal reviews and audits;

(f) a design submission and review schedule, indicating dates that Project Co plans to:

(i) submit Interim Designs;

(ii) undertake review meetings in accordance with Section 1.3 [Review Meetings and Minutes] of this Part; and

(iii) submit Final Designs;

(g) the process and schedule for Road Safety Audits;

(h) the process for Designer reviews during construction;

(i) an overview of document management and controls;

(j) confirmation of the drawing standards to be used;

(k) a drawing tree indicating the organization and hierarchy of Project Co's drawings; and

(l) appropriate metrics to measure the progress of the Design for each discipline.

Any subsequent amendments or updates to the Design Management Plan shall be submitted by Project Co to the Province's Representative in accordance with the Review Procedure.

1.2 Compliance with Design Management Plan

Project Co shall implement and comply with the Design Management Plan which has been accepted by the Province's Representative in accordance with the Consent Procedure, and any subsequent amendments or updates to the Design Management Plan to which there is no objection by the Province in accordance with

the Review Procedure, in connection with all Design Data prepared or adopted in connection with the Design and the Construction.

1.3 Review Meetings and Minutes

(a) Project Co shall organize review meetings with the Province for the purpose of reviewing the Design information in accordance with the Design Management Plan.

(b) Project Co shall prepare minutes of such review meetings, including recording Province comments, and promptly address the comments to the satisfaction of the Province. Copies of the minutes shall be provided to the Province's Representative within 10 Business Days following the review meeting.

(c) For greater certainty, discussion between the Province and Project Co at the review meetings and any minutes from such review meetings, including any Province comments included and addressed therein, shall not be considered for the purposes of this Agreement as either Province Changes or Project Co Proposals, or as a comment or response to a submission.

1.4 TAF Submission Requirements

(a) Each Final Design and Construction submission package submitted by Project Co in accordance with this Part shall be accompanied by a completed TAF.

(b) In any case where submitted Design Data involves any mechanical or electrical and/or intelligent transportation system functions, or similar specialization, Project Co shall submit to the Province's Representative in accordance with the Review Procedure a TAF in respect of such data and functions.

(c) In any case where the Project Work involves the complete or partial demolition of an existing Structure, Project Co shall submit to the Province's Representative in accordance with the Review Procedure a TAF in respect of such complete or partial demolition.

1.5 TAF Form and Content

Each TAF submitted by Project Co pursuant to Section 1.4 [TAF Submission Requirements] of this Part shall be in the format shown in Appendix E [Sample Contents for a Structural TAF] to this Schedule and shall:

(a) for Final Design submissions, include the relevant design criteria, environmental and ground considerations, and interface requirements, together with a listing of the design documentation included in the design package accompanying the Design Certificate;

(b) for Construction submissions, provide the relevant Construction Certificate for such Construction; and

(c) be signed by:

(i) Project Co's Representative; and

(ii) the Designer(s) and the Design-Build Contractor(s), or their respective principal(s), as necessary.

1.6 TAF Variation

Any variation to a TAF which has been subject to the Review Procedure during Design, assessment or any Construction shall be submitted in accordance with the Review Procedure as an addendum to the TAF.

ARTICLE 2 DESIGN SUBMISSIONS, REVIEW AND REPORTS

2.1 Design and Certification Procedure

(a) Project Co shall implement and enforce the procedure set out in this Part (the "**Design and Certification Procedure**"), together with the accepted Design Management Plan, throughout the Term.

(b) The Design and Certification Procedure shall apply to all Design Data prepared or adopted in connection with the Construction, including any further design development or changes to a design once a TAF has been subjected to the Review Procedure.

(c) Project Co shall ensure that all certification procedures referred to in the Design Management Plan and the Design and Certification Procedure are complied with by the appropriate persons referred to therein, including the Design Team, the Designer and any independent team or engineer within the Designer, as the case may be (together, the "**Appropriate Persons**"), and that all Appropriate Persons are at all relevant times duly authorized and qualified to carry out such procedures and to sign the relevant certificates. Any failure by any Appropriate Person to fulfil the obligations required of them under the Design Management Plan or the Design and Certification Procedure shall be a breach of Project Co's obligations under this Agreement.

2.2 Design and Certification Procedure in Emergency

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 Design and Certification Procedure, provided that Project Co shall comply with the provisions of this Design and Certification Procedure otherwise applicable to those measures as soon as reasonably possible under the circumstances.

2.3 No Limitation

A requirement for certification or for any check or review pursuant to, and for purposes of, this Part 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 any of the Project Requirements, or pursuant to any applicable professional standards or practices.

2.4 Format of Design Submissions

(a) Project Co shall provide two hard copies, one PDF file and one AutoCAD data file for each Interim Design and Final Design submission.

(b) Drawings shall be in a format in accordance with the requirements of the Ministry Standards. Project Co shall confirm drawing conventions and standards, including AutoCAD standards, title block and stationing convention, with the Province's Representative prior to commencing design drawing production.

2.5 Preparation of Design Data

All Design Data shall be prepared under the supervision of the Designer. Prior to the submission of any Design Data to the Province's Representative, the Designer and the Checking Team where applicable, shall satisfy themselves that the Design Data meets all Project Requirements and otherwise complies with the requirements of this Agreement.

2.6 Interim Design Submission

(a) Project Co shall submit to the Province's Representative Interim Designs, including supporting information for the New Project Infrastructure and any Design required in connection with any plans developed by Project Co in accordance with Section 2.7(c) of Schedule 6 [Environmental Obligations].

(b) Interim Design submissions shall be informal and shall not be reviewed according to the Review Procedure. Rather, such informal Interim Design submissions shall be used to inform the Province on the development of the Design and provide an opportunity for a dialog on compliance with the Project Requirements before the Design is complete.

(c) The content of such Interim Design submissions shall be appropriate to the subject and discipline and include any specific requirements for such submissions set out in this Agreement. The information provided shall be adequate to show that the Design is proceeding in compliance with the Project Requirements and is taking into consideration the relevant Construction.

(d) In accordance with this Design and Certification Procedure, Project Co and the Province shall agree on the design information to be submitted for review in the Interim Design submissions, the schedule of such Interim Design submissions, and the scope of each review.

2.7 Final Design Review

Final Designs from all design disciplines shall be submitted to the Province's Representative in accordance with the Review Procedure, including the relevant TAF(s) together with all Final Design drawings, Design Certificates, supporting Design Data and calculations required in accordance with this Schedule.

2.8 Final Design Submissions

2.8.1 General

(a) Design folders shall be prepared for the Final Design submissions and shall have indexes and sectional dividers. The design folders shall contain pertinent correspondence, shall be arranged by subject matter in chronological order, and shall include design calculations and backup information. Design folders shall include, without limitation, copies of all approvals, design reports, correspondence, internal design reviews, quality control records and calculations.

(b) The Final Design submissions shall address any comments by the Province from the Interim Design review.

(c) Final Design drawings and reports shall be signed and sealed by the responsible engineer, who shall be a duly experienced Professional Engineer of an appropriate discipline.

2.8.2 Roadway and Drainage Design

The Final Design submission shall, without limitation:

(a) contain all design drawings, including complete laning and geometrics, profiles, typical and template cross-sections, right of way acquisitions and drainage;

(b) include the stormwater management plan and Drainage Design Report;

(c) include revisions made in the Design to address stakeholder issues, plans for Utility relocations, critical constructability and traffic handling considerations, environmental issues and mitigation plans; and

(d) include baseline, construction and operational noise assessments, noise modelling and noise mitigation design.

2.8.3 Bridge Design

The Final Design submission shall contain, without limitation, the following:

(a) all design drawings, including for general arrangements, Foundations, Substructures, Superstructures, auxiliary components, Utilities on the Bridges, drainage, inspection and maintenance accesses, barriers and all related information;

(b) a geotechnical report for each of the Structures;

(c) for the New Fraser River Bridge;

(i) Seismic Design Strategy Memorandum;

(ii) River Hydraulics Management Plan;

(iii) Hydraulic Design Report;

(iv) Aerodynamic Test Report;

(v) Durability Plan;

(vi) Future Six Lane Configuration Report;

(vii) Operation and Maintenance Manual;

(viii) Category III Checking Team Report; and

(ix) Designer response to the Category III Checking Team Report, in accordance with Article 3 of this Part;

(d) special provisions for the construction of the Bridges;

(e) Inspection, Maintenance and Replacement Plans and Procedures for Bridges;

(f) seismic retrofit strategies for existing Bridges;

(g) a spreadsheet (hard copy and electronic) containing the structure parameters data in accordance with Article 3 [Structural Design Criteria] of Part 2 of this Schedule;

(h) global stability reports, if applicable;

(i) a plan for the settlement monitoring of Bridges; and

(j) a neat, bound, indexed set of design calculations for the Bridge Structures initialled by the responsible engineer and checker, who shall be a duly experienced Professional Engineer of the appropriate discipline.

2.8.4 Other Structures Design

The Final Design submission shall contain, without limitation, the following:

(a) final geotechnical report for each of the Structures;

(b) special provisions for the construction of Structures;

(c) seismic retrofit strategies for existing Structures;

(d) descriptions of aesthetic treatment for all walls;

(e) descriptions of maintenance considerations for all Structures;

(f) global stability reports, if applicable;

(g) a plan for the settlement monitoring of Structures; and

(h) a neat, bound, indexed set of design calculations for the Structures, initialled by the responsible engineer, who shall be a duly experienced Professional Engineer of the appropriate discipline.

2.8.5 Geotechnical Design

(a) The geotechnical reports shall be updated and submitted to the Province's Representative at Final Design.

(b) For Category III Structures the Final Design shall include;

(i) relevant sections of the Category III Checking Team Report; and

(ii) Designer response to the Category III Checking Team Report, in accordance with Article 3 of this Part.

(c) In addition, the Final Design submission shall, without limitation, contain:

(i) a summary of any additional work and subsurface investigations that have been completed since the Interim Design, including drafted drill summary logs in Ministry format;

(ii) final recommendations for foundation systems, allowable loads and estimates of total and differential settlements at 2, 5, 10, 20, 40 and 75 years following construction;

(iii) geotechnical design recommendations for retaining structures;

(iv) ground improvement designs;

(v) geotechnical design recommendations for pavements;

(vi) estimates of total and differential settlement of embankments and roadways at 2, 5, 10, 20, 40 and 75 years following construction;

(vii) requirements for ground improvement measures necessary to meet the static and seismic performance requirements for foundations, cut and fill slopes, embankments and retaining structures;

(viii) an assessment of the stability of approach embankments, road embankments, cut slopes and fill slopes under static and seismic loading conditions and the ability of these to meet the seismic performance requirements;

(ix) drawings showing the road alignment in plan and profile with drill hole locations shown on the plan and simplified summary logs shown on the profile (design notes are to be shown along the bottom of the drawings); and

(x) a final geotechnical report for each Structure with drawings showing the general arrangements for the Bridge Structures in plan and profile, with drill locations shown in plan and simplified summary logs shown in profile.

2.8.6 Pavement Design

(a) The Pavement Design Report shall be updated and submitted with the Final Design.

2.8.7 Electrical, Signing and Pavement Markings Design

(a) The Final Design submissions shall include electrical (including signals, lighting and telecommunications), signing and Pavement Marking plans.

(b) Design drawings for all electrical systems shall contain, without limitation, the following:

(i) electrical equipment and all associated support structure locations;

(ii) lighting calculations where appropriate

(iii) service locations; and

(iv) schematics showing electrical wiring layout.

(c) Design drawings for the telecommunications conduit network shall contain, without limitation, the following:

(i) network diagram showing conduit locations; and

(ii) design drawings showing the locations for all interconnection points.

(d) Sign design sheets shall be submitted for all custom guide signs. Sign design sheets shall be produced using Transoft Guide sign (or equivalent) software.

(e) All cantilever and sign bridge Structures submissions shall be undertaken in accordance with Section 300 of the Electrical and Signing Materials Standards.

(f) A layout drawing shall be submitted, as a separate Design package, identifying the cyclist wayfinding signage.

2.8.8 ITS Equipment

The Final Design submission shall contain, without limitation, the following:

(a) design drawings for the ITS Equipment containing, without limitation, the following:

(i) equipment and all associated cabinet locations;

(ii) equipment support structure locations;

(iii) service locations; and

(iv) schematics showing communications and electrical wiring layout;

(b) neat, bound, indexed set of product information identifying the manufacturer, make, model and technical information for all ITS Equipment.

2.8.9 Landscaping and Site Restoration

The Final Design submission shall contain a detailed landscape plan and drawings that reflect any highway design changes and incorporate comments made on the interim submissions. Project Co shall document changes and describe the design work that has been completed since the Interim Design submission. Drawings shall be of a suitable scale for legibility, and provide enlarged detailing where needed.

2.8.10 Traffic Modelling and Traffic Engineering

The Final Design submission shall contain, without limitation, the following:

(a) traffic engineering analysis, micro-simulation models and associated reports and files in accordance with Part 2 of this Schedule;

(b) traffic engineering checklists and signal timing sheets associated with the design of signalized intersections;

(c) the assigned traffic volumes, along with the traffic engineering checklists and signal timing sheets for opening day operation of signalized intersections; and

(d) traffic engineering analysis along with the traffic engineering checklists and signal timing sheets whenever traffic signal timings are adjusted after opening day.

2.8.11 Environmental Design

The Final Design submission shall contain, without limitation, the following:

(a) applicable construction drawings that include:

(i) all critical and sensitive wildlife habitats and ecosystems (e.g. nest trees, red and blue listed plant communities, wetlands, etc.);

(ii) "no disturbance" riparian and "vegetation to remain" (protected vegetation) areas;

(iii) all fish bearing streams and aquatic habitats; and

(iv) all archaeological features;

(b) riparian restoration and terrestrial reclamation/revegetation drawings that, as a minimum, describe timing requirements, seed mixes and applications rates of hydroseeding and site specific restoration plans, including species type, size and spacing for riparian areas, areas of higher sensitivity, and areas prone to erosion or shallow slope movement;

(c) environmental design drawings that show environmental mitigation and compensation features and any environmental features to be constructed;

(d) environmental design documentation including:

(i) regulatory agency review and acceptance documentation for the Environmental Management Plan specific to the work designed;

(ii) all licenses, notifications, permits, authorisations and approvals specific to the work designed;

(iii) all assessments, studies, surveys and monitoring reports specific to the work designed;

(e) an environmental design criteria checklist that lists general environmental commitments and conditions, environmental design commitments, site specific environmental features and environmental mitigation/compensation plans.

2.9 Road Safety Audit Design Data

All Design Data shall be subject to Road Safety Audits in accordance with Article 13 [Road Safety Audits] of Part 2 of this Schedule as and where required pursuant to the provisions of the Design Management Plan, the Project Requirements and any other provision of this Agreement.

2.10 Objection to Design Data

If the Province objects to any Design Data in accordance with the Review Procedure, the Province shall so notify Project Co and Project Co shall, unless Project Co disputes the objection by the Province to such Design Data in accordance with the Dispute Resolution Procedure, either:

(a) cause to be made such alterations and additions as may be necessary such that the Design Data accords with the Project Requirements and all other requirements of this Agreement, all in accordance with the Review Procedure; or

(b) subject to the other provisions of this Agreement, submit a Project Co Proposal.

2.11 Adherence to Design Data

Design Data which has been the subject of a Certificate that has been submitted to the Province's Representative in accordance with the Design Management Plan, the Design and Certification Procedure or this Agreement shall not be departed from otherwise than in accordance with Schedule 11 [Changes] of this Agreement.

2.12 Issued for Construction Drawings

Project Co shall submit copies of all drawings that are "issued for construction", together with manuals, instructions to the Design-Build Contractor and other relevant information as requested by the Province, to the Province's Representative and to the Independent Certifier.

2.13 No Construction

Project Co shall not commence or permit the commencement of the Construction (including any Temporary Works) unless and until all Design Data and relevant Certificates required in respect of the relevant part of the Design and Construction have been submitted by Project Co to the Province's Representative for consideration in accordance with the Design Management Plan and the Design and Certification Procedure.

2.14 Designer Review During Construction

During Construction, Project Co shall ensure that the Designer, in accordance with the procedures set out in the Design Management Plan and the relevant Quality Documentation and other Project Requirements, examines the same and satisfies itself that such Project Work and every part thereof have been designed, constructed, completed, commissioned, tested and maintained in all respects so as to accord with:

(a) Design Data in respect of which Design Certificates have been issued and to which there has been no objection in accordance with the Review Procedure; and

(b) all applicable Project Requirements,

and otherwise to comply in all respects with the requirements of this Agreement.

2.15 Temporary Works

(a) As a minimum, design submissions for Temporary Works shall include those items intended for public use and/or potentially affecting public safety. Final Designs, including TAFs, for these Temporary Works shall be submitted to the Province's Representative in accordance with the Review Procedure.

(b) Design Data relating to any Temporary Works shall be checked by a Checking Team independent of the designer.

(c) In performing the check referred to in paragraph (b) above, the Checking Team shall satisfy itself that:

(i) the Design Data meets the Project Requirements and otherwise complies with the requirements of this Agreement;

(ii) the Temporary Works (as a whole and the constituent parts) are satisfactory for the safe and proper discharge of Project Co's relevant obligations; and

(iii) the Design Data reflects the requirements of the relevant Governmental Authorities for all affected highways or other roads or areas used by or accessible to the public other than the New Project Infrastructure.

(d) Where any Temporary Works may endanger public safety on any highway or other road or area used by or accessible to the public other than the New Project Infrastructure, Project Co shall consult the relevant highway Governmental Authority and the Design Data shall reflect the requirements of such Governmental Authority.

2.16 Documentation for Ministry Jurisdictional Atlas

Project Co shall prepare drawings for the Ministry Jurisdictional Atlas for the purposes of defining the boundaries between Provincial and Municipal infrastructure. Project Co shall consult with the Province prior to preparing the drawings. The drawings shall be submitted to the Province's Representative in accordance with the Review Procedure no later than 60 days prior to the SC1 Substantial Completion Date.

ARTICLE 3 CHECKING OF STRUCTURES

3.1 Independent Review

In addition to the requirements of this Article, all Structures shall have, as part of the Interim Design submission, an independent review in accordance with Bylaw 14(b) [Quality Management] of the EGBC Bylaws (as they may be amended from time to time) and the EGBC Quality Management Guidelines (as they may be amended from time to time). A copy of the documentation shall be included in the Interim Design and Final Design submissions.

3.2 Categories of Structures

The "Category" of a Structure shall determine the degree of independence of checking of Design Data required for that Structure. Every Structure shall be placed in one of four Categories:

(a) Category 0. Minor individual Structures provided they conform to one of the following:

(i) a Structure with a single span of less than 10m and which is statically determinate;

(ii) a buried Structure less than 3m clear span/diameter, or multicell buried Structure where the cumulative span is less than 5m and having more than 1m cover;

(iii) a conventional retaining wall without tie-back anchors and less than 3m retained height; or

(iv) mechanically stabilized earth with concrete facing panel systems less than 3m in height.

(b) Category I. Simple individual Structures provided they conform to one of the following:

(i) a conventional retaining wall without tie-back anchors and with 3m or more but less than 7m retained height;

(ii) a buried concrete box or corrugated steel buried Structure with less than 8m span;

(iii) a Structure with a simply supported single span of less than 20m and having less than 25 deg. skew;

(iv) mechanically stabilized earth with concrete facing panel system with 3m, or more but less than 7m, in height; or

(v) noise walls 3m or more than 3m in height.

(c) Category II. All those Structures not within the parameters of Categories 0, I or III.

(d) Category III. Structures which:

(i) require sophisticated analysis; or

(ii) contain low structural redundancy; or

(iii) contain unconventional design aspects; or

(iv) have any span exceeding 50 metres; or

(v) have a skew exceeding 45 degrees; or

(vi) have unusual or complex Foundation configurations; or

(vii) are Bridges with suspension systems, cable stayed Bridges, steel Bridges with orthotropic decks, floating structures, hinged arch structures and all tunnels, movable Bridges and Bridge access gantries; or

(viii) are Lifeline Structures; or

(ix) are retaining walls with tie-back anchoring systems.

3.3 Existing Structures

The assessment of existing Structures (whether existing on the date of this Agreement or constructed as part of the Project Work) and the renewal or strengthening work affecting structural integrity of existing Structures shall be categorized on the basis of the original Structure unless otherwise agreed by the Province.

3.4 Category Proposal

As soon as sufficient Design Data for a Structure has been prepared to allow the determination of a category, Project Co shall submit its proposed category (together with such Design Data as necessary to support that proposal) to the Province's Representative in accordance with the Review Procedure.

3.5 Structure Checking Procedure

Design Data relating to each Structure (including without limitation calculations, assessments, drawings and bar schedules) shall be checked as follows:

(a) Category 0 and Category I Structures require an independent check by a Professional Engineer, other than the engineer who designed the Structure. The checking Professional Engineer may be from the original Design Team.

(b) Category II Structures require a check by a Checking Team which may be from the Designer but shall be independent of the Design Team.

(c) Category III Structures require a check to be carried out by a Checking Team appointed to perform an independent check by an organization not related to the Designer, the Design-Build Contractor or Project Co and utilizing the expertise as required in this Article. The Checking Team shall report directly to Project Co.

(d) The independent check for Category III Structures shall be conducted throughout the design process with documentation of the comments received from the Checking Team and the resulting action taken by Project Co to address all such comments provided at the Interim Design and Final Design Submission.

In addition to the checking procedures required above, Project Co shall conduct all checking procedures required by EGBC.

3.6 Checking Team

At the time it submits the initial Design Management Plan, Project Co shall submit to the Province's Representative under the Consent Procedure a proposal, which shall be supported by a resume for each

member of the proposed Checking Team, as to the organization to serve as the Checking Team and the proposed terms and conditions of its employment. The following responsibilities and expertise shall be required of and incorporated in the Checking Team for Category III Structures:

(a) The Checking Team shall be responsible for:

(i) Performing an independent check of the Design Data for Category III Structures to ensure that the design of such Category III Structures meets performance expectations outlined in this Agreement and that such design is carried out according to accepted industry standards;

(ii) undertaking supplementary analyses to independently verify and confirm the design methodologies and assumptions used;

(iii) identifying deficiencies in the Design Data, and notifying Project Co and the Province of unresolved deficiencies;

(iv) attending review meetings in accordance with this Part; and

(v) providing a report (the "**Category III Checking Team Report**") including resolution of deficiencies.

(b) The following shall be included in the expertise of the Checking Team:

(i) expert in seismic design and analysis of long-span Bridges located in high seismic risk regions and in soils susceptible to liquefaction;

(ii) expert in ground improvement methods to mitigate liquefaction;

(iii) expert in displacement-based design philosophy;

(iv) expert in the disciplines of geotechnical and structural engineering;

(v) expert in structural steel fabrication and material manufacture;

(vi) expert in wind loading on Structures;

(vii) expert in ship impact loading on Structures;

(viii) expert in hydrotechnical analysis and design for Structures;

(ix) expert in the analysis and design of all aspects of long span and complex Structures;

(x) individuals who are experts in the seismic design provisions in CAN/CSA-S6-14, ATC-49, AASHTO and all other applicable Reference Documents;

(xi) individuals who are experts in geotechnical, structural, and soil-structure interaction modeling and software used for design and analysis of Bridge Foundations;

(xii) individuals who are experts in the review of designs to ensure compliance with Environmental Laws and other environmental requirements; and

(xiii) individuals who are registered as Professional Engineers.

3.7 Structure Design Checking Responsibility

The Design Team, Designer and the Checking Team shall each satisfy itself as to the applicability and accuracy of all computer programs used and shall ensure the validity of the program for each application. The Design Team, Designer and the Checking Team shall each also be responsible for its own interpretation of the relevant ground information.

3.8 Independence

Independence of the Checking Team, as provided in Section 3.5 [Structure Checking Procedure] of this Part, shall be maintained at all times. The method of analysis they employ need not be the same. They may consult each other to ensure that the results they are obtaining are directly comparable.

ARTICLE 4 DESIGN CERTIFICATION

4.1 Design Certificates

Project Co shall issue a Design Certificate for each Final Design package that is submitted. All Design Certificates shall be:

(a) on the appropriate form(s) attached as Appendix D [Form of Certificates] to this Schedule; and

(b) be signed and sealed by the responsible engineer, who shall be a Professional Engineer and a principal of the Designer, and by Project Co's Representative (or, in the case only of Design Certificates for environmental works incorporated in the Project Work, the Environmental Director).

All parties that sign Design Certificates shall clearly print their name and position held in their organization.

4.2 Submission of Design Certificates

All Design Certificates together with the supporting documentation shall be submitted to the Province's Representative in accordance with the Review Procedure with original signatures, seals and registration numbers and in such form as to allow the Province to perform its function in respect of such Design Certificate without delay.

4.3 Road Safety Audit Certificates

(a) Project Co shall submit to the Province's Representative a certificate (a "**Road Safety Audit Certificate**") in the form attached as Appendix D [Form of Certificates] to this Schedule in respect of the Stage 1, Stage 2 and Stage 3 Road Safety Audits respectively. Each Road Safety Audit Certificate shall be signed by the Designer, the Road Safety Audit Team, the Design-Build Contractor and Project Co's Representative.

(b) The Stage 3 Road Safety Audit Certificate shall be provided to the Independent Certifier and the Certificate of Substantial Completion for the Primary Infrastructure Components (or other Relevant Components, as may be applicable) shall not be issued unless a Stage 3 Road Safety Audit Certificate in respect thereof has been submitted and signed by the Designer, the Road Safety Audit Team, the Design-Build Contractor and Project Co's Representative.

ARTICLE 5 TESTING

5.1 Conduct of Testing

To the extent and in the manner provided by the Design Management Plan, Quality Documentation and other Project Requirements, all testing shall be carried out by a duly accredited and certified testing facility and organization. Except for categories of tests (if any) in respect of which the Province gives written notice to Project Co that it does not require such notice, the Province's Representative shall be given timely advance notice (being not less than 2 Business Days) of the date of such tests. The Province shall be entitled to attend at any test. Any materials or Plant which fail such tests shall be rejected.

5.2 Test Recording and Reporting

With respect to continuous testing operations (such as concrete quality, structural concrete strengths, aggregate quality, compaction tests and bituminous material quality) Project Co shall provide to the Province's Representative at regular intervals (not to exceed weekly unless otherwise agreed) test summary sheets and statistical analyses indicating strength and quality trends and shall do so in accordance with the requirements of Schedule 17 [Records and Reports], including Section 1.6 [Province Access to Records].

ARTICLE 6 CONSTRUCTION CERTIFICATION

6.1 Construction Certificates

Project Co shall, in accordance with the procedures set out in the Design Management Plan and the relevant Quality Documentation or other Project Requirements, submit Construction Certificates to the Province's Representative in accordance with the Review Procedure. Construction Certificates shall be submitted to the Province's Representative prior to opening any New Project Infrastructure for use by the public. All Construction Certificates shall be signed by Project Co's Representative, the Designer and the Design-Build Contractor. Project Co shall provide a copy of all Construction Certificates to the Independent Certifier.

6.2 Deliverables for Substantial Completion

Without limiting Project Co's obligations under this Agreement, Project Co shall deliver the deliverables set out in Part I [Deliverables for Substantial Completion] of Appendix F to this Schedule prior to Substantial Completion of the applicable Relevant Components.

6.3 Deliverables for Total Completion

Without limiting Project Co's obligations under this Agreement, Project Co shall deliver the deliverables set out in Part II [Deliverables for Total Completion] of Appendix F to this Schedule prior to Total Completion.

6.4 Requirements for Substantial Completion of Primary Infrastructure Components

Substantial Completion of the Primary Infrastructure Components shall only be achieved after:

(a) the Stay Cable Snow and Ice Removal System has been commissioned, operational and available to the Province no less than 30 days prior to the anticipated SC1 Substantial Completion Date, in accordance with Section 3.4 of Part 2 of this Schedule;

(b) the ITS Equipment has been operational, subsystem verification completed and available to the Province for ATMS system integration no less than 60 days prior to the anticipated SC1 Substantial Completion Date, in accordance with Section 12.3(d)(iii) of Part 2 of this Schedule;

(c) the traffic measurement equipment has been installed, tested and commissioned no less than one month prior to the anticipated SC1 Substantial Completion Date in accordance with Section 12.10.1(b) of Part 2 of this Schedule;

(d) the pedestrian and cyclist counting equipment has been installed, tested and commissioned no less than one month prior to the anticipated SC1 Substantial Completion Date in accordance with Section 12.11.1(b) of Part 2 of this Schedule;

(e) all Construction Certificates have been issued in respect of the Primary Infrastructure Components;

(f) a Stage 3 Road Safety Audit Certificate in respect of the Primary Infrastructure Components has been issued in accordance with Section 13.4.4 [Stage 3: Post Construction Road Safety Audit] of Part 2 of this Schedule;

(g) the drawings for the Ministry Jurisdictional Atlas required pursuant to Section 2.16 [Documentation for Ministry Jurisdictional Atlas] of this Part have been submitted to the Province's Representative no less than 60 days prior to the anticipated SC1 Substantial Completion Date; and

(h) all relevant quality inspections and audits have been satisfactorily completed in accordance with the Design Management Plan, the Quality Documentation and other relevant provisions of this Agreement and provided to the Province demonstrating that the Primary Infrastructure Components have been Substantially Completed in accordance with all applicable Project Requirements and other requirements of this Agreement.

6.5 Notice of Substantial Completion of Primary Infrastructure Components

(a) Project Co shall issue to the Independent Certifier and the Province's Representative a notice informing them at least 28 days but no more than 42 days prior to the date upon which Project Co expects Substantial Completion of the Primary Infrastructure Components. If Project Co has at any time reason to believe that the said date expected for Substantial Completion of the Primary Infrastructure Components shall be delayed or achieved earlier by more than five Business Days, it shall issue a fresh notice informing the Independent Certifier and the Province's Representative of the new date expected for Substantial Completion of the Primary Infrastructure Components.

(b) At the same time that Project Co delivers a notice under Section 6.5(a) of this Part, Project Co shall submit to the Province's Representative for review, acting reasonably, in accordance with the Review Procedure, and to the Independent Certifier a list of any defects or deficiencies in the Primary Infrastructure Components (the "**SC1 Final Deficiency List**"), which list shall:

(i) identify all outstanding defects or deficiencies in the Primary Infrastructure Components that Project Co expects to remain outstanding as of Substantial Completion of the Primary Infrastructure Components and required to be corrected by Project Co in order to achieve Total Completion, which defects or deficiencies shall include any failure by Project Co to deliver a deliverable required by Section 6.2 [Deliverables for Substantial Completion] of this Part prior to Substantial Completion of the Primary Infrastructure Components;

(ii) include Project Co's estimate of the cost to remedy each such 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, the "**SC1 Deficiency Agreed Remedy Cost**"); and

(iii) Project Co's proposed date for the remedy of each such defect or deficiency, which date shall be no later than 90 days after the SC1 Substantial Completion Date.

6.6 Inspection for Substantial Completion of Primary Infrastructure Components

Upon Project Co issuing a notice contemplated in Section 6.5 [Notice of Substantial Completion of Primary Infrastructure Components] of this Part, and subject to the delivery to the Independent Certifier and the Province's Representative of Construction Certificates in respect of the Substantial Completion of the Primary Infrastructure Components and all other relevant Certificates and supporting documentation in accordance with the Design and Certification Procedure, the Province and Project Co shall cause the Independent Certifier to commence, within 10 Business Days of receipt of such notice, an inspection of the Primary Infrastructure Components to determine whether Substantial Completion of the Primary Infrastructure Components has been achieved and whether the SC1 Final Deficiency List is correct.

6.7 Issuance of Certificate of Substantial Completion for Primary Infrastructure Components and Signing of SC1 Final Deficiency List

(a) The Province and Project Co shall cause the Independent Certifier, within 20 Business Days of the commencement of the inspection under Section 6.6 [Inspection for Substantial Completion of Primary Infrastructure Components] of this Part, to either:

(i) issue the Certificate of Substantial Completion for the Primary Infrastructure Components, stating the SC1 Substantial Completion Date, to the Province and Project Co; or

(ii) notify Project Co and the Province's Representative of its decision not to issue such Certificate of Substantial Completion and state the reasons in detail for such decision, including what further work may be required to achieve Substantial Completion of the Primary Infrastructure Components.

(b) The Province and Project Co shall cause the Independent Certifier, within 15 Business Days after the commencement of the inspection under Section 6.6 [Inspection for Substantial Completion of Primary Infrastructure Components] of this Part, to either:

(i) sign the SC1 Final Deficiency List to reflect the Independent Certifier's determination that the SC1 Final Deficiency List is correct; or

(ii) notify Project Co and the Province's Representative of its decision not to sign the SC1 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 SC1 Final Deficiency List.

6.8 Refusal to Issue Certificate of Substantial Completion for Primary Infrastructure Components or Sign SC1 Final Deficiency List

(a) The Independent Certifier shall refuse to issue the Certificate of Substantial Completion for the Primary Infrastructure Components, only if the Primary Infrastructure Components are not Substantially Complete, or any other conditions or requirements under the Agreement to the achievement of Substantial Completion of the Primary Infrastructure Components have not been satisfied or complied with.

(b) The Independent Certifier shall refuse to sign the SC1 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 of the Primary Infrastructure Components and that are required to be remedied in order to achieve Total Completion.

6.9 Completion of Further Work for Substantial Completion of Primary Infrastructure Components

(a) In the event of service of a notice by the Independent Certifier under Section 6.7(a)(ii) of this Part, Project Co shall issue to the Independent Certifier a notice not less than five Business Days but no more than 10 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 Substantial Completion.

(b) In the event of service of a notice by the Independent Certifier under Section 6.7(b)(ii) of this Part, Project Co shall amend the SC1 Final Deficiency List to include:

(i) the further defects or deficiencies in the Project Work to be added to the SC1 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 SC1 Deficiency 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 90 days after the SC1 Substantial Completion Date.

(c) Upon Project Co notifying the Independent Certifier and the Province's Representative that such further work or measures necessary or appropriate have been completed or, as the case may be, the SC1 Final Deficiency List has been amended in accordance with Section 6.9(b) of this Part, the Province and Project Co shall cause the Independent Certifier to commence within 10 Business Days of the notice of completion an inspection of such further work or measures and/or to review the amended SC1 Final Deficiency List and the provisions of Section 6.5 [Notice of Substantial Completion of Primary Infrastructure Components] of this Part through to this Section, inclusive, shall apply *mutatis mutandis*.

6.10 Requirements for Substantial Completion of Completion Components

Substantial Completion of the Completion Components shall only be achieved after:

(a) all Construction Certificates have been issued in respect of the Completion Components;

(b) a Stage 3 Road Safety Audit Certificate in respect of the Completion Components has been issued in accordance with Section 13.4.4 [Stage 3: Post Construction Road Safety Audit] of Part 2 of this Schedule; and

(c) all relevant quality inspections and audits have been satisfactorily completed in accordance with the Design Management Plan, the Quality Documentation and other relevant provisions of this Agreement and provided to the Province demonstrating that the Completion Components have been Substantially Completed in accordance with all applicable Project Requirements and other requirements of this Agreement.

6.11 Notice of Substantial Completion of Completion Components

(a) Project Co shall issue to the Independent Certifier and the Province's Representative a notice informing them at least 28 days but no more than 42 days prior to the date upon which Project Co expects Substantial Completion of the Completion Components. If Project Co has at any time reason to believe that the said date expected for Substantial Completion of the Completion Components shall be delayed or achieved earlier by more than five Business Days, it shall issue a fresh notice informing the Independent Certifier and the Province's Representative of the new date expected for Substantial Completion of the Completion Components.

(b) At the same time that Project Co delivers a notice under Section 6.11(a) of this Part, Project Co shall submit to the Province's Representative for review, acting reasonably, in accordance with the Review Procedure, and to the Independent Certifier a list of any defects or deficiencies in the Completion Components (the "**SC2 Final Deficiency List**"), which list shall:

(i) identify all outstanding defects or deficiencies in the Completion Components that Project Co expects to remain outstanding as of Substantial Completion of the Completion Components and required to be corrected by Project Co in order to achieve Total Completion, which defects or deficiencies shall include any failure by Project Co to deliver a deliverable required by Section 6.2 [Deliverables for

Substantial Completion] of this Part prior to Substantial Completion of the Completion Components;

(ii) include Project Co's estimate of the cost to remedy each such 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, the "**SC2 Deficiency Agreed Remedy Cost**"); and

(iii) Project Co's proposed date for the remedy of each such defect or deficiency, which date shall be no later than 60 days after the SC2 Substantial Completion Date.

6.12 Inspection for Substantial Completion of Completion Components

Upon Project Co issuing a notice contemplated in Section 6.5 [Notice of Substantial Completion of Completion Components] of this Part, and subject to the delivery to the Independent Certifier and the Province's Representative of Construction Certificates in respect of the Substantial Completion of the Completion Components and all other relevant Certificates and supporting documentation in accordance with the Design and Certification Procedure, the Province and Project Co shall cause the Independent Certifier to commence, within 10 Business Days of receipt of such notice, an inspection of the Completion Components to determine whether Substantial Completion of the Completion Components has been achieved and whether the SC2 Final Deficiency List is correct.

6.13 Issuance of Certificate of Substantial Completion for Completion Components and Signing of SC2 Final Deficiency List

(a) The Province and Project Co shall cause the Independent Certifier, within 20 Business Days of the commencement of the inspection under Section 6.12 [Inspection for Substantial Completion of Completion Components] of this Part, to either:

(i) issue the Certificate of Substantial Completion for the Completion Components, stating the SC2 Substantial Completion Date, to the Province and Project Co; or

(ii) notify Project Co and the Province's Representative of its decision not to issue such Certificate of Substantial Completion and state the reasons in detail for such decision, including what further work may be required to achieve Substantial Completion of the Completion Components.

(b) The Province and Project Co shall cause the Independent Certifier, within 15 Business Days after the commencement of the inspection under Section 6.12 [Inspection for Substantial Completion of Completion Components] of this Part, to either:

(i) sign the SC2 Final Deficiency List to reflect the Independent Certifier's determination that the SC2 Final Deficiency List is correct; or

(ii) notify Project Co and the Province's Representative of its decision not to sign the SC2 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 SC2 Final Deficiency List.

6.14 Refusal to Issue Certificate of Substantial Completion for Completion Components or Sign SC2 Final Deficiency List

(a) The Independent Certifier shall refuse to issue the Certificate of Substantial Completion for the Completion Components, only if the Completion Components are not Substantially Complete, or any other conditions or requirements under the Agreement to the achievement of Substantial Completion of the Completion Components have not been satisfied or complied with.

(b) The Independent Certifier shall refuse to sign the SC2 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 of the Completion Components and that are required to be remedied in order to achieve Total Completion.

6.15 Completion of Further Work for Substantial Completion of Completion Components

(a) In the event of service of a notice by the Independent Certifier under Section 6.13(a)(ii) of this Part, Project Co shall issue to the Independent Certifier a notice not less than five Business Days but no more than 10 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 Substantial Completion.

(b) In the event of service of a notice by the Independent Certifier under Section 6.13(b)(ii) of this Part, Project Co shall amend the SC2 Final Deficiency List to include:

(i) the further defects or deficiencies in the Project Work to be added to the SC2 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 SC2 Deficiency 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 60 days after the SC2 Substantial Completion Date.

(c) Upon Project Co notifying the Independent Certifier and the Province's Representative that such further work or measures necessary or appropriate have been completed or, as the case may be, the SC2 Final Deficiency List has been amended in accordance with Section 6.15(b) of this Part, the Province and Project Co shall cause the Independent Certifier to commence within 10 Business Days of the notice of completion an inspection of such further work or measures and/or to review the amended SC2 Final Deficiency List and the provisions of Section 6.11 [Notice of Substantial Completion of Completion Components] of this Part through to this Section, inclusive, shall apply *mutatis mutandis*.

6.16 Requirements for Substantial Completion of Bridge Demolition

Substantial Completion of the Bridge Demolition shall only be achieved after:

(a) all Construction Certificates in respect of the Bridge Demolition have been issued;

(b) Project Co has provided to the Province's Representative all required deliverables for the Bridge Demolition, in accordance with Section 6.2 [Deliverables for Substantial Completion] to this Schedule; and

(c) all relevant quality inspections and audits, including inspections and audits respecting impacts to the New Bridge, have been satisfactorily completed in accordance with the Design Management Plan, the Bridge Demolition Plan, the Quality Documentation and other relevant provisions of this Agreement and provided to the Province demonstrating that the Bridge Demolition has been Substantially Completed in accordance with all applicable Project Requirements and other requirements of this Agreement.

6.17 Notice of Substantial Completion of Bridge Demolition

(a) Project Co shall issue to the Independent Certifier and the Province's Representative a notice informing them at least 28 days but no more than 42 days prior to the date upon which Project Co expects Substantial Completion of the Bridge Demolition. If Project Co has at any time reason to believe that the said date expected for Substantial Completion of the Bridge Demolition shall be delayed or achieved earlier by more than five Business Days, it shall issue a fresh notice informing the Independent Certifier and the Province's Representative of the new date expected for Substantial Completion of the Bridge Demolition.

(b) At the same time that Project Co delivers a notice under Section 6.17(a) of this Part, Project Co shall submit to the Province's Representative for review, acting reasonably, in accordance with the Review Procedure, and to the Independent Certifier a list of any defects or deficiencies in the Bridge Demolition (the "**SC3 Final Deficiency List**"), which list shall:

(i) identify all outstanding defects or deficiencies in the Bridge Demolition that Project Co expects to remain outstanding as of Substantial Completion of the Bridge Demolition and required to be corrected by Project Co in order to achieve Total Completion, which defects or deficiencies shall include any failure by Project Co to deliver a deliverable required by Section 6.2 [Deliverables for Substantial Completion] of this Part prior to Substantial Completion of the Bridge Demolition;

(ii) include Project Co's estimate of the cost to remedy each such 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, the "**SC3 Deficiency Agreed Remedy Cost**"); and

(iii) Project Co's proposed date for the remedy of each such defect or deficiency, which date shall be no later than the Total Completion Target Date.

6.18 Inspection for Substantial Completion of Bridge Demolition

Upon Project Co issuing a notice contemplated in Section 6.17 [Notice of Substantial Completion of Bridge Demolition] of this Part, and subject to the delivery to the Independent Certifier and the Province's Representative of Construction Certificates in respect of the Substantial Completion of the Bridge Demolition and all other relevant Certificates and supporting documentation in accordance with the Design and Certification Procedure, the Province and Project Co shall cause the Independent Certifier to commence, within 10 Business Days of receipt of such notice, an inspection of the Bridge Demolition to determine whether Substantial Completion of the Bridge Demolition has been achieved and whether the SC3 Final Deficiency List is correct.

6.19 Issuance of Certificate of Substantial Completion for Bridge Demolition and Signing of SC3 Final Deficiency List

(a) The Province and Project Co shall cause the Independent Certifier, within 20 Business Days of the commencement of the inspection under Section 6.18 [Inspection for Substantial Completion of Bridge Demolition] of this Part, to either:

(i) issue the Certificate of Substantial Completion for the Bridge Demolition, stating the SC3 Substantial Completion Date, to the Province and Project Co; or

(ii) notify Project Co and the Province's Representative of its decision not to issue such Certificate of Substantial Completion and state the reasons in detail for such decision, including what further work may be required to achieve Substantial Completion of the Bridge Demolition.

(b) The Province and Project Co shall cause the Independent Certifier, within 15 Business Days after the commencement of the inspection under Section 6.18 [Inspection for Substantial Completion of Bridge Demolition] of this Part, to either:

(i) sign the SC3 Final Deficiency List to reflect the Independent Certifier's determination that the SC3 Final Deficiency List is correct; or

(ii) notify Project Co and the Province's Representative of its decision not to sign the SC3 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 SC3 Final Deficiency List.

6.20 Refusal to Issue Certificate of Substantial Completion for Bridge Demolition or Sign SC3 Final Deficiency List

(a) The Independent Certifier shall refuse to issue the Certificate of Substantial Completion for the Bridge Demolition only if the Bridge Demolition is not Substantially Complete, or any other conditions or requirements under the Agreement to the achievement of Substantial Completion of the Bridge Demolition have not been satisfied or complied with.

(b) The Independent Certifier shall refuse to sign the SC3 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 of the Bridge Demolition and that are required to be remedied in order to achieve Total Completion.

6.21 Completion of Further Work for Substantial Completion of Bridge Demolition

(a) In the event of service of a notice by the Independent Certifier under Section 6.19(a)(ii) of this Part, Project Co shall issue to the Independent Certifier a notice not less than five Business Days but no more than 10 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 Substantial Completion.

(b) In the event of service of a notice by the Independent Certifier under Section 6.19(b)(ii) of this Part, Project Co shall amend the SC3 Final Deficiency List to include:

(i) the further defects or deficiencies in the Project Work to be added to the SC3 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 SC3 Deficiency 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.

(c) Upon Project Co notifying the Independent Certifier and the Province's Representative that such further work or measures necessary or appropriate have been completed or, as the case may be, the SC3 Final Deficiency List has been amended in accordance with Section 6.21(b) of this Part, the Province and Project Co shall cause the Independent Certifier to commence within 10 Business Days of the notice of completion an inspection of such further work or measures and/or to review the amended SC3 Final Deficiency List and the provisions of Section 6.17 [Notice of Substantial Completion of Bridge Demolition] of this Part through to this Section, inclusive, shall apply *mutatis mutandis*.

6.22 Outstanding Work for Total Completion

(a) The Province shall be entitled to hold back from:

(i) the SC1 Substantial Completion Payment, the SC1 Deficiency Holdback on account of any defects or deficiencies in the Primary Infrastructure Components as identified on the SC1 Final Deficiency List signed by the Independent Certifier pursuant to Section 6.7(b)(i) of this Part;

(ii) the repayment of the SC1a Withholding Amount, the SC2 Deficiency Holdback on account of any defects or deficiencies in the Completion Components as identified on the SC2 Final Deficiency List signed by the Independent Certifier pursuant to Section 6.13(b)(i) of this Part; and

(iii) the repayment of the SC1b Withholding Amount, the SC3 Deficiency Holdback on account of any defects or deficiencies in the Bridge Demolition as identified on

the SC3 Final Deficiency List signed by the Independent Certifier pursuant to Section 6.19(b)(i) of this Part; and

(b) Notwithstanding the issue of a Certificate of Substantial Completion for each of the Primary Infrastructure Components, the Completion Components and the Bridge Demolition, Project Co shall promptly complete all outstanding Project Work required to achieve Total Completion as soon as practicable.

6.23 Requirements for Total Completion

Total Completion shall only be achieved after:

(a) the completion of the remedy of all SC1 Final Deficiency List Deficiencies, all SC2 Final Deficiency List Deficiencies and all SC3 Final Deficiency List Deficiencies;

(b) Project Co has provided to the Province's Representative all required deliverables for Total Completion, in accordance with Section 6.3 [Deliverables for Total Completion] of this Part;

(c) all relevant quality inspections and audits, including inspections and audits respecting impacts to the New Fraser River Bridge, have been satisfactorily completed in accordance with the Design Management Plan, the Bridge Demolition Plan, the Quality Documentation and other relevant provisions of this Agreement and provided to the Province demonstrating that the Total Completion has been completed in accordance with all applicable Project Requirements and other requirements of this Agreement; and

(d) all demolition, removal and disposal of Infrastructure shall have been completed in accordance with Article 14 [Demolition, Removals and Disposals] of Part 2 of this Schedule.

6.24 Notice of Total Completion

Project Co shall issue to the Independent Certifier and the Province's Representative a notice informing them at least 28 days but no more than 42 days prior to the date upon which Project Co expects Total Completion. If Project Co has at any time reason to believe that such expected date for Total Completion shall be delayed or achieved earlier by more than five Business Days, it shall issue a fresh notice informing the Independent Certifier and the Province's Representative of the new date expected for Total Completion.

6.25 Inspection for Total Completion

Upon Project Co issuing a notice contemplated in Section 6.24 [Notice of Total Completion] of this Part and subject to the delivery to the Independent Certifier and the Province's Representative of Construction Certificates for Total Completion and all other relevant Certificates and supporting documentation in accordance with the Design and Certification Procedure, Project Co shall cause the Independent Certifier to commence, within 10 Business Days of receipt of such notice, an inspection of the Primary Infrastructure Components, the Completion Components and the Bridge Demolition to determine whether Total Completion has been achieved.

6.26 Issuance of Certificate of Total Completion

The Province and Project Co shall cause the Independent Certifier, within 20 Business Days of the commencement of the inspection pursuant to Section 6.25 [Inspection for Total Completion] of this Part, to either:

(a) issue the Certificate of Total Completion, stating the Total Completion Date, to the Province and Project Co; or

(b) notify Project Co and the Province of its decision not to issue the Certificate of Total Completion and state the reasons in detail for such decision.

6.27 Refusal to Issue Certificate of Total Completion

The Independent Certifier shall refuse to issue the Certificate of Total Completion only if any of the Primary Infrastructure Components, the Completion Components or the Bridge Demolition are not Totally Complete, or any other conditions or requirements under the Agreement to the achievement of Total Completion have not been satisfied or complied with.

6.28 Completion of Further Work for Total Completion

In the event of service of a notice by the Independent Certifier under Section 6.26(b) of this Part, Project Co shall issue to the Independent Certifier a notice not less than five Business Days but no more than 10 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 Certificate of Total Completion. Upon Project Co notifying the Independent Certifier and the Province's Representative that such further work or measures necessary or appropriate have been completed, the Province and Project Co shall cause the Independent Certifier to commence within 10 Business Days of the notice of completion an inspection of such further work or measures and the provisions of Sections 6.24 [Notice of Total Completion] of this Part through to this Section, inclusive, shall apply *mutatis mutandis*.

6.29 Submissions by Province

The Province may, at any time, following receipt of notice given by Project Co pursuant to any of Section 6.5 [Notice of Substantial Completion of Primary Infrastructure Components], Section 6.11 [Notice of Substantial Completion of Completion Components], Section 6.17 [Notice of Substantial Completion of Bridge Demolition] or Section 6.24 [Notice of Total Completion] of this Part, as applicable, and prior to the Independent Certifier issuing or notifying Project Co and the Province's Representative of its decision not to issue a Certificate of Substantial Completion or the Certificate of Total Completion, as the case may be, provide the Independent Certifier and Project Co with the Province's submissions as to whether the conditions for issuance of such Certificate of Substantial Completion or the Certificate of Total Completion, as the case may be, have been satisfied and, if applicable, any reasons as to why the Province considers that such Certificate of Substantial Completion or the Certificate of Total Completion, as the case may be, should not be issued. The Independent Certifier shall consider such submissions in determining whether to issue such Certificate of Substantial Completion or the Certificate of Total Completion, as the case may be.

6.30 No Limitation

The issuance of any Certificate of Substantial Completion or the Certificate of Total Completion 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.

6.31 Disputed Certificate

If there is any dispute between the parties as to the decision of the Independent Certifier to issue or not to issue any Certificate of Substantial Completion or the Certificate of Total Completion in accordance with this Part, then either the Province or Project Co may refer such dispute for resolution under the Dispute Resolution Procedure.

6.32 Certificate Effective Pending Dispute

Notwithstanding any other provision in this Agreement or Schedule 16 [Dispute Resolution Procedure], if the Independent Certifier has issued any Certificate of Substantial Completion or the Certificate of Total Completion and the Province or Project Co has referred a dispute in respect thereof for resolution under the Dispute Resolution Procedure pursuant to Section 6.31 [Disputed Certificate] of this Part, then for all purposes of this Agreement such Certificate of Substantial Completion or the Certificate of Total Completion, as the case may be, shall be deemed to have been issued unless and until it is determined in accordance with the Dispute Resolution Procedure that it was improperly issued by the Independent Certifier in accordance with the terms of this Part.

ARTICLE 7 CONSTRUCTION COMPLETION

7.1 Completion Plan

Project Co shall submit a plan (the "**Completion Plan**") in accordance with the Review Procedure not less than 120 days prior to the SC1 Substantial Completion Target Date. The Completion Plan shall include as a minimum:

(a) Project Co's detailed completion procedure that supports Substantial Completion and Total Completion in accordance with this Schedule 4;

(b) a comprehensive list and projected dates of all Substantial Completion and Total Completion activities, including key milestones;

(c) a proposal for including the Province's Representative and Independent Certifier for joint reviews, walkthroughs, testing, or inspection activities in support of the completion process;

(d) a process for Project Co, the Province's Representative and the Independent Certifier to identify, accept and document each of the SC1 Final Deficiency List Deficiencies, the SC2 Final Deficiency List Deficiencies and the SC3 Final Deficiency List Deficiencies;

(e) a process for Project Co to manage the remedy of the SC1 Final Deficiency List Deficiencies, the SC2 Final Deficiency List Deficiencies and the SC3 Final Deficiency List Deficiencies prior to Total Completion;

(f) a proposal for providing evidentiary documentation for meeting the Substantial Completion and Total Completion obligations in accordance with this Schedule 4; and

(g) a process for the handover of each of the Relevant Components.

7.2 Substantial Completion Requirements

The Completion Plan shall include all activities, processes and documentation demonstrating Substantial Completion of each of the Relevant Components, including the applicable requirements as set out in the following:

(a) Section 6.2 [Deliverables for Substantial Completion] of this Part;

(b) Section 6.4 [Requirements for Substantial Completion of Primary Infrastructure Components] of this Part;

(c) Section 6.10 [Requirements for Substantial Completion of Completion Components] of this Part;

(d) Section 6.16 [Requirements for Substantial Completion of Bridge Demolition] of this Part; and

(e) the definition of Substantial Completion in Section 1.1 [Definitions] of Schedule 1.

7.3 Total Completion Requirements

The Completion Plan shall include all activities, processes and documentation demonstrating Total Completion, including the requirements as set out in the following:

(a) Section 6.3 [Deliverables for Total Completion] of this Part;

(b) Section 6.23 [Requirements for Total Completion] of this Part; and

(c) the definition of Substantial Completion in Section 1.1 [Definitions] of Schedule 1.

PART 4
TRAFFIC MANAGEMENT

ARTICLE 1 GENERAL TRAFFIC MANAGEMENT REQUIREMENTS

1.1 Order of Precedence

Project Co's Traffic Management Plan and traffic control operations for all Construction shall be in accordance with the criteria contained in this Part and the following codes and standards and if there is any conflict between the criteria and any of the Reference Documents, the following shall apply in descending order of precedence:

(a) the criteria contained in this Part;

(b) the applicable Ministry Technical Circulars and Technical Bulletins included in the Reference Documents;

(c) Traffic Management Manual;

(d) DBSS;

(e) Electrical and Traffic Engineering Manual;

(f) Manual of Standard Traffic Signs and Pavement Markings;

(g) Standard Highway Sign Specifications;

(h) Electrical and Signing Materials Standards;

(i) BC Supplement to TAC;

(j) TAC Geometric Design Guide;

(k) Bus Infrastructure Design Guidelines;

(l) TAC Bikeway Traffic Control Guidelines;

(m) NCHRP Report 350

(n) City of New Westminster Construction Traffic Control Guidelines for Pedestrians and Cyclists; and

(o) the applicable documented standards of the relevant Municipality.

1.2 Recognized Products List

All traffic control devices used in the Project are to be selected from the Recognized Products List. The use of traffic control devices not on the Recognized Products List requires written acceptance from the Province in accordance with the Consent Procedure.

1.3 General Requirements

(a) The restrictions outlined in this Part shall be the basis for the development of the Traffic Management Plan including the Traffic Control Plans. Variations to the restrictions at specific locations may be permitted for such specific locations, but only if substantiated through a plan by Project Co that addresses, at a minimum, traffic requirements, analysis and stakeholder consultation, where applicable, and such plan is accepted by the Province in accordance with the Consent Procedure.

(b) All traffic data used for analysis for Traffic Management purposes shall be less than six months old. Project Co shall be responsible for obtaining any traffic data necessary for traffic analysis.

(c) All existing road capacities and intersection turning movements, capacities and storage lengths shall be maintained during Restricted Periods.

(d) Implementation and removal of any Lane Closures, Stoppages, Full Closures, Detour Routes, Lane Shifts or other changes in traffic patterns shall be completed outside of Restricted Periods.

(e) Project Co shall not engage in any activity that could result in the occurrence of a Traffic Disruption Event, or that could otherwise impede or disrupt the flow of traffic, during a Restricted Period.

(f) The Province may, in its discretion, temporarily adjust the Traffic Disruption Event restrictions identified in this Part in circumstances considered appropriate by the Province including, without limitation, for the purposes of or during Statutory Holidays, unspecified Special Events, Incidents and Maintenance.

(g) The Province may direct Project Co, on 30 days advance notice, to eliminate any or all Traffic Disruption Events for up to a 24 hour period for any major planned event other than a Special Event.

(h) If Project Co's Traffic Control Supervisor or the Province determines that any traffic delays, queues or disruptions are excessive (e.g. where the extent of vehicular queues affect upstream intersections, ramps, intersection or interchange operations or the ability of vehicles on a highway or road to exit at upstream interchange ramps), Project Co shall cease any relevant Construction and safely make all the necessary travel lanes available to traffic as quickly as possible.

(i) Any proposed Lane Closures, Full Closures, Stoppages, Detour Routes, Lane Shifts and alternations to on-street parking not included in Project Co's accepted Traffic Control Plan shall be subject to prior acceptance by the Province in accordance with the Consent Procedure.

(j) Lane Closures and Full Closures shall not be permitted on McBride Avenue, Royal Avenue or Columbia Street during a Full Closure of Front Street.

(k) Project Co shall not use private roads without making prior arrangements with all affected or Interested Parties and the Province.

(l) Physical access to all adjacent properties shall be maintained throughout active Construction zones.

(m) Construction vehicle access to active Construction zones on the Highway 17 Mainline and associated ramps shall be permitted only outside of the applicable Restricted Periods, unless separate acceleration and deceleration lanes are provided from and to such active Construction zones. Design of acceleration and deceleration lanes shall take into account all construction vehicle types to be used in the performance of the relevant Project Work.

(n) Full access for emergency and first responders shall be maintained at all times.

(o) Project Co shall provide off street parking for all staff and contractors within walking distance of the site or an alternative means for accessing the site

(p) Project Co shall prohibit staff and contractors from parking on Municipal Streets, in the Scott Road Park and Ride Parking Lot and in parking lots owned by the City of New Westminster unless approval has been received

(q) Project Co shall minimize impacts to public on-street parking.

(r) Project Co shall coordinate with TransLink on the nightly lane closures on the Existing Pattullo Bridge, weekday 3pm to 6pm closures of the westbound Columbia to Existing Pattullo Bridge ramp, and any other planned or emergency closures of the Existing Pattullo Bridge.

(s) For each scheduled Full Closure, Lane Closure or Detour Route, Project Co shall provide advance notice to the travelling public and other stakeholders of the scheduled Full Closure, Lane Closure or Detour Route in accordance with Schedule 9 [Communication and Engagement].

(t) Project Co shall provide PDMS to provide advance notice of each scheduled Full Closure, Lane Closure or Detour Route and to provide advance notice of all traffic pattern changes and disruptions. PDMS (including flashers and other warning devices) shall be placed at strategic upstream locations.

(u) Construction site access and haul routes shall avoid residential areas where alternatives are available.

(v) No Lane Closures shall be permitted on residential streets after 10pm unless accepted by the Province in accordance with the Consent Procedure.

1.4 Location and Storage of Materials and Equipment

Project Co shall not store materials or equipment on the travel portion or Shoulder of any road at any time. Materials and equipment stored within the Clear Zone of any road shall be protected by barriers.

1.5 Accommodation of Marine Traffic

(a) Project Co shall accommodate marine traffic along the Fraser River in accordance with requirements under the *Navigable Waters Protection Act* (Canada) and the requirements of the Port Authority and of Transport Canada.

(b) Project Co shall develop and implement a Marine Access Management Plan in accordance with this Agreement.

1.6 Accommodation of Rail Traffic

Project Co shall accommodate rail traffic in accordance with this Agreement including, without limitation, the Railway Agreements and the Reference Documents.

1.7 Special Events

Project Co shall comply with the following requirements when scheduling hours of work or Project Co-initiated Traffic Disruption Events during the following events and circumstances (together, "**Special Events**"), provided that such requirements shall not apply to Other Streets:

(a) Project Co shall not implement any Traffic Disruption Events during any of the timeframes for restrictions set out in Table 1.7b in relation to any of the holiday events identified in Table 1.7a (each a Special Event).

Table 1.7a Holiday Events	
New Year's Day	British Columbia Day
BC Family Day	Labour Day
Good Friday	Thanksgiving Day
Easter Monday	Remembrance Day
Victoria Day	Christmas Day
Canada Day	Boxing Day

Table 1.7b Restrictions on Traffic Disruption Events	
Day on which Special Event falls	**Timeframes for Restrictions**
Monday	From 5:00 am the Friday before the holiday event to the day of the holiday event at 12:00 midnight
Tuesday, Wednesday, or Thursday	From 5:00 am the day before the holiday event to the day of the holiday event at 12:00 midnight
Friday	From 5:00 am the Thursday before the holiday event to the Sunday after the holiday event at 12:00 midnight

(b) Project Co shall actively search for other major events in the region that may affect traffic volumes in the area (e.g. sporting events, festivals, parades, etc). Project Co shall assess these events for their effect on traffic and alter the Traffic Control Plans appropriately.

1.8 Detour Route and Lane Shift Requirements

1.8.1 General

(a) All Detour Routes and Lane Shifts shall be paved with appropriate Pavement Markings and signs placed in accordance with the Traffic Management Manual.

(b) Project Co shall ensure that the condition of the pavement used for all Detour Routes and Lane Shifts is adequate for its intended purpose, and does not adversely impact on the safety and intended function of such Detour Routes and Lane Shifts.

(c) Project Co shall schedule Construction such that no milled surface on the Pattullo Mainline or the Highway 17 Mainline shall be open to traffic for more than one daytime shift. Project Co shall schedule Construction such that no milled surface on all other roads shall be open to traffic for more than 14 days. Each milled surface open to traffic shall be clean and allow adequate drainage.

(d) Project Co shall prepare an engineered design for each Detour Route and Lane Shift that shall as a minimum be consistent with the existing road geometry and where possible conform to the minimum Design criteria for Detour Routes and Lane Shifts.

(e) Project Co shall provide Detour Routes and Lane Shifts with adequate drainage facilities to prevent hydroplaning, pooling of water on and flow of water across the roadway.

(f) Variations to the Detour Route and Lane Shift Design criteria shall not be permitted unless accepted by the Province in accordance with the Consent Procedure.

(g) Detours utilising municipal roads outside of the Project Site require prior consultation with the affected Municipality.

1.8.2 Traffic Control Devices

(a) Construction and Advisory Signs

(i) Project Co shall be responsible for the design, supply, installation, relocation, maintenance, and removal of all requisite signage and Pavement Markings, including temporary regulatory, warning, guide, advisory, directional and dynamic message signs. The location and type of each sign shall be indicated on the Traffic Control Plan in accordance with the Electrical and Signing Materials Standards, the Traffic Management Manual and the Manual of Standard Traffic Signs and Pavement Markings.

(ii) In accordance with Section 194 [Traffic Management for Work Zones] of the DBSS, all standard signs, new and replacement, shall meet the Standard Highway Sign Specifications.

(b) Portable Dynamic Message Signs

(i) Portable Dynamic Message Signs ("**Portable Dynamic Message Signs**" or "**PDMS**") shall be in accordance with Technical Circular T-16/06.

(ii) As a minimum, Project Co shall provide PDMS or portable Changeable Message Signs ("**PCMS**") as required, and shall use PDMS to provide advance notification of planned traffic pattern changes in accordance with Schedule 9 [Communication and Engagement]. Sign locations and messages shall be as shown on the Traffic Control Plan. In addition, Project Co is to use PDMS to provide notification of

Incidents or unplanned traffic pattern changes, as deemed necessary by the Emergency Response Plan.

(iii) Project Co shall ensure that any messages displayed on PDMS are current and applicable to prevailing conditions.

(iv) When in operation, the bottom of each PDMS shall be a minimum of 2 m above the road surface, and shall be level and capable of pivoting for visibility purposes.

1.8.3 Concrete Roadside Barrier Requirements

(a) As a minimum, Project Co shall supply and install temporary concrete roadside barriers:

(i) between traffic and median wall construction;

(ii) between traffic and excavations/embankment construction;

(iii) between traffic and Underpass/Overpass construction;

(iv) to meet drop-off delineation requirements; and

(v) where required by Project Co's Traffic Control Plan.

(b) Traffic barriers used for Detour Routes and Lane Shifts, or used for the protection of the Project Site, shall be continuous or adequately protected by terminals, flares, or impact attenuators. Traffic barrier systems (including barriers, terminals, flares, and impact attenuators) not on the Recognized Product List shall meet all criteria set out in NCHRP Report 350, and shall be submitted to the Province's Representative for acceptance in accordance with the Consent Procedure. Temporary barriers shall have reflectors installed in accordance with the Manual of Standard Traffic Signs and Pavement Markings.

(c) Where equipment is actively working adjacent to the Pattullo Mainline, Highway 17 Mainline and Ramps, in order to avoid driver distraction, headlight glare and to inhibit debris from blowing onto the travel surfaces, visual screens shall be installed on or adjacent to barriers. Project Co shall submit the product proposed for visual screens to the Province's Representative for acceptance in accordance with the Consent Procedure.

(d) Where traffic barriers are used, Project Co shall make adequate provision for drainage and removal of snow, ice and Debris.

1.8.4 Drop-Offs

Project Co shall perform all Construction so as to minimize any drop-offs (abrupt changes in roadway elevation) left exposed to traffic during non-working hours. Drop-offs left exposed to traffic during non-working hours shall be delineated as follows:

(a) Drop-offs up to 60 mm may remain exposed with appropriate traffic control devices alerting motorists to the condition. However, no drop-offs shall be allowed between adjacent lanes of traffic of the same direction of travel. Drop-offs transverse to the direction of travel shall be ramped to allow for safe passage of all road users.

(b) Drop-offs greater than 60 mm that are in the roadway or Shoulder shall be delineated with appropriate traffic control devices and further delineated as described in paragraph (c) below. Subject to a Road Safety Audit, Project Co may use channelizing devices as listed in paragraph (c) below provided that Project Co's Traffic Control Plan can demonstrate the effectiveness of the relevant channelizing device(s) and the drop-off is less than 100 mm.

(c) Drop-offs greater than 60 mm but less than 130 mm that are not within the roadway or Shoulder shall be delineated with appropriate traffic control devices and further protected or delineated in accordance with at least one of the following:

(i) A wedge of compacted stable material (25 mm well graded base course aggregate or better) placed at a slope of 4:1 or flatter.

(ii) Channelizing devices (Type 1 barricades, plastic safety drums, or other devices 1 m or more in height) placed along the traffic side of the drop-off and a new edge-of-pavement stripe placed a minimum of 2 m from the drop-off. Appropriate traffic control devices shall be placed in advance of and throughout the drop-off treatment.

(iii) Temporary concrete barrier, or other accepted barrier, installed on the traffic side of the drop-off with 300 mm between the drop-off and the back of the barrier and a new edge-of-pavement stripe placed a minimum of 500 mm from the face of the barrier. An accepted terminal, flare, or impact attenuator shall be required at the beginning of the section. For night use, the barrier shall have reflective markers and/or warning lights.

(d) Drop-offs of more than 130 mm that are not within the roadway or Shoulder shall be delineated with appropriate traffic control devices and further delineated as indicated in paragraph (c) above if all of the following conditions are met:

(i) the drop-off is less than 600 mm;

(ii) the drop-off does not remain for more than three consecutive days;

(iii) the drop-off is not present at any time during any Statutory Holiday or Special Event; and,

(iv) the drop-off is only on one side of the roadway.

(e) Drop-offs of more than 130 mm that are not within the roadway or Shoulder and are not otherwise covered by (d) above shall be delineated with appropriate traffic control devices and further delineated as indicated in Sections 1.9.4(c)(i) and (ii) of this Part.

(f) Any drop-off of over 130 mm in height shall be protected with concrete roadside barrier with end treatments as required by the Traffic Management Manual.

All areas of excavation and their proposed safety measures shall be shown in the Traffic Control Plan.

1.8.5 Temporary Pavement Markings

(a) Further to Section 4.4 of the Traffic Management Manual, Project Co shall be responsible for the application, maintenance and removal of all temporary Pavement Markings and reflective devices. Only permanent Pavement Markings shall be applied to the final pavement surface.

(b) When traffic lanes are to be redefined for long-duration work (more than one daytime shift), Project Co shall eradicate all redundant temporary or permanent Pavement Markings that are not required for the intended traffic patterns (without leaving excessive grooves on the pavement surface) and install revised markings.

(c) Notwithstanding Section 194.45 of the DBSS, Project Co shall supply all temporary Pavement Markings. The material used for any temporary Pavement Markings shall be paint with glass bead or thermoplastic marking supplemented with temporary overlay markers or raised pavement markings.

(d) Project Co shall apply all Pavement Markings in accordance with the signing and pavement markings drawings and the Detour Route and Lane Shift Design drawings.

(e) Project Co shall maintain positive delineation at all times and shall re-apply temporary pavement markings, raised pavement markers, delineators and barrier reflectors that are faded, damaged or missing.

(f) Project Co shall ensure that barriers shall have reflectors in accordance with the Manual of Standard Traffic Signs and Pavement Markings.

(g) Raised pavement markers shall be installed on the Pattullo Mainline, Highway 17 and Ramps in accordance with the Signage and Pavement Marking Manual.

1.8.6 Speed Limits and Safe Passage through Project Site

Further to Section 2.4 of the Traffic Management Manual, the Province reserves the right to determine speed limits within the Project Site. Unless specifically specified in this Part or agreed to in writing by the Province, the existing speed limits shall be maintained.

1.9 Existing Traffic Signals

(a) Modifications to existing traffic signals shall be undertaken in accordance with Sections 1.6 [Traffic Engineering] and 6.6 [Traffic Signals] of Part 2 of this Schedule

(b) Project Co shall develop and implement new signal timing plans as required at existing Ministry owned signalized intersections where Construction shall impact intersection operations.

(c) Project Co shall be responsible for liaising and coordinating with Municipalities regarding any required modifications to existing municipal signalized intersections.

(d) Existing signal coordination shall be maintained at all traffic signals affected by the Construction.

1.10 Temporary Traffic Signals and Lighting

(a) Temporary traffic signals shall be provided where required in accordance with Sections 1.6 [Traffic Engineering] and 6.6 [Traffic Signals] of Part 2 of this Schedule.

(b) Temporary lighting shall be provided in accordance with Section 6.8 [Temporary Lighting During Construction] of Part 2 of this Schedule.

(c) Temporary traffic signals shall be designed and implemented to allow actuated operation.

1.11 Accommodation of Pedestrians and Cyclists

PDC.11.1a Project Co shall ensure passage at each existing facility and crossing point within the Project Site currently used by pedestrians and cyclists is maintained in a safe and efficient manner throughout Construction, except at facilities or crossing points that are to be permanently closed.

(b) Temporary closures or re-routing of pedestrian and cycling routes may be permitted by the Province contingent upon provision of a safe, efficient and suitable alternative route. Any proposed temporary closure or re-routing of pedestrian and cycling routes shall be submitted to the Province's Representative in accordance with the Consent Procedure. Detour routes in place for greater than 3 days or longer than 30m shall be of a similar or better standard as the existing route.

PDC.11.1c Any temporary closure of pedestrian and cycling routes exceeding 10 minutes shall be preceded with signage indicating the dates and duration of any closure as well as alternative routes available in accordance with Schedule 9 [Communication and Engagement].

1.12 Accommodation of Transit

(a) Project Co shall ensure passage along each existing transit route within the Project Site is maintained or rerouted in a safe and efficient manner.

(b) Project Co shall consult with TransLink, Coast Mountain Bus Company and the British Columbia Rapid Transit Company with respect to any Construction that might affect transit operations, facilities, schedules or routing.

(c) Project Co shall coordinate with TransLink, Coast Mountain Bus Company and the British Columbia Rapid Transit Company to prevent adverse impacts on bus and SkyTrain operating schedules.

(d) Project Co shall arrange with TransLink, Coast Mountain Bus Company and the Municipalities for any relocation of bus stops and associated facilities.

(e) Project Co shall design and construct all temporary transit facilities in accordance with the Bus Infrastructure Design Guidelines.

1.13 Consequences of Occurrence of Non-Permitted Traffic Disruption Events

Traffic Management Payments shall be payable by Project Co to the Province pursuant to and in accordance with Schedule 10 [Payment and Performance Mechanism] in respect of each Non-Permitted Traffic Disruption Event.

ARTICLE 2 PATTULLO MAINLINE

2.1 General Requirements

(a) The requirements in this Article 2 are applicable to the Existing Pattullo Bridge, the New Fraser River Bridge, the Bridge Connector and King George Boulevard (together, the "**Pattullo Mainline**").

(b) Only for the purposes of placement and sizing of Traffic Control Devices, the speed limit shall be assumed to be no less than 60 km/h.

(c) Traffic Management shall be designed such that standing or stopped traffic on the Existing Pattullo Bridge is avoided.

2.2 Restricted Periods for Pattullo Mainline

Restricted Periods for the Pattullo Mainline are as follows:

Direction	**Weekdays**	**Saturday**	**Sunday**
Both directions	5:00am – 10:00pm	8:00am – 10:00pm	10:00am – 10:00pm

2.3 Lane Closures on Pattullo Mainline

(a) As a minimum, the number of lanes in each direction existing as at the Effective Date on the Pattullo Mainline shall be kept open for traffic during Restricted Periods.

(b) Except where Full Closures are permitted, a minimum of one basic lane (excluding auxiliary lanes) in each direction shall be maintained open for general traffic outside of Restricted Periods.

2.4 Stoppages on Pattullo Mainline

(a) Subject to acceptance by the Province in accordance with the Consent Procedure, the following Stoppages shall be permitted outside of Restricted Periods for the Pattullo Mainline:

(i) Stoppages less than two minutes' duration; and

(ii) Stoppages greater than two minutes' duration but less than 20 minutes' duration between 12:00 am and 4:00 am only.

(b) After a Stoppage has been implemented and removed, Project Co shall allow all queues to clear before implementing another Stoppage.

2.5 Full Closures on Pattullo Mainline

Subject to acceptance by the Province in accordance with the Consent Procedure, in exceptional situations (e.g. Bridge girder erection, demolition of existing Structures or sign gantry installation), the Province may permit Full Closures on a site specific basis and under the following condition:

(a) Full Closures shall be permitted only on weekends between Friday 10:00 pm and Monday 5:00 am.

2.6 Non-Permitted Traffic Disruption Events on Pattullo Mainline

Each of the following Traffic Disruption Events occurring on the Pattullo Mainline is a Non-Permitted Traffic Disruption Event:

(a) a Lane Closure occurring on the Pattullo Mainline:

(i) during a Restricted Period for the Pattullo Mainline;

(ii) during a Special Event in contravention of Section 1.7 [Special Events] of this Part; or

(iii) in any other circumstances not expressly permitted pursuant to Section 2.3 [Lane Closures on Pattullo Mainline] of this Part;

(b) a Full Closure occurring on the Pattullo Mainline:

(i) during a Restricted Period for the Pattullo Mainline;

(ii) during a Special Event in contravention of Section 1.7 [Special Events] of this Part; or

(iii) in any other circumstances not expressly permitted pursuant to Section 2.5 [Full Closures on Pattullo Mainline] of this Part; and

(c) a Stoppage occurring on the Highway mainline in circumstances not expressly permitted pursuant to Section 2.4 [Stoppages on Highway Mainline].

2.7 Detour Route and Lane Shift Design Criteria for Pattullo Mainline

(a) Table 2.7 summarizes the minimum geometric design criteria that shall be incorporated into the Design of all Detour Routes and Lane Shifts for the Pattullo Mainline.

Table 2.7

Construction Detour Route and Lane Shift Design Criteria – Pattullo Mainline	
Design/Posted Speed	60 / 50 km/h
Design Vehicle	WB20
Design Grade	8%
Maximum Superelevation	6%
Minimum Radius	As per BC Supplement to TAC
Vertical Clearance	The lesser of 5.0 m or existing travel lane clearance

Construction Detour Route and Lane Shift Design Criteria – Pattullo Mainline	
Lane Width	maintain existing lane widths (min)
Outside Paved Shoulder Width (Open)	1.0 m (min), including 0.5 m (min) gravel
Outside Paved Shoulder Width (Closed by Barrier)	0.5 m (min)
Inside Paved Shoulder Width (Closed by Barrier)	0.5 m (min)
Side Slopes (w/o Barrier)	The lesser of 3 : 1 (max) or existing

Note: Minimum Shoulder widths shall be permitted except where dictated otherwise by sight distance requirements, in which case widened Shoulder width in order to meet sight distance requirements shall be provided.

(b) Except as permitted in this Section, variations to the above Detour Route and Lane Shift criteria shall not be permitted unless accepted by the Province in accordance with the Consent Procedure.

ARTICLE 3 HIGHWAY 17 MAINLINE

3.1 General Requirements

(a) The requirements in this Article 3 are applicable to Highway 17 and the Highway 17 Distributor, but excluding the Highway 17 Ramps (together, the "**Highway 17 Mainline**").

(b) Only for the purposes of placement and sizing of Traffic Control Devices, the speed limit shall be assumed to be no less than 80 km/h.

3.2 Restricted Periods for Highway 17 Mainline

Restricted Periods for the Highway 17 Mainline are as follows:

Direction	**Weekdays**	**Saturday**	**Sunday**
Westbound	5:00am – 10:00pm	7:00am – 10:00pm	7:00am – 10:00pm
Eastbound	6:00am – 10:00pm	7:00am – 10:00pm	7:00am – 10:00pm

3.3 Lane Closures on Highway 17 Mainline

(a) As a minimum, the number of lanes in each direction existing as at the Effective Date on the Highway 17 Mainline shall be kept open for traffic during Restricted Periods for the Highway 17 Mainline.

(b) Except in the circumstances in which Full Closures are permitted pursuant to Section 3.5 [Full Closures on Highway 17 Mainline] of this Part, a minimum of one basic lane (excluding auxiliary lanes) in each direction on the Highway 17 Mainline shall be kept open for general traffic outside of Restricted Periods for the Highway 17 Mainline.

3.4 Stoppages on Highway 17 Mainline

(a) Subject to acceptance by the Province in accordance with the Consent Procedure, the following Stoppages shall be permitted outside of Restricted Periods for the Highway 17 Mainline:

(i) Stoppages less than two minutes' duration; and

(ii) Stoppages greater than two minutes' duration but less than 20 minutes' duration between 11:00 pm and 5:00 am only.

(b) After a Stoppage has been implemented and removed, Project Co shall allow all queues to clear before implementing another Stoppage.

3.5 Full Closures on Highway 17 Mainline

Subject to acceptance by the Province in accordance with the Consent Procedure, in exceptional situations (e.g. Bridge girder erection, demolition of existing Structures or sign gantry installation), the following directional Full Closures on the Highway 17 Mainline may be permitted on a site specific basis and under the following conditions:

(a) Full Closures shall be permitted only between 11:00 pm and 5:00 am.

(b) Where a Detour Route is provided, then a Full Closure may be permitted up to the entire duration of the period between 11:00 pm and 5:00 am.

(c) If a Detour Route is not provided, then any Full Closure otherwise permitted under this Section shall not exceed a duration of 20 minutes, at which time the vehicular queues must be cleared prior to the commencement of another Full Closure.

3.6 Non-Permitted Traffic Disruption Events on Highway 17 Mainline

Each of the following Traffic Disruption Events occurring on the Highway 17 Mainline is a Non-Permitted Traffic Disruption Event:

(a) a Lane Closure occurring on the Highway 17 Mainline;

(i) during a Restricted Period for the Highway 17 Mainline;

(ii) during a Special Event in contravention of Section 1.7 [Special Events] of this Part; or

(iii) in any other circumstances not expressly permitted pursuant to Section 3.3 [Lane Closures on Highway 17 Mainline] of this Part;

(b) a Full Closure occurring on the Highway 17 Mainline:

(i) during a Restricted Period for the Highway 17 Mainline;

(ii) during a Special Event in contravention of Section 1.7 [Special Events] of this Part; or

(iii) in any other circumstances not expressly permitted pursuant to Section 3.5 [Full Closures on Highway 17 Mainline] of this Part;

(c) a Stoppage occurring on an Other Provincial Highway in circumstances not expressly permitted pursuant to Section 3.4 [Stoppages on Other Provincial Highways] of this Part.

3.7 Detour Route and Lane Shift Design Criteria for Highway 17 Mainline

(a) Table 3.7 summarizes the minimum geometric design criteria that shall be incorporated into the Design of all Detour Routes and Lane Shifts on the Highway 17 Mainline.

Table 3.7

Construction Detour Route and Lane Shift Design Criteria – Highway 17 Mainline	
Design/Posted Speed	maintain existing posted speed
Design Vehicle	WB20
Maximum Grade	8%
Maximum Superelevation	6%
Minimum Radius	As per BC Supplement to TAC
Vertical Clearance	The lesser of 5.0 m or existing travel lane clearance
Lane Width	maintain existing lane widths (min)
Outside Paved Shoulder Width (Open)	2.0 m (min), including 0.5 m (min) gravel
Outside Paved Shoulder Width (Closed by Barrier)	2.5 m (min)
Inside Paved Shoulder Width (Closed by Barrier)	0.5 - 1.0m (min)
Side Slopes (w/o Barrier)	The lesser of 4: 1 (max) or existing

Note: Minimum Shoulder widths shall be permitted except where dictated otherwise by sight distance requirements, in which case widened Shoulder width in order to meet sight distance requirements shall be provided.

(b) Notwithstanding the above, localized sections (i.e. maximum 300 m length) along the Highway 17 Mainline with both reduced inside and outside Shoulder widths (i.e. minimum 0.5 m) may be permitted in order to accommodate Construction. Concrete roadside barriers shall be provided along both sides, complete with barrier flares, as required.

ARTICLE 4 RAMPS

4.1 General Requirements

(a) The requirements in this Article 4 are applicable to that portion of any entrance or exit ramps connecting Pattullo Mainline to Specified Roads or Highway 17 and any entrance or exit ramps connecting Highway 17 to Specified Roads (the "**Ramps**").

(b) All existing and new Ramp turning movements at each Ramp location shall be provided outside of Restricted Periods, unless otherwise accepted by the Province in accordance with the Consent Procedure.

(c) Temporary Works at on and off Ramps shall be designed to prevent queuing onto the Pattullo Mainline and the Highway 17 Mainline.

4.2 Restricted Periods for Ramps

Restricted Periods for Ramps are as follows:

Ramps	Weekdays	Saturday	Sunday
Ramps connecting Highway 17 with Specified Roads	5:00am – 10:00pm	7:00am – 10:00pm	7:00am – 10:00pm
Ramps connecting the Pattullo Mainline with Specified Roads or Highway 17	5:00am – 9:00pm	9:00am – 9:00pm	9:00am – 9:00pm

4.3 Lane Closures on Ramps

(a) All existing ramp turning movements, capacities and storage lengths at each location shall be maintained during Restricted Periods.

(b) Except in the circumstances in which Stoppages or Full Closures are permitted pursuant to Sections 4.4 [Stoppages on Ramps] and 4.5 [Full Closures on Ramps], respectively, of this Part, a minimum of one basic lane (excluding auxiliary lanes) on each Ramp shall be kept open for general traffic outside of Restricted Periods for Ramps.

4.4 Stoppages on Ramps

(a) Subject to acceptance by the Province in accordance with the Consent Procedure, the following Stoppages shall be permitted outside of Restricted Periods for Ramps:

(i) Stoppages less than two minutes' duration; and

(ii) Stoppages greater than two minutes' duration but less than 20 minutes' duration between 12:00 am and 4:00 am only.

(b) After a Stoppage has been implemented and removed, Project Co shall allow all queues to clear before implementing another Stoppage.

4.5 Full Closures on Ramps

Subject to acceptance by the Province in accordance with the Consent Procedure in exceptional situations (e.g. Bridge girder erection, demolition of existing Structures or sign gantry installation), the following directional Full Closures on Ramps may be permitted on a site specific basis and under the following conditions:

(a) Full Closures shall be permitted only between 11:00 pm and 5:00 am.

(b) Where a Detour Route is provided, then a Full Closure may be permitted up to the entire duration of the period.

(c) If a Detour Route is not provided, then any Full Closure otherwise permitted under this Section shall not exceed a duration of 20 minutes, at which time the vehicular queues must be cleared prior to the commencement of another Full Closure.

4.6 Non-Permitted Traffic Disruption Events on Ramps

Each of the following Traffic Disruption Events occurring on a Ramp is a Non-Permitted Traffic Disruption Event:

(a) a Lane Closure occurring on a Ramp:

(i) during a Restricted Period for Ramps;

(ii) during a Special Event in contravention of Section 1.7 [Special Events] of this Part; or

(iii) in any other circumstances not expressly permitted pursuant to Section 4.3 [Lane Closures on Ramps] of this Part;

(b) a Full Closure occurring on a Ramp:

(i) during a Restricted Period for Ramps;

(ii) during a Special Event in contravention of Section 1.7 [Special Events] of this Part; or

(iii) in any other circumstances not expressly permitted pursuant to Section 4.5 [Full Closures on Ramps] of this Part; or

(c) a Stoppage occurring on a Ramp in circumstances not expressly permitted pursuant to Section 4.4 [Stoppages on Ramps] of this Part.

4.7 Detour Route and Lane Shift Design Criteria for Ramps

Table 4.7 summarizes the minimum geometric design criteria that shall be incorporated into the Design of all Detour Routes and Lane Shifts for all Ramps.

Table 4.7

Construction Detour Routes and Lane Shift Design Criteria –Ramps	
Design/Posted Speed	40 km/h
Design Vehicle	WB20
Maximum Grade	8% or existing
Maximum Superelevation	6%
Minimum Radius	The lesser of 55 m or existing
Vertical Clearance	The lesser of 5.0 m or existing travel lane clearance

Construction Detour Routes and Lane Shift Design Criteria –Ramps	
Lane Width	4.5m (min) for one lane ramps
Lane Width	3.5m (min) for two lane ramps
Outside Paved Shoulder Width (Open)	1.0m (min) for one lane ramps
Outside Paved Shoulder Width (Open)	1.5m (min) for two lane ramps
Outside Paved Shoulder Width (Closed by Barrier)	1.5 m (min)
Inside Paved Shoulder Width (Closed by Barrier)	1.0m (min)
Inside Paved Shoulder Width (Open)	0.5m (min)
Side Slopes (w/o Barrier)	The lesser of 4:1 (max) or existing

Note: Minimum Shoulder widths shall be permitted except where dictated otherwise by sight distance requirements, in which case widened Shoulder width in order to meet sight distance requirements shall be provided.

ARTICLE 5 SPECIFIED ROADS

5.1 General Requirements

(a) The requirements in this Article 5 are applicable to McBride Boulevard, Royal Avenue, East Royal Avenue, East Columbia Street, Columbia Street, Front Street, Scott Road, Bridgeview Drive, Tannery Road, Old Yale Road and 128 Street (the "**Specified Roads**").

(b) The existing lane capacity and movements on McBride Boulevard south of Royal Avenue shall be maintained until the Ramp connection between the New Fraser River Bridge northbound and East Columbia eastbound is permanently open to traffic in the Final Design configuration.

5.2 Restricted Periods for Specified Roads

Restricted Periods for Specified Roads are as follows:

Road/Direction	**Weekdays**	**Saturday**	**Sunday**
All Specified Roads	5:00am – 10:00pm	7:00am – 10:00pm	7:00am – 10:00pm

5.3 Lane Closures on Specified Roads

(a) Except in circumstances in which Stoppages or Full Closures are permitted pursuant to Sections 5.4 [Stoppages on Specified Roads] and 5.5 [Full Closures on Specified Roads], respectively, of this Part, a minimum of one basic lane (excluding auxiliary lanes) in each direction shall be kept open for general traffic outside of Restricted Periods for Specified Roads.

(b) Single lane alternating traffic operations on Old Yale Road and Front Street may be permitted outside of Restricted Periods on a site specific basis following consultation with the relevant Municipality and subject to the prior acceptance of the Province in accordance with the Consent Procedure.

5.4 Stoppages on Specified Roads

(a) Subject to acceptance by the Province in accordance with the Consent Procedure, the following Stoppages may be permitted outside of Restricted Periods for Specified Roads:

(i) Stoppages of less than two minutes' duration; and

(ii) Stoppages of greater than two minutes' duration but less than 20 minutes' duration between 12:00 am and 5:00 am only.

(b) After a Stoppage has been implemented and removed, Project Co shall allow all queues to clear before implementing another Stoppage.

(c) The aforementioned requirements are not applicable to random minor interruptions in traffic (not greater than two minutes) which may need to occur from time to time, including during Restricted Periods for Specified Roads.

5.5 Full Closures on Specified Roads

Subject to acceptance by the Province in accordance with the Consent Procedure in exceptional situations (e.g. Bridge girder erection, demolition of existing Structures or sign gantry installation), the following directional Full Closures on Specified Roads may be permitted:

(a) on a site specific basis and under the following conditions:

(i) Full Closures shall be permitted only between 11:00 pm and 5:00 am;

(ii) where a Detour Route is provided, then the Full Closure may be permitted up to the entire duration of the hours between 11:00 pm and 5:00 am; and

(iii) if a Detour Route is not provided, then any Full Closure otherwise permitted under this Section shall not exceed a duration of 20 minutes, at which time the vehicular queues must be cleared prior to the commencement of another Full Closure; and

(b) three Full Closures on Front Street, between East Columbia and a point not greater than 100m west of the Existing Pattullo Bridge, may be permitted for a duration of up to six months for each Full Closure.

5.6 Non-Permitted Traffic Disruption Events on Specified Roads

Each of the following Traffic Disruption Events occurring on a Specified Road is a Non-Permitted Traffic Disruption Event:

(a) a Lane Closure occurring on a Specified Road;

(i) during a Restricted Period for Specified Roads;

(ii) during a Special Event in contravention of Section 1.7 [Special Events] of this Part; or

(iii) in any other circumstances not expressly permitted pursuant to Section 5.3 [Lane Closures on Specified Roads] of this Part;

(b) a Full Closure occurring on a Specified Road:

(i) during a Restricted Period for Specified Roads;

(ii) during a Special Event in contravention of Section 1.7 [Special Events] of this Part; or

(iii) in any other circumstances not expressly permitted pursuant to Section 5.5 [Full Closures on Specified Roads] of this Part; or

(c) a Stoppage occurring on a Specified Road and not expressly permitted pursuant to Section 5.4 [Stoppages on Specified Roads] of this Part.

5.7 Detour Route and Lane Shift Design Criteria for Specified Roads

Table 5.7 summarizes the minimum geometric design criteria that shall be incorporated into the Design of all Detour Routes and Lane Shifts for all Specified Roads.

Table 5.7

Construction Detour Route and Lane Shift Design Criteria - Specified Roads		
Design/Posted Speed	50 km/h or less	60 km/h
Design Vehicle	WB20	WB20
Maximum Grade	8% or existing	8% or existing
Maximum Superelevation	6%	6%
Minimum Radius	The lesser of 90 m or existing	The lesser of 130 m or existing
Vertical Clearance	The lesser of 5.0 m or existing travel lane clearance	The lesser of 5.0 m or existing travel lane clearance
Lane Width	maintain existing lane widths (min)	maintain existing lane widths (min)
Outside Paved Shoulder Width (Open)	1.0 m (min), including 0.5 (min) paved	2.0 m (min), including 0.5 m (min) paved
Outside Paved Shoulder Width (Closed by Barrier)	0.5 m (min) paved	1.0 m (min)
Inside Paved Shoulder Width (Closed by Barrier)	0.5 m (min) paved	0.5 m (min)
Side Slopes (w/o Barrier)	The lesser of 3:1 or existing	The lesser of 3:1 or existing
Pedestrian/cycle facilities	To match existing	To match existing

Note: Minimum Shoulder widths shall be permitted except where dictated otherwise by sight distance requirements, in which case, widened Shoulder width in order to meet sight distance requirements shall be provided.

ARTICLE 6 OTHER STREETS

6.1 General Requirements

(a) The requirements in this Article 7 are applicable to Granville Street, Dufferin Street, Coburg Street, Agnes Street, Albert Crescent, Hastings Street, Wellington Street, Leopold Place, Bushby Street, Blackberry Drive, Ross Drive, Memorial Drive, Francis Way, Timberland Road, Bridge Road, 111 Avenue, 111A Avenue, 112 Avenue, 112A Avenue, 128A Avenue, 124 Street, Musqueam Drive, Industrial Road, King George Fronting, and all other roads except private roads (the "**Other Streets**").

(b) Project Co shall provide advisory signage per direction of travel for each scheduled Stoppage having a duration greater than five minutes, Full Closure or Detour Route, and shall also provide signs to provide advance notification to the travelling public of all traffic pattern changes.

(c) For each scheduled Stoppage having a duration greater than five minutes or Full Closure, Project Co shall provide advance notification to the travelling public and other stakeholders of the scheduled Stoppage or Full Closure in accordance with Schedule 9 [Communication and Engagement].

(d) If the existing on-street parking (informal or official) on either side of 112 Avenue is proposed to be disrupted, Project Co shall operate and maintain a temporary parking lot that meets the following requirements:

(i) the temporary parking lot is within 400m walking distance to all commercial businesses on the east side of 112 Avenue, north of 124 Street;

(ii) the walking route between the temporary parking lot and commercial businesses shall be a minimum of 2 meters wide, paved, safe, free of obstructions and hazards, and suitable for all users;

(iii) the temporary parking lot shall be paved, well lit, and easily identifiable through the use of signage and wayfinding;

(iv) the temporary parking lot shall have a minimum of 70 parking stalls available to the public at no charge;

(v) Project Co shall manage the temporary parking lot and enforce parking restrictions consistent with City of Surrey street parking regulations; and

(vi) Project Co shall submit the Design for the parking lot with the associated Traffic Control Plan.

6.2 Restricted Periods for Other Streets

Restricted Periods for Other Streets are as follows:

Direction	Weekdays	Saturday	Sunday
All	7:00am – 9:00am 3:00pm – 6:00pm	None	None

6.3 Lane Closures on Other Streets

Single lane alternating traffic operations along Other Streets may be permitted outside of Restricted Periods on a site specific basis following consultation with the relevant Municipality and subject to the prior acceptance of the Province in accordance with the Consent Procedure.

6.4 Stoppages on Other Streets

(a) Subject to acceptance by the Province in accordance with the Consent Procedure, the following Stoppages may be permitted outside of Restricted Periods for Other Streets:

(i) Stoppages of less than five minutes' duration; and

(ii) Stoppages of greater than five minutes' duration but less than 20 minutes duration between 10:00 pm and 5:00 am only.

(b) After a Stoppage has been implemented and removed, Project Co shall allow all queues to clear before implementing another Stoppage.

(c) The aforementioned requirements are not applicable to random minor interruptions in traffic (i.e. not exceeding two minutes in duration in each case) which may need to occur from time to time, including during Restricted Periods for Other Streets.

6.5 Full Closures on Other Streets

(a) Full Closures of Other Streets are not permitted except with the prior acceptance of the Province pursuant to the Consent Procedure, provided that Project Co has first consulted with the relevant Municipality.

(b) Full Closures of both directions are not permitted on 112 Avenue. Where a Detour Route is provided on-site, then a Full Closure of the southbound travel lane may be permitted.

6.6 Non-Permitted Traffic Disruption Events on Other Streets

Each of the following Traffic Disruption Events occurring on an Other Street is a Non-Permitted Traffic Disruption Event:

(a) a Lane Closure during a Restricted Period for Other Streets; or

(b) a Stoppage not expressly permitted pursuant to Section 7.4 [Stoppages on Other Streets] of this Part; or

(c) a Full Closure occurring on an Other Street in circumstances not expressly permitted pursuant to Section 7.5 [Full Closures on Other Streets] of this Part.

6.7 Detour Route and Lane Shift Design Criteria for Other Streets

Table 6.7 provides the minimum geometric design criteria that shall be incorporated into the Design of all Detour Routes and Lane Shifts for Other Streets. If existing posted speeds are higher than those included in Table 6.7, then the 80km/h criteria contained in Table 6.7 shall apply.

Table 6.7

Construction Detour Route and Lane Shift Design Criteria – Other Streets		
Design/Posted Speed	50 km/h or less	60 km/h
Design Vehicle	WB20	WB20
Maximum Grade	10% or existing	8% or existing
Maximum Superelevation	6%	6%
Minimum Radius	The lesser of 90 m or existing	The lesser of 130 m or existing
Vertical Clearance	The lesser of 5.0 m or existing travel lane clearance	The lesser of 5.0 m or existing travel lane clearance
Lane Width	maintain existing lane widths (min)	maintain existing lane widths (min)
Outside Paved Shoulder Width (Open)	1.0m (min), including 0.5m (min) paved	2.0m (min), including 0.5m (min) paved
Outside Paved Shoulder Width (Closed by Barrier)	0.5 m (min) paved	1.0 m (min)
Inside Paved Shoulder Width (Closed by Barrier)	0.5 m (min) paved	1.0m (min)
Side Slopes (w/o Barrier)	The lesser of 3:1 or existing	The lesser of 3:1 or existing
Pedestrian/cycle facilities	To match existing	To match existing

Note: Minimum Shoulder widths shall be permitted except where dictated otherwise by sight distance requirements, in which case widened Shoulder width in order to meet sight distance requirements shall be provided.

ARTICLE 7 TRAFFIC MANAGEMENT PLAN

7.1 General Requirements

(a) Within 30 days following the Effective Date, Project Co shall submit an initial Traffic Management Plan to the Province's Representative pursuant to the Consent Procedure. Following the acceptance of the initial Traffic Management Plan by the Province's Representative in accordance with the Consent Procedure, Project Co shall submit all subsequent proposed changes to the Traffic Management Plan, including sub-plans, to the Province's Representative pursuant to the Consent Procedure.

(b) The Traffic Management Plan and all updates thereto shall be consistent with and comply with all of the requirements set forth in this Part and all other relevant provisions of this Agreement.

(c) Project Co's Traffic Management Plan shall reference and interface with Project Co's Traffic Quality Management Plan provided in accordance with Schedule 7 [Quality Management] and the Construction Communication Plan provided in accordance with Schedule 9 [Communication and Engagement].

(d) In addition to the requirements set out in Section 7.1(a) of this Part, Project Co shall not conduct any Construction that affects traffic without a current Traffic Management Plan that has also been accepted and sealed by Project Co's Traffic Engineer.

(e) This work has been assessed to be a Category 3 Project in accordance with the Traffic Management Manual. The Traffic Management Plan shall comply with the definitions and guidelines provided in the Traffic Management Manual.

(f) Project Co's Traffic Management Plan shall outline how general traffic, as well as the traffic generated by Project Work, is to be managed.

(g) Project Co's Traffic Management Plan shall include a parking management plan that provides the following details:

(i) how the requirements for Project Co staff and contractor parking will be implemented, managed and monitored; and

(ii) how impacts to public parking will be minimized.

(h) The following sub-plans for Project Co's Traffic Management Plan are required:

(i) Traffic Control Plans;

(ii) Emergency Response Plan;

(iii) Traffic Management Communications Plan, including an Advisory Signing Plan;

(iv) Implementation Plan; and

(v) Risk Assessment Plan.

(i) As part of the Traffic Management Plan, Project Co shall outline its approach to maintaining accurate records documenting traffic control measures, activities, and Incidents in accordance with the Traffic Management Manual.

(j) Starting on the Effective Date, Project Co shall provide to the Province a schedule of proposed Full Closures for the upcoming 12 months, Lane Closures for the upcoming three months and the schedule shall be updated and resubmitted to the Province on a monthly basis.

7.2 Traffic Management Sub-Plans

7.2.1 Traffic Control Plan

(a) Project Co shall prepare Project specific Traffic Control Plans in accordance with the Traffic Management Manual and other Reference Documents for all activities that affect traffic operations, including but not limited to:

(i) individual traffic management layouts;

(ii) all Construction that affects traffic;

(iii) activation of newly constructed Ramps, interchanges and Structures; and

(iv) any alteration to, cycling and pedestrian facilities, transit facilities, and on-street parking.

(b) Project Co is assigned responsibility for, and shall at all times make provision for, traffic to pass throughout the Project Site in accordance with this Part as well as ensuring the convenience and safety of the public, vehicular, cycling and pedestrian traffic, and the workers on the Project Site, and the protection of the Project Work.

(c) Any one or more of the advance warning areas, transition areas, buffer spaces, work areas and termination areas may be outside the Project Site, but this shall in no way diminish Project Co's responsibility to meet the requirements of this Part.

(d) Construction signs, specific to an operation, shall be either removed or effectively covered so that their message is obscured whenever such operation is not in progress.

(e) Further to the Category 3 Traffic Management Plan requirements in the Traffic Management Manual, Project Co shall conduct traffic analysis on the Traffic Control Plan for each stage of the Construction where traffic operations are affected. The traffic analysis shall determine the effect of each Traffic Control Plan on the roadway capacity and operation, including as a minimum the existing traffic capacity and operational conditions and the resulting vehicle delays and queue lengths. The traffic analysis shall confirm that the resulting delays and queues and other impacts are acceptable and are expected to clear before the commencement of a Restricted Period. The traffic analysis shall be conducted for proposed design speed and the representative hour(s) and day(s) that each Traffic Control Plan is in operation. Traffic analysis shall be included in the Traffic Control Plan submission.

(f) Project Co shall be responsible for including Construction generated traffic data in the Traffic Control Plan and any associated analysis.

(g) Project Co shall continuously monitor and measure the effectiveness of Traffic Control Plans and, if those observations and measurements indicate a Traffic Control Plan is not functioning as intended or is non-compliant, Project Co shall immediately adjust the Traffic Control Plan to bring it into compliance.

(h) The Traffic Control Plan shall include engineered designs for each Stoppage, Full Closure, Detour Route, Lane Shift, Lane Closure, modification of existing traffic signals and

implementation of temporary traffic signals. The locations and details of all signs, PDMS, Pavement Markings, barriers, and protective works shall be provided on the drawings. All drawings are to be signed/sealed by the Traffic Engineer.

(i) The Traffic Control Plans shall take into account the locations of active Construction zones which are adjacent or in proximity to the areas which are subjected to such Traffic Control Plans.

(j) Where applicable, Project Co shall make provision for Project Co parking and construction related storage areas for equipment and materials in its development of the Traffic Control Plans.

(k) The Traffic Control Plans and traffic analysis shall consider regional traffic, planned works by others on Highway 17, Specified Roads, Other Streets, other Fraser River crossings and other roads in the region.

(l) Storage lengths at existing signalized intersections shall not be reduced unless traffic analysis confirms acceptable operation.

(m) Acceleration/deceleration lane lengths shall not be reduced unless traffic analysis confirms acceptable operation.

7.2.2 Emergency Response Plan

(a) Project Co shall prepare and submit an Emergency Response Plan meeting the Incident Response Plan requirements of the Traffic Management Manual.

(b) The Emergency Response Plan shall specify how Project Co will provide access for emergency vehicles and provide assistance to Emergency Response personnel.

(c) The Emergency Response Plan shall also address access via the Project Site for Incidents or emergencies external to the Project Site but for which emergency vehicles and response personnel require passage over the Project Site.

(d) Project Co shall consult with first responders in developing the Emergency Response Plan, and liaise closely with them throughout Construction.

7.2.3 Traffic Management Communications Plan

(a) Project Co shall prepare and submit a Traffic Management Communications Plan meeting the requirements of Schedule 9 [Communication and Engagement] and the Public Information Plan requirements of the Traffic Management Manual.

(b) Project Co shall ensure that the Traffic Management Communications Plan defines a process to routinely notify the Province's Representative, the Relevant Authorities, TransLink, emergency response agencies, traffic media, adjacent property owners, and the travelling public, including pedestrians and cyclists, of any scheduled or unscheduled activities affecting traffic.

(c) As part of the Traffic Management Communications Plan, Project Co shall prepare and implement an Advisory Signing Plan for all Construction that affects traffic, including:

(i) each Construction stage;

(ii) activation of newly constructed roads, intersections, ramps and Structures;

(iii) adjustments to on-street parking;

(iv) adjustments to any accesses; and

(v) any other construction activity that affects the expected traffic pattern or times to travel routes within the Project Site;

(d) The Advisory Signing Plan shall set out a strategy to notify the travelling public in advance of the scheduled Construction, Detour Routes, Full Closures, Stoppages, Lane Closures, and any changes to pedestrian, cycling, transit, access or parking operations.

(e) Project Co shall ensure that each Advisory Signing Plan is signed/sealed by the Traffic Engineer.

7.2.4 Implementation Plan

Project Co shall prepare and submit an Implementation Plan in accordance with the Traffic Management Manual. This plan shall identify the Traffic Control Supervisor, Traffic Engineer and Traffic Manager, along with the qualifications and experience of those named individuals. This plan shall also define processes to ensure that the Traffic Control Plans and Emergency Response Plans are developed and implemented efficiently and appropriately, and that they are kept up-to-date with necessary modifications during Construction.

7.2.5 Risk Assessment Plan

Project Co shall perform an independent assessment to identify any risks or special conditions that must be addressed through Project Co's Risk Assessment Plan. Project Co shall identify all risks and state the measures to be implemented to manage or eliminate the risks, including identifying all risks relating to Construction that affect traffic and measures to be implemented to manage or eliminate such risks.

ARTICLE 8 RESPONSIBILITIES FOR TRAFFIC MANAGEMENT PLAN

8.1 Project Co Responsibilities

Project Co shall accept full responsibility for quality control and quality assurance of all activities affecting the Traffic Management Plan. The Traffic Management Plan quality control process shall be included in the Traffic Quality Management Plan. Project Co shall ensure that all personnel identified in the Traffic Management Plan are suitably qualified and licensed.

8.2 Traffic Manager

(a) Project Co shall designate a Traffic Manager who shall be responsible for the following:

(i) developing, implementing and managing the Traffic Management Plan;

(ii) ensuring the Province is kept informed of all upcoming traffic activities and any revisions to the Traffic Management Plan;

(iii) ensuring that appropriate modifications are made to the Traffic Management Plan if the specified traffic control measures are not achieving the desired effect; and

(iv) coordinating with adjacent work areas, including work being carried out by others.

(b) The Traffic Manager shall be a Key Individual subject to the requirements of Section 3.3(c) of Schedule 2 [Representatives, Review Procedure and Consent Procedure] and shall have the following experience:

(i) directly overseeing Traffic Management for complex transportation projects;

(ii) managing and coordinating Traffic Management on projects of comparable scope, scale and complexity to the Project; and

(iii) leading Traffic Management teams on complex transportation projects in a highway and urban environment.

8.3 Traffic Engineer

(a) Project Co shall designate a Professional Engineer as the Traffic Engineer, who has Project Co's authority to review and seal the Traffic Management Plan and associated sub-plans and take responsibility for ensuring that all traffic engineering issues and requirements are taken into account.

(b) The Traffic Engineer shall sign and seal all traffic engineering checklists and signal timing sheets.

(c) The Traffic Engineer shall have experience in developing Traffic Management Plans and Traffic Control Plans for projects in urban and highway environments of comparable complexity to the Project.

8.4 Traffic Control Supervisors

(a) Project Co shall designate one or more Traffic Control Supervisors, each of whom shall have Project Co's authority to respond to traffic control requirements and each of whom shall personally perform all the duties of the Traffic Control Supervisor, in accordance with this Part. Traffic Control supervisors shall have experience in similar roles on projects in urban and highway environments of comparable complexity to the Project.

(b) Further to Section 194.04 of the DBSS, a Traffic Control Supervisor shall be on the Project Site full-time when active Construction is underway. The Traffic Control Supervisor shall have direct line authority over all of Project Co's traffic control personnel and procedures on the Project Site. Project Co shall not designate the Site Superintendent as the Traffic Control Supervisor. The Traffic Control Supervisor shall have no other duties. Where active

Construction occurs simultaneously on both sides of the Fraser River, a minimum of one Traffic Control Supervisor for each side shall be stationed on the Project Site.

(c) The duties of the Traffic Control Supervisor shall include but not be limited to the following:

(i) Directing all traffic control operations on the Project Site and coordinating with other contractors for any adjacent construction or maintenance operation;

(ii) Liaising with the Province's Representative, as required;

(iii) Recording the actual duration of Lane Closures, Stoppages, Full Closures, Detour Routes and Lane Shifts and unauthorized traffic delays and forwarding this information, on a daily basis, to the Province for information;

(iv) Monitoring queue lengths and delays in active Construction zones and implementing appropriate measures when such queues or delays become excessive;

(v) Documenting Traffic Control measures and activities in accordance with this Part; and

(vi) Overseeing all requirements of the Agreement that contribute to the convenience, safety, and orderly movement of vehicular, cycling, pedestrian and equestrian traffic.

(d) Traffic control supervision shall be provided by the Traffic Control Supervisor on the Project Site on a 24 hours per day basis when active Construction is underway. During non-work periods, the Traffic Control Supervisor or accepted alternate shall be on the Project Site within 45 minutes of being notified. The Traffic Control Supervisor shall have appropriate personnel and equipment available on call, at all times.

8.5 Traffic Control Personnel

All traffic control personnel shall be qualified in accordance with Health and Safety Laws.

8.6 Temporary Traffic Control On-site Road Safety Audits

Temporary Traffic Control [Design and On-site] Road Safety Audits shall be carried out in accordance with Article 13 [Road Safety Audit] of Part 2 of this Schedule.

APPENDIX A
FORM OF INDEPENDENT CERTIFIER CONTRACT

THIS CONTRACT is made as of the _____ day of _____, 2020.

AMONG:

HER MAJESTY THE QUEEN IN RIGHT OF THE PROVINCE OF BRITISH COLUMBIA, as represented by the **MINISTER OF TRANSPORTATION AND INFRASTRUCTURE**

(the "**Province**")

AND:

FRASER CROSSING PROJECT CORPORATION

(the "**Project Co**")

AND:

[INDEPENDENT CERTIFIER]

(the "**Independent Certifier**")

WHEREAS:

A. The Province and Project Co (being herein collectively and individually referred to as the "**PA Parties**") have entered into the Project Agreement.

B. Pursuant to the terms of the Project Agreement, the PA Parties wish to appoint the Independent Certifier, and the Independent Certifier wishes to accept such appointment, to perform certain services in connection with the Project Agreement.

C. The PA Parties and the Independent Certifier wish to enter into this Contract in order to record the terms upon which the Independent Certifier shall perform such services.

NOW THEREFORE in consideration of the mutual promises and agreements of the PA Parties and the Independent Certifier herein expressed and for other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the PA Parties and the Independent Certifier covenant and agree as follows:

1. DEFINITIONS AND INTERPRETATION

1.1 Definitions

In this Contract including the recitals and Attachments, unless the context indicates a contrary intention, terms which are defined in Schedule 1 to the Project Agreement (and not otherwise defined in this Contract) shall have the meanings given to them in Schedule 1 to the Project Agreement, and the following terms shall have the following meanings:

(a) "**PA Parties**" has the meaning given in Recital A hereto.

(b) "**Project Agreement**" means the agreement entitled "Project Agreement" made between the Province, BC Transportation Financing Authority and Project Co and dated as of February 7, 2020, as the same may be amended or replaced from time to time.

(c) "**Contract**" means this Contract, as the same may be amended, supplemented or replaced from time to time.

(d) "**Contract Material**" means all material:

(i) provided to the Independent Certifier or created or required to be created by any PA Party pursuant to this Contract or the Project Agreement; and

(ii) provided by or created or required to be created by the Independent Certifier as part of, or for the purpose of, performing the Functions,

including documents, equipment, reports, technical information, plans, charts, drawings, calculations, tables, schedules and data (stored and recorded by any means).

(e) "**Fee**" means the fees payable by the PA Parties to the Independent Certifier for the Functions, as such fees are specified and made payable in Attachment 2 to this Contract.

(f) "**Functions**" means:

(i) the signing of the SC1 Final Deficiency List, SC2 Final Deficiency List and SC3 Final Deficiency List;

(ii) the issuance of the Relevant Certificates;

(iii) all of the functions and obligations conferred on and to be performed by the Independent Certifier under the Project Agreement in connection with the signing of the SC1 Final Deficiency List, the SC2 Final Deficiency List and the SC3 Final Deficiency List and the issuance of the Relevant Certificates;

(iv) all of the functions and obligations conferred on and to be performed by the Independent Certifier under this Contract in connection with the signing of the SC1 Final Deficiency List, SC2 Final Deficiency List, SC3 Final Deficiency List and the issuance of the Relevant Certificates, including the functions described in Attachment 1 to this Contract; and

(v) all other things or tasks which the Independent Certifier must do to comply with its obligations and discharge it duties under this Contract and to comply with the obligations and discharge the duties of the Independent Certifier under the Project Agreement in connection with the signing of the SC1 Final Deficiency List, SC2 Final Deficiency List, SC3 Final Deficiency List and the issuance of the Relevant Certificates.

(g) "**Functions Variation**" means any change to the Functions.

(h) "**Relevant Certificates**" means:

(i) the Certificate of Substantial Completion in respect of the Primary Infrastructure Components;

(ii) the Certificate of Substantial Completion in respect of the Completion Components;

(iii) the Certificate of Substantial Completion in respect of the Bridge Demolition; and

(iv) the Certificate of Total Completion.

1.2 Interpretation

This Contract shall be interpreted according to the following provisions, save to the extent that the context or the express provisions of this Contract otherwise require:

(a) The parties waive the application of any rule of law which otherwise would be applicable in connection with the construction of this Contract that ambiguous or conflicting terms or provisions should be construed against the party who (or whose counsel) prepared the executed agreement or any earlier draft of the same, or against the party benefiting from such terms or provisions.

(b) The table of contents, headings and sub-headings, and references to them, in this Contract, are for convenience of reference only, do not constitute a part of this Contract, and will not be taken into consideration in the interpretation or construction of, or affect the meaning of, this Contract.

(c) All references to Articles, Sections, subsections, paragraphs and Attachments are references to the relevant Articles, Sections, subsections, paragraphs and Attachments of this Contract unless reference is made to another agreement. Without limiting the generality of the foregoing, reference in this Contract, or in an Attachment of this Contract, to an Article or Section refers to the applicable Article or Section in this Contract (excluding the Attachments), unless reference to an Article or Section of a particular Attachment of this Contract is indicated.

(d) The words "**herein**", "**hereof**" and "**hereunder**" and other words of similar import refer to this Contract as a whole and not to any particular Article, Section, subsection or Attachment of this Contract.

(e) Unless a reference to a statute is expressly limited to a statute in effect at a particular time, references to any statute or statutory provision (including any subordinate legislation) include any statute or statutory provision which amends, extends, consolidates or replaces the same or which has been amended, extended, consolidated or replaced by the same and include any orders, regulations, bylaws, ordinances, orders, codes of practice, instruments or other subordinate legislation made under the relevant statute.

(f) Words importing the singular include the plural and vice versa.

(g) Words importing a particular gender include all genders.

(h) Any reference to a corporate entity includes and is also a reference to any corporate entity that is a successor to such entity.

(i) All monetary amounts are expressed in Canadian dollars and all amounts to be calculated and paid pursuant to this Contract are to be calculated and paid in Canadian dollars.

(j) Any requirement for any thing or action to be "in accordance with" or "in compliance with" any standard, code or specification or other requirement or stipulation means that such thing or action is to exceed or at least equal that standard, code, specification or other requirement or stipulation.

(k) The words "**include**", "**includes**" or "**including**" are to be construed as meaning "include without limitation", "includes without limitation" and "including without limitation", respectively, and the words following "include", "includes" and "including" shall not be considered to set forth an exhaustive list.

(l) General words are not given a restrictive meaning:

(A) if they are introduced by the word "other", by reason of the fact that they are preceded by words indicating a particular class of act, matter or thing; or

(B) by reason of the fact that they are followed by particular examples intended to be embraced by those general words.

(m) Unless otherwise defined in this Contract, words or abbreviations which have well-known trade meanings are used in accordance with those meanings.

(n) All accounting and financial terms used herein are, unless otherwise indicated, to be interpreted and applied in accordance with GAAP, consistently applied.

(o) No provision of this Contract is intended to derogate from or be inconsistent with or in conflict with any Laws and should not be interpreted in a manner as to result in any derogation, inconsistency or conflict and, if any such provision is found by a court of competent jurisdiction to be inconsistent with or in conflict with any Laws, the applicable Laws will prevail and such provision will be read down or rendered inoperative (either generally or in such particular situation, as appropriate), to the extent of such conflict or inconsistency, as the case may be and, if any such provision is found by a court of competent jurisdiction to derogate from any Laws, then such provision will be read down or rendered inoperative (either generally or in such particular situation, as appropriate) to the extent of the derogation.

1.3 Obligations and Exercise of Rights by PA Parties

(a) All obligations of the PA Parties under this Contract are and shall be several and not joint or joint and several.

(b) Except as specifically provided for in this Contract, including pursuant to Section 9.5 of this Contract, the rights of the PA Parties under this Contract shall be jointly exercised by the PA Parties.

2. ROLE OF THE INDEPENDENT CERTIFIER

2.1 Engagement

The PA Parties hereby appoint the Independent Certifier, and the Independent Certifier hereby accepts such appointment, to carry out the Functions in accordance with this Contract and the provisions of the Project Agreement. The Independent Certifier shall perform the Functions in accordance with this Contract and the provisions of the Project Agreement.

2.2 Qualifications and Standard of Skill, Care and Diligence

The Independent Certifier represents and warrants to the PA Parties that:

(a) it has and shall continue to have all requisite professional qualifications, skill, knowledge and expertise;

(b) it holds and shall continue to hold all requisite permits, licences, consents and authorizations; and

(c) it has and shall continue to have all requisite expertise, qualifications, facilities, materials and equipment in addition to those referred to in paragraphs (a) and (b) above,

required to undertake and perform the Functions and its obligations under this Contract in accordance with the terms of this Contract and the Project Agreement. The Independent Certifier shall exercise and ensure that all of its staff members engaged in the performance of the Functions exercise the standard of skill, care and diligence in the performance of the Functions that would be expected of an expert professional experienced in providing services in the nature of the Functions for projects similar to the Project.

2.3 Duty of Independent Judgement

(a) In performing the Functions, the Independent Certifier must:

(i) act fully, impartially, honestly and independently in representing the interests of both PA Parties in accordance with the terms of the Project Agreement and this Contract;

(ii) act reasonably and to the highest professional standards and in accordance with all Laws;

(iii) act in a timely manner:

(A) in accordance with the times prescribed in this Contract and in the Project Agreement; or

(B) where no times are prescribed, within a reasonable time so as to enable the PA Parties to exercise their respective rights and perform their respective obligations under the Project Agreement; and

(iv) act in accordance with the joint directions of the PA Parties provided that the directions are not inconsistent with the other terms of this Contract or the terms of the Project Agreement and do not vary or prejudice the Independent Certifier's authority or responsibilities or the exercise by the Independent Certifier of its professional judgement under this Contract.

(b) Although the Independent Certifier may take account of any opinions or representations made by the PA Parties, the Independent Certifier shall not be bound to comply with any opinions or representations made by either of them in connection with any matter on which the Independent Certifier is required to exercise its professional judgement.

(c) The Independent Certifier acknowledges that the PA Parties may rely on the Functions, including determinations, findings and certifications made by the Independent Certifier, and accordingly the Independent Certifier.

2.4 Authority to Act

The Independent Certifier:

(a) is an independent consultant and is not, and must not purport to be, a partner, joint venturer or agent of any PA Party;

(b) has no authority to give any directions to a PA Party or its officers, directors, members, employees, contractors, consultants or agents; and

(c) has no authority to waive or alter any terms of the Project Agreement, nor to discharge or release a party from any of its obligations under the Project Agreement.

2.5 Knowledge of the PA Parties' Requirements

The Independent Certifier represents and warrants to the PA Parties that:

(a) it has reviewed the Project Agreement and informed and shall be deemed to have informed itself fully of the requirements of the Project Agreement as they relate to the performance of the Functions and as to the nature of the Project Work provided for under the Project Agreement;

(b) it shall inform itself fully of, and shall be deemed to have informed itself fully of, the requirements of all Contract Material as may become relevant from time to time to the performance of the Functions;

(c) without limiting Sections 2.5(a) to 2.5(c), inclusive, of this Contract, it has and shall be deemed to have informed itself fully of all time limits and other requirements for the

performance of any Function which the Independent Certifier is required to carry out under the Project Agreement and this Contract;

(d) it has and shall be deemed to have informed itself fully of the work necessary for the performance of the Functions and the means of access to, communication with and facilities at the Project Site including restrictions on any such access or protocols that are required; and

(e) it has satisfied itself as to the correctness and sufficiency of its proposal for the Functions and that the Fee covers the cost of complying with all of the obligations under this Contract and of all matters and things necessary for the due and proper performance and completion of the Functions.

2.6 Co-ordination and Information by Independent Certifier

The Independent Certifier must:

(a) fully co-operate in good faith with the PA Parties;

(b) carefully co-ordinate the Functions with the work and services performed by the PA Parties;

(c) without limiting its obligations under Sections 2.3 and 2.6 of this Contract, perform the Functions so as to avoid unreasonably interfering with, disrupting or delaying the work and services being performed by the PA Parties; and

(d) provide copies to all PA Parties of all reports, communications, certificates and other documentation that it provides to any PA Party.

2.7 Ability to Fulfill Terms of Contract; Conflict of Interest

The Independent Certifier represents and warrants to the PA Parties that:

(a) it has no knowledge of any fact, circumstance or condition that adversely affects or, so far as it can foresee, might adversely affect its ability to perform the Functions in accordance with and to fulfill the terms of this Contract; and

(b) at the date of signing of this Contract, no actual or perceived conflict of interest exists or is likely to arise in the performance of the Functions or any of its other obligations under this Contract.

The Independent Certifier shall not (and shall at all time have and maintain in place practices and procedures to ensure that it does not) perform services for or provide advice to any other person or engage in any other activity that may or does give rise to any actual or perceived conflict of interest in the performance of the Functions or any of its other obligations under this Contract. Without prejudice to the foregoing, if during the term of this Contract any such actual or perceived conflict or risk of actual or perceived conflict of interest arises, the Independent Certifier shall notify the PA Parties immediately in writing of that conflict or risk of conflict including full particulars of all relevant facts and circumstances with respect thereto and,

without limiting any other rights or remedies of the PA Parties, shall forthwith provide each of the PA Parties with such further information relating thereto as it may request and take such steps as may be required by each of the PA Parties to avoid or mitigate that conflict or risk.

2.8 Independent Certifier Personnel

(a) The Independent Certifier represents and warrants to the PA Parties that it has and shall continue to have expert and professional staff who are competent, experienced and qualified to perform, and who hold all requisite licences and other professional qualifications necessary to perform, the Functions in accordance with the terms of this Contract and the Project Agreement.

(b) Subject to Section 2.7 of this Contract, the Independent Certifier shall use the partners, directors or employees described in Attachment 3 hereof in connection with the performance of the Functions and such persons' services shall be available for so long as may be necessary to ensure the proper performance by the Independent Certifier of the Functions. Such persons shall have full authority to act on behalf of and bind the Independent Certifier for all purposes in connection with this Contract.

(c) None of the persons listed in Attachment 3 shall be removed or replaced unless he/she ceases to work as a partner in or director or employee of the Independent Certifier due to circumstances beyond the control of the Independent Certifier or he/she is unable to work because of death or illness. The Independent Certifier shall notify the PA Parties of any such circumstances and shall be responsible for finding a replacement who shall previously have been approved in writing by the PA Parties.

3. ROLE OF THE PA PARTIES

3.1 Cooperation

The PA Parties shall co-operate with and provide reasonable assistance to the Independent Certifier to enable the Independent Certifier to carry out its obligations under this Contract.

3.2 Instructions in Writing

All instructions to the Independent Certifier by the PA Parties shall be given in writing jointly signed by the PA Parties. Such written instructions shall be valid if jointly signed by the Province's Representative and Project Co's Representative.

3.3 Information and Services

Each of the PA Parties shall make available to the Independent Certifier, as soon as practicable from time to time, all information, documents and particulars necessary for the Independent Certifier to carry out the Functions, including such information, documents and particulars required in order for the Independent Certifier to determine whether the SC1 Final Deficiency List, SC2 Final Deficiency List and SC3 Final Deficiency List is correct and whether Substantial Completion of the Primary Infrastructure Components, the Completion Components and the Bridge Demolition, and Total Completion, or any other component thereof, has occurred, and shall provide copies of all such information, documents and particulars provided

by it to the Independent Certifier to the other PA Party. Each PA Party hereby consents to the other PA Party disclosing to the Independent Certifier any Confidential Information in connection with or for the purpose of enabling the Independent Certifier to carry out the Functions (which Confidential Information disclosed to the Independent Certifier shall, for greater certainty, form part of the Contract Material).

3.4 Additional Information

If any information, documents or particulars are reasonably required to enable the Independent Certifier to perform the Functions and have not been provided by the PA Parties, then:

(a) the Independent Certifier must give notice in writing to Project Co's Representative and the Province's Representative of the details of the information, documents or particulars demonstrating the need and the reasons why they are required; and

(b) Project Co must arrange, at its own cost, the provision of the required information, documents or particulars, unless such information, documents or particulars is not in Project Co's possession but is in the Province's possession, in which case it will be provided by the Province.

3.5 Right to Enter and Inspect

Upon giving reasonable notice to the Province's Representative and Project Co's Representative, the Independent Certifier (and any person authorized by it) may enter upon and inspect the Project Work, the Project Site or any part or parts thereof at any reasonable time in connection with the exercise or performance or proposed exercise or performance of rights or obligations under this Contract, subject to:

(a) observance of the reasonable rules of Project Co as to safety and security for the Project Work and the Project Site;

(b) not causing unreasonable delay to the carrying out of the Project Work by reason of its presence at the Project Site; and

(c) not causing any damage to the Project Work or the Project Site.

3.6 PA Parties Not Relieved

Neither PA Party shall be relieved from performing or observing its obligations, or from any other liabilities, under the Project Agreement as a result of either the appointment of, or any act or omission by, the Independent Certifier.

3.7 PA Parties Not Liable

On no account shall either PA Party be liable to the other PA Party for any act or omission of the Independent Certifier whether under or purportedly under a provision of the Project Agreement, this Contract or otherwise, provided that any such act or omission shall not extinguish, relieve, limit or qualify the nature or extent of any right or remedy of either PA Party against, or any obligation or liability of either PA Party to, the other PA Party which would have existed regardless of such act or omission.

4. QUALITY

4.1 Quality Project Plan

The Independent Certifier must:

(a) develop and implement a quality project plan identifying the processes and outcomes of the Functions that complies with all requirements of the Independent Certifier's quality assurance accreditation, and is otherwise satisfactory to each of the Province's Representative and Project Co's Representative;

(b) within 14 days after the date of this Contract, provide such quality project plan to each of the Province's Representative and Project Co's Representative;

(c) provided it is satisfactory to each of the Province's Representative and Project Co's Representative, implement such quality project plan; and

(d) if such quality project plan is not satisfactory to either the Province's Representative or Project Co's Representative, within 7 days after receiving notice thereof from either PA Party to that effect, revise and resubmit the quality project plan to each of the Province's Representative and Project Co's Representative, and, once it is satisfactory to each of the Province's Representative and Project Co's Representative, implement such quality project plan as so revised.

4.2 Quality Project Plan Not to Relieve Independent Certifier

The Independent Certifier shall not be relieved of any responsibilities or obligations in respect of the performance of the Functions and shall remain solely responsible for them notwithstanding:

(a) the obligation of the Independent Certifier to develop and implement a quality project plan; or

(b) any comment or direction upon, review or acceptance of, approval to proceed with or request to vary any part of the quality project plan by either the Province's Representative or Project Co's Representative.

5. SUSPENSION

5.1 Notice by PA Parties

The Functions (or any part thereof) may be suspended at any time by the PA Parties:

(a) if the Independent Certifier fails to comply with its obligations under this Contract, immediately by the PA Parties giving joint notice in writing to the Independent Certifier; or

(b) in any other case, by the PA Parties giving seven days' joint notice in writing to the Independent Certifier.

5.2 Notice by Independent Certifier

The Functions (or any part thereof) may be suspended at any time by the Independent Certifier if one, or other, of the PA Parties fails to comply with its obligations under this Contract, immediately by the Independent Certifier giving notice in writing to each of the PA Parties.

5.3 Costs of Suspension

The Independent Certifier shall:

(a) subject to the Independent Certifier complying with Section 8.1 of this Contract, be entitled to recover the extra costs incurred by the Independent Certifier by reason of a suspension directed under Section 5.1(b) of this Contract valued as a Functions Variation under Sections 8.1 and 8.2 of this Contract; and

(b) have no entitlement to be paid any costs, expenses, losses or damages arising from a suspension under Section 5.1(a) of this Contract.

5.4 Recommencement

The Independent Certifier must recommence the carrying out of the Functions (or any part thereof) as soon as practicable following the receipt of a joint written notice from the PA Parties requiring it to do so.

6. INSURANCE AND LIABILITY

6.1 Independent Certifier's Professional Indemnity Insurance

The Independent Certifier must have and maintain in place:

(a) professional errors and omissions insurance:

(i) in the amount of per claim and in the aggregate, a deductible of not more than per claim and from an insurer and on terms satisfactory to each of the PA Parties;

(ii) with a term and extended reporting period from the date of this Contract until the expiration of from the cessation of the Functions; and

(iii) covering liability which the Independent Certifier might incur as a result of a breach by it of its obligations or any breach of a duty owed by the Independent Certifier in a professional capacity to the PA Parties, or either of them, under or in connection with this Contract or the provision of the Functions; and

(b) comprehensive general liability insurance in the amount of per claim and in the aggregate, no deductible for personal injury or bodily injury, a deductible of not more than per occurrence for property damage, and from an insurer and on terms and conditions satisfactory to each of the PA Parties;

(c) if any licensed vehicles are owned, leased, rented or used in the performance of this contract, then Automobile Liability coverage with inclusive limits of not less than $2 million providing third party liability and accident benefits insurance must be provided for all these vehicles.

The Independent Certifier must provide copies of its insurance policies and renewals to each of the PA Parties (or as either of them may direct) upon request.

6.2 Workers Compensation Insurance

The Independent Certifier must, at its own cost, insure its liability (including its common law liability) as required under any applicable workers compensation statute or regulation in relation to its employees engaged in the performance of the Functions.

7. PAYMENT FOR SERVICES

7.1 The Fee

(a) In consideration of the Independent Certifier performing the Functions in accordance with this Contract, the PA Parties shall pay the Independent Certifier the Fee.

(b) The Fee includes all taxes (except for GST), disbursements and expenses (including accommodation, car hire, equipment and travel expenses), overheads and profit to perform the Functions.

7.2 Payment of Fee

The PA Parties shall each pay one-half of the Fee to the Independent Certifier in accordance with the payment schedule specified in Attachment 2. The obligation of each PA Party to pay its one-half of the Fee to the Independent Certifier is a several obligation and not subject to joint or joint and several liability, and neither PA Party shall have any liability whatsoever for the non-payment by the other PA Party of any fees or costs payable by such other PA Party under this Contract. Failure of either or both PA Parties to pay its one-half of the Fee or costs to the Independent Certifier in accordance with its obligations under the Contract shall entitle the Independent Certifier to suspend work and ultimately to terminate the Contract.

7.3 Appropriation

The Independent Certifier acknowledges that it is aware of the provisions of subsection 28(2) of the *Financial Administration Act* (British Columbia).

8. FUNCTIONS VARIATIONS

8.1 Notice of Functions Variation

If the Independent Certifier believes, other than in the case of a "**Functions Variation Order**" under Section 8.3 of this Contract, that any direction by the PA Parties constitutes or involves a Functions Variation, it must:

(a) within 7 days after receiving the direction and before commencing work on the subject matter of the direction, give notice to the PA Parties that it considers the direction constitutes or involves a Functions Variation; and

(b) within 21 days after giving the notice under Section 8.1(a) of this Contract, submit a written claim to each of the Province's Representative and Project Co's Representative which includes detailed particulars of the claim, the amount of the claim and how it was calculated.

Regardless of whether the Independent Certifier considers that such a direction constitutes or involves a Functions Variation, the Independent Certifier must continue to perform the Functions in accordance with this Contract and all directions, including any direction in respect of which notice has been given under this Section.

8.2 No Adjustment

If the Independent Certifier fails to comply with Section 8.1 of this Contract, the Fee shall not be adjusted as a result of the relevant direction.

8.3 Functions Variation Procedure

(a) The Province's Representative and Project Co's Representative may jointly issue a document titled "**Functions Variation Price Request**" to the Independent Certifier which shall set out details of a proposed Functions Variation which the PA Parties are considering.

(b) Within 7 days after the receipt of a Functions Variation Price Request pursuant to Section 8.3(a) of this Contract, the Independent Certifier must provide each of the Province's Representative and Project Co's Representative with a written notice in which the Independent Certifier sets out the effect which the proposed Functions Variation will have on the Fee.

(c) Each of the Province's Representative and Project Co's Representative may then jointly direct the Independent Certifier to carry out a Functions Variation by a written document titled "**Functions Variation Order**" which shall state either that:

(i) the Fee is adjusted as set out in the Independent Certifier's notice; or

(ii) the adjustment (if any) to the Fee shall be determined under Section 8.4 of this Contract.

8.4 Cost of Functions Variation

Subject to Section 8.2 of this Contract, the Fee shall be adjusted for all Functions Variations or suspensions under Section 5.1(b) of this Contract carried out by the Independent Certifier by:

(a) the amount (if any) stated in the "**Functions Variation Order**" in accordance with Section 8.3(c)(i) of this Contract;

(b) if Section 8.4(a) of this Contract is not applicable, an amount determined pursuant to the fee schedule for Functions Variations in Attachment 2 to this Contract; or

(c) where such rates or prices are not applicable, a reasonable amount to be agreed between the PA Parties and the Independent Certifier or, failing agreement, determined in accordance with the Dispute Resolution Procedure under the Project Agreement.

Any reductions in the Fee shall be calculated on the same basis as any increases.

9. TERM AND TERMINATION

9.1 Term

Subject to earlier termination, this Contract shall commence on • **[NTD: Insert Commencement Date]** and continue in full force until:

(a) 60 days after the Total Completion Date; or

(b) such later date as may be mutually agreed between the PA Parties and the Independent Certifier.

9.2 Notice of Breach

If the Independent Certifier commits a breach of this Contract, the PA Parties may give written notice to the Independent Certifier:

(a) specifying the breach; and

(b) directing its rectification in the period specified in the notice being a period not less than 7 days from the date of service of the notice.

9.3 Termination for Breach

If the Independent Certifier fails to rectify the breach within the period specified in the notice issued under Section 9.2(b) of this Contract, the PA Parties acting jointly may, without prejudice to any other rights of the PA Parties or either of them, immediately terminate this Contract.

9.4 Termination for Financial Difficulty

The PA Parties acting jointly may, without prejudice to any other rights which the PA Parties or either of them may have, terminate this Contract immediately if:

(a) events have occurred or circumstances exist which, in the opinion of the PA Parties, may result in or have resulted in insolvency of the Independent Certifier or the control of the Independent Certifier passing to another body or corporation; or

(b) the Independent Certifier has communications with its creditors with a view to entering into, or enters into, any form of compromise, arrangement or moratorium of any debts whether formal or informal, with its creditors.

9.5 Termination for Convenience

Notwithstanding anything to the contrary in this Contract, the PA Parties acting jointly may at any time terminate this Contract upon 30 days' written notice to the Independent Certifier.

9.6 Independent Certifier's Rights upon Termination for Convenience

Upon a termination under Section 9.5 of this Contract, the Independent Certifier shall:

(a) continue on a day to day basis thereafter until a new Independent Certifier is appointed, unless otherwise directed by the PA Parties;

(b) be entitled to be reimbursed by the PA Parties for the value of the Functions performed by it to the date of termination; and

(c) not be entitled to any damages or other compensation in respect of the termination, including (without limitation) any amount in respect of:

(i) the lost opportunity to earn a profit in respect of the Functions not performed at the date of termination;

(ii) any lost opportunity to recover overheads from the turnover which would have been generated under this Contract but for it being terminated; and

(iii) any indirect, consequential or special losses or damages.

9.7 Procedure upon Termination

Upon completion of the Independent Certifier's engagement under this Contract or earlier termination of this Contract (whether under Section 9.3, 9.4 or 9.5 of this Contract or otherwise) the Independent Certifier must:

(a) co-operate with the PA Parties;

(b) hand over to the PA Parties all Contract Material and all other information concerning the Project held or prepared by the Independent Certifier; and

(c) as and when required by the PA Parties, meet with them and such other persons nominated by them with a view to providing them with sufficient information to enable the PA Parties to execute the Project or the persons nominated to provide the Functions.

9.8 Effect of Termination

Except as otherwise expressly provided in this Contract, termination of this Contract shall be without prejudice to any accrued rights and obligations under this Contract as at the date of termination (including the right of the PA Parties to recover damages from the Independent Certifier).

9.9 Survival

Termination of this Contract shall not affect the continuing rights and obligations of the PA Parties and the Independent Certifier under Sections 6.1, 6.2, 7.1, 7.2, 7.3, 9.6, 9.7, 9.8, 10.1, 11.7 or 11.8 of this Contract, this Section, or any other Section of this Contract which is expressed to survive termination or which is required to give effect to such termination or the consequences of such termination.

10. INDEMNITY

10.1 Indemnity

The Independent Certifier shall indemnify and hold the PA Parties and each of them, and their respective employees, directors, officers, representatives and agents (collectively, the "**PA Parties Indemnitees**"), harmless from and against any and all losses, claims, damages, liabilities and costs (including without limitation costs and expenses incurred in retaining another person to act as the Independent Certifier under the Project Agreement in the event of termination of this Contract pursuant to Section 9.3 or 9.4 of this Contract) incurred or suffered by any of the PA Parties Indemnitees by reason of, resulting from, in connection with, or arising out of:

(a) the breach of any representation, warranty, covenant, term, duty or obligation of the Independent Certifier set out in or arising under this Contract or the Project Agreement; or

(b) any act or omission of the Independent Certifier in connection with the subject matters of this Contract.

For the purposes of this Section, "costs" includes reasonable lawyers' fees and expenses, reasonable accountants' fees and expenses, arbitration costs, court costs and all other reasonable out-of-pocket expenses on a full indemnity basis.

10.2 Reliance on Documentation

In the discharge of its duties under this Contract, the Independent Certifier is entitled to rely on the proper and correct issue of all documentation by Project Co under this Contract and the Project Agreement.

11. GENERAL

11.1 Entire Agreement

This Contract and the Project Agreement constitute the entire agreement between the PA Parties and the Independent Certifier and supersede all communications, arrangements and agreements, either oral or written, made or entered into prior to the date of this Contract between the PA Parties and the Independent Certifier with respect to the subject matter of this Contract.

11.2 Negation of Employment

(a) The Independent Certifier, its officers, directors, members, employees, servants and agents and any other persons engaged by the Independent Certifier in the performance of the Functions shall not by virtue of this Contract or the performance of the Functions become in the service or employment of the PA Parties for any purpose.

(b) The Independent Certifier shall be responsible for all matters requisite as employer or otherwise in relation to such officers, directors, members, employees, servants and agents and other persons who are engaged by the Independent Certifier.

11.3 Waiver

Except as expressly provided otherwise in this Contract, any waiver of any provision of this Contract shall only be effective if in writing signed by the waiving party, and no other failure by any party at any time to exercise a right under or enforce any provision of this Contract or to require performance by any other party of any of the provisions of this Contract shall be construed as a waiver of any such provision and shall not affect the validity of this Contract or any part thereof or the right of any party to enforce any provision in accordance with its terms. Any waiver shall only apply to the specific matter waived and only in the specific instance and for the specific purpose for which it is given.

11.4 Notices

Any notice, demand, request, consent, approval, objection, agreement or other communication required or permitted to be given, made or issued under this Contract must, unless otherwise specifically provided in this Contract, be in writing signed by the providing party and delivered by hand, sent by a recognized courier service (with delivery receipt requested), or transmitted by electronic transmission to the address or electronic email address of each party set out below:

(a) if to Project Co:

Fraser Crossing Project Corporation
c/o Acciona FCP Holdings Inc.
Three Bentall Centre
#2000 – 595 Burrard Street
P.O. Box 49125
Vancouver British Columbia
V7X 1J1
Attention: Project Co's Representative

and

Fraser Crossing Project Corporation
c/o Aecon FCP Holdings Inc.
20 Carlson Court, Suite 105
Toronto, Ontario
M9W 7K6
Attention: Project Co's Representative

(b) if to the Province:

Ministry of Transportation and Infrastructure
5B – 940 Blanshard Street
Victoria, British Columbia
V8W 3E6

Attention: The Deputy Minister
Facsimile: 250-387-6431

(c) if to the Independent Certifier:

- **[NTD: Must be a BC address, or provide agent for service]**

Attention: •
Email: •

or to such other address in British Columbia or electronic email address as any party or its representative may, from time to time, designate to the other parties and their representatives in the manner set out above. Any such notice or communication shall be considered to have been received:

(d) if delivered by hand or by a courier service during business hours on a Business Day, when delivered and, if not delivered during business hours, upon the commencement of business hours on the next Business Day; and

(e) if sent by electronic transmission during business hours on a Business Day, upon receipt, and if not delivered during business hours, upon the commencement of business hours on the next Business Day provided that:

(i) the receiving party has, by electronic mail or by hand delivery, acknowledged to the notifying party that it has received such notice; or

(ii) within 24 hours after sending the notice the notifying party has also delivered a copy of such notice to the receiving party by hand delivery.

11.5 Transfer and Assignment

(a) The Independent Certifier:

(i) must not assign, transfer, mortgage, charge or encumber any right or obligation under this Contract without the prior written consent of the PA Parties, which each PA Party may give or withhold in its absolute and unfettered discretion; and

(ii) agrees that any assignment, transfer, mortgage, charge or encumbrance shall not operate to release or discharge the Independent Certifier from any obligation or liability under this Contract save to the extent agreed by the PA Parties in their absolute and unfettered discretion.

(b) For the purposes of this Section, an assignment shall be deemed to have occurred where there is a change in effective control of the Independent Certifier after the date of this Contract, being a change for any reason in the person or persons controlling:

(i) the composition of the board of directors;

(ii) the voting power of the board of directors;

(iii) any class of shareholders; or

(iv) more than half the issued shares in the capital,

in each case, of the Independent Certifier.

11.6 Governing Laws and Attornment

(a) This Contract is governed exclusively by, and is to be enforced, construed and interpreted exclusively in accordance with, the laws of British Columbia and the laws of Canada applicable in British Columbia, and the laws of British Columbia and the laws of Canada applicable in British Columbia are the proper law of this Agreement.

(b) The PA Parties and the Independent Certifier hereby irrevocably submits to the exclusive jurisdiction of the Court with respect to any action, suit, proceeding or dispute in connection with this Contract.

11.7 Confidentiality

The Independent Certifier must ensure that:

(a) except as required by law, neither it nor any of its officers, directors, members, employees, servants and agents disclose, or otherwise make public, any Contract Material or any other information or material acquired in connection with or during the performance of the Functions without the prior written approval of each of the PA Parties (which approval may be granted or withheld in the absolute and unfettered discretion of each PA Party); and

(b) no Contract Material is used, copied, supplied or reproduced for any purpose other than for the performance of the Functions under this Contract.

The PA Parties may at any time require the Independent Certifier to give and to arrange for its officers, directors, members, employees, servants and agents engaged in the performance of the Functions to give written undertakings, in the form of confidentiality agreements on terms required by the PA Parties, relating to the non-disclosure of Contract Material, in which case the Independent Certifier must promptly arrange for such agreements to be made and delivered to the PA Parties.

11.8 Contract Material

(a) The PA Parties and the Independent Certifier agree that the Independent Certifier does not and shall not have any rights, including any Intellectual Property Rights, in any Contract Material provided to the Independent Certifier or created or required to be created by any PA Party.

(b) As between the PA Parties and the Independent Certifier, all title and ownership, including all Intellectual Property Rights, in and to the Contract Material created or required to be created by the Independent Certifier as part of, or for the purposes of performing, the Functions, is hereby assigned jointly to the PA Parties on creation or, where such title, ownership and Intellectual Property Rights cannot be assigned before creation of the Contract Material, it shall be assigned to the PA Parties on creation. In addition, to the extent that Intellectual Property Rights may subsist in such Contract Material so created by the Independent Certifier, the Independent Certifier hereby waives all past, present and future moral rights therein and the Independent Certifier shall ensure that any agent or employee of the Independent Certifier shall have waived all such moral rights. The PA Parties acknowledge and agree that, as between themselves, title, ownership and other rights to the Contract Material shall be governed by the Project Agreement.

(c) The Independent Certifier shall do all such things and execute all such documents as reasonably requested by either of the PA Parties in order to confirm or perfect the assignment of Intellectual Property in the Contract Material referred to in this Section.

11.9 Time of the Essence

Time shall be of the essence of this Contract and of the transactions contemplated by this Contract.

11.10 Amendment

No change or modification of this Contract shall be valid unless it is in writing and signed by each of the parties hereto.

11.11 Severability

Each provision of this Contract shall be valid and enforceable to the fullest extent permitted by law. If any provision of this Contract is held to be invalid, unenforceable or illegal to any extent, such provision may be severed and such invalidity, unenforceability or illegality shall not prejudice or affect the validity, enforceability and legality of the remaining provisions of this Contract. If any such provision of this Contract is held to be invalid, unenforceable or illegal, the parties shall promptly endeavour in good faith to negotiate new provisions to eliminate such invalidity, unenforceability or illegality and to restore this Contract as nearly as possible to its original intent and effect.

11.12 Binding Effect

Subject to the restrictions on transfer contained in this Contract, this Contract shall enure to the benefit of and be binding upon the parties hereto and their respective permitted successors and assigns.

11.13 Counterparts

This Contract may be executed in any number of counterparts, each of which shall be deemed to be an original, and this has the same effect as if the signatures on the counterparts were on a single copy of this Contract so that it shall not be necessary in making proof of this Contract to produce or account for more than one such counterpart.

IN WITNESS WHEREOF the Province, Project Co and the Independent Certifier have executed this Contract.

SIGNED on behalf of **HER MAJESTY THE QUEEN IN RIGHT OF THE PROVINCE OF BRITISH COLUMBIA** by a duly authorized representative of the **MINISTER OF TRANSPORTATION AND INFRASTRUCTURE** in the presence of:	)	
_____	)	_____
(Witness)		Grant Main Deputy Minister, Ministry of Transportation and Infrastructure

FRASER CROSSING PROJECT CORPORATION
by its authorized signatories:

Per: _____
Name:
Title:

Per: _____
Name:
Title:

[INDEPENDENT CERTIFIER]
by its authorized signatories:

Per: _____
Name:
Title:

Per: _____
Name:
Title:

ATTACHMENT 1
TO INDEPENDENT CERTIFIER CONTRACT

FUNCTIONS

1. The Independent Certifier shall do everything expressed in, or reasonably to be implied from, the Project Agreement as the functions of the Independent Certifier.

2. Without limiting the other provisions of this Contract and the Project Agreement, and without prejudice to the generality of paragraph 1 of this Attachment, in order for the Independent Certifier to perform in accordance with the standards required of the Independent Certifier under this Contract, the Independent Certifier shall, amongst other things, provide the following services and perform the following functions:

   (a) Review drawings and other Design Data, documentation and information related to the design, construction and completion of the Primary Infrastructure Components, the Completion Components and Bridge Demolition, or any component thereof, on a select basis in the Independent Certifier's sole professional judgment and only if and to the extent such review is required in order to sign the SC1 Final Deficiency List, SC2 Final Deficiency List and SC3 Final Deficiency List and issue the Relevant Certificates.

   (b) Review such progress reports as may be delivered to the Independent Certifier for the Independent Certifier to be and to keep itself informed as to the progress of the Project Work as required in order to sign the SC1 Final Deficiency List, SC2 Final Deficiency List and SC3 Final Deficiency List and issue the Relevant Certificates.

   (c) Signing to acknowledge receipt of all Construction Certificates;

   (d) Attend site meetings as requested by the Province's Representative and Project Co's Representative.

   (e) Attend commissioning tests at the end of construction activities, including re-tests, and inspections at the end of the construction activities to be performed as set out in the Design and Construction Requirements or as otherwise required for Project Co to achieve Substantial Completion of the Primary Infrastructure Components, the Completion Components and the Bridge Demolition, and Total Completion, or any other component thereof.

   (f) Prior to issuing any Relevant Certificate, consider the views, comments and submissions of the Province's Representative in relation to the satisfaction of the conditions for the issuance of such Relevant Certificate, as the case may be.

   (g) Inspect the Project Work as required in order to issue the Relevant Certificates.

   (h) Review all documentation, including Certificates and approvals, Design Data, certifications, test results and quality inspections and audits, provided to the Independent Certifier pursuant to the Project Agreement or otherwise required for the Independent Certifier to discharge its obligations and duties under this Contract in respect of the signing

of the SC1 Final Deficiency List, SC2 Final Deficiency List and SC3 Final Deficiency List and the issuance of the Relevant Certificates.

(i) Consider all Laws as applicable to the issuance of the Relevant Certificates.

(j) Upon receipt of notice from Project Co given in accordance with the applicable provision of Article 6 [Construction Certification] of Part 3 of Schedule 4 to the Project Agreement requesting the issuance of a Relevant Certificate, carry out all necessary inspections of the Relevant Components of the Project Work within the time period set out in the applicable provision of such Article, consider such request and, within the time period set out in the relevant provision of such Article, either:

(i) issue the Relevant Certificate to the Province and Project Co; or

(ii) notify Project Co and the Province's Representative of its decision not to issue the Relevant Certificate, and state the reasons for such decision.

(k) Upon receipt of notice from Project Co given in accordance with Article 6 [Construction Certification] of Part 3 of Schedule 4 to the Project Agreement requesting the signing of each of the SC1 Final Deficiency List, SC2 Final Deficiency List and SC3 Final Deficiency List, carry out all necessary inspections of the Project Work within the time period set out in the applicable provision of such Article, and, within the time period set out in the applicable provision of such Article, either:

(i) sign the SC1 Final Deficiency List, SC2 Final Deficiency List and SC3 Final Deficiency List, as applicable, and deliver a copy of same to the Province and Project Co; or

(ii) notify Project Co and the Province's Representative of its decision not to sign the SC1 Final Deficiency List, SC2 Final Deficiency List or SC3 Final Deficiency List, as the case may be, and state the reasons for such decision, including what further defects or deficiencies in the Project Work should be added to the SC1 Final Deficiency List, SC2 Final Deficiency List or SC3 Final Deficiency List, as applicable.

(l) If the Independent Certifier serves a notice under clause (ii) of paragraph (j) of this Attachment and upon Project Co issuing a notice to the Independent Certifier and the Province's Representative that such further works or other measures necessary or appropriate to remedy or remove the cause of the Independent Certifier's refusal to issue the Relevant Certificate have been completed, the Independent Certifier shall inspect such further works or measures within the time period set out in the relevant provision of Article 6 [Construction Certification] of Part 3 of Schedule 4 of the Project Agreement and shall repeat the procedures in paragraph (j) of this Attachment until the issuance of the Relevant Certificate.

(m) If the Independent Certifier serves a notice under clause (ii) of paragraph (k) of this Attachment and upon Project Co issuing a notice to the Independent Certifier and the Province's Representative that such further works or other measures necessary or

appropriate to remedy or remove the cause of the Independent Certifier's decision not to sign the SC1 Final Deficiency List, SC2 Final Deficiency List or SC3 Final Deficiency List have been completed and/or delivering an amended SC1 Final Deficiency List, SC2 Final Deficiency List or SC3 Final Deficiency List, the Independent Certifier shall, if applicable, inspect such further works or measures within the time period set out in the applicable provision of such Article and/or review the amended SC1 Final Deficiency List, SC2 Final Deficiency List or SC3 Final Deficiency List, as applicable and shall repeat the procedures in paragraph (k) of this Attachment until the signing of the SC1 Final Deficiency List, SC2 Final Deficiency List or SC3 Final Deficiency List, as the case may be.

(n) Provide advice on other matters that may arise under the Project Agreement that both of the PA Parties may jointly require in writing.

(o) Participate in and give the PA Parties and their professional advisors all reasonable cooperation, access and assistance (including providing or making available documents and information and witnesses for attendance at hearings and other proceedings) in connection with any proceedings pursuant to the Dispute Resolution Procedure relating to any of the Functions.

ATTACHMENT 2
TO INDEPENDENT CERTIFIER CONTRACT

FEE

[NTD: To be completed prior to execution of the Independent Certifier Contract. This Attachment will include a fee schedule for Functions Variations.]

ATTACHMENT 3
TO INDEPENDENT CERTIFIER CONTRACT

INDEPENDENT CERTIFIER PERSONNEL

[NTD: To be completed prior to execution of the Independent Certifier Contract.]

APPENDIX B
PROVINCE PERMITS

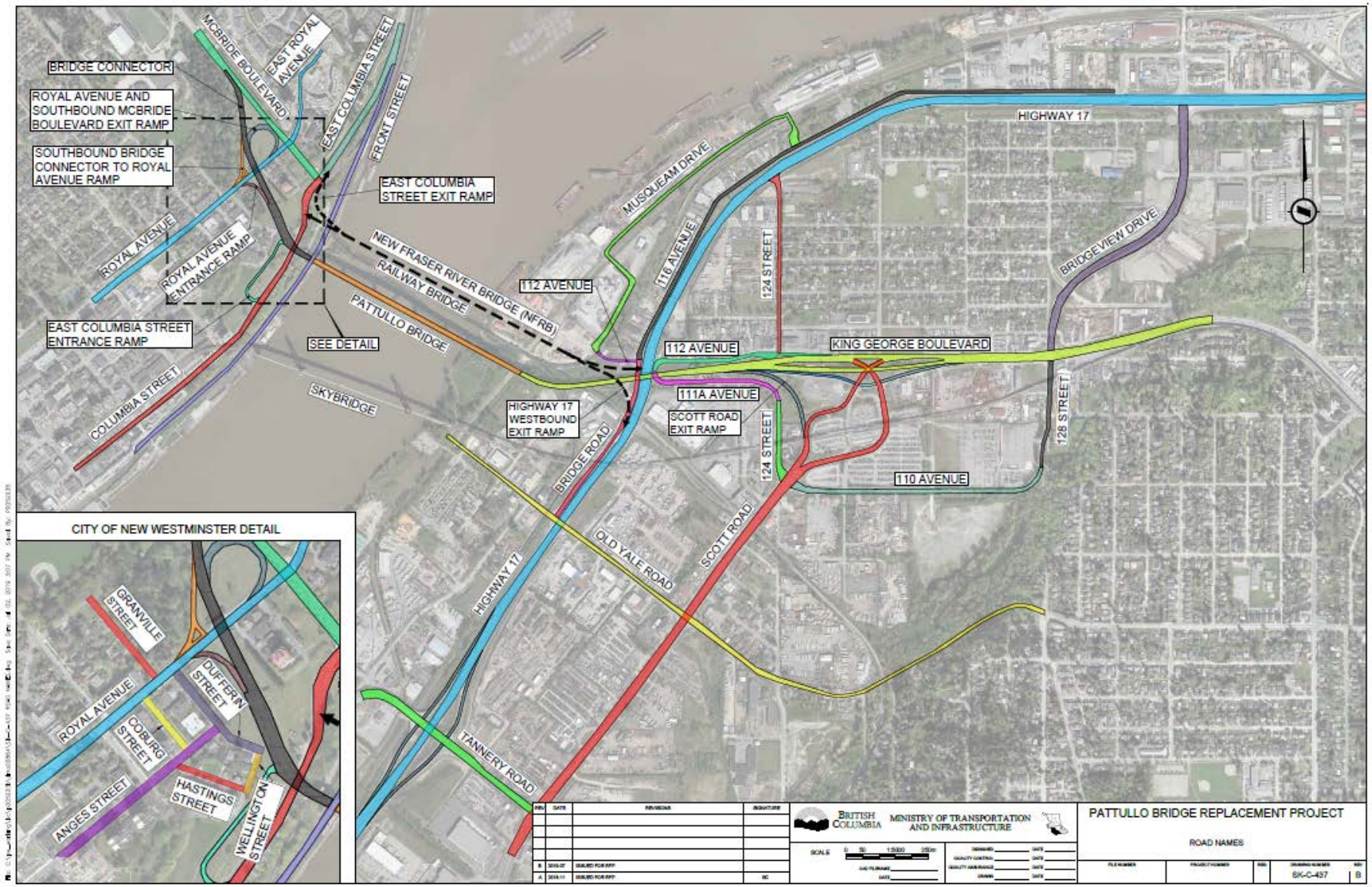
1. Environmental Assessment Certificate

2. Port Project and Environmental Permit

3. Permit 2016-0390 issued December 1, 2016 pursuant to section 14 of the *Heritage Conservation Act* (British Columbia), and amended November 30, 2017, June 4, 2018 and September 4, 2018

4. The Permit pursuant to section 12 of the *Heritage Conservation Act* (British Columbia) referred to in Section 2.5(c) of Schedule 6 [Environmental Obligations]

APPENDIX C
PROJECT ROAD NAMES



APPENDIX D
FORM OF CERTIFICATES

1. Design Certificate (General)
2. Design Certificate (Independent Check for Category III Structures)
3. Design Certificate (Environmental)
4. Road Safety Audit Certificate (Stage 1)
5. Road Safety Audit Certificate (Stage 2)
6. Road Safety Audit Certificate (Stage 3)
7. Construction Certificate
8. Certificate of Substantial Completion
9. Certificate of Total Completion
10. Assessment Certificate (Structures)

Certificate Form 1

Certificate Ref No. [ ]

DESIGN CERTIFICATE (GENERAL)

In respect of :…… (Provide details e.g. Structures/Roadway/Geotechnical etc.)

Agreement between Her Majesty the Queen in right of the Province of British Columbia, BC Transportation Financing Authority and Fraser Crossing Project Corporation dated February 7, 2020 ("the Agreement") relating to the Project. Defined terms and expressions used in the Agreement have the same meanings in this Certificate.

Form of Certificate to be used by the Designer for certifying the Design of the applicable Relevant Components in accordance with Part 3 of Schedule 4 to the 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 Agreement and all relevant Project 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 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 Project 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 Agreement;

    (iii) complies with all applicable standards, codes and current Good Industry Practice; and

    (iv) accurately describes and depicts the work to be undertaken.

SCHEDULE

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

Signed: .....
Designer (Principal)
Name: .....
Title: .....
Date: .....
Professional Registration Number: …….
Affix Professional Seal

Signed: .....
Project Co's Representative
Name: .....
Date: .....

2. 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 2

Certificate Ref. No [ ]

DESIGN CERTIFICATE (INDEPENDENT CHECK FOR CATEGORY III STRUCTURES)

Agreement between Her Majesty the Queen in right of the Province of British Columbia, BC Transportation Financing Authority and Fraser Crossing Project Corporation dated February 7, 2020 ("the Agreement") relating to the Project. Defined terms and expressions used in the Agreement have the same meanings in this Certificate.

Form of certificate to be used by the Checking Team for certifying the design of Category III Structures incorporated in the Project Work, in accordance with Part 3 of Schedule 4 to the 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 Agreement.

2. We certify that we have performed an independent check (as required in the 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 **[and annexed in accordance with all applicable requirements contained in the 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 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]; and

    ii. the design, methodologies and assumptions are consistent with Good Industry Practice.

SCHEDULE

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

Signed: .....
Checking Team (Principal)
Name: .....
Title: .....
Date: .....
Professional Registration Number: …….
Affix Professional Seal

Signed: .....
Project Co's Representative
Name: .....
Date: .....

2. 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)

Agreement between Her Majesty the Queen in right of the Province of British Columbia, BC Transportation Financing Authority and Fraser Crossing Project Corporation dated February 7, 2020 ("the Agreement") relating to the Project. Defined terms and expressions used in the Agreement have the same meanings in this Certificate.

Form of certificate to be used by the Designer for certifying the design of environmental works incorporated in the Project Work, in accordance with Part 3 of Schedule 4 to the 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 Agreement and all relevant Project 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 and annexed in accordance with all applicable requirements contained in the 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 Project 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 Agreement; and

    iii. the said Design Data complies with all applicable standards, codes and current Good Industry Practice.

SCHEDULE

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

Signed: .....
Designer (Principal)
Name: .....
Title: .....
Date: .....
Professional Registration Number: …….
Affix Professional Seal

Signed: .....
Environmental Director
Name: .....
Title: .....
Date: .....
Professional Registration Number: …….
Affix Professional Seal

2. 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 4

Certificate Ref No. [ ]

ROAD SAFETY AUDIT CERTIFICATE (STAGE 1)

Agreement between Her Majesty the Queen in right of the Province of British Columbia, BC Transportation Financing Authority and Fraser Crossing Project Corporation dated February 7, 2020 ("the Agreement") relating to the Project. Defined terms and expressions used in the Agreement have the same meanings in this Certificate.

Form of Certificate to be used by the Designer for certifying that a Stage 1 Road Safety Audit has been carried out in accordance with Article 13 of Part 2 of Schedule 4 to the Agreement.

1. We certify that the preliminary design of [.....] has been the subject of a Stage 1 Road Safety Audit in accordance with Article 13 of Part 2 of Schedule 4 to the Agreement, the Design Management Plan, the Design Quality Management Plan and all other relevant provisions of the Agreement.

2. The Audit Team's report and statement certifying the audit has been carried out are attached.

Signed: .....
Audit Team (Principal)
Name: .....
Title: .....
Date: .....
Professional Registration Number: …….
Affix Professional Seal

3. We certify that the preliminary design of [.....] has been the subject of a Stage 1 Road Safety Audit in accordance with Article 13 of Part 2 of Schedule 4 to the Agreement, the Design Management Plan, the Design Quality Management Plan and all other relevant provisions of the Agreement and that all observations and recommendations in the Audit Team's report have been satisfactorily addressed and resolved.

Signed: .....
Designer (Principal)
Name: .....
Title: .....
Date: .....
Professional Registration Number: …….
Affix Professional Seal

Signed: .....
Design-Build Contractor (Principal)
Name: .....
Title: .....
Date: .....
Professional Registration Number: …….
Affix Professional Seal

Signed: .....
Project Co's Representative
Name: .....
Date: .....

4. Receipt of this Certificate is acknowledged.

Signed:.....
Province's Representative
Name:.....
Date:.....

Certificate Form 5

Certificate Ref. No. [ ]

ROAD SAFETY AUDIT CERTIFICATE (STAGE 2)

Agreement between Her Majesty the Queen in right of the Province of British Columbia, BC Transportation Financing Authority and Fraser Crossing Project Corporation dated February 7, 2020 ("the Agreement") relating to the Project. Defined terms and expressions used in the Agreement have the same meanings in this Certificate.

Form of Certificate to be used by the Designer for certifying that a Stage 2 Road Safety Audit has been carried out in accordance with Article 13 of Part 2 of Schedule 4 to the Agreement.

1. We certify that the Detailed Design of [.....] has been the subject of a Stage 2 Road Safety Audit in accordance with Article 13 of Part 2 of Schedule 4 to the Agreement, the Design Management Plan, the Design Quality Management Plan and all other relevant provisions of the Agreement.

2. The Audit Team's report and statement certifying the audit has been carried out are attached.

Signed: .....
Audit Team (Principal)
Name: .....
Title: .....
Date: .....
Professional Registration Number: …….
Affix Professional Seal

3. We certify that the Detailed Design of [.....] has been the subject of a Stage 2 Road Safety Audit in accordance with Article 13 of Part 2 of Schedule 4 to the Agreement, the Design Management Plan, the Design Quality Management Plan and all other relevant provisions of the Agreement and that all observations and recommendations in the Audit Team's report have been satisfactorily addressed and resolved.

Signed: .....
Designer (Principal)
Name: .....
Title: .....
Date: .....
Professional Registration Number: …….
Affix Professional Seal

Signed: .....
Design-Build Contractor (Principal)
Name: .....
Title: .....
Date: .....
Professional Registration Number: …….
Affix Professional Seal

Signed: .....
Project Co's Representative
Name: .....
Date: .....

4. Receipt of this Certificate is acknowledged.

Signed:.....
Province's Representative
Name:.....
Date:.....

Certificate Form 6

Certificate Ref. No. [ ]

ROAD SAFETY AUDIT CERTIFICATE (STAGE 3)

Agreement between Her Majesty the Queen in right of the Province of British Columbia, BC Transportation Financing Authority and Fraser Crossing Project Corporation dated February 7, 2020 ("the Agreement") relating to the Project. Defined terms and expressions used in the Agreement have the same meanings in this Certificate.

Form of Certificate to be used by the Designer for certifying that a Stage 3 Road Safety Audit has been carried out in accordance with Article 13 of Part 2 of Schedule 4 to the Agreement.

1. We certify that the [reference relevant works] as constructed, tested and commissioned has been the subject a Stage 3 Road Safety Audit in accordance with Article 13 of Part 2 of Schedule 4 to the Agreement, the Design Management Plan, the Design Quality Management Plan and all other relevant provisions of the Agreement.

2. The Audit Team's report and statement certifying the audit has been carried out are attached.

Signed: .....
Audit Team (Principal)
Name: .....
Title: .....
Date: .....
Professional Registration Number: …….
Affix Professional Seal

3. We certify that the [reference relevant works] as constructed, tested and commissioned has been the subject of a Stage 3 Road Safety Audit in accordance with Article 13 of Part 2 of Schedule 4 to the Agreement, the Design Management Plan, the Design Quality Management Plan and all other relevant provisions of the Agreement and that all observations and recommendations in the Audit Team's report have been satisfactorily addressed and resolved.

Signed: .....
Designer (Principal)
Name: .....
Title: .....
Date: .....
Professional Registration Number: …….
Affix Professional Seal

Signed: .....
Design-Build Contractor (Principal)
Name: .....
Title: .....
Date: .....
Professional Registration Number: …….
Affix Professional Seal

Signed: .....
Project Co's Representative
Name: .....
Date: .....

4. Receipt of this Certificate is acknowledged.

Signed:.....
Province's Representative
Name:.....
Date:.....

Certificate Form 7

Certificate Ref. No. [ ]

CONSTRUCTION CERTIFICATE

Agreement between Her Majesty the Queen in right of the Province of British Columbia, BC Transportation Financing Authority and Fraser Crossing Project Corporation dated February 7, 2020 ("the Agreement") relating to the Project. Defined terms and expressions used in the Agreement have the same meanings in this Certificate.

Form of Certificate to be used by the Designer, Design-Build Contractor and Project Co for certifying the Substantial Completion or Total Completion of Construction in respect of Relevant Components of the Project Work in accordance with Part 3 of Schedule 4 to the Agreement.

Design-Build Contractor's and Project Co's Statement

1. We certify that **[name and element of construction]** has been designed, constructed, [Substantially Completed] [Totally Completed], commissioned and tested in all respects in accordance with:

   (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 Agreement including all applicable Project Requirements [as amended by the following Minor Works, Province Changes and Value Engineering Proposals: [.....].

Signed:.....
Design-Build Contractor (Principal)
Name:.....
Title:.....
Date:.....
Professional Registration Number: …….
Affix Professional Seal

Signed:.....
Project Co's Representative
Name:.....
Date:.....
Professional Registration Number: …….
Affix Professional Seal

Designer's Statement

2. We certify that we have examined the **[name and element of construction]** in accordance with the requirements for examination of the Project Work contained in the 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 Project Work or other works has been designed, constructed, [Substantially Completed] [Totally Completed], commissioned and tested in all respects in accordance with:

(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 Agreement including all applicable Project Requirements [as amended by the Minor Works, Province Changes and Value Engineering Proposals listed in paragraph 1 above].

Signed:.....
Designer (Principal)
Name:.....
Title:.....
Date:.....
Professional Registration Number: …….
Affix Professional Seal

3. Receipt of this Certificate is acknowledged.

Signed:.....
Independent Certifier
Name:.....
Date:.....
Professional Registration Number: …….
Affix Professional Seal

Certificate Form 8

Certificate Ref No. [ ]

CERTIFICATE OF SUBSTANTIAL COMPLETION

Agreement between Her Majesty the Queen in right of the Province of British Columbia, BC Transportation Financing Authority and Fraser Crossing Project Corporation dated February 7, 2020 ("the Agreement") relating to the Project. Defined terms and expressions used in the Agreement have the same meanings in this Certificate.

Form of Certificate of Substantial Completion to be used by Independent Certifier in accordance with Part 3 of Schedule 4 to the Agreement.

1. Confirmation was given on [date] by Project Co that [describe Relevant Components] has been Substantially Completed in accordance with the Agreement and that all conditions to achievement of Substantial Completion as set out in the Project Agreement have been met.

2. A Road Safety Audit Certificate (Stage 3) for the [describe Relevant Components] was issued on [date]. **[NTD: This paragraph not required for Bridge Demolition.]**

3. Construction Certificates for the Substantial Completion of the [describe Relevant Components] were issued on [dates].

4. This document shall serve as the Certificate of Substantial Completion for [describe Relevant Components].

5. The [SC1/SC2/SC3] Final Deficiency List signed by the Independent Certifier is appended.

6. The [SC1/SC2/SC3] Substantial Completion Date shall be [date].

Signed:.....
Independent Certifier
Name:.....
Title:……..
Date:.....
Professional Registration Number: …….
Affix Professional Seal

Certificate Form 9

Certificate Ref. No. [ ]

CERTIFICATE OF TOTAL COMPLETION

Agreement between Her Majesty the Queen in right of the Province of British Columbia, BC Transportation Financing Authority and Fraser Crossing Project Corporation dated February 7, 2020 ("the Agreement") relating to the Project. Defined terms and expressions used in the Agreement have the same meanings in this Certificate.

Form of Certificate of Total Completion to be used by Independent Certifier in accordance with Part 3 of Schedule 4 to the Agreement.

1. Confirmation was given on [date] by Project Co that Total Completion has been achieved in accordance with the Agreement.

2. Construction Certificates for the Total Completion were issued on [dates].

3. This document shall serve as the Certificate of Total Completion.

4. The Total Completion Date shall be [date].

Signed: .....
Independent Certifier
Name: .....
Title……..
Date.....
Professional Registration Number: …….
Affix Professional Seal

Certificate Form 10

Certificate Ref. No. [ ]

ASSESSMENT CERTIFICATE (STRUCTURES)

Agreement between Her Majesty the Queen in right of the Province of British Columbia, BC Transportation Financing Authority and Fraser Crossing Project Corporation dated February 7, 2020 ("the Agreement") relating to the Project. Defined terms and expressions used in the Agreement have the same meanings in this Certificate.

1. We certify that in assessing […..] **[Name and Category of the Structure and list of all elements of the Structure included in the assessment]** listed in the Schedule hereto and annexed we have complied with all applicable requirements contained in the 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:

   i the said assessment complies with all applicable Project 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 Agreement; and

   ii the assessed capacity of each element of the Structure is as follows:

SCHEDULE

[Include here drawing numbers and title used for the assessment.]

Signed:……..
Designer (Principal)
Name:……..
Title:……
Date:……
Professional Registration Number: …….
Affix Professional Seal

Signed: .....
Project Co's Representative
Name: .....
Date: .....

2. 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: .....

APPENDIX E
SAMPLE CONTENTS FOR A STRUCTURAL TAF

Ref. No.....

1. NAME OF PROJECT.....

1.1 Type of highway

1.2 Posted traffic speed (for a Bridge give over and/or under).

2. NAME OF STRUCTURE (for example).....

2.1 Obstacles crossed.

3. PROPOSED STRUCTURE

3.1 Description of Structure.

3.2 Structural type) Include reasons

3.3 Foundation type) for choice

3.4 Span arrangements)

3.5 Articulation arrangements.

3.6 Barrier type.

3.7 Proposed arrangements for inspection and maintenance.

3.8 Materials and finishes.

4. DESIGN/ASSESSMENT CRITERIA

4.1 Live Loading, Vertical Clearance.

4.1.1 Highway live loading.

4.1.2 Design Vehicle.....

4.1.3 Pedestrian or multi-use path live loading.

4.1.4 Provision for exceptional abnormal loads.

4.1.4.1 Gross weight ..... tonnes on vehicle no. .....m.

4.1.4.2 Axle load and spacing.

4.1.4.3 Air cushion ..... tonnes over ..... m x .....m.

4.1.4.4 Location of vehicle track on deck cross-section.

4.1.5 Any special loading not covered above.

4.1.6 Ministry heavy or high load route requirements and arrangements being made to preserve the route.

4.1.7 Minimum vertical clearance provided ..... m. and navigational clearances and rail clearance envelopes.

4.1.8 Authorities consulted and any special conditions required.

4.2 List of relevant design documents.

4.3 Proposed Alternative Proposals.

5. STRUCTURAL ANALYSIS

5.1 Methods of analysis proposed for superstructure, substructure and Foundations.

5.2 Description and diagram of idealised structure to be used for analysis.

5.3 Assumptions intended for calculation of structural element stiffness.

5.4 Proposed earth pressure coefficients (ka, ko, or kp) to be used in design of earth retaining elements.

6. SEISMIC DESIGN

6.1 Seismic design inputs.

6.2 Load paths.

6.3 Identification of capacity protected members and hinge locations.

6.4 Special devices such as dampers or bearings.

7. SEISMIC INSTRUMENTATION

7.1 Proposed layout of seismic instrumentation.

8. GROUND CONDITIONS

8.1 Acceptance of interpretative recommendations of the soils report to be used in the design and reasons for any proposed departures.

8.2 Describe Foundations fully including the reasons for adoption of allowable and proposed bearing pressures/pile loads, strata in which Foundations are located, provision for skin friction effects on piles and for lateral pressures due to compression of underlying strata, etc.

8.3 Differential settlement to be allowed for in design of structure.

8.4 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.

8.5 Results of tests of ground water (e.g. pH value, chloride or sulphate content) and any counteracting measures proposed.

8.6 Anticipated ground movements or settlement due to seismic loading, measures proposed to deal with these impacts as far as they affect the structure.

9. CHECKING

9.1 Name of proposed Checking Team.

10. DRAWINGS AND DOCUMENTS

10.1 List of drawings (including numbers) and documents accompanying the submission. To include (without limitation):

10.1.1 a location plan;

10.1.2 a preliminary general arrangement drawing; and

10.1.3 relevant parts of the ground investigation report.

11. THE ABOVE DESIGN AND CONSTRUCTION PROPOSALS ARE SUBMITTED FOR REVIEW.

For permanent works:

Signed: .....
Designer (Principal)
Name: .....
Engineering Qualifications:.....
Date: .....
Professional Registration Number: …….
Affix Professional Seal

Signed:.....
Project Co's Representative
Name:.....
Date:.....

For Temporary Works:

Signed: .....
Designer (Principal) or designer (Principal), as applicable
Name: .....
Engineering Qualifications:.....
Date: .....
Professional Registration Number: …….
Affix Professional Seal

Signed:.....
Design-Build Contractor (Principal)
Name:.....
Date:.....

Signed:.....
Project Co's Representative
Name:.....
Date:.....

12. 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: .....

APPENDIX F
DELIVERABLES FOR SUBSTANTIAL COMPLETION AND TOTAL COMPLETION

PART I DELIVERABLES FOR SUBSTANTIAL COMPLETION

1. Evidence of Assignments and Transfers of Property and Warranties

Prior to Substantial Completion of each Relevant Component, Project Co shall deliver the following to the Province, or at the discretion of the Province to BCTFA or other third party designated by the Province:

(a) written confirmations or acknowledgements of:

(i) the assignment of Principal Contractor and Subcontractor warranties in respect of the Relevant Component as required by Section 2.5 [Assignment of Warranties to Province] of Schedule 5; and

(ii) where not previously provided pursuant to Section 2.12(c), the transfer of any other assets required to be transferred prior to the Substantial Completion Date for the Relevant Component to the Province or any other person under the terms of this Agreement; and

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

2. Operations and Maintenance Manuals

Prior to Substantial Completion of the Primary Infrastructure Components, Project Co shall deliver to the Province the Operation and Maintenance Manual and all other operation and maintenance manuals required in accordance with this Schedule 4, having been reviewed in advance in accordance with the Review Procedure.

3. Keys, Codes and Passwords

Prior to Substantial Completion of the Primary Infrastructure Components, Project Co shall deliver to the Province:

(a) in respect of all locks, supply and install permanent cores;

(b) deliver the following keys to the Province or a third party designated by the Province:

(i) the permanents keys to all permanent cores installed under paragraph (a) above;

(ii) the keys to all traffic sign housings;

(iii) the lifting keys for all types of chamber covers; and

(iv) all other keys to all buildings forming part of the Project Infrastructure; and

(c) 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.

4. Asset Inventory Data

(a) Prior to Substantial Completion of each Relevant Component, Project Co shall update the Province's electronic asset inventory records in respect of the applicable Relevant Component. Such asset inventory data shall be provided and input into the following Province corporate asset inventory systems:

(i) Bridge Management Information System (BMIS): Structures containing Bridges, Major Retaining Walls, Major Culverts, Tunnels, Major Sign Structures and toll gantries.

(ii) Roadway Pavement Management Systems (RPMS): Pavements, including Travelled Lanes, Shoulders, medians, rest area parking and other areas specified to be treated to adjacent highway standard. The Shoulder and surface type are also recorded in CHRIS.

(iii) Corporate Highway and Resource Information System (CHRIS): Other Structures with retaining walls less than 2.0m high, minor culverts, noise barriers, buildings including other drainage appliances, all Signs, highway furniture (including walls, fences, gates, guardrails and reflectors, and lineal safety features) and Pavement Markings (including longitudinal, transverse and intersection markings, thermoplastic marking and HRPM).

(b) The asset inventory shall be formatted to the most current edition of the manual for the applicable Province asset inventory system.

(c) Project Co shall upload all additions and amendments to the asset inventory for RPMS and CHRIS electronically directly into the corporate asset inventory system. The file(s) shall be compatible with the software used by the Province for managing the asset inventory.

(d) For BMIS, Project Co shall access the BMIS electronic program directly to enter inventory data. The information supplied shall be generated in accordance with the definitions utilized within the BMIS. Clearance data, general arrangement data and Structure location information are required to be input into BMIS prior to opening the Structure to public vehicle use. All remaining inventory data is to be input into BMIS within 12 months and in any event prior to Total Completion.

(e) Project Co shall provide the Province with a complete list of all electrical inventory in electronic and hard copy.

(f) Unless specified otherwise, electronic files shall be compatible with the most recent version of either Microsoft Office or Adobe Acrobat Reader, and all supplied electronic files shall be on a USB data storage device and be clearly labelled as to the content.

5. Records Documentation

(a) Project Co shall compile a complete set of Construction Records, including record drawings, for the Primary Infrastructure Components and the Completion Components no later than 180 days prior to the anticipated SC3 Substantial Completion Date, and submit the finalized Construction Records to the Province's Representative for record purposes.

(b) Record drawings shall be provided in the following formats:

(i) one full set of original signed and sealed full size hard copies, in custom sized cardboard boxes with suitable sized folders and appropriate labels;

(ii) one full set original signed and sealed of 11x17 hard copies, hole punched and placed in three ring binders;

(iii) one full set of AutoCAD data files;

(iv) two full sets of 11x17 hard copies, hole punched and placed in three ring binders;

(v) three full sets in PDF format, on USB stick or similar; and

(vi) one set of all drawings of Municipal Infrastructure, original signed and sealed 11x17 hard copies and one set of PDF drawings on a USB stick.

(c) All Construction Records compiled by Project Co shall be available to the Province and the Independent Certifier upon request.

(d) Project Co shall ensure that all changes to drawings are properly and completely identified for record purposes, in accordance with Ministry standards. The drawing numbers shall remain the same as the originals. All Construction Records shall be stand-alone documents drafted in the format and to the standards of the original Design drawings.

PART II DELIVERABLES FOR TOTAL COMPLETION

1. Records Documentation

(a) Prior to Total Completion, Project Co shall revise and update the Construction Records, as required, including record drawings submitted to the Province in accordance with Section 5 of Part I of this Appendix and compile a final set of Construction Records for the Primary Infrastructure Components, the Completion Components and the Bridge Demolition. Project Co shall submit the final set of Construction Records to the Province's Representative, in accordance with the Review Procedure.

(b) Record drawings shall be provided in the formats as set out in Part I of this Appendix F.

(c) All Construction Records compiled by Project Co shall be available to the Province and the Independent Certifier upon request, prior to Total Completion.

APPENDIX G
BRITISH COLUMBIA SMART INFRASTRUCTURE MONITORING SYSTEM AND BC STRONG MOTION NETWORK REQUIREMENTS

1. General

(a) Project Co shall design, supply, install and commission a proven Structural Health Monitoring System for the New Fraser River Bridge. The Structural Health Monitoring System will provide real-time data for the British Columbia Smart Infrastructure Monitoring System (the "**BCSIMS**"). The Structural Health Monitoring System shall include, but not be limited to, data recorders, accelerometers, velocity and displacement transducers, strain gauges wind sensors, GPS (Global Positioning System), temperature and humidity sensors, and piezometers. The Structural Health Monitoring System shall be capable of supplying real-time data simultaneously streaming from all of the sensors via data records and services to four external receivers, including, but not limited to, the BC Strong Motion Network and the BCSIMS data centre.

(b) Proprietary software selected for the Structural Health Monitoring System, streaming of ground motion data and structural vibration data resulting from any seismic activity and environmental changes shall be demonstrably compatible with the current BC Strong Motion Network and BCSIMS network.

(c) All ground motion vibration data exceeding the pre-set trigger levels must be transmitted to the BC Strong Motion Network in real-time in a format (e.g., miniSeed file format) compatible with the current configuration of the BC Strong Motion Network without additional signal processing including the use of compatible units and parameters. This transmission shall be in accordance with the Compatibility Requirements for S/M Instruments and the required data processing as explained in the Internet Accelerograph Paper.

(d) All sensor data shall be supplied to the BCSIMS data centre in real-time streaming in digital format compatible with the BCSIMS's current data archiving protocol and provided in the compressed VDAS file. Project Co shall, identify and submit the type of compression to be used, to the Province's Representative in accordance with the Consent Procedure. This data shall not require additional signal processing and will include the units and parameters compatible with the current BCSIMS and BC Strong Motion Network standards.

(e) The Structural Health Monitoring System shall provide a minimum of three weeks of data storage to continuously store all sensors data in real-time.

(f) The data recorders and all of the sensors in the Structural Health Monitoring System shall be installed in highly protected and secure locations to minimize the likelihood of vandalism and in a waterproof enclosure to prevent water leakage and ensure protection from other elements. The proposed locations of the sensors, data recorders, connectors, and sensor enclosures shall be submitted to the Province's Representative in accordance with the Consent Procedure.

(g) Within 120 days following the Effective Date, Project Co shall prepare and submit to the Province's Representative in accordance with the Review Procedure a structural health monitoring design report (the "**Structural Health Monitoring Report**" or "**SHMR**") including but not limited to the following:

(i) separate Finite Element Models (FEM) for each approach and the main span of the New Fraser River Bridge created to perform time history analysis and response spectrum analysis. All FEM shall be provided in a commercially available software, or in other forms of software satisfactory to the Province's Representative.

(ii) the description and drawings of the expected damage on the approaches and the New Fraser River Bridge for each of the Design Earthquake Events. The description and drawings of the expected damage shall include the type, extent and locations of expected damage.

(iii) a detailed explanation of how each component of the Structural Health Monitoring system can be used post-earthquake to assist in determining the actual damage compared to the expected damage after a significant/major earthquake.

2. Scope of the Work and Location of the Instruments

2.1 Strong Motion Network

A minimum of two strong motion instruments shall be installed to provide ground vibration data. These are free-field, surface or near surface instruments, not necessarily on firm ground. These instruments shall be installed within the Provincial right of way in the vicinity of the locations identified below. The exact locations of strong motion instruments and the soil conditions at those locations including shear wave velocity shall be submitted to the Province's Representative in accordance with the Consent Procedure:

(a) on land to the north of the north tower of the New Fraser River Bridge and away from other significant structures; and

(b) on land in Surrey to the south of the south tower of the New Fraser River Bridge and away from other significant structures.

2.2 Free-field Downhole Array

(a) One downhole array shall be installed on land in Surrey south of the south tower.

(b) The array shall consist of 3 tri-axial accelerometers and one piezometer as follows:

(i) one triaxial downhole free-field accelerometer, at bedrock;

(ii) one triaxial downhole free-field accelerometer at the top of the marine clay layer, approximately at 40m depth;

(iii) one triaxial downhole free-field accelerometer at the top of the sand layer, approximately at 10m depth, under any surficial clay, silt or fill; and

(iv) one piezometer in the liquefiable sand layer, approximately at 20m depth.

(c) The proposed location of the downhole array and the locations of the sensors in the downhole array shall be submitted to the Province's Representative in accordance with the Consent Procedure.

2.3 New Fraser River Bridge and Approaches

A proven Structural Health Monitoring System shall be provided appropriate for the New Fraser River Bridge. Each sensor instrumentation location shall be submitted to the Province's Representative in accordance with the Consent Procedure, and the system shall consist of the following:

(a) North and South Approaches

(i) One tri-axial accelerometer shall be provided at each abutment.

(ii) Two tri-axial displacement transducers shall be provided at each expansion joint with one at the east and west side of the Bridge Deck.

(iii) One displacement transducer shall be installed at a minimum of four bearings on the south approach at the corners of one of the spans and a minimum of four bearings on the north approach at the corners of one of the spans to measure displacements in the longitudinal transverse and vertical directions.

(iv) One span on each approach shall be instrumented with a tri-axial accelerometer on the east and west side at mid-span, plus one tri-axial accelerometer at each end of the span, located at the centre of the deck.

(v) One pier on each approach shall be instrumented with one tri-axial accelerometer and one bi-axial tilt meter at the top of the pier and shall also be instrumented with one tri-axial accelerometer and one bi-axial tilt meter at the bottom of the pier.

(vi) If any portion of the spans have discontinuous transverse deck, then it is considered twinned and requires duplicate instrumentation.

(b) Main spans and/or cable supported Sections

(i) 10 percent of all stay cables shall have tri-axial accelerometers installed inside the protective piping or duct tube that encloses the cable and between 10 to 16 metres above the deck.

(ii) No less than 20 triaxial accelerometers distributed throughout the span shall be installed on representative types of tension and compression members of trusses and arches.

(iii) One GPS sensor shall be installed at the top of each pylon to simultaneously measure the movement of the pylons in two horizontal directions perpendicular to each other. One GPS sensor shall be installed at the base of each pylon footing.

(iv) Two GPS sensors shall be installed at deck level in the mid-span of the bridge on each side of the deck to measure the vertical movement.

(v) Four tri-axial acceleration sensors shall be installed on top of each pylon footing, one at each corner, positioned to capture all directions of motion including rocking in both horizontal directions.

(vi) One tri-axial accelerometer shall be installed at the top of each pylon. One tri-axial accelerometer shall be installed at each pylon at bridge deck level. One tri-axial accelerometer shall be installed at each pylon between bridge deck level and the top of pylon.

(vii) One biaxial tilt meter shall be installed at the top and bottom of each pylon to measure the vertical inclination (tilt/level).

(viii) Any pylon cross beams shall have a tri-axial accelerometer located at mid-span of the cross beam.

(ix) Two displacement transducers shall be installed at each expansion joint to measure longitudinal and transverse movements at the ends of the main span or cable-stayed portion of the bridge.

(x) One weather station to collect data including, but not limited to, temperature, humidity, wind speed and direction data shall be installed at the top of one pylon.

(xi) Three temperature sensors equally spaced along the length of the bridge deck shall be installed on the deck to measure the temperature of the deck material.

(xii) Three temperature sensors equally spaced along the length of each pylon will be installed to measure the temperature of the pylon.

(xiii) Total of 18 tri-axial acceleration sensors shall be equally spaced and installed on the deck level of the bridge between pylons (9 sensors at each side of the deck).

(xiv) Total of 10 tri-axial acceleration sensors shall be equally spaced and installed on each back span of the deck (not between pylons).

(xv) If any portion of the spans have discontinuous transverse deck, then it is considered twinned and requires duplicate instrumentation.

3. Instrument Specifications

3.1 BC Strong Motion Network

All instruments for the BC Strong Motion Network shall:

(a) be self-contained with digitizer and one tri-axial force-balance accelerometer with dynamic range not less than 150 dB;

(b) have a digitizer resolution of at least 24 bits effective and have a minimum recording capability of 200 Hertz per channel with simultaneous sampling rate for all channels;

(c) have the natural frequency of the sensors > 80 Hz with a flat response from DC to 100 Hz;

(d) have common time synchronization and a minimum standard clock accuracy of 20 ppm, with the clock being capable of recording Coordinated Universal Time;

(e) have accelerometer sensitivity better than 0.1 mg (milli-gravity) RMS and range +/- 4g (order of magnitude below felt level);

(f) provide continuous recording with a minimum three weeks of data storage, which shall not be less than 2 GB;

(g) be capable of secure TCP/IP Ethernet communications for real-time data streaming and seismic parameter reporting including, but not limited to, the following parameters: Peak Ground Acceleration (PGA), Peak Ground Velocity (PGV), Peak Ground Displacement (PGD), and Katayama spectral intensity (KSI) in accordance with the Internet Accelerograph Paper;

(h) allow remote configuration including the calculated parameters, the pre-set trigger levels for all the parameters and the units of all parameters as well as real-time data retrieval over the Provincial fibre network;

(i) by default, not retain any recorded data on site but provide data storage capacity for at least three weeks of storage in the event of power and/or network outage;

(j) have an integrated, uninterruptible power source for at least three weeks without external power; and

(j) include peripheral equipment for secure connectivity and communication with the Provincial fibre network, and data processing software compatible with the current BCSIMS and the BC Strong Motion Network.

3.2 Free-field Downhole Array

The downhole array shall provide free-field ground readings without significant structural influence and shall:

(a) be comprised of tri-axial force-balance accelerometers;

(b) have the natural frequency of the sensors > 80 Hz with a flat response from DC to 100 Hz;

(c) have resolution and dynamic range of at least LSB 3mV and 150 dB, respectively;

(d) be able to have all tests and recalibrations of the accelerometers executed from the surface;

(e) be a central recording unit with sufficient channels for the required servo devices;

(f) connect to the required tri-axial force-balance accelerometers with a minimum full scale range of +/- 4 g;

(g) provide continuous real-time seismic reporting and on-line notification of recorded events.

(h) allow remote configuration of the data recorders and downloading over the Ethernet (must be broadband, not dial-up);

(i) be a multi-tasking operating system that allows simultaneous data acquisition and interrogation;

(j) have common time synchronization and a minimum standard clock accuracy of 20ppm, with the clock being capable of recording Coordinated Universal Time;

(k) provide a minimum digitizer resolution of 24 effective bits;

(l) have a minimum recording capability of 200 sps per channel with simultaneous sampling rate for all channels and storage memory of at least 1.0 GB;

(m) have a frequency range greater than 5 times the natural frequency of the structure;

(n) have built-in digital signal filtering capabilities;

(o) be able to operate from an uninterruptible power source for at least 3 weeks;

(p) be waterproof to the required depth of water pressure;

(q) have cables that are shielded and meet the specifications of Belden cables;

(r) have each downhole accelerometer installed in separate boreholes and in a guided tube, such as an inclinometer tube, such that axial orientation is assured;

(s) have the guided tube embedded in the borehole with grout whose stiffness matches the ground and the accelerometer stabilized in the tube with glass beads to 1.0 metre, and if the guided tube is placed within another pipe in the borehole, that pipe shall not be such as to impart structural interference on the readings; and

(t) include peripheral equipment for Provincial fibre network connectivity and communication, and data processing software shall be compatible with the current BCSIMS and BC Strong Motion Network to provide calculated parameters including, but not limited to, Peak Ground Acceleration (PGA) in units of gravity (g), Peak Ground Velocity (PGV), Peak Ground Displacement (PGD) and Katayama Spectral Intensity (KSI) in accordance with the Internet Accelerograph Paper.

3.3 Structural Health Monitoring

(a) In the event of a power failure the entire Structural Health Monitoring System shall operate from an uninterruptible power source for at least 3 weeks

(b) All Structural Health Monitoring System sensors shall have cables from each sensor to data recorders/loggers that are shielded and meet the specifications of Belden cables.

Accelerometers

(a) All accelerometers shall be connected to data recorders/loggers with suitable wire. No wireless accelerometer is allowed in the Structural Health Monitoring System monitoring.

(b) Uniaxial, biaxial, and tri-axial accelerometers shall be force-balance accelerometers to measure structural response with a minimum full-scale range of +/- 4g and a natural frequency larger than 80 Hz with a flat response from DC to 100 Hz. Sensitivity of the acceleration sensor shall be al least 2.5V/g.

(c) All accelerometers shall have a resolution and dynamic range of at least LSB 3mV and 150 dB (DC to 10 Hz), respectively

(d) A water proof box shall be provided for each accelerometer, and each accelerometer shall have a built-in surge protection against lightning.

(e) Thermal drift of the acceleration sensor shall be less than 600 μg/°C with an operating =temperature between -20°C and 60°C.

Data Recorders

(a) All data recorders shall connect to the accelerometers, displacement transducers and required gauges, providing continuous real-time seismic reporting, on-line notification of recorded events and allow remote configuration and simultaneous data acquisition and interrogation over the Ethernet (must be broadband, not dial-up);

(b) All data recorders shall have a programmable and configurable trigger level for the acquisition of operational vibrations and structural response as well as strong motion vibrations;

(c) All data recorders shall have a battery backed SRAM of at least 5 MB and an additional flash disk of 8 GB.

(d) All data recorders shall be accessible remotely via the Provincial fibre network from the BCSIMS central servers located in the Kamloops Government data center. All data recorders shall be connected to the distribution ITS Communication System specified in Article 14, Section 14.4 of Part 2 of this Schedule.

(e) All data recorders shall have the capability of continuous recording with sufficient channels for all sensors in the Structural Health Monitoring System and shall include peripheral equipment for Provincial fibre network connectivity and communication and data processing software, all compatible with the BCSIMS network

(f) All data recorders shall have the capability of external trigger mode (external pulse on trigger input).

(g) All data recorders shall be able to receive GPS inputs to correct its internal clock on regular basis. Accuracy with GPS shall be at least ±10 μsec. Data recorder shall have a minimum clock accuracy of 20ppm, with a clock that must be capable of recording Coordinated Universal Time.

(h) All data recorders shall a minimum digitizer resolution of 24 effective bits and have resolution and dynamic range of at least LSB 3mV and 155 dB.

(i) All data recorders shall be able to sample at least 200 samples per second per channel with simultaneous sampling rate for all channels and storage memory of at least 2.0 GB. Data recorder shall operate between -30°C and 70°C.

(j) All data recorders shall have built-in digital signal filtering capabilities

GPS sensors

(a) All GPS sensors shall have the capability of measuring in real-time with at least 200 Hz sampling frequency and accuracy of ±1 millimeter.

Tilt meters

(a) All tilt meters shall have the operating temperature between -30°C and 80°C, operating range of ±25°, and linear range of ±10°.

(b) All tilt meters shall have the repeatability of ±0.004°, the resolution less than 0.0003°, and the time constant less than 1 second.

Piezometers

(a) All piezometers shall have the accuracy of at least ±0.1%, and standard pressure ranges of 0 – 1m through 0 – 300 m.

(b) All piezometers shall have the operating temperature range between -15°C and 70°C and have the pressure output of 0 to 5 VDC: 4 to 20 mA.

Displacement sensor

(a) All displacement transducers shall have full stroke range of at least 1500 millimetres or the required displacement capacity by the structure at the location of installation.

(b) All displacement transducers shall have the repeatability of at least ±0.02% full stroke and resolution options of 20 to 500 pulses per inch.

(c) All displacement transducers shall have the measuring cable of stainless steel or thermoplastic with powder-painted aluminum or stainless-steel enclosure material.

(d) All displacement transducers shall operate between -20°C and 70°C and operate up to 10 g at 2000 Hz maximum.

Weather stations

(a) All temperature sensors shall have the operating temperature between -40°C and 80°C with enclosure rating of IP66, NEMA4, and UV-resistant polycarbonate of UL94.

(b) All wind speed and direction sensors shall have the operating range of 0-100 m/s, azimuth of 360° mechanical, accuracy of ±0.3 m/s for wind speed and ±2 degrees for wind direction.

4. Commissioning, Operation and Maintenance

(a) Acceptable data transmission from all sensors through recorders to four remote receivers shall be demonstrated and confirmed that the data from the entire Structural Health Monitoring System is being received at the BCSIMS data center in the form, units and parameters as specified in this Appendix.

(b) Upon written confirmation from the Province that the data is being received as required, a one-month test period with full data transmission will commence. Any issues found during a test period shall be corrected and the one-month test period shall re-commence.

(c) No less than 60 days prior to the anticipated SC1 Substantial Completion Date, Project Co shall submit a report (the "**SHM Commissioning Report**") to the Province's Representative in accordance with the Review Procedure. The SHM Commissioning Report shall include, but not be limited to:

(i) a detailed map of all sensors in the Structural Health Monitoring System including sensor locations clearly marked, channel numbers and orientation clearly marked, and data recorder/logger locations and channel connection numbering clearly included.

(ii) a table of sensors including the information from the sensor map such as channel numbers, code name, sensor type, sensitivity, unit, location, IP number, orientation, etc.

(iii) detailed specifications of all sensors, data records, and other hardware and cables used in the Structural Health Monitoring System.

(iv) any issues or information of note that arose.

(v) a detailed operation and maintenance manual.

5. Equipment warranty

Project Co shall provide the Province with manufacturers warranties for all Structural Health Monitoring System equipment. The warranties shall be a minimum three years in length, commencing at the SC1 Substantial Completion Date.