

SOUTH FRASER PERIMETER ROAD PROJECT**SCHEDULE 4
DESIGN AND CONSTRUCTION**

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**PART 1
GENERAL PROVISIONS**

ARTICLE 1 REFERENCE DOCUMENTS

1.1 Application of DBSS

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

- (a) Section 125 [Value Engineering – Proposal Guidelines] shall not apply;
- (b) any and all reference to “approval by the Ministry Representative” in 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 DBSS to 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) the Concessionaire shall, when required to submit for approval by the Ministry Representative samples of any products proposed by the Concessionaire which are not included in the Recognized Products List, 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) DBSS; and
- (c) any other applicable Reference Documents.

1.4 Reference Concept

Any use by the Concessionaire of any or all aspects of the Reference Concept in performing the Project Work shall be entirely at the Concessionaire’s own risk.

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ARTICLE 2 DESIGN AND CONSTRUCTION

2.1 Responsibility for Design and Construction

The Concessionaire shall be responsible for the Design, the Construction and all other Construction Activities, including completion, commissioning and testing of the New Infrastructure, 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 Province Project Office

The Concessionaire shall make available to the Province, from 60 days after the Effective Date until the Western Segment Substantial Completion Date, at the Concessionaire's sole cost and expense, a minimum of 5,000 square feet of office space:

- (a) approximately 50% of which office space shall be in proximity to the Concessionaire's project office, together with six secured parking stalls; and
- (b) approximately 50% of which office space shall be in proximity to the Concessionaire's field construction office, together with six secured parking stalls,

and both of which locations shall be within reasonable walking distance to public transit. Such office space shall include sufficient office furnishings and equipment, other than computer and telephone network systems, to permit the use thereof by the Province.

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 Concessionaire, and that is experienced in respect of projects of the nature and scope of the Project, to carry out services of the nature required of an engineer to certify the Substantial Completion of the Eastern Segment and the Western Segment and the Total Completion of the Primary Infrastructure Components, or any other component thereof, has acted as an engineer on projects similar to the Project, and is without bias or conflict of interest.

3.2 Independent Certifier Contract

The Province and the Concessionaire 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 the Concessionaire 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 by the Province and the Concessionaire, each acting reasonably.

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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 the Concessionaire shall without the other's prior 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 the Concessionaire shall perform its respective obligations arising under or in connection with the Independent Certifier Contract.

3.6 Cooperation

The Province and the Concessionaire 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 the Concessionaire to the Independent Certifier shall be simultaneously copied to the other and both the Province and the Concessionaire shall be entitled to attend all inspections performed by or meetings involving the Independent Certifier.

3.7 Information

The Concessionaire 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

The Concessionaire 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 the Concessionaire 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

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reasonably practicable. The identity of any such replacement shall be as agreed by the Province and the Concessionaire and the terms of the appointment shall, unless otherwise agreed, be substantially as set out in the Independent Certifier Contract.

3.10 Failure to Agree on Replacement

In the event the Province and the Concessionaire 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 the Concessionaire 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 the Concessionaire 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.

3.11 Independent Certifier for Other Construction Activities

- (a) The parties acknowledge and agree that, unless they agree otherwise, they shall require an independent certifier to certify Substantial Completion and Total Completion of Construction Activities comprised within the Project Work and occurring after the Total Completion Date. To the extent that any such certification is required and the original Independent Certifier does not remain engaged to provide such services pursuant to the Independent Certifier Contract, the parties shall cooperate to select a new Independent Certifier and enter into a new contract with such new Independent Certifier substantially in the form set out in Appendix A [Form of Independent Certifier Contract] to this Schedule, with such modification as may be required to reflect the scope of the required services.
- (b) The provisions of this Part shall apply *mutatis mutandis* to any new Independent Certifier selected by the parties in accordance with this Section.

ARTICLE 4 MUNICIPAL, PORT AND OTHER HIGHWAY FACILITIES

4.1 Responsibility for Municipal, Port and Other Highway Facilities

- (a) The Concessionaire is responsible for, and the Project Work includes, the Design and Construction, including completion, commissioning and testing, of the New Municipal Infrastructure, the New Port Infrastructure and the New Other Highway Infrastructure, which shall be carried out in strict accordance with the Design and Construction Requirements and the Design and Certification Procedure and in such a manner as to comply with this Agreement and all other applicable Project Requirements.

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- (b) The Project Work in connection with the New Municipal Infrastructure and all New Other Highway Infrastructure to be constructed by the Concessionaire that is or will be, in accordance with the Ministry Jurisdictional Atlas, within Municipal jurisdiction, shall be carried out in accordance with the applicable standards of the relevant Municipality.

4.2 Handover of Municipal, Port and Other Highway Facilities

Subject to Section 2.6 [Access to Non-Province Controlled Lands], from and after the Total Completion Date, the Concessionaire shall have no further obligations in respect of the operation of the Municipal Facilities, the Port Facilities or the Other Highway Facilities.

ARTICLE 5 UTILITIES

5.1 Concessionaire Responsibility

The Concessionaire 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 the Concessionaire 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 the Concessionaire 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 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 the Concessionaire during and after the performance of the Project Work and any other works carried out in the course of the Project.

5.3 Location

The Concessionaire 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 Part 2 [Design and Construction Requirements] of this Schedule. The Concessionaire 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

The Concessionaire 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.

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5.5 Utility Work

- (a) The Concessionaire 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 the Concessionaire and, without limiting the generality of the foregoing, the Concessionaire 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) liasing, 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;
 - (v) observing and complying with any instructions or directions relating to the Utility Work that may be issued by the Province or the Province expressly on behalf of a relevant Utility Supplier, Relevant Authorities and 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;
 - (vii) when any Utility Work affecting Utilities referred to in a Utility Agreement are to be carried out, the Concessionaire shall, prior to commencing such Utility Work, give written notice to the relevant Utility Supplier confirming that the Utility Work is being carried out by or on behalf of the Concessionaire pursuant to this Agreement;
 - (viii) all British Columbia Hydro and Power Authority distribution and telecommunication separate and/or combined crossings of the Concession Highway, Other Province Highways and ramps shall be permanently placed underground; and

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- (ix) Policy Item 2 of Section 10 of the Utility Policy Manual shall apply, except that transmission lines of 69 kv crossing the Concession Highway or Other Provincial Highways may be overhead or underground.
- (c) For greater certainty, the Utility Work to be carried out by the Concessionaire under this Agreement will not include the following:
 - (i) the protection or relocation of any of the following:
 - (A) the existing abandoned 42 mm diameter gas distribution pipe along 116 Avenue between 136 Street and 138 Street;
 - (B) any existing abandoned vacuum sanitary sewer pipes along Tannery Road between Timberland and Span;
 - (C) the existing abandoned 200 mm diameter sanitary sewer pipe along 116 Avenue between 136 Street and 138 Street; and
 - (D) the abandoned methane collection pipe (if existing) from the Port Mann landfill leachate pump station/Norseman methane compression station to 250 m east; or
 - (ii) the relocation of either of the following:
 - (A) the existing overhead BC Hydro distribution line along the west side of 72 Street south of Ladner Trunk Road; and
 - (B) the existing twin sanitary sewer crossing of Highway 99 at Crescent Slough,

and the Concessionaire shall not be required to carry out any such work except pursuant to a Province Change to which the provisions of Part 7 [Province Changes and Concessionaire Proposals] shall apply accordingly.

5.6 Concessionaire Responsible for Utility Costs

The Concessionaire shall:

- (a) 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; and
- (b) notwithstanding any contrary provisions in existing Utility Agreements related to payment responsibilities, be responsible for all costs and expenses arising from or in connection with the Utility Work,

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

5.7 Province Assistance with Utility Matters

- (a) Without prejudice to Section 5.10 [New and Amended Utility Agreements] of this Part, and provided the Concessionaire 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 the Concessionaire may request the assistance of the Province (at the expense of the Concessionaire) 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 the Concessionaire and a Utility Supplier as to whether the Concessionaire is entitled to the benefit of or to exercise rights under any Utility Agreement which dispute, despite the reasonable and diligent efforts of the Concessionaire, has not been resolved within a reasonable period of time, the Province, at the request and expense of the Concessionaire, shall use reasonable efforts subject to the scope of the Province's legal rights under the terms of the relevant Utility Agreement to assist the Concessionaire in taking the benefit of or exercising the relevant rights under the Utility Agreement.

5.8 Utility Agreements

In the exercise of its rights and performance of its obligations under this Agreement the Concessionaire 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). The Concessionaire 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

The Concessionaire 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 (excluding any pricing arrangements provided for therein) 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 or 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

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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:

- (a) the Province shall give notice to the Concessionaire and provide the Concessionaire 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) the Province shall 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 Concession Highway or physical damage to the Concession Infrastructure; and
- (c) unless such new Utility Agreement was entered into to facilitate the Project Work, as part of or for the purposes of the acquisition of Designated Lands or Other Highway Lands pursuant to Schedule 8 [Lands], the Province shall issue in respect of such new Utility Agreement a Province Change and the provisions of Part 7 [Province Changes and Concessionaire Proposals] shall apply accordingly.

5.11 Indemnity by Concessionaire

The Concessionaire 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:

- (a) where the Concessionaire is given assistance by the Province in accordance with Section 5.7(a) of this Part, and regardless of whether or not the Concessionaire ultimately obtains the relevant rights of entry, access or other action as a result of the provision of such assistance, the provision of such assistance; and
- (b) where the Concessionaire is given assistance by the Province in accordance with Section 5.7(b) of this Part and, regardless of whether or not the Concessionaire is ultimately able to take the benefit of or exercise the relevant rights under the relevant Utility Agreement as a result of the provision of such assistance, the provision of such assistance.

ARTICLE 6 WARRANTY

6.1 Warranty Period

The Concessionaire warrants to the Province that, on the Western Segment Substantial Completion Date or the earlier termination of this Agreement:

- (a) the Construction of the New Other Highway Infrastructure;

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- (b) the Construction of the New Municipal Infrastructure; and
- (c) the Construction of the New Port Infrastructure,

shall be free of any defect for the Warranty Period.

6.2 Notice and Remedy of Warranty Claim

The Concessionaire shall, upon receipt of notification from the Province, promptly and diligently remedy, at the Concessionaire's expense, any defect referred to in Section 6.1 [Warranty Period] of this Part and identified during the Warranty Period, to the satisfaction of the Province. The parties acknowledge and agree that the Province may not bring any claim arising out of, or relating to, any defect referred to in Section 6.1 [Warranty Period] of this Part, including, without limitation, any claim arising out of, or relating to, any breach of this Agreement, any negligence in the performance of the Concessionaire's obligations under this Agreement or any indemnity obligation of the Concessionaire under this Agreement, each in connection with any defect referred to in Section 6.1 [Warranty Period] of this Part, unless notice of such defect is provided under this Section by the Province to the Concessionaire prior to the expiration of the Warranty Period.

6.3 Failure to Remedy Warranty Claim

If the Concessionaire does not remedy within a reasonable time any defect referred to in Section 6.1 [Warranty Period] of this Part to the satisfaction of the Province, the Province may in its discretion have such rectification work carried out by its own labour forces (including day labour retained by the Province) or by a Third Party Contractor, in which event all costs of and associated with such defect and any remedial or other works required as a result of such defect shall be borne by the Concessionaire.

ARTICLE 7 INSPECTION OF THIRD PARTY SEGMENTS

7.1 Third Party Segment Inspection Plan

- (a) The Concessionaire shall prepare and submit to the Province's Representative pursuant to the Consent Procedure, by no later than 90 days following the Effective Date, a plan (the "**Third Party Segment Inspection Plan**") for the inspection, if any, of each applicable component of the Third Party Segments proposed by the Concessionaire throughout the construction of the Third Party Segments by the relevant Third Party Contractors, and for the joint inspections of each applicable component the Third Party Segments by the Concessionaire and the Province in advance of the substantial completion and total completion thereof pursuant to the relevant agreement for such component of the Third Party Segments, all as contemplated in Section 17.2 [Joint Inspection of Third Party Segments].
- (b) The Concessionaire shall implement and comply with the Third Party Segment Inspection Plan, and shall submit any proposed modifications to the Third Party Segment Inspection Plan to the Province's Representative pursuant to the Review Procedure prior to implementation of any such modifications.

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**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 Circulars and Technical Bulletins included in the Reference Documents;
- (c) BC Supplement to TAC;
- (d) TAC Geometric Design Guide; and
- (e) the applicable standards of the relevant Municipality.

1.2 General Requirements

- (a) The New Infrastructure shall include a new South Fraser Perimeter Road from Highway 17 south of Deltaport Way to west of 104 Avenue in Surrey.
- (b) The Concessionaire'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 1.5 [Traffic Engineering] of this Part.
- (c) The laning and geometrics design criteria for the Project Infrastructure are set out in this Article.

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 [Corridor Laning and Geometric Design Criteria] of this Part. 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 such guides are applicable.

1.2.2 General Laning

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

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- (b) Transitions and interfacing with municipal roadways shall be, at a minimum, consistent with the ambient condition.
- (c) Where existing roads are truncated, cul-de-sacs shall be provided.

1.2.3 Interchanges

- (a) All interchange layouts shall incorporate single-exit configurations, except as noted otherwise in this Article.
- (b) The use of left-side exit and entrances ramps shall not be permitted, except as necessary to accommodate CD roads.
- (c) All exit ramps shall be designed as direct taper exit ramps.
- (d) All entrance ramps shall be designed as parallel entrance ramps.
- (e) Single-point diamond interchanges shall not be permitted.
- (f) Access and egress from interchange ramps shall not be permitted unless provided otherwise in Section 1.4 [Specific Design Requirements by Project Section] of this Part.

1.2.4 Intersections

- (a) All intersections shall be Performance Based Connections unless provided otherwise in this Part.
- (b) Intersections shall be designed in accordance with Chapter 700 of the BC Supplement to TAC unless provided otherwise in Section 1.4 [Specific Design Requirements by Project Section] of this Part.
- (c) Intersection configurations which incorporate left and/or right turn movements of more than two lanes (per movement) shall not be permitted.
- (d) The number of SFPR through lanes at intersections shall be two in each direction.
- (e) Signalized intersection designs shall be in accordance with Article 6 [Electrical, Signals and Lighting Design Criteria] of this Part.
- (f) Single lane channelized right turn movements onto SFPR at signalized intersections shall be yield controlled with no acceleration lanes.
- (g) Double lane channelized right turn movements at signalized intersections shall be signal controlled.
- (h) Right turn movements onto SFPR at unsignalized intersections shall be provided on parallel entrance ramps and designed in accordance with Section 2.4.6 of the TAC Geometric Design Guide.

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1.2.5 Roundabouts

- (a) All roundabouts shall be Performance Based Connections unless provided otherwise in Section 1.4 [Specific Design Requirements by Project Section] of this Part.
- (b) Roundabouts shall be considered as an option for intersection designs in accordance with Technical Circular T-06/08.
- (c) Roundabouts shall be designed in accordance with Section 740 of the BC Supplement to TAC.
- (d) Roundabouts with more than three lanes within the circulatory roadway shall not be permitted.

1.2.6 Accesses

- (a) Accesses to and egresses from affected properties (other than those properties identified in Appendix H [Exceptions to Access Requirements] of this Schedule) from and to the municipal road network shall be provided in the Design.
- (b) Accesses to and egresses from mainlines of SFPR and Other Provincial Highways shall not be permitted in the Design unless provided otherwise in Section 1.4 [Specific Design Requirements by Project Section] of this Part.
- (c) Accesses to existing Utilities shall be provided in the Design.
- (d) All property accesses to municipal roads are not Performance Based Connections.

1.2.7 Weaving Sections

- (a) The minimum length, number of lanes, and capacity analysis of weaving sections are to be determined using procedures in the Highway Capacity Manual and specified in Section 1.5 [Traffic Engineering] of this Part.
- (b) Weaving sections on the mainline of SFPR and Other Provincial Highways shall be designed as Type 'B' weaving sections in order to maintain the principles of 'lane balance' as per the TAC Geometric Design Guide.

1.2.8 Horizontal Curves

- (a) The minimum horizontal curve radii shown in the design criteria tables for Ministry freeways, expressways, arterials and interchange ramps are based on a maximum superelevation of 6%.
- (b) The minimum horizontal curve radii shown in the design criteria tables for municipal arterial and collector roadways are based on a maximum superelevation rate of 6% for Delta and 4% for Surrey.

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1.2.9 Vertical Curves

Low points in the design profiles shall not occur on Bridges and shall be a minimum of 5 m beyond the abutments.

1.2.10 Stopping Sight Distance

The minimum stopping sight distances shown on the design criteria tables are based on TAC Geometric Design Guide Table 1.2.5.3. The increased stopping sight distance values as shown in TAC Geometric Design Guide Table 1.2.5.4 shall be used where appropriate.

1.2.11 Decision Sight Distance

Decision sight distance based on TAC Geometric Design Guide Table 1.2.5.6 shall be provided, and shall be applied as noted in Section 1.3 [Corridor Laning and Geometric Design Criteria] of this Part.

1.2.12 Clear Zone Requirements

- (a) Clear zone distances and side slope treatments on new roads within Provincial jurisdiction shall be established in accordance with Section 620.06 of the BC Supplement to TAC.
- (b) On highways where the existing shoulder is retained and the ambient (existing) clear zone conditions are deficient, the clear zone distances and side slope treatments are to be established in accordance with Section 620.10 of the BC Supplement to TAC.

1.2.13 Emergency Vehicle Turnarounds

Emergency vehicle turnarounds shall be provided on SFPR at no more than 6 km intervals. Emergency vehicle turnarounds shall be median openings in accordance with TAC Geometric Design Guide 2.3.11. Median openings shall accommodate Light Single-Unit Trucks making u-turns from the inner through lane to the outer through lane.

1.2.14 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.

1.2.15 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 4.
- (c) Roadside barrier warrants shall be in accordance with the Barrier Index Warrant, Section 610 of the BC Supplement to TAC.

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1.2.16 Transit Facilities

All existing transit facilities are to be retained or reconstructed and shall be designed and constructed in accordance with the TransLink Infrastructure Design Guidelines.

1.2.17 Rail Interface

- (a) Rail crossings shall be designed and constructed in accordance with the Railway Agreements, the applicable rail authority requirements, the Bridge Standards and Procedures Manual, CTA Cost Apportionment Guidelines and the Transport Canada Railway Clearance Standard.
- (b) The following rail crossings shall be grade separated:
 - (i) SFPR mainline and Interchange Ramps; and
 - (ii) Highway 17.
- (c) A shared drainage ditch shall be designed and constructed adjacent to SFPR on the parcels of Specified Concession Lands identified by numbers 1 through and including 6 and numbers 22 through and including 31 in Table A.1 [Specified Concession Lands Exceptions] to Schedule 8 in accordance with the draft letter agreement between British Columbia Railway Company and the Province dated July 2, 2009.
- (d) A shared access road shall be designed and constructed adjacent to SFPR on the parcels of Specified Other Highway Lands identified by numbers 19 through and including 26 in Table B.1 [Specified Other Highway Lands Exceptions] to Schedule 8 in accordance with the BNSF Master Agreement.

1.2.18 Wildlife Mitigation Measures

Wildlife crossings and buffers shall be provided in accordance with Schedule 6 [Environmental Obligations].

1.2.19 Noise Mitigation

- (a) All noise mitigation, attenuation and impact assessment work required to be carried out by the Concessionaire in accordance with this Section 1.2.19 [Noise Mitigation Work] shall be in accordance with the Noise Policy, and shall assume free-flowing traffic.
- (b) The Concessionaire shall identify appropriate works designed to achieve the mitigation requirements, and where mitigation is warranted under the Noise Policy. Mitigation shall be designed to achieve a minimum 5 dBA reduction in noise at ground floor level, as compared to 2021 levels predicted by the Concessionaire's noise assessment identified in Section 1.2.19(g) of this Part. Acceptable noise mitigation works may include, but not necessarily be limited to, noise barriers and specialized pavement treatments (such as OGFC).

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- (c) Noise mitigation works (walls, berms or wall/berm combinations) to be carried out by the Concessionaire shall be limited to the locations and lengths set out in Table 1.2.19 [Noise Mitigation Locations]:

Table 1.2.19 Noise Mitigation Locations

| Location | Noise Wall Length (m) |
|---|-----------------------|
| Nordel Way to Glenrose Cannery | 1000 |
| Glenrose Cannery to Elevator Road (at ravines only) | 500 |
| Bridgeview | 1000 |

and if any noise mitigation works (walls, berms or wall/berm combinations) other than those set out in Table 1.2.19 [Noise Mitigation Locations] are required to be carried out by the Concessionaire in accordance with the Final Design, then the Province shall issue a Province Change therefor and the provisions of Part 7 [Province Changes and Concessionaire Proposals] shall apply accordingly.

- (d) The benchmark maximum mitigation cost in Policy 4.3 of the Noise Policy shall not apply except that prior to final design of the noise mitigation the Concessionaire shall notify the Province's Representative of areas where the estimated mitigation costs are expected to exceed [REDACTED] per directly-fronting residential unit.
- (e) Prior to Construction, the Concessionaire shall conduct a traffic noise impact assessment specific to the Design that will include re-establishment of baseline noise levels. Baseline noise measurements shall allow sufficient accuracy to permit prediction of mitigation requirements.
- (f) A noise impact assessment to predict construction-related noise shall be conducted using current US Federal Highway Administration software or equivalent and shall include site-specific consideration of construction staging, night work, and the Construction Plant.
- (g) The Concessionaire shall conduct a traffic noise impact assessment to predict operational Project noise (using 2021 traffic volumes provided in the EA Application), and verify that its noise mitigation Design is expected to meet the requirements of the Noise Policy and Section 1.2.19(b) of this Part. The Concessionaire 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 all traffic (24 hours per day) traveling at the posted speeds.
- (h) Where Project construction-related noise levels are predicted to exceed L_d 80 dBA and L_n 65 dBA, and mitigation is warranted for operational traffic noise levels under the Noise Policy, noise mitigation works shall be constructed prior to other Construction Activities.
- (i) The Concessionaire shall conduct post construction noise monitoring at all noise monitoring sites including those listed in the EA Application and those established by the Concessionaire within one year following, for noise monitoring sites within the Eastern Segment, the Eastern Segment Substantial Completion Date and, for noise monitoring sites within the Western Segment, the Western Segment Substantial Completion Date.

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- (j) If the results of post-construction noise monitoring indicate that noise mitigation works and any other noise attenuation measures for the Project fail to achieve the performance identified in Section 1.2.19(b) of this Part, the Concessionaire shall assess and recommend additional noise mitigation measures to the Province's Representative.
- (k) Notwithstanding the foregoing, OGFC shall be provided for noise mitigation as the surface course for the following portions of the SFPR mainline at a minimum:
 - (i) from the eastern limit of construction for a distance of 2700 m to the west;
 - (ii) between 300 metres south of Ladner Trunk Road and 300 metres north of Ladner Trunk Road; and
 - (iii) from the west side of Highway 91 for a distance of 1 km to the east.

1.2.20 Hydrology Mitigation Berms

- (a) The Concessionaire shall be responsible for the final design and the construction of the hydrology mitigation berms in accordance with the following Reference Documents:
 - (i) SFPR – Conceptual Design of Hydrology Mitigation for Burns Bog; and
 - (ii) SFPR – Preliminary Design of 80th Street Hybrid Peat Berm.
- (b) For greater certainty, the Project Work to be carried out by the Concessionaire under this Agreement in relation to the hydrology mitigation for Burns Bog will not include the design and construction of flap gates in the following areas:
 - (i) from 25 m east of the western boundary of PID 002-147-947 and 25 m west of the eastern boundary of PID 008-821-321; and
 - (ii) from 25 m east of the western boundary of PID 008-821-321 and 25 m west of the eastern boundary of PID 005-245-486,

and if any such work is required to be carried out by the Concessionaire in accordance with the Final Design, then the Province shall issue a Province Change therefor and the provisions of Part 7 [Province Changes and Concessionaire Proposals] shall apply accordingly.

1.2.21 Contamination Management Requirements

The Concessionaire shall implement the contamination management requirements set out in Section 3.8 [Contamination Management Requirements] of Schedule 6.

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1.3 Corridor Laning and Geometric Design Criteria

1.3.1 South Fraser Perimeter Road (SFPR)

Table 1.3.1 provides the highway geometric design criteria that are to be applied for the design and construction of SFPR. Site specific additional requirements and/or exceptions (if any) to these requirements are addressed in Section 1.4 [Specific Design Requirements by Project Section] of this Part.

Table 1.3.1

| | SFPR |
|--------------------------------------|------------------------------|
| Design Classification ⁽⁷⁾ | RAD |
| Posted Speed | 80 km/h |
| Design Speed | 80 km/h |
| Basic Lanes | 4 (2 per direction) |
| Minimum Radius | 250 m |
| Min. K Factor Sag | 32(16) ⁽⁴⁾ |
| Min. K Factor Crest | 36 ⁽⁵⁾ |
| Max. Grade | 4.0% |
| Min. Grade | 0.0% ⁽⁶⁾ |
| Max. Superelevation | 6% |
| Minimum S.S.D. | 140 m |
| Minimum D.S.D. | 230 m |
| Lane Width | 3.60 m ⁽¹⁾ |
| Shoulder Width Outside | 2.50 m |
| Shoulder Width Inside | 0.50 – 2.90 m ⁽²⁾ |
| Median Width | 1.6 – 4.0 m ⁽³⁾ |
| Design Vehicle ⁽⁷⁾ | WB20 |

Notes:

- (1) Interchange and intersection deceleration and acceleration lanes shall be 3.5 m wide with 2.5 m outside paved shoulders.
- (2) Inside shoulder width varies depending on the horizontal and vertical alignment. The inside shoulder width shall not be less than 0.5 m between the Concrete Median Barrier (CMB) face and the lane line provided the minimum SSD can be achieved. Where SSD is restricted by horizontal curvature and the CMB, the inside shoulder width shall be increased to improve the minimum SSD up to a maximum inside shoulder width of 2.9 metres using an asymmetrical median treatment as described in Section 630.02(6) of the BC Supplement to TAC.
- (3) Median width varies depending on the horizontal and vertical alignment. In tangent and sections with flat horizontal curves, the median width shall be a minimum of 1.6 metres. In areas of tight horizontal curves, the inside shoulder widths shall be increased to improve the minimum SSD, to a maximum overall median width of 4.0 metres.
- (4) Unbracketed value shown is the minimum k value based on headlight control for sag curves and shall apply where the roadway is unlit. Where the roadway is fully illuminated, the minimum k value shown in brackets, based on comfort control, may be used.
- (5) The minimum k value for crest curves is based on taillight control.
- (6) The minimum gradient is 0.0%, except where the cross slope is less than 0.50% a minimum longitudinal gradient of 0.50% shall be achieved.

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- (7) Design Classification and Design Vehicle terms have the meanings given thereto in the TAC Geometric Design Guide.

1.3.2 Deltaport Way, Highway 17 and Highway 99

Table 1.3.2 provides the highway geometric design criteria to be applied to Deltaport Way, Highway 17 and Highway 99. Site specific additional requirements and/or exceptions (if any) to these requirements are addressed in Section 1.4 [Specific Design Requirements by Project Section] of this Part.

Table 1.3.2

| Geometric Design Criteria Deltaport Way, Highway 17 and Highway 99 | | | | |
|---|-----------------------|-----------------------|-----------------------|---------------------------------|
| | Deltaport Way | Highway 17 | Highway 99 | Highway 99 C-D Roads |
| Design Classification ⁽⁶⁾ | RAU | RAD | RFD | RFD |
| Posted Speed | 80 km/h | 90 km/h | 100 km/h | 80 km/h |
| Design Speed | 80 km/h | 90 km/h | 100 km/h | 80 km/h |
| Basic Lanes | 2 | 4 | 4 ⁽³⁾ | 1-2 |
| Minimum Radius | 250 m | 340 m | 440 m | 250 m |
| Min. K Factor Sag | 32(16) ⁽¹⁾ | 40(20) ⁽¹⁾ | 50(25) ⁽¹⁾ | 32(16) ⁽¹⁾ |
| Min. K Factor Crest | 36 ⁽²⁾ | 53 ⁽²⁾ | 80 ⁽²⁾ | 36 ⁽²⁾ |
| Max. Grade | 8.0% | 4.0% | 4.0% | 6.0% |
| Min. Grade | 0.0% ⁽⁴⁾ | 0.0% ⁽⁴⁾ | 0.0% ⁽⁴⁾ | 0.0% ⁽⁴⁾ |
| Max. Superelevation | 6% | 6% | 6% | 6% |
| Minimum S.S.D. | 140 m | 170 m | 210 m | 140 m |
| Minimum D.S.D. | 230 m | 275 m | 315 m | 230 m |
| Lane Width | match existing | match existing | 3.70 m | 3.60m – 4.8m ⁽⁵⁾ |
| Shoulder Width Outside | match existing | match existing | 2.50m | 2.50 m |
| Shoulder Width Inside | open shoulder | match existing | varies | 1.00 m |
| Median Width | N/A | match existing | varies | N/A |
| Design Vehicle ⁽⁶⁾ | WB20 | WB20 | WB20 | WB20 |

Notes:

- (1) Unbracketed value shown is the minimum k value based on headlight control for sag curves and shall apply where the roadway is unlit. Where the roadway is fully illuminated, the minimum k value shown in brackets, based on comfort control, may be used.
- (2) The minimum k value for crest curves is based on taillight control.
- (3) Four basic lanes to be provided on Highway 99. However, a northbound collector-distributor system shall be provided at the SFPR interchange.
- (4) The minimum gradient is 0.0%, except where the cross slope is less than 0.50% a minimum longitudinal gradient of 0.50% shall be achieved.
- (5) Highway 99 collector distributor roads: 3.60m lane widths for two lane road; 4.80m minimum lane width for single lane road.
- (6) Design Classification and Design Vehicle terms have the meanings given thereto in the TAC Geometric Design Guide.

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1.3.3 Interchange Ramps

Table 1.3.3 provides the geometric design criteria to be applied to interchange ramps.

Table 1.3.3

| Geometric Design Criteria: Interchange Ramps | | | | | |
|---|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|
| | Loop Ramps | 1 or 2 Lane Ramps | 1 or 2 Lane Ramps | 1 or 2 Lane Ramps | 1 or 2 Lane Ramps |
| Design Classification ⁽⁶⁾ | RAD | RAD | RAD | RAD | RAD |
| Posted Speed | 40 km/h | 50 km/h | 60 km/h | 70 km/h | 80 km/h |
| Design Speed ⁽¹⁾ | 40 km/h | 50 km/h | 60 km/h | 70 km/h | 80 km/h |
| Minimum Radius | 55 m | 90 m | 130 m | 190 m | 250 m |
| Min. K Factor Sag | 4 ⁽²⁾ | 6 ⁽²⁾ | 9 ⁽²⁾ | 12 ⁽²⁾ | 16 ⁽²⁾ |
| Min. K Factor Crest | 4 ⁽³⁾ | 7 ⁽³⁾ | 13 ⁽³⁾ | 23 ⁽³⁾ | 36 ⁽³⁾ |
| Max. Grade | 7.0% | 7.0% | 6.0% | 6.0% | 6.0% |
| Min. Grade | 0.0% ⁽⁴⁾ | 0.0% ⁽⁴⁾ | 0.0% ⁽⁴⁾ | 0.0% ⁽⁴⁾ | 0.0% ⁽⁴⁾ |
| Max. Superelevation | 6% | 6% | 6% | 6% | 6% |
| Minimum S.S.D. | 45 m | 65 m | 85 m | 110 m | 140 m |
| Minimum D.S.D. | 75 m | 145 m | 175 m | 200 m | 230 m |
| Lane Width | 3.60/4.80 m ⁽⁵⁾ | 3.60/4.80 m ⁽⁵⁾ | 3.60/4.80 m ⁽⁵⁾ | 3.60/4.80 m ⁽⁵⁾ | 3.60/4.80 m ⁽⁵⁾ |
| Shoulder Width Outside | 2.50 m | 2.50 m | 2.50 m | 2.50 m | 2.50 m |
| Shoulder Width Inside ⁽⁶⁾ | 1.00 m | 1.00 m | 1.00 m | 1.00 m | 1.00 m |
| Design Vehicle ⁽⁶⁾ | WB20 | WB20 | WB20 | WB20 | WB20 |

Notes:

- (1) Refer to Section 1.4 of this Part for any specific minimum ramp design speed requirements.
- (2) The minimum k value for sag curves is based on comfort control.
- (3) The minimum k value for crest curves is based on taillight control.
- (4) The minimum gradient is 0.0%, except where the cross slope is less than 0.50% a minimum longitudinal gradient of 0.50% shall be achieved.
- (5) 3.60 m lane width for two lane ramps. 4.80 m lane width for single lane ramps.
- (6) Design Classification and Design Vehicle terms have the meanings given thereto in the TAC Geometric Design Guide.

1.3.4 Cross Streets, Access Roads and Municipal Roadways Geometric Design Criteria**1.3.4.1 General Requirements**

- (a) The standard cross slopes on roadways within Municipal jurisdiction shall be 2.5%.
- (b) Where raised medians are incorporated along cross streets within Provincial jurisdiction, the inside/median through lane shall have a minimum clear width of

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4.0 m (i.e. the lane widths identified in this Section 1.3.4 do not include the gutter pan where barrier curbs are used).

- (c) The minimum Decision Sight Distances shown in the Tables in this Section 1.3.4 are based on the values shown in Column A or B of TAC Geometric Design Guide Table 1.2.5.6 for stopping on a rural or urban roadway respectively. On roadways where the situation is more complex, and where a speed, path, or direction change is required, the appropriate value from Columns C through E of TAC Table 1.2.5.6 shall be applied.

1.3.4.2 Specific Requirements

The following Tables 1.3.4a through 1.3.4g provide the geometric design criteria to be applied to cross streets and roadways within Municipal jurisdiction. Site specific additional requirements and/or exceptions (if any) to these requirements are addressed in Section 1.4 [Specific Design Requirements by Project Section] of this Part.

Table 1.3.4a

| Geometric Design Criteria: Cross Streets, Access Roads and Municipal Roadways Corporation of Delta Section | | | | |
|---|--------------------------|---|---|---|
| | Ladner Trunk Road | 72 Street (Ladner Trunk Road to Burns Drive) | 72 Street (south of Ladner Trunk Road) | Burns Drive (72 Street to 88 Street) |
| Design Classification ⁽³⁾ | RAU | ---- | RCU | ---- |
| Posted Speed | 80 km/h | 30 km/h | 50 km/h | 30 km/h |
| Design Speed | 80 km/h | 30 km/h | 50 km/h | 30 km/h |
| Basic Lanes | 2 | 1 | 2 | 1 |
| Minimum Radius | 250 m | 30 m | 90 m | 30 m |
| Min. K Factor Sag | 32(16) ⁽¹⁾ | 4(2) ⁽¹⁾ | 12(6) ⁽¹⁾ | 4(2) ⁽¹⁾ |
| Min. K Factor Crest | 36 ⁽²⁾ | 2 ⁽²⁾ | 7 ⁽²⁾ | 2 ⁽²⁾ |
| Max. Grade | 6.0% | 8.0% | 8.0% | 8.0% |
| Max. Superelevation | 6% | 6% | 6% | 6% |
| Minimum S.S.D. | 140 m | 30 m | 65 m | 30 m |
| Minimum D.S.D. | 230 m | ---- | 145 m | ---- |
| Lane Width | 3.70 m | 4.00 m | 3.50 m | 4.00 m |
| Shoulder Width Outside | 2.00 m | 1.00 m | 1.00 m | 1.00 m |
| Sidewalk Width | N/A | N/A | N/A | N/A |
| Shoulder Treatment | open shoulder | open shoulder | open shoulder | open shoulder |
| Median Width | N/A | N/A | N/A | N/A |
| Design Vehicle ⁽³⁾ | WB20 | WB20 | WB20 | WB20 |

Notes:

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- (1) Unbracketed value shown is the minimum k value based on headlight control for sag curves and shall apply where the roadway is unlit. Where the roadway is fully illuminated, the minimum k value shown in brackets, based on comfort control, may be used.
- (2) The minimum k value for crest curves is based on taillight control.
- (3) Design Classification and Design Vehicle terms have the meanings given thereto in the TAC Geometric Design Guide.

Table 1.3.4b

| Geometric Design Criteria: Cross Streets, Access Roads and Municipal Roadways Corporation of Delta Section | | | | | |
|---|---|---|--|--|--|
| | Burns Drive (72 Street to Crescent Slough) | Burns Drive (Crescent Slough to 64 Street) | 72 Street (at SFPR crossing near McAllister Road) | 80 Street (North of SFPR) | 80 Street (South of SFPR) |
| Design Classification ⁽³⁾ | RCU | ---- | ---- | UCU | ---- |
| Posted Speed | 50 km/h | 30 km/h | 30 km/h | 50 km/h | 30 km/h |
| Design Speed | 50 km/h | 30 km/h | 30 km/h | 50 km/h | 30 km/h |
| Basic Lanes | 2 | 1 | 1 | 2 | 1 |
| Minimum Radius | 90 m | 30 m | 30 m | 90 m | 30 m |
| Min. K Factor Sag | 12(6) ⁽¹⁾ | 4(2) ⁽¹⁾ | 4(2) ⁽¹⁾ | 12(6) ⁽¹⁾ | 4(2) ⁽¹⁾ |
| Min. K Factor Crest | 7 ⁽²⁾ | 2 ⁽²⁾ | 2 ⁽²⁾ | 7 ⁽²⁾ | 2 ⁽²⁾ |
| Max. Grade | 8.0% | 12.0% | 8.0% | 8.0% | 12.0% |
| Max. Superelevation | 6% | 6% | 6% | 6% | 6% |
| Minimum S.S.D. | 65 m | 30 m | 30 m | 65 m | 30 m |
| Minimum D.S.D. | 75 m | ---- | ---- | 160 m | ---- |
| Lane Width | 3.50 m | 4.00 m | 4.00 m | 3.50 m | 4.00 m |
| Shoulder Width Outside | 1.50 m | 1.00 m | 1.00 m | 1.50 m | 1.00 m |
| Sidewalk Width | N/A | N/A | N/A | N/A | N/A |
| Shoulder Treatment | open shoulder | open shoulder | open shoulder | open shoulder | open shoulder |
| Median Width | N/A | N/A | N/A | N/A | N/A |
| Design Vehicle ⁽³⁾ | WB20 | WB20 | WB20 | WB20 | WB20 |

Notes:

- (1) Unbracketed value shown is the minimum k value based on headlight control for sag curves and shall apply where the roadway is unlit. Where the roadway is fully illuminated, the minimum k value shown in brackets, based on comfort control, may be used.
- (2) The minimum k value for crest curves is based on taillight control.
- (3) Design Classification and Design Vehicle terms have the meanings given thereto in the TAC Geometric Design Guide.

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Table 1.3.4c

| Geometric Design Criteria: Cross Streets, Access Roads and Municipal Roadways Corporation of Delta Section | | | | | | |
|---|---|--|---|---|---|----------------------|
| | Tilbury Connector (80 Street to SFPR) ⁽⁴⁾ | River Way (Alexander Road to South of SFPR) | River Road (at tie in to Highway 91 Connector) | Highway 91 Connector (from River Road to SFPR) | Highway 91 Connector (from SFPR to Highway 91) | Nordel Way |
| Design Classification ⁽⁴⁾ | UCU | RCU | RCU | UAU | UAU | UAU |
| Posted Speed | 50 km/h | 50 km/h | 50 km/h | 50 km/h | 60 km/h | 50 km/h |
| Design Speed | 50 km/h | 50 km/h | 50 km/h | 50 km/h | 60 km/h | 50 km/h |
| Basic Lanes | 4 | 2 | 2 | 3-4 ⁽³⁾ | 4 | 4 |
| Minimum Radius | 90 m | 90 m | 90 m | 90 m | 130 m | 90 m |
| Min. K Factor Sag | 12(6) ⁽¹⁾ | 12(6) ⁽¹⁾ | 12(6) ⁽¹⁾ | 12(6) ⁽¹⁾ | 18(9) ⁽¹⁾ | 12(6) ⁽¹⁾ |
| Min. K Factor Crest | 7 ⁽²⁾ | 7 ⁽²⁾ | 7 ⁽²⁾ | 7 ⁽²⁾ | 13 ⁽²⁾ | 7 ⁽²⁾ |
| Max. Grade | 8.0% | 8.0% | 8.0% | 8.0% | 8.0% | 8.0% |
| Max. Superelevation | 6% | 6% | 6% | 6% | 6% | 6% |
| Minimum S.S.D. | 65 m | 65 m | 65 m | 65 m | 85 m | 65 m |
| Minimum D.S.D. | 160 m | 75 m | 75 m | 160 m | 205 m | 160 m |
| Lane Width | 3.50 m | 3.50 m | 3.50 m | 3.50 m | 3.50 m | 3.50 m |
| Shoulder Width Outside | 2.00 m | 1.50 m | 1.50 m | 2.00 m | 2.00 m | 1.50 m |
| Sidewalk Width | N/A | N/A | N/A | N/A | N/A | N/A |
| Shoulder Treatment | open shoulder | open shoulder | open shoulder | open shoulder | open shoulder | open shoulder |
| Median Width | N/A | N/A | N/A | N/A | N/A | N/A |
| Design Vehicle ⁽⁵⁾ | WB20 | WB20 | WB20 | WB20 | WB20 | WB20 |

Notes:

- (1) Unbracketed value shown is the minimum k value based on headlight control for sag curves and shall apply where the roadway is unlit. Where the roadway is fully illuminated, the minimum k value shown in brackets, based on comfort control, may be used.
- (2) The minimum k value for crest curves is based on taillight control.
- (3) Highway 91 Connector: 3 lanes from River Road to BNSF Railway; 4 lanes from BNSF Railway to SFPR.
- (4) Tilbury Connector is a road that may be included in the Design to connect 80 Street north of SFPR with the SFPR/Tilbury Connection.
- (5) Design Classification and Design Vehicle terms have the meanings given thereto in the TAC Geometric Design Guide.

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Table 1.3.4d

| Geometric Design Criteria: Cross Streets, Access Roads and Municipal Roadways Corporation of Delta Section | | | |
|---|---|---|---|
| | River Road (Nordel Way to Terrace Drive) | Sunbury Port Metro Vancouver Access Road | River Road (92A Avenue to 96 Avenue) |
| Design Classification ⁽³⁾ | UCU | N/A | UCU |
| Posted Speed | 50 km/h | 30 km/h | 60 km/h |
| Design Speed | 50 km/h | 50 km/h | 60 km/h |
| Basic Lanes | 2 | 2 | 2 |
| Minimum Radius | 90 m | 90 m | 130 m |
| Min. K Factor Sag | 12(6) ^{(1)]} | 2 | 18(9) ^{(1)]} |
| Min. K Factor Crest | 7 ⁽²⁾ | 2 | 13 ⁽²⁾ |
| Max. Grade | 8.0% | 8.0% | 8.0% |
| Max. Superelevation | 6% | 2.0% | 6% |
| Minimum S.S.D. | 65 m | N/A | 85 m |
| Minimum D.S.D. | 160 m | N/A | 205 m |
| Lane Width | 3.50 m | 3.50 m | 3.50 m |
| Sidewalk Width | 1.5 m south side | N/A | 1.5 m south side |
| Shoulder Width Outside | 1.50 m | 1.0 m | 1.50 m |
| Shoulder Width Inside | N/A | N/A | N/A |
| Shoulder Treatment | curb and gutter | open shoulder | curb and gutter |
| Median Width | N/A | N/A | N/A |
| Design Vehicle ⁽³⁾ | WB20 | WB20 | WB20 |

Notes:

- (1) Unbracketed value shown is the minimum k value based on headlight control for sag curves and shall apply where the roadway is unlit. Where the roadway is fully illuminated, the minimum k value shown in brackets, based on comfort control, may be used.
- (2) The minimum k value for crest curves is based on taillight control.
- (3) Design Classification and Design Vehicle terms have the meanings given thereto in the TAC Geometric Design Guide.

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Table 1.3.4e

| Geometric Design Criteria: Cross Streets, Access Roads and Municipal Roadways City of Surrey Section | | | | | |
|---|---------------------------------------|----------------------|------------------------------|------------------------------|-------------------------------|
| | River Road (96 Avenue to Miller Road) | Timberland Road | Tannery Road (South of SFPR) | Tannery Road (North of SFPR) | Old Yale Road |
| Design Classification ⁽⁷⁾ | UCU | RCU | UAD | UAU | RAU/RCU ⁽⁵⁾ |
| Posted Speed | 60 km/h | 50 km/h | 60 km/h | 50 km/h | 50 km/h |
| Design Speed | 60 km/h | 50 km/h | 60 km/h | 50 km/h | 50 km/h |
| Basic Lanes | 2 | 2 | 4 | 4 | 2 |
| Minimum Radius | 130 m | 100 m | 150 m | 80 m | 100 m |
| Min. K Factor Sag | 18(9) ⁽³⁾ | 12(6) ⁽³⁾ | 18(9) ⁽³⁾ | 12(6) ⁽³⁾ | 12(6) ⁽³⁾ |
| Min. K Factor Crest | 13 ⁽⁴⁾ | 7 ⁽⁴⁾ | 13 ⁽⁴⁾ | 7 ⁽⁴⁾ | 7 ⁽⁴⁾ |
| Max. Grade | 8.0% | 8.0% | 7.0% | 7.0% | 7.0% |
| Max. Superelevation | 6% | 4% | 4% | 6% | 4% |
| Minimum S.S.D. | 85 m | 65 m | 85 m | 65 m | 65 m |
| Minimum D.S.D. | 205 m | 75 m | 205 m | 160 m | 75 m |
| Lane Width | 3.50 m | 3.50 m | 4.30/3.30 m ⁽¹⁾ | 4.30/3.30 m ⁽²⁾ | match existing |
| Shoulder Width Outside | 1.50 m | 2.00 m | N/A | N/A | match existing |
| Shoulder Width Inside | N/A | N/A | N/A | N/A | N/A |
| Shoulder Treatment | curb & gutter | open shoulder | curb & gutter | curb & gutter | open shoulder |
| Sidewalk Width | 1.5 m south side | N/A | 3.00 m ⁽¹⁾ | 3.00 m ⁽²⁾ | match existing ⁽⁶⁾ |
| Median Width | N/A | N/A | 3.80 m | N/A ⁽²⁾ | N/A |
| Design Vehicle ⁽⁷⁾ | WB20 | WB20 | WB20 | WB20 | WB20 |

Notes:

- (1) Tannery Road (South): 4.30 m curb lane and 3.30 m median lane. 3.00 m multi-use path on northeast side only.
- (2) Tannery Road (North): 4.30 m curb lane and 3.30 m inside lane. 3.00 m multi-use path on northeast side only. Cross section transitions to undivided section (i.e. no median) west of intersection channelisation.
- (3) Unbracketed value shown is the minimum k value based on headlight control for sag curves and shall apply where the roadway is unlit. Where the roadway is fully illuminated, the minimum k value shown in brackets, based on comfort control, may be used.
- (4) The minimum k value for crest curves is based on taillight control.
- (5) Old Yale Road: RAU design classification South-East of SFPR; RCU design classification North-West of SFPR.
- (6) Match existing multi-use path.
- (7) Design Classification and Design Vehicle terms have the meanings given thereto in the TAC Geometric Design Guide.

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Table 1.3.4f

| Geometric Design Criteria: Cross Streets, Access Roads and Municipal Roadways City of Surrey Section | | | | | |
|---|----------------------|----------------------|----------------------------|----------------------|----------------------|
| | Bridge Road | 124 Street | Bridgeview Drive | 130 Street | 116 Avenue Connector |
| Design Classification ⁽⁶⁾ | RLU | RLU | RCU | RLU | UCU |
| Posted Speed | 50 km/h | 50 km/h | 50 km/h | 50 km/h | 50 km/h |
| Design Speed | 50 km/h | 50 km/h | 50 km/h | 50 km/h | 50 km/h |
| Basic Lanes | 2 | 2 | 2 | 2 | 2 |
| Minimum Radius | 100 m | 100 m | 100 m | 100 m | 80 m |
| Min. K Factor Sag | 12(6) ⁽²⁾ | 12(6) ⁽²⁾ | 18(9) ⁽²⁾ | 12(6) ⁽²⁾ | 12(6) ⁽²⁾ |
| Min. K Factor Crest | 7 ⁽³⁾ | 7 ⁽³⁾ | 13 ⁽³⁾ | 7 ⁽³⁾ | 7 ⁽³⁾ |
| Max. Grade | 8.0% | 8.0% | 7.0% | 8.0% | 8.0% |
| Max. Superelevation | 4% | 4% | 4% | 4% | 4% |
| Minimum S.S.D. | 65 m | 65 m | 85 m | 65 m | 65 m |
| Minimum D.S.D. | 75 m | 75 m | 205 m | 75 m | 75 m |
| Lane Width | 3.50 m | 3.50 m | 4.30/3.30 m ⁽¹⁾ | 3.50 m | 3.50 m |
| Shoulder Width Outside | 2.00 m | 2.00 m | N/A | 2.00 m | 2.00 m |
| Shoulder Width Inside | N/A | N/A | N/A | N/A | N/A |
| Shoulder Treatment | open shoulder | open shoulder | curb & gutter | open shoulder | open shoulder |
| Sidewalk Width | N/A | N/A | 1.50 m | N/A | N/A |
| Median Width | N/A | N/A | 5.60 m | N/A | N/A |
| Design Vehicle ⁽⁴⁾ | WB20 | WB20 | WB20 | WB20 | WB20 |

Notes:

- (1) Bridgeview Drive (South): 4.30 m curb lane and 3.30 m median lane.
- (2) Unbracketed value shown is the minimum k value based on headlight control for sag curves and shall apply where the roadway is unlit. Where the roadway is fully illuminated, the minimum k value shown in brackets, based on comfort control, may be used.
- (3) The minimum k value for crest curves is based on taillight control.
- (4) Design Classification and Design Vehicle terms have the meanings given thereto in the TAC Geometric Design Guide.

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Table 1.3.4g

| Geometric Design Criteria: Cross Streets, Access Roads and Municipal Roadways City of Surrey Sections | | | | | |
|--|----------------------|----------------------|-----------------------|------------------------------|----------------------|
| | 115 Avenue | 134 Street | 136 Street | 136/138 Street Connector | King Road Connector |
| Design Classification ⁽⁶⁾ | UCU | ULU | UCU | RLU | RCU |
| Posted Speed | 50 km/h | 50 km/h | 50 km/h | 50 km/h | 50 km/h |
| Design Speed | 50 km/h | 50 km/h | 50 km/h | 50 km/h | 50 km/h |
| Basic Lanes | 2 | 2 | 2 | 2 | 2 |
| Minimum Radius | 80 m | 80 m | 80 m | 100 m | 100 m |
| Min. K Factor Sag | 12(6) ⁽⁴⁾ | 12(6) ⁽⁴⁾ | 12(6) ⁽⁴⁾ | 12(6) ⁽⁴⁾ | 12(6) ⁽⁴⁾ |
| Min. K Factor Crest | 7 ⁽⁵⁾ | 7 ⁽⁵⁾ | 7 ⁽⁵⁾ | 7 ⁽⁵⁾ | 7 ⁽⁵⁾ |
| Max. Grade | 8.0% | 8.0% | 8.0% | 8.0% | 8.0% |
| Max. Superelevation | 4% | 4% | 4% | 4% | 4% |
| Minimum S.S.D. | 65 m | 65 m | 65 m | 65 m | 65 m |
| Minimum D.S.D. | 160 m | 160 m | 160 m | 75 m | 75 m |
| Lane Width | 4.85 m | 5.50 m | 4.85 m | 3.50 m ⁽²⁾ | 3.50 m |
| Shoulder Width Outside | N/A | N/A | N/A | 2.00 m ⁽²⁾ | 2.00 m |
| Shoulder Width Inside | N/A | N/A | N/A | N/A | N/A |
| Shoulder Treatment | curb & gutter | curb & gutter | curb & gutter | open shoulder ⁽²⁾ | open shoulder |
| Sidewalk Width | 2.0 m ⁽³⁾ | N/A | 1.50 m ⁽¹⁾ | N/A ⁽²⁾ | N/A |
| Median Width | N/A | N/A | N/A | N/A | N/A |
| Design Vehicle ⁽⁵⁾ | WB20 | WB20 | WB20 | WB20 | WB20 |

Notes:

- (1) 136 Street: 1.50 m sidewalk on east side only.
- (2) 136/138 Street: Between 137A Street and 138 Street: Curb and gutter on north side, together with 1.50 m sidewalk; concrete roadside barrier on south side.
- (3) 115 Avenue: 2.0 m sidewalk on south side. No sidewalk on north side.
- (4) Unbracketed value shown is the minimum k value based on headlight control for sag curves and shall apply where the roadway is unlit. Where the roadway is fully illuminated, the minimum k value shown in brackets, based on comfort control, may be used.
- (5) The minimum k value for crest curves is based on taillight control.
- (6) Design Classification and Design Vehicle terms have the meanings given thereto in the TAC Geometric Design Guide.

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1.4 Specific Design Requirements by Project Section

In this Section, it has been assumed for description purposes that SFPR and Deltaport Way follow an east/west alignment and Highway 99 runs north/south.

1.4.1 Corporation of Delta South Section

The following section provides the minimum requirements for the Design between Highway 17/Deltaport Way and 96 Street.

1.4.1.1 SFPR/Highway 17/Deltaport Way Connection

In this Section, it has been assumed for description purposes that Highway 17 follows a north/south alignment.

An interchange shall be incorporated into the Design with the following minimum elements:

- (a) All movements shall be free flow.
- (b) The requirement in paragraph (a) above shall not apply to the Highway 17 movements to and from Deltaport Way.
- (c) The through movements on Deltaport Way shall be free flow between SFPR and 57B Street. A protected T intersection at Deltaport Way and 57B Street shall be provided north of Deltaport Way.
- (d) The mainline is to be Highway 17 northbound to SFPR eastbound, and SFPR westbound to Highway 17 southbound.
- (e) An on ramp shall be provided for the eastbound Deltaport Way to eastbound SFPR movement.
- (f) An off ramp shall be provided for the westbound SFPR to westbound Deltaport Way movement.
- (g) A single lane ramp shall be provided for the northbound Highway 17 to northbound Highway 17 movement.
- (h) A single lane ramp shall be provided for the southbound Highway 17 to southbound Highway 17 movement.
- (i) An off ramp shall be provided for the southbound Highway 17 to westbound Deltaport Way movement.
- (j) An on ramp shall be provided for the eastbound Deltaport Way to northbound Highway 17 movement.

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- (k) The southbound Highway 17 to eastbound SFPR and westbound SFPR to northbound Highway 17 movements shall not be provided.

1.4.1.2 SFPR/Highway 99 Connection

In this Section, it has been assumed for description purposes that Highway 17 follows an east/west alignment.

An interchange shall be incorporated into the Design with the following minimum elements:

- (a) The following free flow movements shall be provided:
 - (i) Highway 99 northbound and southbound;
 - (ii) SFPR eastbound and westbound;
 - (iii) Highway 99 northbound to SFPR westbound;
 - (iv) Highway 99 northbound to Highway 17 eastbound and westbound via the new Highway 99 northbound CD road;
 - (v) Highway 99 southbound to SFPR eastbound and westbound;
 - (vi) SFPR westbound to Highway 99 northbound; and
 - (vii) SFPR eastbound to Highway 99 northbound and southbound.
- (b) The SFPR eastbound to Highway 99 northbound free flow movement shall be provided by a minimum of two lanes.
- (c) An off ramp shall be provided from Highway 99 southbound to Burns Drive/72 Street east of Highway 99 to provide access to the Vancouver Land Fill. Intersection control may be provided at the ramp terminal/road interface,
- (d) A northbound CD road on Highway 99 shall be provided. This CD road shall commence east of the SFPR/Highway 99 interchange as a single lane exit ramp and terminate east of the existing Highway 17 interchange. Between the SFPR/Highway 99 interchange and the Highway 17/Highway 99 interchange the CD road is to incorporate a minimum of two lanes. The CD road is to accommodate the following movements:
 - (i) SFPR westbound to Highway 99 northbound and to Highway 17 eastbound and westbound;
 - (ii) Highway 99 northbound to SFPR westbound and to Highway 17 eastbound and westbound; and

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- (iii) Vancouver Land Fill to Highway 99 northbound via a ramp connection from the realigned Burns Drive/72 Street intersection.

The SFPR westbound to Highway 99 northbound, and Vancouver Land Fill to Highway 99 northbound connections to the CD road shall be on separate ramps. All ramp connections to the CD road shall incorporate right side entrances. East of the Highway 17/Highway 99 interchange the two CD road lanes shall diverge with one lane merging onto Highway 99 northbound east of the existing Highway 17/Highway 99 interchange bridge and the other lane exiting onto the existing Highway 17/River Road off ramp.

- (e) The existing direct movement from Highway 99 northbound to the Highway 17/River Road off ramp shall be eliminated and physically prevented.
- (f) The SFPR eastbound to Highway 99 northbound ramp shall connect directly to the Highway 99 northbound mainline between the start and end of the CD road.
- (g) Connectivity of Burns Drive with 72 Street east of Highway 99 shall be provided.
- (h) All connections on Burns Drive and 72 Street to the east of Highway 99 are not Performance Based Connections and shall accommodate all movements and include single lanes on all approaches.
- (i) Movements between Ladner Trunk Road and Burns Drive shall be provided via 72 Street realigned as necessary. 72 Street and Highway 99 shall be grade separated.
- (j) The Design shall be in accordance with Article 6 [Electrical, Signals and Lighting Design Criteria] with regard to the George Massey Tunnel counterflow system.

1.4.1.3 SFPR/Tilbury Connection

A Performance Based Connection shall be incorporated into the Design in the Tilbury area with the following minimum elements:

- (a) All movements between SFPR, 80 Street and Progress Way shall be provided.

1.4.1.4 Weigh Scale Pull Outs

One eastbound and one westbound roadside inspection pullout shall be incorporated in the Design located to enable inspection of commercial vehicle traffic travelling on the SFPR mainline between the Tilbury and Sunbury connections. Roadside inspection pullouts shall be designed in accordance with the Commercial Vehicle Inspection Station Design Guide.

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1.4.1.5 Middle Alpha Landfill to Quantum Landfill

The Design for the Landfill Closure Area shall be consistent with the Middle Alpha to Quantum Landfills Concept Drawing.

1.4.1.6 Cross Streets and Municipal Roadways

The following elements shall be incorporated into the Design:

- (a) SFPR and 64 Street shall be grade separated.
- (b) SFPR and 36 Avenue shall be grade separated.
- (c) SFPR and Ladner Trunk Road shall be grade separated. The design for the grade separation shall accommodate a future signalized intersection (work by others) at Ladner Trunk Road and 72 Street. The Ladner Trunk Road approaches to 72 Street will have left turn lanes that extend through the grade separation of SFPR and Ladner Trunk Road.
- (d) A gated, full movement, emergency access onto SFPR shall be provided to connect to the municipal road network in the vicinity of the Ladner Trunk Road/72 Street intersection.
- (e) New single lane roads (extension of Burns Drive) shall be provided on the east side of Highway 99 between the realigned 72 Street and 88 Street and between Crescent Slough and 64 Street. Pull outs shall be provided on these roads every 200m alternating between the east and west sides of the road.
- (f) A grade separated crossing of SFPR shall be provided at the northern boundary of PID 013-218-557 with tie in to the existing service road. The minimum clearance envelope for the service road shall be 6.0 m horizontal and 4.5 m vertical and accommodate large mammals in accordance with Schedule 6 [Environmental Obligations].
- (g) SFPR and 72 Street shall be grade separated.
- (h) An extension of River Way shall be provided between Alexander Road and the south boundary of PID 008-821-321, including a "T" intersection at and an east-west extension along the south property boundary. The extension of River Way shall include an at-grade crossing of the BNSF Railway and a grade separation with SFPR. The grade separation shall have a minimum horizontal clearance of 15.0 m.

1.4.1.7 Deviations from Specified Design Criteria

- (a) The minimum centreline radius of 72 Street (Ladner Trunk Road to Burns Drive) may be reduced to 10 m within 50 m of the centreline of Highway 99, with lane widening to allow farm vehicles to navigate the curve.

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- (b) The minimum centreline radius of the 80 Street access road (south of SFPR) may be reduced to 20 m at 80 Street and to 25 m within 40 m of the SFPR/Tilbury connection.

1.4.2 Corporation of Delta North Section

The following section provides the minimum requirements for the Design between 96 Street and the City of Surrey.

1.4.2.1 SFPR/Sunbury Connection

Performance Based Connections shall be incorporated into the Design in the Sunbury area with the following minimum elements:

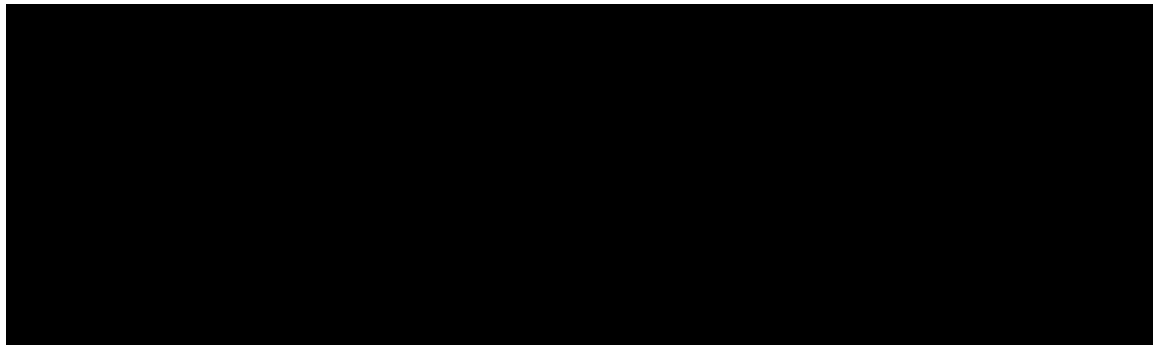
- (a) All movements shall be provided between SFPR, Highway 91, Nordel Way and River Road.

1.4.2.2 Cross Streets and Municipal Roadways

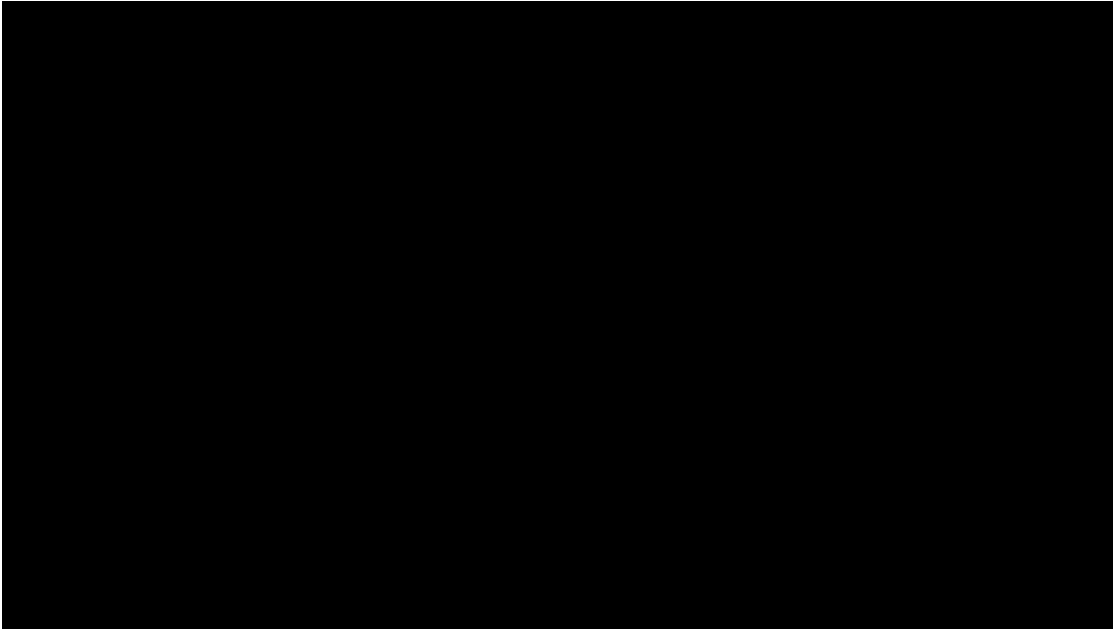
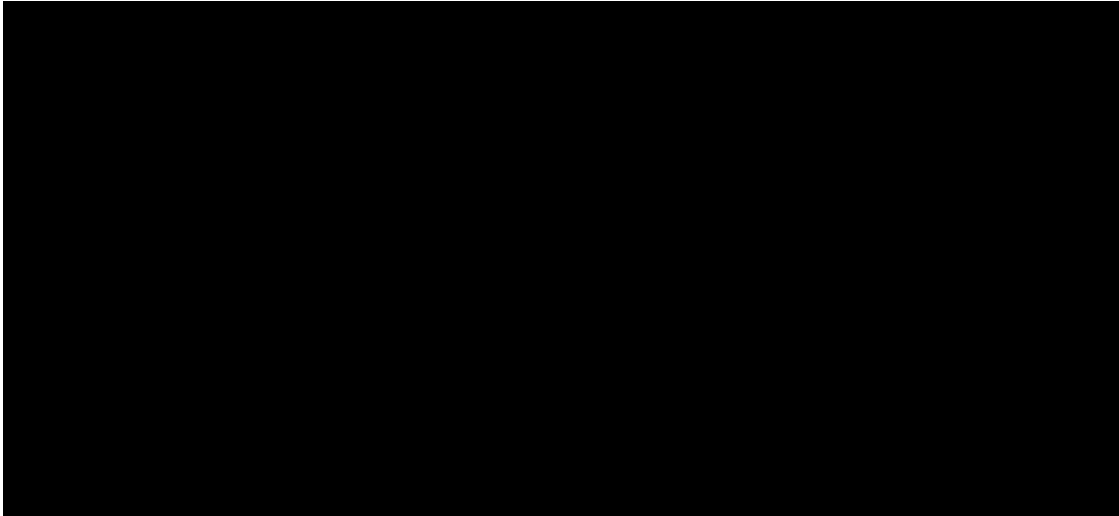
The following elements shall be incorporated into the Design:

- (a) An access to PID 007-790-694 from the Highway 91 Connector shall be provided to accommodate all turning movements for a WB-20 design vehicle, including a Highway 91 Connector northbound left turn lane with a 30 m storage length.
- (b) The existing weigh scale on Nordel Way shall be retained. Access to the site shall be provided via a Performance Based Connection. Trucks to and from SFPR, Highway 91, Nordel Way (east and west of Highway 91) and River Road shall be able to access the weigh scale.
- (c) A cul-de-sac shall be provided at the east terminus of River Road between 96 Street and Nordel Way.
- (d) Continuity of River Road between Nordel Way and Millar Road shall be provided.
- (e) Existing capacity at all intersections on River Road between Nordel Way and Millar Road shall be maintained.

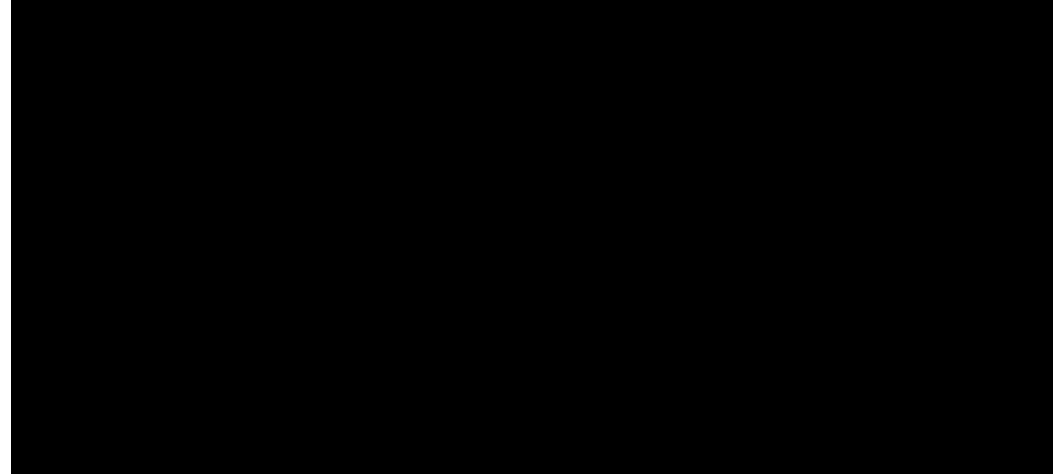
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1.4.3 City of Surrey Section

The following section provides the minimum requirements for the Design in the City of Surrey.

1.4.3.1 SFPR/Elevator Road Connection

The SFPR/Elevator Road connection is not a Performance Based Connection and the following elements shall be incorporated into the Design:

- (a) SFPR through movements shall be free flow.
- (b) A westbound right in/right out access to Elevator Road from SFPR.
- (c) A westbound right turn deceleration/storage lane shall be provided on SFPR and shall have a minimum storage length of 200m.

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1.4.3.2 SFPR/103A Avenue Connection

The SFPR/103A Avenue connection is not a Performance Based Connection and the following elements shall be incorporated in the Design:

- (a) SFPR through movements shall be free flow.
- (b) A right in/right out access to 103A Avenue off SFPR eastbound shall be provided.
- (c) An eastbound right turn deceleration/storage lane shall be provided. The length of right turn storage shall be 30 m.

1.4.3.3 SFPR/Tannery Connection

Performance Based Connections shall be incorporated into the Design in the Tannery area with the following minimum elements:

- (a) All movements between SFPR, Tannery Road, and Timberland Road west of Tannery Road, shall be provided.
- (b) Adequate storage shall be provided to prevent queuing into SFPR throughlanes during a train event.

1.4.3.4 SFPR/124 Street Connection

The SFPR/124 Street Connection is not a Performance Based Connection and the following elements shall be incorporated in the Design:

- (a) SFPR through movements shall be free flow.
- (b) A right in/right out access to 124 Street off SFPR eastbound shall be provided.
- (c) An eastbound right turn deceleration/storage lane shall be provided. The length of right turn storage shall be 30 m.

1.4.3.5 SFPR/Bridgeview Connection

A Performance Based Connection shall be incorporated into the Design at Bridgeview Drive/130 Street with the following minimum elements.

- (a) All movements between SFPR, Bridgeview Drive and 130 Street shall be provided.
- (b) All movements between 130 Street and 116 Avenue shall be provided.

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1.4.3.6 SFPR/136 Street Connection

A Performance Based Connection shall be incorporated into the Design in the vicinity of 136 Street and 138 Street with the following minimum elements:

- (a) All movements between SFPR, 136 Street north of SFPR, and 138 Street north of SFPR shall be provided.
- (b) An SFPR eastbound left turn lane shall be provided.

1.4.3.7 Cross Streets and Municipal Roadways

The requirements that shall be incorporated into the Design include:

- (a) Continuity of River Road between Nordel Way and Millar Road shall be provided.
- (b) A gated, full movement, emergency access from the municipal road network onto SFPR shall be provided in the vicinity of Grace Road.
- (c) SFPR at Old Yale Road shall be grade separated.
- (d) A realignment of Bridge Road between Old Yale Road and 112 Avenue shall be provided generally parallel to and on the north side of SFPR and connecting to Industrial Road. All associated connections are not Performance Based Connections and shall have single lanes on all approaches.
- (e) The existing connection between 112 Avenue and 111A Avenue under the Pattullo Bridge shall be retained.
- (f) Continuity of Bridge Road/Industrial Road/116 Avenue shall be provided between 112 Avenue and 132 Street, including a new 116 Avenue Connector in the vicinity of 130 Avenue. A cul-de-sac shall be provided at the eastern end of 116 Avenue at 132 Street.
- (g) A new municipal road (King Road Connector) shall be provided to connect the existing 115 Avenue (in the vicinity of 132A Street) to the existing King Road (in the vicinity of 138B Street).
- (h) An intersection shall be provided at 136 Street and 115 Avenue. This connection is not a Performance Based Connection and shall provide for all movements between 115 Avenue east and west and 136 Street north of 115 Avenue. All approaches shall have single lanes.
- (i) A gated, full movement, emergency access between King Road and 116 Avenue shall be provided in the vicinity of SFPR.

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- (j) Cul-de-Sacs shall be provided on 115B Avenue (on each side of Bridgeview Drive).
- (k) A gated emergency access from the municipal road network across and onto SFPR in the vicinity of Surrey Road shall be provided.

1.4.3.8 Deviations from the Specified Design Criteria

- (a) The minimum centreline radii connecting Tannery Road to Timberland Road on the north side of the SFPR/Tannery connection may be reduced to 80 m and the “minimum radius on downgrades” adjustment noted in the BC Supplement to TAC shall not apply.
- (b) Minimum centreline radii may be reduced to 15 m at 90 degree bends if providing access to properties north of SFPR connecting 116 Avenue east and west of Bridgeview Drive, with lane widening to allow opposing design vehicles to pass each other.
- (c) The lane width may be reduced to 3.0 m along 136/138 Street Connector between 137A Street and 138 Street. Also between these limits curb and gutter shall be provided on north side together with 1.5 m sidewalk, and 1.10 m offset provided to barrier on south side.
- (d) The minimum centreline radii may be reduced to 40 m at either end of 136 Street, with lane widening to allow opposing design vehicles to pass each other.
- (e) Access to and from the 103A Avenue extension may be provided off of the eastbound off-ramp of the Tannery Road interchange, providing that the design satisfies the safety and operational requirements of this ramp.
- (f) Sight distance may be reduced to 100 meters on SFPR along CRB beneath the SRY trestle bridge south of 112 Avenue.
- (g) 112th to Old Yale road connection shoulder widths may be reduced to 1.0 m beneath the SRY trestle bridge to avoid bridge piers.
- (h) The minimum centerline radius may be reduced to 25 m on the section of 134 Street connecting 115 Avenue to the existing cul-de-sac north of 115 Avenue.
- (i) The minimum centerline radii may be reduced on the 136/138 Street Connector at the following locations:
 - (i) the curve at the intersection with SFPR may be reduced to 34 m; and
 - (ii) the curve at the connection to the existing 138 Street may be reduced to 45 m.

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- (j) The minimum centreline radius of 124 Street may be reduced to 50 metres within 90 metres of the SFPR centreline. K-values are to be verified along the vehicle path.

1.5 Traffic Engineering

1.5.1 General Requirements

The Concessionaire's Design shall meet the traffic engineering requirements specified in this Section 1.5.

1.5.2 Temporary Works

- (a) New temporary works shall meet the traffic performance criteria of this Section 1.5 [Traffic Engineering].
- (b) The traffic volumes used in the analysis and design of new temporary works shall be current volumes, reassigned as appropriate. All traffic data used for analysis shall be less than 18 months old. The Concessionaire shall be responsible for obtaining the necessary traffic data.

1.5.3 Design Hour Traffic Volumes

- (a) The AM and PM design hour traffic volumes are provided in the SFPR Design Traffic Volumes. These volumes shall solely dictate the traffic engineering Design for the Project. Traffic volumes provided in other documentation are not to be used for engineering analysis and Design.
- (b) For all Design traffic analysis, the Peak Hour Factor, as defined in the Highway Capacity Manual, shall be one.

1.5.4 Traffic Engineering Design and Performance Criteria

- (a) The traffic engineering design criteria in this Section 1.5.4 shall only apply to Performance Based Connections in accordance with Section 1.4 [Specific Design Requirements by Project Section] of this Part, temporary works in accordance with Section 1.5.2 [Temporary Works] of this Part, and highway weave sections.
- (b) The Concessionaire shall undertake the necessary traffic engineering analysis to demonstrate that the geometric design and configuration of signalized intersections, including storage lengths of all left and right turn movements, shall accommodate the AM and PM design hour traffic volumes with respect to the following minimum traffic performance criteria as defined in and determined using the methodology prescribed in the Highway Capacity Manual:
 - (i) overall intersection LOS D (average vehicle delay less than 55 seconds);

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- (ii) no movement shall exceed LOS D (average vehicle delay less than 55 seconds);
and
 - (iii) no movement shall exceed a v/c of 0.85.
- (c) The Concessionaire shall undertake the necessary traffic engineering analysis to demonstrate that the geometric design and configuration of unsignalized intersections, including storage lengths of all left and right turn movements, shall accommodate the AM and PM design hour traffic volumes with respect to the following minimum traffic performance criteria as defined in and determined using the methodology prescribed in the Highway Capacity Manual:
- (i) overall intersection LOS D (average vehicle delay less than 35 seconds);
 - (ii) no movement shall exceed LOS D (average vehicle delay less than 35 seconds);
and
 - (iii) no movement shall exceed a v/c of 0.85.
- (d) The Concessionaire shall undertake the necessary traffic engineering analysis to demonstrate that the geometric design and configuration of roundabouts identified as Performance Based Connections in Section 1.4 [Specific Design Requirements by Project Section] of this Part, shall accommodate the AM and PM design hour traffic volumes with respect to the following minimum traffic performance criteria as determined using the methodology prescribed in the SFPR Roundabout Traffic Modelling Requirements:
- (i) overall roundabout LOS D (average vehicle delay less than 55 seconds);
 - (ii) no movement shall exceed LOS D (average vehicle delay less than 55 seconds);
and
 - (iii) no movement shall exceed a v/c of 0.85.
- (e) For adjacent intersections or roundabouts with less than 200 m separation, analysis by the Concessionaire shall demonstrate that the intersections or roundabouts can operate as a network with regard to queue lengths and signal coordination if applicable, and that queues will not spill back into upstream intersections, roundabouts or interchanges.
- (f) The Concessionaire shall undertake the necessary traffic engineering analysis to demonstrate that the geometric design and configuration of weave sections shall accommodate the AM and PM design hour traffic volumes with respect to the following minimum traffic performance criteria as defined in and determined using the methodology prescribed in the Highway Capacity Manual:
- (i) LOS D; and
 - (ii) Volume Ratios (VR) shall not exceed 0.85.

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- (g) The following traffic engineering analysis and reporting shall be included in the Interim and Final Design submissions in accordance with Part 3 [Design and Certification Procedure] of this Schedule:
 - (i) all Highway Capacity Manual traffic engineering analysis worksheets including a discussion on all assumptions and associated rationale; and
 - (ii) digital files and output for all roundabout traffic engineering analysis including a discussion on all assumptions and associated rationale and in accordance with the SFPR Roundabout Traffic Modelling Requirements.

1.5.5 Traffic Signals

- (a) Traffic signal coordination shall be implemented on all roadways where signalized intersection spacing is less than 200 metres.
- (b) If municipal traffic signals are to be included in the traffic signal coordination scheme the Concessionaire shall define the coordination scheme and seek approvals from the relevant Municipality.
- (c) The Concessionaire shall coordinate with the Municipalities with regard to any modifications that may be required at municipal traffic signals during construction and post-construction. Proposed modifications shall be supported by traffic engineering analysis.
- (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 pursuant to the Consent Procedure.
- (e) The Concessionaire 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) The Concessionaire shall design and implement new signal timing plans to accommodate opening day traffic at all intersections within the New Infrastructure. The design of signal timing plans shall meet the performance criteria in Section 1.5.4(b) of this Part. At a minimum four signal timing plans (AM, PM, Midday, and off peak) shall be designed and implemented for each signalized intersection. The Concessionaire shall be responsible for estimating opening day traffic volumes. 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) After opening of the SFPR to general traffic, the Concessionaire shall review the traffic signal operations at all intersections within Provincial jurisdiction one week, one month, six months and annually thereafter. As part of each review, the Concessionaire shall

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undertake traffic counts and develop and implement new signal timing plans to meet the performance criteria in Section 1.5.4(b) of this Part. 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.

- (h) 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.
- (i) The Concessionaire 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

Design of new pavements shall be carried out using Technical Circular T-01/04 as a guideline. The use of alternate pavement design methodologies such as the mechanistic empirical design method is not precluded. Pavement design shall be in accordance with the references to the Ministry's Standard Specifications for Highway Construction provided in Technical Circular T-01/04, except that the corresponding sections of DBSS shall apply. The Concessionaire shall be responsible for traffic analysis for the pavement design.

2.2 General Requirements

- (a) The construction of pavements shall be in accordance with DBSS.
- (b) Final travelled surfaces within the Project Site shall meet the requirements as specified in Schedule 5 [OMR and End of Term].
- (c) Short sections of highway with varying pavement types (for example asphalt and concrete) shall be avoided.

2.3 Asphalt Pavements

- (a) For asphalt paving, DBSS Section 502 shall take precedence over DBSS Section 501. The payment adjustments given in DBSS Section 502 shall not apply. The Roughness criteria identified in Section 2.4 [Roughness] of this Part shall take precedence over DBSS.
- (b) Pavement utilizing an Open Graded Friction Course (OGFC) and stone mastic asphalt is permitted.
- (c) Pavement utilizing OGFC shall be used in certain areas as specified in Article 1 [Laning and Geometrics Design Criteria] of this Part.
- (d) Graded aggregate seal coat is not permitted.

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- (e) Sulphur asphalt is not permitted.

2.4 Roughness

Following Construction, the annual Asset Preservation Performance Measures for highway running surfaces set out in Appendix B [Asset Preservation Specification] of Schedule 5 shall apply. In addition, Roughness for all travel lanes shall have an IRI less than 1.6 m/km upon opening to traffic, as measured in accordance with DBSS. Contrary to DBSS, excluded surfaces shall be limited to concrete surfaced Bridges, concrete surfaced bridge approach slabs, Weigh-in-motion Sites, weigh scales and Shoulders. Acceptance criteria for roughness testing shall apply for both asphalt and concrete pavements.

2.5 Pedestrian and Cycle Facilities

All multiuse paths and off-road pedestrian and cycling facilities shall be surfaced with a minimum of 50mm thick asphalt layer or a minimum 100 mm thick concrete layer, underlain by compacted well graded crush granular base in not less than 150mm thickness, underlain by sub-base material as per design recommendations of Concessionaire's geotechnical engineer. All granular materials shall be constructed as per DBSS Section 202. All gravel surfaces to be asphalt surfaced must have an emulsified asphalt primer. If vehicle use is anticipated, appropriate adjustments to the pavement structure shall be made.

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 for Design of Structures:

- (a) the criteria contained in this Article;
- (b) Bridge Standards and Procedures Manual;
- (c) DBSS; and
- (d) CAN/CSA-S6-06.

3.2 General Requirements

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 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 the Concessionaire 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.

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3.2.2 Unacceptable Materials and Systems

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

- (a) stay-in-place metal formwork;
- (b) metal grid decking;
- (c) sandwich plate decks;
- (d) induced current cathodic protection system;
- (e) Bridge deck heating systems;
- (f) timber components, except timber (if preservative treated) below a known permanent water level;
- (g) proprietary composite steel/concrete girders;
- (h) fibre reinforced polymer deck systems;
- (i) previously used materials; and
- (j) movable Bridges.

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. The Concessionaire shall supply Bridge numeral forms and imprint identification numbers on Bridges.

3.2.4 Structure Parameters Data

As part of the Final Design submission, the Concessionaire shall include a spreadsheet of structure parameters data for Structures as identified in the document "Structure Parameters for Delivery by Engineers-of-Record on Ministry Projects – South Coast Region" dated December 11, 2008.

3.3 New Structures

This section includes the requirements for all new Structures including but not limited to new Bridges, viaducts, elevated road ways, tunnels, retaining walls, sign structures, noise walls and Major Culverts.

3.3.1 Design Criteria

3.3.1.1 Design Loads

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

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

3.3.1.2 Design and Service Life

- (a) All new Structures shall have a minimum Design Life of 75 years starting at the Western Segment Substantial Completion Date. The Service Life of all main structural components (Foundations, piers, abutments, superstructure, deck, saddles, wall components including but not limited to wall facings and anchorages) shall also be 75 years starting at the Western Segment Substantial Completion Date.
- (b) “Service Life” shall be the period of time during which the structural component safely performs its design function without significant repairs, rehabilitation or replacement.
- (c) Time dependent design calculations including corrosion, fatigue and creep shall use a Service Life of 100 years.

3.3.1.3 In-Service Inspection and Maintenance Access for Bridges

- (a) Components that are not completely accessible using conventional and readily available inspection equipment such as manlifts and bridge inspection vehicles shall be provided with permanent access (outside of traffic lanes) that is suitable for safe inspection and maintenance activities.
- (b) Permanent access shall be provided to and inside hollow towers and piers to allow inspection and maintenance. Hollow towers and hollow piers shall be provided with internal lighting and motorized elevators for access. Cable stayed Bridge 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.

3.3.1.4 Clearances

- (a) Horizontal and vertical clearances for Structures shall be provided and maintained in accordance with the BC Supplement to CAN/CSA-S6-06 and the requirements of other authorities having jurisdiction.
- (b) Notwithstanding the requirements of item (a), in Tunnels and below elevated roadways additional horizontal and vertical clearance shall be determined with due regard to life safety including but not limited to ventilation, fire, signage and illumination
- (c) Horizontal and vertical navigation clearance envelopes for new Bridges over navigable waters shall be established and implemented by the Concessionaire in

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accordance with the requirements of Transport Canada's Navigable Waters Protection Division and relevant environmental requirements.

- (d) Horizontal and vertical clearance requirements for air traffic shall be established and implemented by the Concessionaire in accordance with the requirements of Transport Canada.
- (e) The Concessionaire shall establish and implement the required vertical and horizontal clearances for Railways together with the affected Railway and the Canadian Transportation Authority.

3.3.1.5 Aesthetics

Bridges shall be designed in accordance with the guidelines in the Manual of Aesthetic Design Practice as well as CAN/CSA-S6-06 using a "Baseline" classification with the exception of retaining walls and slope protection which shall be based on a "Tourway" classification. Concrete stacking block wall systems, steel sheet pile walls and extended steel pipe piles shall not be permitted where they are readily visible by the public.

3.3.1.6 Elevated Roadways

- (a) Elevated roadways are permitted to allow double decking of the highway. Elevated deck Structures shall be designed to minimize expansion joints.
- (b) Where deck sections flare to accommodate more or fewer lanes, expansion joints shall be carried across the full width of the deck.
- (c) The detrimental effects of vehicular exhaust emissions and road spray containing de-icing salts on the soffits and substructures of elevated deck Structures shall be addressed in the Design of the Structure to ensure that the required Service Life can be achieved. Emission levels shall be established based on 2000 vehicles per hour per lane under the elevated roadway.

3.3.1.7 Road Tunnels

The design of tunnels shall address life safety, including but not limited to fire, ventilation, illumination and signage in accordance with recognized Canadian standards and in the case where Canadian standards are not definitive, the Concessionaire shall apply recognized North American standards.

3.3.1.8 Piers, Abutments, Wing Walls and Return Walls

All exposed portions of piers, abutments, wing walls and return walls shall be reinforced concrete construction.

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- (c) The grade for superstructure members shall be 350 AT Category 3 for plate and 350 A Category 2 for rolled sections. Miscellaneous steelwork (including railings, deck joints, restrainer bolts, anchor bolts, drains, embedments in concrete, fence) shall be hot-dipped galvanized in accordance with CAN/CSA-G164-M92. All non-structural steel shall be hot-dipped galvanized.

3.3.1.11 Deck Wearing Surface Systems

- (a) The deck wearing surface system is defined as the replaceable surface and waterproofing elements that protect the Bridge Deck from abrasion and the ingress of water and chlorides.
- (b) Where asphalt is used, a liquid type waterproofing membrane shall also be used
- (c) The deck wearing surface system can be either structurally monolithic with the Bridge Deck or applied as separate components. For a structurally composite deck wearing surface, the design of the Bridge Deck shall allow for removal and replacement of the wearing surface.
- (d) Deck wearing surface systems shall be provided on all Bridges.
- (e) The skid resistance of the deck wearing surface system shall be consistent with that of the rest of the Project.
- (f) Deck wearing surfaces systems shall be designed to eliminate water penetration into the structural deck over the Service Life of the deck wearing surface system.
- (g) For deck wearing surface systems where the deck wearing surface cannot be rehabilitated without damaging the waterproofing elements, then the deck wearing surface shall have the same Service Life as the waterproofing and drainage elements of the deck wearing surface system.
- (h) Regardless of the deck wearing surface system provided by the Concessionaire, except for Bridges with 100 mm asphalt overlay, all Bridges shall be designed for an additional future load allowance of 50 mm asphalt overlay.
- (i) The Service Life of concrete wearing surface systems shall be 50 years.

3.3.1.12 Bridge Decks

- (a) The Concessionaire shall ensure that the Bridge Deck system 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 Service Life requirements of the Project.
- (b) In particular, the design of concrete Bridge Decks for durability shall consider the following parameters:

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- (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, freeze-thaw durability.
- (c) Using the above noted parameters, ingress of chloride and other contaminants shall be predicted, using generally accepted state-of-the-art software and taking into account concrete cracking, over the Service Life of the Bridge Deck and time to corrosion of the reinforcement shall be established such that a 75 year Service Life is achieved for the Bridge Deck and a 50 year Service Life is achieved for concrete wearing surface systems.
- (d) The design of welded orthotropic steel decks for strength shall be carried out using recognised standards. 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.
- (e) 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-S6-06 shall be supplemented with laboratory testing to produce fatigue design data for each weld detail. Testing shall be carried out on each of the critical details listed below using a full scale model, fabricated using the proposed methods, with care to represent actual fit up conditions:
- (i) welds between longitudinal stiffeners and diaphragms or cross beam webs;
 - (ii) welds between longitudinal stiffeners and deck plate;
 - (iii) longitudinal stiffener splice welds; and
 - (iv) web stiffener to deck connections.

3.3.1.13 Bridge Deck Joints

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

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- (b) Bridge Deck joints shall be dimensioned and detailed to allow sufficient space for joints to be inspected, maintained and replaced.
- (c) Integral and semi-integral abutments shall make provision for movement at the interface between the approach slab and the approach roadway pavement construction.
- (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.
- (e) In-span and mid-span expansion joints are not acceptable.
- (f) Where deck sections flare to accommodate more or fewer lanes, expansion joints shall be carried across the full width of the deck.

3.3.1.14 Deck Drainage

Runoff water from the roadway surface of all Bridges shall be discharged in accordance with the drainage and environmental requirements of the Project.

3.3.1.15 Approach Slabs

Approach slabs shall be provided at all abutments and be designed to mitigate anticipated settlements.

3.3.1.16 Slope Protection

Slope protection shall be provided under all end spans of overpasses and underpasses and shall be in accordance with the Bridge Standards and Procedures Manual.

3.3.1.17 Water Ingress

Water ingress into or onto the substructure or abutment wall backfill from the superstructure above shall be prevented. Joints between the superstructure/end diaphragm and the substructure shall be waterproofed.

3.3.1.18 Foundation Deformations

The Concessionaire shall predict Foundation deformations for new Structures. Predictions shall be made for 2 years, 5 years, 10 years, 20 years, 40 years and 75 years after the Western Segment Substantial Completion Date. Structures shall be designed such that the predicted deformations are accommodated and required clearances are maintained for the Design Life. The Design shall ensure that the required vertical and horizontal clearances are met without additional intervention such as jacking.

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3.3.1.19 Crash Barriers

Structures shall be provided with crash barriers to protect them from vehicular and rail collisions as required by CAN/CSA-S6-06 and as required by other Relevant Authorities such as Railways.

3.3.1.20 Bearings

- (a) The Bridge bearings shall allow sufficient space for bearings to be inspected, maintained and replaced.
- (b) Bearings shall be restrained from “walking”.
- (c) 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/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:

- (1) The testing machine used shall have platens at least 20 mm greater in both plan dimensions than the bearing under test.
- (2) 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.
- (3) The load shall be applied at the rate of 1.5 MPa/minute to a load of 8.0 MPa multiplied by the gross plan area. The deformations shall be recorded.
- (4) 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.
- (5) The load on the bearing shall be maintained at 1.5 MPa for fifteen minutes, and the deformations shall be recorded.
- (6) The bearing shall be reloaded as in step (3), and steps (4) and (5) shall be repeated.
- (7) The bearing shall be reloaded to 11 MPa with deformations being recorded after each 1 MPa increment.

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- (8) The compressive stress of 11 MPa shall be maintained for one hour. The deformation shall be recorded at 10 minute intervals within this one hour period.
- (9) A graph of the pressure versus average deformation with data recorded shall be constructed.
- (10) The rates of loading specified in steps (3) and (4) also apply to steps (6) and (7).

(ii) Combined Compression and Shear Tests

- (1) 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” plus “Vertical Seismic Load”.
- (2) 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.
- (3) 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 based on the following deficiencies:

- (1) if it displays bulging patterns under compression load which indicate laminate placement which does not satisfy design criteria and manufacturing tolerances, or poor laminate bond;
- (2) if it has more than three surface cracks which are greater than 2 mm long and 2 mm deep;
- (3) 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;
- (4) if lack of rubber to steel bond occurs under combined compression and shear tests; or
- (5) if the shear stiffness differs by more than 15% from the calculated value.

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3.3.1.21 Pre-stressed Concrete

Un-bonded pre-stressing is not permitted except that for external tendons inside box girders unbonded tendons are permitted provided a proven system is included to ensure the tendons are permanently protected from corrosion.

3.3.1.22 Hydraulic Design

- (a) The Concessionaire shall undertake all hydrology/hydraulic analyses and design for Structures. This shall include all hydrotechnical modeling, analysis and design to ensure that all Foundations, adjacent facilities, utilities and water course banks are protected from scour.
- (b) The Concessionaire shall identify, design and construct all scour protection, erosion control, and river stabilization necessary to prevent damage to Structures, roadways or property affected by the Project Work.
- (c) Rip-rap material shall be tested for acid rock drainage (ARD) and metal leaching (ML) in accordance with Technical Circular T-10/04.

3.3.1.23 Animal and Bird Access Protection

The Concessionaire shall incorporate features to prevent access to or roosting or habitation in hidden or enclosed spaces.

3.3.2 Cable Stay Bridges

3.3.2.1 Order of Precedence

In addition to the requirements of this Schedule and the applicable codes and standards, the Design and Construction of cable stays shall conform to the requirements of the PTI Guide and the state of the art practice which updates the PTI Guide.

3.3.2.2 Requirements for Cable Stay Structures

Requirements for cable stay Structures include the following:

- (a) All cable systems shall be designed to be replaceable while maintaining traffic. Cable stays shall be capable of being removed and replaced one at a time with the Bridge carrying full design vehicle live load on the travelled lanes, except that the single lane adjacent to the cable-plane may be closed to traffic during cable replacement.
- (b) The structure including cables shall be aerodynamically stable throughout the Design Life and during Construction.
- (c) Cable vibrations and their effects shall be addressed in the Design.

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- (d) Cables and structure shall be designed to avoid ice build-up from falling into traffic.
- (e) The Design shall address differences in the mean temperatures of cables, towers and deck.
- (f) Design for cables and the structure shall include effects of rain and/or ice build up on cables, including the effects on cable vibrations and fatigue life.
- (g) The span shall be designed not to collapse in the event of loss of support of any two consecutive cable stays or hangers, excluding the impact dynamic force resulting from the sudden fracture of the cables. 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.
- (h) All cables shall terminate in the pylon using appropriate anchorages. Saddles shall not be used.
- (i) Further to CAN/CSA-S6-06, Clause 3.10.5, wind tunnel testing shall be performed.
- (j) Cables shall conform to ASTM A416.
- (k) Cable shall be weldless, low relaxation grade. Solid bars shall not be used for cable stays;
- (l) Cable connections and adjacent components shall be designed to exceed the breaking load of the cables at the ultimate limit state.
- (m) Design of cable stays shall allow for the effects of rotation at the anchorages under both static and dynamic loads.
- (n) 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.
- (o) Cables shall be designed against fatigue failure allowing for combined tension and bending (concurrent longitudinal and transverse bending). Fatigue design curves for the cables shall be established from a test program meeting the requirements of CAN/CSA-S6-06. 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.
- (p) Cables and anchorages shall be designed to permit removal and replacement of their cable stays. Cable stays shall be accessible for inspection throughout their length.

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3.3.2.3 *Corrosion Protection*

- (a) Cable stays 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 outer 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 high density polyethylene pipe (HDPE) conforming to ASTM D3035 or ASTM F714. White or light coloured HDPE pipe may be used if the Concessionaire can demonstrate to the Province's Representative that the selected pipe has demonstrated ultra-violet resistance equal to or better than black pipe. Proposed use of HDPE pipe shall be submitted to the Province's Representative in accordance with the Consent Procedure.
- (b) The corrosion protection system shall provide protection during Construction installation of the cables and during the Service Life of the new cable-stayed Bridge Structures.
- (c) Steel pipe sheathing shall not be used.

3.3.2.4 *Deck Replacement*

As part of the Design of cable stayed Bridge Structures, a deck replacement method shall be established by the Concessionaire that meets the requirements of Schedule 5 [OMR and End of Term]. The details of the deck replacement methodology shall be documented and provided to the Province's Representative as part of the Design submission.

3.3.3 *Segmental Concrete Bridges*

Segmental concrete and extradosed Bridges shall be designed and constructed in accordance with, in order of precedence, this Schedule, BC Supplement to CAN/CSA-S6-06, CAN/CSA-S6-06, the AASHTO Specifications for Segmental Bridges and the PTI Guide.

3.4 **Existing Bridges, Tunnels and Major Culverts**

3.4.1 ***General***

- (a) The Project Work shall be carried out in such a manner so as not to affect the following Structures:

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| Structure Name | MoT Bridge Information GIS Structure Name/Number |
|--------------------------|--|
| Alex Fraser Bridge | Alex Fraser S Appro/27535 |
| Southern Railway Trestle | 8355 |
| Skytrain Bridge | 8354 |
| Patullo Bridge | 0933 |
| New Port Mann Bridge | 1614 |
| Old Port Mann Bridge | Port Mann/1614 B |

- (b) The requirements of Section 3.4.2 [Requirements for Existing Bridges, Tunnels and Major Culverts] of this Part (except for Section 3.4.2(f)) shall not apply to the following Structures:

| Structure Name | MoT Bridge Information GIS Structure Name/Number |
|---------------------------------|--|
| Highway 17/BCRC Overhead | Tsawwassen O/H /2452 |
| SFPR/Highway 17 Northbound Ramp | 8312 |
| SFPR/BCRC Overhead | 8313 |
| SFPR/64 Street Underpass | 8316 |
| SFPR/36 Avenue Underpass | 8317 |
| Fraser Heights Bridge | 8360 |

- (c) Where the Concessionaire's Design includes modifications to the Structures identified in Section 3.4.1(b) of this Part, Section 3.4.2 [Requirements for Existing Bridges, Tunnels and Major Culverts] of this Part shall apply.

3.4.2 Requirements for Existing Bridges, Tunnels and Major Culverts

The following requirements apply to existing Bridges, Tunnels and Major Culverts that are part of the Concession Highway or that are affected by the Project Work:

- (a) New structural components added to existing Structures shall be designed to BC Supplement to CAN/CSA-S6-06 and CAN/CSA-S6-06 using the requirements for new Structures.
- (b) Existing Bridges, Tunnels and Major Culverts shall be evaluated using CAN/CSA-S6-06 for live load capacity using the BCL 625 and the Ministry's 85-tonne GVW special permit vehicle loading. Load posting of Bridges, Tunnels and Major Culverts is not permitted and Bridges, Tunnels and Major Culverts found to be substandard with regard to live load capacity shall be upgraded. Load rating and strengthening strategies shall be documented in a report and submitted as part of the design submission.

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- (c) Existing Bridges, Tunnels and Major Culverts shall be seismically analyzed and retrofitted as required, in accordance with the provisions of Article 4 [Seismic Design Criteria] of this Part with the following provisos:
 - (i) Existing Bridges, Tunnels and Major Culverts shall be analyzed for the 10% in 50 year probability of exceedance event and the Cascadia Subduction Zone Event in accordance with Table 4.5 [Minimum Required Seismic Analysis] of this Part.
 - (ii) The minimum performance criteria shall be as described in Appendix D [Seismic Performance Criteria] to this Schedule for the 10% in 50 year probability of exceedance event and the Cascadia Subduction Zone Event.
 - (iii) Where the Structure comprises both new and existing portions, these must be seismically compatible.
 - (iv) Seismic assessment and retrofit strategies shall be documented in a report and submitted as part of the design submission.
- (d) Barriers on existing Bridges, Tunnels and Major Culverts shall be upgraded to meet the requirements of the BC Supplement to CAN/CSA-S6-06 and CAN/CSA-S6-06. The same type of barrier shall be used on each side of the Bridge, Tunnel or Major Culvert.
- (e) The hydraulic opening of culverts shall be upgraded to meet the requirements given in the codes and standards listed in Section 3.1 [Order of Precedence] of this Part.
- (f) Existing clearances for existing Bridges and Tunnels may be maintained or increased from existing conditions, but not decreased. New Structures that twin existing Bridges or Tunnels shall meet the clearance requirements for new Structures.
- (g) The wearing surface of the widened portions of existing Bridge Decks shall be the same material type as that used on the adjoining existing deck.

3.5 New and Existing Retaining Walls

In addition to the requirements for new and existing Structures, the following apply to new and existing retaining walls.

- (a) Additional anchors, tie-backs, soil straps, soil nails, shall be installed for new walls or modifications of existing walls to allow for the end of Term inspection and testing procedures set out in Part 7 [End of Term Audits] of Schedule 7. The number of additional elements provided for 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 walls.
- (c) The following retaining wall systems and abutment wall types are not acceptable:

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- (i) Mechanically stabilized earth (MSE) walls with dry cast concrete block facings; and
- (ii) Metal bin walls.
- (d) Walls required to retain Bridge embankments adjacent to Bridge Foundations are considered abutment walls.
- (e) Mechanically stabilized earth walls with Extensible Reinforcement are not permitted for use as abutment walls or wing walls.
- (f) If the Concessionaire is prevented in the Final Design from using wire-faced walls for any wall that is not any portion of a wall that is not required to be reinforced concrete construction in accordance with Section 3.3.1.8 [Piers, Abutments, Wing Walls and Return Walls] of this Part, then the Province shall issue a Province Change therefor and the provisions of Part 7 [Province Changes and Concessionaire Proposals] shall apply accordingly.
- (g) Geotextiles are not permitted for use as soil reinforcement.
- (h) Wire used in wire facing or soil reinforcing components of all MSE and gabion walls shall be galvanized and shall have a minimum thickness determined in accordance with Section 3.3.1.10(b) of this Part.
- (i) Structural design shall be performed in accordance with this Schedule, the BC Supplement to CAN/CSA-S6-06 and CAN/CSA-S6-06.
- (j) For mechanically stabilized earth walls, items not covered by the AASHTO Standard Specifications shall meet the requirements of the FHWA Guidelines.
- (k) For mechanically stabilized earth abutment walls and wing walls, precast concrete facing panels shall be used and a 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 Standard Specifications. Any strap within a 1:1 slope of an abutment footing or pile cap shall be considered as influenced by the footing.
- (l) The tops of the walls shall be finished in straight-line segments.
- (m) Adequate drainage shall be provided for all walls. Existing walls with substandard drainage shall be retrofitted to provide proper drainage.
- (n) The aesthetics of retaining walls shall be in accordance with the general guidelines in the Manual of Aesthetic Design Practice and in accordance with Section 3.3.1.5 [Aesthetics] and Article 9 [Landscape and Site Restoration Design Criteria] of this Part.
- (o) The following shall apply to existing walls:

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- (i) Existing walls shall be analyzed and retrofitted as required to meet the performance criteria in Appendix D [Seismic Performance Criteria] to this Schedule, as applied in accordance with Article 4 [Seismic Design Criteria] of this Part.
- (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 all design criteria for new walls.
- (iv) If ground conditions in front of an existing wall are changed, then the wall shall be retrofitted to meet the design criteria for new walls.
- (p) 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 DBSS.
- (q) 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.

3.6 Sign, Traffic Signal and Lighting Structures

- (a) The Concessionaire shall design, fabricate and install Structures for Signs, traffic signals and lighting in accordance with the BC Supplement to CAN/CSA-S6-06, CAN/CSA-S6-06 and the Electrical and Signing Materials Standards. Levelling nuts below the base plates are not 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) Camera support Structures shall have a maximum sway of 25mm at 65 km/h wind speed.
- (e) Sign Structures shall be designed and constructed as “Other Structures” for seismic design in accordance with the BC Supplement to CAN/CSA-S6-06 and CAN/CSA-S6-06.

3.7 Noise Walls

- (a) Noise walls shall be designed and constructed in accordance with the BC Supplement to CAN/CSA-S6-06 and CAN/CSA-S6-06.
- (b) Noise walls shall have a minimum Design Life of 50 years.

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- (c) Noise walls on roadside or median barriers shall:
 - (i) meet crash test requirements for TL3 of NCHRP Report 350;
 - (ii) be designed for PL2 loads at 1070 mm height; or
 - (iii) be a system used by other highway jurisdictions, with proven acceptable performance in service.
- (d) Noise walls on Bridges and Structures shall:
 - (i) meet crash test requirements for PL2 (TL4) of NCHRP Report 350; or
 - (ii) be a system used by other highway jurisdictions with proven acceptable performance in service.

ARTICLE 4 SEISMIC DESIGN CRITERIA

4.1 General Requirements and Order of Precedence

The Concessionaire shall comply with the seismic requirements of this Article, including the following which shall apply in descending order of precedence:

- (a) Seismic inputs;
- (b) System level seismic performance criteria;
- (c) Component level design criteria;
- (d) Seismic analyses;
- (e) BC Supplement to CAN/CSA-S6-06;
- (f) CAN/CSA-S6-06;
- (g) ATC-32; and
- (h) ATC-49.

4.2 Seismic Inputs

- (a) The firm ground motion time-histories and response spectra provided in the Design Firm Ground Response Spectra and Ground Motions (New Port Mann Bridge), scaled for the location of the structure as specified below, shall be used for Design of new Structures and the seismic retrofit design for existing Structures. This data includes:

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- (i) Three sets of firm-ground time-history records and the associated uniform hazard response spectrum for each of the following events (the “**Design Earthquake Events**”):
 - (A) 10% in 50 years;
 - (B) 5% in 50 years; and
 - (C) 2% in 50 years.
 - (ii) One set of firm-ground time-history records and the uniform hazard response spectrum corresponding to the Cascadia subduction zone event.
- (b) For the Design Earthquake Events, a set of records is defined as two orthogonal horizontal records and the relevant vertical record for each Design Earthquake Event.
 - (c) The set of records for the Cascadia subduction zone event consists of two orthogonal horizontal records.
 - (d) The firm-ground motion time-histories and response spectra provided in the Design Firm Ground Response Spectra and Ground Motions (New Port Mann Bridge), except those for the Cascadia subduction zone event, shall be uniformly scaled using the ratios of peak firm ground accelerations for the location of the structure to the peak ground accelerations given in the Design Firm Ground Response Spectra and Ground Motions (New Port Mann Bridge).
 - (e) Peak firm-ground accelerations for the Design Earthquake Events for the location of the structure shall be obtained from the Geological Survey of Canada (http://earthquakescanada.nrcan.gc.ca/hazard/interpolator/index_e.php) for specific site locations.
 - (f) Scaling of the firm-ground response spectra and time-history records for the Cascadia subduction zone event is not required.
 - (g) For elevations above firm ground, using the firm-ground records provided, uniformly scaled for the locations of the structures as specified above, the Concessionaire shall develop location-specific ground motion inputs appropriate to their design using generally accepted site response analysis methods.
 - (h) For design based on inelastic time history analysis the design response shall be taken as the mean response quantity obtained from analysis using the full suite of three sets of records provided and uniformly scaled as specified above.
 - (i) Spatial and geometric coherency and incoherency shall be included in the Design.
 - (j) The response spectra given in the Design Firm Ground Response Spectra and Ground Motions (New Port Mann Bridge) are based on 5% structural damping. The Concessionaire may change the structural damping to a value appropriate to the Design

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as required. The Concessionaire shall submit any proposed revisions to the given response spectra to the Province's Representative in accordance with the Consent Procedure.

4.3 System Level Seismic Performance Criteria

- (a) All Bridges, retaining walls and Structures which physically support the Concession Highway or upon which the function of the Concession Highway is dependent (including components or interchanges) are "Economic Sustainability Route Structures" which shall comply with the system level performance criteria shown in Part 1 [Disaster Response Route and Economic Sustainability Route Structures] of Appendix D to this Schedule. The "function of the Concession Highway" shall mean the applicable service level as described in the Service Level Performance column for the earthquake events in the table in Part 1 [Disaster Response Route and Economic Sustainability Route Structures] of Appendix D to this Schedule.
- (b) All Structures on Other Provincial Highways, Deltaport Way or Ladner Trunk Road, or Structures carrying Other Provincial Highways, Deltaport Way or Ladner Trunk Road over the Concession Highway and which are not part of an interchange of the Concession Highway shall carry the classification of that Other Provincial Highway, Deltaport Way or Ladner Trunk Road, as the case may be, and shall comply with the system level performance criteria in Appendix D [Seismic Performance Criteria] to this Schedule. The following routes are classified as a "Disaster Response Route": Highway 17, Deltaport Way, Ladner Trunk Road and Highway 91. Highway 99 is classified as an "Economic Sustainability Route".
- (c) All other Structures are "Other Structures" which shall comply with the respective system level performance criteria set out in Part 2 [Other Structures] of Appendix D to this Schedule. The performance of "Other Structures" shall not prevent "Disaster Response Route Structures" and "Economic Sustainability Route Structures" from meeting the system level performance criteria shown in Part 1 [Disaster Response Route and Economic Sustainability Route Structures] of Appendix D to this Schedule.
- (d) All structures shall be considered to be in seismic performance zone 4 from CAN/CSA-S6-06.

4.4 Component Level Design Criteria

4.4.1 General Requirements

- (a) The Concessionaire shall design structural components for new Structures using a "capacity design" approach, as described in CAN/CSA-S6-06, and seismic performance zone 4. Inelastic behaviour corresponding to a 5% exceedance in 50 years for "Disaster Response Route Structures" and "Economic Sustainability Route Structures" and 10% exceedance in 50 years for "Other Structures" shall not exceed the more restrictive of the following:
 - (i) Strain limits:

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Concrete: 75% of ultimate compressive strain

Reinforcing Steel: 75% of ultimate strain

- (ii) Seismic performance criteria; and
 - (iii) Other displacement limits given in this Schedule.
- (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) Buckling of reinforcing bars shall be considered in the Design and detailing. Expected strengths shall be used for the assessment of these strains and Structure performance.
 - (d) For ground motion corresponding to a 5% exceedance in 50 years for “Disaster Response Route Structures” and “Economic Sustainability Route Structures” and 10% exceedance in 50 years for “Other Structures”, Structure displacements shall not exceed the more restrictive of the following:
 - (i) Displacements corresponding to the maximum material strains defined above.
 - (ii) Post-yield displacements of 80% of the displacement corresponding to the peak lateral load resistance on applicable inelastic analysis.
 - (e) In addition, design displacements as predicted from inelastic analysis shall be taken as not less than 80% of the values obtained from elastic dynamic analysis.
 - (f) Inelastic static response curves and non-linear analyses shall account for P-delta effects.
 - (g) Nominal (design) material properties shall be used for the proportioning of structural components in accordance with CAN/CSA-S6-06.
 - (h) Capacity protected elements shall be designed to resist over strength force demands.

4.4.2 Foundations

- (a) Seismic design of piles shall be based on the approaches outlined in Clause 4.5.5 of ATC-32. Piles shall be designed as capacity-protected elements with demands in accordance with CAN/CSA-S6-06 and the BC Supplement to CAN/CSA-S6-06.
- (b) The design of pile Foundations shall address the effects of inertial loading from the Structure and the loading from ground displacements due to seismic shaking. Settlements resulting from liquefaction of soils shall be identified and addressed in the Design.

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- (c) Spread footing design for seismic effects shall be based on the approach outlined in Clause 4.5.6 of ATC-32. Load factors and combinations shall, however, be based on CAN/CSA-S6-06 and the BC Supplement to CAN/CSA-S6-06 rather than on ATC-32.
- (d) Rocking shall be considered in the design of single column bents on spread footings.

4.4.3 Retaining Walls

- (a) Seismic design for the global stability of retaining walls shall be performed in accordance with the AASHTO Standard Specifications for the ground motion with 10% and 5% exceedance in 50 years.
- (b) Dynamic soil-structure interaction analysis shall be performed for retaining walls supporting 5 m or more of soil. Analysis software to be used 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.
- (c) Permanent wall lateral deformations shall be such that the service level performance and damage level performance requirements for Structures are met.

4.4.4 Liquefaction

- (a) The potential for liquefaction and its consequences and effects on the design of Structures and their Foundations shall be based on the requirements in Section 7.6 (Part I Specifications) and Appendix D (Part II Commentary and Appendices) of ATC-49.
- (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.
- (c) Foundations in soils susceptible to liquefaction shall be designed to have sufficient lateral capacity to resist the forces generated by the soils. Strategies adopted to limit deformation shall be identified. Liquefaction-induced ground displacements and the corresponding lateral loads shall be considered for the Design Earthquake Events plus the Cascadia subduction zone event.

4.4.5 Slopes and Embankments

- (a) For slopes and embankments in close proximity to a Structure (as defined in Appendix D [Seismic Performance Criteria] to this Schedule), seismic loading-induced deformation analysis shall be performed. The deformation analysis shall consider the input ground motion time-histories in this Schedule as a minimum and take 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 non-linear soil behaviour, pre- and post-liquefaction stress-strain-strength

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behaviour of soils, soil-structure interaction effects, and time domain base input excitations.

Deformations shall be in accordance with the seismic performance criteria in Appendix D [Seismic Performance Criteria] to this Schedule.

- (b) For slopes and embankments away from the Structures, performance shall be such that not less than 50% of lanes (rounded up to the nearest whole number) are available for use within two weeks after seismic events with the probability of exceedance of 10% in 50 years. Full access to be restorable within four weeks.

4.4.6 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 implied in CAN/CSA-S6-06 for ductile substructures. An ultimate system displacement capacity at least 25% greater than that determined from a non-linear dynamic analysis shall be demonstrated for base-isolated Structures for each design event.

4.5 Seismic Analyses

- (a) As a minimum, the Concessionaire shall perform the seismic analyses listed in Table 4.5.

Table 4.5 Minimum Required Seismic Analysis

| Seismic Ground Motion Probability Of Exceedance In 50 Years | Required Analyses | Other Structures |
|--|---|---|
| 10% | Elastic Dynamic Damage Assessment Inelastic Static (Pushover) | Elastic Dynamic Damage Assessment Inelastic Static (Pushover) |
| 5% | Elastic Dynamic Damage Assessment Inelastic Static (Pushover) Inelastic Time History [*] | Elastic Dynamic Damage Assessment Inelastic Static (Pushover) |
| 2% | Elastic Dynamic Damage Assessment Inelastic Static (Pushover) | |
| Cascadia Subduction Zone Event | Elastic Dynamic Damage Assessment Inelastic Static (Pushover) Non-linear ground response analyses to assess the impact of long-duration ground motions on soil liquefaction and Foundation performance | Elastic Dynamic Damage Assessment Inelastic Static (Pushover) Non-linear ground response analyses to assess the impact of long-duration ground motions on soil liquefaction and Foundation performance |

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* Structures in Category 0 or 1 (in accordance with Section 3.2 [Categories of Structures] of Part 3 of this Schedule) and single span, simply supported Bridges of span less than 50 m do not require time history analysis.

- (b) In all cases, analyses shall be focused on determining the expected seismic deformations and the performance of the Structures.
- (c) Elastic dynamic analysis shall meet the minimum requirements of ATC-32 Clause 3.21.6. The assumed damping ratio shall not exceed 5% of critical unless justified by analysis and experimental evidence relevant to the lateral load resisting system being designed. Damping values greater than 5% of critical are to be consistent with the performance requirements and damping values shall not be assumed to exceed 10% in elastic analyses based on initial stiffness assumptions.
- (d) 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 Foundations and Structures and shall be supported by relevant analyses and experimental evidence.
- (e) Inelastic static analysis shall meet the requirements of ATC-32 Clause 3.21.7. Inelastic dynamic analysis shall meet the requirements of ATC-32 Clause 3.21.8.
- (f) 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 the BC Supplement to CAN/CSA-S6-06 and CAN/CSA-S6-06.
- (g) Foundations, soil-structure interaction and hydrodynamic effects shall be included in 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.

4.6 Seismic Monitoring System

The Concessionaire shall design, supply and install a seismic monitoring system for the Project as outlined in Appendix G [Seismic Monitoring System] to this Schedule.

4.7 Existing Adjacent and Dependent Buildings

New and modified retaining walls, slopes and embankments shall be designed and constructed such that existing adjacent and depending buildings (as defined in the BC Building Code) meeting the building performance requirements of the BC Building Code under seismic loading for the 2% event including the new provisions for slope stability as described in Sentence 4.1.8.16(8) and 9.4.4.4(2) of the BC Building Code.

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ARTICLE 5 GEOTECHNICAL DESIGN CRITERIA

5.1 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 not be less than 1.5 under static loading conditions for all possible failure modes.
- (b) Where existing cut and fill slopes are modified, all functional and performance requirements of this Schedule shall be met.
- (c) For seismic design of new or modified cut and fill slopes and seismic performance requirements of slopes, refer to Article 4 [Seismic Design Criteria] of this Part.
- (d) 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. For slopes under the end spans of overpass and underpass Bridges, slope protection shall be provided in accordance with Article 3 [Structural Design Criteria] of this Part.

5.2 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) The total and differential settlements of road embankments and pavement surfaces over a 75 year period following the Western Segment Substantial Completion Date shall be such that the 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. Vertical offsets at longitudinal joints in pavement surfaces shall not be greater than 5 mm over this period.

5.3 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 2-hour fire rating.
- (c) Appropriate sign Foundation systems and landscaping must be provided 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 200 year flood level shall be considered in the design of lightweight fills, regardless of any flood protection provided

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for the area in which the fill is to be constructed. The 200 year flood levels shall be obtained from the local dyking authorities.

- (e) Shredded rubber tires shall not be used as fill.
- (f) Use of hog fuel as lightweight fill shall be in accordance with Technical Circular T-17/06. The Concessionaire is to assume the owner's risks specified in this circular.
- (g) 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 minimum 10-mil thickness black polyethylene sheeting;
 - (v) Polyethylene sheeting joints shall be overlapped by a minimum of 0.5m; and
 - (vi) EPS blocks shall have a minimum 1.0 m granular cover vertically and horizontally.

5.4 Use of Timber Piles

Timber piles, if used, must be treated completely and permanently below groundwater level.

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) BC Supplement to TAC;
- (d) TAC Roadway Lighting Design Guide;

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- (e) Electrical and Signing Materials Standards;
- (f) Standard Electrical Equipment Maintenance Manual;
- (g) applicable specifications of the relevant Municipality;
- (h) Pedestrian Crossing Control Manual;
- (i) Traffic Control Manual;
- (j) Traffic Management Guidelines; and
- (k) 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 falls under municipal jurisdiction shall be provided with separate power sources from those under Ministry jurisdiction.
- (b) The Concessionaire 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. The Concessionaire shall coordinate preparation and submittal of service applications with the Province's Representative.

6.4 ITS/Telecommunications Conduit Infrastructure

The Concessionaire shall provide a power and communication duct system for intelligent transportation systems (ITS). The requirements for ITS power and communication ducts are as follows:

- (a) A conduit network shall be provided for SFPR between its southern most tip near Hwy 17 and the eastern end of the SFPR Extension and connected to conduit at the eastern end of the SFPR Extension. The Technical Bulletin for Communication Conduit (No. TE-2007-03) shall form the basis for conduit requirement except for the number and size of the conduits. There shall be a total of five 2" (53mm) conduits – one reserved for power use, and four dedicated for ITS/telecommunications use. These conduits are intended for use by the Province.
- (b) In addition to the required crossings outlined in the Bulletin, the ITS power and communication duct system shall provide a terminus point (communications vault) at each end and at each of the following crossings between SFPR and the other major road network:

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- (i) Highway 1 at the Port Mann Bridge;
 - (ii) Highway 17;
 - (iii) Highway 91/Alex Fraser Bridge;
 - (iv) Highway 99; and
 - (v) Pattullo Bridge (or its replacement bridge).
- (c) The ITS and power and communication duct system shall be placed laterally along the roadway shoulder and shall consistently remain on the same side of the roadway for its length (except for branch crossings). The main duct system shall not cross the roadway or be placed within the roadway median without approval from the Province's Representative in accordance with the Consent Procedure.

6.5 Lighting

- (a) All lighting shall be dark sky compliant. Light trespass and disability glare for drivers shall be minimized.
- (b) Luminaires on Structures shall have safety cables designed to meet ANSI C136.31 requirements for vibration.
- (c) All roadway luminaires shall be flat-glass style.
- (d) 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 (ie. intersections and interchanges) within the Concession Highway 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) Lighting is not required at the following locations:
 - (A) Burns Drive (72 Street to 64 Street);
 - (B) 72 Street (at SFPR crossing near McAllister Road);
 - (C) 80 Street (south of SFPR); and
 - (D) River Way (Alexander Road to south of SFPR).

and if the Concessionaire is required to provide for lighting at any such location in accordance with the Final Design, then the Province shall issue a Province

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Change therefor and the provisions of Part 7 [Province Changes and Concessionaire Proposals] shall apply accordingly.

- (e) The pedestrian and cyclist routes noted below shall be illuminated:
 - (i) separated pedestrian/cyclist facilities along interchange structures and approaches; and
 - (ii) any new exclusive pedestrian/cyclist Bridges, tunnels and approaches.
- (f) All equipment to be re-used shall be power washed clean prior to re-use. Luminaire poles shall 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 installed later than 1996 may be re-used provided they are in good condition, meets the Ministry standards, and are certified structurally sound by a structural engineer.
- (b) A 50 mm conduit shall be installed between all traffic signals that are located within 500m of each other to accommodate hardwire interconnection. The Concessionaire shall provide separate communication ducting connecting Ministry signals and Municipal signals.

6.6.2 Ministry Traffic Signals

- (a) New traffic signals shall be designed and installed where warranted in accordance with the Electrical and Traffic Engineering Manual.
- (b) The Concessionaire shall be responsible for modifying existing traffic signals to suit Traffic Management requirements or the Concessionaire's Design including staged works. This shall include, but not be limited to, modifications to signal timing design, phasing, signal poles, signal head, cabling, detector loops, 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 in accordance with Section 1.5 [Traffic Engineering] of this Part.
- (d) All traffic signals shall be equipped with emergency pre-emption and shall have uninterruptible power supplies.
- (e) All traffic signals shall be programmed by the Concessionaire.
- (f) All Ministry controllers shall be interconnected to the main corridor communications system using a separate 50 mm conduit.

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- (g) The Concessionaire shall provide and install NEMA TS2 Type 1 National Transportation Communications ITS Protocol (NTCIP) compliant NAZTEC (current Ministry standard) controllers at all new and temporary signal installations.
- (h) The Concessionaire shall supply and install NEMA TS-2 Type 1 Traffic Controller Cabinets compliance with the Ministry's "1110 Traffic Controller Cabinet Assembly Specifications – NEMA TS-2 TYPE 1" for all new signals.
- (i) Signal detection systems shall be designed to provide 0.1 second vehicle passage times but ensure vehicles travelling within 4 seconds of each other maintain a green signal for that movement.
- (j) Railway pre-emption shall be required where roadway is near a railway crossing. The Concessionaire shall consult and define the pre-emption scheme and seek approvals from the relevant railway authority.

6.6.3 Municipal Traffic Signals

The Concessionaire shall be responsible for liaising and coordinating with the Municipalities for any modifications that may be required to municipal traffic signals. This clause applies to municipal traffic signals that may require adjustment during construction as well as post construction.

6.7 Power, Control Cabinets, and Electrical Kiosks

- (a) The Concessionaire may retain or re-use existing control cabinets and kiosks.
- (b) New cabinets and kiosks shall meet the following requirements:
 - (i) Provide enclosures that meet the requirements of Section 402 of the Electrical and Signing Materials Standards.
 - (ii) Supply enclosures manufactured by Ministry approved suppliers.
 - (iii) 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.
 - (iv) Provide a fold down shelf permanently fastened to each door for holding testing equipment or documentation.
 - (v) Provide adequate power supplies to accommodate equipment.
 - (vi) Supply all cabinets with a complete set of their respective as-built design drawings in the plan pouches.

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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 to accommodate traffic detours in accordance with the Reference Documents specified in this Article.

6.9 Existing George Massey Tunnel Counterflow and Congestion Warning System

- (a) The existing counterflow system at the George Massey Tunnel shall remain operational and shall not be impacted by the Design and the Construction.

The existing congestion warning system (“CWS”) at the George Massey Tunnel shall remain operational except for minimal downtimes that may be required for modification or relocation of the existing system, equipment, devices and structures. Downtimes shall not be permitted on Business Days.

- (b) The Concessionaire shall identify, based on the Design, a proposed scope of work for the following specific scope items related to the design and construction of modifications to the CWS if required (the “CWS Modifications”):
 - (i) modifications to the CWS software;
 - (ii) decommissioning and relocation of vehicle detection stations (“VDS”), including:
 - (A) relocation of VDS cabinets along with programmable logic controller and fibre modem;
 - (B) supply and installation of new conduit;
 - (C) supply and installation of new vehicle detection loops;
 - (D) supply and splicing of fibre optic cable; and
 - (E) connection to AC power;
 - (iii) decommissioning and relocation of variable message signs (“VMS”), including:
 - (A) relocation and/or provision of sign support structures including foundations;
 - (B) relocation of VMS signs and all associated communications equipment;
 - (C) supply and installation of new conduit;
 - (D) supply and splicing of fibre optic cable; and

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(E) connection to AC power; and

(iv) commissioning and testing of the modified CWS plus associated field components at all stages of Construction,

and shall submit the proposed CWS Modifications to the Province's Representative in accordance with the Consent Procedure, along with an estimate of the Change in Costs applicable to the design and construction of the proposed CWS Modifications in accordance with the principles set out in Section 2.4 [Valuation of Change in Costs] of Schedule 11. Upon the acceptance by the Province of any such proposed CWS Modifications, the Province shall issue a Province Change therefor and the provisions of Article 7 [Province Changes and Concessionaire Proposals] shall apply accordingly.

6.10 Nordel Weigh Scale Signage System

- (a) Electronic weigh scale Open/Closed signs shall be placed to direct trucks to the Nordel weigh scale as described in Section 8.4 [Regulatory Signing] of this Part.
- (b) The Concessionaire shall provide a sign control system from the Nordel weigh scale to the new and relocated Open/Closed signs, and to the Open/Closed signs not affected by Construction.
- (c) Conduit for sign connectivity shall be in addition, and separate from the conduit specified in Section 6.4 [ITS/Telecommunications Conduit Infrastructure] of this Part.
- (d) License-exempt, RF-based communications for remote control of the signs shall not be permitted.
- (e) All signs shall comply with the LED Open/Closed Sign Functional Specification, except existing signs that are not relocated.
- (f) The existing Nordel weigh scale system shall remain operational except for minimal downtimes that may be required for relocation or modification of the existing system, equipment, devices and signs. Downtime shall not be permitted on Business Days.
- (g) The Concessionaire shall be responsible for the commissioning and testing of the modified Nordel weigh scale system plus associated field components at all stages of Construction.

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;

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- (b) BC Supplement to CAN/CSA-S6-06;
- (c) BC Supplement to TAC;
- (d) Best Management Practices for Highway Maintenance Activities;
- (e) Culvert and Fish Passage Fact Sheet;
- (f) applicable requirements of the relevant Municipality;
- (g) Stormwater Planning Guidebook;
- (h) GVRD Best Management Practices for Stormwater;
- (i) Stormwater Design Guidelines - GVRD; and
- (j) 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) The Concessionaire 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 be a 100-year return period, for a 1-day, 2-day or 5-day duration storm event whichever generates critical hydraulic conditions in the impacted drainage system that is within the watershed either upstream or downstream of the Concession Highway (an “**Impacted Drainage System**”); and
 - (ii) 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.
- (c) Performance Criteria:
 - (i) The existing maximum water surface elevations within the Impacted Drainage System shall not increase.
 - (ii) The total volume of discharge at the system outfalls through pumps shall not increase from the existing during the design storm events and during the drainage season.
 - (iii) Project runoff shall not increase erosion potential in receiving systems.

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- (d) The Concessionaire shall demonstrate the hydraulic performance of the Impacted Drainage System using appropriate hydrology and hydraulic models.
- (e) Description of the performance and performance criteria of the proposed drainage system shall be provided in a drainage design report.
- (f) It is the responsibility of the Concessionaire to obtain approval of 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 and requirements of the Municipality and other owners of the receiving systems.

7.3 Stormwater Quality Criteria

- (a) The Concessionaire shall meet the performance objectives for the Surface Water Quality and Sediment Control Plan as outlined in the Environmental Management Plan Framework.
- (b) The drainage system shall incorporate stormwater quality treatment that maintains or improves existing water quality in the receiving systems. Except for the drainage system between the western boundary of PID 024-310-069 and the eastern boundary of PID 024-309-681, the drainage system shall provide capacity for half of the 2-year return period 24-hour duration storm to meet a 24-hour residence time for pollutant removal, and if the drainage system between the western boundary of PID 024-310-069 and the eastern boundary of PID 024-309-681 is required in accordance with the Final Design to provide such capacity, then the Province shall issue a Province Change therefor and the provisions of Part 7 [Province Changes and Concessionaire Proposals] shall apply accordingly.
- (c) The drainage system shall incorporate spill containment features prior to discharging into the municipal drainage/irrigation system.
- (d) The Concessionaire 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 improvement Best Management Practices.
- (e) Design of new or replacement culvert crossings and other stormwater management infrastructure shall take into account the Concessionaire's Environmental Obligations 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.
- (f) The Concessionaire 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.

7.4 Irrigation Channel Crossings

The Concessionaire shall design and construct:

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- (a) the following irrigation channel crossings consistent with the concept drawing “Delta Irrigation Enhancement Project, Gateway Program, Exhibit 1.1 Irrigation Culvert Dimensions West of 80th Street” dated November 27, 2009 and located in the Data Room:
 - (i) an SFPR/irrigation channel crossing at 80 Street; and
 - (ii) an SFPR/irrigation channel crossing at McAllister Road;
- (b) the following irrigation channel crossing consistent with the concept drawing “Delta Irrigation Enhancement Project, Gateway Program, Exhibit 1.2 Irrigation Culvert Dimensions West of 72nd Street” dated November 27, 2009 and located in the Data Room:
 - (i) an SFPR/irrigation channel crossing at 72 Street; and
- (c) the following irrigation channel crossings consistent with the concept drawing “Delta Irrigation Enhancement Project, Gateway Program, Exhibit 1.3 Irrigation Culvert Dimensions East of 80th Street” dated November 27, 2009 and located in the Data Room:
 - (i) irrigation channel crossings wherever new roadway crosses the irrigation channel at 80 Street.

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) SFPR Guide Signage Strategy;
- (c) DBSS;
- (d) Technical Bulletin TE-2005-05;
- (e) the following Ministry Technical Circulars:
 - (i) Technical Circular T-05/05;
 - (ii) Technical Circular T-07/05;
 - (iii) Technical Circular T-08/05;

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- (iv) Technical Circular T-10/05;
 - (v) Technical Circular T-01/06;
 - (vi) Technical Circular T-05/06;
 - (vii) Technical Circular T-08/06;
 - (viii) Technical Circular T-12/06;
 - (ix) Technical Circular T-15/06;
 - (x) Technical Circular T-02/07;
 - (xi) Technical Circular T-03/07; and
 - (xii) Technical Circular T-16/06;
- (f) Manual of Standard Traffic Signs and Pavement Markings;
 - (g) Sign Pattern Manual; and
 - (h) Standard Highway Sign Specifications.

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) Undamaged existing sign boards may be reused providing they meet the reflectivity levels above and the sign message meets the requirements of this Section.
- (c) Standard signs shall be from the Sign Pattern Manual.
- (d) The final sign records to be used for the manufacture of any custom signing shall be provided by the Province's Representative.

8.3 Guide Signing

- (a) Guide signing shall be in accordance with the SFPR Guide Signage Strategy.
- (b) All text fonts for guide signs shall be "Clearview Type Fonts". Text and graphics shall be sized to meet the following standards:

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- (i) urban high volume freeway standards shall apply to SFPR, Highway 99, Highway 91, Highway 17, Highway 15 and Highway 1 mainlines, ramps and interchanges;
- (ii) rural conventional highway standards shall apply to Deltaport Way, 80 Street Connector, Highway 91 Connector, Tannery Road, Timberland Road, Bridgeview Drive, 104 Avenue and Golden Ears Connector; and
- (iii) urban conventional highway standards shall apply to all other roads.
- (c) Exit markers with exit numbers shall be used.
- (d) Distance markers shall be installed at 1 km intervals.
- (e) All custom guide signs shall be erected over the applicable traffic lanes.
- (f) The Concessionaire shall liaise with the Province's Representative through the Interim Design submission process to initiate the involvement of the Ministry's Provincial Sign Shop.

8.4 Regulatory Signing

- (a) In addition to standard regulatory signage to be designed and installed in accordance with the Reference Documents, regulatory signs are to be designed and installed to:
 - (i) prohibit trucks on both directions of Highway 17 between Deltaport Way and the Highway 99 interchange;
 - (ii) restrict the use of the Burns Drive extension between 72 Street and 88 Street to farm vehicles only;
 - (iii) restrict the use of Burns Drive between Crescent Slough and 64 Street to farm vehicles only;
 - (iv) restrict the use of 72 Street between Ladner Trunk Road and Burns Drive to farm vehicles only;
 - (v) restrict the use of 72 Street between the Vancouver Landfill and McAllister Road to local traffic only;
 - (vi) direct trucks in the Sunbury area from Highway 91, Nordel Way (east and west of Highway 91) and River Road to the existing weigh scale on Nordel Way; and
 - (vii) direct trucks exiting SFPR, west of Nordel Way in the Sunbury area, to the existing weigh scale on Nordel Way.
- (b) The truck signage system referred to in Sections 8.4(a)(vi) and (vii) above shall be similar to the existing signage system on Highway 91 southbound in advance of the

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Nordel Way interchange and shall comprise both static and electronic signs controlled from the weigh scale. The truck signage system shall be in accordance with Article 6 [Electrical, Signals and Lighting Design Criteria] of this Part.

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) Inlaid pavement markings are an acceptable alternative to painted markings.

8.5.2 Post Mounted Delineators

The Concessionaire shall supply and install post mounted delineators on open shoulder sections in accordance with 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

Reflectors shall be mounted on top of barriers and only reflectors designed 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 listed on the Recognized Product 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 snowplowable housings.

ARTICLE 9 LANDSCAPE AND SITE RESTORATION DESIGN CRITERIA

9.1 Order of Precedence

The Concessionaire 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) DBSS;
- (c) Manual of Aesthetic Design Practice; and

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- (d) Landscape Policy and Design Standards.

9.2 Landscaping Classification

The overall highway aesthetic classification for this Project is “Tourway”, as defined in the Manual of Aesthetic Design Practice, with the general landscape design level standard designated as “Rural/Suburban”. This category requires that the roadside landscape treatment shall consist mainly of tree and shrub plantings to form natural appearing groupings and basic, but visually attractive finishing to Structures. In this context, the focus of the landscape Design and Construction shall be on:

- (a) preserving existing native vegetation;
- (b) new plantings of primarily indigenous tree species that require low maintenance with grass and/or shrubs to be established in all other areas to be re-vegetated; and
- (c) reducing the negative appearance of introduced hard structural elements through appropriate planting, and/or aesthetic design treatment.

9.3 Landscaping Requirements

The Design and Construction of the landscaping and site restoration works shall comply with the criteria set out in this Article and shall ensure compliance with the applicable Performance Measures set out in Schedule 5 [OMR and End of Term].

9.3.1 Conservation of Existing Vegetation

The Concessionaire shall preserve, to the extent possible, 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 the Concessionaire shall implement ‘close cut clearing/no grubbing’ practices to retain the vegetation roots, minimize soil disturbance, and encourage re-growth of plants.

9.3.2 Integration of “Hard” and “Soft” Landscape Elements

The Concessionaire shall design and construct the landscape and site restoration such that the earthworks, plantings and Infrastructure blend with the conditions of the adjacent terrain, and complement the main roadwork features. The Concessionaire shall:

- (a) address transition points, and provide practical solutions for both good appearance and low maintenance; and
- (b) coordinate screening and buffer requirements with any sound attenuation installation, including selection and placement of aesthetic noise walls and berms, and the integration of these with existing and introduced vegetation and habitat.

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9.3.3 Retaining Walls, Noise Walls and Hardscape Surfacing

Where retaining walls, noise walls and hardscape surfacings, (such as medians, traffic islands and bridge abutment aprons) are required in areas of high visibility, the Concessionaire shall incorporate design treatments for these structures that are aesthetically appealing, and offer 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 highway corridor. This work shall be complementary to, and in accordance with all applicable references in Schedule 6: Environmental Obligations, Appendix B: Table of Commitments and Assurances.

9.3.4 Landscape and Restoration Planting

Subject in each case to the limitations described in Section 9.3.7:

- (a) For landscaping purposes, primarily indigenous trees shall be provided in accordance with Table 9.3.5, and installed in naturalized groupings within interchanges, medians and other roadside locations. Shrub only plantings shall be utilized where tree planting is not suitable.
- (b) Where functional plantings are required to provide screening to augment highway structural components, suitable indigenous or introduced plant selections appropriate for the application shall be used.
- (c) Where existing desirable vegetation adjacent to private or municipal property is impacted or removed, it shall be replaced with similar plant material to mitigate the loss.
- (d) Where planting is proposed for environmental reasons such as riparian vegetation restoration/enhancement, habitat compensation, or other such requirement, this work will take precedent over opportunities for general landscape planting, and shall be carried out in accordance with Schedule 6: Environmental Obligations. Where general landscape plantings are in close proximity to environmental re-vegetation, the Concessionaire shall design and construct the landscaping to be complementary to, and coordinated with the environmental works.
- (e) Remnants of old road surfaces or other structures that are not retained as part of the New Infrastructure shall be removed, and the areas occupied suitably prepared and planted and/or seeded, in accordance with this Schedule.

9.3.5 Planting Requirements

Subject in each case to the limitations described in Section 9.3.7:

- (a) All interchange, roadside and median areas appropriate for tree planting shall be planted. Trees shall be installed at a minimum planting density of one tree per 10 sq. m, and the quantities and sizes of trees determined from the criteria provided in Table 9.3.5. Groupings of trees shall generally be interplantings of the species noted in Table 9.3.5. Where functional plantings are required for such purposes as a continuous lineal hedge

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for screening, the use of a suitable single species may be indicated, and both the tree selection and the plant spacing shall be determined as appropriate for the situation.

Table 9.3.5 Interchange, Roadside and Median Planting Criteria

| Plant Material | Size | Plant Quantities |
|---|-------|------------------|
| Douglas Fir <i>Pseudotsuga menziesii</i> | 1.25m | 30% of total |
| | 2.00m | 10% of total |
| Western Red Cedar <i>Thuja plicata</i> | 1.25m | 20% of total |
| | 2.00m | 10% of total |
| Himalayan Cedar <i>Cedrus deodara</i> | 2.00m | 10% of total |
| Vine Maple <i>Acer circinatum</i> | 2.5m | 8% of total |
| Deborah Maple <i>Acer platanoides 'Deborah'</i> | 2.5m | 8% of total |
| Pacific Dogwood <i>Cornus nuttallii</i> | 2.5m | 4% of total |

- (b) Figure 9-1 [Typical Planting at Diamond Interchange Configuration] and Figure 9-2 [Typical Planting at Cloverleaf Interchange Configuration] in the Data Room identify planting limits for acceptable types of planting for interchange configurations.
- (c) Sketch drawings 4 and 5 in the Landscape Policy and Design Standards indicate the required planting setback distances along roadways.

9.3.6 Re-vegetation Seeding

Subject in each case to the limitations described in Section 9.3.7:

- (a) All disturbed ground that is available for landscaping, and that will not otherwise be receiving tree planting, shrub planting, bark mulch or hard surfacing, shall be promptly re-graded and seeded with grass. Where existing soils are impoverished, compacted, poor draining, or otherwise not conducive to supporting a healthy turf cover, these areas shall be suitably scarified and amended with compost and/or covered with topsoil and/or compost blanket application prior to seeding.
- (b) Areas impacted by placement of pre-load or stockpiled materials shall be graded and seeded promptly after removal of the materials as an interim measure prior to final grading of the Project Site. Areas that are highly susceptible to wind or water erosion due to slope or material composition shall be protected prior to grass establishment, by the use of straw matting, hydraulically applied mulch and binder, compost blanket, or other suitable treatment as necessary.

9.3.7 Landscaping Plans and Scope

- (a) The Concessionaire shall develop plans in accordance with this Section 9.3.7 for the design and implementation of the scope of work required to meet the planting and re-vegetation seeding requirements set out in Sections 9.3.4 [Landscape and Restoration Planting], 9.3.5 [Planting Requirements] and 9.3.6 [Re-vegetation Seeding] of this Article (together, the “**Planting and Seeding Work**”).

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- (b) The Concessionaire shall, within 120 days following the Effective Date, develop a plan (the “**Construction Landscaping Plan**”) for all required Planting and Seeding Work necessary for the purposes of erosion control and site stability for temporary and permanent works, using all reasonable efforts to incorporate temporary works into permanent works (the “**Construction Landscaping Work**”) and submit the Construction Landscaping Plan, together with an estimate of the Change in Costs applicable to the final design and implementation of the Construction Landscaping Work in accordance with, subject to paragraph (f) below, the principles set out in Section 2.4 [Valuation of Change in Costs] of Schedule 11, to the Province’s Representative for review, acting reasonably, pursuant to the Review Procedure. Following the review by the Province of the proposed Construction Landscaping Plan in accordance with the Review Procedure, the Province shall issue a Province Change therefor and the provisions of Article 7 [Province Changes and Concessionaire Proposals] shall apply accordingly, subject to paragraph (e) below.
- (c) The Concessionaire shall, in consultation with the Province, within 180 days following the Effective Date, develop a plan (the “**Landscaping Plan**”) for all proposed Planting and Seeding Work other than the Construction Landscaping Work (the “**Landscaping Work**”), and submit the Landscaping Plan, together with an estimate of the Change in Costs applicable to the final design and implementation of the Landscaping Work in accordance with, subject to paragraph (f) below, the principles set out in Section 2.4 [Valuation of Change in Costs] of Schedule 11, to the Province’s Representative in accordance with the Consent Procedure. Upon the acceptance by the Province of the proposed Landscaping Plan, the Province shall issue a Province Change therefor and the provisions of Article 7 [Province Changes and Concessionaire Proposals] shall apply accordingly, subject to paragraph (e) below.
- (d) Potential enhancements to the Landscaping Plan (the “**Landscaping Enhancements**”) may potentially be identified through the consultation process with the public and Municipalities. The Concessionaire shall identify and submit the proposed Landscaping Enhancements to the Province’s Representative in accordance with the Consent Procedure as soon as reasonably practicable following the completion of such consultation process, along with an estimate of the Change in Costs applicable to the final design and construction of the proposed Landscaping Enhancements in accordance with, subject to paragraph (f) below, the principles set out in Section 2.4 [Valuation of Change in Costs] of Schedule 11. Upon the acceptance by the Province of any such proposed Landscaping Enhancements, the Province shall issue a Province Change therefor and the provisions of Article 7 [Province Changes and Concessionaire Proposals] shall apply accordingly, subject to paragraph (e) below.
- (e) Until such time as the aggregate Change in Costs for the Construction Landscaping Work, Landscaping Work and the Landscaping Enhancements determined in accordance with the foregoing (the “**Aggregate Landscaping Change in Costs**”) exceeds \$3,000,000, the Concessionaire shall bear all such Change in Costs. The Province shall pay to the Concessionaire, in accordance with the provisions of Article 7 [Province Changes and Concessionaire Proposals], the amount by which the Aggregate Landscaping Change in Costs exceeds \$3,000,000.

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- (f) Notwithstanding anything to the contrary in Schedule 11 [Changes], the following unit rates shall be used by the parties for the determination of the Change in Costs for the Construction Landscaping Work, Landscaping Work and the Landscaping Enhancements determined in accordance with the foregoing, to the extent such Change in Costs are less than or equal to \$3,000,000:
- (i) for hydroseeding, including hydroseeding, fertilization and overseeding, \$0.81 per m²; and
 - (ii) for top soil placement (10cm), including onsite haul and stockpile, reload and onsite haul, screening and placement, \$4.25 per m².

The determination of any such Change in Costs above \$3,000,000 shall be made wholly in accordance with the principles set out in Section 2.4 [Valuation of Change in Costs] of Schedule 11.

ARTICLE 10 CYCLING AND PEDESTRIAN CRITERIA

10.1 Order of Precedence

The Concessionaire shall design and implement cycling and pedestrian facilities in accordance with the criteria set out 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) for cycling facilities:
 - (i) the criteria contained in this Article;
 - (ii) BC Supplement to TAC;
 - (iii) TAC Geometric Design Guide;
 - (iv) TAC Bikeway Traffic Control Guidelines;
 - (v) Cycling Guide (cycling facility signage only); and
 - (vi) the applicable standards of the relevant Municipality; and
- (b) for pedestrian facilities:
 - (i) the criteria contained in this Article;
 - (ii) BC Supplement to TAC;
 - (iii) Pedestrian Crossing Control Manual;
 - (iv) TAC Geometric Design Guide; and

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- (v) the applicable standards of the relevant Municipality.

10.2 General Requirements

- (a) Cyclists shall be accommodated on all segments of the SFPR, including intersections and interchange ramps. Cyclist crossing facilities shall not be provided across interchange ramps where the traffic volumes provided in the SFPR Design Traffic Volumes exceed 900 vehicles per hour in any of the peak hours. At such locations cyclists shall be directed off the mainline onto an alternate route that does not require the crossing of high volume ramps.
- (b) Pedestrian facilities shall not be permitted along any part of the SFPR mainlines and ramps except at ramp terminals. Pedestrian facilities shall be provided at all SFPR at-grade connections to the municipal street network.
- (c) Where the scope of pedestrian, cycling and equestrian requirements is not specifically defined, the Concessionaire shall, at a minimum, maintain or reinstate existing pedestrian, cycling and equestrian facilities and maintain continuity along routes.

10.3 Design Requirements

10.3.1 Intersections

Cyclists and pedestrians shall be accommodated at signalized intersections. Such elements shall include, but are not limited to, crosswalks, pedestrian signal heads and pushbuttons.

10.3.2 Transitions

Transition sections are to be provided to match to existing facilities. Where cyclists approach on-road or no existing facilities exist, it shall be assumed that cyclists operate on both sides of the road in the direction of traffic.

10.3.3 Ramp/Road Crossings

- (a) At-grade pedestrian or cyclist crossings of roads classified as arterials or higher, including freeway collector-distributor and ramp segments, are not permitted except at signalized intersections, signal controlled crossings, or for ramps, only at ramp terminals. Pedestrian / cyclist operated signals shall not be permitted on ramps.
- (b) Where pedestrian and cycling facilities cross ramp terminals that include free right turns from or onto the arterial road, safety elements shall be included to improve driver awareness of crossing pedestrians / cyclists. Such elements could include, but are not limited to, additional signage, lighting and/or paint markings.
- (c) Where a sidewalk or multiuse path crosses a ramp in which the geometric design speed exceeds 40 km/h, the Design shall include a special crosswalk in accordance with the Pedestrian Crossing Control Manual.

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10.3.4 Cross Sections

- (a) An additional 0.5 m of clear width is required within pedestrian / cyclist only underpasses / tunnels.
- (b) Underpasses / tunnels designated for shared equestrian use shall have a minimum vertical clearance in accordance with the Bridge Standards and Procedures Manual.

10.3.5 Railings

- (a) Railings shall be provided in accordance with the BC Supplement to TAC.
- (b) On Structures designated for shared equestrian use, railings 1.8m high shall be provided.

10.3.6 Cyclist Signage/Pavement Marking

Signage shall provide positive guidance where required. At a minimum, directional signage for cyclists shall be provided to the following locations:

- (a) George Massey Tunnel Cycle Shuttle stop;
- (b) River Road east and west;
- (c) Highway 91 north and south; and
- (d) Scott Road Skytrain station.

10.4 Specific Requirements

- (a) A connection for cyclists shall be provided between 36 Avenue west of SFPR and SFPR westbound.
- (b) Cyclists shall be accommodated between the SFPR/Tilbury connection and 80 Street north of SFPR.
- (c) Cyclists shall be accommodated between the SFPR/Sunbury connection and River Road.
- (d) Cyclists shall be accommodated between the SFPR/Sunbury connection and Nordel Way.
- (e) Cyclist facilities shall be provided in the vicinity of the existing River Road between 96 Street and Nordel Way.
- (f) Pedestrians shall be accommodated on a grade separated crossing of SFPR at PID 012-975-729 to connect River Road to the existing grade separated rail crossing.
- (g) Cyclists and pedestrians shall be accommodated on a grade separated crossing of SFPR in the vicinity of 112 Avenue with a connection between 111A Avenue and Industrial Road.

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- (h) Cyclists shall be accommodated on both sides of Bridgeview Drive between the SFPR/Bridgeview Drive Connection and 115 Avenue.
- (i) Cyclists shall be accommodated between the SFPR/136 Street connection and King Road.

ARTICLE 11 ROAD SAFETY AUDIT

11.1 Order of Precedence

The Concessionaire 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 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) Technical Circular T-02/04 and Road Safety Audit Guidelines; and
- (c) the TAC Road Safety Audit Guide.

11.2 Road Safety Audit Team

The Road Safety Audit Team shall consist of a minimum of two auditors. Each team member must 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.

11.3 Concessionaire's Responsibility

- (a) The Concessionaire 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 audit;
 - (iii) ensuring that the audit is conducted to a high quality standard;
 - (iv) receiving and reviewing the audit report;
 - (v) responding to the audit report and documenting this response;

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- (vi) conducting any re-design as a result of the safety audit suggestions;
 - (vii) highlighting major changes to the required Design drawings; and
 - (viii) providing all documentation related to the Road Safety Audit to the Province's Representative.
- (b) All costs associated with the Road Safety Audit, including any re-design and increased Construction costs which result from the Road Safety Audit, are the responsibility of the Concessionaire.
- (c) After each Road Safety Audit, except as otherwise expressly agreed in writing by the Province's Representative, the Concessionaire shall address all recommendations made by the Road Safety Audit Team.

11.4 Road Safety Audit Process

- (a) The Road Safety Audit process shall be carried out in accordance with the TAC Road Safety Audit Guide, the Road Safety Audit Guidelines and 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 the Concessionaire's Design team for the stages identified below. The Road Safety Audit reports shall clearly identify safety hazards that need to be addressed by the Concessionaire along with recommendations for remediation. The Concessionaire shall respond to the identified hazards and recommendations with remediation counter-measures.
- (c) The Road Safety Audits shall be provided to the Province's Representative in accordance with the Review Procedure for review at three stages as follows:

11.4.1 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. The audit shall undertake a detailed review of the Interim Design plans 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 location;

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- (f) Stopping sight distance and turning sight distance;
- (g) Operation of public transport;
- (h) Maintenance safety;
- (i) Clearances to roadside objects;
- (j) Safety barriers; and
- (k) Provision for vulnerable road users.

11.4.2 Stage 2: Final Design Road Safety Audit

A Stage 2 Final Design 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 completed Final Design plans 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) 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.

11.4.3 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 including the transition to the SFPR

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Extension 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 each of the Eastern Segment and the Western Segment, the applicable Certificate of Substantial Completion; and
 - (ii) in respect of any other Relevant Components, the certification of the attainment of Substantial Completion for such Relevant Components in accordance with Section 6.21 [Substantial and Total Completion for Other Construction Activities] of Part 3 of this Schedule.
- (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 must fully examine such Relevant Components, including:
 - (i) meeting with the Project team to review any Construction Activity-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 audit 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 Activity 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 its operation from the perspective of the road user.

11.5 Temporary Traffic Control On-site Road Safety Audit

- (a) For each phase of Construction Activity, Road Safety Audits shall be conducted on the Project Site, following implementation, for temporary traffic control set-ups that meet both of the following criteria:
 - (i) Two or more individual temporary traffic control set-ups in close proximity to each other such that one would influence the traffic operation of the other, and whose complexity exceeds that of the standard templates used in the Traffic Control Manual. The spacing between the termination area of one work zone and the advance warning area of the next work zone for which one temporary traffic control set-up influences the traffic operations of the next temporary traffic control set-up is 2 km or less.

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- (ii) The duration of temporary traffic control set-ups is a month or more. The set-up does not necessarily have to be in place for the entire time but can be one of a number of repeating set-ups that are active at different times.
- (b) Each such Road Safety Audit shall be completed within two days after implementation 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 night time temporary traffic control set-up and where applicable the accommodation of vulnerable road users.

11.6 Certificates

After each of the four stages of the Road Safety Audit process, the Concessionaire shall submit a Road Safety Audit Certificate in accordance with Section 4.3 [Road Safety Audit Certificates] of Part 3 of this Schedule.

ARTICLE 12 TRAFFIC MEASUREMENT EQUIPMENT

12.1 General Requirements

The Concessionaire shall provide and install traffic measurement equipment along the Concession Highway at the locations specified in Section 12.2(c) of this Part. The Province's Representative shall provide site numbering for the data collection locations. Data shall be collected for all travel lanes at the traffic counting locations in a manner that is consistent with the requirements set out in Schedule 5 [OMR and End of Term].

12.2 Technology and Locations

- (a) Traffic data from permanent counters shall be accessible by the Province remotely via telephone modem or through an acceptable equivalent communication technology.
- (b) Equipment shall be capable of reprogramming to permit changes to the parameters of the data types.
- (c) The Concessionaire shall install eight permanent traffic counting stations (two in each Road Section) along the Concession Highway, with the exact locations to be identified by the Concessionaire and submitted to the Province's Representative for acceptance in accordance with the Consent Procedure.
- (d) The Concessionaire shall not cut the pavement, the deck surface of Bridges or tunnels in order to install the vehicle counting systems; however the Concessionaire may be allowed to surface cut road sensors for the purpose of measuring axles. Pre-formed sensor technologies that are installed, at least 100 mm below the road surface, prior to final pavement placement are not precluded.

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12.3 Performance

- (a) The traffic measurement equipment provided by the Concessionaire 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 by the Federal Highway Administration FHWA-14 classification system (for permanent counter sites only);
 - (iii) classified according to vehicle length based on the binning system used by the Province; and
 - (iv) 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) Sensors and other support equipment installed at short duration sites must have data detection capabilities equivalent to those for permanent sites for the collection of volume, length and speed data. Short count sites are not required to be configured to collect FHWA 14 Classification data.
- (e) 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.
- (f) 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.

ARTICLE 13 DEMOLITION, REMOVALS AND DISPOSAL

13.1 Demolition

- (a) The demolition, disassembly and removal of Infrastructure and other buildings, improvements and amenities from the Project Site shall be carried out in accordance with Schedule 6 [Environmental Obligations] and shall satisfy all Environmental Laws and requirements of Governmental Authorities and Utility Suppliers.
- (b) The Concessionaire shall prepare and submit a demolition plan to the Province's Representative in accordance with the Review Procedure a minimum of 90 days in advance of implementation.

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- (c) Demolition in accordance with this Article shall be completed before the Concessionaire submits a request for a Certificate of Total Completion pursuant to Section 6.12 [Notice of Total Completion] of Part 3 of this Schedule.
- (d) Demolition shall include backfilling abutment excavations, grading and landscaping of demolition site upon completion of the demolition work.
- (e) Demolition of Structures shall be carried out to a depth of 0.5 m below the existing ground level.
- (f) Portions of roadway that are not retained as part of the New Infrastructure shall be removed and restored in accordance with this Article.

13.2 Waste Removal

- (a) The Concessionaire shall remove and dispose off the Project Site all materials and installations not incorporated in the New Infrastructure.
- (b) All contaminated or dangerous material, including elements of the Original Infrastructure that contain lead paints, shall be disposed of in accordance with the regulations of relevant Governmental Authorities.
- (c) Disposal at sea, as defined in Environmental Laws, is not permitted.

13.3 Removal of Existing Electrical Equipment

The Concessionaire shall remove from the Project Site and dispose of all existing electrical equipment, including underground boxes, foundations and wiring, not incorporated into the New Infrastructure.

13.4 Removal of Existing Utilities

The Concessionaire shall:

- (a) remove from the Project Site and dispose of any abandoned pipe, exceeding 600 mm in diameter, situated beneath permanent travelled lanes; and
- (b) remove and dispose of exposed portions of any abandoned Utilities.

13.5 Excavated Material

The Concessionaire shall:

- (a) submit a plan for the placement of any materials in any of the Excavated Materials Placement Areas (including details of any proposed construction contemplated by paragraph (b) below) to the Province in accordance with the Review Procedure, prior to the placement of any such materials;

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- (b) construct any vehicular access roads onto the Excavated Materials Placement Areas as required for the placement of materials thereon;
- (c) place only materials excavated from the Project Site in the Excavated Material Placement Areas, and place no Contamination in the Excavated Materials Placement Area;
- (d) place all materials in the Excavated Materials Placement Areas in accordance with Good Industry Practice for a materials disposal area; and
- (e) pay any and all costs relating to the placement of materials in the Excavated Materials Placement Areas (other than taxes, permits or charges of any kind, including any amounts owing pursuant to any municipal bylaw, for access to such Excavated Materials Placement Areas).

If the Concessionaire is required to perform any additional work in connection with the placement of materials in any of the Excavated Materials Placement Areas beyond that required in accordance with Good Industry Practice for a materials disposal area, then the Province shall issue a Province Change therefor and the provisions of Part 7 [Province Changes and Concessionaire Proposals] shall apply accordingly.

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**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, the Concessionaire 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 by the Operator;
- (c) the identification of the Checking Team for Structures;
- (d) the contents and format of Interim Design and Final Design submissions;
- (e) a design review and audit schedule, indicating dates that the Concessionaire plans to:
 - (i) conduct internal audits of the design verification process;
 - (ii) submit Interim Designs and Final Designs; and
 - (iii) undertake review meetings in accordance with Section 1.3 [Review Meetings and Minutes] of this Part;
- (f) the process and schedule for Road Safety Audits;
- (g) a drawing tree indicating the organization and hierarchy of the Concessionaire's drawings; and
- (h) 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 the Concessionaire to the Province's Representative in accordance with the Review Procedure.

1.2 Compliance with Design Management Plan

The Concessionaire shall implement and comply with the initial 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 initial Design Management Plan to which there is no objection by the Province's Representative in accordance with the Review Procedure, in connection with all Design Data prepared or adopted in connection with the Design, the Construction and any other Construction Activities.

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1.3 Review Meetings and Minutes

- (a) The Concessionaire shall organize review meetings with the Province's Representative for the purpose of reviewing the Design information in accordance with the Design Management Plan.
- (b) The Concessionaire shall prepare minutes of such review meetings, including recording Province comments, and promptly address the comments to the satisfaction of the Province's Representative. Copies of the minutes shall be provided to the Province's Representative within 10 Business Days following the review meeting.
- (c) For greater certainty, the minutes of 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 Concessionaire Proposals.

1.4 TAF Submission Requirements

- (a) Each Final Design and Construction Activity completion package submitted by the Concessionaire 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, the Concessionaire 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, the Concessionaire 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 the Concessionaire pursuant to Section 1.4 [TAF Submission Requirements] of this Part shall be in the format shown in Appendix F [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 Activity submissions, provide the relevant Construction Certificate for such Construction Activity; and
- (c) be signed by:
 - (i) the Concessionaire's Representative; and
 - (ii) the Designer(s) and Constructor(s), or their respective principal(s), as necessary.

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1.6 TAF Variation

Any variation to a TAF which has been subject to the Review Procedure during Design, assessment or any Construction Activity shall be submitted in accordance with the Review Procedure as an addendum to the TAF.

ARTICLE 2 DESIGN SUBMISSIONS, REVIEW AND REPORTS

2.1 Design and Certification Procedure

- (a) The Concessionaire 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 and any other Construction Activities taking place during the Term, including any further design development or changes to a design once a TAF has been subjected to the Review Procedure.
- (c) The Concessionaire 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 the Concessionaire’s obligations under this Agreement.

2.2 Design and Certification Procedure in Emergency

In the case of an emergency, the Concessionaire 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 the Concessionaire 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 the Concessionaire 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.

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2.4 Format of Design Submissions

- (a) The Concessionaire shall provide two hard copies and one electronic copy of each Interim Design and Final Design submission.
- (b) Drawings shall be in a format in accordance with the requirements of the Ministry Standards. The Concessionaire 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.
- (c) Drawings for the New Municipal Infrastructure and all New Other Highway Infrastructure to be constructed by the Concessionaire that will, in accordance with the Ministry Jurisdictional Atlas, be within Municipal jurisdiction, shall be in accordance with the applicable standards of the relevant Municipality.

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 Review

- (a) The Concessionaire shall submit to the Province's Representative Interim Designs, including supporting information for, at a minimum, the Concession Highway, the New Other Highway Infrastructure, the New Municipal Infrastructure, the New Port Infrastructure, Structures, geotechnical Design and any design required in connection with any plans developed by the Concessionaire in accordance with Section 3.6(c) of Schedule 6 [Environmental Obligations]. The supporting information shall include the traffic engineering analysis and reporting in accordance with Article 1 [Laning and Geometrics Design Criteria] of Part 2 of this Schedule.
- (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's Representative 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. 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 Activities and the Operation.
- (d) In accordance with this Design and Certification Procedure, the Concessionaire and the Province's Representative 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.

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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 and shall consist of the relevant TAF(s) together with all Final Design drawings, supporting Design Data and calculations required in accordance with this Part.

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 and calculations.
- (b) 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 signed and sealed drawings, including complete laning and geometrics, profiles, typical and template cross-sections, right-of-way acquisition and drainage;
- (b) stormwater management plan and drainage design report;
- (c) address any comments of the Province's Representative from the Interim Design reviews, internal design reviews, quality control, and design reports; and
- (d) include revisions, stakeholder issues, plans for utility relocations, critical constructability and traffic handling considerations, environmental issues and mitigation plans.

2.8.3 Bridges Design

The Final Design submission shall contain, without limitation, the following:

- (a) all design drawings, including general arrangements, sub-structure and super-structure;
- (b) a geotechnical report for the Structures;
- (c) environmental mitigation/compensation plans;
- (d) resolution of all issues identified during Interim Design reviews;
- (e) any special provisions for the construction of the Structures (including deck replacement methodology for new Structures and seismic retrofit strategies for existing Structures);

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- (f) 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; and
- (g) a neat, bound, indexed set of design calculations for the Bridge Structures initialled by the responsible engineer, who shall be a duly experienced Professional Engineer of the appropriate discipline.

2.8.4 Retaining Wall Design

The Final Design submission shall contain, without limitation, the following:

- (a) final geotechnical report for the walls;
- (b) descriptions of aesthetic treatment for all walls;
- (c) descriptions of maintenance considerations for walls including walls in the New Municipal Infrastructure, the New Other Highway Infrastructure and the New Port Infrastructure;
- (d) resolution of all issues identified during Interim Design reviews; and
- (e) all Final Design drawings; and
- (f) a neat, bound, indexed set of design calculations for the walls, initialled by the responsible engineer, who shall be a duly experienced Professional Engineer of the appropriate discipline.

2.8.5 Geotechnical Design

- (a) For the Final Design submission the Concessionaire shall prepare a comprehensive geotechnical report for the Project that covers existing geotechnical information and known site conditions, new investigations performed for the Project, geotechnical engineering analysis, geotechnical design assumptions and design parameters (and the basis for these) and geotechnical design recommendations. The report shall be submitted to the Province's Representative at the Interim Design completion level and updated and resubmitted with Final Design.
- (b) 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 progress report, 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;

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- (iv) light weight fill designs and geotechnical design recommendations for pavements;
- (v) estimates of total and differential settlement of embankments and roadways at 2, 5, 10, 20, 40 and 75 years following construction;
- (vi) requirements for ground improvement measures necessary to meet the static and seismic performance requirements for foundations, cut and fill slopes, embankments and retaining structures;
- (vii) 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;
- (viii) reduced size (11" x 17") drawings showing the road alignment in plan and profile with drill hole locations shown on the plan and simplified summary logs shown on the profile (design notes are to be shown along the bottom of the drawings); and
- (ix) a final geotechnical progress report for the structures with reduced size (11" x 17") 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 *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) The Final Design submission shall include resolution of all issues identified during Interim Design reviews.

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- (e) Sign design sheets shall be submitted for all custom guide signs. Sign design sheets shall be produced using Transoft Guidesign (or equivalent) software.
- (f) All cantilever and sign bridge Structures submissions shall be undertaken in accordance with Section 300 of the Electrical and Signing Materials Standards.

2.8.7 Landscaping and Site Restoration

The Final Design submission shall contain detailed landscape drawings that reflect any highway design changes and incorporate comments made on the interim submissions. The Concessionaire 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.

2.8.8 Traffic Engineering

The Final Design submission shall contain, without limitation, the following:

- (a) traffic engineering analysis and associated reports and files in accordance with Article 1 [Laning and Geometrics Design Criteria] of 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.

2.8.9 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

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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) Environmental Design Criteria Checklist (EDCC) that lists general environmental commitments and assurances, environmental design commitments, site specific environmental features and environmental mitigation/compensation plans including all commitments, assurances and plans relating to archaeological features; and
- (f) Resolution of all issues identified during Interim Design reviews.

2.9 Road Safety Audit Design Data

All Design Data shall be subject to Road Safety Audits in accordance with Article 11 [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's Representative objects to any Design Data in accordance with the Review Procedure, the Province's Representative shall so notify the Concessionaire and the Concessionaire shall, unless the Concessionaire disputes the objection by the Province's Representative 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 Concessionaire 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 and the Design and Certification

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Procedure shall not be departed from otherwise than in accordance with Schedule 11 [Changes] of this Agreement.

2.12 Issued for Construction Drawings

The Concessionaire shall submit copies of all drawings that are “issued for construction”, together with manuals, instructions to the Constructor and other relevant information as requested by the Province’s Representative, to the Province’s Representative and to the Independent Certifier.

2.13 No Construction

The Concessionaire shall not commence or permit the commencement of the Construction (including any Temporary Works) or any other Construction Activities unless and until all Design Data and relevant Certificates required in respect of the relevant part of the Design and Construction or other Construction Activities have been submitted by the Concessionaire 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, the Concessionaire 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 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 as follows:
 - (i) any such Design Data prepared by or on behalf of the Constructor requires an independent check by the Designer; and
 - (ii) any such Design Data prepared by the Designer requires an independent check by a Checking Team which may be from the Designer but shall be independent of the Design Team.

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- (c) In performing the check referred to in paragraph (a) above, the Designer 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 the Concessionaire'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 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 Infrastructure, the Concessionaire shall consult the relevant highway Governmental Authority and the Design Data shall reflect the requirements of such Governmental Authority.

2.16 Determination of OMR Boundaries

The final boundaries of the Concession Highway within each of the Eastern Segment and the Western Segment for which the Concessionaire shall carry out the Operations, the Maintenance and the Rehabilitation shall be defined by the Concessionaire in accordance with Section 1.2 [Scope of Operation, Maintenance and Rehabilitation] of Schedule 5 and submitted to the Province's Representative in accordance with the Consent Procedure at the time of Substantial Completion of each of the Eastern Segment and the Western Segment, respectively. The Concessionaire shall also develop documentation to be used for the Ministry and the Ministry Jurisdictional Atlas.

ARTICLE 3 CHECKING OF STRUCTURES

3.1 Concept Review

All Structures shall have a Concept Review and a copy of the documentation shall be included in the Design submission.

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;

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- (iii) a retaining wall with less than 3m retained height; or
- (iv) facing panel systems less than 3m in height.
- (b) **Category I.** Simple individual Structures provided they conform to one of the following:
 - (i) a retaining wall with 3m or more than 3m and 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) facing panel systems 3m, or more than 3m and 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 high structural redundancy; or
 - (iii) contain unconventional design aspects; or
 - (iv) have any span exceeding 50 meters; or
 - (v) have a skew exceeding 45 degrees; or
 - (vi) have difficult Foundation problems; or
 - (vii) 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.

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's Representative.

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3.4 Category Proposal

As soon as sufficient Design Data for a Structure has been prepared to allow the determination of a category, the Concessionaire 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 detailed check by experts in Bridge structural analysis and design, and in seismic design by an organization not related to the Designer. The Checking Team shall report directly to the Concessionaire.

In addition to the checking procedures required above, the Concessionaire shall conduct all checking procedures required by APEGBC.

3.6 Checking Team

At the time it submits the initial Design Management Plan, the Concessionaire 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) conducting design checks 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; and
 - (iii) identifying deficiencies in the design and analyses, and notifying the Concessionaire and the Province's Representative of unresolved deficiencies; and
- (b) the following expertise shall be included in the expertise of the Checking Team:

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- (i) recognized expertise in seismic design and analysis of long-span Bridges located in high seismic risk regions and in soils susceptible to liquefaction;
- (ii) recognized expertise in ground improvement methods to mitigate liquefaction;
- (iii) recognized expertise in displacement-based design philosophy;
- (iv) recognized expertise in the disciplines of geotechnical and structural engineering;
- (v) recognized expertise in wind loading on Structures;
- (vi) recognized expertise in ship impact loading on Structures;
- (vii) recognized expertise in hydrotechnical analysis and design for Structures;
- (viii) recognized expertise in the analysis and design of all aspects of long span and complex Structures;
- (ix) individuals who are generally recognized experts in the seismic design provisions in CSA-S6-06, ATC-49, AASHTO and all other applicable Reference Documents;
- (x) individuals who are generally recognized experts in the state-of-the-art geotechnical, structural, and soil-structure interaction modeling and software used for design and analysis of Bridge Foundations;
- (xi) individuals who are generally recognized experts in the review of designs to ensure compliance with Environmental Laws and other environmental requirements; and
- (xii) individuals who are registered or qualified to be 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 Checking Team shall each also be responsible for its own interpretation of the relevant ground information.

3.8 Independence

Independence of the Design Team and Checking Team, and independence of the Designer, Concessionaire and Constructor, 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.

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ARTICLE 4 DESIGN CERTIFICATION

4.1 Design Certificates

The Concessionaire 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 E [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 the Concessionaire'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's Representative to perform its function in respect of such Design Certificate without delay.

4.3 Road Safety Audit Certificates

- (a) The Concessionaire shall submit to the Province's Representative a certificate (a "**Road Safety Audit Certificate**") in the form attached as Appendix E [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 Constructor and the Concessionaire's Representative.
- (b) The Stage 3 Road Safety Audit Certificate shall be provided to the Independent Certifier and the Certificate of Substantial Completion shall not be issued for each of the Eastern Segment and the Western Segment 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 Constructor and the Concessionaire'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's Representative gives written notice to the Concessionaire 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

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the date of such tests. The Province's Representative 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

- (a) The Concessionaire shall develop a test recording system which shall permit ready retrieval of all test readings and shall provide test readings to the Province's Representative on request.
- (b) With respect to continuous testing operations (such as concrete quality, structural concrete strengths, aggregate quality, compaction tests and bituminous material quality) the Concessionaire 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.

ARTICLE 6 CONSTRUCTION CERTIFICATION

6.1 Construction Certificates

The Concessionaire 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 Infrastructure for use by the public. All Construction Certificates shall be signed by the Concessionaire's Representative, the Designer and the Constructor. The Concessionaire shall provide a copy of all Construction Certificates to the Independent Certifier.

6.2 Requirements for Substantial Completion of Eastern Segment and Western Segment

Substantial Completion of each of the Eastern Segment and the Western Segment shall only be achieved after:

- (a) all Construction Certificates in respect of the Eastern Segment or the Western Segment, as the case may be, have been issued;
- (b) a Stage 3 Road Safety Audit Certificate in respect of the Eastern Segment or the Western Segment, as the case may be, has been issued in accordance with Section 11.4.3 [Stage 3: Post Construction Road Safety Audit] of Part 2 of this Schedule;
- (c) all relevant quality assurance 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 showing that the Eastern Segment or the Western Segment, as the case may be, has been Substantially Completed in accordance with all applicable Project Requirements and other requirements of this Agreement; and
- (d) for the Western Segment, the Eastern Segment Substantial Completion Date shall have occurred prior to or concurrently with Substantial Completion of the Western Segment.

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6.3 Notice of Substantial Completion

The Concessionaire shall issue to the Independent Certifier and the Province's Representative a notice informing them at least 15 Business Days but no more than 30 Business Days prior to the date upon which the Concessionaire expects Substantial Completion of each of the Eastern Segment and the Western Segment. If the Concessionaire has at any time reason to believe that the said date expected for Substantial Completion of the Eastern Segment or the Western Segment, as the case may be, 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 Eastern Segment or the Western Segment, as the case may be.

6.4 Inspection for Substantial Completion

Upon the Concessionaire issuing a notice contemplated in Section 6.3 [Notice of Substantial Completion] 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 all of the Eastern Segment or the Western Segment, as the case may be, and all other relevant Certificates and supporting documentation in accordance with the Design and Certification Procedure, the Province and the Concessionaire shall cause the Independent Certifier to commence, within 10 Business Days of receipt of such notice, an inspection of the Eastern Segment or the Western Segment, as the case may be, to determine whether Substantial Completion of the Eastern Segment or the Western Segment, as the case may be, has been achieved.

6.5 Issuance of Certificate of Substantial Completion

The Province's Representative and the Concessionaire shall cause the Independent Certifier, within 25 Business Days of the commencement of the inspection under Section 6.4 [Inspection for Substantial Completion] of this Part, to either:

- (a) issue the Certificate of Substantial Completion for the Eastern Segment or the Western Segment, as the case may be, and stating the Eastern Segment Substantial Completion Date or the Western Segment Substantial Completion Date, as the case may be, to the Province and the Concessionaire; or
- (b) notify the Concessionaire and the Province's Representative of its decision not to issue the applicable 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 Eastern Segment or the Western Segment, as the case may be.

6.6 Refusal to Issue Certificate of Substantial Completion

The Independent Certifier shall refuse to issue the Certificate of Substantial Completion for the Eastern Segment or the Western Segment, as the case may be, only if the Eastern Segment or the Western Segment, as applicable, is not Substantially Complete, or any other conditions or requirements under the Agreement to the achievement of Substantial Completion of the Eastern Segment or the Western Segment, as the case may be, have not been satisfied or complied with in respect to the Eastern Segment or the Western Segment, as the case may be.

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6.7 Completion of Further Work for Substantial Completion

In the event of service of a notice by the Independent Certifier under Section 6.5(b) of this Part, the Concessionaire 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 the Concessionaire 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. Upon the Concessionaire notifying the Independent Certifier and the Province's Representative that such further work or measures necessary or appropriate have been completed, the Province's Representative and the Concessionaire shall cause the Independent Certifier to commence, within 10 Business Days of receipt of such notice, an inspection of such further work or measures and the provisions of Sections 6.3 [Notice of Substantial Completion] of this Part through to this Section, inclusive, shall thereafter apply to such notice *mutatis mutandis*.

6.8 Outstanding Work for Total Completion

Notwithstanding the issue of a Certificate of Substantial Completion for each of the Eastern Segment and the Western Segment, the Concessionaire shall promptly complete all outstanding Project Work required to achieve Total Completion of the Primary Infrastructure Components as soon as practicable.

6.9 Record Documentation

- (a) Prior to Total Completion of the Primary Infrastructure Components, the Concessionaire shall compile a complete set of Construction Records, including "as built" drawings.
- (b) All Construction Records compiled by the Concessionaire shall be available to the Province's Representative and the Independent Certifier upon request.
- (c) The Concessionaire shall ensure that all changes to drawings are properly and completely identified for record purposes. 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.

6.10 Asset Inventory Data

- (a) The Concessionaire shall update the Province's electronic asset inventory records in respect of the New Infrastructure. Such asset inventory 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 and Major Sign Structures.
 - (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.

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- (iii) Corporate Highway and Resource Information System (CHRIS): Other Structures with retaining walls less than 2.0m high, minor culverts, other Drainage Appliances, all Signs, highway furniture (including fences, gates, Guardrails and reflectors, and lineal safety features) and Pavement Marking (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) The Concessionaire 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, the Concessionaire shall access the BMIS electronic programme 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 of such Structure.
- (e) The Concessionaire shall provide the Province with a complete list of all electrical inventory in 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 CD or DVD and be clearly labelled as to the content.

6.11 Requirements for Total Completion of Primary Infrastructure Components

Total Completion of the Primary Infrastructure Components shall only be achieved after:

- (a) the Concessionaire has provided to the Province's Representative all required Construction Records for the Primary Infrastructure Components, in accordance with Section 6.9 [Record Documentation] of this Part;
- (b) all asset inventory data for the Primary Infrastructure Components has been completed in the appropriate Province management system in accordance with Section 6.10 [Asset Inventory Data] of this Part; and
- (c) all demolition, removal and disposal of Infrastructure shall have been completed in accordance with Article 13 [Demolition, Removals and Disposal] of Part 2 of this Schedule.

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6.12 Notice of Total Completion

The Concessionaire shall issue to the Independent Certifier and the Province's Representative a notice informing them at least 15 Business Days but no more than 30 Business Days prior to the date upon which the Concessionaire expects Total Completion of the Primary Infrastructure Components. If the Concessionaire has at any time reason to believe that such expected date for Total Completion of the Primary Infrastructure Components will 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 of the Primary Infrastructure Components.

6.13 Inspection for Total Completion

Upon the Concessionaire issuing a notice contemplated in Section 6.12 [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 the Total Completion of all of the Primary Infrastructure Components and all other relevant Certificates and supporting documentation in accordance with the Design and Certification Procedure, the Concessionaire 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 Total Completion has been achieved.

6.14 Issuance of Certificate of Total Completion

The Province's Representative and the Concessionaire shall cause the Independent Certifier, within 20 Business Days of the commencement of the inspection pursuant to Section 6.13 [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 the Concessionaire; or
- (b) notify the Concessionaire and the Province's Representative of its decision not to issue the Certificate of Total Completion and state the reasons in detail for such decision.

6.15 Refusal to Issue Certificate of Total Completion

The Independent Certifier shall refuse to issue the Certificate of Total Completion for the Primary Infrastructure Components only if the Primary Infrastructure Components 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 in respect of the Primary Infrastructure Components.

6.16 Completion of Further Work for Total Completion

In the event of service of a notice by the Independent Certifier under Section 6.14(b) of this Part, the Concessionaire 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 the Concessionaire 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 the Concessionaire notifying the Independent Certifier and the Province's Representative that such further work or measures necessary or appropriate have been completed, the Province's Representative and the Concessionaire

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shall cause the Independent Certifier to commence, within 10 Business Days of receipt of such notice, an inspection of such further work or measures and the provisions of Sections 6.12 [Notice of Total Completion] of this Part through to this Section, inclusive, shall thereafter apply to such notice *mutatis mutandis*.

6.17 Submissions by Province's Representative

The Province's Representative may, at any time, following receipt of notice given by the Concessionaire pursuant to Section 6.3 [Notice of Substantial Completion] or Section 6.12 [Notice of Total Completion] of this Part and prior to the Independent Certifier issuing or notifying the Concessionaire and the Province's Representative of its decision not to issue a Certificate of Substantial Completion or Certificate of Total Completion, as the case may be, provide the Independent Certifier and the Concessionaire with the Province's Representative's submissions as to whether the conditions for issuance of such Certificate of Substantial Completion or Certificate of Total Completion, as the case may be, have been satisfied and, if applicable, any reasons as to why the Province's Representative considers that such Certificate of Substantial Completion or 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 Certificate of Total Completion, as the case may be.

6.18 No Limitation

The issuance of any Certificate of Substantial Completion or any 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.

6.19 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 any Certificate of Total Completion in accordance with this Part, then either the Province's Representative or the Concessionaire may refer such dispute for resolution under the Dispute Resolution Procedure.

6.20 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 any Certificate of Total Completion and the Province's Representative or Concessionaire has referred a dispute in respect thereof for resolution under the Dispute Resolution Procedure pursuant to Section 6.19 [Disputed Certificate] of this Part, then for all purposes of this Agreement such Certificate of Substantial Completion or such 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.

6.21 Substantial and Total Completion for Other Construction Activities

Subject to Section 3.11 [Independent Certifier for Other Construction Activities] of Part 1 of this Schedule, the provisions of this Part shall apply *mutatis mutandis* to the certification of Substantial Completion and Total Completion in respect of the Relevant Components for each of the Construction

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Activities, other than the Construction of the Primary Infrastructure Components, carried out by the Concessionaire during the Term.

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**PART 4
TRAFFIC MANAGEMENT**

ARTICLE 1 GENERAL TRAFFIC MANAGEMENT REQUIREMENTS

1.1 Order of Precedence

The Concessionaire's Traffic Management Plan and traffic control operations 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 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 Circulars and Technical Bulletins included in the Reference Documents;
- (c) Traffic Management Guidelines;
- (d) Traffic Control Manual;
- (e) DBSS;
- (f) Electrical and Traffic Engineering Manual;
- (g) BC Supplement to TAC;
- (h) TAC Geometric Design Guide;
- (i) TAC Bikeway Traffic Control Guidelines; and
- (j) the applicable standards of the relevant Municipality;

1.2 General Requirements

- (a) The restrictions outlined in this Part 4 shall be the basis for the development of the Traffic Control Plan. Variations to the restrictions at specific locations may be permitted for such specific locations, but only if substantiated through a plan by the Concessionaire that addresses, at a minimum, traffic requirements, analyses and stakeholder consultation, where applicable, and such plan is accepted by the Province's Representative in accordance with the Consent Procedure.
- (b) Available traffic data are posted under the Planning and Traffic section of the Data Room. All traffic data used for analysis for Traffic Management purposes shall be less than 18 months old. The Concessionaire shall be responsible for obtaining any traffic data necessary for its traffic analysis.

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- (c) Implementation and removal of any Lane Closures, Stoppages, Full Closures, Detour Routes, Lane Shifts and/or other changes in traffic patterns shall be completed outside of Restricted Periods.
- (d) The Concessionaire 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.
- (e) The Province's Representative may, in its discretion, temporarily adjust the restrictions identified in this Part in relation to Traffic Disruption Events in circumstances considered appropriate by the Province's Representative (including, without limitation), Statutory Holidays, unspecified Special Events, Incidents and Maintenance.
- (f) The Province's Representative may direct the Concessionaire, on 30 days' advance notice, to eliminate any or all Traffic Disruption Events and initiate free-flow traffic for a 24 hour period from midnight to midnight on the day of any major planned event other than a Special Event.
- (g) If the Concessionaire's Traffic Control Supervisor determines that traffic delays, queues and/or disruptions are excessive (e.g. where the extent of vehicular queues affect upstream intersection or interchange operations or the ability of vehicles on a highway mainline to exit at upstream interchange ramps), the Concessionaire shall cease any relevant roadway Construction Activities and make all the necessary travel lanes available to traffic as quickly as possible.
- (h) Any proposed Lane Closures, Full Closures, Detour Routes and Lane Shifts not included in the Concessionaire's accepted Traffic Control Plan shall be subject to prior acceptance by the Province's Representative pursuant to the Consent Procedure.
- (i) Multiple Active Construction Zones in close proximity to each other along the Concession Highway, Other Provincial Highways, Interchange Ramps and Specified Roads, or routes between them, such that traffic encounters multiple disruptions and/or discontinuity in the lane geometries, shall not be permitted.
- (j) The Concessionaire shall not use private roads without making prior arrangements with all affected parties and the Province's Representative.
- (k) Physical access to all adjacent properties shall be maintained throughout Active Construction Zones.
- (l) Construction vehicle access to Active Construction Zones along the Concession Highway, Other Provincial Highways and Interchange 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 Project Work.

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1.3 Location and Storage of Materials and Equipment

The Concessionaire shall not store equipment on the travel portion or shoulder of any road at any time. Equipment stored within the Clear Zone of any road shall be protected by barriers.

1.4 Accommodation of Rail Traffic

The Concessionaire shall accommodate rail traffic in accordance with this Agreement (including, without limitation, the Railway Master Agreements and Reference Documents).

1.5 Incident Management

The Concessionaire shall undertake Incident management in accordance with Schedule 5 [OMR and End of Term] and Part 4 of this Schedule.

1.6 Special Events

The Concessionaire shall comply with the following requirements when scheduling hours of work or Concessionaire-initiated Traffic Disruption Events during the following events and circumstances (together, “**Special Events**”), provided that such requirements shall not apply to Specified Roads and Other Streets:

- (a) The Concessionaire shall not implement any Traffic Disruption Events during any of the timeframes for restrictions set out in Table 1.6b in relation to any of the holiday events identified in Table 1.6a.

| Table 1.6a Holiday Events | |
|--|--|
| Good Friday Easter Monday Victoria Day Canada Day British Columbia Day Labour Day | Thanksgiving Day Remembrance Day Christmas Day Boxing Day New Year’s Day |

| Table 1.6b Restrictions on Traffic Disruption Events | |
|---|--|
| Days on which Holiday 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) No Traffic Disruption Events shall be permitted during the period from February 4, 2010 to March 3, 2010 (for the 2010 Winter Olympic Games).

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- (c) For purposes of the application of the restrictions set out in Table 1.6b to Other Provincial Highways and Interchange Ramps, the United States holiday events identified in Table 1.6c shall also constitute Special Events.

| Table 1.6c US Holiday Events | |
|---|---|
| Martin Luther King Jr. Day President's Day Memorial Day | Independence Day Columbus Day Thanksgiving Day plus the following day |

1.7 Detour Route and Lane Shift Requirements

1.7.1 General

- (a) All Detour Routes and Lane Shifts shall be paved, with appropriate Pavement Markings and signs placed in accordance with the Traffic Control Manual.
- (b) The Concessionaire 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) The Concessionaire shall schedule Construction such that no milled surface shall be open to traffic for more than one daytime shift. Each milled surface open to traffic shall be clean and allow adequate drainage.
- (d) The Concessionaire shall prepare an engineered design for each Detour Route and Lane Shift that shall conform to the minimum Design requirements.
- (e) The Concessionaire shall provide Detour Routes and Lane Shifts with adequate drainage facilities to prevent 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's Representative in accordance with the Consent Procedure.

1.7.2 Traffic Control Devices

- (a) Construction and Advisory Signs
 - (i) The Concessionaire 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 and directional 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 Control Manual and the Manual of Standard Traffic Signs and Pavement Markings.

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- (ii) In accordance with Section 194 [Traffic Management for Work Zones] of DBSS, all standard signs, new and replacement, shall meet the Standard Highway Sign Specifications.
- (b) **CMSs**
 - (i) As a minimum, the Concessionaire shall provide portable CMSs as required and shall use the same to provide advance notification of planned traffic pattern changes in accordance with Part 4 [Traffic Management Communications] of Schedule 9. Sign locations and messages shall be as shown on the Traffic Control Plan. In addition, the Concessionaire is to use CMSs to provide notification of Incidents or unplanned traffic pattern changes, as deemed necessary by the Emergency Response Plan.
 - (ii) When in operation, the bottom of each portable CMS shall be a minimum of 2 m above the road surface, and shall be level and capable of pivoting for visibility purposes.

1.7.3 Concrete Roadside Barrier Requirements

- (a) As a minimum, the Concessionaire 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 the Concessionaire'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 in accordance with NCHRP Report 350. 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 Concession Highway, Other Provincial Highways and Interchange 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. The Concessionaire 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 the Concessionaire shall make adequate provision for drainage and removal of snow, ice and Debris.

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1.7.4 Drop-Offs

The Concessionaire 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 of the condition. However, no drop-offs shall be allowed between adjacent lanes of traffic.
- (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. The Concessionaire may use channelizing devices as listed in paragraph (c) below provided that, subject to a Road Safety Audit, the Concessionaire's Traffic Control Plan can demonstrate its effectiveness and the drop-off is less than 100 mm.
- (c) Drop-offs greater than 60 mm but less than 150 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 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 painted 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 more than 150 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.

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- (e) Drop-offs more than 150 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 1.7.4(c)(i) and (ii) of this Part.
- (f) Any drop-off over 150 mm in height shall be protected with concrete roadside barrier with end treatments as required by the Traffic Control Manual.

All areas of excavation and their proposed safety measures shall be shown in the Traffic Control Plan.

1.7.5 Temporary Pavement Markings

- (a) Further to Section 2.2.1 of the Traffic Control Manual, the Concessionaire 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), the Concessionaire 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 DBSS, the Concessionaire shall supply all temporary Pavement Markings. The material used for temporary Pavement Markings shall be paint with glass bead or thermoplastic marking.
- (d) The Concessionaire shall apply all Pavement Markings in accordance with the signing and pavement markings drawings and the Detour Route and Lane Shift design drawings.
- (e) The Concessionaire shall re-apply temporary pavement markings, raised pavement markers, delineators and barrier reflectors that are faded, damaged or missing.
- (f) Raised pavement markers shall be installed on any Detour Routes and Lane Shifts on the Concession Highway, Other Provincial Highways and Interchange Ramps in accordance with the Signage and Pavement Marking Manual.

1.7.6 Speed Limits and Safe Passage through Project Site

- (a) Further to Section 1.7.6 of the Traffic Control 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's Representative, the existing speed limits shall be maintained.
- (b) Where the Province considers it is either not practical on a Detour Route or Lane Shift to achieve a design speed equal to the existing posted speed, or where a temporary speed zone has been established within Active Construction Zones for short-duration work (not more than one shift), then a temporary reduction in the Other Provincial Highways speed limit may be granted. The Concessionaire may request, for consideration by the Province in its sole discretion, a temporary reduction in the Other Provincial Highways

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speed limit to a speed of not less than 60 km/h through an Active Construction Zone, but only outside of Restricted Periods and for no more than 2 km in length.

1.8 Existing Traffic Signals

- (a) Modifications to existing traffic signals shall be undertaken in accordance with Section 1.5 [Traffic Engineering] and Section 6.6 [Traffic Signals] of Part 2 of this Schedule
- (b) The Concessionaire shall develop and implement new signal timing plans as required at existing Ministry owned signalized intersections where Construction will impact intersection operations.
- (c) The Concessionaire shall be responsible for liaising and coordinating with Municipalities regarding any modifications to existing Municipal signalized intersections that may be required.
- (d) Existing signal coordination shall be maintained at all traffic signals affected by Construction.

1.9 Temporary Traffic Signals and Lighting

- (a) Temporary traffic signals shall be provided where required in accordance with Section 1.5 [Traffic Engineering] and Section 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.

1.10 Accommodation of Pedestrians, Cyclists and Equestrians

- (a) The Concessionaire shall ensure passage at each existing facility and crossing point within the Project Site currently used by pedestrians, cyclists and equestrians is maintained in a safe and efficient manner throughout Construction, except at facilities or crossing points that are to be permanently closed.
- (b) Temporary closure or re-routing of pedestrian, cycling or equestrian routes may be permitted by the Province contingent upon provision of a suitable alternative route. Proposed temporary closure or re-routing of pedestrian, cycling or equestrian routes shall be submitted to the Province's Representative in accordance with the Consent Procedure.
- (c) Any closures of pedestrian, cycling or equestrian routes exceeding 10 minutes shall be preceded with signage indicating the dates and duration of any closure as well as alternative routes available.

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1.11 Accommodation of Transit

- (a) The Concessionaire shall ensure passage along each existing transit route within the Project Site is maintained or rerouted in a safe and efficient manner throughout Construction.
- (b) The Concessionaire shall consult with TransLink and Coast Mountain Bus Company with respect to any Construction Activities that might affect transit operations, facilities and routing.
- (c) The Concessionaire shall ensure that delays along transit routes are minimized and have been coordinated with TransLink and Coast Mountain Bus Company to prevent adverse impacts on transit operating schedules.
- (d) The Concessionaire shall arrange with TransLink, Coast Mountain Bus Company and the Municipalities for the relocation of bus stops and associated facilities.
- (e) The Concessionaire shall design and construct all temporary transit facilities in accordance with the Transit Infrastructure Design Guidelines.

1.12 Consequences of Occurrence of Non-Permitted Traffic Disruption Events

- (a) Traffic Management Payments shall be payable by the Concessionaire to the Province, pursuant to and in accordance with Schedule 10 [Performance Mechanism], in respect of each Non-Permitted (Payment) Traffic Disruption Event.
- (b) NCE Points shall be assigned by the Province, pursuant to and in accordance with Schedule 10 [Performance Mechanism], in respect of each Non-Permitted (Points) Traffic Disruption Event.

ARTICLE 2 OTHER PROVINCIAL HIGHWAYS

2.1 General Requirements

- (a) The requirements in this Article 2 are applicable to all Other Provincial Highways.
- (b) Existing emergency turnarounds and routes shall either be maintained or relocated in the near vicinity.
- (c) Closures on both Highway 91 and 99, which affect traffic in the same direction across the Fraser River at the same time, shall not be permitted.
- (d) The Concessionaire shall provide portable CMSs 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. Portable CMSs (including flashers and other warning devices) shall be placed at strategic upstream locations in order to advance-warn motorists and allow them adequate opportunity to divert prior to reaching the Closure or Detour Route location.

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- (e) For each scheduled Full Closure, Lane Closure or Detour Route, the Concessionaire shall provide advance notice to the travelling public and other stakeholders of the scheduled Full Closure or Detour Route in accordance with Part 4 [Traffic Management Communications] of Schedule 9.

2.2 Restricted Periods for Other Provincial Highways

Restricted Periods for Other Provincial Highways are as follows:

| Direction | Weekdays | Saturday | Sunday |
|-------------------|------------------|------------------|------------------|
| Highway 99 | | | |
| Northbound | 5:00am – 8:00pm | 7:00am – 8:00pm | 7:00am – 9:00pm |
| Southbound | 6:00am – 9:00pm | 7:00am – 9:00pm | 7:00am – 9:00pm |
| Highway 91 | | | |
| Northbound | 5:00am – 8:00pm | 7:00am – 8:00pm | 7:00am – 8:00pm |
| Southbound | 6:00am – 9:00pm | 9:00am – 9:00pm | 9:00am – 9:00pm |
| Highway 17 | | | |
| Northbound | 6:00am – 10:00pm | 9:00am – 10:00pm | 9:00am – 11:00pm |
| Southbound | 5:00am – 9:00pm | 8:00am – 9:00pm | 8:00am – 9:00pm |

2.3 Lane Closures on Other Provincial Highways

- (a) As a minimum, the number of lanes in each direction existing as at the Effective Date on each Other Provincial Highway shall be kept open for traffic during Restricted Periods for Other Provincial Highways.
- (b) Except in the circumstances in which Full Closures are permitted pursuant to Section 2.5 [Full Closures on Other Provincial Highways] of this Part 4, a minimum of one basic lane (excluding auxiliary lanes) in each direction on each Other Provincial Highway shall be kept open for general traffic outside of Restricted Periods for Other Provincial Highways.

2.4 Stoppages on Other Provincial Highways

Except in the circumstances in which Full Closures are permitted pursuant to Section 2.5 [Full Closures on Other Provincial Highways] of this Part 4, Stoppages of traffic on the Other Provincial Highways will not be permitted at any time.

2.5 Full Closures on Other Provincial Highways

Subject to acceptance by the Province's Representative in accordance with the Consent Procedure, in exceptional situations (such as Bridge girder erection and sign gantry installation) the following directional Full Closures shall be permitted on a site specific basis and under the following conditions:

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- (a) Full Closures shall be permitted only between 12:00 am and 4:00 am.
- (b) Where a Detour Route is provided on the Project Site (for example rerouted along Interchange Ramps), then a Full Closure shall be permitted up to the entire duration of the period between 12:00 am and 4:00 am on any day.
- (c) If a Detour Route is not provided on the Project Site, then any Full Closure otherwise permitted under this Section 2.5 shall not exceed a duration of 20 minutes, at which time the vehicular queues must be cleared prior to commencement of another Full Closure.
- (d) If a Detour Route is not provided on the Project Site, there shall be permitted no more than one Full Closure per direction on an Other Provincial Highway at any time (i.e. maximum of one Full Closure location per direction where an on-site Detour Route is not provided).

2.6 Non-Permitted Traffic Disruption Events on Other Provincial Highways

Each of the following Traffic Disruption Events occurring on an Other Provincial Highway is a Non-Permitted Traffic Disruption Event:

- (a) a Lane Closure occurring on an Other Provincial Highway;
 - (i) during a Restricted Period for Other Provincial Highways;
 - (ii) during a Special Event in contravention of Section 1.6 [Special Events] of this Part; or
 - (iii) in any other circumstances not expressly permitted pursuant to Section 2.3 [Lane Closures on Other Provincial Highways] of this Part;
- (b) a Full Closure occurring on an Other Provincial Highway:
 - (i) during a Restricted Period for Other Provincial Highways;
 - (ii) during a Special Event in contravention of Section 1.6 [Special Events] of this Part; or
 - (iii) in any other circumstances not expressly permitted pursuant to Section 2.5 [Full Closures on Other Provincial Highways] of this Part;
- (c) a Stoppage occurring on an Other Provincial Highway in circumstances not expressly permitted pursuant to Section 2.4 [Stoppages] of this Part.

2.7 Detour Route and Lane Shift Design Criteria

- (a) Table 2.7 summarizes the minimum geometric design criteria that shall be incorporated into the Design of all Detour Routes and Lane Shifts on Other Provincial Highways.

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Table 2.7

| | Other Provincial Highway Mainlines |
|--|---|
| Design/Posted Speed | 80 - 100 km/h |
| 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 | 3.5 m travel lanes (minimum) |
| 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) | 1.0m (min) |
| Side Slopes (w/o Barrier) | The lesser of 4: 1 (max) or existing |

- (b) Notwithstanding the above, localized sections (i.e. maximum 300 m length) along the Other Provincial Highways with both reduced inside and outside shoulder widths (i.e. minimum 0.5 m) may be permitted in order to accommodate median pier Construction. Concrete roadside barriers shall be provided along both sides, complete with barrier flares as required.
- (c) On Other Provincial Highway curves, the inside shy distance shall be increased to provide at least the lesser of 1.0 m or the distance required to accommodate the appropriate stopping sight distance for a minimum 80 km/hr design speed.

ARTICLE 3 INTERCHANGE RAMPS AND DELTAPORT WAY

3.1 General Requirements

- (a) The requirements in this Article 3 are applicable to all Interchange Ramps and Deltaport Way.
- (b) All existing ramp turning movements, capacities and storage lengths at each interchange location shall be maintained during Restricted Periods for Interchange Ramps.

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- (c) All existing ramp turning movements at each interchange location shall be provided outside of Restricted Periods, unless otherwise accepted by the Province’s Representative in accordance with the Consent Procedure.
- (d) Temporary works at existing interchange exit ramps shall be designed to prevent queuing onto Other Provincial Highways.
- (e) Existing emergency turnarounds and routes shall either be maintained or relocated in the near vicinity.
- (f) The Concessionaire shall provide portable CMSs to provide advance notice of each scheduled Full Closure, Lane Closure, Stoppage or Detour Route and to provide advance notice of all traffic pattern changes and disruptions. Portable CMSs (including flashers and other warning devices) shall be placed at strategic upstream locations in order to advance-warn motorists and allow them adequate opportunity to divert prior to reaching the Full Closure, Stoppage or Detour Route location.
- (g) For each scheduled Full Closure, Lane Closure, Stoppage or Detour Route, the Concessionaire shall provide advance notice to the travelling public and other stakeholders of the scheduled Full Closure, Stoppage or Detour Route in accordance with Part 4 [Traffic Management Communications] of Schedule 9.

3.2 Restricted Periods for Interchange Ramps

Restricted Periods for Interchange Ramps are as follows:

| Direction | Weekdays | Saturday | Sunday |
|------------------|------------------|------------------|------------------|
| All | 5:00am – 10:00pm | 7:00am – 10:00pm | 7:00am – 10:00pm |

3.3 Lane Closures on Interchange Ramps

Except in the circumstances in which Stoppages or Full Closures are permitted pursuant to Sections 3.4 [Stoppages on Interchange Ramps] and 3.5 [Full Closures on Interchange Ramps], respectively, of this Part 4, a minimum of one basic lane (excluding auxiliary lanes) on each Interchange Ramp shall be kept open for general traffic outside of Restricted Periods for Interchange Ramps.

3.4 Stoppages on Interchange Ramps

- (a) Subject to acceptance by the Province’s Representative in accordance with the Consent Procedure, the following Stoppages shall be permitted outside of Restricted Periods for Interchange 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.

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- (b) After a Stoppage has been implemented and removed, the Concessionaire shall allow all queues to clear before implementing another Stoppage.

3.5 Full Closures on Interchange Ramps

Subject to acceptance by the Province's Representative in accordance with the Consent Procedure, in exceptional situations (such as Bridge girder erection and sign gantry installation) the following directional Full Closures shall be permitted on a site specific basis and under the following conditions:

- (a) Full Closures shall be permitted only between 12:00 am and 4:00 am.
- (b) Where a Detour Route is provided on the Project Site, then a Full Closure shall be permitted up to the entire duration of the period between 12:00 am and 4:00 am on any day.
- (c) If a Detour Route is not provided on the Project Site, then any Full Closure otherwise permitted under this Section 3.5 shall not exceed a duration of 20 minutes, at which time the vehicular queues must be cleared prior to commencement of another Full Closure.

3.6 Non-Permitted Traffic Disruption Events on Interchange Ramps

Each of the following Traffic Disruption Events occurring on an Interchange Ramp, or on Deltaport Way, is a Non-Permitted Traffic Disruption Event:

- (a) a Lane Closure occurring on an Interchange Ramp:
 - (i) during a Restricted Period for Interchange Ramps;
 - (ii) during a Special Event in contravention of Section 1.6 [Special Events] of this Part; or
 - (iii) in any other circumstances not expressly permitted pursuant to Section 3.3 [Lane Closures on Interchange Ramps] of this Part;
- (b) a Full Closure occurring on an Interchange Ramp:
 - (i) during a Restricted Period for Interchange Ramps;
 - (ii) during a Special Event in contravention of Section 1.6 [Special Events] of this Part; or
 - (iii) in any other circumstances not expressly permitted pursuant to Section 3.5 [Full Closures on Interchange Ramps] of this Part; or
- (c) a Stoppage occurring on an Interchange Ramp in circumstances not expressly permitted pursuant to Section 3.4 [Stoppages on Interchange Ramps] of this Part.

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3.7 Detour Route and Lane Shift Design Criteria

- (a) Table 3.7 summarizes the minimum geometric design criteria that shall be incorporated into the Design of all Detour Routes and Lane Shifts for all Interchange Ramps and Deltaport Way.

Table 3.7

| | Interchange Ramps | Deltaport Way |
|--|--|---|
| Design/Posted Speed | 40 km/h | 60km/h |
| Design Vehicle | WB20 | WB20 |
| Maximum Grade | 8% | 8% |
| Maximum Superelevation | 6% | 6% |
| Minimum Radius | The lesser of 55m or existing | 130 m |
| 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 | 4.5m (minimum) for one lane ramps 3.5m (minimum) for two lane ramps | 3.3m (minimum) |
| Outside Paved Shoulder Width (Open) | 1.0m (minimum) for one lane ramps 1.5m (minimum) for two lane ramps | 1.0m (minimum) |
| Outside Paved Shoulder Width (Closed by Barrier) | 1.5 m (minimum) | 1.0m (minimum) |
| Inside Paved Shoulder Width | 0.5m (minimum) (open) 1.0m (minimum) (barrier) | 0.5m (minimum) (open) 1.0m (minimum) (barrier) |
| Side Slopes (w/o Barrier) | The lesser of 4.1 (max) or existing | The lesser of 4.1 (max) or existing |

ARTICLE 4 SPECIFIED ROADS

4.1 General Requirements

- (a) The requirements in this Article 4 are applicable to all Specified Roads.

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- (b) All existing road capacities and intersection turning movements, capacities and storage lengths shall be maintained during Restricted Periods for Specified Roads.
- (c) Temporary works at intersections in the vicinity of interchange exit ramps shall be designed to prevent queuing onto Other Provincial Highways.
- (d) Existing emergency turnarounds and routes shall either be maintained or relocated in the near vicinity.
- (e) The Concessionaire shall provide portable CMSs to provide advance notice of each scheduled Full Closure, Lane Closure, Stoppage or Detour Route and to provide advance notice of all traffic pattern changes and disruptions. Portable CMSs (including flashers and other warning devices) shall be placed at strategic upstream locations in order to advance-warn motorists and allow them adequate opportunity to divert prior to reaching the Full Closure, Lane Closure, Stoppage or Detour Route location.
- (f) For each scheduled Full Closure, Lane Closure, Stoppage or Detour Route, the Concessionaire shall provide advance notice to the travelling public and other stakeholders of the scheduled Full Closure, Lane Closure, Stoppage or Detour Route in accordance with Part 4 [Traffic Management Communications] of Schedule 9.

4.2 Restricted Periods for Specified Roads

- (a) Restricted Periods for River Road, Nordel Way, Scott Road and King George Highway are as follows:

| Direction | Weekdays | Saturday | Sunday |
|-----------|-----------------|-----------------|-----------------|
| All | 6:00am – 9:00pm | 8:00am – 8:00pm | 8:00am – 8:00pm |

- (b) Restricted Periods for all other Specified Roads are as follows:

| Direction | Weekdays | Saturday | Sunday |
|-----------|-----------------|-----------------|-----------------|
| All | 6:00am – 8:00pm | 8:00am – 8:00pm | 8:00am – 8:00pm |

4.3 Lane Closures on Specified Roads

Except in circumstances in which Stoppages or Full Closures are permitted pursuant to Sections 4.4 [Stoppages on Specified Roads] and 4.5 [Full Closures on Specified Roads], respectively, of this Part 4 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.

4.4 Stoppages on Specified Roads

- (a) Subject to acceptance by the Province's Representative in accordance with the Consent Procedure, the following Stoppages shall be permitted outside of Restricted Periods for Specified Roads:
 - (i) Stoppages of less than five minutes' duration; and

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- (ii) Stoppages of greater than five 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, the Concessionaire 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' duration in each case) which may need to occur from time to time, including during Restricted Periods for Specified Roads. Such random minor interruptions shall be limited to no more than two per hour during Restricted Periods.

4.5 Full Closures on Specified Roads

Full Closures of Specified Roads are not permitted except:

- (a) with the approval of the relevant Municipality; and
- (b) provided that the Concessionaire has first obtained the approval of the relevant Municipality, with the prior acceptance of the Province's Representative pursuant to the Consent Procedure.

4.6 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 1.6 [Special Events] of this Part; or
 - (iii) in any other circumstances not expressly permitted pursuant to Section 4.3 [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 1.6 [Special Events] of this Part; or
 - (iii) in any other circumstances not expressly permitted pursuant to Section 4.5 [Full Closures on Specified Roads] of this Part; or

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- (c) a Stoppage occurring on a Specified Road and not expressly permitted pursuant to Section 4.4 [Stoppages on Specified Roads] of this Part.

4.7 Detour Route and Lane Shift Design Criteria

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 Specified Roads.

Table 4.7

| 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% | 8% |
| Maximum Superelevation | 6% | 6% |
| 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 | 3.3m travel lanes minimum | 3.3m travel lanes minimum |
| Shoulder (Open) | 1.0m minimum including 0.5m minimum paved | 2.0m minimum including 0.5m minimum paved |
| Shoulder (with Barrier) | 0.5 m minimum paved | 1.0 m minimum (outside), 0.5m minimum (inside), all paved |
| 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 |

ARTICLE 5 OTHER STREETS

5.1 General Requirements

- (a) The requirements in this Article 5 are applicable to all Other Streets.
- (b) All existing road capacities and intersection turning movements, capacities and storage lengths shall be maintained during Restricted Periods for Other Streets.

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- (c) The Concessionaire 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.
- (d) For each scheduled Stoppage having a duration greater than five minutes, or Full Closure, the Concessionaire shall provide advance notification to the travelling public and other stakeholders of the scheduled Stoppage or Full Closure in accordance with Part 4 [Traffic Management Communications] of Schedule 9.

5.2 Restricted Periods for Other Streets

- (a) Subject to Section 5.2(b) of this Part, Restricted Periods for Other Streets are as follows:

| Direction | Weekdays | Saturday | Sunday |
|-----------|------------------------------------|----------|--------|
| All | 7:00am – 9:00am 4:00pm – 6:30pm | None | None |

- (b) Restricted Periods for Other Streets that are used by school related traffic and are within 500m of an elementary or secondary school, on days when schools are in session, are as follows:

| Direction | Weekdays | Saturday | Sunday |
|-----------|-------------------------------------|----------|--------|
| All | 7:00am – 10:00am 2:00pm – 6:30pm | None | None |

5.3 Lane Closures on Other Streets

Single lane alternating traffic operations along Other Streets may be permitted outside of Restricted Periods, subject to the prior acceptance of the Province's Representative on a site specific basis.

5.4 Stoppages on Other Streets

- (a) Subject to acceptance by the Province's Representative in accordance with the Consent Procedure, the following Stoppages shall 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 8:00 pm and 6:00 am only.
- (b) After a Stoppage has been implemented and removed, the Concessionaire shall allow all queues to clear before implementing another Stoppage.

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- (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.

5.5 Full Closures on Other Streets

- (a) Full Closures of Other Streets are not permitted except:
 - (i) with the approval of the relevant Municipality; and
 - (ii) provided that the Concessionaire has first obtained the approval of the relevant Municipality, with the prior acceptance of the Province’s Representative pursuant to the Consent Procedure.

5.6 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 5.4 [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 5.5 [Full Closures on Other Streets] of this Part.

5.7 Detour Route and Lane Shift Design Criteria

Table 5.7 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 5.7, then the 80km/h criteria contained in Table 5.7 shall apply.

Table 5.7

| Construction Detour Route and Lane Shift Design Criteria – Other Streets | | |
|---|---|---|
| Design Speed/Posted Speed | 50 km/h or less | 60 km/h |
| Design Vehicle | WB20 | WB20 |
| Maximum Grade | 10% | 10% |
| Maximum Superelevation | 6% | 6% |
| Vertical Clearance | the lesser of 5.0 m or existing travel lane clearance | the lesser of 5.0 m or existing travel lane clearance |

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| Construction Detour Route and Lane Shift Design Criteria – Other Streets | | |
|---|---|--|
| Lane Width | 3.3m travel lanes minimum | 3.5m travel lanes minimum |
| Shoulder (Open) | 1.0m minimum including 0.5m minimum paved | 2.0m minimum including 0.5m minimum paved |
| Shoulder (with Barrier) | 0.5m minimum paved | 1.0m minimum (outside), 0.5m minimum (inside), all paved |
| 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 |

ARTICLE 6 CONCESSION HIGHWAY

6.1 Concession Highway Closures

For the Eastern Segment following the Eastern Segment Substantial Completion Date, and for the entire Concession Highway following the Western Segment Substantial Completion Date, the following restrictions shall apply:

- (a) A minimum of one basic lane on the Eastern Segment or the Concession Highway, as the case may be, within in each direction shall be kept open for general traffic at all times.
- (b) No Lane Closures shall be permitted on the Eastern Segment or the Concession Highway, as the case may be, during the period from 6:00 am to 9:00 am or during the period from 3:00 pm to 6:30 pm on Business Days.
- (c) Outside of the hours set out in paragraph (b) above, the Concessionaire shall not permit the occurrence of any Closures in any Road Section in the Eastern Segment or the Concession Highway, as the case may be, in respect of which the Assumed Usage, as defined in Schedule 10, is in excess of the product derived by application of the following formula:

1,300 vehicles per hour × the least number of lanes intended by the Concessionaire to remain open in the Road Section at any time during the occurrence or subsistence of the Closure.
- (d) The restrictions in paragraph (c) above do not apply between 12:00 am and 4:00 am.

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ARTICLE 7 TRAFFIC MANAGEMENT PLAN

7.1 General Requirements

- (a) Within 30 days following the Effective Date, the Concessionaire 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, the Concessionaire shall submit all subsequent proposed changes to the Traffic Management Plan 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) The Concessionaire's Traffic Management Plan shall reference and interface with the Concessionaire's Traffic Quality Management Plan provided in accordance with Schedule 7 [Quality Management], the Emergency Response Plan provided in accordance with Schedule 5 [OMR and End of Term] and the Traffic Management Communications Plan provided in accordance with Schedule 9 [Communication and Consultation].
- (d) The initial Traffic Management Plan documents how the Concessionaire plans on managing traffic for the Construction of the Primary Infrastructure Components. Additional Traffic Management Plans shall be prepared and submitted to the Province's Representative pursuant to the Review Procedure for any and all Construction Activities to be carried out on the Eastern Segment following the Eastern Segment Substantial Completion Date, or on the entire Concession Highway following the Western Segment Substantial Completion Date.
- (e) In addition to the requirements set out in Sections 6.1 (a) and (d) of this Part, the Concessionaire shall not conduct any Construction Activity that affects traffic without a current Traffic Management Plan that has also been accepted and sealed by the Concessionaire's Traffic Engineer.
- (f) Further to Section 194.11 of DBSS, this work has been assessed to be a Category 4 Project in accordance with the Traffic Management Guidelines. The Traffic Management Plan must comply with the definitions and guidelines provided in the Traffic Management Guidelines.
- (g) The Concessionaire's Traffic Management Plan shall outline how general traffic, as well as the traffic generated by Construction, is to be managed.
- (h) The following sub-plans for the Concessionaire's Traffic Management Plan are required:
 - (i) Traffic Control Plan;

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- (ii) Emergency Response Plan;
- (iii) Implementation Plan;
- (iv) Advisory Signing Plan; and
- (v) Risk Assessment Plan.

7.2 Traffic Management Sub-Plans

7.2.1 Traffic Control Plans

- (a) The Concessionaire shall prepare Project specific Traffic Control Plans in accordance with the Traffic Management Guidelines and other reference documents for all activities that affect traffic operations, including but not limited to:
 - (i) each Construction stage;
 - (ii) activation of newly constructed roads, interchanges and Structures; and
 - (iii) any other Construction Activity during the Term.
- (b) The following Traffic Control Manual sections are modified as shown below.

| | |
|---|--|
| Further to Section 1.2.3: Responsibility | The Concessionaire is assigned such responsibility for, and shall at all times make provision for, traffic to pass throughout the Project Site in accordance with this Part, to ensure the convenience and safety of the public, vehicular, cycling, pedestrian and equestrian traffic, and the workers on the Project Site, and the protection of the Project Work. |
|---|--|

| | |
|--|--|
| Further to Section 1.4: Traffic Control (Work) Zones | Any one or more of the advance warning areas, transition areas, buffer spaces, work areas and termination areas of the traffic control zone may be outside the Project Site, but this shall in no way diminish the Concessionaire's responsibility to meet the requirements of the Traffic Control Manual. |
|--|--|

| | |
|--|--|
| Further to Section 1.5: Installation, Maintenance and Inspection of Traffic Control | 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. |
|--|--|

- (c) Further to the Category 4 Traffic Management Plan requirements in the Traffic Management Guidelines, the Concessionaire shall conduct traffic analysis on the Traffic Control Plan for each stage of the Construction where traffic operations are affected (except for Other Streets). The traffic analysis shall determine the effect of each Traffic Control Plan on the capacity and operation, including the resulting vehicle delays and queue lengths. The analysis shall confirm that the resulting queues are expected to clear

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before the commencement of a Restricted Period. The traffic analysis shall be conducted for the representative hour(s) and day(s) that each Traffic Control Plan is in operation. Analysis results are to be provided to the Province's Representative.

- (d) The Concessionaire shall be responsible for including Construction generated traffic in the Traffic Control Plan and any associated analysis.
- (e) The Concessionaire shall continuously measure the effectiveness of Traffic Control Plans and, if those measurements indicate a Traffic Control Plan is non-compliant, the Concessionaire shall immediately adjust the Traffic Control Plan to bring it into compliance.
- (f) The Traffic Control Plan shall include engineered designs for each Detour Route, Lane Shift and Lane Closure. The locations and details of all signs, portable CMSs, Pavement Markings, barriers, and protective works shall be indicated on the drawings. All drawings are to be signed/sealed by the Traffic Engineer.
- (g) The Traffic Control Plan shall be coordinated with any adjacent construction work to be completed by others.
- (h) Storage lengths at existing signalized intersections shall not be reduced unless analysis confirms acceptable operation.
- (i) Acceleration / deceleration lane lengths shall not be reduced unless analysis confirms acceptable operation.

7.2.2 *Emergency Response Plan*

The Concessionaire shall prepare and submit an Emergency Response Plan meeting the requirements of Article 12 [Emergency Operation and Maintenance] of Appendix A to Schedule 5 and the Incident Response Plan requirements of the Traffic Management Guidelines. The Emergency Response Plan shall specify how the Concessionaire will provide access for emergency vehicles and provide assistance to Emergency Response personnel. 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. The Concessionaire shall consult with first responders in developing the Emergency Response Plan, and liaise closely with them throughout the period until the Western Segment Substantial Completion Date.

7.2.3 *Implementation Plan*

The Concessionaire shall prepare and submit an Implementation Plan in accordance with the Traffic Management Guidelines. 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 and during any subsequent Construction Activities.

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7.2.4 Advisory Signing Plan

The Concessionaire shall prepare and implement an Advisory Signing Plan. The primary objective of an Advisory Signing Plan is to notify the travelling public in advance of the scheduled Construction Activities, Detour Routes, Full Closures, Stoppages and Lane Closures.

7.2.5 Risk Assessment Plan

The Concessionaire shall perform an independent assessment to identify any risks or special conditions that must be addressed through the Concessionaire's Risk Assessment Plan. The Concessionaire shall identify all risks and state the measures to be implemented to manage or eliminate the risks.

ARTICLE 8 RESPONSIBILITIES FOR TRAFFIC MANAGEMENT PLAN

8.1 Concessionaire Responsibilities

The Concessionaire 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. The Concessionaire shall ensure that all personnel identified in the Traffic Management Plan are suitably qualified and licensed.

8.2 Traffic Manager

The Concessionaire shall designate a Traffic Manager who shall be responsible for the following:

- (a) development, implementation and management of the Traffic Management Plan;
- (b) ensuring the Province's Representative is kept informed of all upcoming traffic activities and any revisions to the Traffic Management Plan;
- (c) ensuring that appropriate modifications are made to the Traffic Management Plan if the specified traffic control measures are not achieving the desired effect; and
- (d) coordinating with adjacent work areas, including work being carried out by others.

8.3 Traffic Engineer

The Concessionaire shall designate a Professional Engineer as the Traffic Engineer, who has the Concessionaire'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.

The Traffic Engineer shall sign and seal all traffic engineering checklists and signal timing sheets.

8.4 Traffic Control Supervisors

- (a) The Concessionaire shall designate one or more Traffic Control Supervisors, each of whom shall have the Concessionaire's authority to respond to traffic control

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requirements and each of whom shall personally perform all the duties of the Traffic Control Supervisor, in accordance with this Part.

- (b) Further to Section 194.04 of 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 the Concessionaire's traffic control personnel and procedures on the Project Site. The Concessionaire 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 along sections 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, Detours and Lane Shifts and unauthorized traffic delays and forwarding this information, on a daily, basis to the Province's Representative for information;
 - (iv) Monitoring queue lengths in Active Construction Zones and implementing appropriate measures when such queues 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.

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**APPENDIX A
FORM OF INDEPENDENT CERTIFIER CONTRACT**

THIS CONTRACT is made as of the ____ day of _____, 200____.

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:

[CONCESSIONAIRE]

(the “**Concessionaire**”)

AND:

[INDEPENDENT CERTIFIER]

(the “**Independent Certifier**”)

WHEREAS:

A. The Province, BC Transportation Financing Authority and the Concessionaire (the Province and the Concessionaire being herein collectively and individually referred to as the “**CA Parties**”) have entered into the Concession Agreement.

B. Pursuant to the terms of the Concession Agreement, the CA Parties wish to appoint the Independent Certifier, and the Independent Certifier wishes to accept such appointment, to perform certain services in connection with the Concession Agreement.

C. The CA 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 CA Parties and the Independent Certifier herein expressed and for other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the CA 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 Concession Agreement (and not otherwise defined in this Contract) shall have the meanings given to them in Schedule 1 to the Concession Agreement, and the following terms shall have the following meanings:

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- (a) “**CA Parties**” has the meaning given in Recital A hereto.
- (b) “**Concession Agreement**” means the agreement entitled “Concession Agreement” made between the Province, BC Transportation Financing Authority and the Concessionaire and dated as of ●, 200●, 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 CA Party pursuant to this Contract or the Concession 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 CA 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 issuance of the Relevant Certificates;
 - (ii) all of the functions and obligations conferred on and to be performed by the Independent Certifier under the Concession Agreement in connection with the issuance of the Relevant Certificates;
 - (iii) all of the functions and obligations conferred on and to be performed by the Independent Certifier under this Contract in connection with the issuance of the Relevant Certificates, including the functions described in Attachment 1 to this Contract; and
 - (iv) all other things or tasks which the Independent Certifier must do to comply with its obligations and discharge its duties under this Contract and to comply with the obligations and discharge the duties of the Independent Certifier under the Concession Agreement in connection with 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 Eastern Segment;

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- (ii) the Certificate of Substantial Completion in respect of the Western Segment; and
- (iii) the Certificate of Total Completion in respect of the Primary Infrastructure Components.

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.

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- (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 CA Parties

- (a) All obligations of the CA 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 CA Parties under this Contract shall be jointly exercised by the CA Parties.

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2. ROLE OF THE INDEPENDENT CERTIFIER

2.1 Engagement

The CA 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 Concession Agreement. The Independent Certifier shall perform the Functions in accordance with this Contract and the provisions of the Concession Agreement.

2.2 Qualifications and Standard of Skill, Care and Diligence

The Independent Certifier represents and warrants to the CA 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 Concession 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 CA Parties in accordance with the terms of the Concession 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 Concession Agreement; or
 - (B) where no times are prescribed, within a reasonable time so as to enable the CA Parties to exercise their respective rights and perform their respective obligations under the Concession Agreement; and

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- (iv) act in accordance with the joint directions of the CA Parties provided that the directions are not inconsistent with the other terms of this Contract or the terms of the Concession 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 CA 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 CA 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 CA Party;
- (b) has no authority to give any directions to a CA Party or its officers, directors, members, employees, contractors, consultants or agents; and
- (c) has no authority to waive or alter any terms of the Concession Agreement, nor to discharge or release a party from any of its obligations under the Concession Agreement.

2.5 Knowledge of the CA Parties' Requirements

The Independent Certifier represents and warrants to the CA Parties that:

- (a) it has reviewed the Concession Agreement and informed and shall be deemed to have informed itself fully of the requirements of the Concession Agreement as they relate to the performance of the Functions and as to the nature of the Project Work provided for under the Concession 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 Concession 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

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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 CA Parties;
- (b) carefully co-ordinate the Functions with the work and services performed by the CA 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 CA Parties; and
- (d) provide copies to all CA Parties of all reports, communications, certificates and other documentation that it provides to any CA Party.

2.7 Ability to Fulfill Terms of Contract; Conflict of Interest

The Independent Certifier represents and warrants to the CA 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 CA 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 CA Parties, shall forthwith provide each of the CA Parties with such further information relating thereto as it may request and take such steps as may be required by each of the CA Parties to avoid or mitigate that conflict or risk.

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2.8 Independent Certifier Personnel

- (a) The Independent Certifier represents and warrants to the CA 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 Concession 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 CA Parties of any such circumstances and shall be responsible for finding a replacement who shall previously have been approved in writing by the CA Parties.

3. ROLE OF THE CA PARTIES

3.1 Cooperation

The CA 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 CA Parties shall be given in writing jointly signed by the CA Parties. Such written instructions shall be valid if jointly signed by the Province's Representative and the Concessionaire's Representative.

3.3 Information and Services

Each of the CA 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 Substantial Completion of the Eastern Segment or Western Segment or Total Completion of the Primary Infrastructure Components or 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 CA Party. Each CA Party hereby consents to the other CA 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).

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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 CA Parties, then:

- (a) the Independent Certifier must give notice in writing to the Concessionaire'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) the Concessionaire must arrange, at its own cost, the provision of the required information, documents or particulars, unless such information, documents or particulars is not in the Concessionaire'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 the Concessionaire'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 the Concessionaire 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 CA Parties Not Relieved

Neither CA Party shall be relieved from performing or observing its obligations, or from any other liabilities, under the Concession Agreement as a result of either the appointment of, or any act or omission by, the Independent Certifier.

3.7 CA Parties Not Liable

On no account shall either CA Party be liable to the other CA Party for any act or omission of the Independent Certifier whether under or purportedly under a provision of the Concession 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 CA Party against, or any obligation or liability of either CA Party to, the other CA Party which would have existed regardless of such act or omission.

4. QUALITY

4.1 Quality Project Plan

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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 the Concessionaire'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 the Concessionaire's Representative;
- (c) provided it is satisfactory to each of the Province's Representative and the Concessionaire's Representative, implement such quality project plan; and
- (d) if such quality project plan is not satisfactory to either the Province's Representative or the Concessionaire's Representative, within 7 days after receiving notice thereof from either CA Party to that effect, revise and resubmit the quality project plan to each of the Province's Representative and the Concessionaire's Representative, and, once it is satisfactory to each of the Province's Representative and the Concessionaire'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 the Concessionaire's Representative.

5. SUSPENSION

5.1 Notice by CA Parties

The Functions (or any part thereof) may be suspended at any time by the CA Parties:

- (a) if the Independent Certifier fails to comply with its obligations under this Contract, immediately by the CA Parties giving joint notice in writing to the Independent Certifier; or
- (b) in any other case, by the CA Parties giving seven days' joint notice in writing to the Independent Certifier.

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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 CA Parties fails to comply with its obligations under this Contract, immediately by the Independent Certifier given notice in writing to each of the CA 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 CA 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 [REDACTED] per claim and in the aggregate, a deductible of not more than [REDACTED] per claim and from an insurer and on terms satisfactory to each of the CA Parties;
 - (ii) with a term and extended reporting period from the date of this Contract until the expiration of [REDACTED] 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 CA 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 [REDACTED] per claim and in the aggregate, no deductible for personal injury or bodily injury, a deductible of not more than [REDACTED] per occurrence for property damage, and from an insurer and on terms and conditions satisfactory to each of the CA Parties.

Section 17 and 21



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The Independent Certifier must provide copies of its insurance policies and renewals to each of the CA 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 CA 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 CA 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 CA 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 CA Party shall have any liability whatsoever for the non-payment by the other CA Party of any fees or costs payable by such other CA Party under this Contract. Failure of either or both CA 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 CA 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 CA Parties that it considers the direction constitutes or involves a Functions Variation; and

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- (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 the Concessionaire'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 the Concessionaire'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 CA 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 the Concessionaire'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 the Concessionaire'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

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- (c) where such rates or prices are not applicable, a reasonable amount to be agreed between the CA Parties and the Independent Certifier or, failing agreement, determined in accordance with the Dispute Resolution Procedure under the Concession 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 CA Parties and the Independent Certifier.

9.2 Notice of Breach

If the Independent Certifier commits a breach of this Contract, the CA 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 CA Parties acting jointly may, without prejudice to any other rights of the CA Parties or either of them, immediately terminate this Contract.

9.4 Termination for Financial Difficulty

The CA Parties acting jointly may, without prejudice to any other rights which the CA 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 CA 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.

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9.5 Termination for Convenience

Notwithstanding anything to the contrary in this Contract, the CA 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 CA Parties;
- (b) be entitled to be reimbursed by the CA 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 CA Parties;
- (b) hand over to the CA 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 CA Parties, meet with them and such other persons nominated by them with a view to providing them with sufficient information to enable the CA 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 CA Parties to recover damages from the Independent Certifier).

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9.9 Survival

Termination of this Contract shall not affect the continuing rights and obligations of the CA 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 CA Parties and each of them, and their respective employees, directors, officers, representatives and agents (collectively, the “**CA 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 Concession 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 CA 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 Concession 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 the Concessionaire under this Contract and the Concession Agreement.

11. GENERAL

11.1 Entire Agreement

This Contract and the Concession Agreement constitute the entire agreement between the CA 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 CA Parties and the Independent Certifier with respect to the subject matter of this Contract.

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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 CA 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 facsimile transmission to the address or facsimile transmission number of each party set out below:

- (a) if to the Concessionaire:

-
- Attention: •
- Facsimile: •

- (b) if to the Province:

-
- Attention: •
- Facsimile: •

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- (c) if to the Independent Certifier:
- **[NTD: Must be a BC address, or provide agent for service]**

Attention: •
Facsimile: •

or to such other address in British Columbia or facsimile transmission number 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 facsimile transmission during business hours on a Business Day, upon the sender receiving confirmation of the successful transmission and, if not transmitted during business hours, upon the commencement of business hours on the next Business Day following confirmation of the transmission.

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 CA Parties, which each CA 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 CA 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.

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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 CA 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 CA Parties (which approval may be granted or withheld in the absolute and unfettered discretion of each CA 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 CA 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 CA 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 CA Parties.

11.8 Contract Material

- (a) The CA 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 CA Party.
- (b) As between the CA 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 CA 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 CA 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

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rights. The CA Parties acknowledge and agree that, as between themselves, title, ownership and other rights to the Contract Material shall be governed by the Concession Agreement.

- (c) The Independent Certifier shall do all such things and execute all such documents as reasonably requested by either of the CA 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, the Concessionaire and the Independent Certifier have executed this Contract.

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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)

•
•, Ministry of Transportation and Infrastructure

[CONCESSIONAIRE]
by its authorized signatories:

Per: _____
Name:
Title:

Per: _____
Name:
Title:

[INDEPENDENT CERTIFIER]
by its authorized signatories:

Per: _____
Name:
Title:

Per: _____
Name:
Title:

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**ATTACHMENT 1
TO INDEPENDENT CERTIFIER CONTRACT**

FUNCTIONS

1. The Independent Certifier shall do everything expressed in, or reasonably to be implied from, the Concession Agreement as the functions of the Independent Certifier.
2. Without limiting the other provisions of this Contract and the Concession 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 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 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 issue the Relevant Certificates.
 - (c) Attend site meetings as requested by the Province's Representative and the Concessionaire's Representative.
 - (d) 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 the Concessionaire to achieve Substantial Completion of each of the Eastern Segment and the Western Segment and Total Completion of the Primary Infrastructure Components, or any other component thereof.
 - (e) 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.
 - (f) Inspect the Project Work as required in order to issue the Relevant Certificates.
 - (g) Review all documentation, including Certificates and approvals, Design Data, certifications, test results and quality assurance audits, provided to the Independent Certifier pursuant to the Concession Agreement or otherwise required for the Independent Certifier to discharge its obligations and duties under this Contract in respect of the issuance of the Relevant Certificates.
 - (h) Consider all Laws as applicable to the issuance of the Relevant Certificates.

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- (i) Upon receipt of notice from the Concessionaire given in accordance with the applicable provision of Article 6 [Construction Certification] of Part 3 of Schedule 4 to the Concession 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 the Concessionaire; or
 - (ii) notify the Concessionaire and the Province's Representative of its decision not to issue the Relevant Certificate, and state the reasons for such decision.
- (j) If the Independent Certifier serves a notice under clause (ii) of paragraph (i) of this Attachment and upon the Concessionaire 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 Concession Agreement and shall repeat the procedures in paragraph (i) of this Attachment until the issuance of the Relevant Certificate.
- (k) Provide advice on other matters that may arise under the Concession Agreement that both of the CA Parties may jointly require in writing.
- (l) Participate in and give the CA 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.

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**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.]

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**ATTACHMENT 3
TO INDEPENDENT CERTIFIER CONTRACT**

INDEPENDENT CERTIFIER PERSONNEL

[NTD: To be completed prior to execution of the Independent Certifier Contract.]

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SCHEDULE 4: DESIGN AND CONSTRUCTION****APPENDIX B
PROVINCE PERMITS**

1. Environmental Assessment Certificate
2. CEEA Screening Report and Decision Letter
3. Province Fisheries Authorization
4. Approval A2005600 issued December 23, 2008 by BC Ministry of Environment, Water Stewardship Division and obtained by the Province under subsection 9(1) clauses (a), (b) and (c) of the *Water Act* (British Columbia) as applied for in a letter dated December 5, 2008 entitled “Multi-site Water Act Approval (8 Advanced Site Preparation Work Sites in Delta that will include “changes in and about a stream”)”
5. Approval applied for in a letter dated December 5, 2008 entitled “South Fraser Perimeter Road Project – *Water Act* Notifications for 50 Advanced Site Preparation Work Sites in Delta that will include “changes in and about a stream” as commented by the MoE on March 3, 2009
6. Approval A2005568 issued August 25, 2008 by BC Ministry of Environment, Water Stewardship Division and obtained by the Province under subsection 9(1) clauses (a), (b) and (c) of the *Water Act* (British Columbia) as applied for in a letter dated August 7, 2008 entitled “South Fraser Perimeter Road Project – Multi-Site *Water Act* Approval (20 Advanced Site Preparation Work Sites in Surrey that will include “changes in and about a stream”)”
7. Permit 2009-0014 issued January 9, 2009 by BC Ministry of Tourism, Culture and the Arts and obtained by the Province under the *Heritage Conservation Act* (British Columbia) as applied for in Application for Permit dated December 11, 2008 regarding alterations to archaeological site  ← Section 18
8. Approval applied for in a letter dated June 5, 2009 entitled “South Fraser Perimeter Road Project - *Water Act* Notifications for Two Advanced Site Preparation Work Sites in Delta that will include “changes in and about a stream” (re. 7590 80th St. Ditch) as commented by the MoE on June 22, 2009
9. Authorization File #8200-09-8308 issued July 21, 2009 by the Minister of Transport, Infrastructure and Communities pursuant to subsections 5(1) and 5(3) of the *Navigable Waters Protection Act* (Canada) (re. Crescent Slough)
10. Approval applied for in a letter dated December 19, 2008 entitled South Fraser Perimeter Road Project - *Water Act* Notifications for two Advanced Site Preparation Work Sites in Delta that will include “changes in and about a stream” (re 72nd St. N/E Ditch) as commented by the MoE on March 9, 2009
11. Approval A2005652 issued September 3, 2009 by BC Ministry of Environment, Water Stewardship Division and obtained by the Province under subsection 9(1) clauses (a), (b) and (c) of the *Water Act* (British Columbia) as applied for in a letter dated June 12, 2009 entitled South Fraser Perimeter Road Project - *Water Act* Notifications for two Advanced Site Preparation

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Appendix B: Province Permits

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Work Sites in Delta that will include “*changes in and about a stream*” (re Crescent Slough Hamming’s Ditch)

12. Approval applied for in a letter dated March 13, 2009 entitled South Fraser Perimeter Road Project - *Water Act* Notifications for 3 Advanced Site Preparation Work Sites in Delta that will include “*changes in and about a stream*” (re. Hwy 99 to 80th section – Crescent Slough, 80th St. Ditch East, Crescent Slough Tributary) as commented by the MoE on April 2, 2009
13. Approval A2005644 issued July 24, 2009 by BC Ministry of Environment, Water Stewardship Division and obtained by the Province under subsection 9(10) clauses (a), (b) and (c) of the *Water Act* (British Columbia) as applied for in a letter dated May 12, 2009 entitled “South Fraser Perimeter Road Project – *Water Act* Approval for 136 Street Ditch – East in Surrey, BC (stream diversion 18)
14. Approval applied for in a letter dated June 25, 2009 entitled “South Fraser Perimeter Road Project – *Water Act* Notification for 136 Street Ditch – East (upgrade existing road crossing culverts) as commented by the MoE on July 13, 2009
15. Approval applied for in a letter dated October 13, 2009 entitled “South Fraser Perimeter Road Project – *Water Act* Notification for small water feature in Surrey, BC (upgrade existing culvert and drainage) as commented by the MoE on October 20, 2009
16. Permit 2009-0150 issued June 2, 2009 by BC Ministry of Tourism, Culture and the Arts, Permitting and Assessment Section and obtained by the Province under the *Heritage Conservation Act* (British Columbia) as applied for in Application for Permit dated March 25, 2009 regarding alterations to archaeological site [REDACTED] ← Section 18
17. Permit 2009-0150 amended September 4, 2009 by BC Ministry of Tourism, Culture and the Arts, Permitting and Assessment Section for the Province under the *Heritage Conservation Act* (British Columbia) as applied for in a letter dated August 18, 2009 entitled “*Heritage Conservation Act* Site Alteration Permit 2009-0150 Amendment Request [REDACTED] ← Section 18
18. Permit 2004-0052 issued March 24, 2004 by the BC Ministry of Tourism, Culture and the Arts, Permitting and Assessment Section and obtained by Andrew Mason of 500 – 4260 Still Creek Drive, Burnaby, BC, V5C 6C6 under the *Heritage Conservation Act* (British Columbia) as applied for in Application for Permit dated February 12, 2004 regarding the “Archaeological impact assessment of the Ministry of Transportation’s proposed South Fraser Perimeter Road Project, located on the south side of the Fraser River extending from Highway 17 – Deltaport Interchange to Highway 1/15 and 184th Street in Surrey”
19. Permit 2004-0052 amended January 18, 2005 by BC Ministry of Tourism, Culture and the Arts, Permitting and Assessment Section for the Province under the *Heritage Conservation Act* (British Columbia) as requested on January 18, 2005
20. Permit 2004-0052 amended December 19, 2005 by BC Ministry of Tourism, Culture and the Arts, Permitting and Assessment Section for the Province under the *Heritage Conservation Act* (British Columbia) as requested on December 19, 2005

**SOUTH FRASER PERIMETER ROAD PROJECT
SCHEDULE 4: DESIGN AND CONSTRUCTION
Appendix B: Province Permits**

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21. Permit 2004-0052 amended January 25, 2007 by BC Ministry of Tourism, Culture and the Arts, Permitting and Assessment Section for the Province under the Heritage Conservation Act (British Columbia) as requested on January 5, 2007
22. Permit 2004-0052 amended December 18, 2008 by BC Ministry of Tourism, Culture and the Arts, Permitting and Assessment Section for the Province under the Heritage Conservation Act (British Columbia) as requested on December 18, 2008.

**SOUTH FRASER PERIMETER ROAD PROJECT
SCHEDULE 4: DESIGN AND CONSTRUCTION**

**APPENDIX C
UTILITY AGREEMENTS**

PART 1 SFPR UTILITY AGREEMENTS (SITE PREPARATION)

1. Letter of Authority – Distribution Line Relocation Work Associated With South Fraser Perimeter Road (SFPR) Preload Phase 2 Work Area addressed to British Columbia Hydro and Power Authority dated February 16, 2009 [Ref. 048LOA6053].
2. Letter of Authority – Fir Road & Old Yale Road – Guy Wire Anchor Relocation Design & Installation addressed to British Columbia Hydro and Power Authority dated October 30, 2008 [Ref. 048LOA6048].
3. Letter of Authority – Plant Relocation Work along 116 Avenue and West of 124 Street Distribution Bypass Works from Tannery Road to 136th Street in Surrey addressed to British Columbia Hydro and Power Authority dated September 26, 2008 [Ref. 048LOA6045].
4. Letter of Authority – Extension of OH Distribution Line on 115th Avenue up to proposed Bolivar Pump Station Plant addressed to British Columbia Hydro and Power Authority dated May 12, 2009 [Ref. 048LOA6062].
5. Letter of Authority – BC Hydro Line Relocation Work Associated with the South Fraser Perimeter Road (SFPR) Preload Phase 3 addressed to British Columbia Hydro and Power Authority dated June 29, 2009 [Ref. 048LOA6069].
6. Letter of Authority – Relocation of poles and cables on Tannery Road addressed to Telus Network Operations dated June 9, 2009 [Ref. 048LOA6064].
7. Letter of Authority – Plant Relocation Work along Industrial Rd. And 116th Ave from 112th Ave to 128th St addressed to Telus Communications Inc. dated September 29, 2008. [Ref. 048LOA6046]
8. Letter of Authority – 60mm Gas Main Abandonment – 13600 blk of 116th Ave, Surrey, BC addressed to Terasen Gas Inc. dated February 25, 2009 [Ref. 048LOA6055].
9. Letter of Authority – Plant Relocation Work for Distribution System on 131st Street (near 116th Avenue), Surrey, BC addressed to Terasen Gas Inc. dated December 16, 2008 [Ref. 048LOA6050].
10. Letter of Authority - Plant Relocation Work for Distribution System on 124th Street and 132nd Street (near 116th Avenue), Surrey, BC addressed to Terasen Gas Inc. dated December 2, 2008 [Ref. 048LOA6049].
11. Letter of Authority – Contract 048LOA6037 – Authorization to Proceed for Pipeline Bypass at Cranwest Farm addressed to Terasen Gas dated August 21, 2008 [Ref. 048LOA6037].
12. Pipe Relocation Agreement – South Fraser Perimeter Road (Distribution System Bypass Works from Tannery Road to 136th Street in Surrey) between Terasen Gas Inc. and Her Majesty the Queen in right of the Province of British Columbia as represented by the Minister of Transportation and Infrastructure dated February 20, 2009.

SOUTH FRASER PERIMETER ROAD PROJECT
SCHEDULE 4: DESIGN AND CONSTRUCTION
Appendix C: Utility Agreements

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13. Agreement – Authorization to Proceed for Pipeline Bypass at Cranwest Farms between Terasen Gas Inc. and Her Majesty the Queen in right of the Province of British Columbia as represented by the Minister of Transportation dated June 17, 2009.
14. Letter of Authority – Relocation Work for 219mm IP Gas Main on 36th Avenue Delta addressed to Terasen Gas Inc. dated February 1, 2010 [Ref. 048LOA6087].
15. Letter of Authority – Relocation Work for 114mm IP Gas Main on 64th St Delta addressed to Terasen Gas Inc. dated January 29, 2010 [Ref. 048LOA6086].
16. Pipe Relocation Agreement – South Fraser Perimeter Road (Transmission Pipeline Bypass Works, Location SF3 – East of 80th Street) between Terasen Gas Inc. and Her Majesty the Queen in right of the Province of British Columbia as represented by the Minister of Transportation and Infrastructure dated May 7, 2010.
17. Pipe Relocation Agreement – South Fraser Perimeter Road (Transmission Pipeline Bypass Works, Location SF5 – Nordel Connector) between Terasen Gas Inc. and Her Majesty the Queen in right of the Province of British Columbia as represented by the Minister of Transportation and Infrastructure dated May 7, 2010.
18. Letter of Authority – City of Surrey (CoS) Irrigation Work Associated with South Fraser Perimeter Road (SFPR) Surrey Preload addressed to City of Surrey dated September 3, 2009 [Ref 048LOA6066].
19. Letter of Authority – City of Surrey (CoS) Drainage Work Associated with South Fraser Perimeter Road (SFPR) Surrey Preload addressed to City of Surrey dated June 26, 2009 [Ref. 048LOA6065].
20. Water and Sanitary Sewer Systems Infrastructure Relocation and Maintenance Agreement South Fraser Perimeter Road between City of Surrey and Her Majesty the Queen in right of the Province of British Columbia as represented by the Minister of Transportation and Infrastructure dated December 4, 2009.
21. Letter of Authority – Temporary bypass of Norseman Engineering’s methane gas pipeline on 116 Ave. At 136 St. And 132 St. for works associated with SFPR Preload addressed to Norseman Engineering dated March 26, 2009 [Ref. 048LOA60501].
22. Letter of Authority – CN Utility Relocation Work Associated with South Fraser Perimeter Road (SFPR) Surrey Preload addressed to Canadian National Railway Company dated February 23, 2009 [Ref. 048LOA6054].
23. Letter of Authority – Contract 048LOA6024 addressed to Corporation of Delta as amended on February 11, 2009 regarding field investigation of Delta’s sanitary force main.
24. Letter of Authority – Contract 048LOA6061 addressed to Corporation of Delta dated May 11, 2009 regarding utility disconnection at 9858 and 11148 River Rd., in Delta.

**SOUTH FRASER PERIMETER ROAD PROJECT
SCHEDULE 4: DESIGN AND CONSTRUCTION
Appendix C: Utility Agreements**

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25. Letter of Authority – Contract 048LOA6063 addressed to Corporation of Delta dated May 26, 2009 regarding disconnection of utility services of buildings located at 10289 and 10273 River Rd. in Delta.
26. Agreement Supplementary to Section 3 Agreement between Cranwest Farms Limited Partnership and Her Majesty the Queen in right of the Province of British Columbia as represented by the Minister of Transportation and Infrastructure dated June 8, 2009.
27. Letter Agreement – Ref. TRAN-42000-40/10405A – Addressed to Corporation of Delta dated November 3, 2009 regarding South Fraser Perimeter Road– Municipal Utilities; Corporation of Delta Registered Statutory Rights of Way and Municipal Highways.
28. Letter Agreement addressed to BC Hydro and Power Authority and BC Transmission Corporation dated July 14, 2009 regarding “Proposed Placement of Preload under Transmission Line at Nordel Way and Riverway, Delta.

PART 2 GATEWAY HIGHWAY PROGRAM UTILITY FRAMEWORK AGREEMENTS

1. Gateway Highway Program Utility Framework Agreement between Terasen Gas Inc. and Her Majesty the Queen in right of the Province of British Columbia as represented by the Minister of Transportation and Infrastructure dated September 15, 2009.
2. Gateway Highway Program Utility Framework Agreement between Greater Vancouver Water District and Greater Vancouver Sewerage and Drainage District and Her Majesty the Queen in right of the Province of British Columbia as represented by the Minister of Transportation and Infrastructure dated March 22, 2010.

PART 3 PROTOCOL AGREEMENTS

1. Protocol Agreement between Ministry of Transportation and Highways and BC Tel dated January 26, 1996.
2. Protocol Agreement between Ministry of Transportation and Highways and B.C. Hydro dated September 19, 1995.

PART 4 MASTER USE AGREEMENTS

1. Master Use Agreement for Wireless Communications Sites between Her Majesty the Queen in right of the Province of British Columbia as represented by the Minister of Transportation and Highways and BC Tel Mobility Cellular Inc. dated December 4, 1997.
2. Master Use Agreement for Wireless Communications Sites between Her Majesty the Queen in right of the Province of British Columbia as represented by the Minister of Transportation and Highways and Rogers Cantel Inc. dated November 14, 1997.
3. Master Use Agreement for Wireless Communications Sites between Her Majesty the Queen in right of the Province of British Columbia as represented by the Minister of Transportation and Highways and Bell Mobility Cellular Inc. dated June 1, 2001.

SOUTH FRASER PERIMETER ROAD PROJECT
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Appendix C: Utility Agreements

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4. Master Use Agreement for Ledcor Industries between Her Majesty the Queen in right of the Province of British Columbia as represented by the Minister of Transportation and Highways and Ledcor Industries Limited dated August 5, 1998.

**SOUTH FRASER PERIMETER ROAD PROJECT
SCHEDULE 4: DESIGN AND CONSTRUCTION**

**APPENDIX D
SEISMIC PERFORMANCE CRITERIA**

The following seismic performance criteria are applicable to Structures and approach embankments in close proximity to Structures. An approach embankment in close proximity to a Structure is defined as that part of the entire approach embankment that, if deformed under seismic loading, would affect the seismic performance of the Structure. As a minimum, this part of an approach embankment shall be a distance of two times the embankment height from the ballast wall away from the Structure.

**PART 1 DISASTER RESPONSE ROUTE AND ECONOMIC SUSTAINABILITY ROUTE
STRUCTURES**

| Probability of Exceedance (Design Earthquake) | Service Level Performance | Damage Level Performance |
|---|---|---|
| <p>10% in 50 years and the Cascadia Subduction Event</p> | <p>Limited: Limited access (not less than 50% of lanes rounded up to the nearest whole number for through lanes and ramps) following the design earthquake. Full access to be restorable within two weeks.</p> | <p>Repairable damage (no span or component collapse): inelastic response is permitted but shall be limited such that the structure can be restored to its pre-earthquake condition without replacement of primary structural members or requiring complete closure.</p> <p>Permanent offsets (residual displacements) are not to exceed approximately 0.5% or impede the required repairs. Any permanent offset of retaining walls and approach embankments in close proximity to a Structure must not impede adjacent or dependent facilities from meeting their performance criteria.</p> <p>Inelastic response in concrete structures may result in concrete cracking, reinforcement yielding (not fracture or buckling), and minor spalling of cover concrete. For steel structures, inelastic response shall not result in member fracture or connection failure for primary load carrying members; however, limited buckling of secondary steel members, and limited flexural yielding in steel columns or limited axial tensile yielding of braces may occur.</p> <p>Earthquake-induced Foundation movements or other Foundation effects are acceptable if such effects can be repaired to restore the structure to full service.</p> |

SOUTH FRASER PERIMETER ROAD PROJECT
SCHEDULE 4: DESIGN AND CONSTRUCTION
Appendix D: System Level Seismic Performance Criteria

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| Probability of Exceedance (Design Earthquake) | Service Level Performance | Damage Level Performance |
|---|--|---|
| 5% in 50 years | <p>Significantly Limited: It is expected that limited access to emergency traffic is possible within days following the Design Earthquake. Public access is not expected until repairs are completed.</p> | <p>Significant Damage but No Collapse: Damage shall not cause collapse of any span or part of the structure, nor lead to the loss of the ability of primary support members to sustain gravity loads. Permanent offsets may occur and damage consisting of cracking, yielding, and major spalling of concrete. Re-instatement of the structure may require extensive repairs. For concrete structures, inelastic response may result in significant cracking, yielding of reinforcing bars, and major spalling of concrete. For steel structures, inelastic response shall not result in fracture or connection failure for primary load carrying members; however, buckling of secondary steel members and significant flexural yielding of steel columns or significant axial tensile yielding of braces may occur. The permanent offset of retaining walls and approach embankments in close proximity to a Structure must not prevent the timely restoration of adjacent or dependent facilities.</p> <p>Earthquake induced Foundation movements or affects are acceptable if all the specified seismic performance criteria are met.</p> <p>Inelastic deformations of the Foundations, including ground movements, shall be determined and the effects of these movements on the performance of the structure shall be included in the evaluation and design.</p> |
| 2% in 50 years | <p>Possible loss of service: Access to traffic is not envisaged for a prolonged period following the Design Earthquake</p> | <p>Significant Damage (Loss-of-span Prevention): A risk of extensive, non-repairable damage is accepted, but collapse of the superstructure from unseating or from failure of supporting piers is not acceptable.</p> <p>Inelastic deformations of the Foundations, including ground movements, shall be determined and the effects of these movements on the performance of the structure shall be included in the evaluation and design.</p> |

SOUTH FRASER PERIMETER ROAD PROJECT
SCHEDULE 4: DESIGN AND CONSTRUCTION
Appendix D: System Level Seismic Performance Criteria

PART 2 OTHER STRUCTURES

| Probability of Exceedance (Design Earthquake) | Service Level Performance | Damage Level Performance |
|---|--|---|
| <p>10% in 50 years and the Cascadia Subduction Event</p> | <p>Significantly Limited: It is expected that limited access to emergency traffic is possible within days following the Design Earthquake. Public access is not expected until repairs are completed.</p> | <p>Significant Damage but No Collapse: Damage shall not cause collapse of any span or part of the structure, nor lead to the loss of the ability of primary support members to sustain gravity loads. Permanent offsets may occur and damage consisting of cracking, yielding, and major spalling of concrete. Re-instatement of the structure may require extensive repairs. For concrete structures, inelastic response may result in significant cracking, yielding of reinforcing bars, and major spalling of concrete. For steel structures, inelastic response shall not result in fracture or connection failure for primary load carrying members; however, buckling of secondary steel members and significant flexural yielding of steel columns or significant axial tensile yielding of braces may occur. The permanent offset of retaining walls and approach embankments in close proximity to a Structure must not prevent the timely restoration of adjacent or dependent facilities.</p> <p>Earthquake induced Foundation movements or affects are acceptable if all the specified seismic performance criteria are met.</p> <p>Inelastic deformations of the Foundations, including ground movements, shall be determined and the effects of these movements on the performance of the structure shall be included in the evaluation and design.</p> |
| <p>5% in 50 years</p> | <p>Possible loss of service: Access to traffic is not envisaged for a prolonged period following the Design Earthquake</p> | <p>Significant Damage (Loss-of-span Prevention): A risk of extensive, non-repairable damage is accepted, but collapse of the superstructure from unseating or from failure of supporting piers is not acceptable.</p> <p>Inelastic deformations of the Foundations, including ground movements, shall be determined and the effects of these movements on the performance of the structure shall be included in the evaluation and design.</p> |

**SOUTH FRASER PERIMETER ROAD PROJECT
SCHEDULE 4: DESIGN AND CONSTRUCTION**

**APPENDIX E
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. End of Term Certificate
11. Assessment Certificate (Structures)

**SOUTH FRASER PERIMETER ROAD PROJECT
SCHEDULE 4: DESIGN AND CONSTRUCTION
Appendix E: Form of Certificates**

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Certificate Form 1

Certificate Ref No. []

DESIGN CERTIFICATE (GENERAL)

In respect of :..... (Provide details eg. Highways/Geotechnical/Traffic Operations Modelling/Landscape etc.)

Agreement between Her Majesty the Queen in right of the Province of British Columbia, BC Transportation Financing Authority and [Concessionaire] dated • (“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 Primary Infrastructure Components or any other 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.

**SOUTH FRASER PERIMETER ROAD PROJECT
SCHEDULE 4: DESIGN AND CONSTRUCTION
Appendix E: Form of Certificates**

SCHEDULE

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

Signed:
Designer (Principal)
Name:
Title:
Date:
Professional Registration Number:
Affix Professional Seal

Signed:
Concessionaire’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:

**SOUTH FRASER PERIMETER ROAD PROJECT
SCHEDULE 4: DESIGN AND CONSTRUCTION
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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 [Concessionaire] dated • (“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.

**SOUTH FRASER PERIMETER ROAD PROJECT
SCHEDULE 4: DESIGN AND CONSTRUCTION
Appendix E: Form of Certificates**

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:
Concessionaire’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:

**SOUTH FRASER PERIMETER ROAD PROJECT
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Appendix E: Form of Certificates**

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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 [Concessionaire] dated • (“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.

**SOUTH FRASER PERIMETER ROAD PROJECT
SCHEDULE 4: DESIGN AND CONSTRUCTION
Appendix E: Form of Certificates**

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:

**SOUTH FRASER PERIMETER ROAD PROJECT
SCHEDULE 4: DESIGN AND CONSTRUCTION
Appendix E: Form of Certificates**

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 [Concessionaire] dated • (“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 11 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 11 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 11 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

**SOUTH FRASER PERIMETER ROAD PROJECT
SCHEDULE 4: DESIGN AND CONSTRUCTION
Appendix E: Form of Certificates**

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Signed:
Constructor (Principal)
Name:
Title:
Date:
Professional Registration Number:
Affix Professional Seal

Signed:
Concessionaire's Representative
Name:
Date:

4. Receipt of this Certificate is acknowledged.

Signed.....
Province's Representative
Name.....
Date.....

**SOUTH FRASER PERIMETER ROAD PROJECT
SCHEDULE 4: DESIGN AND CONSTRUCTION
Appendix E: Form of Certificates**

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 [Concessionaire] dated • (“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 11 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 11 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 11 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

**SOUTH FRASER PERIMETER ROAD PROJECT
SCHEDULE 4: DESIGN AND CONSTRUCTION
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Signed:
Constructor (Principal)
Name:
Title:
Date:
Professional Registration Number:
Affix Professional Seal

Signed:
Concessionaire's Representative
Name:
Date:

4. Receipt of this Certificate is acknowledged.

Signed.....
Province's Representative
Name.....
Date.....

**SOUTH FRASER PERIMETER ROAD PROJECT
SCHEDULE 4: DESIGN AND CONSTRUCTION
Appendix E: Form of Certificates**

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 [Concessionaire] dated • (“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 11 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 11 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 11 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

**SOUTH FRASER PERIMETER ROAD PROJECT
SCHEDULE 4: DESIGN AND CONSTRUCTION
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Signed:
Constructor (Principal)
Name:
Title:
Date:
Professional Registration Number:
Affix Professional Seal

Signed:
Concessionaire's Representative
Name:
Date:

4. Receipt of this Certificate is acknowledged.

Signed.....
Province's Representative
Name.....
Date.....

**SOUTH FRASER PERIMETER ROAD PROJECT
SCHEDULE 4: DESIGN AND CONSTRUCTION
Appendix E: Form of Certificates**

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 [Concessionaire] dated • (“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, Constructor and Concessionaire for certifying the Substantial Completion or Total Completion of Construction Activities in respect of Relevant Components of the Project Work in accordance with Section 6.1 of Part 3 of Schedule 4 to the Agreement.

Constructor’s and Concessionaire’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.....
 Constructor (Principal)
 Name.....
 Title.....
 Date.....
 Professional Registration Number:
 Affix Professional Seal

Signed.....
 Concessionaire’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

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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

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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 [Concessionaire] dated • (“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 Section 6.5 or Section 6.21 of Part 3 of Schedule 4 to the Agreement.

1. Confirmation was given on [date] by the Concessionaire that [describe Relevant Components] has been Substantially Completed in accordance with the Agreement and that [describe Relevant Components] are suitable and safe for use by members of the public without traffic management restrictions.
2. A Road Safety Audit Certificate (Stage 3) for the [describe Relevant Components] was issued on [date].
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 [Eastern/Western] Substantial Completion Date shall be [date]. [Include only for Substantial Completion of the Eastern Segment and the Western Segment under Section 6.5.]

Signed.....
 Independent Certifier
 Name.....
 Title.....
 Date.....
 Professional Registration Number:
 Affix Professional Seal

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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 [Concessionaire] dated • (“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 Section 6.14 or Section 6.21 of Part 3 of Schedule 4 to the Agreement.

- 1. Confirmation was given on [date] by the Concessionaire that Total Completion of [describe Relevant Components] has been achieved in accordance with the Agreement.
- 2. Construction Certificates for the Total Completion of the [describe Relevant Components] were issued on [dates].
- 4. This document shall serve as the Certificate of Total Completion for [describe Relevant Components].
- 5. The Total Completion Date shall be [date]. [Include only for Total Completion of the Primary Infrastructure Components under Section 6.14.]

Signed:
 Independent Certifier
 Name:
 Title.....
 Date.....
 Professional Registration Number:
 Affix Professional Seal

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Certificate Form 10

Certificate Ref. No. []

END OF TERM CERTIFICATE

Agreement between Her Majesty the Queen in right of the Province of British Columbia, BC Transportation Financing Authority and [Concessionaire] dated • (“the Agreement”) relating to the Project. Defined terms and expressions used in the Agreement have the same meanings in this Certificate.

- 1. The Expiry Date for the Agreement was [].
- 2. A joint inspection of the Project Infrastructure was carried out on [] as required by Section 7.5 [Final End of Term Audit and Certificate] of Schedule 7 to the Agreement.
- 3. This Certificate shall serve as the End of Term Certificate as referred to in Section 7.5(b)(i) of Schedule 7 to the Agreement.

Signed
 Independent Certifier
 Name
 Date
 Professional Registration Number:
 Affix Professional Seal

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Certificate Form 11

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 [Concessionaire] dated • (“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:

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SCHEDULE

[Include here drawing numbers and title used for the assessment.]

Signed.....
Designer (Principal)
Name.....
Title.....
Date.....
Professional Registration Number:
Affix Professional Seal

Signed:
Concessionaire’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:

**SOUTH FRASER PERIMETER ROAD PROJECT
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**APPENDIX F
SAMPLE CONTENTS FOR A STRUCTURAL TAF**

Ref. No.....

- 1. NAME OF PROJECT.....**
 - 1.1 Type of highway
 - 1.2 Permitted 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 Parapet type.
 - 3.7 Proposed arrangements for inspection and maintenance.
 - 3.8 Materials and finishes.
- 4. DESIGN/ASSESSMENT CRITERIA**
 - 4.1 Live Loading, Headroom.
 - 4.1.1 BC Bridge Code loading:
 - 4.1.2 Design Vehicle.....
 - 4.1.3 Footway or footbridge 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 xm.
 - 4.1.4.4 Location of vehicle track on deck cross-section.

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- 4.1.5 Any special loading not covered above.
- 4.1.6 MOT heavy or high load route requirements and arrangements being made to preserve the route.
- 4.1.7 Minimum headroom 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 (k_a , k_o , or k_p) 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.

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Appendix F: Sample Contents for a Structural TAF**

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- 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.

Signed:
 Designer/Constructor (Principal)
 Name:
 Engineering Qualifications:.....
 Date:
 Professional Registration Number:
 Affix Professional Seal

Signed:.....
 Concessionaire's Representative
 Name:.....
 Date:.....
 Professional Registration Number:
 Affix Professional Seal

Note:† The Constructor may sign only in respect of Temporary Works.

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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:.....

**SOUTH FRASER PERIMETER ROAD PROJECT
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**APPENDIX G
SEISMIC MONITORING SYSTEM**

1. General

- (a) The Concessionaire shall design, supply and install a proven seismic monitoring system for the Project. This system shall include recorders, accelerometers, transducers, gauges and software for real time monitoring of ground motions and structural responses resulting from seismic activity.
- (b) The seismic monitoring system shall be capable of supplying near-real-time data to four external receivers including Pacific Geoscience Centre (PGC) and University of British Columbia, Earthquake Engineering Department. Ground motion data exceeding the preset trigger level must be received by PGC in a format compatible with their Strong Motion Network without additional signal processing. Structural and downhole data must be supplied to UBC in digital and non-proprietary format (such as ASCII compressed file).
- (c) The seismic monitoring system shall provide minimum two weeks data storage with one week of seismic data stored on a continuously renewed basis. When the trigger level is exceeded, the current week of data shall be frozen and one additional week of data shall be stored to capture after-shocks.
- (d) The recorder and accelerometers are to be installed in protected and secure locations to minimize the likelihood of vandalism and ensure protection from the elements.

2. Scope and Location

2.1 Strong Motion Network

A minimum of six strong motion instruments shall be installed to provide free-field surface values. These are free-field, surface or near surface instruments and not necessarily on firm ground. These instruments shall be installed within the Concession Highway Right-of-Way in the vicinity of the locations identified below. The exact location shall be identified by the Concessionaire and submitted to the Province's Representative for acceptance in accordance with the Consent Procedure:

- (a) 36 Avenue
- (b) 72 Street;
- (c) 80 Street;
- (d) Elevator Road;
- (e) 132 Street; and
- (f) Between Nelson View Creek and Gundersen Creek.

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2.2 Free-field Downhole Array

- (a) Downhole arrays shall be installed in free-field conditions within the footprint of the roadworks at the following locations:
 - (i) Highway 17; and
 - (ii) Highway 99.
- (b) Downhole arrays shall be installed where the surface soils are soft and at locations appropriate to the Design. Proposed locations of downhole arrays shall be submitted to the Province's Representative in accordance with the Consent Procedure.
- (c) Each array shall consist of:
 - (i) 1 triaxial downhole free-field accelerometer, at till;
 - (ii) 1 triaxial downhole free-field accelerometer at the top of the marine clay layer, approximately at 15 metres depth;
 - (iii) 1 triaxial downhole free-field accelerometer at the top of the sand layer, under any peat or fill; and
 - (iv) 1 piezometer in the liquefiable sand layer.

2.3 Structural Health Monitoring

2.3.1 Bridge Structures

- (a) The Concessionaire shall provide structural health monitoring systems appropriate for the Bridge design, for Bridges located at the SFPR/Sunbury connection, the railway Overpass under the Alex Fraser Bridge, the SFPR/Tannery connection and for the SFPR/BCRC Overhead (Structure No. 8313) at the SFPR/Highway 17 interchange. The systems shall consist of the following for each Structure:
 - (i) except for the SFPR/BCRC Overhead (Structure No. 8313), 2 free-field triaxial accelerometers, one a downhole, clear of structural interference but proximate to the ends of each Structure, intended to pick up firm ground readings at till at one end of the Structure and soft ground readings at the other end;
 - (ii) 1 triaxial accelerometer at each abutment;
 - (iii) 1 triaxial accelerometer on the footing of the highest pier;
 - (iv) 1 biaxial accelerometer on the cap at the top of the highest pier;
 - (v) 1 biaxial and 1 triaxial accelerometer on one side of the deck, at the midspan of different spans;

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- (vi) 2 vertical accelerometers on the deck opposing the biaxial and triaxial in (v);
 - (vii) 2 biaxial accelerometers on one side of the deck, at the midspan of different spans;
 - (viii) 2 vertical accelerometers on the deck opposing the biaxials;
 - (ix) 1 displacement transducer; and
 - (x) 1 ambient temperature and humidity gauge.
- (b) If the crossing has more than four spans, two triaxial accelerometers shall be added. If the crossing is a twin Structure, the instrumentation shall be doubled, except for the free-field accelerometers and the temperature and humidity gauge. The system shall be designed in consultation with the Province's Representative and the proposed instrumentation locations shall be submitted to the Province's Representative in accordance with the Consent Procedure.
- (c) Provide a finite element model, (standard commercially available software) for each instrumented structure.

3. Instrument Specifications

3.1 Strong Motion Network

The strong motion network shall:

- (a) be self contained with digitizer and triaxial accelerometer;
- (b) have digitizer resolution better than 16 bits effective and clock accuracy better than 20 ms RMS;
- (c) have accelerometer sensitivity better than 1.0 mg RMS (milli-gravity) and range +/- 2g (order of magnitude below felt level);
- (d) provide continuous recording with a minimum 24 hour data storage;
- (e) be capable of TCP/IP ethernet communications for real-time seismic parameter reporting, with parameters including peak ground acceleration (PGA), peak ground velocity (PGV), peak displacement (PGD) and spectral intensity (SI);
- (f) allow remote configuration and data retrieval over ethernet;
- (g) have integrated, uninterruptible power source (UPS) with more than 5 hrs. run time without external power;

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- (h) include peripheral equipment for internet connectivity and communication and data processing software compatible with the Pacific Geoscience Centre's Strong Motion Network.

One device that meets these criteria is the IA-1 from "Geosig" whose details are available at <http://www.geosig.com/ptdigitize.htm>.

3.2 Free-field Downhole Array

The downhole array shall provide free-field ground readings without significant structural influence and shall:

- (a) be triaxial 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 120 dB;
- (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 triaxial force-balance accelerometers with a minimum full scale range of +/- 2.5 g;
- (g) provide continuous real time seismic reporting, on-line notification of recorded event and allow remote configuration and downloading over the ethernet (must be broadband, not dial-up);
- (h) be a multi-tasking operating system that allows simultaneous data acquisition and interrogation;
- (i) have common time synchronization and a minimum standard clock accuracy of 20ppm, with the clock being capable of recording Coordinated Universal Time (UTC);
- (j) provide a minimum digitizer resolution of 24 effective bits;
- (k) 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;
- (l) have a frequency range greater than 5 times the natural frequency of the structure;
- (m) have built-in digital signal filtering capabilities;
- (n) be able to operate from an uninterrupted auxiliary power supply (UPS) for at least 3 weeks;

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- (o) be waterproof to the required depth of water pressure;
- (p) have cables that are shielded and meet the specifications of Belden cables;
- (q) have each downhole accelerometer installed in separate boreholes and in a guided tube, such as an inclinometer tube, such that axial orientation is assured;
- (r) 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
- (s) include peripheral equipment for internet connectivity and communication and data processing software compatible with UBC Earthquake Engineering and with the Pacific Geoscience Centre's Strong Motion Network.

3.3 Structural Health Monitoring

The structural health monitoring system shall:

- (a) be a central recording unit with sufficient channels for the required servo devices and include peripheral equipment for internet connectivity and communication and data processing software compatible with UBC Earthquake Engineering;
- (b) have common time synchronization and a minimum standard clock accuracy of 20ppm, with a clock that must be capable of recording UTC;
- (c) provide a minimum digitizer resolution of 24 effective bits and have resolution and dynamic range of at least LSB 3mV and 120 dB;
- (d) 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;
- (e) Have built-in digital signal filtering capabilities;
- (f) connect to the accelerometers, displacement transducers and required gauges, providing continuous real time seismic reporting, on-line notification of recorded event and allow remote configuration and simultaneous data acquisition and interrogation over the ethernet (must be broadband, not dial-up);
- (g) have a programmable trigger level for the acquisition of operational vibrations and structural response as well as strong motion vibrations;
- (h) be able to operate from an uninterrupted auxiliary power supply (UPS) for at least 3 weeks;
- (i) have a frequency range greater than 5 times the natural frequency of the structure;

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- (j) connect to the required uniaxial, biaxial and triaxial force balance accelerometers with a minimum full scale range of +/- 3.5 g and a natural frequency > 80 Hz with a flat response from DC to 100 Hz;
- (k) connect to the required cable accelerometers (such as piezoelectric), which shall be appropriate to the design but have at a minimum, a full scale range of +/- 5 g, a frequency range between 0.2 Hz and 100 Hz, and be small enough relative to the cables to avoid added mass effect;
- (l) connect to displacement transducers that measure rotation and translation displacements;
- (m) connect to an ambient temperature gauge and wind sensor that measures wind speed and wind direction with 3% accuracy over a range suitable for the location; and
- (n) provide robust instruments suitable for the exposure conditions and potential vibrations and cables that are shielded and meet the specifications of Belden cables.

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**APPENDIX I
PROVINCE WORK**

[NTD: See separate document.]