Public Works and Government Services Canada

Requisition No. EZ899-19-1080

SPECIFICATIONS

For

Wonowon Intersection Improvements, Alaska Highway, BC

Project No. R.017173.321 June 2018

APPROVED BY:

July-18-2018

Alaska Hwy Program Manager, EASS Date

2018-07-18

Construction Safety Coordinator Date

TENDER:

July-18-2018

Project Manager Date

Real Property Services Branch, Professional and Technical Services, Pacific Region
219 - 800 Burrard Street, Vancouver, B.C. V6Z 0B9

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PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA X. L. LIU # 29829
July 25, 2018
(For Civil Scope only)

2018-07-25 PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA M. M. CETNAROWSKI # 35181
For Electrical Scope Only As Per Drawings

APPENDICES

Appendix	Description
A	Preliminary Hazard Assessment Form *Note: The Preliminary Hazard Assessment Form is provided for the Contractor's general information and reference only. PWGSC takes no responsibility for the completeness or any misrepresentation by the Contractor of the on-site hazards based on the information provided in the Preliminary Hazard Assessment Form. The Contractor shall remain responsible for the identifying and mitigating against all hazards on the project.*
B	Confirmation of Prime Contractor's Main Responsibilities Under the WorkSafeBC Occupational Health and Safety Regulations and Worker's Compensation Act
C	Written Communication / Document Management Protocol
D	Environmental Protection Plan (EPP) – Checklist
E	Responsibility Checklist for Authorizations/Approvals/Notifications/Permitting
F	Relevant Environmental Publications
G	Geotechnical Data Report for Wonowon Intersection Improvement (Km 161.9), Alaska Highway, BC. Tetra Tech, June 29, 2018

REFERENCE DOCUMENTATION

Standards and Best Practices for Instream Works, British Columbia Ministry of Land and Air Protection Ecosystem Standards and Planning Biodiversity Branch – March 2004.
Available online at:
http://www.env.gov.bc.ca/wld/documents/bmp/iswstdsbpsmarch2004.pdf

Land Development Guidelines for the Protection of Aquatic Habitat, Fisheries and Oceans – September 1993.
Available online at:
http://www.dfo-mpo.gc.ca/Library/165353.pdf

Manual of Standard Traffic Signs & Pavement Markings, BC Ministry of Transportation and Infrastructure – September 2000
Available online at:
http://www.th.gov.bc.ca/publications/eng_publications/electrical/most_pm.pdf

BC Ministry of Transportation and Infrastructure, 2015 Interim Traffic Management Manual for Work on Roadways and applicable Amendments available at time of tender closing.
Available online at:
http://www2.gov.bc.ca/gov/content/transportation/transportation-infrastructure/engineering-standards-guidelines/trafficmanagementmanual

2016 Standard Specifications for Highway Construction, BC Ministry of Transportation and Infrastructure – July 1, 2016 – Volume 1 and 2 and applicable Amendments available at time of tender closing.
Available online at:
http://www2.gov.bc.ca/gov/content/transportation/transportation-infrastructure/engineering-standards-guidelines/standard-specifications-for-highway-construction

BC Ministry of Transportation and Infrastructure, Recognized Product List.
Available online at:
http://www2.gov.bc.ca/gov/content/transportation/transportation-infrastructure/engineering-standards-guidelines/recognized-products-list

Public Works and Government Services Canada – Acquisition Forms
Available online at:
http://www.tpsgc-pwgsc.gc.ca/app-acq/forms/formulaires-forms-eng.html

LIST OF CONTRACT DRAWINGS

Sheet No.	Title	Drawing Number	Revision Number
Civil:			
1	Cover Page	C000	0
2	Project Location Plan, Key Plan, Drawing Index	C001	0
3	Legend and Control Monument Locations	C002	0
4	Plan and Profile	C101 – C104	0
5	Geometrics, Laning, Signage & Pavement Markings	C201 – C204	0
6	Typical Sections & Details	C301 – C304	0
7	Spot Elevations - North & South Intersections	C401	0
8	Cross Sections	C501 – C506	0
9	Mass Haul Diagram	C601	0
Electrical			
10	Lighting Revisions - Site Plan – Notes	TE-11027-1	0
11	Lighting Revisions - Elevations – Wiring Diagram	TE-11027-2	0

PART 1 – GENERAL

Section Includes

PART 1:

1.1 Order of Precedence.

1.2 Work Covered by Contract Documents.

1.3 Codes.

1.4 Contractor's Use of Site.

PART 2:

2.1 Site Inspection.

2.2 Work Completion.

2.3 Special Precautions.

2.4 Survey.

2.5 Contract Drawings.

2.6 Electronic Contract Drawings.

2.7 Contract Submittals.

2.8 Supervisory Personnel.

2.9 Special Requirements.

2.10 Work by Others.

2.11 Departmental Representative's Office Trailer.

1.1 Order of Precedence

.1 In the event of any discrepancy or conflict, order of precedence shall be in accordance with GC 1.2.2 – Order of Precedence and as follows:

.1 The Division 1 Sections of these Specifications take precedence over the other sections of the Specifications.

.2 In the event that two or more plans show conflicting information, the information on the most recently dated plan shall govern.

.3 If conflict arises between an item in the main body of these Specifications (Division 1 – Division 34) and an

item found in one of the Appendices (Reference Documents), the main body of the Specifications (Division 1 – Division 34) shall govern.

.4 Any technical and manufacturer's standard, Government Act, Regulation or Code of practice referred to in the Contract documents shall be the version current at the time of tender closing.

1.2 Work Covered by Contract Documents

.1 The project is to be constructed in two phases. Refer to Section 01 14 00 – Work Restrictions, Access Development, Construction Staging, and Restoration, Subsection 1.8, Article .1 and .2. Overall, the project includes the following but not limited to:

.1 Widening of the highway and intersection improvements through the Wonowon area per Contract Drawings.

.2 Construction of new and realignment/upgrade of existing frontage roads.

.3 Installation of new and relocation of existing lamp standards per Contract Drawings.

.4 Utility works.

.2 The work under this contract generally comprises of the following but is not limited to:

.1 Completion and submission of accepted submittals listed for review and acceptance by the Departmental Representative prior to the undertaking the work effected by the submittal.

.2 Stripping of organic material, temporary stockpile, and reuse as topsoil.

.3 Development of construction access to facilitate construction. Restoration of the disturbed areas following the construction.

.4 Excavation, transport, place, and compact material for roadway embankment.

.5 Remove and dispose of existing drainage culverts at existing access locations and replace with ditches.

.6 Relocate utilities shown on Contract Drawings and as per the specifications of this Contract. The Contractor is responsible for all coordination with the utility owners or their contractors regardless of whether or not

the utility works are included in this contract.

.7 Excavate, manufacture, transport, place, and compact sub-base course, crushed base gravel and crushed surfacing gravel.

.8 Saw cutting and removal of existing asphalt concrete pavement structure per Contract Drawings. Transport and dispose of asphalt concrete material offsite.

.9 Supply, manufacture, transport, and placement of Asphalt Prime, Asphalt Tack Coat, and Hot Mix Asphalt Concrete Pavement.

.10 Transport, placement (using a purpose built shouldering machine), grading, and compaction of Gravel Shouldering.

.11 Supply and install drainage infrastructure including aluminized CSP culverts.

.12 Supply and install precast concrete barriers.

.13 Remove and stockpile for re-use by others the existing traffic signage and posts.

.14 Supply and install permanent traffic signage, line painting and markings.

.15 Restoration to pre-construction conditions and Hydroseeding of disturbed areas and decommissioned highway.

.16 Construction layout surveys, quantity surveys, and as-built surveys.

.17 Environmental protection and monitoring.

.18 Traffic management including maintaining safe and efficient public traffic flow through the limits of the work via the implementation of the Contractor's construction staging plans with the details of all required temporary lanes, traffic control, signage, and detours for the duration of the works.

.19 Dust control.

.20 Quality management and quality control.

.21 Work complete by Change Order (if required).

1.3 Codes .1 Meet or exceed requirements of:

.1 Contract Documents;

.2 Specified standards, applicable legislation, codes, and referenced documents; and,

.3 Other codes of Local, Provincial, or Federal application (in the case of conflict or discrepancy, the more stringent requirements shall apply).

1.4 Contractor's Use of Site

.1 Restrict work to within the construction footprint shown on the Contract Drawings and as agreed to by the Departmental Representative.

.2 Any additional areas required by the Contractor outside the lands owned by the Departmental Representative and designated for use on this project, shall be the Contractor's responsibility to organize. Any costs associated with the use of these additional lands shall be the Contractor's responsibility.

.3 Assume full responsibility for protection and safekeeping of products under this contract.

PART 2 – EXECUTION

2.1 Site Inspection

.1 Submission of tender is deemed to be confirmation that the Contractor has inspected the site and is conversant with all conditions affecting execution and completion of the work.

2.2 Work Completion

.1 Preparation of required submittals to commence any time after receipt of notice to proceed and be completed in sufficient time as to not delay the work.

.2 Achieve Substantial Performance by July 30, 2019.

.3 Achieve Completion by August 15, 2019.

.4 Works may need to be temporally shut down during heavy rain events, or adverse weather conditions. The works may be stopped by the following processes:

.1 The Contractor with approval from the Departmental Representative shall suspend works should be adverse weather conditions adversely affect the Contractors ability to achieve the contract specifications for quality of work.

.2 The Contractor's Environmental Monitor with approval from the Departmental Representative may suspend work should they feel it is not be possible to

achieve the environmental requirements due to the adverse weather conditions.

.3 The Departmental Representative in conjunction with British Columbia Ministry of Environment and Climate Change Strategy (MoE) may suspend the work should they feel that it is not possible to achieve the environmental requirements or the contract specifications for quality of work due to the adverse weather conditions.

.5 Regardless of who suspends the work, the Contractor will be responsible for maintaining the site and protecting the works throughout the suspension period to ensure the site is in an acceptable condition safe to the public.

.6 The Contractor shall account for the possibility of not being able to complete work due to adverse weather conditions in the construction schedule and in the unit prices. No payment for temporary work stoppages due to adverse weather conditions will be made.

2.3 Special Precautions

.1 The Contractor's attention is drawn to the possibility of impacting abandoned and live utilities within the limits of work. The Contractor shall confirm the locations of all such utilities before construction starts. All costs for utility locates shall be incidental to the work. The Contractor shall notify the Departmental Representative should utilities be located in areas other than those shown on the Contract Drawings or if any conflicts with constructability, and await instructions from the Departmental Representative before proceeding with work in the vicinity of such encountered services and utilities. See Section 01 14 00 – Work Restrictions, Access Development, Construction Staging, and Restoration for more details.

.2 Existing structures, signs, utilities, asphalt, culverts, and all other structures, services, piping or equipment within the limits of work shall be properly protected from any injury or damage, direct or indirect. Any damage that is caused as a result of the operations of the Contractor shall be repaired and made good at the Contractor's expense to the satisfaction of the Departmental Representative.

2.4 Survey

.1 The Contractor shall be responsible for all layout surveys to complete the work per the design lines and grades, survey of construction for measurement for payment (see Section 01 29 00 – Payment Procedures), and as-built surveys (see Section 01 78 00 – Closeout Submittals). All surveys shall achieve the following:

.1 Be collected to an accuracy of +/-0.02 m horizontal and +/-0.02 m vertical or better and shall be referenced / tie into the PWGSC's monument / coordinate system as shown on the Contract Drawings.

.2 Use industry standards, methods, equipment, and the survey requirements of Item 1.3 – Survey of Section 01 29 00 – Payment Procedures, and other approaches (if necessary) as pre-approved by the Departmental Representative.

.2 Unless specified otherwise in the Contract Specifications, all layout surveys and quantity surveys shall be considered incidental to the work and not measured for payment.

.3 All layout surveys, quantity surveys, monitoring surveys, and quantity calculations for the purposes of progress payments shall be completed by a Professional Engineer, an Applied Science Technologist or Certified Engineering Technician, or other qualified surveyor, with the knowledge, skills and abilities acceptable to the Departmental Representative. The surveyor or person(s) used for this tasks shall have a minimum of 5 years' experience working on projects of similar size, scope and cost. A resume detailing this experience shall be provided to the Departmental Representative for review and acceptance if requested.

.4 Report any discrepancies between project survey control monuments, Contract Drawings, and existing conditions to the Departmental Representative as soon as they are discovered. Should a discrepancy be found, await written approval from the Departmental Representative prior to proceeding.

.5 Establish working control points based on survey control monuments provided (others monuments not listed shall not be used). Report to the Departmental Representative when a working control point is lost or destroyed because of necessary work. Replace working control points from the project survey control monuments.

.6 Establish / layout the proposed alignment(s) and grades using paint lines and survey stakes based on working control points and survey control monuments provided.

.7 The Departmental Representative may elect to verify surveys. Verification of the survey by the Departmental Representative does not abdicate the Contractor's responsibility for the correctness and accuracy of the survey.

.8 Maintain a complete, accurate log of control and survey work

as it progresses. On request of the Departmental Representative, submit documentation to verify the accuracy of the field engineering work.

.9 The Contractor shall regularly monitor the condition of the Work Site and of property on and adjoining the Work Site throughout the construction period, and shall immediately notify the Owner if any deterioration in condition is detected. Such monitoring shall cover all pertinent features and property including, but not limited to, buildings, structures, roads, walls, fences, slopes, sewers, culverts and landscaped areas.

.10 The Departmental Representative may, but shall not be obligated to, survey and record the condition of the Work Site and of property on or adjoining the Work Site prior to the commencement of construction by the Contractor. If a survey is undertaken and if requested by the Contractor, the Departmental Representative will provide a copy of the survey records to the Contractor for reference.

.11 Whenever supplied with survey records, the Contractor shall satisfy itself as to the accuracy and completeness of the survey records provided by the Departmental Representative for any area before commencing construction in that area. Commencement of construction in any area shall be interpreted to signify that the Contractor has accepted such survey records as being a true record of the existing conditions prior to construction.

.12 The provision of the records of a survey of existing conditions by the Departmental Representative shall in no way limit or restrict the Contractors responsibility to exercise proper care to prevent damage to all property within or adjacent to the Work Site, whether all such property is covered by the survey or not.

2.5 Contract Drawings

.1 Upon award of the project, PWGSC will at the request of the successful Contractor provide the successful Contractor with up to 4 x 609.6 mm x 914.4 mm (24” x 36”) and 6 x 279.4 mm x 431.8 mm (11” x 17”) “Issued for Construction” or “Issued for Tender” hard copy Contract Drawing sets. Preparation and plotting of the hard copy drawing sets may take up to 14 days to prepare (excluding shipping).

.2 Upon award of the project, PWGSC will provide the successful Contractor with a digital PDF version of the “Issued for Construction” or “Issued for Tender” Contract Drawings. Preparation of the PDF drawing file may take up to 14 days to prepare.

2.6 Electronic Contract Drawings

.1 If requested by the Contractor, the Departmental

Representative will provide the Contractor with available Contract Drawings in electronic format for the Contractor to reference throughout the work.

.2 The format and software of the electronic Contract Drawings shall be at the Departmental Representatives discretion.

.3 The Departmental Representative accepts no responsibility for the accuracy or completeness of the electronic Contract Drawings. Should the Contractor choose to reference the electronic Contract Drawings, the Contractor shall satisfy itself as to the accuracy and completeness of the electronic Contract Drawings before commencing construction. Should a discrepancy between the electronic Contract Drawings and the hard copy Contract Drawings be discovered (at any time during the work), the hard copy Contract Drawings shall govern. The Contractor will be responsible for all costs associated with any corrections to ensure the work is in conformance with the hard copy Contract Drawings. The Departmental Representative shall not be responsible for updating or correcting any discrepancies between the electronic Contract Drawings and the hard copy Contract Drawings identified by the Contractor.

2.7 Contract Submittals

.1 Complete and submit for Departmental Representative review, all required contract submittals as detailed in the relevant sections of the contract specifications. Work affected by the submittals shall not proceed until the submittal is accepted by the Departmental Representative. Allow for submittal review periods as required for each submittal and as detailed in Section 01 33 00 – Submittal Procedures. Required submittals include but are not limited to the following:

.1 Construction Staging Drawings (see Section 01 14 00).

.2 Project Schedule (see Section 01 32 16).

.3 Traffic Management Plan (see 01 35 00.06)

.4 Health and Safety Plan (see Section 01 35 33).

.5 Environmental Protection Plan (see Section 01 35 43).

.6 Quality Management Plan (see Section 01 45 00).

.7 As-built Survey, As-built Drawing mark-ups, and Shop Drawing mark-ups (see Section 01 78 00).

.8 Shop Drawings (if applicable, including professional seal for design work required).

.9 Asphalt Mix Design (see Section 32 12 16).

.10 Asphalt Cement, Asphalt Prime, Asphalt Tack Coat samples and product data (see Section 32 12 10, Section 32 12 13.16, and Section 32 12 13.23).

.11 Aggregate materials quality and property test results.

.12 Preliminary Hazard Assessment Form (Appendix A).

.13 Confirmation of Prime Contractor's Main Responsibilities Under the WorkSafeBC Occupational Health and Safety Regulations and Worker's Compensation Act form (Appendix B).

2.8 Supervisory Personnel

.1 Within five Days after award notification, the Contractor shall submit to the Departmental Representative confirmation of the names of the supervisory personnel and other key staff designated for assignment on the Contract. At a minimum the following personnel shall be included on the list:

.1 Project Superintendent.

.2 Deputy Project Superintendent.

.3 Health and Safety Coordinator.

.4 Quality Control Manager.

.5 Environmental Monitor(s).

.2 The above personnel shall perform the following duties:

.1 Project Superintendent: shall be employed full time and shall be present on the Work Site each and every work day that Work is being performed, from the commencement of work to Substantial Performance and Completion of the Work.

.2 Deputy Project Superintendent: shall have the authority of the Project Superintendent during the latter's absence for short periods of time.

.3 Health and Safety Coordinator: shall possess safety experience in general construction. Duties shall encompass all matters of safety activities from commencement of work until Substantial Performance and Completion of the Work (see Section 01 35 33 – Health and Safety for further requirements).

.4 Quality Control Manager: shall be independent from the Contractor, experienced in Quality Management, and dedicated to quality matters from commencement

of work until Substantial Performance and Completion of the Work (see Section 01 45 00 – Quality Management for further requirements).

.5 Environmental Monitors: shall be a P.Biol, RPBio or Qualified Environmental Professional (QEP) (see Section 01 35 43 – Environmental Protection for further requirements).

2.9 Special Requirements

.1 The following special requirements for this project are emphasized for the Contractors attention:

.1 Maintain two-way and two-lane traffic for the Alaska Highway except as otherwise noted in Section 01 35 00.06 – Special Procedures – Traffic Control.

.2 Existing accesses maintained or other suitable accesses of the same width and convenience as existing to the highway, frontage roads or private properties.

2.10 Work by Others

.1 The contractor is advised that concurrent with this project there may be other Contractors working in nearby adjacent projects. Should other Contractors be working in nearby adjacent projects, the Contractor shall coordinate his operations with the other Contractors, including traffic management.

.2 The Contractor is advised that the utility relocation of the following utilities will be undertaken by others before and after work on this project commences. The Contractor will need to coordinate his operations with the owner or its contractor of these utilities to ensure the utilities are not damaged. Refer to Subsection1.3 in Section 01 14 00 – Work Restriction, Access Development, Construction Staging, and Restoration for further details.

.1 BC Hydro power poles located on east side of the Alaska Highway.

.2 Fiber optic line located on east side of the Alaska Highway or fiber optic lines crossing the Alaska Highway.

2.11 Departmental Representative's Office Trailer

.1 Office Trailer: See Section 01 52 00 for requirements for the Departmental Representative's office trailer. Office trailer to be supplied and maintained by the Contractor.

END OF SECTION

PART 1 – GENERAL

Section Includes

PART 1:

1.1 Use of Work Site.

1.2 Work Conducted in and Adjacent to Waterways.

1.3 Utilities.

1.4 Protection of Persons and Property.

1.5 Use of Public Areas.

1.6 Construction Signage.

1.7 Access Development.

1.8 Sequence of Work.

1.9 Construction Staging.

1.10 Restoration.

1.1 Use of Work Site

.1 The Work Site will be specified by the Departmental Representative and shall only be used for the purposes of the Work. The Work Site will be made available to the Contractor for its exclusive use for the duration of the Work, unless otherwise provided in the Contract Documents.

.2 The Contractor's office trailer may be set up in the locations identified in Section 01 52 00 – Construction Facilities. The Contractor's construction camp may be set up in the locations identified in Section 01 59 10.

.3 While the Work Site is under the Contractor's control, the Contractor shall be entirely responsible for the security of the Work Site and of the Work.

.4 The Contractor shall keep the Work Site clean and free from accumulation of waste materials and rubbish regardless of the source. Snow/ice shall be removed by the Contractor as necessary for the performance and inspection of the Work.

.5 The Contractor shall provide sanitary facilities for work force in accordance with governing regulations and the Environmental Procedures for this project. The Contractor shall post notices and take such precautions as required by local health authorities and keep area and premises in sanitary condition.

.6 Any damage to the Work Site caused by the Contractor shall be repaired by the Contractor at its expense.

.7 The Contractor may work up to 12 hours per day from 7am to 9pm, seven days per week. The Contractor may work more than 12 hours per day with the following restrictions:

.1 Work in excess of 12 hrs per day shall require pre-approval from the Departmental Representative. At a minimum, pre-approval shall require a plan from the Contractor to ensure all necessary QC work per the contract requirements is completed during all times of work. The Departmental Representative may withdraw approval for the extended work hours at any time should the Contractor fail to achieve all necessary QC requirements or any other contractual requirement as a result of the extended work hours.

.2 Request for approval to work in excess of 12 hrs per day must be submitted in writing to the Departmental Representative a minimum of five (5) days in advance of the planned change in working hours.

.3 No hauling of material during inclement weather.

.4 Work during non-daylight hours requires suitable lighting.

1.2 Work Conducted in and Adjacent to Waterways

.1 All components of the work shall be conducted in accordance with Section 01 35 43 – Environmental Protection.

1.3 Utilities

.1 There are active utilities within the Highway Right of Way.

.2 The locations of Utilities shown are not necessarily exact nor is there any guarantee that all Utilities in existence within the limits of the Work Site have been shown on the Contract Drawings.

.3 The existing underground fiber optic line shown on the Contract Drawings will be relocated by NorthwesTel and is not part of this Contract. The new fiber optic conduit may be within or near the Highway Right of Way. The Contractor will need to coordinate his operations with the owner or its contractor of the fiber optic utility to ensure the fiber optic conduit is not damaged.

.4 Existing power poles along the east side of the highway shown in Contract Drawings will be relocated by BC Hydro and the pole relocation is not part of this Contract. The Contractor is responsible for the coordination as required with BC Hydro and provide temporary protection of existing and relocated poles

where necessary.

.5 Existing luminaire poles along the west side of the highway within project limits are to be relocated and new luminaire poles are required per the Contract Drawings. Both relocation of existing luminaire poles and supply and install of new luminaire poles are included in this Contract. The Contractor shall cooperate and coordinate as required with BC MoTI for required inspections on the Work Site.

.6 Light poles and/or poles along east side of the highway within project limits as shown in Contract Drawings are to be removed by Contractor. Contractor is solely responsible for the removal, cutting power and coordination with BC Hydro if needed, offsite disposal, coordination with the pole owner(s).

.7 The Contractor shall notify the Departmental Representative and the Utility companies at least seven (7) Days in advance of any activities which may interfere with the operation of such Utilities.

.8 Whenever working in the vicinity of Utilities, the Contractor shall locate such Utilities and expose those that may be affected by the Work, using hand labour as required.

.9 The Contractor shall assess the possible impact of its operation on all utilities and shall protect, divert, temporarily support or relocate, or otherwise appropriately treat such Utilities to ensure that they are preserved.

.10 The Contractor shall immediately report any damage to Utilities to the Departmental Representative and to the Utility company or authority affected, and shall promptly undertake such remedial measures as are necessary at no additional cost to the Owner.

1.4 Protection of Persons and Property

.1 The Contractor shall comply with all applicable safety regulations of WorkSafeBC including, but not limited to, the Workers Compensation Act, Occupational Health and Safety Regulations, Industrial First Aid Regulations, and Workplace Hazardous Materials Information System Regulations (see Section 01 35 33 – Health and Safety for additional requirements).

.2 The Contractor shall take all necessary precautions and measures to prevent injury or damage to persons and property on or near the Work Site.

.3 The Contractor shall promptly take such measures as are required to repair, replace or compensate for any loss or damage

caused by the Contractor to any property.

1.5 Use of Public Areas

.1 Off-road construction equipment (equipment when exceeds legal highway load limits or dimensions) will not be allowed on the Alaska Highway outside the limits of the work shown on the Contract Drawings except as designated in the Contractor's Construction Staging / Traffic Management Plans accepted by the Departmental Representative. Steel tracked equipment with cleats will not be allowed on asphalt outside the limits of the work or asphalt designated for future use.

.2 The Contractor shall ensure that its vehicles and equipment do not cause nuisance in public areas. All vehicles and equipment leaving the Work Site and entering public roadways shall be cleaned of mud and dirt clinging to the body and wheels of the vehicle. All vehicles arriving at or leaving the Work Site and transporting materials shall be loaded in a manner which will prevent dropping of materials or debris on the roadways, and, where contents may otherwise be blown off during transit, such loads shall be covered by tarpaulins or other suitable covers. Spills of material, including rocks and debris from loaded trucks, shall be removed or cleaned immediately by the Contractor at no cost to the Owner. All activities shall be in accordance with Section 01 35 43 – Environmental Protection and the Environmental Protection Plan prepared by the Contractor for the project. The traveled lanes of the Alaska Highway shall remain a Public Highway subject to the rules and laws of Public Highways in the Province of British Columbia. The Contractor is responsible for ensuring all equipment accessing the Highway meets all requirements for vehicles traveling on Public Highways in the Province.

1.6 Construction Signage

.1 No Signs or advertisements, other than regulatory or warning signs, PWGSC supplied signage, and portable electrically illuminated message signs are permitted on site.

.2 Signs and notices for Safety and instruction shall be provided by the Contractor (see Section 01 35 00.06 – Special Procedures - Traffic Control for additional details).

.3 Maintain approved signs and notices in good condition for duration of Project, and dispose of off-site on completion of Project or earlier as directed by the Departmental Representative.

.4 Signage shall be coordinated with Other Contractors working in the area as needed.

1.7 Access Development

.1 The Contractor is required to develop access to the required work areas. The Contractor is fully responsible for the selection

and implementation of all methods to accomplish this requirement. All construction access shall be completed in conformance with the requirements of Section 01 35 43 – Environmental Protection and the Contractor's Environmental Protection Plan.

.2 The Contractor's attention is drawn to the possibility of impacting abandoned and live utilities within the limits of work. The Contractor shall confirm the locations of all such utilities before construction starts. All costs for utility locates shall be incidental to the work. The Contractor shall notify the Departmental Representative should utilities be located in areas other than those shown on the Contract Drawings or if any conflicts with constructability, and await instructions from the Departmental Representative before proceeding with work in the vicinity of such encountered services and utilities. See Section 01 14 00 – Work Restrictions, Access Development, Construction Staging, and Restoration for more details.

.3 Existing structures, signs, utilities, asphalt, culverts, and all other structures, services, piping or equipment within the limits of work shall be properly protected from any injury or damage, direct or indirect. Any damage that is caused as a result of the operations of the Contractor shall be repaired and made good at the Contractor's expense to the satisfaction of the Departmental Representative.

1.8 Sequence of Work

.1 Project will be constructed in two Phases. The Phase 1 in Summer/Fall of 2018 will include relocation and/or removal of utilities, complete subgrade construction as well as frontage roads and lighting works. The Phase 2 in Spring / Summer of 2019 will include gravels and hot mix asphalt concrete pavement as well as installation of traffic signs and pavement markings.

.2 It is anticipated that the project construction will start in the Summer 2018 and completed in the Summer 2019. A winter shutdown is expected with PWGSC being responsible for the snow clearing from October 15, 2018 to April 30, 2019. The Contractor shall provide PWGSC with a minimum one week notice of anticipated winter shutdown and spring start-up. During the winter shutdown the Contractor shall ensure the following is maintained:

.1 Two-way and two lane traffic on the paved asphalt surface for the Alaska Highway.

.2 Existing accesses to the highway, frontage roads and private properties shall be maintained or re-directed to other suitable accesses of the same width and

convenience as existing.

.3 The site is clear of any safety hazards to public traffic, property owners or business operations.

.4 Lighting of the highway maintained to the existing conditions or better.

.5 Positive drainage maintained in all disturbed areas to avoid flooding or ponding.

.6 All construction signage not necessary to driving conditions during winter shutdown shall be removed or covered.

.7 Ground driving surfaces shall be suitable for use free of potholes or other obstructions which may cause an impediment to vehicles.

.3 Staging and construction detours (if any) are the responsibilities of the Contractor.

.4 Complete the work in accordance with Section 01 14 00 – Work Restrictions, Access Development, Construction Staging, and Restoration.

1.9 Construction Staging

.1 The Contractor shall stage the work ensuring that:

.1 All requirements in Sub-section 1.8 – Sequence of Work are achieved.

.2 All design requirements as specified in the Contract Drawings, contractor prepared shop drawings, and contract specifications are achieved.

.3 All requirements of Section 01 35 00.06 – Special Procedures – Traffic Control are achieved.

.4 All requirements of the Section 01 35 43 – Environmental Protection and the Contractor's Environmental Protection Plan are achieved.

.5 Requirements for winter shut down are achieved.

The Contractor is fully responsible for the selection and implementation of all methods to accomplish this requirement.

.2 Prior to undertaking the work, construction staging and detour drawings shall be prepared by the Contractor and submitted to

the Departmental Representative for review and acceptance a minimum of Ten (10) days prior to undertaking the work (see Section 01 33 00 – Submittal Procedures). The drawings shall be sealed by a professional engineer qualified to undertake the design work. The construction staging drawings shall cover each construction staging scenario, required detours and special situations over the length of the project and shall:

.1 Describe and show graphically the proposed stages of construction to complete the work.

.2 Describe and show graphically how vehicle traffic will be accommodated throughout all stages of the work (including vertical and horizontal alignments).

1.10 Restoration

.1 Remove access points, roads, detours, laydown areas, pads, and all other works installed during access development and construction staging. Re-instate the worksite to a condition equal to or better than the site condition prior to construction by:

.1 Restoring organic soils (if removed during access development).

.2 Eliminating uneven areas and low spots.

.3 Restoring existing and proposed drainage patterns as shown on the Contract Drawings.

.4 Removal of all gravels, other materials, or structures placed to create access points, roads, detours, or pads. Dispose of gravels, other materials, or structures at an off-site disposal facility acceptable to the Departmental Representative.

.5 Hydroseeding all disturbed areas and areas designated for hydroseeding, per Section 32 93 21 – Hydraulic Seeding.

END OF SECTION

PART 1 – GENERAL

Section Includes

PART 1:

1.1 Definitions.

1.2 Measurement and Payment Procedures.

1.1 Definitions

.1 Mobilization and Demobilization: Consists of preparatory work and operations, including but not limited to:

.1 Preparation and acceptance of submittals (Construction Schedule, Traffic Management Plan, Quality Management Plan, Environmental Protection Plan, Construction Staging Plans, Health and Safety Plan, and any other submittals required prior to starting work).

.2 Work and costs incurred necessary for the movement of personnel, equipment, supplies and incidentals to/from the work site.

.3 Work and cost incurred in the establishment and operation of offices, camps, and other facilities necessary to undertake the work.

.4 Work and costs incurred in the completion of clean-up and project completion.

.5 All other work and costs incurred in the successful completion of mobilization and demobilization.

1.2 Measurement and Payment Procedures

.1 Payment for Mobilization and Demobilization will be made on the basis of the Price per Unit Bid for Mobilization and Demobilization in the Bid and Acceptance Form. The Price per Unit Bid shall include all costs associated with the items of work listed in 1.1 Definitions above.

.2 Payment for this item will be made at the Lump Sum price and will be scheduled as follows:

.1 50% at the beginning of construction (to a maximum of 5% of the total Tender Price) after the Contractor required submittals (including Construction Schedule, Traffic Management Plan, Quality Management Plan, Environmental Protection Plan, Construction Staging Drawings, Health and Safety Plan and any other submittals required prior to starting work) have been submitted for review, approval, accepted, and work onsite has commenced to the satisfaction of the Departmental Representative.

.2 The remaining 50% once the project has achieved "Completion" and the site has been cleaned to the satisfaction of the Departmental Representative, remaining deficiencies identified during final inspection (Section 01 77 00 – Closeout Procedures) are corrected, and all closeout submittals are provided and accepted by the Departmental Representative.

END OF SECTION

PART 1 – GENERAL

Section Includes

PART 1:

1.1 Terms of Payment.

1.2 Basis of Payment.

1.3 Survey

1.1 Terms of Payment

.1 The project's terms of payment shall be per General Conditions (GC) 5 – Terms of Payment. Progress payments shall be submitted by the Contractor on a monthly basis unless accepted otherwise by the Departmental Representative. The progress payment shall use PWGSC's Request for Progress Payment – Construction Contracts form: PWGSC-TPSGC 1792, found online (see link to Public Works and Government Services – Acquisition Forms within the Reference Documentation section of the Table of Contents for link).

With each progress payment, provide to the Departmental Representative:

.1 Documentation required by General Conditions (GC) 5 – Terms of Payment.

.2 WorkSafeBC Clearance Letter, indicating the Contractor is in active and good standing per the end date of the progress payment in accordance with Section 51 of the Workers Compensation Act (Departmental Representative may waive this requirement).

.3 Updated project schedule (see Section 01 32 16 – Construction Progress Schedules – Bar (Gantt) Chart.

.4 Updated cash flow forecast (see Section 01 31 00 – Project Management and Coordination.

1.2 Basis of Payment

.1 Basis of payment shall be per the Measurement and Payment Procedures in the applicable specification section. Where not specified, basis of payment for all work included in these Specifications or Contract Drawings not specifically mentioned is considered incidental to other work and is part of the Total Contract Amount. No additional payment will be made for incidental work.

.2 Payment for work shall be made per the Price per Unit as shown in the Unit Price Table.

.3 For unit price items in the Bid and Acceptance Form, progress

payments shall be made based on the quantities of work in place (prior to excavation or following placement and compaction (when required)), surveyed, and accepted by the Departmental Representative in the field. Provide to the Departmental Representative for each progress claim, survey data at each stage of construction to support progress claim quantities for each unit price item.

.4 For lump sum items in the Bid and Acceptance Form, progress payments shall be made based on the percent of work completed and accepted by the Departmental Representative at the time of the monthly progress payment (Excluding Mobilization and Demobilization which is paid per 1.2 of Section 01 25 20).

.5 The contractor must support any claims for products purchased, manufactured, or delivered to the place of work but not yet incorporated into work. The support for such claims must include such evidence as may be required by the Departmental Representative to establish value and the percentage of the work completed.

.6 Any work called for in the specifications or shown on the drawings but not specifically mentioned as an item for which payment will be made, will be considered incidental to the items of work listed. No additional payment will be made for this incidental work.

.7 All equipment, materials, and labour necessary to complete any item of work shall be included in the cost of that work.

.8 Materials shall be excavated or placed within the specified tolerances of the design lines and grades shown on the Contract Drawings but not uniformly high or low. Materials excavated or placed outside the specified tolerances will not be measured for payment unless pre-approved by the Departmental Representative.

.9 Measurement for Payment will be at the Departmental Representative's discretion using one or more of the following methods:

.1 Based upon the survey data collected by the Contractor – when the materials have been excavated or placed within the specified tolerances of the design lines and grades shown on the Contract Drawings but not uniformly high or low.

.2 Based upon the survey data collected by the Contractor – when the Contractor's or Departmental Representatives survey data indicates that less materials

were excavated or placed than called for by the design lines and grades on the Contract Drawings.

.3 By the design grade / design drawing neat lines – when the Contractor's or Departmental Representatives survey data indicates that materials were excavated or placed outside / beyond the specified tolerances of the design lines and grades on the Contract Drawings.

1.3 Survey

.1 Surveys shall be undertaken by the Contractor to verify quantities for payment purposes. Survey shall be considered incidental to the work and not measured for payment.

.2 All quantity surveys, and quantity calculations for the purposes of progress payments shall be completed by a Professional Engineer, an Applied Science Technologist or Certified Engineering Technician, or other qualified surveyor, with the knowledge, skills and abilities acceptable to the Departmental Representative. The surveyor or person(s) used for this tasks shall have a minimum of 5 years' experience working on projects of similar size, scope and cost. A resume detailing this experience shall be provided to the Departmental Representative for review and acceptance if requested.

.3 Survey data collected shall be of sufficient density to fully characterize the work. Survey methods and location of surveyed cross sections is subject to prior approval of the Departmental Representative. At a minimum the Contractor shall survey all features at 20 m station intervals (may be reduced to 5 m in locations with grade changes at the discretion of Departmental Representative) and the location of all treatment boundaries including changes in material type / placement, changes in surface treatment, and changes in the terrain.

.4 A survey of the existing ground surfaces and other topographic features shall be undertaken by the Contractor prior to initiation of construction, but in areas designated for Clearing and Grubbing after the Clearing and Grubbing has been completed to the satisfaction of the Departmental Representative. The survey shall be provided to the Departmental Representative for review and acceptance. Additionally, during construction no material shall be placed unless the applicable surveys on the completed surfaces have been carried out and the data accepted by the Departmental Representative, and the completed surface has been inspected and accepted by the Departmental Representative.

.5 Survey data shall be collected at an accuracy of +/-0.02 m horizontal and +/-0.02 m vertical or better and shall be referenced / tie into the PWGSC's monument / coordinate

system as shown on the Contract Drawings.

.6 Survey data shall be provided to the Departmental Representative in digital xyz format with an appropriate descriptor code as to the type of material surface or feature being surveyed. If requested by the Departmental Representative the survey data shall also be provided in a digital CADD model with complete triangulated surfaces created from the survey points and breaklines for each quantity / payment line item in the unit price table.

.7 The Contractor shall provide detailed volume calculations using average end area determination or electronic surface to surface comparisons. Details of volume calculations shall be provided to the Departmental Representative for review.

.8 Surveys may be subject to verification by the Departmental Representative. In case of discrepancy, the Departmental Representative's survey will govern.

END OF SECTION

PART 1 – GENERAL

Section Includes

PART 1:

1.1 Pre-Construction Meeting.

1.2 On-Site Documents.

1.3 Schedules.

1.4 Cash Flow Forecasting.

1.5 Construction Progress Meetings.

1.6 Written Communication / Document Management.

1.7 Submittals.

1.8 Close-Out Procedures.

1.1 Pre-construction Meeting

.1 Following award of the contract and prior to the Contractor mobilizing to the site, attend in person or via teleconference a pre-construction meeting organized by the Departmental Representative.

.2 Departmental Representatives and senior representatives of the Contractor, including but not necessarily limited to the Project Superintendent, Deputy Project Superintendent, Health and Safety Coordinator, Quality Control Manager, and Environmental Monitor, and major subcontractors shall attend in person or via teleconference.

.3 The Departmental Representative shall establish a time, location, and teleconference number for the meeting and notify the Contractor a minimum of three days prior to the meeting. The Contractor shall notify all concerned parties of the meeting.

.4 The agenda is to include but is not limited to the following:

.1 Appointment of the official representative of participants in the work and lines of communication.

.2 Project schedule.

.3 Contractor submissions (requirements and submissions schedule).

.4 Requirements for temporary facilities, site sign, offices, construction camp, storage sheds, utilities, and

fences.

.5 Permitting and Environmental requirements.

.6 Site security in accordance with Section 01 52 00 – Construction Facilities.

.7 Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime, and administrative requirements.

.8 Record drawings in accordance with Section 01 78 00 – Closeout Submittals.

.9 Take-over procedures, acceptance, and warranties in accordance with Section 01 77 00 – Closeout Procedures.

.10 Monthly progress claims, administrative procedures, photographs, and holdbacks.

.11 Contractor's Quality Management and Quality Assurance undertaken by the Departmental Representative.

.12 Insurances and transcript of policies.

.13 Contractor's site specific safety plan.

.14 Other business as required by the Departmental Representative or Contractor.

.5 Within 7 working days of the pre-construction meeting, the Departmental Representative shall distribute meeting minutes to the Contractor. The Contractor shall review the meeting minutes and provide any comments within 5 working days.

1.2 On-Site Documents

.1 Maintain at job site, one copy each of the following:

.1 Contract Drawings.

.2 Specifications.

.3 Addenda.

.4 Reviewed and accepted submittals.

.5 Change orders.

.6 Other modifications to Contract.

.7 Field test reports.

.8 Copy of approved work schedule.

.9 Manufacturer's installation and application instructions (if applicable).

.10 All permits (as required by the Contractor).

.11 Meeting minutes.

.12 Contractor's Site-Specific Health and Safety Plan.

.13 Contractor's Environmental Protection Plan (EPP).

.14 Contractor's Traffic Management Plan.

.15 Current construction standards of workmanship listed in the contract specifications.

.16 One set of "Issued for Construction" Contract Drawings (or "Issued for Tender" if being used for construction), contract specifications, and, if applicable, Shop Drawings for as-built purposes.

1.3 Schedules

.1 Submit preliminary construction progress schedule in accordance with Section 01 32 16 – Construction Progress Schedules – Bar (Gantt) Chart to the Departmental Representative.

.2 After review by Departmental Representative, revise project schedule to comply with comments given.

.3 During progress of work, revise and resubmit as directed by Departmental Representative.

1.4 Cash Flow Forecasting

.1 Provide detailed cash flow forecasting derived from the project schedule and the agreed upon by project payment schedule (project unit prices). The cash flow forecast shall be broken out by line item to coincide with the project schedule. Submit cash flow forecast to the Departmental Representative within fifteen days after award of Contract but in all cases prior to starting onsite work.

.2 Update project cash flow forecasting on a monthly basis or for each submission of a progress payment reflecting changes to the schedule until project completion. Submit updated forecast to the Departmental Representative.

1.5 Construction Progress Meetings

.1 During the course of work the Departmental Representative may schedule construction progress meetings approximately every two weeks.

.2 Departmental Representatives and senior representatives of the Contractor, including but not necessarily limited to the Project Superintendent and major subcontractors shall attend in person. Other contractor representatives including the Deputy Project Superintendent, Health and Safety Coordinator, Quality Control Manager, and Environmental Monitor shall attend in person or via teleconference.

.3 The Departmental Representative shall establish a time, location, and teleconference number for the meeting and notify the Contractor a minimum of three days prior to the meeting. The Contractor shall notify all concerned parties of the meeting.

.4 The meetings may be held on-site provided teleconference capabilities are available or at PWGSC's office in Fort Nelson. If held on site, the contractor shall provide physical space and make arrangements for the meetings.

.5 Agenda to include following:

.1 Review and approval of minutes of previous meeting.

.2 Review of work progress since previous meeting.

.3 Field observations, problems, conflicts.

.4 Problems which impede construction schedule.

.5 Review of off-site fabrication delivery schedules (if applicable).

.6 Corrective measures and procedures to regain projected schedule.

.7 Revision to construction schedule and project submittals.

.8 Progress schedule, during succeeding work period.

.9 Review submittal schedules: expedite as required.

.10 Cash flow forecasting including monthly updates.

.11 Maintenance of quality standards.

.12 Review proposed changes for effect on construction schedule and on completion date.

.13 Other business.

.6 Within 14 working days of the construction progress meeting, the Departmental Representative shall distribute meeting minutes to the Contractor. The Contractor shall review the meeting minutes and provide any comments within 5 working days.

1.6 Written Communication / Document Management

.1 Written communication & document management shall be completed per the Written Communication / Document Management Protocol prepared by the Departmental Representative following award of the contract. The Written Communication / Document Management Protocol will resemble the template provided in Appendix C.

1.7 Submittals

.1 Provide submittals, Shop Drawings, product data and samples in accordance with Section 01 33 00 – Submittal Procedures for review for compliance with Contract Documents, field dimensions and clearances, compatibility and available space, and for relation to work of other contracts. If requested, after receipt of Departmental Representative comments, revise and resubmit.

.2 Submit requests for payment through the Departmental Representative via PWGSC's cloud based document filling system "CentralCollab". Support claims for payment with survey data and other evidence as required by the Departmental Representative.

.3 Submit requests for interpretation of Contract Documents, and obtain instructions through Departmental Representative. If required by the Departmental Representative, provide supporting documents for proposed substitutions via PWGSC's cloud based document filling system "CentralCollab".

.4 Process substitutions through Departmental Representative. If required by the Departmental Representative, provide supporting documents for proposed substitutions via PWGSC's cloud based document filling system "CentralCollab".

.5 Process change orders through Departmental Representative via PWGSC's cloud based document filling system "CentralCollab".

.6 Deliver closeout submittals for review and preliminary inspections, for transmittal to Departmental Representative via

PWGSC's cloud based document filling system "CentralCollab".

1.8 Closeout Procedures

.1 Notify Departmental Representative when work is considered ready for Substantial Performance.

.2 Accompany Departmental Representative on preliminary inspection to determine items listed for completion or correction.

.3 Comply with Departmental Representative's instructions for correction of items of work listed in executed certificate of Substantial Performance.

.4 Notify Departmental Representative of instructions for completion of items of work determined in Departmental Representative's final inspection.

END OF SECTION

PART 1 – GENERAL

Section Includes

PART 1:

1.1 Project Schedule.

1.2 Schedule Format.

1.3 Submission of Schedules.

1.4 Critical Path Scheduling.

1.5 Project Schedule Reporting During the Work.

1.1 Project Schedule

.1 Develop detailed Project Schedule conforming to the project completion dates found in Section 01 11 10 – Summary of Work and the Construction Staging requirements outlined in Section 01 14 00 – Work Restrictions, Access Development, Construction Staging, and Restoration, and winter shutdown requirements.

.2 Ensure detailed Project Schedule includes as a minimum all relevant milestone activity types as follows:

.1 Project Award.

.2 Receipt of Necessary Permits.

.3 Submittal Schedule:

.1 Pre-construction survey

.2 Environmental Protection Plan.

.3 Traffic Management Plan / Detour Plan.

.4 Construction Staging Plan / Site Access.

.5 Quality Management Plan.

.6 Site-Specific Health and Safety Plan, including MSDS sheets.

.7 Hazardous Materials Management Plan.

.8 Shop Drawings and Product Samples (if applicable).

.9 As-built Survey and As-Built Drawing

Mark-ups.

.10 Test results.

.4 Mobilization.

.5 Work activities and material purchases by segment / locations (unless accepted otherwise, at a minimum each line item of work identified in the unit price table shall be identified separately on the project schedule).

.6 Interim inspections.

.7 Site Clean-up / De-mobilization.

.8 Project Substantial Performance and Project Completion dates.

.3 Indicate dates for submitting, review time, resubmission time, and last date for meeting fabrication schedule.

.4 Include dates when reviewed submittals will be required from the Departmental Representative.

1.2 Schedule Format

.1 Prepare schedule in form of a horizontal Gantt bar chart.

.2 Provide a separate bar for each major item of work or operation.

.3 Split horizontally for projected and actual performance.

.4 Provide horizontal time scale identifying first work day of each week.

.5 Format for listings: the chronological order of start of each item of work.

.6 Identification of listings by systems description.

1.3 Submission of Schedules

.1 Submit initial format of schedules within 12 days after award of Contract.

.2 Submit schedules in electronic format via PWGSC's cloud-based system "CentralCollab" (login details to be provided by Departmental Representative at time of submission following contract award). Provide schedules in PDF format and native file format if requested by the Departmental Representative.

.3 If requested submit two hard copies to be retained by the Departmental Representative.

.4 The Departmental Representative will review the schedule and return any comments within ten days after receipt.

.5 Resubmit finalized schedule within five days after return of review copy.

.6 Submit revised progress schedule with each application for payment.

.7 Distribute copies of revised schedule to:

.1 Job site office.

.2 Subcontractors.

.3 Other concerned parties.

.8 Instruct recipients to report to Contractor within ten days any problems anticipated by timetable shown in the schedule.

1.4 Critical Path Scheduling

.1 Include complete sequence of construction activities.

.2 Include dates for commencement and completion of each major element of construction.

.3 Show projected percentage of completion of each item as of the first day of the month.

.4 Indicate progress of each activity to date of submission schedule.

.5 Show changes occurring since previous submission of schedule:

.1 Major changes in scope.

.2 Activities modified since previous submission.

.3 Revised projections of progress and completion.

.4 Other identifiable changes.

.6 Provide a narrative report to define:

.1 Problem areas, anticipated delays, and impact on schedule.

.2 Corrective action recommended and its effect.

.3 Effect of changes on schedules of other Prime Contractor's.

1.5 Project Schedule Reporting

.1 Update project schedule on a monthly basis reflecting activity changes and completions, as well as activities in progress.

.2 Discuss project schedule at Construction Progress Meetings, identify activities that are behind schedule and provide measures to regain slippage.

END OF SECTION

PART 1 – GENERAL

Section Includes

PART 1:

1.1 General Requirements.

1.2 Shop Drawings and Product Data.

1.3 Samples

1.1 General Requirements

.1 Submit to the Departmental Representative submittals listed for review. Submit with reasonable promptness (per the timelines indicated if applicable and in an orderly sequence so as to not cause delay in work. Failure to submit in ample time is not considered sufficient reason for an extension of contract Substantial Performance and Completion Dates, and no claim for extension by reason of such default will be allowed.

.2 Unless specified otherwise or requested by the Departmental Representative, submittals shall be submitted to the Departmental Representative in electronic format via PWGSC's cloud-based document filing system "CentralCollab" (login details to be provided by Departmental Representative at time of submission following contract award). Submittals shall be named and filed on "CentralCollab" in accordance with the Written Communication / Document Management Protocol (see template Appendix C). Each submittal shall be compiled into a single PDF document (multiple files will not be accepted).

.3 The Departmental Representative will review the project submittals for accuracy against the appropriate project specifications and contract requirements, and endeavor to complete the reviews within the review time specified for each particular submittal, however a longer review period may be required. If a longer review period is required, the Contractor will be notified prior to the passing of the specified review period. Upon completion of the submittal reviews by the Departmental Representative, comments and or acceptance of the submittals will be given. Upon review by the Departmental Representative, should comments be provided, the Contractor shall revise the submittal as required and re-submit the complete revised submittal back to the Departmental Representative for review within one week (or within a time preapproved by the Departmental Representative). The submittals will not be accepted until all comments from all reviews have been addressed to the satisfaction of the Departmental Representative. Despite acceptance of a particular submittal, the Departmental Representative reserves the right to provide additional comments to ensure the

correction of any deficiencies with particular submittals at any time during the project.

.4 Work affected by a submittal shall not proceed until the submittal is completed, reviewed, and accepted by the Departmental Representative.

.5 Present all necessary drawings, shop drawings, product data, samples, and mock-ups in SI Metric units.

.6 Where items or information is not produced in SI Metric units, converted values are acceptable.

.7 Review submittals prior to submission to the Departmental Representative. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and coordinated with the requirements of work and Contract Documents. Submittals not stamped, signed, dated, and identified as to a specific project will be returned without being examined and shall be considered rejected.

.8 Notify the Departmental Representative, in writing at time of submission, identifying deviations from requirements of Contract Documents and stating reasons for deviations.

.9 Prior to any submission, verify field measurements and affected adjacent work included on the submission are coordinated.

.10 Contractor’s responsibility for errors and omissions in submission is not relieved by the Departmental Representative’s review of submittals.

.11 Contractor’s responsibility for deviations in submission from requirements of Contract Documents is not relieved by Departmental Representative review.

.12 Keep one reviewed copy of each submission on-site.

1.2 Shop Drawings and Product Data

.1 The term “Shop Drawings” means drawings, diagrams, illustrations, schedules, performance charts, brochures, and other data that are to be provided by the Contractor to illustrate details of a portion of work.

.2 Indicate materials, methods of construction, and attachment or anchorage, erection diagrams, connections, explanatory notes, and other information necessary for completion of work or as indicated elsewhere in the specifications. Where articles or equipment attach or connect to other articles or equipment,

indicate that such items have been coordinated, regardless of the section under which adjacent items will be supplied and installed. Indicate cross-references to design drawings and specifications.

.3 Adjustments made on Shop Drawings by the Departmental Representative are not intended to change the Contract Price. If adjustments affect the value of work, state such in writing to the Departmental Representative prior to proceeding with work.

.4 Make changes in Shop Drawings as the Departmental Representative may require, consistent with Contract Documents. When resubmitting, notify the Departmental Representative in writing of any revisions other than those requested.

.5 Accompany submissions with a transmittal letter, in duplicate, containing:

.1 Date.

.2 Project title and number.

.3 Contractor's name and address.

.4 Identification and quantity of each Shop Drawing, product data, and sample.

.5 Other pertinent data.

.6 Submissions shall include:

.1 Date and revision dates.

.2 Project title and number.

.3 Name and address of:

.1 Subcontractor.

.2 Supplier.

.3 Manufacturer.

.4 Contractor's stamp, signed by the Contractor's authorized representative certifying approval of submissions, verification of field measurements, and compliance with Contract Documents and requirements.

.5 Details of appropriate portions of work as applicable:

.1 Fabrication.

.2 Layout, showing dimensions, including identified field dimensions, and clearances.

.3 Setting or erection details.

.4 Capacities.

.5 Performance characteristics.

.6 Standards.

.7 Operating weight.

.8 Single line and schematic diagrams.

.9 Relationship to adjacent work.

.6 Professional seal and signature of the engineer certifying approval of the work (if required).

.7 After the Departmental Representative's review and acceptance, distribute copies.

.8 Submit an electronic copy of the Shop Drawing for each requested within the specification sections. Submit hard copies as requested by the Departmental Representative.

.9 Submit electronic copies of product data sheets or brochures for requirements requested in Specification Sections and as requested by the Departmental Representative where Shop Drawings will not be prepared due to standardized manufacture of product.

.10 Delete information not applicable to project.

.11 Supplement standard information to provide details applicable to the project.

.12 If upon review by the Departmental Representative no errors or omissions are discovered or if only minor corrections are made, copies will be returned, and fabrication and installation of work may proceed. If Shop Drawings are rejected, noted copy will be returned and resubmission of corrected Shop Drawings, through same procedure indicated above, must be performed before fabrication and installation of work may proceed.

.13 The review of Shop Drawings by the Departmental Representative is for the sole purpose of ascertaining conformance with general concept. This review shall not mean that the Departmental Representative approves the detail design inherent in Shop Drawings, responsibility for which shall remain with the Contractor submitting same, and such review shall not relieve the Contractor of responsibility for errors or omissions in Shop Drawings or of responsibility for meeting all requirements of construction and Contract Documents. Without restricting generality of the foregoing, the Contractor is responsible for dimensions to be confirmed and correlated at job site, for information that pertains solely to fabrication processes or to techniques of construction and installation, and for coordination of work of all sub-trades.

.14 Work affected by shop drawing shall not proceed until the shop drawing is reviewed, and accepted by the Departmental Representative.

1.3 Samples

.1 Submit for review samples in duplicate as requested in respective specification Sections. Label samples with origin and intended use.

.2 Deliver samples prepaid to Departmental Representative's site office.

.3 Notify Departmental Representative in writing, at time of submission of deviations in samples from requirements of Contract Documents.

.4 Where colour, pattern or texture is criterion, submit full range of samples.

.5 Adjustments made on samples by Departmental Representative are not intended to change Contract Price. If adjustments affect value of work, state such in writing to Departmental Representative prior to proceeding with work.

.6 Make changes in samples which Departmental Representative may require, consistent with Contract Documents.

.7 Reviewed and accepted samples will become standard of workmanship and material against which installed work will be verified.

.8 Work affected by the sample shall not proceed until the sample is reviewed, and accepted by the Departmental Representative.

END OF SECTION

PART 1 – GENERAL

Section Includes

PART 1:

1.1 Measurement and Payment Procedures.

1.2 References.

1.3 Definitions.

1.4 Submittals.

PART 2:

2.1 Temporary Traffic Control Devices.

PART 3:

3.1 General.

3.2 Traffic Management.

3.3 Protection of Public Traffic.

1.1 Measurement and Payment Procedures

.1 Payment for the cost of Traffic Control will be made on the basis of the Price per Unit Bid for Traffic Control in the Bid and Acceptance Form. The Price per Unit Bid shall include the completion of the Traffic Management Plan, construction signage, traffic flaggers, automated traffic control devices, pilot vehicles, temporary concrete barriers and privacy fence (if required), shadow and escort vehicles (per line painting requirements), temporary gravel surfacing and shouldering (if required), detours (if required), and all other items necessary for the successful completion of the task.

.2 Measurement for Payment for completion of the Traffic Control will be made by Lump Sum based on the percentage of the work completed and accepted by the Departmental Representative.

1.2 References

.1 British Columbia Ministry of Transportation and Infrastructure.

.1 Traffic Management Manual for Work on Roadways – 2015 Office Edition (Interim).

.2 BC Supplement to TAC Geometric Design Guide (latest edition).

.2 Transportation Association Canada.

.1 Geometric Design Guide for Canadian Roads (latest edition).

1.3 Definitions

.1 Delay – The total amount of time vehicles is stopped by all flaggers or automated traffic control devices due to the Contractor's operations while driving through the limits of the work. The delay time includes the time for a vehicle to come to a stop position behind a queue of vehicles and then start moving again following a long queue of vehicles. The maximum allowable delay on this project is defined below in Subsection 3.2.1.9 – Traffic Management (15 minutes).

.2 Limits of Work – The limits of work for this project are defined as station 161+626 and station 162+740 shown on the Contract Drawings.

1.4 Submittals

.1 Traffic Management Plan

.1 Submit to the Departmental Representative for review and acceptance a Traffic Management Plan. The Traffic Management Plan shall function as a standalone document, be signed/sealed by a P.Eng or PTOE and provide a complete and unambiguous plan of the traffic accommodation strategies proposed for use during the work and incorporate the following requirements.

.1 Fully integrated with the Contactor's plan, schedule, and the accepted construction staging drawings for carrying out the work.

.2 Shall provide a complete and unambiguous plan for the traffic accommodation strategies proposed for use during the work using the allowed products, strategies, layouts, and management techniques as described in Part 2 – Products and Part 3 – Execution of this specification.

.3 Shall be in accordance with Section 3: Traffic Management Plans of the BC Ministry of Transportation and Infrastructure's Traffic Management Manual for Work on Roadways – 2015 Office Edition (Interim), excluding Sections 3.4.1 and 3.4.2.

.4 Developed and conform with the standards for Category 3 Traffic Management Plans as

defined in Section 3: Traffic Management Plans of the BC Ministry of Transportation and Infrastructure's Traffic Management Manual for Work on Roadways – 2015 Office Edition (Interim). As defined by Section 3.4.3, the Category 3 Traffic Management Plan shall be signed and sealed by a Professional Engineer who is licensed in British Columbia and qualified and experienced in traffic management.

.5 Shall at a minimum include all headings and details as provided in the Template for Category 2 and 3 Traffic Management Plans found in Appendix C: Templates for Traffic Management Plan in the BC Ministry of Transportation and Infrastructure's Traffic Management Manual for Work on Roadways – 2015 Office Edition (Interim). PWGSC has the right to reject the Traffic Management Plan if the correct headings from this document are not used by the Contractor.

.6 Shall include procedures for the review and analysis of work zone incidents and near misses per the requirements of Section 3.6 – Analysis of Work Zone Incidents and Near Misses and for the documentation of traffic control records per the requirements of Section 3.7 – Traffic Control Records as provided in the BC Ministry of Transportation and Infrastructure's Traffic Management Manual for Work on Roadways – 2015 Office Edition (Interim).

.7 Shall include traffic signage to be used on side access roads within the limits of the work.

.8 If DMS message signs are required, the messages shall be per Section 4 – Temporary Traffic Control Devices (Table 4.5 and Table 4.2) of the BC Ministry of Transportation and Infrastructure's Traffic Management Manual for Work on Roadways – 2015 Office Edition (Interim). Additional messages required or anticipated to be required on the project not provided in tables listed above shall be outlined in Traffic Management Plan.

.9 Shall include details of the procedures,

processes, and sequencing used to determine the layout of the signs in the field and the order of installation and order of removal of the signs in the field. Refer to Section 6: Traffic Control Layouts – General Instructions of the BC Ministry of Transportation and Infrastructure's Traffic Management Manual for Work on Roadways – 2015 Office Edition (Interim) for further details. At a minimum the text and figures included in Item 6.7.4 – Two-Lane, Two-Way Roadways shall be included within the Contractor's Traffic Management Plan for reference during the work (in main body of the plan or in Appendices of the plan with reference to applicable Appendix in main body of the plan). The Contractor shall customize the details of the steps for the project as required.

.2 The Contractor's Traffic Management Plan shall be submitted to the Departmental Representative as a single PDF document (multiple files will not be accepted) for review and acceptance in accordance with the procedures outlined in Section 01 33 00 – Submittal Procedures. The Departmental Representative will review the plan (first submission and if required all subsequent re-submissions) within 14 days of submission. Upon review of the plan the Departmental Representative will do one of the following:

.1 Accept the plan.

.2 Accept portions of the plan and provide comments outlining required changes or additional information in other sections. Following completion of edits by the Contractor, the Contractor shall re-submit the complete plan for review.

.3 Reject the plan and provide comments outlining required changes or additional information needed before the plan will be reviewed in detail. Following completion of edits by the Contractor, the Contractor shall re-submit the complete plan for review.

.3 The Contractor shall allow time in the schedule for the reviews, and subsequent edits / re-submission.

.4 Work affected by the Traffic Management Plan (as determined by the Departmental Representative) shall not proceed until acceptance of the Traffic Management Plan by the Departmental Representative.

.5 The review of the Traffic Management Plan by the Departmental Representative shall not relieve the Contractor of responsibility for errors or omissions in the accepted Traffic Management Plan or of responsibility for meeting all requirements of construction and Contract Documents or for ensuring safe and appropriate traffic management.

.6 Should deficiencies in the Contractor's Traffic Management Plan be noted following acceptance of the submittal by the Departmental Representative but during the project work, the Departmental Representative reserves the right to provide additional comments to the Contractor and require re-submission of the Traffic Management Plan to ensure the correction of any deficiencies.

.2 Other Submittals:

.1 Any other traffic control related documents such as incident reports, daily check sheets, daily reports, etc. shall be distributed to the Departmental Representative in electronic format via "CentralCollab" as discussed in Section 01 33 00 – Submittal Procedures of these specifications.

PART 2 – PRODUCTS

2.1 Temporary Traffic Control Devices

.1 Temporary Traffic Control Devices shall be in accordance with Section 4: Temporary Traffic Control Devices of the BC Ministry of Transportation and Infrastructure's Traffic Management Manual for Work on Roadways – 2015 Office Edition (Interim) and the following requirements.

.1 Supply and maintain two (2) portable dynamic message signs (DMS) for the duration of the work. The DMS shall have a minimum of 3 lines with 8 characters per line (minimum 450 mm character size)

.2 Unless preapproved by the Departmental Representative, where 45 cm, 70 cm, or 90 cm cones are called for by the BC Ministry of Transportation and Infrastructure's Traffic Management Manual for Work on Roadways – 2015 Office Edition (Interim), 100 cm

tubular markers shall be used.

.3 Automated Flagger Assistance Devices (AFADs) shall not be used on the project.

.2 Sign sizes used shall conform with the requirements of Appendix B.2: Sizes and Applications of Individual Signs of the BC Ministry of Transportation and Infrastructure's Traffic Management Manual for Work on Roadways – 2015 Office Edition (Interim).

PART 3 – EXECUTION

3.1 General

.1 All traffic control on the project shall be undertaken in accordance with Section 1.1.3 – Applying the Principles in the Manual as defined in the BC Ministry of Transportation and Infrastructure's Traffic Management Manual for Work on Roadways – 2015 Office Edition (Interim).

.2 Responsibilities for traffic control shall be undertaken in accordance with Section 1.2.3 – Traffic Control Responsibilities of the BC Ministry of Transportation and Infrastructure's Traffic Management Manual for Work on Roadways – 2015 Office Edition (Interim) and as follows.

.1 Road Authority shall be Public Works and Government Services Canada (PWGSC).

.2 Prime Contractor shall be the Contractor as defined by GC1.1.2 – Terminology.

.3 Management and site supervision shall be the responsibility of the Contractor including the:

.1 Site Supervisor/Foreman/Superintendent;

.2 Traffic Control Manager; and

.3 Traffic Control Supervisors and Traffic Control Persons.

.3 PWGSC will assist the Contractor with the Public Information Plan by notifying DriveBC of the work and posting notice of the project on PWGSC's permanent variable message signs along the highway. All other requirements of the Public Information Plan (Section 3.2.3 of the BC Ministry of Transportation and Infrastructure's Traffic Management Manual for Work on Roadways – 2015 Office Edition (Interim) shall be included in the Traffic Management Plan and by undertaken / implemented by the Contractor prior to

commencing work.

3.2 Traffic Management .1 Traffic management shall be undertaken in accordance with the requirements of:

.1 The reviewed and accepted Traffic Management Plan prepared by the Contractor (see Section 1.4 - Submittals).

.2 Section 2: Fundamentals of Traffic Management and Traffic Control of the BC Ministry of Transportation and Infrastructure's Traffic Management Manual for Work on Roadways – 2015 Office Edition (Interim) and as follows.

.1 Section 2.5.3 – Road Authority Acceptance shall be replaced with the requirements of Section 1.4 – Submittals within this specification.

.2 References to Ministry shall be replaced with PWGSC.

.3 Section 5: Traffic Control Persons (TCP's) of the BC Ministry of Transportation and Infrastructure's Traffic Management Manual for Work on Roadways – 2015 Office Edition (Interim).

.4 Section 6: Traffic Control Layouts – General Instructions of the BC Ministry of Transportation and Infrastructure's Traffic Management Manual for Work on Roadways – 2015 Office Edition (Interim).

.5 Section 7: Traffic Control Layouts – Two-Lane, Two-Way Roadways of the BC Ministry of Transportation and Infrastructure's Traffic Management Manual for Work on Roadways – 2015 Office Edition (Interim) and as follows.

.1 Traffic control layouts as described in the following sections shall not be used on this project.

.1 7.3 – Emergent Work (<5 Minutes) – Two-Lane, Two Way Roadway.

.2 7.4 – Brief-Duration Work (<15 Minutes) – Two-Lane, Two-Way Roadway.

.3 7.5 – Work On Shoulder – Short and Long Duration.

.4 7.6 – Work in Parking Lane – Urban Area.

.5 7.7 – Roadside Work – Encroachment into Travel Lane – Short Duration.

.6 7.9 – Lane Closure with AFADs – Short and Long Duration.

.7 7.11 – Work on Low Volume Roadway – No Centerline – Short Duration.

.8 7.12 – Work on Low-Volume Roadway – No Centerline – Long Duration.

.9 7.13 – Two-Way Left-Turn Lane Closed – Short and Long Duration.

.10 7.15 – One-Lane Bridge or Roadway – Short and Long Duration.

.2 Signage as described in Section 7.2 - Typical Construction Speed Zone Signing – Two-Lane, Two-Way Roadway shall be used on the project in conjunction with other acceptable signage/traffic control layouts as described in Section 7 and with the following revisions.

.1 Sign C-035 shall be replaced with the PWGSC supplied Government of Canada "Accelerated Infrastructure Program" signs. If not supplied by PWGSC, the "Accelerated Infrastructure Program" signs are not needed and shall be removed from the Contractor's Traffic Management Plan.

.2 If a PWGSC Government of Canada "Accelerated Infrastructure Program" (C-035) sign is used or warranted (per the criteria outline in the BC Ministry of Transportation and Infrastructure's Traffic Management Manual for Work on Roadways – 2015 Office

Edition (Interim)), The C-086-1 sign shall be replaced with C-086-2 sign.

.3 A DMS and signs C-035-C, C-035-CT, and C-082 shall be added to the signage outside the Limits of Construction in both directions. The DMS shall be positioned approximately 300 m prior to the sign C-018-2A. The signs C-035-C, C-035-CT, and C-082 shall be positioned following sign C-035 and shall be appropriately spaced within the 2 km zone provided.

.4 Any duplicate signage resulting from the use of other layouts as provided in Section 7 and the Typical Construction Speed Zone Signing layout shown in Section 7.2 shall be removed.

.3 Single lane alternating traffic temporary traffic signals as described in Section 7.10 – Lane Closure with Temporary Signals – Single Lane Alternating – Short and Long Duration can be used subject to the following.

.1 Temporary traffic signals shall only be used during non-working hours. During work hours, Traffic Control Persons and applicable signage as described in Section 7.8 – Lane Closure with TCPs – Single Lane Alternating – Short and Long Duration shall be used.

.2 Temporary traffic signals shall only be used when the distance between the temporary signals is less than or equal to 150 m and a direct line of sight is available.

.3 A stop bar from removable pavement markings shall be used in conjunction with the R-025-R sign.

.4 Pilot cars with the signage layout as described in Section 7.16 – Pilot Cars shall be used when the length of the single lane alternating traffic

exceeds 300 m or where access through the work would be otherwise dangerous. The use of pilot cars and this signage layout shall be subject to the following.

.1 Temporary traffic signals shall not replace traffic control persons.

.6 Section 14: Traffic Control Layouts – Pavement Marking of the BC Ministry of Transportation and Infrastructure's Traffic Management Manual for Work on Roadways – 2015 Office Edition (Interim). The following shall be used.

.1 Section 14: Legend, Table A, and Table B.

.2 14.1 General Information – Pavement Marking.

.3 14.7: Conventional Long-Line Centerline and White Line Marking – Two-Lane, Two-Way Roadway – Short and Long Duration.

.7 Section 15: Traffic Control Layouts – Surveying of the BC Ministry of Transportation and Infrastructure's Traffic Management Manual for Work on Roadways – 2015 Office Edition (Interim). The following are minimum requirements if the Contractor's surveyor will be on site prior to the Contractor setting up signage as per Section 7.2 of the above manual.

.1 Section 15: Legend, Table A, and Table B.

.2 15.2: Surveying on shoulder.

.3 15.3: Surveying on centerline.

.8 Maintain existing conditions for traffic throughout the period of contract except that, when required for contract construction and when measures have been taken as specified herein and reviewed by Departmental Representative to protect and control public traffic. Existing conditions for traffic may be restricted to single lane (min 5.5 m lane width) alternating traffic during completion of on-highway work including, full depth reclamation, regrading, paving, shouldering, line painting, rumble strip installation, or others works as preapproved by the Departmental Representative. Speed limit reduced during these times to 30 km/h (or 50 km/h, at the

Contractor's discretion).

.9 The maximum allowable delay to any individual motorist travelling through the project limits as a result of the Contractor's operations will be 15 minutes.

.10 Maintain traffic flow throughout the period of culvert installation. Traffic flow restrictions shall be consistent with the plan outlined on the accepted Construction Staging drawings and Traffic Management Plan. During culvert construction traffic may be restricted to single lane alternating traffic detours constructed to the following requirements.

.1 The horizontal and vertical geometrics for single lane alternating traffic shall conform with the requirements as defined in Table 01 35 00 - 01.

Table 01 35 00 - 01: Single Lane Alternating Traffic

Criteria	Value
Design Speed	30 km/h
Design Vehicle	WB-20
Max Grade	8%
Maximum Superelevation	6%
Minimum Lane Width	3.5 m
Minimum Shoulder Width (Open, width required both sides of lane)	0.5 m
Minimum Shoulder Width (Closed by Barrier, width required both sides of lane)	1.0 m

Other geometric requirements (not listed, e.g. off tracking and barrier flare requirements) shall be in conformance with the BC MoTI Supplement to TAC Geometric Design Guide (latest edition, use Low-Volume Roads Chapter when required for 30 km/h design speed), and the Transportation Association Canada Geometric Design Guide for Canadian Roads (latest edition) for a 30 km/h design speed and 3000 AADT.

.2 Maintain 3H:1V or flatter embankment or gravel side slopes on both sides of all two way or single lane traffic lanes. Should the Contractor choose to use temporary side slopes steeper than 3H:1V, temporary precast concrete barriers shall be installed.

.11 Load limit restrictions will be in accordance with British Columbia Highway Traffic Act pertaining to registered weight limits and vehicle size both within and outside Contract Limits.

.12 For sites with access roads / intersections, the following shall be used:

.1 At a minimum, a C-004 (or C-018-1A) sign shall be placed in front of a C-029 sign, followed by a C-001-1 sign (if traffic flaggers are used) or a C-027 sign (if traffic flaggers are not used). If traffic flaggers are not used, a custom sign stating "wait for pilot vehicle" (or similar) must be displayed before the C-027 sign. Depending on the traffic volumes, flaggers may be necessary at all access road intersections. The need for flaggers shall be determined on site following discussion and acceptance by the Departmental Representative.

.2 Signs should be positioned so that they do not block the sight lines of drivers entering a roadway from side roads or other access points.

.3 The maximum allowable delay to any individual motorist travelling through the project limits from an access road / intersection as a result of the Contractor's operations will be 15 minutes.

3.3 Protection of Public Traffic .1 Ensure traffic control and other measures as necessary are in place for the duration of the works to protect and accommodate public traffic as follows:

.1 Ensure that all vehicles can safely travel and traverse the entire length of the project (including detours and frontage roads) without damage to vehicles regardless of the material type placed and used as a driving surface.

.2 Protect passing vehicles from damage caused by extraneous materials from construction activities at the site.

.3 Keep travelled way and detours graded, free of pot holes, and of sufficient width for required number of

lanes of traffic.

.4 Provide well graded, signed, and maintained temporary traffic lanes and detours to facilitate passage of vehicles through limits of construction.

.5 Provide dust control, (if necessary).

.6 Complete new grade as soon as practical after disturbing existing roadway surface.

.7 Provide and maintain reasonable access to property in vicinity of work under contract and in other area as indicated, unless other reasonable means of road access exist that meet approval of Departmental Representative.

END OF SECTION

PART 1 – GENERAL

Section Includes

PART 1:

1.1 References.

1.2 Workers' Compensation Coverage.

1.3 Compliance with Regulations.

1.4 Submittals.

1.5 Contractor's Responsibility.

1.6 Health and Safety Coordinator.

1.7 General.

1.8 Project / Site Conditions.

1.9 Regulatory Requirements.

1.10 Work Permits.

1.11 Filing of Notice.

1.12 Emergency Procedures.

1.13 Hazardous Products.

1.14 Overloading.

1.15 Fire Safety Requirements.

1.16 Unforeseen Hazards.

1.17 Posted Documents.

1.18 Correction of Non-Compliance.

1.19 Medical.

1.20 Accidents and Accident Reports.

1.1 References

.1 Government of Canada:

.1 Canada Labour Code - Part II

.2 Canada Occupational Health and Safety Regulations.

.2 National Building Code of Canada (NBC):

.1 Part 8, Safety Measures at Construction and Demolition Sites.

.3 Canadian Standards Association (CSA) as amended:

.1 CSA Z797-2009 Code of Practice for Access Scaffold

.2 CSA S269.1-1975 (R2003) Falsework for Construction Purposes

.3 CSA S350-M1980 (R2003) Code of Practice for Safety in Demolition of Structures

.4 Fire Protection Engineering Services, HRSDC:

.1 FCC No. 301, Standard for Construction Operations.

.2 FCC No. 302, Standard for Welding and Cutting.

.5 American National Standards Institute (ANSI):

.1 ANSI A10.3, Operations – Safety Requirements for Powder-Actuated Fastening Systems.

.6 Province of British Columbia:

.1 Workers Compensation Act Part 3-Occupational Health and Safety.

.2 Occupational Health and Safety Regulation.

.7 Preliminary Hazard Assessment Form (Appendix A).

.8 Confirmation of Prime Contractor’s main responsibilities under WorkSafeBC Occupational Health and Safety Regulations and Worker’s Compensation Act Form (Appendix B).

1.2 Workers' Compensation Coverage

.1 Comply fully with the Workers' Compensation Act, regulations and orders made pursuant thereto, and any amendments up to the completion of the work.

.2 Maintain Workers' Compensation Board coverage during the term of the Contract, until and including the date that the Certificate of Final Completion is issued.

1.3 Compliance with Regulations

.1 PWGSC may terminate the Contract without liability to PWGSC where the Contractor, in the opinion of PWGSC, refuses to comply with a requirement of the Workers' Compensation Act or the Occupational Health and Safety Regulations.

.2 It is the Contractor's responsibility to ensure that all workers are qualified, competent and certified to perform the work as required by the Workers' Compensation Act or the Occupational Health and Safety Regulations.

1.4 Submittals

.1 The Contractor's Health and Safety Plan shall be submitted to the Departmental Representative as a single PDF document (multiple files will not be accepted) for review and acceptance in accordance with the procedures outlined in Section 01 33 00 – Submittal Procedures. The Departmental Representative will review the plan (first submission and if required all subsequent re-submissions) within 14 days of submission. Upon review of the plan the Departmental Representative will do one of the following:

.1 Accept the plan.

.2 Accept portions of the plan and provide comments outlining required changes or additional information in other sections. Following completion of edits by the Contractor, the Contractor shall re-submit the complete plan for review.

.3 Reject the plan and provide comments outlining required changes or additional information needed before the plan will be reviewed in detail. Following completion of edits by the Contractor, the Contractor shall re-submit the complete plan for review.

.2 Submit the following to the Departmental Representative in accordance with the procedures outlined in Section 01 33 00 – Submittal Procedures:

.1 Preliminary Hazard Assessment Form

(Appendix A).

.2 Confirmation of Prime Contractor's Main Responsibilities Under the WorkSafeBC Occupational Health and Safety Regulations and Worker's Compensation Act form (Appendix B).

.3 Copies of reports or directions issued by Federal and Provincial health and safety inspectors.

.4 Copies of incident and accident reports.

.5 Complete set of Material Safety Data Sheets (MSDS), and all other documentation required by Workplace Hazardous Materials Information System (WHMIS) requirements.

.6 Emergency Procedures.

.7 Medical surveillance: where prescribed by legislation, regulation or safety program, submit certification of medical surveillance for site personnel prior to commencement of work, and submit additional certifications for any new site personnel to Departmental Representative.

.3 The Contractor shall allow time in the schedule for the reviews, and subsequent edits / re-submission.

.4 Work affected by the submittal (as determined by the Departmental Representative) shall not proceed until acceptance of the submittal by the Departmental Representative.

.5 Submission of the Health and Safety Plan, and any revised version, to the Departmental Representative are for information and reference purposes only. It shall not:

.1 Be construed to imply approval by the Departmental Representative.

.2 Be interpreted as a warranty of being complete, accurate and legislatively compliant.

.3 Relieve the Contractor of his legal obligations for the provision of health and safety on the project.

.6 Should deficiencies in the Contractor's Health and Safety Plan be noted following acceptance of the submittal by the Departmental Representative but during the project work,

the Departmental Representative reserves the right to provide additional comments to the Contractor and require re-submission of the Health and Safety Plan to ensure the correction of any deficiencies.

1.5 Contractor's Responsibility

.1 Be responsible for health and safety of persons on-site, safety of property on-site and for protection of persons adjacent to site and environment to extent that they may be affected by conduct of work.

.2 Comply with and enforce compliance by employees with safety requirements of Contract documents, applicable Federal, Provincial, Territorial and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.

.3 The protection of persons off-site and the environment such that they may be affected by the conduct of the work.

1.6 Health and Safety Coordinator

.1 Employ and assign to work, a competent and authorized representative as Health and Safety Coordinator. The Health and Safety Coordinator shall:

.1 Be responsible for completing all health and safety training, site orientations, and ensuring that personnel that do not successfully complete the required training are not permitted to enter the site to perform work.

.2 Be responsible for implementing, daily enforcing, and monitoring the site-specific Health and Safety Plan.

.3 Be on-site during execution of critical elements of the work or as required by the Contractor.

.4 Have a minimum of two years site related working experience specific to activities associated with Construction.

.5 Have working knowledge of occupational safety and health regulations.

.6 Attend pre-construction and construction progress meetings as required or as requested by the Departmental Representative.

1.7 General

.1 Provide safety barricades and lights around work site as required to provide a safe working environment for workers and protection for pedestrian and vehicular traffic.

.2 Ensure that non-authorized persons are not allowed to circulate in designated construction areas of the work site.

.1 Provide appropriate means by use of barricades, fences, warning signs, traffic control personnel, and temporary lighting as required.

.2 Secure site during non-work at night time or provide security guard as deemed necessary to protect site against entry.

.3 Conduct daily safety meetings and task specific meetings (toolbox) as required by special work. At a minimum meetings shall include refresher training for existing equipment and protocols, review ongoing safety issues and protocols, and examine new site conditions as encountered. Keep records of meetings and post to CentralCollab on a weekly or more frequent basis.

1.8 Project / Site Conditions

.1 Work at the site will, at a minimum, involve contact with:

.1 Utilities.

.2 General public (including large transport trucks) and PWGSC maintenance personnel travelling the highway.

.3 Local wildlife.

.4 Unpredictable and adverse weather conditions.

1.9 Regulatory Requirements

.1 Comply with specified codes, acts, bylaws, standards and regulations to ensure safe operations at site.

.2 In event of conflict between any provisions of the above authorities, the most stringent provision will apply. Should a dispute arise in determining the most stringent requirement, the Departmental Representative will advise on the course of action to be followed.

1.10 Work Permits

.1 Obtain specialty permit(s) related to project before start of work.

1.11 Filing of Notice

.1 The Contractor is to complete and submit an Advance Notice of Project as required by the Worker's Compensation Board and any other authority in effect at the place or work.

.2 Provide copies of all notices to the Departmental Representative.

1.12 Emergency Procedures

.1 List standard operating procedures and measures to be taken in emergency situations. Include an evacuation plan and emergency contacts (i.e. names/telephone numbers) of:

.1 Designated personnel from Contractor's company.

.2 Regulatory agencies applicable to work and as per legislated regulations.

.3 Local emergency resources.

.4 Departmental Representative.

.2 Include the following provisions in the emergency procedures:

.1 Notify workers and the first-aid attendant, of the nature and location of the emergency.

.2 Evacuate all workers safely.

.3 Check and confirm the safe evacuation of all workers.

.4 Notify the fire department or other emergency responders.

.5 Notify adjacent workplaces or residences which may be affected if the risk extends beyond the workplace.

.6 Notify Departmental Representative.

.3 Provide written rescue/evacuation procedures as required for, but not limited to:

.1 Work at high angles.

.2 Work in confined spaces or where there is a risk of entrapment.

.3 Work with hazardous substances.

.4 Underground work.

.5 Work on, over, under and adjacent to water.

.6 Workplaces where there are persons who require physical assistance to be moved.

.4 Design and mark emergency exit routes to provide quick and unimpeded exit.

.5 Emergency drills must be held at least once each year for all projects lasting longer than one year. The purpose of these drills is to ensure awareness and effectiveness of emergency exit routes and procedures. A record of the drills must be kept by the Contractor.

.6 Revise and update emergency procedures as required, and re-submit to the Departmental Representative.

1.13 Hazardous Products

.1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage and disposal of hazardous materials, and regarding labeling and provision of Material Safety Data Sheets (MSDS) acceptable to the Departmental Representative and in accordance with the Canadian Labour Code.

.2 Where use of hazardous and toxic products cannot be avoided:

.1 Advise Departmental Representative beforehand of the product(s) intended for use. Submit applicable MSDS and WHMIS documents as per Section 01 33 00 – Submittal Procedures.

.2 Provide adequate means of ventilation acceptable to the Departmental Representative and suitable for the hazard.

1.14 Overloading

.1 Ensure no part of the work is subject to a load which will endanger its safety or will cause permanent deformation.

1.15 Fire Safety Requirements

.1 Store oily/paint-soaked rags, waste products, empty containers and materials subject to spontaneous combustion in ULC approved, sealed containers and remove from site on a daily basis.

.2 Handle, store, use and dispose of flammable and combustible materials in accordance with the National Fire Code of Canada.

1.16 Unforeseen Hazards

.1 Should any unforeseen or peculiar safety-related factor, hazard or condition become evident during performance of the work, immediately stop work and advise the Departmental Representative verbally and in writing.

.2 Should contaminated site conditions be encountered when completing the work, refer to GC4.4 – Contaminated Site Conditions for procedures which the Contractor shall undertake.

1.17 Posted Documents

.1 Post legible versions of the following documents on-site:

.1 Health and Safety Plan.

.2 Sequence of work.

.3 Emergency procedures.

.4 Site drawing showing project layout, locations of the first-aid station, evacuation route and marshaling station, and the emergency transportation provisions.

.5 Notice of Project.

.6 Floor plans or site plans.

.7 Notice as to where a copy of the Workers' Compensation Act and Regulations are available on the work site for review by employees and workers.

.8 Workplace Hazardous Materials Information System (WHMIS) documents.

.9 Material Safety Data Sheets (MSDS).

.10 List of names of Joint Health and Safety Committee members, or Health and Safety Representative, as applicable.

.2 Post all Material Safety Data Sheets (MSDS) on-site, in a common area, visible to all workers and in locations accessible to tenants when work of this Contract includes construction activities adjacent to occupied areas.

.3 Postings should be protected from the weather, and visible from the street or the exterior of the principal construction-site shelter provided for workers and equipment, or as approved by the Departmental Representative.

1.18 Correction of Non-compliance

.1 Immediately address health and safety non-compliance issues identified by the Departmental Representative.

.2 Provide Departmental Representative with written report of action taken to correct non-compliance with health and safety issues identified.

.3 The Departmental Representative may issue a "stop work order" if non-compliance of health and safety regulations is not corrected immediately or within posted time. The General Contractor/subcontractors will be responsible for any costs arising from such a "stop work order".

1.19 Medical

.1 Provide and maintain first aid facilities for all workers as required by the Workers' Compensation Act or the Occupational Health and Safety Regulations.

.2 Provide the appropriate first aid kit, based on the number of workers, in accordance with the Workers' Compensation Act or the Occupational Health and Safety Regulations.

.3 Establish an emergency response plan acceptable to Departmental Representative, for the removal of any injured person to medical facilities or a doctor's care in accordance with applicable legislative and regulatory requirements.

.4 Provide proof of First Aid credentials to Departmental Representative prior to the start of construction. Provide the appropriate number of first aid attendants on site in accordance with Workers' Compensation Act or the Occupational Health and Safety Regulations.

.5 Emergency and First Aid Equipment:

.1 Locate and maintain emergency and first aid equipment in appropriate location on site including first aid kit to accommodate number of site personnel; portable emergency eye wash; fire protection equipment as required by legislation.

.2 Locate sufficient; blankets and towels; stretcher; and 1 hand held emergency siren in all confined access locations.

.3 Provide a minimum of 1 qualified first aid attendant as per Workers' Compensation Act or the Occupational Health and Safety Regulations on site at all times when Work activities are in progress; duties of first aid attendant may be shared with other light duty Work related activities.

1.20 Accidents and Accident Reports

.1 Immediately report, verbally, followed by a written report within 24 hours, to Departmental Representative, all accidents of any sort arising out of or in connection with the performance of the Work, giving full details and statements of witnesses. If death or serious injuries or damages are caused, report the accident promptly to Departmental Representative by telephone in addition to any report required under federal and territorial laws and regulations.

.2 If a claim is made by anyone against Contractor or Sub-Contractor on account of any accident, promptly report the facts in writing to Departmental Representative, giving full details of the claim.

END OF SECTION

PART 1 – GENERAL

Section Includes

PART 1:

1.1 Definitions.

1.2 References.

1.3 Regulatory Overview.

1.4 Submittals.

1.5 Environmental Protection Plan (EPP).

1.6 Environmental Site Inspection Memo.

1.7 Environmental Monitoring Report.

1.8 Notification

PART 2:

2.1 Products.

PART 3:

3.1 Environmental Monitoring.

3.2 Site Access and Parking.

3.3 Protection of Work Limits.

3.4 Erosion Control.

3.5 Pollution Control.

3.6 Equipment Maintenance, Fueling, and Operation.

3.7 Operation of Equipment.

3.8 Managing of Invasive Plant Vegetation.

3.9 Fires and Fire Prevention and Control.

3.10 Wildlife.

3.11 Relics and Antiquities.

3.12 Waste Materials Storage and Removal.

3.13 Wastewater Discharge Criteria.

3.14 Camp Wastewater Discharge Criteria.

3.15 Drainage.

3.16 Site Clearing and Plant Protection.

3.17 Environmental Protection Supplies.

1.1 Definitions

.1 Environmental Pollution and Damage: presence of chemical, physical, biological elements or agents which adversely affect human health and welfare; unfavorably alter ecological balances of importance to human life; affect other species of importance to humankind; or degrade the environment aesthetically, culturally and/or historically.

.2 Environmental Protection: prevention/control of pollution and habitat or environment disruption during construction. Control of environmental pollution and damage requires consideration of land, water, and air; biological and cultural resources; and includes management of visual aesthetics; noise; solid, chemical, gaseous, and liquid waste; radiant energy and radioactive material as well as other pollutants.

.3 Wetted Perimeter: area of stream where water is currently running or pooled.

.4 In-stream Work: any work performed below the high water mark, either within or above the Wetted Perimeter of any Fisheries Sensitive Zone.

.5 Fisheries Sensitive Zone: in-stream aquatic habitats and out of stream habitat features such as side channels, wetlands, and riparian areas.

.6 Invasive plants: are any alien plant species that have the potential to pose undesirable or detrimental impacts on humans, animals or ecosystems. Invasive plants have the capacity to establish quickly and easily on both disturbed and un-disturbed sites, and can cause widespread negative economic, social and environmental impacts.

.7 Noxious weeds: are invasive plants that have been designated under the BC Weed Control Act. This legislation imposes a duty on all land occupiers to control a set list of identified invasive plants.
www.agf.gov.bc.ca/cropprot/noxious.htm

1.2 References

.1 Standards and Best Practices for Instream Works, British

Columbia Ministry of Land and Air Protection Ecosystem Standards and Planning Biodiversity Branch – March 2004 (See Reference Documentation – Table of Contents).

.2 Land Development Guidelines for the Protection of Aquatic Habitat, Fisheries and Oceans – September 1993 (See Reference Documentation – Table of Contents).

.3 Environmental Protection Plan (EPP) – Checklist (Appendix D).

.4 Responsibility Checklist For Authorizations /Approvals / Notifications / Permitting (Appendix E).

.5 Relevant Environmental Publications (Appendix F).

1.3 Regulatory Overview

.1 The Departmental Representative will complete the environmental notification / permitting required under provincial regulations (Ministry of Forests, Lands, and Natural Resource Operations (FLNRO) and or British Columbia Ministry of Environment and Climate Change Strategy (MoE)), prior to the start of the project. The Contractor shall be aware that submission of the Contractor's Environmental Protection Plan (EPP) may be required for this notification.

.2 Comply with all applicable environmental laws, regulations and requirements of Federal, Provincial, and other regional authorities, and acquire and comply with such permits, approvals and authorizations as may be required.

.3 Comply with and be subject to those permits and approvals obtained from the Departmental Representative to conduct the Work.

.4 Pay specific attention to the provincial BC Land Use Permit, Water License and Quarry Permit.

.5 Pay specific attention to the Migratory Birds Convention Act, as amended in 1994.

.6 Pay specific attention to the provincial BC guidelines under Peace Region Least Risk Timing Windows: Biological Rational (2009).

.7 Pay specific attention to provincial standards for instream works, refer to British Columbia Ministry of Land and Air Protection Ecosystem Standards and Planning Diversity Branch publication, Standard and Best Practices for Instream

Works – March 2004.

1.4 Submittals

.1 The Contractor's EPP, Environmental Site Inspection Memos, and Environmental Monitoring Report shall be submitted to the Departmental Representative. Each report/ memo shall be submitted as a single PDF documents (multiple files will not be accepted) for review and acceptance in accordance with the procedures outlined in Section 01 33 00 – Submittal Procedures. The Departmental Representative will review the EPP, Environmental Site Inspection Memos, and Environmental Monitoring Report (first submission and if required all subsequent re-submissions) within 14 days of submission. Upon review of the plan / report / memo the Departmental Representative will do one of the following:

.1 Accept the plan / report / memo.

.2 Accept portions of the plan / report / memo and provide comments outlining required changes or additional information in other sections. Following completion of edits by the Contractor, the Contractor shall re-submit the complete plan / report / memo for review.

.3 Reject the plan / report / memo and provide comments outlining required changes or additional information needed before the plan / report / memo will be reviewed in detail. Following completion of edits by the Contractor, the Contractor shall re-submit the complete plan / report / memo for review.

.2 The Contractor shall allow time in the schedule for the reviews, and subsequent edits / re-submission.

.3 Work affected by the submittal (as determined by the Departmental Representative) shall not proceed until acceptance of the EPP and Breeding Bird Nest Survey by the Departmental Representative.

.4 Upon Departmental Representative acceptance of the Contractor's EPP, the Departmental Representative may submit the EPP as part of the environmental notification / permitting process to FLNRO / MoE.

.5 The review of the EPP, Environmental Site Inspection Memos, and Environmental Monitoring Report by the Departmental Representative shall not relieve the Contractor of responsibility for errors or omissions in the accepted submittals or of responsibility for meeting all requirements of the Contract Documents.

.6 Should deficiencies in the Contractor's EPP be noted following acceptance of the submittal by the Departmental Representative but during the project work, the Departmental Representative reserves the right to provide additional comments to the Contractor and require re-submission of the EPP to ensure the correction of any deficiencies.

1.5 Environmental Protection Plan (EPP)

.1 The Contractor is required to prepare an EPP. The EPP should include and address all relevant environmental impacts/issues at the site as indicated by the EPP Checklist (Appendix D) and as identified in this Section of the specifications. The EPP will require the Contractor to carefully think through the entire project, including identifying what activities and works will be occurring, both generally and at specific sites, and by what methods. The Environmental Protection Plan shall be completed by a P.Biol or RPBio, or other qualified professional, and shall, at a minimum include the following:

.1 The specifics of a detailed monitoring program (to be completed by the contractor). This includes details and rational concerning sampling locations, timing, duration, and methods, and identification of the person(s) who will be carrying out the monitoring program. Include resumes of proposed environmental monitors and personnel responsible for the preparation of the EPP.

.2 The process and protocol for ensuring that supervisors and individual staff employed by the Contractor are very clear on which environmental standards need to be achieved, how they will be achieved, and establishing how the Contractor will ensure that this is successfully occurring.

.3 Erosion, drainage, and sediment control plan which identifies type and location of erosion and sediment controls to be provided including monitoring and reporting requirements to assure that control measures are in compliance with the requirements of the applicable provincial regulatory requirements (FLNRO / MoE) approval or notification for instream work or under FLNRO / MoE guidelines, and all other applicable regulations including the requirements of these specifications.

.4 Drawings should show locations of proposed temporary excavations or embankments for haul roads, stream crossings, material storage areas, structures, sanitary facilities, and stockpiles of any

excess or spoil materials including methods to control runoff and to contain materials on site.

.5 Work area plan showing proposed activity in each portion of area and identifying areas of limited use or non-use. Plan to include measures for marking limits of use areas including methods for protection of features to be preserved within authorized work areas.

.6 Spill Control Plan: including procedures, instructions, and reports to be used in the event of unforeseen spill of regulated substance.

.7 Non-Hazardous solid waste disposal plan identifying methods and locations for solid waste disposal including clearing debris.

.8 Contaminant prevention plan that: identifies potentially hazardous substances to be used on job site; identifies intended actions to prevent introduction of such materials into air, water, or ground; and details provisions for compliance with Federal, Provincial, and Municipal laws and regulations for storage and handling of these materials.

.9 Outline the avoidance and mitigate measures which the Contractor will undertake and implement to ensure compliance with the environmental regulations applicable to the project (which may include requirements provided in FLNRO Approval or Notifications for Instream Work, NWPA Approval for Instream Work, DFO Fisheries Act requirements etc.) and these contract specifications.

.10 The procedures for stopping the work and implementing changes to the construction methods should the Contractor not be achieving the environmental requirements as outlined in these specifications.

.11 The procedures for stopping work should the Contractor encounter archaeological anomalies or human remains.

1.6 Environmental Site Inspection Memo

.1 The Contractor shall submit an Environmental Site Inspection Memo within 3 weekdays of each site visit or week of full time site inspections. The Environmental Site Inspection Memo shall include the following:

.1 Date and times when environmental monitor onsite.

.2 General site conditions / construction activities ongoing at the time of the inspection.

.3 Findings, non-conformances with EPP, and items requiring correction by the Contractor from the environmental monitors review and inspection of environmentally sensitive activities including but not limited to:

.1 Fuel and Oil Storage and Fueling Practices

.2 Care and Maintenance of Construction Equipment

.3 Spill Response Preparedness

.4 Construction Activities and Construction Site Management

.5 Erosion and Sediment Issues

.6 Wildlife Observations/Mitigation and Sensitive Habitat

.7 Culvert/In-Stream Work

.8 Camp management

.9 Other/Comments.

.4 Photos of any concerns, non-conformances with EPP, or items requiring attention.

1.7 Environmental Monitoring Report

.1 The Contractor shall submit an Environmental Monitoring Report within 60 days of project completion. The report shall be completed for MoE / FLNRO but submitted first to the Departmental Representative for review and acceptance.

.2 The Environmental Monitoring Report shall use the recommended format as outlined in Section 8 – Monitoring and Reporting of the BC MoE Standards and Best Practices for Instream Works and summarized below as follows:

.1 Project Description: project name; site location; type of works; and person or organization undertaking the works.

.2 Site Inspections: frequency of monitoring; staff member(s) conducting the inspection; dates and times of inspection; extent of inspection; summary description of each inspection visit; and weather on the day of inspection and during the period immediately preceding the inspection.

.3 Construction Stage: a brief description of the construction activities completed; and a brief description of planned construction activities for the period following the site inspections.

.4 Mitigation Measures/Structures: recommended mitigation measures, including the maintenance of previously constructed measures, and the construction, installation or implementation of new measures; and review of previously recommended mitigation measures.

.5 Salvage Results: results of fish and amphibian salvages conducted prior to works, including, at a minimum, a specific site location, list of species, and numbers salvaged.

.6 Comments/Other: description of any incidents related to environmental issues or emergencies that occurred on the site and how they were monitored, mitigated and remediated; and description of any outstanding mitigative measures or monitoring programs needed for until the completion of site restoration.

.7 Photographs: representative date stamped photographs should be taken during each site inspection, and during and after all incidents.

1.8 Notification

.1 Departmental Representative will notify Contractor in writing of observed non-compliance with Federal, Provincial or Municipal environmental laws or regulations, permits, etc.

.2 Contractor: after receipt of such notice, shall inform Departmental Representative of proposed corrective action and take such action for approval by Departmental Representative.

.3 Departmental Representative will issue stop order of Work until satisfactory corrective action has been taken.

.4 No time extensions granted or equitable adjustments allowed to Contractor for such suspensions.

PART 2 – PRODUCTS

2.1 Products .1 Not Used.

PART 3 – EXECUTION

3.1 Environmental Monitoring .1 At a minimum the environmental monitoring shall be completed by P.Biol, RPBio, or Qualified Environmental Professional (QEP). If a QEP completes the monitoring, the QEP must work under the direction of the P.Biol or RPBio who completes the Environmental Protection Plan.

.2 The monitoring program must be anticipatory and responsive to construction practices or environmental changes, reflecting the site-specific conditions, level of sensitivity of the receiving environment, potential adverse effects, and level of environmental risk. Submitted documents regarding the proposed monitoring program should clearly identify how monitoring will adhere to this approach.

.3 The monitoring program shall satisfy all regulatory requirements and terms of these specifications. The onus is on the Contractor to monitor and ensure compliance, to identify arising problems, and to subsequently take responsibility and all necessary measures in response. At a minimum, the environmental monitor shall be onsite once every two weeks.

3.2 Site Access and Parking .1 The Contractor shall review both short and long term access requirements with the Departmental Representative, both at the start-up and on an on-going basis. In consultation with the Departmental Representative, the contractor shall formulate an agreement for worker transportation to and from the work site and where workers shall park their private vehicles. Generally, personal vehicles shall be parked at least 10 meters from any water course.

.2 The Contractor shall ensure that the environment beyond the work limits is not negatively impacted or damaged by workers' vehicles or construction machinery and shall instruct workers so that the "footprint" of the project is kept within defined boundaries.

3.3 Protection of Work Limits .1 The Contractor shall include in the EPP details on the work limits, how these shall be marked and what procedures will be employed to ensure trespass outside these limits does not occur, to the satisfaction of the Departmental Representative.

3.4 Erosion Control .1 Erosion control measures that prevent sediment from entering any waterway, water body or wetland in the vicinity of the

construction site are a critical element of the project and shall be implemented by the Contractor.

.2 If necessary, on-site sediment control measures shall be constructed and functional prior to initiating activities associated with the construction activities. The Contractor shall prepare an Erosion Control Plan, to be part of the EPP, to the satisfaction of the Departmental Representative.

.3 The regular monitoring and maintenance of all erosion control measures shall be the responsibility of the Contractor. If the design of the control measures is not functioning effectively they are to be repaired. The Departmental Representative will monitor the Contractor's erosion control performance.

.4 Erosion control measures must be in compliance with both Federal and Provincial legislation where required. Contractors should be referencing the provincial MoE Standards and Best Practices for Instream Works (2004).

3.5 Pollution Control

.1 The Contractor shall prevent any deleterious and objectionable materials from entering streams, rivers, wetlands, water bodies or watercourses that would result in damage to aquatic and riparian habitat. Hazardous or toxic products shall be stored no closer than 100 metres to any surface water.

.2 A Spill Response Plan will be prepared as part of the EPP and shall detail the containment and storage, security, handling, use and disposal of empty containers, surplus product or waste generated in the application of these products, to the satisfaction of the Departmental Representative, and in accordance with all applicable federal and provincial legislation. The EPP shall include a list of products and materials to be used or brought to the construction site that are considered or defined as hazardous or toxic to the environment. Such products include, but are not limited to, waterproofing agents, grout, cement, concrete finishing agents, hot poured rubber membrane materials, asphalt cement and sand blasting agents.

.3 The containment, storage, security, handling, use, unique spill response requirements and disposal of empty containers, surplus product or waste generated in the use of any hazardous or toxic products shall be in accordance with all applicable federal and provincial legislation. Hazardous products shall be stored no closer than 100 metres from any surface water.

.4 An impervious berm shall be constructed around fuel tanks and any other potential spill area. The berms shall be capable

of holding 110% of tank storage volumes and shall be to the satisfaction of the Departmental Representative. Measures such as collection/drip trays and berms lined with occlusive material such as plastic and a layer of sand, and double lined fuel tanks can prevent spills into the environment.

.5 The Contractor shall prevent blowing dust and debris by covering and/or providing dust control for temporary roads and on-site work such as rock drilling and blasting by methods that are approved by the Departmental Representative.

.6 The Contractor shall provide spill kits, to the satisfaction of the Departmental Representative, at refueling, lubrication and repair locations that will be capable of dealing with 110% of the largest potential spill and shall be maintained in good working order on the construction site. The Contractor and site staff shall be informed of the location of the spill response kit(s) and be trained in its use.

.7 Timely and effective actions shall be taken to stop, contain and clean-up all spills as long as the site is safe to enter. The Departmental Representative shall be notified immediately of any spill as well as the provincial authorities. Basic instructions and phone numbers shall be part of the Contractor's EPP.

.8 In the event of a major spill, the Contractor shall prioritize the cleanup and all other work shall be stopped, where appropriate, and personnel devoted to spill containment and cleanup.

.9 The costs involved in a major spill incident (control, clean up, disposal of contaminants, and site remediation to pre-spill conditions), shall be the responsibility of the Contractor. The site will be inspected to ensure completion to the pre-spill condition to the satisfaction of the Departmental Representative.

3.6 Equipment Maintenance, Fueling and Operation

.1 The Contractor shall ensure that all soil, seeds and any debris attached to construction equipment to be used on the project site shall be removed (e.g. power washing) outside before delivery to the work site.

.2 Equipment fueling sites will be identified by the Contractor to the satisfaction of the Departmental Representative. Except for chain saws, any fueling closer than 100 metres to any surface water (streams, wetlands, water bodies or watercourses) shall require discussion with the Departmental Representative. Regardless of fueling location, personnel shall maintain a presence during refueling with immediate

attention to the fueling operations.

.3 Diesel and gasoline delivery vehicles, including bulk tankers shall be not be parked within 100 metres from any surface water unless actively being used for refueling. Immediately following refueling bulk tankers shall be moved to a location 100 m or greater from any surface water. Gravity fed fuel systems are not allowed. Manual or electric pump delivery systems shall be used.

.4 Mobile fuel containers (e.g. slip tanks, small fuel carboys) shall remain in the service vehicle at all times. Protection and containment of approved fuel storage sites is addressed in Item 3.5 - Pollution Control, subsection .4 of this specification.

.5 Equipment use on the project shall be fueled with E10, and low sulphur diesel fuels where available, and shall conform to local emission requirements. The Contractor is to ensure that unnecessary idling of the vehicles is avoided.

.6 Oil changes, lubricant changes, greasing and machinery repairs shall be performed at locations satisfactory to the Departmental Representative. Waste lubrication product (e.g. oil filters, used containers, used oil, etc.) shall be secured in spill-proof containers and properly recycled or disposed of at an approved facility, No waste petroleum, lubricant products or related materials are to be discarded, buried or disposed of in borrow pits, turnouts, picnic areas, viewpoints, etc. or anywhere within the work area.

.7 The Contractor shall ensure that all equipment is inspected daily for fluid/fuel leaks and maintained in good working condition. Maintenance certificates or maintenance logs for all equipment shall be available on site during work.

.8 Fuel containers and lubricant products shall be stored only in secure locations to the satisfaction of the Departmental Representative. Fuel tanks or other potential deleterious substance containers shall be secured to ensure they are tamperproof and cannot be drained by vandals when left overnight. Alternatively, the Contractor may hire a security person employed to prevent vandalism.

3.7 Operation of Equipment

.1 Equipment movements shall be restricted to the “footprint” of the construction area. The work limits shall be identified by stake and ribbon or other methods to the satisfaction of the Departmental Representative. No machinery will enter, work in or cross over streams, rivers, wetlands, waterbodies or watercourse, nor damage aquatic and riparian habitat or trees

and plant communities. Where construction activities require working close to surface water, the Contractor is required to describe measures to be employed to ensure fugitive materials (e.g. rocks, soil, branches) and especially deleterious substances (e.g. chemicals) does not enter any surface water areas.

.2 The Contractor shall instruct workers to prevent pushing, placement, raveling, storage or stockpiling of any materials (e.g. slash, rock, fill or top soils) in the trees bordering the right-of-way or into surface water.

.3 When, in the opinion of PWGSC, negligence on the part of the Contractor results in damage or destruction of vegetation, or other environmental or aesthetic features beyond the designated work area, the Contractor shall be responsible, at his or her expense, for complete restoration including the replacement of trees, shrubs, topsoil, grass, etc. to the satisfaction of the Departmental Representative.

.4 Restrict vehicle movements to the work limits.

.5 Workers vehicles are to remain within the construction footprint.

3.8 Managing Invasive Plant Vegetation

.1 Keep equipment clean and avoid parking, turning around or staging equipment in known invasive species infested areas, or mow prior to use.

.2 Wash equipment prior to mobilization to site.

.3 Minimize unnecessary disturbance of roadside aggregates or soil, and retain desirable roadside vegetation whenever possible.

.4 Where possible, begin mowing or brushing in “invasive plant free” areas and end in infested areas.

.5 Where possible, use only clean fill material from an “invasive plant free” source.

.6 Whenever possible, re-seed with grass mixtures that are free of weeds, locally adapted, non-invasive, and quick to establish. Spread seed in the early spring or late fall to ensure successful establishment.

3.9 Fires and Fire Prevention and Control

.1 Fires or burning of waste materials is not permitted.

.2 A fire extinguisher shall be carried and available for use on each machine and at locations within the quarry in the event

of fire. Should the contractor choose to burn timber and organic materials resulting from clearing operations, firefighting equipment is required [recommended] [as follows] (e.g. a water truck; minimum 2000 Liters with 150 meters of fire hose and a pump capable of producing 300 kPa water pressure at the nozzle, three shovels, two Pulaski's, and two 20 liter backpack pumps) shall be maintained at the construction site at a location known and easily accessible to all Contractors' staff. The Contactor's staff shall receive basic training in early response to wildfire events during the "environmental briefing" presented by the Contractor.

.3 Construction equipment shall be operated in a manner and with all original manufacturers' safety devices to prevent ignition of flammable materials in the area.

.4 Care shall be taken while smoking on the construction site to ensure that the accidental ignition of any flammable material is prevented.

.5 In case of fire, the Contractor or worker shall take immediate action to extinguish the fire provided it is safe to do so. The Departmental Representative shall be notified of any fire immediately as well as the applicable Provincial Authorities. Basic instruction and phone numbers will be provided on site by the Contractor and will be discussed in the project pre-construction meeting.

.6 Where fires or burning is permitted, prevent staining or smoke damage to structures, materials or vegetation which is to be preserved. Restore, clean and return to new condition stained or damaged Work.

.7 Provide supervision, attendance and fire protection measures as directed by the Departmental Representative or other authorities.

3.10 Wildlife

.1 Avoid or terminate activities on site that attract or disturb wildlife and vacate the area and stay away from bears, cougars, wolves, elk, moose, or bison, or other animals that display aggressive behavior or persistent intrusion. Extra care to control materials that might attract wildlife (e.g. lunches and food scraps) must be exercised at all times.

.2 Notify the Departmental Representative immediately about dens, litters, nests. Carcasses (road kills), bear activity or encounters on or around the site or crew accommodations. Other wildlife related encounters are to be reported within 24 hours.

3.11 Relics and Antiquities	.1	Artifacts, relics, antiquities, and items of historical interest such as cornerstones, commemorative plaques, inscribed tablets and any objects found on the work site that may be considered artifacts shall be reported to the Departmental Representative immediately. The Contractor and workers shall wait for instruction before proceeding with their work.
	.2	All historical or archaeological objects found in the rock quarry are protected under federal and provincial Acts and regulations. The Contractor and workers shall protect any articles found and request direction from the Departmental Representative.
	.3	Human remains must be reported immediately to the local RCMP.
3.12 Waste Materials Storage and Removal	.1	The Contractor and workers shall dispose of hazardous wastes in conformance with the applicable federal and provincial regulations and should be part of the EPP. All waste materials shall be disposed of at a disposal facility acceptable to the Departmental Representative. No waste materials shall be buried onsite.
	.2	All wastes originating from construction, trade, hazardous and domestic sources, shall not be mixed, but will be kept separate.
	.3	Construction, trade, hazardous waste and domestic waste materials shall not be burned, buried, or discarded at the construction site. These wastes shall be contained and removed in a timely and approved manner by the Contractor and workers, and disposed of at an appropriate waste landfill site located outside the work area.
	.4	A concerted effort shall be made by the Contractor and workers to reduce, reuse and recycle materials where possible.
	.5	Sanitary facilities, such as portable container toilets, shall be provided by the Contractor and maintained in a clean condition.
3.13 Wastewater Discharge Criteria	.1	Wash water, meltwater collection, rinse water resulting from the cleaning of fuel tanks and pipelines, contaminated groundwater, and/or any other liquid effluent stream will be released onto the ground at a location that is a minimum of 30 metres from natural drainage courses and 100 metres from fish bearing waters, and will conform to the discharge requirements set out in the provincial Water Act Permit:
	.2	Contractor must obtain approval from the provincial Water

Act Officer prior to discharging any treated wastewater.

3.14 Camp Wastewater Discharge Criteria

.1 Camp wastewater will be released onto the ground at a location that is a minimum of 30 metres from natural drainage courses and 100 metres from fish bearing waters and conform to the discharge requirements set out in the provincial Water Act Permit.

.2 If unable to meet the discharge criteria, provide additional storage and/or treatment necessary to meet criteria prior to discharge.

.3 Treat all camp wastewater to conform to the discharge requirements set out in the Water Act Permit.

.4 No direct discharge is allowed to wetland or surface waters.

.5 Contractor must obtain approval from the Water Act Officer prior to discharging treated wastewater.

3.15 Drainage

.1 Provide temporary drainage and pumping as necessary to keep excavations and site free from water. Drainage plans shall be part of the EPP.

.2 Do not pump water containing suspended materials into waterways, sewer or drainage systems.

.3 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authority requirements such as the provincial Water Act.

.4 Provide an erosion and sediment control plan that identifies type and location of erosion and sediment controls to be provided. Plan to include monitoring and reporting requirements to assure that control measures are in compliance with erosion and sediment control plan, Federal, Provincial, and Municipal laws and regulations.

.5 As part of the EPP, submit details of proposed erosion, sediment and drainage control to Departmental Representative for review and approval prior to commencing Work in fisheries sensitive areas or in areas that may affect fisheries sensitive areas and specifically address the protection of water bodies, water courses, and the following:

.1 Details of grading Work to prevent surface drainage into or out of Work areas.

.2 Details of erosion control works and materials to be used, including the deployment of silt fencing,

floating silt curtains and containment booms during construction and excavation activities.

.3 Work schedule including the sequence and duration of all related Work activities.

.4 The treatment of site runoff to prevent siltation of watercourses.

.5 Dewatering procedures for excavated materials including silt removal procedures prior to discharge.

.6 Stabilizing procedures during excavation.

.7 Maintenance of filters and sedimentation traps.

.6 Any dewatering activities will be released onto the ground at a location that is a minimum of 30 metres from natural drainage courses and 100 metres from fish bearing waters.

.7 Have on hand sufficient pumping equipment, machinery, and tankage in good working condition for ordinary emergencies, including power outage, and competent workers for operation of pumping equipment.

3.16 Site Clearing and Plant Protection

.1 Protect trees and plants on site and adjacent properties where indicated.

.2 Wrap in burlap, trees and shrubs adjacent to construction Work, storage areas and trucking lanes, and encase with protective wood framework from grade level to height of 2 m.

.3 Protect roots of designated trees to dripline during excavation and site grading to prevent disturbance or damage. Avoid unnecessary traffic, dumping and storage of materials over root zones.

.4 Minimize stripping of topsoil and vegetation.

.5 Restrict tree removal to areas indicated or designated by Departmental Representative and shown on Contract Drawings.

3.17 Environment Protection Supplies

.1 Comply with federal and provincial fisheries and environmental protection legislation, including preventing the loss or destruction of fish habitat, and minimizing the impact of sedimentation, siltation or otherwise causing a degradation in water quality.

.2 Provide a minimum of 30 m or more and as required of

polypropylene silt fence (typical height of 0.9 m) and the necessary stakes for installation. This will be used as necessary to prevent sediment transport into water bodies.

.3 Provide a minimum of 50 lineal metres or more and as required of 200 mm diameter hydrophobic, sorbent booms. This will be used as necessary to prevent the migration of hydrocarbons.

.4 Supply, transport, install and maintain erosion, sediment and drainage controls necessary to complete the Work in accordance with the requirements of Departmental Representative.

.5 At the completion of construction, leave silt fence(s) in place if requested by the Departmental Representative.

.6 Unused Erosion, Sediment and Drainage Control supplies will remain the property of Departmental Representative until the completion of the Contract.

.7 Provide inventory of environmental protection supplies prior to mobilization.

END OF SECTION

PART 1 – GENERAL

Section Includes

PART 1:

1.1 Measurement and Payment Procedures.

1.2 References.

1.3 Definitions.

1.4 Responsibilities.

1.5 General.

1.6 Submittals.

1.7 Quality Management Plan.

1.8 Quality Control Personnel.

1.9 QC Documentation and Submittal to Departmental Representative.

1.10 QC Testing.

1.11 Non-Conformance Reports.

1.12 Departmental Representative Inspection and Audits.

1.1 Measurement and Payment Procedures

.1 Payment for Quality Management will be made on the basis of the Price per Unit Bid for Quality Management in the Bid and Acceptance Form. The Price per Unit Bid shall include all costs for the completion and adherence to the Quality Management Plan including Quality Control and all other items necessary for successful completion of the work.

.2 Measurement for Payment for Quality Management will be made by Lump Sum based on the percentage of the work completed and accepted by the Departmental Representative provided all the associated Quality Management Requirements have been achieved with respect to check sheets, testing frequency, documentation and reporting, staffing etc.

1.2 References

.1 British Columbia MoTI – 2016 Standard Specifications for Highway Construction (or latest edition).

.2 American Society for Testing and Materials (ASTM), latest edition.

.1 ASTM C136, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

.2 ASTM D5519, Standard Test Methods for Particle Size Analysis of Natural and Man-Made Riprap Materials.

.3 ASTM D698, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3)).

.4 ASTM C143, Standard Test Method for Slump of Hydraulic-Cement Concrete.

.5 ASTM C173, Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.

.6 ASTM C39, Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.

.7 ASTM C117, Standard Test Method for Materials Finer than 75-µm (No. 200) Sieve in Mineral Aggregates by Washing.

.8 ASTM D5821, Standard Test Method for Determining the Percentage of Fractured Particles in Coarse Aggregate.

.9 ASTM C127, Standard Test Method for Relative Density (Specific Gravity) and Absorption of Coarse Aggregate.

.10 ASTM C142, Standard Test Method Clay Lumps and Friable Particles in Aggregates.

.11 ASTM D6928, Standard Test Method for Resistance of Coarse Aggregate to Degradation by Abrasion in the Micro-Deval Apparatus.

.12 ASTM D4791, Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.

.13 ASTM D4318, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

.14 ASTM D2419, Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate.

.15 ASTM C566, Standard Test Methods for Total Evaporable Moisture Content of Aggregate by Drying.

.16 ASTM D2216, Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass.

.17 ASTM D5581 - Standard Test Method for Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus (6 inch-Diameter Specimen).

.18 ASTM D6307, Standard Test Method for Asphalt Content of Asphalt Mixture by Ignition Method.

.19 ASTM D5 / D5M, Standard Test Method for Penetration of Bituminous Materials.

.20 ASTM D2171, Standard Test Method for Viscosity of Asphalts by Vacuum Capillary Viscometer.

.21 ASTM D2726, Standard Test Method for Bulk Specific Gravity and Density of Non-Absorptive Compacted Bituminous Mixtures.

.22 ASTM D6938, Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

.3 American Association of State Highway and Transportation Officials (AASHTO), latest edition.

.1 AASHTO T 245, Standard Method of Test for Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus.

.2 AASHTO T 304, Standard Method of Test for Uncompacted Void Content of Fine Aggregate.

1.3 Definitions

.1 Quality Control (QC): The process of independently checking specific product or services to determine if they comply with the contract documents and relevant quality standards and identifying ways to eliminate causes of unsatisfactory product or service performance.

.2 Quality Assurance (QA): The process of ensuring that the Contractor's Quality Management Plan (QMP) (QC, non-conformances, etc.) are being followed. The results of the

QA are provided as feedback to the QC team. Where required the Contractor shall implement changes to the project based on the feedback received from the QA process.

.3 Quality Management Plan (QMP): The complete details of the Contractor's plans and processes to ensure quality on the project.

.4 Deficiency / Non-conformance: Work or product failing to meet the conditions or requirements of the contract (general conditions, specifications, drawings, or other section(s) forming the project contract).

1.4 Responsibilities

.1 The quality management responsibilities for this project are as follows:

.1 Quality Control: The Contractor's responsibility.

.2 Quality Assurance: The Departmental Representative's responsibility.

.3 Quality Management Plan: Prepared by the Contractor.

.4 Non-Conformance Reports: Prepared by the Contractor's QC team in conjunction with the Contractor and if necessary the Departmental Representative.

1.5 General

.1 The Contractor shall be responsible for ensuring the product meets the contractual quality requirements and that Quality Control measuring and documenting the quality of the work is completed by qualified personnel independent from the Contractor's organization. Quality Control work includes monitoring, inspecting, testing, and documenting the means, methods, materials, workmanship, processes and products of all aspects of the work as necessary to ensure conformance with the Contract.

.2 The Contractor shall provide unrestricted access to all Quality Control operations and documentation produced by or on behalf of the Contractor and shall allow the Departmental Representative full access at any time during working hours.

.3 The Departmental Representative will review the Contractor's performance of the work and determine the acceptability of the work based on the Departmental Representative's Quality Assurance results and, where deemed appropriate by the Departmental Representative,

supplemented by the Contractor's Quality Control results. If needed, the Departmental Representative may request further testing.

.4 Work failing to meet the conditions of the Contract shall be considered a non-conformance. A non-conformance report will then be issued by the Contractor's Quality Manager. Non-conforming work shall be removed / replaced from the work unless an exception to the contract documents is accepted by the Owner.

.5 The Contractor shall not be entitled to payment for work that lacks the appropriate Quality Control documentation, verified by the Quality Control Manager, as required by the Contract or is subject to an unresolved NCR.

.6 The Contractor shall implement a well-coordinated approach to all operations related to the work and will organize its team and operations in keeping with the goal of doing things right the first time.

1.6 Submittals

.1 The Contractor's Quality Management Plan shall be submitted to the Departmental Representative as a single PDF document (multiple files will not be accepted) for review and acceptance in accordance with the procedures outlined in Section 01 33 00 – Submittal Procedures. The Departmental Representative will review the plan (first submission and if required all subsequent re-submissions) within 14 days of submission. Upon review of the plan the Departmental Representative will do one of the following:

.1 Accept the plan.

.2 Accept portions of the plan and provide comments outlining required changes or additional information in other sections. Following completion of edits by the Contractor, re-submit the complete plan for review.

.3 Reject the plan and provide comments outlining required changes or additional information needed before the plan will be reviewed in detail. Following completion of edits by the Contractor, re-submit the complete plan for review.

.2 The Contractor shall allow time in the schedule for the reviews, and subsequent edits / re-submission.

.3 No work shall be undertaken on any element of Project Work (including payments, incidental work, or submittals for

review) for which the applicable portions of the Quality Management Plan have not been accepted by the Departmental Representative.

.4 The review of the Quality Management Plan by the Departmental Representative shall not relieve the Contractor of responsibility for errors or omissions in the accepted Quality Management Plan or of responsibility for meeting all requirements of the Contract Documents.

.5 Should deficiencies in the Contractor's Quality Management Plan be noted following acceptance of the submittal by the Departmental Representative but during the project work, the Departmental Representative reserves the right to provide additional comments to the Contractor and require re-submission of the Quality Management Plan to ensure the correction of any deficiencies.

1.7 Quality Management Plan

.1 The Contractor shall prepare a Quality Management Plan. The purpose of the plan is to ensure the performance of the work in accordance with Contract requirements.

.2 The Quality Management Plan is required to cover the work in its entirety, including without limitation all materials the Contractor and Subcontractors are supplying, monitoring and testing of the construction, documentation, and all items and phases of construction on the Project. At a minimum this shall include:

.1 Procedures for verifying and documenting conformance of the work to the contract requirements including but not limited to review of the work and completion of check sheets and daily reports.

.2 Procedure for immediately notifying the Contactor's management so work can be stopped and corrective action taken when material, product, processes or submittals are deficient or non-compliant with the contract requirements.

.3 List of the testing and survey checks, including minimum frequencies, to be completed by the Contractor (e.g. compaction, concrete, aggregate gradation, and tolerances of the work completed).

.4 The environmental monitoring and reporting procedures to assure that the Environmental Monitoring and all work is being completed in compliance with the requirements of the EPP and all

other applicable regulations including the requirements of these specifications.

.5 All forms to be filled in by the Quality Control Personnel (ex. check sheets, test forms, daily reports, NCR's, etc.).

.6 Procedures for the review of the project submissions by the QC Manager and Contractor to ensure accuracy and completeness of each submission against the project / specification requirements by the Contractor prior to submission to the Departmental Representative for review approval.

.7 Resumes of Quality Control Manager and designated replacement (if applicable) detailing the Quality Control Manager(s) past experience performing similar roles on similar projects.

.8 Details of the anticipated work schedule (onsite and breaks) for the Quality Control Manager and designate replacement Quality Control Manager.

.9 Survey procedures undertaken to monitor for movement in the existing highway driving surface during construction.

.10 Details (including frequencies) and records of the calibration and correlation of testing equipment (plant sensors, lab equipment, nuclear/density gauges, etc.) which have been undertaken or will be undertaken during the work.

.11 Details of the QC procedures and processes which will be undertaken during the preparation of the Mix design(s).

.12 Details of the asphalt plant mixing procedures (cold feed, sampling, AC flow rate, temperature control, records, weigh scale, etc.).

.13 Details of the professional standards for asphalt placement including joints, placing temperature, rolling procedures, etc., which will be undertaken to help ensure the quality standards on the project will be achieved.

.14 Details of the procedure which will be undertaken by the Contractor to ensure that all workers are familiar with the Quality Management Plan, its

goals, and their role under it, as well as the Contract Specifications associated with the work they are to undertake.

.15 The Quality Management Plan should describe how the Quality Control Personnel are allocated to Project requirements, the tasks assigned to each, and how their work will be coordinated.

.3 The Quality Management Plan will include the following information:

.1 The name of the Quality Control Manager, including designated replacement (if applicable), and details of their qualifications establishing a proven capability to provide the specific services required for the Project.

.2 The name of Quality Control testing agencies and details of their qualifications and relevant experience to provide the specific services required for the Project.

.3 A listing of Quality Control Staff (including names, qualifications and relevant experience) and their assigned roles and work scheduling in performing Quality Control duties.

.4 A list of testing equipment to be used for the work.

.4 The Contractor shall ensure that all workers are familiar with the Quality Management Plan, its goals, and their role under it, as well as the Contract Specifications associated with the work they are to undertake.

.5 The Quality Management Plan shall be reviewed and signed by QC Manager prior to submission to the Departmental Representative for review. The QC Manager's signature shall also include a note indicating the that the Quality Management Plan is complete and conforms with project's requirements for QC as noted in the Contract Specifications and any additional QC requirements that the Contractor may have for the project prior to submission to the Departmental Representative for review.

1.8 Quality Control Personnel .1 The Contractor shall appoint qualified, and experienced Quality Control Personnel (Quality Control Manager and Quality Control Staff as necessary to complete required QC workload), who are dedicated to quality matters, and independent from the Contractor's organization. The

Quality Control Manager and Quality Control Staff will report regularly to the Contractor's management and report on the Contractor's conformance with the quality requirements on the project.

.2 The Contractor shall designate one person as the Quality Control Manager and if needed one person as the designate replacement Quality Control Manager (when the Quality Control Manager is offsite on a break) who shall be responsible for the implementation of the QC Plan. The Quality Control Manager and designate replacement Quality Control Manager shall be a qualified Professional Engineer, Certified Engineering Technician, or Applied Science Technologist, or other person with knowledge, skills and abilities acceptable to the Departmental Representative.

.3 The Quality Control Manager, or a designated replacement Quality Control Manager, shall remain on site at all times the Contractor is performing work which must be tested or inspected in-process, and must be readily accessible and able to return when off-site. Unless preapproved by the Departmental Representative, the Quality Control Manager shall only be replaced by the designate replacement Quality Control Manager during scheduled breaks as outlined in the Quality Control Plan.

.4 At a minimum the Quality Control Manager shall:

.1 Be responsible to measure conformance of the work with the contract requirements and ensure that quality is not being compromised by production measures.

.2 Be empowered by the Contractor to resolve Quality Control matters.

.3 Direct and monitor Quality Control work completed by Quality Control testing agencies and Quality Control Staff.

.4 Review, sign, and be responsible for all reports (material and testing results).

.5 Immediately notify the Contactor's management so work can be stopped and corrective action taken when material, product, processes or submittals are deficient or non-compliant with the contract requirements.

.6 Complete internal Non-conformance Reports

(NCR's).

.7 Respond to NCR's issued by the Departmental Representative.

.8 Attend pre-construction and construction progress meetings.

.5 PWGSC reserves the right to reject one or more of the Contractor's Quality Control Personnel and require the Contractor to find alternative Quality Control Personnel prior to or during the work should the Quality Control Personnel not have the necessary qualifications as listed in this specification or not provide quality control services as required by this specification during the work. Should Quality Control Personnel be rejected, any work which cannot undergo complete quality control as outlined in these specifications shall stop while the Contractor finds replacement Quality Control Personnel.

1.9 QC Documentation and Submittal to Departmental Representative

.1 Check sheets:

.1 Check sheets to verify and document conformance of the work to the quality requirements of the contract are fundamental to the QC process. The check sheets prepared as part of the Quality Management Plan shall include all components of the project work and all checks required to ensure the components of the work are completed in conformance with the requirements of the Contract Documents.

.2 The frequency of check sheets completed by the Quality Control Staff to verify and document conformance of the work to the quality requirements of the contract shall be established by the Quality Control Manager to ensure the quality of the work is thoroughly documented. At a minimum, the frequency of check sheets shall achieve the following [most stringent of]:

.1 Daily (relative to the work being performed).

.2 Daily QC reports:

.1 Daily Reports shall be completed by the Quality Control Manager each day work in being completed requiring QC.

.2 The Daily Report shall include a list of the QC

activities completed that day (checks sheets and tests) and note any concerns with respect to quality, all non-conformances identified by the Quality Control Personnel (even when immediately corrected by the Contractor), and all Non-conformance Reports issued by the Quality Control Manager.

.3 The Daily Report shall include photos of any QC concerns or non-conformances identified by the Quality Control Personnel.

.3 All check sheets and daily reports shall be reviewed and signed by the Quality Control Manager prior to submission to the Departmental Representative.

.4 Check sheets, daily reports, NCR's, test results, and other documents and forms prepared as part of the Quality Management Plan and completed throughout the project to verify conformance with the contract requirements shall be distributed to the Departmental Representative in electronic format via PWGSC's cloud based document filing system "CentralCollab" within 24 hrs. of the completion. Submit to the Departmental Representative hard copies of the same documents, forms, and test results if requested.

1.10 QC Testing

.1 Testing required to provide Quality Control to assure that the work strictly complies with the Contract requirements shall be completed by the Contractor using a fully equipped, operational, and staffed onsite field laboratory (except for tests noted otherwise in Table 01 45 00 – 01) during times of construction activity and gravel manufacturing and at a minimum include:

.1 All testing required to confirm aggregate properties, aggregate gradation, compaction and asphalt mix properties where specified.

.2 All testing specified in the Contract Documents.

.3 Any other testing required as a condition for deviation from the specified Contract procedures.

.2 At a minimum the Contractor shall achieve the most stringent Quality Control testing and inspection frequencies as follows:

.1 The specific frequencies defined elsewhere in these specifications.

.2 The minimum QC testing and inspection frequencies as defined in Table 01 45 00 – 01.

Table 01 45 00 - 01: Minimum QC Testing and Inspection Frequencies

Activity	Test / Inspection	Frequency
Manufacture – Crushed Base Gravel, Crushed Surfacing Gravel, Gravel Shouldering, Culvert Bedding, Culvert Crushed Base Gravel	ASTM C136, Sieve Analysis of Fine and Coarse Aggregates	The more stringent of: 1 test per 3000 m^3 or 1 test for every two (2) hours of manufacturing.
Gradation – Sub-base Course Gravel	ASTM C136, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates	Three per source at the discretion of the Departmental Representative
Gradation – Highway Embankment	ASTM C136, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates	Once per source at the discretion of the Departmental Representative
Screening / sorting riprap	ASTM D5519, Particle Size Analysis of Natural and Man-Made Riprap Materials	1 Test per every 1 day of production
Placement / Site Tolerance – Gravel Shouldering	Survey	2 points every 20 Stations on each side of road
Placement / Site Tolerance – Culvert Bedding, & Culvert Crushed Base Gravel	Survey	1 point every 2 m^2 of placed material.
Placement / Site Tolerance – Crushed Base Gravel	Survey	Final lift , 5 points Along Each Cross Section at 20 m Stations
Manufacture – Precast Concrete Barrier	ASTM C143, Test Method for Slump of Hydraulic-Cement Concrete ASTM C173, Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method	As per CSA Certified Manufacturing Plant QC Requirements
Manufacture – Precast Concrete Barrier	Compressive Strength Tests	As per CSA Certified Manufacturing Plant QC Requirements
Manufacture – Asphalt Aggregate	ASTM C-136, Dry Sieve Analysis of Aggregate or C117 Sieve Analysis by Washing	- Split Stockpile: 1 for each stockpile for every 2 hours of production. - One main stockpile: for every 300t - Blend Sand: 1 for every 100t during stockpiling. - Natural filler: 1 for every 50t during stockpiling
Manufacture – Asphalt Aggregate	ASTM D-5821 Determining the Percentage of Fracture Particles in Coarse Aggregate	Every second coarse aggregate sieve test

Manufacture – Asphalt Aggregate	ASTM C-117 Sieve Analysis of Aggregates by Washing (Field Lab)	1 per shift on reduced sample obtained from combined samples from the crusher
Manufacture – Asphalt Aggregate	ASTM C-136, Dry Sieve Analysis of Aggregate	1 of combined aggregate (off the belt) every 300t
Manufacture – Asphalt Aggregate (Coarse Aggregates)	ASTM C127, Relative Density (Specific Gravity) and Absorption of Coarse Aggregate (1)	The more stringent of: - 1 for each coarse aggregate gravel pit source - 1 for any change in nature or source of aggregates within a gravel pit
Manufacture – Asphalt Aggregate (Coarse Aggregates)	ASTM C142, Clay Lumps and Friable Particles in Aggregates (1)	1 per every 3,000t of coarse aggregate manufactured
Manufacture – Asphalt Aggregate (Coarse Aggregates)	ASTM D6928, Resistance of Coarse Aggregate to Degradation by Abrasion in the Micro-Deval Apparatus (1)	The more stringent of: - 1 for each coarse aggregate gravel pit source - 1 for any change in nature or source of aggregates within a gravel pit
Manufacture – Asphalt Aggregate (Coarse Aggregates)	ASTM D4791, Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate (1)	The more stringent of: - 1 for each coarse aggregate gravel pit source - 1 for any change in nature or source of aggregates within a gravel pit
Asphalt Products Test	Asphalt Tack Coat and Asphalt Prime	Contractor's option
Tests During Asphalt Plant Mixing	ASTM C-566 & D2216, Moisture Content	Aggregate: 2 tests/Lot Asphalt Mix: 1 on first Sub-lot and every second day.
Tests During Asphalt Plant Mixing	ASTM C-117 Sieve Analysis of Aggregates by Washing (Field Lab)	1 per shift on reduced sample obtained from combined samples from the plant cold feed.
Tests During Asphalt Plant Mixing	ASTM D-5581, Resistance to Plastic Flow Using Marshall Apparatus	One set of three briquettes for 1,200t or Lot, whichever is less
Tests During Asphalt Plant Mixing	Asphalt Extraction Test ASTM D-6307 Ignition Method	One per Lot
Tests During Asphalt Plant Mixing	Penetration of Bituminous Materials ASTM D -5	One per Manufacturer's Batch. Samples should be taken every 3000t of mix production
Tests During Asphalt Plant Mixing	Viscosity ASTM D-2171	Contractor's Option
Test Following Asphalt Paving for Density Testing	ASTM D2726, Standard Test Method for Bulk Specific Gravity and Density of Non-Absorptive Compacted Bituminous Mixtures (Core Samples)	At start, two (2) cores for each Sub-Lot. After rolling pattern established, only one core for each Sub-Lot. All cores to be a minimum of 100 mm diameter.

Test During Asphalt Paving for Density Testing	AASHTO T 245-97 Resistance to Plastic Flow Using Marshall Apparatus	One 15 kg sample for every sub-lot or minimum 1/day for field testing.
Compaction of Common Fill	In-Place Density, Proof Roll	Proof roll over full width and length of each lift of materials placed.
Compaction of Granular Base, Sub-base, Crushed Surfacing Gravel, and Gravel shouldering	In-Place Density (ASTM D6938)	3 randomly located tests over the full width of material placed every 20 m station, per each lift of material placed.
Compaction – Culvert Bedding Material	In-Place Density (ASTM D6938)	4 randomly located tests over the full length of the culvert per each lift of material placed if using open cut method

.2 As defined in the BC MoTI 2016 Standard Specifications for Highway Construction (Volumes 1 and 2, and applicable Amendments available at time of tender closing). Should one of these specifications be silent on a particular testing frequency the testing frequencies shall be as defined in the Alberta Transportation Standard Specification for Highway Construction (latest edition and applicable Amendments available at time of tender closing). Wherever these standard specifications refer to standards (e.g. CSA, ASTM, and others) the minimum testing frequencies in these standards shall be utilized.

.3 One test per each individual area / location the material is utilized.

.3 Quality Control Testing agencies, their inspectors, and their representatives are not authorized to revoke, alter, relax, or release any requirement of the Contract Documents, nor to approve or accept any part of the work.

.4 The Contractor shall complete testing in the following manner:

.1 Provide testing facilities and personnel for the tests and inform the Departmental Representative in advance to enable the Departmental Representative to witness the tests if so desired. Onsite testing laboratories to conform to 1.10.1 – QC Testing of this specification.

.2 Notify the Departmental Representative when sampling will be conducted.

.3 Within 24 hrs. of the completion of a test and prior to transport or placement of material, submit the test result to the Departmental Representative (hard copy if requested) and in electronic format via PWGSC's cloud based document system "CentralCollab".

.4 Identify test reports with the name and address of the organization performing all tests, and the date of the tests.

.5 Immediately after completion of tests, provide all test results on Contractor-supplied forms acceptable to the Departmental Representative or on forms used by the BC Ministry of Transportation and Infrastructure.

.6 Initiate other Quality Control tests or procedures as necessary for ensuring production of a quality product and include them in the Quality Control Plan. Tests or procedures may also be introduced after the start of work as necessary as amendments to the Quality Control Plan.

.7 Repair and fill all core holes created to collected quality control core samples as per the requirements of 1.4.8 of Section 32 12 16 – Hot Mix Asphalt Concrete Pavement.

1.11 Non-Conformance Reports

.1 The Contractor shall, and the Departmental Representative may review, the work to determine conformance with the contract requirements.

.2 Should the Contractor's Quality Control reporting indicate that the work, product, or methodology is not in conformance, the Quality Control Manager shall:

.1 Inform the Contractor of the deficiency. The Contractor shall then take appropriate action to correct the deficiency.

.2 Ensure that the action taken by the Contractor corrected the deficiency and any substandard product was eliminated from the work. If the deficiency was not corrected and substandard product remains or becomes part of the work, an internal Non-Conformance Report (NCR) shall be issued to the Contractor, with a copy to the Departmental Representative. Included as part of the NCR will be a required response time.

The Contractor shall then respond to the NCR (within the specified response time) by notifying the Quality Control Manager and the Departmental Representative of the proposed resolutions and corrective actions. The Contractor and/or the Quality Control Manager may consult with the Departmental Representative on the resolutions but is not required to do so.

Payment for the work for which the NCR has been issued may be withheld until the NCR issue is resolved.

.3 Should the Contractor's Quality Control reporting indicate that an aspect of the Contractor's work is continually deficient, the Quality Control Manager shall issue an internal procedural Non-Conformance Report (NCR) to the Contractor, with a copy to the Departmental Representative. Included as part of the NCR will be a required response time.

The Contractor shall then respond to the NCR (within the specified response time) by notifying the Quality Control Manager and the Departmental Representative of the proposed resolutions and corrective actions. The Contractor and/or the Quality Control Manager may consult with the Departmental Representative on the resolutions but is not required to do so.

Payment for the work for which the NCR has been issued may be withheld until the NCR issue is resolved.

.4 Should the Departmental Representative Quality Assurance reporting indicate that the work is not in conformance, the Departmental Representative will issue to the Contractor a NCR with a required response time.

The Contractor shall then respond to that NCR, within the specified response time, with proposed resolutions and corrective actions. The Departmental Representative will accept or reject the proposed resolution and corrective action proposal. If the proposed resolution is rejected by the Departmental Representative, the Contractor shall resubmit with an alternative response until a solution acceptable to the Departmental Representative is found.

Quality Assurance testing and inspection may be performed by the Departmental Representative to determine if the corrective action has provided an acceptable product. Acceptance and rejection will continue until the

Departmental Representative determines that a quality product has been achieved.

Payment for the work for which the NCR has been issued may be withheld until the NCR issue is resolved.

.5 If in the opinion of the Departmental Representative it is not viable to correct non-conforming work or work not performed in accordance with Contract Documents, the Departmental Representative may deduct from the Contract Price the difference in value between work performed and that called for by Contract Documents, the amount of which shall be determined by the Departmental Representative.

1.13 Departmental Representative Inspection and Audits

.1 The Departmental Representative may perform quality assurance audits as desired. Such audits will not relax the responsibility of the Contractor to perform work in accordance with Contract Documents.

.2 Allow the Departmental Representative access to work. If part of the work is in preparation at locations other than the place of work, allow access to such work whenever it is in progress.

.3 If Contractor covers, or permits to be covered, work that has been designated for Quality Assurance testing, inspections, or approvals before such is made, uncover such work, have inspections or tests satisfactorily completed, and make good such work.

.4 Independent Inspection/Testing Agencies may be engaged by the Departmental Representative for the purpose of Quality Assurance inspection and/or testing portions of the work. Costs of such services will be borne by the Departmental Representative.

END OF SECTION

PART 1 – GENERAL

Section Includes

PART 1:

1.1 Measurement and Payment Procedures

1.2 Installation and Removal.

1.3 Scaffolding.

1.4 Hoisting.

1.5 Site Storage/Loading.

1.6 Security.

1.7 Equipment, Tool, and Materials Storage.

1.8 Sanitary Facilities.

1.9 Construction Signage.

1.10 Construction Laydown Area, Construction Parking, and Site Office.

1.11 Departmental Representative's Office Trailer.

1.12 Power.

1.13 Communications.

1.14 Temporary Heating, Ventilation, and Lighting.

1.15 Fire Protection.

1.1 Measurement and Payment Procedure

.1 Payment for the Departmental Representative's Office Trailer will be made on the basis of the Lump Sum Price for the office trailer in the Bid and Acceptance Form. The Lump Sum Price shall include all costs associated with supply, layout and installation, and services of the office trailer, and all other items necessary for successful completion of the work.

.2 Measurement for Payment for completion of Departmental Representative's Office Trailer will be measured by Lump Sum Price on the percentage of work completed and accepted by the Departmental Representative.

1.2 Installation and Removal

.1 Provide construction facilities in order to execute work expeditiously.

	.2	Remove from site all such work after use.
1.3 Scaffolding	.1	Provide and maintain scaffolding, ramps, ladders, swing staging, platforms, and temporary stairs as necessary to carry out work.
1.4 Hoisting	.1	Provide, operate, and maintain hoists and cranes as necessary for moving of workers, materials, and equipment.
	.2	Hoists and cranes shall be operated by qualified operators.
1.5 Site Storage/Loading	.1	Confine work and operations of employees by Contract Documents. Do not unreasonably encumber premises with products.
	.2	Do not load or permit to load any part of work with a weight or force that will endanger the work or existing infrastructure.
1.6 Security	.1	Provide and pay for responsible security personnel as required.
1.7 Equipment, Tool, and Materials Storage	.1	If required by the Contractor provide and maintain, in a clean and orderly condition, lockable weather proof sheds for storage of tools, equipment and materials.
	.2	Locate materials not required to be stored in weatherproof sheds on-site in a manner to cause least interference with public.
1.8 Sanitary Facilities	.1	Provide sanitary facilities for work force in accordance with governing regulations and ordinances.
	.2	Post notices and take such precautions as required by local health authorities. Keep area and premises in sanitary condition.
1.9 Construction Signage	.1	No other signs or advertisements, other than those required by Section 01 35 00.06 – Special Procedures - Traffic Control, are permitted on-site.
1.10 Construction Laydown Area, Construction Parking, and Site Office	.1	Confine construction laydown areas, site office locations, and construction parking to the locations identified below in compliance with Section 01 35 43 – Environmental Protection and as pre-approved by the Departmental Representative.
		.1 Within highway right of way, preferably on areas previously disturbed and off the traveled potion of the highway.
		.2 Other areas as pre-approved by the Departmental

Representative.

1.11 Departmental Representative's Office Trailer

.1 Provide Departmental Representative with office trailer set up in a location preapproved by the Departmental Representative.

.2 Departmental Representative's Office Trailer shall have:

.1 Inside dimensions measuring a minimum 3.6 m long x 3 m wide x 2.4 m high, with floor 0.3 m above grade, complete with 4 50% opening windows and one lockable door.

.2 Insulation and heating system to maintain 22 degrees C inside temperature at -10 degrees C outside temperature.

.3 Finished inside walls and ceiling with plywood, hardboard or wallboard and paint in selected colours. Finish floor with 19 mm thick plywood.

.4 Equip office with 1 x 2 m table, 4 chairs, 6 m of shelving 300 mm wide, one 3 drawer filing cabinet, and one coat rack and shelf.

.5 Install electrical lighting system to provide min 750 lx using surface mounted, shielded commercial fixtures with 10 % upward light component.

.6 Provide private washroom facilities adjacent to office complete with flush or chemical type toilet, and maintain supply of paper towels and toilet tissue.

.7 Power for the on-site trailer shall be available at all times by means of a generator, supplied and maintained by the Contractor, or by other hook-ups as accepted by the Departmental Representative.

1.12 Power

.1 Provide and pay for power as required for the completion of the works and operations of construction site offices.

1.13 Communications

.1 Ensure Contractor's onsite representative have suitable onsite phone communications allowing the Departmental Representative reliable communication to the Contractors onsite representative when onsite.

1.14 Temporary Heating, Ventilation, and Lighting

.1 Provide temporary heating, ventilation, and lighting as required during construction period to facilitate construction of the works.

1.15 Fire Protection

.1 Provide and maintain temporary fire protection equipment during performance of work.

END OF SECTION

PART 1 – GENERAL

Section Includes	PART 1:	
	1.1	Installation and Removal.
	1.2	Hoarding.
	1.3	Guiderails and Barricades.
	1.4	Access to Site.
	1.5	Public Traffic Flow.
	1.6	Fire Routes.
	1.7	Protection for Off-site and Public Property.
	1.8	Protection of Structure Finishes.
1.1 Installation and Removal	.1	Provide temporary controls in order to execute Work expeditiously.
	.2	Remove from site all such work after use.
1.2 Hoarding	.1	Provide barriers around trees and plants designated to remain. Protect from damage by equipment and construction procedures.
1.3 Guiderails and Barricades	.1	Provide secure, rigid guiderails and barricades around deep excavations and open shafts.
	.2	Provide as required by governing authorities.
1.4 Access to Site	.1	Provide and maintain access roads, sidewalk crossings, ramps and construction runways as may be required for access to Work.
1.5 Public Traffic Flow	.1	Provide and maintain competent signal flag persons, traffic signals, barricades and flares, lights, or lanterns as required to perform Work and protect the Public.
1.6 Fire Routes	.1	Maintain access to property for use by emergency response vehicles.
1.7 Protection for Off-site and Public Property	.1	Protect surrounding private and public property from damage during performance of Work.
	.2	Be responsible for damage incurred.
1.8 Protection of Structure Finishes	.1	Provide protection for finished and partially finished structure finishes and equipment during performance of Work.

.2 Provide necessary screens, covers and hoardings.

.3 Confirm with Departmental Representative locations and installation schedule three (3) day prior to installation.

END OF SECTION

PART 1 – GENERAL

Section Includes

PART 1:

1.1 General Requirements.

1.2 Requirements of Regulatory Agencies.

PART 2:

2.1 Products.

PART 3:

3.1 Mobilization.

3.2 Maintenance.

3.3 Demobilization.

1.1 General Requirements

.1 The Contractor to provide its own construction camp as necessary. The construction camp shall not be located within PWGSC's Right of Way. Obtain approval from land owner should Contractor chooses to setup construction camp outside of PWGSC's Right of Way.

.2 The Contractor shall be responsible for all utility services to the construction camp. The construction camp to be established and operated in accordance with local regulations.

1.2 Requirements of Regulatory Agencies

.1 Obtain necessary licenses and approvals required by Authority having Jurisdiction for authorized use of water and disposal of domestic sewage and other waste.

.2 Comply with Environmental regulations.

PART 2 – PRODUCTS

.1 Not Used.

PART 3 – EXECUTION

3.1 Mobilization

.1 Mobilize equipment, personnel, and materials as necessary to establish temporary construction camp and offices. Obtain necessary licenses and approvals from Authorities having Jurisdiction prior to mobilization. Camp and service area location and layout plan to be submitted to Departmental Representative for review and acceptance.

.2 Temporary construction camps to be established and operated in

accordance with local regulations.

3.2 Maintenance	.1	Maintain construction camp and offices in a neat and tidy condition.
3.3 Demobilization	.1	Upon vacating construction camp, offices and temporary services, clean-up and leave site in a condition satisfactory to the Departmental Representative and the Authorities having Jurisdiction.

END OF SECTION

PART 1 – GENERAL

Section Includes

PART 1:

1.1 Project Cleanliness.

1.2 Final Cleaning.

1.1 Project Cleanliness

.1 Maintain work in a tidy condition, free from accumulation of waste products and debris.

.2 Remove waste materials from site at regularly scheduled times or dispose of as directed by the Departmental Representative.

.3 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.

.4 Provide wildlife resistant containers for collection of waste materials and debris.

.5 Dispose of waste materials and debris off-site.

.6 Clear snow and ice from areas of work.

1.2 Final Cleaning

.1 When work is substantially performed, remove surplus products, tools, construction machinery, and equipment not required for performance of remaining work.

.2 Remove waste products, debris, and materials used in construction. Reinstate the work site to the conditions pre-existing and to the satisfaction of the Departmental Representative.

.3 Prior to final review, remove surplus products, tools, construction machinery, and equipment.

.4 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.

.5 Inspect finishes and fitments and ensure specified workmanship and operation.

.6 Remove dirt and other disfiguration from exterior surfaces.

.7 Remove debris and surplus materials from crawl areas and other accessible concealed spaces.

.8 Sweep and wash clean paved areas.

.9 Clean drainage systems.

END OF SECTION

PART 1 – GENERAL

Section Includes

PART 1:

1.1 Inspection and Declaration.

1.1 Inspection and Declaration

.1 Contractor's Inspection: Contractor and all subcontractors shall conduct an inspection of work, identify deficiencies and defects, and repair as required to conform to Contract Documents.

.1 Notify the Departmental Representative in writing of satisfactory completion of the Contractor's Inspection and that corrections have been made.

.2 Request the Departmental Representative's Inspection.

.2 Departmental Representative's Inspection: The Departmental Representative and Contractor will perform inspection of work to identify obvious defects or deficiencies. Contractor shall correct work accordingly.

.3 Completion: Submit written certification that the following have been performed:

.1 Work has been completed and inspected for compliance with Contract Documents.

.2 Defects have been corrected and deficiencies have been completed.

.3 Work is complete and ready for final inspection.

.4 Final Inspection: When the items noted above are completed, request final inspection of work by the Departmental Representative and Contractor. If work is deemed incomplete by the Departmental Representative, complete the outstanding items and request re-inspection.

END OF SECTION

PART 1 – GENERAL

Section Includes

PART 1:

1.1 Submissions.

1.2 Recording As-built Conditions (As-Built Drawings).

1.3 As-Built Survey.

1.1 Submissions

.1 Submit submissions for Departmental Representative review. Following each review the submission will be returned with the Departmental Representative's comments. Revise and re-submit submission per the comments provided.

.2 Provide the following submissions to the Departmental Representative within two weeks of substantial performance:

.1 As-built survey.

.2 As-built drawing and shop drawing mark-ups.

1.2 Recording As-built Conditions (As-built Drawings)

.1 The Departmental Representative will provide one set of Issued for Construction (or Issued for Tender) drawings for use by the Contractor to record as-built conditions and submit at the completion of the project as the "As-built Drawings".

.2 Record information concurrently with construction progress on the Issued for Construction (or Issued for Tender) drawings. Do not conceal work until the required information is recorded.

.3 Legibly mark each item on the Issued for Construction (or Issued for Tender) drawings and Shop Drawings in red ink to record actual construction conditions and any changes made by addenda and change orders.

.4 Maintain record documents in clean, dry, and legible condition.

.5 Keep record documents available for inspection by the Departmental Representative.

.6 Submit to the Departmental Representative one copy of Issued For Construction (or Issued for Tender) drawings which have been marked by the Contractor up to include all "as-built" conditions.

1.3 As-Built Survey

.1 At the completion of the work complete an as-built survey of the works. At a minimum the survey shall include.

.1 Topo of all areas disturbed and modified during

construction (between limits of clearing incl. cut and fill slopes, embankment and gravels placed).

.2 Culverts (size, type and length of culvert, inverts at inlet and outlet).

.3 Signage.

.4 Concrete barriers.

.5 Edge of asphalt.

.6 Gravel Shoulder.

.7 Pavement Markings.

.8 Any other feature or elements of work incorporated into the project.

.2 The survey to include sufficient point density to adequately characterize the work. Survey methods and point density is subject to prior approval of the Departmental Representative. At a minimum the Contractor shall survey all features at 20 m station intervals and the location of all treatment boundaries including changes in material type / placement, changes in surface treatment, changes in terrain, and changes in asphalt concrete pavement width.

.3 Survey data shall be collected at an accuracy of +/- 0.020 m horizontal and +/- 0.020 m vertical or better and shall be referenced / tie into the PWGSC's monument / coordinate system as shown on the Contract Drawings.

.4 Survey data shall be provided to the Departmental Representative in digital xyz format with an appropriate descriptor code as to the type of material surface or feature being surveyed, and also provided in a digital CADD model with triangulated surfaces created from the survey points and breaklines.

END OF SECTION

PART 1 – GENERAL

Section Includes

PART 1:

1.1 Measurement and Payment Procedures.

PART 2:

2.1 Products.

PART 3:

3.1 Signs.

3.2 Fences.

3.3 Culverts.

3.4 Light Poles.

1.1 Measurement and Payment Procedures

.1 Payment for Sign Removal will be made on the basis of the Price per Unit Bid for Sign Removal in the Bid and Acceptance Form. The Price per Unit Bid shall include all costs for removal and offsite disposal, removal and salvage, or relocate and reuse, and all other items necessary for successful completion of the work.

.2 The measurement for Payment for completion of Sign Removal will be made on each of the sign removed and accepted by Departmental Representative.

.3 Payment for Fence Removal will be made on the basis of the Price per Unit Bid for Fence Removal in the Bid and Acceptance Form. The Price per Unit Bid shall include all costs for offsite removal and disposal and all other items necessary for successfully completion of the work.

.4 The measurement for Payment for completion of Fence Removal will be made on fence removed in linear metre and accepted by Departmental Representative.

.5 Payment for removal and offsite disposal of existing CSP culverts will be made on the basis of the Price per Unit Bid for Culvert Removal in the Bid and Acceptance Form. The Price per Unit Bid shall include all costs for:

.1 Native Material: excavation, backfill (when required), disposal (in a pre-approved location if unsuitable for

re-use). If native material is re-used, native material volume shall be excluded from embankment volume for payment.

.2 Culverts and associated components (screens, debris catchments etc., if present): removal, loading, transport, and offsite disposal.

.3 All other items necessary for successful completion of the work.

.6 Measurement for Payment of Culvert Removal will be made on culvert removed in linear metre and accepted by Departmental Representative.

.7 Payment for Light Pole Removal will be made on the basis of the Price per Unit Bid for Light Pole Removal in the Bid and Acceptance Form. The Price per Unit Bid shall include all costs for removal of poles, cutting power, removal of all electrical accessories, and offsite disposal, and all other items necessary for successful completion of the work.

.8 The measurement for Payment for completion of Light Pole Removal will be made on count of each pole removed by Contractor and accepted by the Departmental Representative.

PART 2 – PRODUCTS .1 Not Used

PART 3 - EXECUTION

3.1 Signs .1 All existing regulatory signs and posts and other signs designated for removal on the Contract Drawings shall be removed by the Contractor and stockpiled in a location pre-approved by the Departmental Representative. The Contractor shall take necessary precautions to prevent damage to the signs or posts during the removal, transport, and stockpiling process. The order and timing of sign removal shall be completed in conjunction with the Contractor's Traffic Management Plan to ensure necessary signage for the protection and control of public traffic is available throughout the construction.

3.2 Fencing .1 Remove existing fencing as shown on the Contract Drawings or as directed by the Departmental Representative. The removed fence material to be disposed in an offsite location approved by Departmental Representative.

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3.3 Culverts

.1 Take all necessary precautions as outline in Section 01 35 43 – Environmental Protection and the Contractor's EPP to mitigate against sediment transport and other environmental pollution or damage during construction.

.2 Excavate and remove all existing culverts and associated components (screens, debris catchments etc., if present) within the limits of the work. Dispose of the culverts in an offsite disposal facility within British Columbia permitted to accept the culvert materials and acceptable to the Departmental Representative. If requested by the Departmental Representative, salvage the associated culvert components (screens, debris catchments etc.) and stockpile in a location directed by the Departmental Representative.

.3 Reuse excavated material as embankment (if suitable) or dispose of the material in an offsite location and condition acceptable to the Departmental Representative.

3.4 Private Light Poles

.1 Remove light poles as shown on Contract Drawings and cut power first if needed. Coordinate with BC Hydro if power needs to cut off.

END OF SECTION

PART 1 – GENERAL

Section Includes

PART 1:

1.1 Definitions.

1.2 Submittals.

1.3 Storage and Handling.

1.4 Transportation.

PART 2:

2.1 Materials.

PART 3:

3.1 Disposal.

1.1 Definitions

.1 Dangerous Goods: Product, substance, or organism that is specifically listed or meets the hazard criteria established in Transportation of Dangerous Goods Regulations.

.2 Hazardous Material: Product, substance, or organism that is used for its original purpose and that is either dangerous goods or a material that may cause adverse impact to the environment or adversely affect health of persons, animals, or plant life when released into the environment.

.3 Hazardous Waste: Any hazardous material that is no longer used for its original purpose and that is intended for recycling, treatment, or disposal.

.4 Workplace Hazardous Materials Information System (WHMIS): A Canada-wide system designed to give employers and workers information about hazardous materials used in the workplace. Under WHMIS, information on hazardous materials is to be provided on container labels, material safety data sheets (MSDS), and worker education programs. WHMIS is put into effect by a combination of federal and provincial laws.

1.2 Submittals

.1 Submit product data in accordance with Section 01 33 00 – Submittal Procedures.

.2 Submit to the Departmental Representative a current Material Safety Data Sheet (MSDS) for each hazardous material required prior to bringing hazardous material on-site.

.3 Submit Hazardous Materials Management Plan to the Departmental Representative that identifies all hazardous materials, their use, their location, personal protective equipment requirements, and disposal arrangements.

1.3 Storage and Handling

.1 Abide by internal requirements for labeling and storage of materials and wastes. If required coordinate storage of hazardous materials with the Departmental Representative.

.2 Store and handle hazardous materials and wastes in accordance with applicable federal and provincial laws, regulations, codes, and guidelines.

.3 Store and handle flammable and combustible materials in accordance with current National Fire Code of Canada requirements.

.4 Store all flammable and combustible liquids in approved safety cans bearing the Underwriter's Laboratory of Canada or Factory Mutual seal of approval.

.5 Transfer of flammable and combustible liquids is prohibited within buildings.

.6 Transfer of flammable and combustible liquids will not be carried out in the vicinity of open flames or any type of heat-producing devices.

.7 Flammable liquids having a flash point below 38°C, such as naphtha or gasoline, will not be used as solvents or cleaning agents.

.8 Store flammable and combustible waste liquids for disposal in approved containers located in a safe, ventilated area. Keep quantities to a minimum.

.9 Observe smoking regulations at all times. Smoking is prohibited in any area where hazardous materials are stored, used, or handled.

.10 Abide by the following storage requirements for quantities of hazardous materials and wastes in excess of 5 kg for solids, and 5 L for liquids:

.1 Store hazardous materials and wastes in closed and sealed containers that are in good condition.

.2 Label containers of hazardous materials and wastes in accordance with WHMIS.

.3 Store hazardous materials and wastes in containers compatible with that material or waste.

.4 Segregate incompatible materials and wastes.

.5 Ensure that different hazardous materials or hazardous wastes are not mixed.

.6 Store hazardous materials and wastes in a secure storage area with controlled access.

.7 Maintain a clear egress from storage area.

.8 Store hazardous materials and wastes in a manner and location which will prevent them from spilling into the environment.

.9 Have appropriate emergency spill response equipment available near the storage area, including personal protective equipment.

.10 Maintain an inventory of hazardous materials and wastes, including product name, quantity, and date when storage began.

.11 Ensure personnel have been trained in accordance with WHMIS requirements.

.12 Report spills or accidents involving hazardous materials immediately to the Provincial Emergency Program 24 hour phone line at 1-800-663-3456, other local authority having jurisdiction, and the Departmental Representative. Submit a written spill report to the Departmental Representative within 24 hours of incident.

.13 Store and handle all hazardous materials away from any water course as outlined in Section 01 35 43 – Environmental Protection.

1.4 Transportation

.1 Transport hazardous materials and wastes in accordance with federal Transportation of Dangerous Goods Act, Transportation of Dangerous Goods Regulations, and applicable provincial regulations.

.2 If exporting hazardous waste to another country, ensure compliance with federal Export and Import of Hazardous Waste Regulations.

PART 2 – PRODUCTS

2.1 Materials

.1 Only bring on-site the quantity of hazardous materials required to perform work.

.2 Maintain MSDS in proximity to where the materials are being used. Communicate this location to personnel who may have contact with hazardous materials.

PART 3 – EXECUTION

3.1 Disposal

.1 Dispose of hazardous waste materials in accordance with applicable federal and provincial acts, regulations, and guidelines. Costs for disposal to be considered incidental to the work.

.2 Recycle hazardous wastes for which there is an approved, cost-effective recycling process available.

.3 Send hazardous wastes only to authorized hazardous waste disposal or treatment facilities.

.4 Burning, diluting, or mixing hazardous wastes for purpose of disposal is prohibited.

.5 Disposal of hazardous materials in waterways, storm or sanitary sewers, or in municipal solid waste landfills is prohibited.

.6 Dispose of hazardous wastes in a timely fashion in accordance with applicable provincial regulations.

END OF SECTION

PART 1 – GENERAL

Section Includes

PART1:

1.1 Measurement and Payment Pprocedures.

1.2 References.

PART 2:

2.1 Wood Posts and Hardware

2.2 Signs

PART 3:

3.1 Wood Posts and Signs

1.1 Measurement and Payment Procedures

.1 Payment for the supply and placement of permanent traffic signs will be made on the basis of the Price per Unit Bid for Traffic Signage in the Bid and Acceptance Form. The price per Unit Bid shall include all costs for supply and install of the sign and post, hardware, and all other items necessary for successful completion of the work.

.2 Measurement for Payment for Traffic Signage will be made by the count of each traffic sign (sign and post) installed and accepted by the Departmental Representative. A single sign post designated to hold a sign on both sides (for both the northbound and southbound traffic, ex. G-104 sign type) will only be counted as one sign for payment.

1.2 References

.1 British Columbia MoTI – Manual of Standard Traffic Signs & Pavement Markings (September 2000, or latest edition).

.2 British Columbia MoTI – Standard Specifications for Highway Construction (July 2016, or latest edition).

.3 Transportation Association of Canada - Manual of Uniform Traffic Control Devices for Canada (January 2014, or latest edition).

PART 2 – PRODUCTS

2.1 Wood Posts and Hardware

.1 The sign posts and hardware shall be in conformance with the BC MoTI 2016 Standard Specification for Highway Construction (or latest edition), See Section 635, subsection 635.27 and the following requirements.

.1 The sign post shall be 6” x 4” pressure treated Douglas Fir/Larch, No. 1 Grade.

2.2 Signs

.1 Signs shall be per the BC MoTI 2016 Standard Specification for Highway Construction (or latest edition), See Section 635, subsection 635.32 and the following requirements.

.1 Signs shall be sheet aluminum.

.2 All sign shall be per the BC MoTI Manual of Standard Traffic Signs & Pavement Markings. If not provided in the BC MoTI Manual of Standard Traffic Signs & Pavement Markings the sign shall be per the Manual of Uniform Traffic Control Devices for Canada.

PART 3 – EXECUTION

3.1 Wood Posts and Signs

.1 The wood posts and signs shall be installed per the BC MoTI Manual of Standard Traffic Signs & Pavement Markings and BC MoTI 2016 Standard Specification for Highway Construction (or latest edition), See Section 635, subsection 635.27 and subsection 635.32 and the following requirements.

.1 Post embedment depth shall be 1600 mm.

.2 Green and white paint not required.

.3 If sign post located in embankment or gravels, the post hole shall be via an auger with a diameter 100mm greater than the post dimensions.

END OF SECTION

PART 1 – GENERAL

Section Includes

PART 1:

1.1 Measurement and Payment Procedures.

1.2 References.

1.3 Submittals.

1.4 General.

1.5 Record Drawings.

1.6 Coordination of Works.

1.7 Inspections.

PART 2:

2.1 Materials Supplied by Contractor.

PART 3:

3.1 Supply and Installation of Concrete Bases.

3.2 Supply and Installation of Plastic Junction Boxes.

3.3 Supply and Installation of Conduits.

3.4 Trenching and Backfilling.

3.5 Modify Existing Light Equipment.

3.6 Modify Existing Service Equipment.

3.7 Supply and Installation of Wiring.

3.8 Removal of Existing Electrical Equipment.

3.9 Relocate Existing Electrical Equipment.

3.10 Supply and Install LED Luminaires

1.1 Measurement and Payment Procedures

.1 Payment for the supply and installation of Concrete Bases – Type C shall be made on the basis of the Price per Unit Bid for Concrete Base in the Bid and Acceptance Form. The Unit Price shall include all costs of excavation, other than concrete and asphalt removal; supply and installation of shoring to meet WCB requirements, formwork, concrete, reinforcing

steel and conduit; supply and installation of grout and sand to fill knock-outs voids in controller bases and concrete pads in front of controller bases; installation of individual anchor bolts or anchor bolts in cages; placing and compaction of excavated material as backfill; removal and disposal of excess excavated material; and all other labour, equipment, and materials necessary to complete the installation. Any additional costs for supplying higher strength concrete shall be borne by the Contractor. Payment shall be considered full compensation for everything furnished and done.

.2 Measurement for Payment for Concrete Bases – Type C will be made by count of each concrete base supplied and installed and accepted by the Departmental Representative.

.3 Payment for the supply and installation of Junction Boxes – Type 10 shall be made on the basis of the Price per Unit Bid in the Bid and Acceptance Form. The Unit Price shall include all costs of excavation, other than concrete and asphalt removal; installation of junction box sections, lids, drain plates, adapter plates and braces; supply and installation of shoring to meet WCB requirements, conductor support bars in boxes, concrete collars, Crushed Base Gravel Aggregate material below the junction box; placing and compaction of excavated material as backfill; removal and disposal of excess excavated material; and all other labour, equipment and materials necessary to complete the installation. Payment shall be considered full compensation for everything furnished and done.

.4 Measurement for Payment for Junction Boxes – Type 10 will be made by count of each junction box supplied and installed and accepted by the Departmental Representative.

.5 Payment for the supply and installation of Conduits – 50 mm PRVC shall be made on the basis of Price per Unit Bid in the Bid and Acceptance Form. The Unit Price shall include all costs for the supply and installation of underground conduit, fittings, cement and pull strings; and all other labour, equipment and materials necessary to complete the installation. Payment for conduits installed above ground on poles or sign structures is not included in this Subsection. Payment shall be considered full compensation for everything furnished and done.

6. Measurement for Payment for Conduits – 50 mm PRVC will be made by length of conduits supplied and installed in linear metre, and accepted by the Departmental Representative.

.7 Payment for Trenching and Backfilling for conduit shall be

made on the basis of Price per Unit Bid in the Bid and Acceptance Form. The Unit Price shall include all costs of excavation, other than concrete and asphalt removal; placing and compaction of excavated material as backfill; dewatering; supply and installation of trench marker tape; removal and disposal of excess excavated material; and all other labour, equipment and materials necessary to complete the installation. Payment shall be considered full compensation for everything furnished and done.

.8 Measurement for Payment for Trenching and Backfilling will be made by length of trenching and backfilling in linear metre and accepted by the Departmental Representative.

.9 Payment for the Modification of Existing Lighting Equipment – Replaced HPS Cobrahead with LED shall be made on the basis of Price per Unit Bid in the Bid and Acceptance Form. The Unit Price shall include all costs for the relocation of existing lighting hardware, rewiring existing conductors and rerouting conduits to the new pole locations; and all other labour, equipment and materials necessary to complete the installation. Payment shall be considered full compensation for everything furnished and done.

.10 Measurement for Payment for Modification of Existing Lighting Equipment – Replaced HPS Cobrahead with LED will be made on count for each HPS Cobrahead replaced and accepted by the Departmental Representative.

.11 Payment for the Modification of Existing Service Equipment – Service Panel No. 1 and No. 2 shall be made the Lump Sum price in the Bid and Acceptance Form. The Lump Sum Price shall include supply and installation of circuit breakers and related wiring; and all other labour, equipment and materials necessary to complete the installation as noted on the Contract Drawings. Payment shall be considered full compensation for everything furnished and done.

.12 Measurement for Payment for Modification of Existing Service Equipment – Service Panel No. 1 and No. 2 will be made on the lump sum, and accepted by the Departmental Representative.

.13 Payment for Wiring – Service Area 1 and Area 2 shall be made on the basis of the Lump Sum price in the Bid and Acceptance Form. The Lump Sum price shall include all costs for the supply and installation of wiring and cables located in the underground conduit system (unless otherwise noted) and splices; labeling of underground conductors; and all other labour, equipment and materials necessary to complete the

installation. Payment shall be considered full compensation for everything furnished and done.

.14 Measurement for Payment for Wiring – Service Area 1 and Area 2 will be made on the lump sum, and accepted by the Departmental Representative.

.15 Payment for the Removal of Existing Electrical Equipment shall be made on the basis of the Lump Sum price in the Bid and Acceptance Form, and shall be considered full compensation for everything furnished and done and shall include the additional Crushed Base Gravel aggregate used to fill resulting holes.

.16 Measurement for Payment for Removal of Existing Electrical Equipment will be made on the lump sum price and accepted by the Departmental Representative.

.17 Payment for the Relocation of Existing Electrical Equipment – Existing Roadway Pole c/w Frangible Base shall be made on the basis of Price per Unit Bid in the Bid and Acceptance Form. The unit price shall include all costs for the relocation of existing lighting hardware, rewiring existing conductors and rerouting conduits to the new pole locations; and all other labour, equipment and materials necessary to complete the installation. Payment shall be considered full compensation for everything furnished and done.

.18 Measurement for Payment for Relocation of Existing Electrical Equipment – Existing Roadway Pole c/w Frangible Base will be made on each pole relocated and accepted by the Departmental Representative.

.19 Payment for the supply and install LED luminaires shall be made on the basis of the Price for Supply and Install LED Luminaires per Unit Bid in the Bid and Acceptance Form. The Unit Price shall include all costs of removal and disposal of old street lights, supply and installation of new LED street lights, and all other labour, equipment and materials necessary to complete the installation. Payment shall be considered full compensation for everything furnished and completed.

.20 Measurement for Payment for Supply and Install LED Luminaires will be made on count for each LED luminaire supplied and installed and accepted by the Departmental Representative.

1.2 References

.1 British Columbia MoTI 2016 Standard Specifications for Highway Construction (or latest edition).

1.3 Submittals .1 Submittals in accordance with Section 01 33 00 – Submittal Procedures.

1.4 General .1 The scope of work under this section includes but not limited to:

.1 Supply and installation of street lighting equipment.

.2 Supply and installation of wiring.

.3 Supply and installation of conduit, junction boxes, vaults, concrete bases and foundations.

.4 Modify existing luminaire pole equipment.

.5 Modify existing service equipment.

.6 Modification of existing electrical equipment.

.7 Removal of existing electrical equipment.

1.5 Record Drawings .1 The Contractor shall record on a current set of plans, in a neat manner, all changes, additions and deletions to reflect the "as constructed" installation. This shall include the location of equipment as installed. This set of plans shall be returned to the Departmental Representative at the completion of the roadway lighting work.

.2 All costs related to record drawings will be included in the various pay items of work involved in the contract. No additional compensation will be made for the above work.

1.6 Coordination of Works .1 The Contractor shall co-ordinate the electrical work to the satisfaction of the Departmental Representative such that there is no interruption of existing night-time roadway lighting.

.2 The Contractor shall obtain permission from the Departmental Representative prior to turning off or removing any existing electrical equipment.

.3 Any materials supplied and/or any temporary relocation or modification to the electrical system made to suit the various construction stages must meet the approval of the Departmental Representatives prior to construction.

.4 All costs related to coordination of work will be included in the various pay items of work involved in the contract. No additional compensation will be made for the above work.

1.7 Inspections

.1 The Departmental Representative will undertake periodic inspections of the installation through construction. Prior to start-up the Contractor shall contact the Departmental Representative for final inspection. Upon completion of the inspection the Departmental Representative will provide the Contractor with a list of deficiencies. The Contractor shall correct all deficiencies to the satisfaction of the Departmental Representative.

PART 2 – PRODUCTS

2.1 Material Supplied by Contractor

.1 The Contractor shall supply all materials for the Roadway Lighting electrical work.

.2 All materials for the electrical works shall be listed on the current version of the Ministry's "Recognized Products List" unless otherwise noted on the Contract Drawings.

.3 The Contractor shall provide suitable storage and protection for materials until they are installed. All materials, with the exception of poles, and junction boxes shall be stored under cover.

.4 All electrical materials provided by the Contractor shall conform to all applicable CSA Standards and shall meet the approval of the British Columbia Safety Authority Inspector.

.5 All costs related to materials will be included in the various items of work involved in the contract. No additional compensation will be made for these materials.

PART 3 – EXECUTION

3.1 Supply and Installation of Concrete Bases

.1 The Contractor shall supply and install concrete bases of the type as identified on the Contract Drawings. The install of the concrete base shall be completed in accordance with Section 635.07 of the BC MoTI 2016 Standard Specifications for Highway Construction.

.2 Concrete bases to be installed at a minimum distance of 0.5 m from the nearest edge of concrete base to the edge of pavement.

3.2 Supply and Installation of Plastic Junction Boxes

.1 The Contractor shall supply and install plastic junction boxes of the type as identified on the Contract Drawings. The

install of the plastic junction boxes shall be completed in accordance with Section 635.08 of the BC MoTI 2016 Standard Specifications for Highway Construction

.2 Installation of plastic underground junction boxes requires the application for a variance as described in memorandum 'Use of Plastic Underground Electrical Junction Boxes'. A copy of this document can be found here:

http://www.th.gov.bc.ca/publications/eng_publications/electrical/Use-of-Plastic-Underground-Electrical-Junction-Boxes.pdf

3.3 Supply and Installation of Conduits

.1 The Contractor shall supply and install conduit of the type and size as identified on the Contract Drawings. The install of the conduits shall be completed in accordance with Section 635.09 of the 2016 BC MoTI Standard Specifications for Highway Construction

3.4 Trenching and Backfilling

.1 Trenching and backfilling shall be performed in accordance with BC MoTI 2016 Standard Specifications for Highway Construction Section SP635.10 and Drawings SP635-1.5.1, 1.5.2, 1.6.1, 1.6.2 and 1.7.1.

3.5 Modify Existing Lighting Equipment

.1 The Contractor shall modify the existing lighting equipment as identified on the Contract Drawings.

3.6 Modify Existing Service Equipment

.1 The Contractor shall modify the existing service equipment as identified on the Contract Drawings.

3.7 Supply and Installation of Wiring

.1 The Contractor shall supply and install all underground wiring as identified on the Contract Drawings. The install of the wiring shall be completed in accordance with SP 635.19 of the BC MoTI 2016 Standard Specifications for Highway Construction

3.8 Removal of Existing Electrical Equipment

.1 The Contractor shall remove existing electrical equipment as shown on the Contract Drawings, or as directed by the Departmental Representative.

.2 The Contractor must obtain permission from the Departmental Representative prior to removing any electrical equipment.

.3 Removal of existing equipment shall include:

.1 Removal of the existing concrete bases, their disposal off site and the supply and installation of Crushed Base Gravel Aggregate material to fill the resulting

holes. Where existing bases and foundations cannot be removed without undermining or damaging the existing asphalt, the Contractor may jackhammer off the top of the concrete base or foundation to 600 mm below finished grade. This shall only apply where specifically indicated on the Contract Drawings. The excavation and backfill shall meet the requirements but not the payment provision of SP635.07.01 BC MoTI 2016 Standard Specifications for Highway Construction.

.2 Removal of the existing junction boxes, their disposal off site and the supply and installation of Crushed Base Gravel Aggregate to fill the resulting holes. The excavation and backfill shall meet the requirements but not the payment provisions of SP635.07.01 BC MoTI 2016 Standard Specifications for Highway Construction.

.3 The removal, disassembly, pick-up, delivery and off-loading of street lighting equipment, wiring and any other electrical devices (as noted on the Drawings) to (Location to be determined by the Departmental Representative).

.4 All existing wiring removed shall be disposed by the Contractor to an offsite location approved by Departmental Representative.

.5 Prior to construction the Contractor shall provide the Departmental Representative with an itemized spreadsheet of all items removed and returned to the BC MoTI designated Works Yard (will be most likely the MOTI's maintenance contractor's (Westcana) yard in Fort St. John for that region/area. To be confirmed by Contractor). Prior to returning any equipment the Contractor shall confirm the exact quantity of each item being returned.

3.9 Relocate Existing Electrical Equipment

.1 The Contractor shall relocate existing electrical equipment as shown on the Contract Drawings, or as directed by the Departmental Representative. The Contractor must obtain permission from the Departmental Representative prior to relocating any electrical equipment.

.2 Relocation of existing electrical equipment shall include Streetlights.

3.10 Supply and Install LED Luminaires

.1 The Contractor shall supply and install LED luminaires as identified on the Contract Drawings. The specified Philips luminaire is a recommended 'Minimum Acceptable

Standard'. Any other luminaire similar or equal (in construction, features and performance) to the one noted as 'Minimum Acceptable Standard' and listed in BC MoTI 'Recognized Product List' (2018 edition) will be accepted. If the Contractor wishes to use any other luminaire than the one noted as 'Minimum Acceptable Standard', a point-to-point lighting calculation is to be submitted along with the shop drawings to confirm that the design requirements are met.

END OF SECTION

PART 1 – GENERAL

Section Includes

PART 1:

1.1 Measurement and Payment Procedures.

1.2 References.

PART 2:

2.1 General.

2.2 Crushed Base Gravel and Crushed Surfacing Gravel.

2.3 Sub-base Course.

PART 3:

3.1 Processing.

3.2 QA Sampling by the Departmental Representative.

3.3 Handling and Transportation.

3.4 Stockpiling.

3.5 Cleanup.

1.1 Measurement and Payment Procedures

.1 Measurement and Payment for Aggregate Materials shall be per the applicable work included in Section 32 11 19 – Sub-base Course, Section 32 11 24 – Crushed Base Gravel, Section 32 11 25 – Crushed Surfacing Gravel, Section 33 42 13 – Pipe Culverts, Section 32 12 16 – Hot Mix Asphalt Concrete Pavement, and any other section as required by these specifications.

1.2 References

.1 British Columbia Ministry of Transportation and Infrastructure (BC MOTI) – 2016 Standard Specifications for Highway Construction (or latest edition).

.2 Geotechnical Data Report produced for this project is available for the Contractor's reference (Appendix G).

.3 American Society for Testing and Materials (ASTM)

.1 ASTM C136 (latest edition), Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

.2 ASTMD2487 (latest edition), Standard Practice for Classification of Soils for Engineering Purposes

(United Soil Classification System).

.3 ASTM D4791-99, Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.

.4 ASTM C117-03, Standard Test Method for Materials Finer than 75-µm (No. 200) Sieve in Mineral Aggregates by Washing.

.5 CGSB Spec.8-GP-2M, Sieves Testing, Woven Wire, Metric Series.

.6 ASTM D4318-00, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

.7 ASTM C131-01, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.

PART 2 – PRODUCTS

2.1 General

.1 The Contractor will be responsible for the manufacture, screening, blending, aeration or drying, or any other required processing to achieve all material requirements.

.2 Aggregate Source: The Contractor shall provide his own source(s) for all aggregate materials for this project. The Contractor will be solely responsible for ensuring that the aggregate source(s) selected by the Contractor continuously achieve all aggregate material properties, quality, and gradation requirements as outlined in this contract specification for the material intended use.

.1 A minimum of seven (7) calendar days prior to Supply or commencement of manufacture of materials from the Contractor's selected aggregate source(s), provide to the Departmental Representative for review and acceptance the following:

.1 Location, name, and owner of material source(s) and test results confirming source(s) meets this contract's required aggregate material properties and quality.

2.2 Crushed Base Gravel and Crushed Surfacing Gravel

.1 Crushed Base Gravel and Crushed Surfacing Gravel shall be manufactured by the Contractor and ensure the materials

conform with the following requirements:

.1 The material shall consist of hard durable particles free from clay lumps, frozen material, organic matter, and other deleterious materials.

.2 When tested in accordance to ASTM C136, or latest edition, the material shall have a gradation conforming to the following gradation limits:

Gradation Limits: Crushed Base Gravel	
Sieve Designation (mm)	**Percent Passing by Weight**
19	100
12.5	70 – 100
4.75	40 - 70
2.00	23 - 50
0.425	7 - 25
0.075	3 - 8

Gradation Limits: Crushed Surfacing Gravel	
Sieve Designation (mm)	**Percent Passing by Weight**
25	100
19	85 – 100
9.5	60 - 85
4.75	40 - 70
1.18	20 - 50
0.30	10 - 30
0.075	5 - 15

.3 Liquid limit when tested in accordance to ASTM D4318-00, maximum 25.

.4 Plasticity index when tested in accordance to ASTM D4318-00, maximum 6.

.5 Los Angles degradation when tested in accordance to ASTM C131-01, maximum percent loss by weight 35.

.6 Fracture, at least 60% of particles by mass retained on 4.75 mm sieve to have at least one freshly fractured face.

2.3 Sub-base Course

.1 Sub-base Course shall be manufactured by the Contractor from the following sources:

.1 "As is" materials excavated from the existing Alaska Highway (gravels excavated from existing gravel shoulder) within the limits of the work. Reuse only if excavated material is reusable following testing and processing.

.2 Manufactured materials by Contractor from other sources.

.2 The Sub-base Course material should be manufactured by Contractor and ensure the material conforms with the following requirements:

.1 The material shall consist of hard durable particles free from clay lumps, frozen material, organic matter, and other deleterious materials.

.2 When tested in accordance to ASTM C136, or latest edition, the material shall have a gradation conforming to the following gradation limits:

Gradation Limits: Sub-Base Course	
Sieve Designation (mm)	**Percent Passing by Weight**
100	100
4.75	20 - 65
0.075	0 - 8

.3 Grading of material shall not show marked fluctuations from opposite extremes of the limits given in above Table, and the curve plotted from the sieve analysis shall flow in a similar manner from acute changes in direction.

.4 Even though particle sizes are within the limits of the grading sizes herein provided, materials will be considered unsuitable if particle shapes are thin or elongated or exhibit other characteristics precluding satisfactory compaction to create a roadbed acceptable to the Departmental Representative.

.5 Liquid limit when tested in accordance to ASTM D4318-00, maximum 25.

.6 Plasticity index when tested in accordance to ASTM D4318-00, maximum 6.

.7 Fracture, at least 20% of particles by mass retained on 4.75 mm sieve to have at least one freshly fractured face.

PART 3 – EXECUTION

3.1 Processing	.1	Process aggregate uniformly using methods that prevent contamination, segregation, and degradation.
	.2	Blend, screen or crush aggregates, if required, to obtain gradation requirements, percentage of crushed particles, or particle shapes, as specified. Use methods and equipment approved by Departmental Representative.
	.3	Wash aggregates, if required to meet specifications. Use only equipment approved by Departmental Representative.
	.4	When operating in stratified deposits use excavation equipment and methods that produce uniform, homogeneous aggregate.
3.2 QA Sampling by the Departmental Representative	.1	Provide Departmental Representative with access to source and processed material for sampling during production.
	.2	Install sampling facilities at discharge end of production conveyor, to allow Departmental Representative to obtain representative samples of items being produced. Stop conveyor belt when directed by Departmental Representative to permit full cross section sampling.
	.3	Pay cost of sampling and testing of aggregates which fail to meet specified requirements.
	.4	Aggregates that do not meet specified tolerances for intended use are subject to rejection by the Departmental Representative as part of the QA process.
3.3 Handling and Transportation	.1	Avoid segregation, contamination, and degradation of aggregate during handling and transporting.
	.2	Load limit restrictions will be in accordance with British Columbia Highway Traffic Act pertaining to registered weight limits and vehicle size.
	.3	Repair and maintain stockpile / laydown areas as necessary to a condition equal to or better than when work began.
3.4 Stockpiling	.1	Stockpile aggregates in locations approved by Departmental Representative and not closer than 1.5 m from the edge of the excavation slopes. Do not stockpile on completed pavement surfaces.

.2 Stockpile aggregates in sufficient quantities to meet project schedules.

.3 Stockpile sites to be level, well drained, and of adequate bearing capacity and stability to support stockpiled materials and handling equipment.

.4 Except where stockpiled on acceptably stabilized areas, provide compacted crushed gravel base not less than 100 mm in depth to prevent contamination of aggregate. Do not incorporate compacted base of pile into work.

.5 Separate different aggregates by strong, full depth bulkheads, or stockpile far enough apart to prevent intermixing.

.6 Do not use intermixed or contaminated materials. Remove and dispose of rejected materials as directed by Departmental Representative.

.7 Uniformly spot-dump aggregates delivered to stockpile in trucks and build up stockpiles as required to prevent segregation.

.8 Do not cone piles or spill material over edges of piles.

.9 Do not use conveying stackers.

.10 Prevent ice and snow from becoming mixed into stockpile or in material being removed from stockpile.

3.5 Cleanup

.1 Any stockpiles temporarily placed on the highway right of way or on PWGSC property will be completely removed and the site restored to its natural condition.

.2 The Contractor shall be responsible for any cleanup of aggregate sources.

END OF SECTION

PART 1 – GENERAL

Section Includes

PART 1:

1.1 Measurement and Payment Procedures.

1.2 References.

1.3 Submittals.

1.4 Quality Management.

PART 2:

2.1 Materials.

PART 3:

3.1 Preparation.

3.2 Placement.

3.3 Asphalt Repairs Following Gravel Shouldering.

1.1 Measurement and Payment Procedures

.1 Payment for Gravel Shouldering will be made on the basis of the Price per Unit Bid for Gravel Shouldering in the Bid and Acceptance Form. The Price per Unit Bid shall include all costs for the supply, manufacture, loading, transport, placement, and compaction of gravel shouldering aggregate, and all other items necessary for successful completion of the works.

.2 Measurement for Payment for completion of Gravel Shouldering will be made by the length of material surveyed in lineal meters, measured parallel to the direction of the highway and accepted by the Departmental Representative. Gravel Shouldering on each side of the highway will be measured separately for payment.

1.2 References

.1 American Society for Testing and Materials (ASTM), latest edition:

.1 ASTM D698, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3)).

1.3 Submittals

.1 Submittals in accordance with Section 01 33 00 – Submittal Procedures.

1.4 Quality Management	.1	Quality Control and Quality Assurance in accordance with Section 01 45 00 – Quality Management.

PART 2 – PRODUCTS

2.1 Materials	.1	Gravel Shouldering Material shall be Crushed Base Gravel in accordance with Section 31 05 16 – Aggregates: General.

PART 3 – EXECUTION

3.1 Preparation	.1	Complete compaction and grading of Granular Material and placement of Hot Mix Asphalt Concrete Pavement prior to placement of Gravel Shouldering.
3.2 Placement	.1	Place Gravel Shouldering to the lines and grades shown on the Contract Drawings using a purpose built shouldering machine or other equipment pre-approved by the Departmental Representative.
	.2	When compacted, finished surfaces of Gravel Shouldering shall be within +/-25 mm of the lines and grades shown in the Contract Drawings but not uniformly high or low.
	.3	Compact Gravel Shouldering to a density not less than 95% of the standard maximum dry density in accordance with ASTM D698.
	.4	Use sweeper to clean any shouldering material from the Hot Mix Asphalt Concrete Pavement surface.
3.3 Asphalt Repairs Following Shouldering	.1	If the adjacent Hot Mix Asphalt Concrete Pavement is damaged during the shouldering operation, the damage shall be repaired to the satisfaction of the Departmental Representative at no cost to the owner.

END OF SECTION

PART 1 – GENERAL

Section Includes

PART 1:

1.1 Measurement and Payment Procedures.

1.2 Definitions.

1.3 References.

PART 2:

2.1 Embankment Material.

2.2 Nonwoven Geotextile.

2.3 Biaxial Geogrid

2.4 Topsoil

PART 3:

3.1 Stripping.

3.2 Excavating.

3.3 Embankment Materials.

3.4. Placement of Nonwoven Geotextile

3.5. Placement of Biaxial Geogrid

3.6 Subexcavation and Backfilling

3.7. Disposal of Excavated Material

3.8 Topsoil

1.1 Measurement and Payment Procedures

.1 Payment for Stripping will be made on the basis of the Price per Unit Bid for Stripping in the Bid and Acceptance Form. The Price per Unit Bid shall include all costs included with the excavating and temporarily stockpiling the stripped material and all other items necessary for successful completion of the work.

.2 Measurement for Payment for completion of Stripping will be made on the in-situ volume of material surveyed (surveyed prior to and following stripping) in cubic metres, excavated within the limits of the work, and accepted by the Departmental Representative. The volume will be

determined by comparing the preconstruction and post stripping survey of the area stripped. Stripping shall not include material greater than 0.3 m from the existing surface unless pre-approved prior to construction by the Departmental Representative.

.3 Payment for completion of Common Excavation to Waste will be made on the basis of the Price Per Unit Bid for Common Excavation (Waste) in the Bid and Acceptance Form. The price per unit shall include all costs for excavation, load, transport, disposal in the designated waste area, and all other items necessary for successful completion of the work.

.4 Measurement for Payment for completion of Common Excavation (Waste) will be made on the in-situ volume of material (surveyed prior to and following) excavation in cubic metres, excavated from the limits of the work, and accepted by the Departmental Representative. The total excavated volume will be determined by comparing the post stripping survey against the post excavation survey. The volume of excavation used as embankment fill or sub-base materials (measured in place as embankment following compaction) will be subtracted from the total excavation volume to find the volume of Common Excavation (Waste). No allowance for shrink or swell of the excavated material will be made.

.5 Payment for the Common Excavation (Reuse) will be made on the basis of the Price Per Unit Bid for Common Excavation (Reuse) in the Bid and Acceptance Form. This includes excavated materials from exiting highway gravel shoulder and earth materials and temporarily stockpile for re-use later as Sub-base Course and Embankment Fill respectively. The Price per Unit Bid shall include all costs for excavation, transport, stockpile and all other items necessary for successful completion of the work.

.6 Measurement for Payment for completion of Common Excavation (Reuse) will be made on the volume of material surveyed in cubic metres incorporated into either Sub-base Course materials (at the completion of compaction) or the finished highway embankment and accepted by the Departmental Representative. No separate measurement or payment for hauling of the material will be made.

.7 Payment for Embankment Fill will be made on the basis of the Price per Unit Bid for Embankment Fill in the Bid and Acceptance Form. The Price per Unit Bid shall include all costs for re-use of Common Excavation as Embankment Fill,

transport, placement (including completion of terraces (benches) in existing ground (if required)), compaction of Embankment Fill and all other items necessary for successful completion of the work.

.8 Measurement for Payment for completion of Embankment Fill will be made on the volume of material surveyed in cubic metres incorporated into the finished highway cross section (at the completion of compaction) and accepted by the Departmental Representative. No separate measurement or payment for hauling of the material will be made.

.9 Payment for the supply and installation Nonwoven Geotextile will be made on the basis of the Price per Unit Bid for Nonwoven Geotextile in the Bid and Acceptance Form. The Price per Unit Bid shall include all cost costs for the supply and installation of the Nonwoven geotextile, and all other items necessary for the successful completion of the work.

.10 Measurement for Payment for completion of the Nonwoven Geotextile will be made per the area in square metre of the Nonwoven geotextile used. The Price per Unit Bid shall include all costs for supply, transport, placement of Nonwoven geotextile and all other items necessary for successful completion of the work.

.11 Payment for the supply and installation Biaxial Geogrid will be made on the basis of the Price per Unit Bid for Biaxial Geogrid in the Bid and Acceptance Form. The Price per Unit Bid shall include all cost costs for the supply and installation of the biaxial geogrid, and all other items necessary for the successful completion of the work.

.12 Measurement for Payment for completion of the Biaxial Geogrid will be made per the area in square metre of the biaxial geogrid used. The Price per Unit Bid shall include all costs for supply, transport, placement of biaxial geogrid and all other items necessary for successful completion of the work.

.13 Payment for Topsoil Placement will be made on the basis of the Price per Unit Bid for Topsoil Placement in the Bid and Acceptance Form. The Price per Unit Bid shall include all costs for the spreading, raking, and grooming of the previously stripped material being reused as Topsoil, grading and cleanup in preparation for Hydraulic Seeding, and all other items necessary for successful completion of the work.

.14 Measurement for Payment for completion of Topsoil Placement will be made on the area of material surveyed in

square metres incorporated into the works and accepted by the Departmental Representative.

.15 Payment for Subexcavation and Backfilling will be made on the basis of the Price per Unit Bid for Subexcavation and Backfilling in the Bid and Acceptance Form. The Price per Unit Bid shall include all costs for sub-excavation, disposal of waste materials to designated waste area, manufacture, placement and compaction of Sub-base Course gavel materials as backfilling and all other items necessary for successful completion of the work. This is an Optional Work item and shall be directed by the Departmental Representative. The possible locations for subexcavation and backfilling are shown on Contract Drawings.

.16 Measurement for Payment for completion of Subexcavation and Backfilling will be made on the volume of material surveyed in cubic metres and accepted by the Departmental Representative. The volume will be determined by comparing the post stripping surface with the after sub-excavation surface.

1.2 Definitions

.1 Stripping: excavation of organic material covering the original ground.

.2 Common excavation: excavation of materials that are not rock excavation or stripping.

.3 Embankment: material derived from usable excavation and placed above stripped surface.

1.3 References

.1 Geotechnical Data Report, Tetra Tech, June 2018, Safety Improvements at Wonowon Intersection Area (Km 161.9), Alaska Highway, BC (Appendix G).

.2 ASTM D4318-10 Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

.3 ASTM D698-12, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3) (600 kN-m/m^3).

.4 ASTM D1556-07 Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.

.5 ASTM D2167-08 Standard Test Methods for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.

.6 ASTM D6938-10 Standard Test Methods for In-Place

Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods.

PART 2 – PRODUCTS

2.1 Embankment Material

.1 Embankment material shall not contain more than 3% organic matter by mass, frozen lumps, weeds, sod, roots, logs, stumps or any other unsuitable material unless otherwise directed by Departmental Representative.

.2 Embankment material shall include the common excavated materials (other than the excavated existing highway gravel materials accepted to be reused as Sub-base Course materials after testing and processing).

2.2 Nonwoven Geotextile

.1 The Nonwoven geotextile shall be Nilex 4551 or pre-approved equivalent.

2.3 Biaxial Geogrid

.1 The biaxial geogrid shall be Tensar BX1200 or pre-approved equivalent.

2.4 Topsoil

.1 Shall be organic material stripped from the native ground during stripping and temporarily stockpiled for later reuse. Topsoil shall be free of rocks > 100 mm in diameter and other debris hindering good vegetative growth.

PART 3 – EXECUTION

3.1 Stripping

.1 Complete stripping to the design lines and grades shown on the Contract Drawings unless directed by otherwise by the Departmental Representative.

.2 Haul as needed and stockpile stripped material within the limits of the work for re-use later as topsoil. Selection of a stockpile location and relocation of the stripped material stockpiles during the work (if needed) shall be the Contractor's responsibility.

3.2 Excavating

.1 Complete excavation to the design lines and grades shown on the Contract Drawings. The Common Excavation (Waste) materials include asphalt concrete pavement materials from sawcut, and surplus excavated materials. Common Excavation (Reuse) materials include gravels excavated from the existing highway shoulder that shall be reused as sub-base course materials after testing and processing and other excavated materials that shall be reused as embankment fill. Notify Departmental Representative should the excavated materials not achieve the requirements for Embankment Fill Material.

.2 During excavation maintain profiles, crowns and cross slopes to provide good surface drainage. Provide ditches as work progresses to provide drainage and construct interceptor ditches as shown on plans or as directed before excavating or placing embankment in adjacent area.

.3 If, during excavation, material appearing to conform to classification for rock excavation is encountered, notify Departmental Representative and provide sufficient time to enable measurements to be made to determine volume of rock. Payment for rock excavation (if required) will be completed via change order.

.4 Obtain embankment materials from suitable common excavation (usable) within the limits of work.

3.3 Embankment Material

.1 Place the earth materials from Common Excavation (Reuse) as embankment material following stripping to the design lines and grades, cross sections and dimensions as shown on the Contract Drawings.

.2 If suitable, the material excavated to generate the terraced / steps on hillsides shall be spread and compacted into the adjoining embankment. No additional payment will be made for excavation of terraces / steps or for placing step material in the adjoining fill.

.3 Remove any snow and ice from existing surfaces prior to placement. Do not place material which is frozen nor place material on frozen surfaces or surfaces covered in snow or ice.

.4 Maintain crowned surface during construction to ensure ready run-off of surface water.

.5 Drain low areas before placing materials.

.6 Place and compact to full width in layers not exceeding 200 mm loose thickness. Departmental Representative may authorize thicker lifts if specified compaction can be achieved and if material contains more than 25% by volume stone and rock fragments larger than 100 mm.

.7 Where material consists of rock:

.1 Place to full width in layers of sufficient depth to contain maximum sized rocks, but in no case is layer thickness to exceed 1 m.

.2 Carefully distribute rock material to fill voids with

smaller fragments to form compact mass.

.3 Fill surface voids at subgrade level with rock spalls or selected material to form earth-tight surface.

.4 Do not place boulders and rock fragments with dimensions exceeding 150 mm within 300 mm of subgrade elevation.

.8 Break material down to sizes that enable required compaction and mix for uniform moisture to full depth of layer. Embankment materials which cannot be compacted to the required density due to high moisture content, or embankment materials with a natural moisture content greater than optimum, shall not be used without prior aeration and drying.

.9 Compact each layer and test compaction of the embankment using proof rolling.

Proof rolling shall require one complete coverage of the entire embankment area for each lift by the tires of a truck having a 9 tonne single axle dual tire or 17 tonne tandem axle group with dual tires with a tire pressure of 600 kPa.

When testing the compaction of the embankment material using proof rolls, the material shall be plus or minus 2% of optimum moisture content.

When testing the compaction of the embankment material using proof rolling, the material shall be considered compacted when upon completing a pass over the embankment area, the embankment exhibits no observed unsuitable deflections or rutting.

.10 Add water or dry as required to bring moisture content of materials to level required to achieve specified compaction and complete compaction testing.

.11 Shape entire embankment to within 100 mm of design lines and grades. Finish slopes and ditch bottoms to neat condition, true to lines, grades and drawings where applicable.

.12 Remove rocks over 150 mm in any dimension from slopes and ditch bottoms.

.13 Hand finish slopes that cannot be finished satisfactorily by machine.

.14 Run dozer tracks over slopes exceeding 3 m in height to leave

growser tracks parallel to centerline of highway.

.15 Trim between constructed slopes and edge of Clearing to provide drainage free of humps, sags, ruts, and protruding stones.

.16 Maintain finished surfaces in condition conforming to this Section until acceptance by Departmental Representative.

3.4 Placement of Nonwoven Geotextile

.1 Place Nonwoven geotextile material by unrolling onto the prepared subgrade in orientation, manner and locations indicated on Contract Drawings and retain in position with pins. All Nonwoven geotextile placed on a slope shall at a minimum be secured with pins min 300 mm long every 2 m^2 of geotextile.

.2 Place Nonwoven geotextile material smooth and free of tension stress, folds, wrinkles and creases.

.3 Place geotextile material on sloping surfaces in one continuous length from toe of slope to upper extent of Nonwoven geotextile.

.4 Overlap each successive strip of Nonwoven geotextile 1000 mm over previously laid strip, such that overlaps are shingled in the direction the fill placement will be spread. Follow Manufacturer's guidelines for overlap of adjacent rolls along their sides and ends.

.5 Pin successive strips of Nonwoven geotextile with securing pins at 1000 mm interval at midpoint of lap.

.6 Protect installed Nonwoven material from displacement, damage or deterioration before, during and after placement of material layers.

.7 Replace damaged or deteriorated Nonwoven geotextile to approval of Departmental Representative.

.8 Upon acceptance by the Departmental Representative, place succeeding material as shown on the Contract Drawings.

3.5 Placement of Biaxial Geogrid

.1 Once the placement of the Nonwoven geotextile on subgrade is complete, place 150 mm thick Sub-base Course gravel and compact to density not less than 98% maximum dry density in accordance with ASTD D698. Construction equipment shall not track directly on top of the Nonwoven geotextile.

.2 Place Biaxial Geogrid material by unrolling onto compacted Sub-base layer surface in orientation, manner and locations

indicated on Contract Drawings. Tension and pin Biaxial Geogrid material in accordance with Manufacturer's guidelines.

.3 Correct orientation of the geogrid shall be verified by the Contractor. Strength direction is typical perpendicular to road control line.

.4 Overlap each successive strip of Biaxial Geogrid 600 mm over previously laid strip, such that overlaps are shingled in the direction the fill placement will be spread. Follow Manufacturer's guidelines for overlap of adjacent rolls along their sides and ends.

.5 Geogrid lengths shall be continuous. Splicing parallel to road control line is not allowed.

.6 Place remaining depth of Sub-base Course gravel on top of geogrid. See Section 32 11 19 – Sub-base Course.

.7 Construction equipment shall not track directly on top of the Biaxial Geogrid. Spread and place a minimum of 150 mm thick of Sub-base Course gravel on the Biaxial Geogrid prior to tracking/driving over with construction equipment.

3.6 Subexcavation and Backfilling

.1 Any soft spots during embankment fill placement shall be subexcavated and replaced with compacted Sub-base Course gravel materials before embankment fill is constructed. This is an Optional Work item and shall be as directed by the Departmental Representative. The possible locations for subexcavation and backfilling include but may not be limited to the locations shown on Contract Drawings.

3.7 Disposal of Excavated Material

.1 Stripping and excavation not reused as embankment fill or Sub-base Course materials, or topsoil for Hydroseeding shall be disposed at an offsite location preapproved by the Departmental Representative.

3.8 Topsoil

.1 Spread topsoil on finished embankment slopes and ditches in locations shown on Contract Drawings and approved by the Departmental Representative. Finished slopes have to be accepted by the Departmental Representative and surveyed prior to spreading topsoil on them. Place topsoil to a thickness of 100 mm (+/- 25 mm, but not uniformly high or low). Neatly shape outside limits of topsoil material to eliminate sharp changes in lines and grades. Ensure ready run-off of surface water.

.2 Screen materials to remove rocks > 100 mm in diameter and other debris hindering good vegetative growth from the

placed topsoil.

.3 Finish surface even, free of large openings and neat in appearance.

.4 Maintain finished surfaces in condition conforming to this Section until acceptance by Departmental Representative.

END OF SECTION

PART 1 – GENERAL

Section Includes

PART 1:

1.1 Measurement and Payment Procedures.

1.2 References.

PART 2:

2.1 Materials.

PART 3:

3.1 Inspection and Survey of Underlying Surface.

3.2 Placing.

3.3 Compaction.

3.4 Tolerances.

3.5 Protection.

1.1 Measurement and Payment Procedures

.1 Payment for Sub-base Course – From Common Excavation material will be made on the basis of the Price per Unit Bid for Sub-base Course – From Common Excavation in the Bid and Acceptance Form. The Price per Unit Bid shall include all costs included with testing, processing, loading, transport, placing, shaping, watering and/or drying and compaction of the sub-base course material, and all other items necessary for successful completion of the work.

.2 Measurement for Payment for completion of Sub-base Course – From Common Excavation will be made on the volume of material surveyed in cubic metres, incorporated in the works (at the completion of compaction and grading) and accepted by the Departmental Representative.

.3 Payment for Sub-base Course – From Import material will be made on the basis of the Price per Unit Bid for Sub-base Course – From Import in the Bid and Acceptance Form. The Price per Unit Bid shall include all costs included with supply, manufacture, loading, transport, placing, shaping, watering and/or drying and compaction of the sub-base course material, and all other items necessary for successful completion of the work.

.4 Measurement for Payment for completion of Sub-base Course – From Import will be made on the volume of

material surveyed in cubic metres, incorporated in the works (at the completion of compaction and grading) and accepted by the Departmental Representative.

1.3 References .1 ASTM D6938 Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

PART 2 – PRODUCTS

2.1 Materials .1 Material shall be Sub-base Course material in accordance with Section 31 05 16 – Aggregates: General.

PART 3 – EXECUTION

3.1 Inspection and Survey of Underlying Surface. .1 Place Sub-base Course material after underlying surface is surveyed by the Contractor and is inspected and approved by Departmental Representative.

3.2 Placing .1 Place Sub-base Course material to lines and grades shown on the Contract Drawings.

.2 Ensure no frozen material is placed.

.3 Place material only on clean unfrozen surface, properly shaped and compacted, and free from snow and ice.

.4 Begin spreading Sub-base Course material on crown line or on high side of one way slope.

.5 Place Sub-base Course material using methods which do not lead to segregation or degradation.

.6 Place material in uniform layers not exceeding 200 mm compacted thickness. Departmental Representative may authorize thicker lifts (layers) if specified compaction can be achieved.

.7 Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.

.8 Remove and replace segregated material.

.9 Complete dust control using water as required throughout the work (see Section 32 15 60 – Roadway Dust Control).

3.3 Compaction .1 Compact to density not less than 98% maximum dry density in accordance with ASTM D698.

.2 Shape and roll alternately to obtain smooth, even and uniformly compacted structure.

.3 Apply water as necessary during compacting to obtain specified density. If Sub-base Course material is excessively moist, take remedial action as directed by Departmental Representative.

.4 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers approved by Departmental Representative.

.5 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.

3.4 Tolerances

.1 Finished Sub-base Course surface to be within plus or minus 50 mm of the design lines and grades but not uniformly high or low.

3.5 Protection

.1 Maintain finished base in condition conforming to this section until acceptance by Departmental Representative and succeeding material is applied. No separate payment will be made for maintenance.

.2 Complete dust control using water as required succeeding material is applied (see Section 32 15 60 – Roadway Dust Control).

END OF SECTION

PART 1 – GENERAL

Section Includes

PART 1:

1.1 Measurement and Payment Procedures.

1.2 References.

PART 2:

2.1 Crushed Base Gravel

PART 3:

3.1 Inspection and Survey of Underlying Surface.

3.2 Placing.

3.3 Compaction

3.4 Tolerances

3.5 Protection

1.1 Measurement and Payment Procedures

.1 Payment for Crushed Base Gravel will be made on the basis of the Price per Unit Bid for Crushed Base Gravel in the Bid and Acceptance Form. The Price per Unit Bid shall include all costs included with the supply, manufacture, stockpiling, loading, transport, placing, shaping, watering and/or drying and compaction of the crushed base gravel, and all other items necessary for successful completion of the work.

.2 Measurement for Payment for completion of Crushed Base Gravel will be made on the volume of material surveyed in cubic metres, incorporated in the works (at the completion of compaction and grading) and accepted by the Departmental Representative. The volume of Crushed Base Gravel measured for payment shall include Crushed Base Gravel used in the bedding and backfill of culverts as shown on the Contract Drawings.

1.2 References

.1 ASTM D6938 Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

PART 2 – PRODUCTS

2.1 Crushed Base Gravel

.1 Material shall be Crushed Base Gravel in accordance with Section 31 05 16 – Aggregates: General.

PART 3 – EXECUTION

3.1 Inspection and Survey of Underlying Surface.	.1	Place Crushed Base Gravel after underlying surface is surveyed by the Contractor and is inspected and approved by Departmental Representative.
3.2 Placing	.1	Place Crushed Base Gravel material to lines and grades shown on the Contract Drawings.
	.2	Ensure no frozen material is placed.
	.3	Place material only on clean unfrozen surface, properly shaped and compacted, and free from snow and ice.
	.4	Begin spreading Crushed Base Gravel material on crown line or on high side of one way slope.
	.5	Place Crushed Base Gravel using methods which do not lead to segregation or degradation.
	.6	Place material in uniform layers not exceeding 150 mm compacted thickness. Departmental Representative may authorize thicker lifts (layers) if specified compaction can be achieved.
	.7	Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.
	.8	Remove and replace segregated material.
	.9	Complete dust control using water as required throughout the work (see Section 32 15 60 – Roadway Dust Control).
3.3 Compaction	.1	Compact to density not less than 100% maximum dry density in accordance with ASTM D698.
	.2	Shape and roll alternately to obtain smooth, even and uniformly compacted structure.
	.3	Apply water as necessary during compacting to obtain specified density. If Crushed Base Gravel material is excessively moist, take remedial action as directed by Departmental Representative.
	.4	In areas not accessible to rolling equipment, compact to specified density with mechanical tampers approved by Departmental Representative.
	.5	Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.

3.4 Tolerances	.1	Finished base surface to be within plus or minus 20 mm of the design lines and grades but not uniformly high or low.
3.5 Protection	.1	Maintain finished base in condition conforming to this section until succeeding material is applied or until acceptance by Departmental Representative. No separate payment will be made for maintenance.

END OF SECTION

PART 1 – GENERAL

Section Includes

PART 1:

1.1 Measurement and Payment Procedures.

1.2 References.

PART 2:

2.1 Materials.

PART 3:

3.1 Inspection and Survey of Underlying Surface.

3.2 Placing.

3.3 Compaction.

3.4 Tolerances.

3.5 Protection.

1.1 Measurement and Payment Procedures

.1 Payment for Crushed Surfacing Gravel will be made on the basis of the Price per Unit Bid for Crushed Surfacing Gravel in the Bid and Acceptance Form. The Price per Unit Bid shall include all costs included with the supply, manufacture, stockpiling, loading, transport, placing, shaping, watering and/or drying and compaction of the crushed surfacing gravel, and all other items necessary for successful completion of the work.

.2 Measurement for Payment for completion of Crushed Surfacing Gravel will be made on the volume of material surveyed in cubic metres, incorporated in the works (at the completion of compaction and grading) and accepted by the Departmental Representative.

1.3 References

.1 ASTM D6938 Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

.2 BC MoTI 2016 Standard Specifications for Highway Construction, BC Ministry of Transportation and Infrastructure (or latest edition).

PART 2 – PRODUCTS

2.1 Materials	.1	Material shall be Crushed Surfacing Gravel in accordance with Section 31 05 16 – Aggregates: General.

PART 3 – EXECUTION

3.1 Inspection and Survey of Underlying Surface.	.1	Place Crushed Surfacing Gravel after underlying surface is surveyed by the Contractor and is inspected and approved by Departmental Representative.
3.2 Placing	.1	Place Crushed Surfacing Gravel to lines and grades shown on the Contract Drawings.
	.2	Ensure no frozen material is placed.
	.3	Place material only on clean unfrozen surface, properly shaped and compacted, and free from snow and ice.
	.4	Begin spreading Crushed Surfacing Gravel material on crown line or on high side of one way slope.
	.5	Place Crushed Surfacing Gravel using methods which do not lead to segregation or degradation.
	.6	Place material in uniform layers not exceeding 150 mm compacted thickness. Departmental Representative may authorize thicker lifts (layers) if specified compaction can be achieved.
	.7	Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.
	.8	Remove and replace segregated material.
	.9	Complete dust control using water as required throughout the work (see Section 32 15 60 – Roadway Dust Control).
3.3 Compaction	.1	Compact to density not less than 100% maximum dry density in accordance with ASTM D698.
	.2	Shape and roll alternately to obtain smooth, even and uniformly compacted structure.
	.3	Apply water as necessary during compacting to obtain specified density. If Crushed Surfacing Gravel material is excessively moist, take remedial action as directed by Departmental Representative.
	.4	In areas not accessible to rolling equipment, compact to specified density with mechanical tampers approved by Departmental Representative.

.5 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.

3.4 Tolerances

.1 Finished base surface to be within plus or minus 20 mm of the design lines and grades but not uniformly high or low.

3.5 Protection

.1 Maintain finished gravel surface in condition conforming to this section until acceptance by Departmental Representative. No separate payment will be made for maintenance.

END OF SECTION

PART 1 – GENERAL

Section Includes

PART 1:

1.1 Measurement and Payment Procedures.

1.2 References.

1.3 Definitions.

1.4 Submittals.

1.5 Quality Management.

PART 2:

2.1 Asphalt Cement.

PART 3:

3.1 Delivery of Asphalt Cement.

3.2 Storage.

3.3 Execution.

1.1 Measurement and Payment Procedures

.1 Payment for Asphalt Cement will be incidental to Hot Mix Asphalt Concrete Pavement. No additional pavement will be made for the incidental asphalt cement.

1.2 References

.1 American Society for Testing and Materials (ASTM), latest edition.

.1 ASTM D140/D140M, Standard Practice for Sampling Asphalt Materials.

.2 American Association of State Highway and Transportation Officials (AASHTO), latest edition.

.1 AASHTO M 320, Standard Specification for Performance-Graded Asphalt Binder.

.3 British Columbia Ministry of Transportation and Infrastructure.

.1 Recognized Product List (latest version available at time of tender closing).

1.3 Definitions	.1	Supply: Supply will include ordering, purchase, scheduling, delivering, supplying storage facilities, handling, storing, sampling, testing, and other related work.
1.4 Submittals	.1	Submit samples in accordance with Section 01 33 30 – Submittal Procedures, manufactures recommended procedures, and ASTM D140/D140M.
	.2	Prior to ordering Asphalt Cement, submit manufacturer's instructions, printed product literature, and data sheets for review and acceptance by Departmental Representative. Include product characteristics, performance criteria, showing materials meet the requirements of this contract specification.
	.3	For each load of Asphalt Cement delivered for the project, provide to the Departmental Representative within 24 hrs of delivery, weigh tickets to show gross and tare weights (before and after unloading).
	.4	For each load of Asphalt Cement delivered for the project, prior to use and following delivery to site, submit one – 1 Liter samples of Asphalt Cement material in a clean, airtight, sealed, wide-mouth plastic-lined container to the Departmental Representative.
1.5 Quality Management	.1	Quality Control and Quality Assurance in accordance with Section 01 45 00 – Quality Management.
	.2	Provide access throughout the work as requested by the Departmental Representative to sample asphalt cement to be incorporated into work.

PART 2 – PRODUCTS

2.1 Asphalt Cement	.1	Asphalt Cement, Performance Grade (PG) 58-31 to meet the requirements of AASHTO M320.
	.2	Asphalt Cement shall be supplied by one of the "Accepted Producers" from one of the accepted "Terminal Supplier from Accepted Producers" as indicated in the Asphalt Cement section of the British Columbia Ministry of Transportation and Infrastructure Recognized Product List.

PART 3 – EXECUTION

3.1 Delivery of Asphalt Cement	.1	The Contractor shall ensure the supplier delivers asphalt in good condition, uniform in product, and at correct temperature to the specified delivery point.

.2 Record of delivery must be kept and every bill of landing must show:

.1 Delivery date/time/location.

.2 Type of product.

.3 Batch number.

.4 Mass.

.5 Relative density at 15 ºC.

.6 PG specification information.

.7 Temperature of product at delivery point.

3.2 Storage

.1 The Contractor is responsible for properly storing and heating the Asphalt Cement until use.

3.3 Execution

.1 As required in the production of Hot Mix Asphalt Concrete Pavement as specified in Section 32 12 16.

END OF SECTION

PART 1 – GENERAL

Section Includes

PART 1:

1.1 Measurement and Payment Procedures.

1.2 References.

1.3 Definitions.

1.4 Submittals.

PART 2:

2.1 Materials.

PART 3:

3.1 Equipment.

3.2 Application.

1.1 Measurement and Payment Procedures

.1 Payment for Asphalt Tack Coat will be made on the basis of the Price per Unit Bid for Asphalt Tack Coat in the Bid and Acceptance Form. The Price per Unit Bid shall include all costs included with the supply, transport, storage, heating, handling, and placement of the Asphalt Tack Coat, and all other items necessary for successful completion of the work.

.2 Measurement for Payment for completion of Asphalt Tack Coat will be made on the area of material surveyed in square metres, incorporated in the works and accepted by the Departmental Representative.

1.2 References

.1 American Society for Testing and Materials (ASTM).

.1 ASTM D140/D140M, Standard Practice for Sampling Asphalt Materials.

1.3 Definitions

.1 Asphalt Tack Coat: an application of liquid asphalt to promote bonding between two separate lifts of Hot Mix Asphalt Concrete Pavement.

1.4 Submittals

.1 Submittals in accordance with Section 01 33 00 – Submittal Procedures, manufactures recommended procedures, and ASTM D140/D140M.

.2 Prior to ordering materials, submit manufactures instructions, printed product literature, and data sheets for review and acceptance by Departmental Representative. Include product

characteristics, performance criteria, showing asphalt tack coat materials meet the requirements of this contract specification.

.3 Prior to use and following delivery to site, submit one – 1 Liter samples of Asphalt Tack Coat material in a clean, airtight, sealed, wide-mouth plastic-lined container to the Departmental Representative.

.4 Provide access as requested by the Departmental Representative to sample Asphalt Tack Coat material throughout the work.

.5 For each application, submit written summary report to Departmental Representative within 24 hrs of application and include information as follows.

.1 Total area covered (station start and end, width, and lane).

.2 Quantity of Asphalt Tack Coat used and mean application rate. Dipstick measurements or electronic printouts are acceptable. Carry out measurements in presence of Departmental Representative upon request.

PART 2 – PRODUCTS

2.1 Materials

.1 Asphalt Tack Coat shall be on EAP-2, EP 2000, or preapproved equivalent as determined by the Departmental Representative.

.2 Water shall be clean, potable, and free of foreign matter.

PART 3 – EXECUTION

3.1 Equipment

.1 Equipment required for Work of this Section to be in satisfactory working condition and maintained for duration of Work.

.2 Pressure distributor:

.1 Designed, equipped, maintained and operated so that asphalt material can be.

.1 Maintained at even temperature.

.2 Applied uniformly on variable widths of surface up to 6 meters.

.3 Applied at readily determined and controlled rates from 0.2 L/m^2 and greater with uniform pressure, and with allowable variation from any specified rate not exceeding 0.1 L/m^2.

.4 Distribute in uniform spray without atomization at temperature required.

.3 Equipped with meter, registering travel in meters per minute, visibly located to enable truck driver to maintain constant speed required for application at specified rate.

.4 Equipped with pump having flow meter graduated in units of 2 L or less per minute passing through nozzles and readily visible to operator. Pump power unit to be independent of truck power unit.

.5 Equipped with easily read, accurate and sensitive device which registers temperature of liquid in reservoir.

.1 Measure temperature to closest whole number.

.6 Equipped with accurate volume measuring device or calibrated tank.

.7 Equipped with nozzles of same make and dimensions, adjustable for fan width and orientation.

.8 Equipped with nozzle spray bar, with operational height adjustment in increments of 0.6 meters and capable of being raised or lowered.

.9 Cleaned if previously used with incompatible asphalt material.

3.2 Application

.1 Apply Asphalt Tack Coat only on clean, dry, and unfrozen surface.

.2 If desired by the Contractor, dilute asphalt emulsion with water at 1:1 ratio for application if recommended by the Asphalt Tack Coat supplier and preapproved by the Departmental Representative. Mix thoroughly by pumping or other method approved by Departmental Representative.

.3 Apply Asphalt Tack Coat evenly to Hot Mix Asphalt Concrete Pavement surface at rate between 0.2 L/m^2 and 0.4 L/m^2 unless recommended otherwise by the product manufacture and preapproved by the Departmental Representative.

.4 Paint contact surfaces of curbs, gutters, headers, manholes and like structures with thin, uniform coat of Asphalt Tack Coat material.

.5 Apply Asphalt Tack Coat only when air temperature greater than 10˚C and when rain is not forecast within 2 hours of application.

.6 Apply Asphalt Tack Coat only to surfaces that are expected to be overlaid on same day.

.7 Evenly distribute localized excessive deposits of tack coat by brooming as directed by Departmental Representative.

.8 Where traffic is to be maintained, treat no more than one half of width of surface in one application.

.9 Keep traffic off tacked areas until Asphalt Tack Coat has set.

.10 Re-apply Asphalt Tack Coat to contaminated or disturbed areas as directed by Departmental Representative.

.11 Allow sufficient time for Asphalt Tack Coat to set before placing Hot Mix Asphalt Concrete Pavement as directed by Departmental Representative.

.12 Inspect Asphalt Tack Coat application to ensure uniformity.

.1 Re-spray areas of insufficient or non-uniform tack coat coverage as directed by Departmental Representative.

.2 Ensure tack coating performed using hand held devices is consistent in appearance with adjacent areas of machine applied material.

END OF SECTION

PART 1 – GENERAL

Section Includes

PART 1:

1.1 Measurement and Payment Procedures.

1.2 References.

1.3 Definitions.

1.4 Submittals.

PART 2:

2.1 Materials.

PART 3:

3.1 Equipment.

3.2 Application.

1.1 Measurement and Payment Procedures

.1 Payment for Asphalt Prime will be made on the basis of the Price per Unit Bid for Asphalt Prime in the Bid and Acceptance Form. The Price per Unit Bid shall include all costs included with the supply, transport, storage, heating, handling, and placement of the Asphalt Prime, and all other items necessary for successful completion of the work.

.2 Measurement for Payment for completion of Asphalt Prime will be made on the area of material surveyed in square metres, incorporated in the works and accepted by the Departmental Representative.

1.2 References

.1 American Society for Testing and Materials (ASTM).

.1 ASTM D140/D140M, Standard Practice for Sampling Asphalt Materials.

1.3 Definitions

.1 Asphalt Prime: an application of liquid asphalt to promote bonding between the finished Crushed Base Gravel surface and the bottom lift of Hot Mix Asphalt Concrete Pavement.

1.4 Submittals

.1 Submittals in accordance with Section 01 33 00 – Submittal Procedures, manufactures recommended procedures, and ASTM D140/D140M.

.2 Prior to ordering materials, submit manufacturer's instructions, printed product literature, and data sheets for review and acceptance by Departmental Representative.

Include product characteristics, performance criteria, showing Asphalt Prime materials meet the requirements of this contract specification.

.3 Prior to use and following delivery to site, submit one – 1 Liter samples of Asphalt Prime material in a clean, airtight, sealed, wide-mouth plastic-lined container to the Departmental Representative.

.4 Provide access as requested by the Departmental Representative to sample Asphalt Prime material throughout the work.

.5 For each application, submit written summary report to Departmental Representative within 24 hrs of application and include information as follows.

.1 Total area covered (station start and end, width, and lane).

.2 Quantity of Asphalt Prime used and mean application rate. Dipstick measurements or electronic printouts are acceptable. Carry out measurements in presence of Departmental Representative upon request.

PART 2 – PRODUCTS

2.1 Materials

.1 Asphalt Prime shall be on EAP-2, EP 2000, or preapproved equivalent.

.2 Water shall be clean, potable, and free of foreign matter.

.3 Sand blotter shall be sand or fine aggregate.

PART 3 – EXECUTION

3.1 Equipment

.1 Equipment required for Work of this Section to be in satisfactory working condition and maintained for duration of Work.

.2 Pressure distributor:

.1 Designed, equipped, maintained and operated so that asphalt material can be.

.1 Maintained at even temperature.

.2 Applied uniformly on variable widths of surface up to 5 meters.

.3 Applied at readily determined and controlled rates from 0.2 L/m^2 and greater with uniform pressure, and with allowable variation from any specified rate not exceeding 0.1 L/m^2.

.4 Distribute in uniform spray without atomization at temperature required.

.3 Equipped with meter, registering travel in meters per minute, visibly located to enable truck driver to maintain constant speed required for application at specified rate.

.4 Equipped with pump having flow meter graduated in units of 2 L or less per minute passing through nozzles and readily visible to operator. Pump power unit to be independent of truck power unit.

.5 Equipped with easily read, accurate and sensitive device which registers temperature of liquid in reservoir.

.1 Measure temperature to closest whole number.

.6 Equipped with accurate volume measuring device or calibrated tank.

.7 Equipped with nozzles of same make and dimensions, adjustable for fan width and orientation.

.8 Equipped with nozzle spray bar, with operational height adjustment in increments of 0.6 meters and capable of being raised or lowered.

.9 Cleaned if previously used with incompatible asphalt material.

3.2 Application

.1 Proceed with placement of Asphalt Prime only after the Crushed Base Gravel surface is complete and accepted by the Departmental Representative and the surface proposed for Asphalt Prime is clean, dry, and unfrozen.

.2 Dilute asphalt emulsion with water at 1:1 ratio for application. Mix thoroughly by pumping or other method approved by Departmental Representative.

.3 Apply Asphalt Prime evenly to prepared surface at rate between 1.0 L/m^2 and 1.5 L/m^2 unless recommended by the product manufacture and preapproved by the Departmental Representative.

.4 Paint contact surfaces of curbs, gutters, headers, manholes and like structures with thin, uniform coat of Asphalt Prime material.

.5 Apply Asphalt Prime only when air temperature greater than 10˚C and when rain is not forecast within 2 hours of application.

.6 Apply Asphalt Prime only to surfaces that are expected to be overlaid on same day.

.7 Evenly distribute localized excessive deposits of Asphalt Prime by brooming as directed by Departmental Representative.

.8 Where traffic is to be maintained, treat no more than one half of width of surface in one application.

.9 Prevent overlap at junction of applications.

.10 Apply Asphalt Prime to areas receiving Hot Mix Asphalt Concrete Pavement. Do not apply Asphalt Prime to surfaces that will be visible when paving is complete.

.11 Keep traffic off primed areas until Asphalt Prime has set.

.12 Re-apply Asphalt Prime to contaminated or disturbed areas as directed by Departmental Representative.

.13 Allow sufficient time for Asphalt Prime to set before placing asphalt pavement.

.14 Inspect Asphalt Prime application to ensure uniformity.

.1 Re-apply Asphalt Prime to areas of insufficient or non-uniform coverage as directed by Departmental Representative.

.2 Ensure Asphalt Prime applied using handheld devices is consistent in appearance with adjacent areas of machine-applied material.

END OF SECTION

PART 1 – GENERAL

Section Includes

PART 1:

1.1 Measurement and Payment Procedures.

1.2 Definitions.

1.3 References.

1.4 Submittals.

1.5 Quality Management.

PART 2:

2.1 Aggregate.

2.2 Asphalt Cement.

2.3 Anti-Stripping Agent.

2.4 Asphalt Concrete Mix and Job Mix Formula.

PART 3:

3.1 Plant and Mixing Requirements.

3.2 Equipment.

3.3 Preparation.

3.4 Transportation & Delivery of Mixtures.

3.5 Placing.

3.6 Compaction.

3.7 Temporary Line Markings.

PART 4:

4.1 General.

4.2 Pavement Density.

4.3 Asphalt Content.

4.4 Aggregate Gradation.

4.5 Material Application Rate.

4.6 Surface segregation.

4.7 Smoothness.

4.8 Workmanship Defects.

4.9 Appeal Testing.

4.10 Asphalt Concrete Overlays as a Corrective Measure.

1.1 Measurement and Payment Procedures

.1 Payment for Hot Mix Asphalt Concrete Pavement will be made on the basis of the Price per Unit Bids for Hot Mix Asphalt Concrete in the Bid and Acceptance Form. The Price per Unit Bids shall include all costs for the supply, manufacture, loading, transport, and mixing of asphalt mix aggregate, the supply of asphalt cement, the supply, manufacture, loading, transport, placement, and compaction of asphalt concrete mix, temporary line markings, quality control, preparation of mix design, and all other items necessary for successful completion of the works. The price per unit shall further include the supply, certification, the operation of a scale to weigh all asphalt concrete mix prior to delivery to the site and the purchase, scheduling, delivery, storage, handling, and incorporation of the anti-stripping agents into the asphalt concrete mix as required.

The Hot Mix Asphalt Concrete Pavement will be subject to Payment Adjustments as detailed in Part 4 – Payment Adjustments and Rejection Limits. The bonus / penalty amounts as determined by the Payment Adjustments will be paid via change order following Substantial Performance of the project.

Acceptance of any Lot or Sub-Lot of Hot Mix Asphalt Concrete Pavement for payment will occur if the Lot or Sub-Lot complies with the requirements of the Contractor's QC plan, Part 2 – Products, and Part 3 – Execution of this specification and the following.

.1 The test results for End Product Specification (EPS) acceptance parameters are such that the Lot or Sub-Lot meets the requirements for acceptance at an adjusted rate.

.2 The Lot or Sub-Lot is approved in respect of all other requirements.

.3 The Contractor has not notified the Departmental

Representative in writing that it shall exercise its option to either repair or remove and replace the work, at its own cost, with work meeting the requirements for acceptance at full or increased payment.

.2 Measurement for Payment for completion of Hot Mix Asphalt Concrete Pavement will be made by the mass of material measured in tonnes incorporated into the work, scaled, and accepted by the Departmental Representative. Provide a copy of each weigh scale ticket to the Departmental Representative upon delivery of the Hot Mix Asphalt Concrete Pavement to the site or at the end of each workday as directed / approved by the Departmental Representative. The measurement for payment of Hot Mix Asphalt Concrete Pavement will include Hot Mix Asphalt incorporated in the Access Road Letdowns and barrier flares.

Unless accepted otherwise by the Departmental Representative, only acceptable Hot Mix Asphalt Concrete Pavement will be included in the payment quantity. Any material failing to achieve the rejection limits (see Part 4 – Payment Adjustments and Rejection Limits) shall not be measured or included for payment. Where overlays are used as a corrective measure (see Item 4.10 – Asphalt Concrete Overlays as a Corrective Measure of Contract Specification Section 32 12 16 – Hot Mix Asphalt Concrete Pavement), the overlay will not be included in the payment quantity but the quantity of Hot Mix Asphalt Concrete Pavement covered by the overlay will be measured in the payment quantity whether or not it was acceptable to the Departmental Representative.

In the Departmental Representative's sole discretion and without setting precedence, where any work is rejected but the Departmental Representative determines that it may be left in place, the Departmental Representative may authorize partial payment to the Contractor as full compensation for any residual value the work may have. Notwithstanding the foregoing, PWGSC is under no obligation to make any payment for such work.

1.2 Definitions

.1 Additives: solid or liquid materials used to enhance the properties of the liquid Asphalt Cement or Asphalt Concrete Mix.

.2 Aggregate: the crushed or screened gravel.

.3 Asphalt Cement: performance grade asphalt used in Hot Mix Asphalt Concrete Pavement.

.4 Asphalt Concrete Mix: high quality, carefully controlled, hot plant mix of Asphalt Cement and dense graded high quality crushed aggregate.

.5 Hot Mix Asphalt Concrete Pavement: paver-laid Asphalt Concrete Mix compacted to uniform density.

.6 Asphalt Content: the quantity of Asphalt Cement in the Asphalt Concrete Mix expressed as a percentage by weight of the total dry aggregate in the mix determined by the oven test procedures.

.1 Design Asphalt Content: the asphalt content upon which the Job Mix Formula is initially established.

.2 Approved Asphalt Content: Design Asphalt Content or subsequent adjustments to it, incorporated in a Job Mix Formula or revised Job Mix Formula as approved by Departmental Representative.

.3 Actual Asphalt Content: amount of asphalt binder in mix as determined by testing done under Departmental Representative's Quality Assurance program. Testing includes an amount to correct for asphalt binder lost due to absorption by the aggregate or aggregate loss.

.7 Asphalt Mix Aggregate: the processed crushed aggregate prior to the addition of the Asphalt Cement.

.8 Asphalt Mix Design: the Asphalt Concrete Mix design that is developed by the Contractor through the initial trials and testing to determine and optimize the Job Mix Formula for the end product of Asphalt Concrete Mix.

.9 Driving Lane: A driving lane shall mean a single lane in any area of the pavement other than a shoulder or a barrier flare.

.10 End Product Specification (EPS): A specification whereby the Contractor is responsible for the workmanship and Quality Control of the construction processes, and whereby the Departmental Representative reviews the workmanship and may perform the specified Quality Assurance sampling and testing of the end product for the purpose of determining acceptance / rejection and payment.

.11 Job Mix Formula: the Job Mix Formula establishes aggregate proportioning, gradation and Asphalt Cement content to be used for production of Asphalt Concrete Mix and requires

approval of Departmental Representative on basis of the Asphalt Mix Design.

.12 Leveling Course: Hot Mix Asphalt Concrete Pavement used to improve cross fall, level and strengthen existing pavements.

.13 Lift: a layer of Hot Mix Asphalt Concrete Pavement laid in a single application then compacted.

.1 Top Lift: the uppermost lift, forming the final running surface.

.2 Lower Lift: Any lift below Top Lift.

.3 Bottom Lift: The lowest Lift (excluding Leveling Course).

.14 Lot:

.1 A Lot is a portion of work being considered for acceptance and for determination of payment.

.2 For the application of the Contract requirements for Density, Asphalt Content, Aggregate Gradation and Material Application Rate, a Lot is defined as.

.1 One day's scheduled production of at least 4 hours of plant production where no changes have occurred to criteria such as, but not limited to.

.1 Accepted Job Mix Formula.

.2 Specified lift being placed.

.3 Required material application rate.

A change in any of the above criteria may require a new Lot designation.

.2 One day's production of less than 4 hours will be dealt with as follows:

.1 Material will be added to next Lot with same criteria, except if test indicates production is subject to Payment Adjustments or rejection, or if no further material will be produced with same criteria, this

production will be designated as a separate Lot.

.3 A Lot shall be no more than two days total production even if above criteria have not changed or been met.

.3 For application of the Contract requirements for Segregation and Smoothness, a Lot is defined as.

.1 One (1) kilometer length of top lift pavement for each driving lane.

.15 Quality Assurance: Departmental Representative's sampling and testing of the end product for the purpose of determining Payment Adjustments and compliance with rejection limit properties (acceptance/rejection). See Section 01 45 00 – Quality Management for further details.

.16 Quality Control: sum of all Contractor's activities to ensure a product meets Contract specification requirements which may include material handling and construction procedures, calibration and maintenance of equipment, production process control and any sampling, testing and inspection that is done for these purposes. The Contractor is entirely responsible for Quality Control. See Section 01 45 00 – Quality Management for further details.

.17 Reject Mix: Asphalt Concrete Mix that is deemed unacceptable for use in the project.

.18 Sample Mean: arithmetic mean of a set of test results constituting the sample.

.19 Sub-Lots: A portion of a Lot being considered for acceptance and for the determination of payment adjustments as follows:

.1 For Density, Asphalt Content and Aggregate Gradation, each Lot shall be divided into three equal Sub-Lots, defined by lineal metres of production.

.2 For Smoothness, each Lot shall be divided into 100 metre Sub-Lots.

.20 Surplus Aggregate: aggregate surplus to the works, in split or un-split stockpiles which singly or combined will meet the desired Aggregate Gradation for Asphalt Concrete Mix.

.21 Stratified Random Sample: a set of test measurements taken from a number of separate (stratified) areas or Sub-Lots

within a Lot in an unbiased way.

.22 Voids in Mineral Aggregate (VMA): the space available to accommodate the effective volume of Asphalt Cement (not absorbed in the aggregate) and volume of air voids necessary in the Asphalt Concrete Mix.

1.3 References

.1 Alberta Transportation.

.1 Paving Guidelines and Segregation Rating Manual (2002).

.2 British Columbia Ministry of Transportation and Infrastructure (BC MoTI).

.1 Recognized Product List (latest edition).

.2 Manual for Work on Roadways – 2015 Office Edition (Interim).

.3 2016 Standard Specifications for Highway Construction.

.3 American Society for Testing and Materials (ASTM), latest edition.

.1 ASTM C136, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

.2 ASTM C117, Test Method for Material Finer Than 75-µm (No. 200) Sieve in Mineral Aggregates by Washing.

.3 ASTM C127, Test Method for Specific Gravity and Absorption of Coarse Aggregate.

.4 ASTM C142, Test Method for Clay Lumps and Friable Particles in Aggregates.

.5 ASTM C566, Test Method for Total Evaporable Moisture Content of Aggregate by Drying.

.6 ASTM D5, Standard Test Method for Penetration of Bituminous Materials.

.7 ASTM D 2171, Standard Test Method for Viscosity of Asphalts by Vacuum Capillary Viscometer.

.8 ASTM D2419, Test Method for Sand Equivalent Value of Soils and Fine Aggregate.

.9 ASTM D2726, Standard Test Method for Bulk Specific Gravity and Density of Non-Absorptive Compacted Bituminous Mixtures.

.10 ASTM D4791, Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.

.11 ASTM D5821, Test Method for Determining the Percentage of Fractured Particles in Coarse Aggregate.

.12 ASTM D6307, Standard Test Method for Asphalt Content of Asphalt Mixture by Ignition Method.

.13 ASTM D6926, Standard Practice for Preparation of Bituminous Specimens Using Marshall Apparatus.

.14 ASTM D6928, Standard Test Method for Resistance of Coarse Aggregate to Degradation by Abrasion in the Micro-Deval Apparatus.

.15 ASTM D4318, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

.4 Asphalt Institute (AI).

.1 Asphalt Institute MS-2 Sixth Edition, Mix Design Methods for Asphalt Concrete and Other Hot-Mix Types.

.5 American Association of State Highway and Transportation Officials (AASHTO), latest edition.

.1 AASHTO T 304, Standard Method of Test for Uncompacted Void Content of Fine Aggregate.

1.4 Submittals

.1 Submittals in accordance with Section 01 33 00 – Submittal Procedures.

.2 Submit Job Mix Formula (Asphalt Mix Design) to Departmental Representative as a single PDF document (multiple files will not be accepted) for review and acceptance in accordance with the procedures outlined in Section 01 33 00 – Submittal Procedures. The Asphalt mix design shall achieve the requirements of 2.4 – Asphalt Concrete Mix and Job Mix Formula of this specification. The Asphalt Mix Design must be reviewed and accepted by the Departmental Representative prior to commencement of

pavement construction. The Departmental Representative will review the plan (first submission and if required all subsequent re-submissions) within 7 days of submission. Upon review of the plan the Departmental Representative will do one of the following:

.1 Accept the Asphalt Mix Design.

.2 Accept portions of the Asphalt Mix Design and provide comments outlining required changes, additional information, or completion of a new mix design. Following completion of required changes, additional information, or completion of a new mix design by the Contractor, the Contractor shall re-submit the complete Asphalt Mix Design for review.

.3 Reject the Asphalt Mix Design and provide comments outlining required changes or additional information needed before the Asphalt Mix Design will be reviewed in detail. Following completion of the required changes or additional information required by the Contractor, the Contractor shall re-submit the complete Asphalt Mix Design for review.

.3 Prior to ordering anti-stripping agent (if necessary) and other additives (if necessary), submit manufacturer's instructions, printed product literature, and data sheets for review and acceptance by Departmental Representative. Include product characteristics, performance criteria, showing materials meet the requirements of this contract specification.

.4 Prior to use and following delivery to site, submit one – 1 Liter samples of anti-stripping agent material in a clean, airtight, sealed, wide-mouth plastic-lined container to the Departmental Representative.

.5 Provide access as requested by the Departmental Representative to sample anti-stripping agent, and other additives throughout the work.

.6 For each shift with the placement of Hot Mix Asphalt Concrete Pavement, submit written summary report to Departmental Representative within 24 hrs of application and include information as follows.

.1 Location (station start and end) lane, and lift paved. Notes pertaining to the paving of any appurtenances (letdowns, intersections, tapers, etc.)

.2 Asphalt Concrete Mix tonnage quantity summary

and copies of the weigh scale tickets for each load of asphalt mix received at the placement operation. Weigh scale tickets shall include:

.1 Truck number.

.2 Weigh ticket number and net weight of load.

.3 Date, time, and location by station of delivery.

.3 Asphalt Cement, Anti-stripping Agents, and any other additives summary tonnage or volume quantity incorporated into the asphalt mix.

.4 Material application rate dimensions and calculations shall be provided for each Lot and each 10 truckloads of Hot Mix Asphalt Concrete Pavement placed during the applicable shift.

.7 Prior to commencement of use, provide weigh Scale and if being used Plant Silo documentation, including:

.1 Location and type of scale.

.2 Calibration Test results.

.8 Coring: The contractor shall be responsible for providing all core samples for Quality Assurance and Payment Adjustments purposes. Unless instructed otherwise, the randomly selected locations for cores shall be supplied by the Departmental Representative to the Contractor. The Contractor shall provide 100 mm diameter cores for these purposes. If requested, the Contractor shall prepare the cores prior to the submission by removing all material not representative of the Hot Mix Asphalt Pavement Lift to be tested. The Contractor shall deliver these cores and provide the locations of the coring to the Departmental Representative, within 24 hours of being provided the locations for the coring, to a designated location as directed by the Departmental Representative.

The Contractor shall fill all core holes before the roadway is re-opened to traffic. Core holes shall be filled by the following method:

.1 Empty the hole of water and loose material.

.2 Remove any excess moisture by wiping the inside with a dry towel.

.3 Apply Tack Coat to the inside surfaces. Apply emulsified asphalt to the outside perimeter.

.4 Place Hot Mix Asphalt Concrete Pavement in loosely, so that the compacted Lifts do not exceed 75 mm.

.5 With a minimum of 20 blows per Lift, compact the loose material using a minimum 2 kg sledge hammer and tamper.

.6 For additional Lifts, repeat Steps 1 to 5.

.7 The final Lift shall be a minimum thickness of 25 mm, and finished to a level higher but not exceeding 6 mm, than the elevation of the surrounding pavement.

The Contractor may use an alternative method if acceptable to the Departmental Representative.

All costs associated with obtaining the cores, including the filling and compaction of the core holes are considered incidental to the Contract and are the responsibility of the Contractor.

.9 Loose samples: The Contractor shall allow for the collection of two (2) loose samples per Sub-Lot by the Departmental Representative from the paver screed or behind the paver screed at random locations. The loose samples shall be collected for Quality Assurance (Payment Adjustments purposes) and as appeal samples should they be needed.

If requested by the Departmental Representative, the Contractor shall collect the two (2) loose samples per Sub-Lot from the paver screed or behind the paver screed at random locations requested by the Departmental Representative. The volume of each samples shall be as directed by the Departmental Representative. The Contractor shall deliver the samples to the Departmental Representative within 24 hours of being collected, to a designated location as directed by the Departmental Representative.

.10 Upon submission and acceptance of the Asphalt Mix Design by the Departmental Representative, the Contractor shall prepare and submit to the Departmental Representative blank aggregate samples for correlation of the Contractor's, Departmental Representative's, and appeal laboratory ignition ovens. The Blanks shall be prepared in accordance

with BC MoTI 2016 Standard Specifications for Highway Construction, Section 502, Appendix 3 – Blank Aggregate Sample Preparation. The Departmental Representative will randomly select which of the individual blanks will be used by each party. Within 3 working days and prior to any mix production, the Contractor and the Departmental Representative shall prepare and test Asphalt Concrete Mix samples in accordance with Section 502, Appendix 4 – Ignition Oven Correlation Procedure of the BC MoTI 2016 Standard Specifications for Highway Construction.

1.5 Quality Management

.1 Quality Control and Quality Assurance in accordance with Section 01 45 00 – Quality Management.

.2 Provide access throughout the work as requested by the Departmental Representative to sample Asphalt Cement to be incorporated into work.

.3 Quality Control Testing Frequency: Minimum test frequency requirements as described in Table 01 45 00 – 01.

.4 Quality Control of aggregate production is responsibility of Contractor. Tests performed by Departmental Representative will be Quality Assurance tests and will not be considered as Quality Control tests. The Contractor shall not produce paving aggregate until the Contractor has received written notification that their Quality Management Plan is acceptable and has in-place testing facilities for aggregate production that are in accordance with their Quality Management Plan.

.5 Provide and maintain equipment and qualified personnel to perform all field testing necessary to determine the characteristics of the materials produced and incorporated into work.

.6 Use professional engineering services and a qualified test laboratory licensed to practice in British Columbia to assess and where necessary, modify aggregate materials being produced to ensure their end use meets all specification requirements.

.7 Departmental Representative reserves the right to test and monitor quality of material being produced by the Contractor at any time and as often as necessary. Departmental Representative is under no obligation to provide Contractor with test results and this testing shall not in any way relieve Contractor of responsibility of producing aggregates that meet specifications in all respects.

PART 2 – PRODUCTS

2.1 Aggregate

.1 The Contractor shall provide their own source(s) of aggregate materials for Hot Mix Asphalt Concrete Pavement. Asphalt Mix Aggregate materials shall be in accordance with Section 31 05 16 – Aggregates: General and the requirements of this specification section.

.2 Aggregate shall be composed of sound, hard and durable particles of sand, gravel and rock free from injurious quantities of elongated, soft or flaky particles, shale, loam and organic or other deleterious materials.

.3 Aggregate shall fully comply with specifications and the Contractor shall recognize and satisfy himself as to the type and amount of work (including washing or other means as necessary) that may be needed to produce the material in accordance with the requirements of these specifications.

.4 Contractor shall split aggregates into coarse and fine fractions prior to crushing coarse fraction. Crushed coarse and fine fractions shall be stockpiled separately with no intermixing of materials.

.5 Aggregate shall meet the following requirements:

.1 Coarse Aggregate.

.1 Shall be all mineral filler retained on sieve designated in test procedures for each individual test.

.2 Shall consist of crushed stone, crushed gravel, or combination thereof, or materials naturally occurring in a fractured condition, or materials naturally occurring of highly angular nature or rough texture.

.3 Shall be free from coating of clay, silt, or other deleterious material, and shall meet requirements in Table 32 12 16 – 01. The tests referenced in Table 32 12 16 – 01 shall be completed to the minimum frequencies and schedule (when applicable) listed in Table 01 45 00 – 01 (Section 01 45 00 – Quality Management).

Table 32 12 16 – 01: Requirements for Coarse Aggregates		
Test Reference #	**Procedures**	**Requirement**
ASTM C127	Maximum Water Absorption: % by mass	2
ASTM C142	Maximum % by mass of clay balls and friable particles	1.0
ASTM D5821	2 Fractured Faces: Minimum % by Mass retained on the 4.75mm sieve	90
ASTM D5821	1 Fractured Faces: Minimum % by Mass retained on the 4.75mm sieve	98
ASTM D6928	Maximum Micro-Deval abrasion loss factor, %	18
ASTM D4791	Flat and Elongated Particles, Max.% by weight	5

.2 Fine Aggregate.

.1 Shall be all mineral filler retained on sieve designated in test procedures for each individual test.

.2 Shall be clean, tough, durable, moderately sharp, and free from coatings of clay, silt, or other deleterious material, and shall contain no clay balls or other aggregations of fine material.

.3 Shall have a sand equivalent of not less than 40 when tested in accordance with ASTM D2419.

.4 Shall have a minimum value of 45 when tested according to the AASHTO Test T 304, Method “A” - Uncompacted Void Content of Fine Aggregate when determining Fine Aggregate Angularity.

.5 Fine aggregate shall have a minimum 60% manufactures fines (passing the 4.75 mm sieve).

.3 Mineral Filler and Mineral Dust:

.1 Mineral filler shall consist of all matter passing the 0.600 mm sieve and mineral dust shall consist of all matter passing the 0.075 mm sieve.

.2 Mineral filler and mineral dust to be free from organic matter.

.3 Mineral filler shall be non-plastic when

tested with ASTM D4318.

.6 Coarse aggregate, fine aggregate, mineral filler, and mineral dust when required shall be combined to produce the gradation of Hot Mix Asphalt Concrete Pavement shown in Table 32 12 16 – 02.

Table 32 12 16 – 02: Asphalt Mix Aggregate Gradation Limits

Sieve Size (mm)	Percentage Passing by Mass
16.0	100
12.5	90 – 100
9.5	73 – 90
4.75	50 – 75
2.36	35 – 57
1.18	26 – 45
0.600	18 – 34
0.300	10 – 26
0.150	6 – 17
0.075	3 – 7

.7 If blend sand is required, it shall be screened to pass the 4.75 mm sieve. There shall be a minimum of 1000 tonnes of blend sand in stockpile at all times, unless less than 1000 tonnes is required to complete the work.

2.2 Asphalt Cement

.1 Purchase, supply, deliver, store, and handle Asphalt Cement to plant site until use in accordance with Section 32 12 10 – Asphalt Cement.

.2 Any change in Asphalt Cement type or grade must be preapproved by the Departmental Representative.

2.3 Anti-Stripping Agent

.1 Unless shown otherwise per the requirements of 2.4 – Asphalt Concrete Mix and Job Mix Formula of these specifications, the Contractor shall select, supply, and incorporate into the Asphalt Concrete Mix an antistrip additive from the “Accepted Products” and “Accepted Manufactures / Suppliers” as indicated in the Anti-stripping Agents section of the British Columbia Ministry of Transportation and Infrastructure Recognized Product List. “Trial use only” products shall not be used.

2.4 Asphalt Concrete Mix and Job Mix Formula

.1 Preparation and submittal of the Asphalt Mix Design for acceptance by the Departmental Representative is the responsibility of Contractor. All costs incurred in Asphalt Mix Design formulation are the responsibility of the Contractor. The Asphalt Mix Design shall be submitted in

accordance with Item 1.4 – Submittals, Subsection .2 of Contract Specification Section 32 12 16 – Hot Mix Asphalt Concrete Pavement.

.2 The Contractor shall utilize a qualified registered member of the Association of Professional Engineers and Geoscientists of British Columbia or a qualified, registered member of the Applied Science Technologists and Technicians of British Columbia who shall sign off the asphalt mix design. The Contractor shall also utilize a CCIL certified testing laboratory meeting the requirements of Section 01 45 00 – Quality Management and acceptable to the Departmental Representative, to assess the aggregate material proposed for use and to carry out the asphalt mix design(s).

.3 Aggregate proportioning and Asphalt Content for the approved Asphalt Mix design will form the Job Mix Formula for production of Asphalt Concrete Mix. Asphalt Mix Design, Job Mix Formulas, and field adjustments made in accordance with these specifications must all be based on the Asphalt Mix meeting the requirements of Item 2.4 - Asphalt Concrete Mix and Job Mix Formula, Subsection .4 of this specification and Table 32 12 16 – 02.

.4 Requirements for Asphalt Mix Design:

.1 Asphalt Mix design shall be performed using the asphalt cement grade specified in Section 32 12 10 – Asphalt Cement and which is from the same refinery contracted to supply the asphalt cement for the duration of the project. Any subsequent changes in the asphalt cement supplied by the Contractor will require a new Asphalt Mix Design unless accepted otherwise by the Departmental Representative.

.2 Asphalt Mix Design shall follow Marshall Method of Mix Design as outlined in latest edition of the Asphalt Institute Manual Series No. 2 (MS-2). The Asphalt Mix Design, at the Design Asphalt Content, shall meet requirements in Table 32 12 16 - 03.

Table 32 12 16 – 03: Marshall Design and Production Criteria	
Property of Laboratory Compacted Paving Mixture	**Requirement**
Number of blows each face of test specimens	75
Minimum % Voids in mineral aggregate for maximum particle size	14.5
Voids Fill with Asphalt (VFA)	65% – 75%
Percentage of Air Voids in laboratory compacted mixture	2.5 to 4.0
Minimum Marshall Load, N @ 60^0C	10,000
Flow Index, units of 0.25mm	8 to 14
Asphalt Film Thickness	Min 8.0 microns
Minimum Tensile Strength Ratio (TSR) - AASHTO T283	75

.3 The Asphalt Concrete Mix shall have tensile strength ratio (TSR) of 75 or greater. The Contractor shall be responsible to incorporate an anti-stripping agent into the Asphalt Concrete Mix at a sufficient volume to achieve this minimum TSR ratio.

.4 Should the Contractor provide documentation showing a TSR ratio of 75 can be achieved without the use of an anti-stripping agent, upon approval of the Departmental Representative, the requirement for an anti-stripping agent can be withdrawn.

.5 The Asphalt Mix Design submission shall include the following information:

.1 Gradation of each aggregate to be used in mixture.

.2 Percentage by mass of each aggregate to be used in mixture.

.3 Asphalt Mix Design gradation of combined aggregate.

.4 Aggregate characteristics including sand equivalent, percentage of fractured faces, and bulk specific gravity.

.5 All Marshall mix design characteristics, including graphs used in arriving at final mix design, bulk specific gravity of combined aggregates, and asphalt absorption of combined aggregates.

.6 Recommended Design Asphalt Content expressed as a percentage of dry weight of aggregate.

.7 Theoretical maximum specific gravity of asphalt mix design at design asphalt content and at asphalt contents considered above and below design asphalt content.

.8 Identification of each asphalt supplier by name, location and type and grade of asphalt to be supplied.

.9 For each asphalt sample supplied, include the asphalt specific gravity and recommended mixing and compaction temperature for the preparation of design specimens.

.10 Void tables to include air voids, VMA and voids filled with asphalt for various asphalt content (0.1% increments) and bulk densities (increment of 5 kg/m3).

.5 Verification of Asphalt Mix Design.

.1 Verification of the Asphalt Mix Design will be carried out by the Contractor during the course of production of the first 1,000 tonnes of mix using the Asphalt Mix Design.

.2 During the first 1,000 tonnes of plant production, the Contractor may make any adjustments it chooses to the Asphalt Mix Design, testing the mix, and refining the Asphalt Mix Design to a state that fully complies with Table 32 12 16 – 02 and Table 32 12 16 – 03, Item 2.4 - Asphalt Concrete Mix and Job Mix Formula, Subsection .6 of Contract Specification Section 32 12 16 – Hot Mix Asphalt Concrete Pavement, and these Contract Specifications.

.3 All mix of the Asphalt Mix Design laid must be tracked by the Contractor, and reported to the Departmental Representative, as to lay-down location and the Asphalt Mix Design values in effect at the time that mix was produced, to ensure appropriate values are used in comparing design to sampled properties.

.4 After production of the first 1,000 tonnes, the Contractor shall declare their Job Mix Formula (JMF) to the Departmental Representative, and

provide volumetric properties/test data on the final mix produced. Any future adjustments to the JMF shall comply with all requirements of Item 2.4 - Asphalt Concrete Mix and Job Mix Formula, Subsection .6 of Contract Specification Section 32 12 16 – Hot Mix Asphalt Concrete Pavement.

.5 Where the JMF varies from the Asphalt Mix Design by a cumulative amount greater than any tolerance specified in Item 2.4 - Asphalt Concrete Mix and Job Mix Formula, Subsection .6.1 of Contract Specification Section 32 12 16 – Hot Mix Asphalt Concrete Pavement, the Contractor shall do a single point confirmatory Asphalt Mix Design and report the results to the Departmental Representative.

.6 Field Adjustment of Job Mix Formula.

.1 A field adjustment to the Job Mix Formula is defined as a change in the asphalt cement content of the mix, aggregate gradation and/or proportioning of various aggregate sizes, within the specified limits without review and acceptance of a new Asphalt Mix Design. The maximum cumulative field adjustment from the job mix formula shall be:

.1 +/- 2.0% passing the 12.5 mm and 9.5 mm sieve.

.2 +/- 1.5% passing the 4.75 mm, 2.36 mm, 1.18 mm, 0.600 mm, 0.300 mm, and 0.150 mm sieve.

.3 +/- 0.5% passing the 0.075 mm sieve.

.4 +/- 0.3% Asphalt Content.

.2 The proposed field adjustment shall be submitted in writing per Section 01 33 00 – Submittal Procedure together with supporting documentation to the Departmental Representative. The Departmental Representative will review the field adjustment for conformance with the contract requirements and notify the Contractor whether or not it is acceptable.

.3 The Contractor’s field adjustment to the Job Mix Formula must comply with the Asphalt Mix Design requirements of Item 2.4 - Asphalt Concrete Mix and Job Mix Formula, Subsection .1 through .4 inclusive of Contract Specification Section 32 12 16 – Hot

Mix Asphalt Concrete Pavement. The Contractor shall provide all supporting verification data.

.4 After the Job Mix Formula has been established in accordance with Item 2.4 - Asphalt Concrete Mix and Job Mix Formula, Subsection .6 of Contract Specification Section 32 12 16 – Hot Mix Asphalt Concrete Pavement, no field adjustment to the Job Mix Formula will be permitted without prior written approval of the Departmental Representative. The Contractor shall be limited to two field adjustments of the Job Mix Formula from the originally derived Asphalt Mix Design.

PART 3 – EXECUTION

3.1 Plant and Mixing Requirements

.1 Mixing plants shall be operated in accordance with manufacturer's recommendations and shall be calibrated prior to commencing production of the specified Asphalt Concrete Mix.

.2 Storage facilities for Asphalt Cement shall be capable of heating material under effective and positive control and shall contain provision for measuring and sampling. Each tank shall contain only one asphalt cement material.

.3 Contractor shall supply equipment necessary to add liquid anti-stripping agent or other additives (if necessary). If liquid anti-stripping agent is required it shall be added in-line with liquid asphalt when it is being pumped into the storage tank.

.4 Asphalt Concrete Mix Production.

.1 Aggregate and Asphalt Cement shall be combined to produce a uniform mixture of specified gradation at an Asphalt Content in accordance with the approved Job Mix Formula and in which all particles of aggregate are uniformly coated.

.2 The temperature of the asphalt mix measured at the plant discharge chute shall be maintained at plus or minus 15°C of the Design Mixing Temperature designated in the accepted Mix Design, with adjustments within that range made at the Contractor’s discretion. Where the Contractor plans to adjust the actual mix temperature to 10°C or more above the Design Mixing Temperature, the Contractor shall notify the Departmental Representative prior to making the adjustment. To optimize mix properties during inclement weather or

to address other specific circumstances, the Departmental Representative may agree, in advance, to a higher mixing temperature. Mix produced at a temperature above the upper tolerance limit may be deemed Reject Mix by the Departmental Representative.

.3 Plant emissions shall not exceed the limits set by British Columbia Ministry of the Environment.

.4 Asphalt plant must be equipped with pollution control devices in addition to, or in replacement of standard cyclone dust collectors, to effectively eliminate emission of dust and smoke pollutants into atmosphere. The use of secondary dust collection systems which require discharge of dust polluted water into natural drainage system will not be allowed. Regardless of requirements stated in the above, asphalt plant operation must comply with all environmental pollution control regulations applicable to the work area.

.5 A uniform mixture shall be produced in which all particles are thoroughly coated. Aggregate particles shall not be coated with residue from fuel combustion.

.6 Contractor shall dispose of rejected Asphalt Concrete Mix in a manner acceptable to Departmental Representative.

3.2 Equipment

.1 Rollers shall be reversible and self-propelled with compaction capability to match plant production rates.

.2 Pavers shall have be self-propelled and operated with automatic electronic screed controls to maintain required levels, crossfalls, and joint matching.

.3 Pavers shall have a paver hopper insert with a minimum capacity of 12 tonnes installed in the hopper of conventional paving equipment when a Materials Transfer Vehicle (MTV) is used.

.4 Pavers shall have the option of attaching a “sloper” for use along the outside edge of the Hot Mix Asphalt Concrete Pavement shoulder should the Departmental Representative request its use.

.5 MTV shall be equipped as follows.

.1 To have a truck unloading system which receives the Asphalt Concrete Mix from the hauling equipment and independently delivers mixture from the hauling equipment to the paving equipment.

.2 Has remixing capability by either a storage bin in the MTV with a minimum capacity of 12 tonnes of Asphalt Concrete Mix and a remixing system in the bottom of MTV storage bin, or a dual pugmill system located in the paver hopper insert with two full length transversely mounted paddle mixers to continuously blend the Asphalt Concrete Mix as it discharges to a conveyor system.

.3 Provide the paver with a homogeneous, non-segregated mixture of uniform temperature with no more than 11ºC difference between the highest and lowest temperatures when measured transversely across the width of the mat in a straight line at a distance of 0.3 m to 0.9 m from the screed while the paver is operating.

.6 If the MTV malfunctions during spreading operations, discontinue placement of Hot Mix Asphalt Concrete after there is sufficient material placed to maintain traffic in a safe manner. Placement of Hot Mix Asphalt Concrete in a lift not exceeding 50 mm may continue until any additional Hot Mix Asphalt Concrete in transit at the time of the malfunction has been placed. Cease spreading operations thereafter until the MTV in operational.

.7 Ensure the MTV is empty when crossing a bridge and is moved across without any other Contractor vehicles or equipment on the bridge. Move the MTV across a bridge in a travel lane and not on the shoulder. Ensure the speed of the MTV is no greater than 8 km/h without any acceleration or deceleration while crossing a bridge.

3.3 Preparation

.1 Failed areas in existing surfaces shall be repaired as directed by Departmental Representative. Areas requiring repair will be identified by Departmental Representative in consultation with Contractor.

.2 Before Hot Mix Asphalt Concrete Pavement is placed, dirt and other objectionable material shall be removed from the surface to be paved, by brooming or other methods.

.3 Existing fillets and ramps at approaches to railway crossings and bridge structures, or adjacent to paved surfaces or other structures, shall be removed to depths shown on plans or in a

manner acceptable to Departmental Representative. Removed material shall be disposed of and exposed surfaces shall be prepared in a manner acceptable to Departmental Representative.

.4 Where new surfacing materials are placed against an existing pavement structure, joint shall be of a vertical butt type, well bonded, sealed and finished to provide a continuous, smooth profile across the joint.

.1 Contact edges of existing asphalt mats shall be coated with Asphalt Tack Coat in accordance with Section 32 12 13.16 before placing Hot Mix Asphalt Concrete Pavement.

.2 Existing concrete pavement surface shall be coated with Asphalt Tack Coat in accordance with Section 32 12 13.16 before the asphalt overlay is constructed.

.3 When paving bottom lift of asphalt, apply and let set Asphalt Prime in accordance with Section 32 12 13.23 - Asphalt Prime.

3.4 Transportation & Delivery of Mixtures

.1 Trucks used for transportation of the Asphalt Concrete Mix shall be compatible with the size and capacity of the spreading equipment.

.2 Load limit restrictions will be in accordance with British Columbia Highway Traffic Act pertaining to registered weight limits and vehicle size.

.3 Truck boxes shall be clean, free from accumulations of asphalt mix and foreign material.

.4 Excess truck box lubricants such as light oil, detergent or lime solutions shall not be allowed to contaminate the mix, and shall be disposed of in an environmentally acceptable manner.

.5 During transport, Asphalt Concrete Mix shall be completely covered to protect it from precipitation and excessive heat loss by securely fastened waterproofed tarpaulins, unless otherwise approved by Departmental Representative.

.6 No loads shall be sent out so late in the day as to prevent completion of spreading and rolling of Hot Mix Asphalt Concrete Pavement during daylight.

3.5 Placing

.1 Hot Mix Asphalt Concrete Pavement shall not be placed when air temperature is below 4°C, or when weather is rainy.

.2 Hot Mix Asphalt Concrete Pavement shall be placed only on clean, dry, and unfrozen surfaces.

.3 Hot Mix Asphalt Concrete Pavement shall be placed in a MTV in advance of the paver.

.4 Hot Mix Asphalt Concrete Pavement shall be placed to the widths, thicknesses, and locations shown on the Contract Drawings. Unless otherwise shown on the Contract Drawings, Hot Mix Asphalt Concrete Pavement shall be placed in the following lift thickness.

.1 New Construction: Driving Lanes, Shoulder, and Access Road Letdowns. The lifts thicknesses shall be as follows:

.1 Top lift: 50 mm (top lift for widened road portion, and overlay for existing pavement).

.2 Lower lift 50 mm.

.3 Bottom lift: 60.

.2 Overlay on Existing Pavement:

.1 50 mm Hot Mix Asphalt Concrete Pavement overlay.

.5 If, during construction, it is found that the spreading and finishing equipment in operation leaves tracks or indented areas that are not satisfactorily corrected by the scheduled operations, or if it produces other permanent blemishes, the use of such equipment shall be discontinued and other satisfactory spreading and finishing equipment shall be provided by the Contractor.

.6 Longitudinal joints shall not be permitted in driving lane on the final lift of Hot Mix Asphalt Concrete Pavement.

.7 Longitudinal joints shall be offset a minimum of 150 mm from one lift to the next.

.8 Longitudinal and transverse joints shall be vertical butt type, well bonded and sealed, and finished to provide a continuous, smooth profile across the joints. Surplus material will be disposed of in a manner acceptable to the Departmental Representative. Broadcasting surplus material across the mat

will not be permitted.

.9 If requested by the Departmental Representative finish the outside edge of the Hot Mix Asphalt Concrete Pavement shoulder using the paver "sloper". The width, rise, and run of "sloper" to be as agreed to with the Departmental Representative.

.10 If required by the Departmental Representative the contact edge of any mat placed by the Contractor shall be coated with Asphalt Tack Coat before placing the adjacent mat.

.11 When paving is temporarily discontinued in any lane, the mat shall be tapered to a slope of 10 horizontal to 1 vertical. The taper may be placed on tar paper and shall be removed when paving is resumed. The transverse joint shall be straight and have a vertical face when the taper is removed.

.12 Transverse construction joints from one lift to the next shall be separated by at least 2 meters.

.13 Where the construction of a final lift of pavement next to a concrete curb section or curb and gutter section will be delayed, the Contractor shall construct a temporary asphalt concrete fillet next to the concrete section in accordance with the plans or as directed by the Departmental Representative. These fillets shall be removed when paving is resumed.

.14 Road intersections and entrances shall be paved in accordance with the plans or as directed by the Departmental Representative. Unless otherwise permitted by the Departmental Representative, the Hot Mix Asphalt Concrete Pavement shall be spread on intersections by means of a paver as paving of the main lanes progress.

.15 Contact faces of curbs, gutters, manholes, and sidewalks shall be coated with asphalt using a hand applicator before placing the Hot Mix Asphalt Concrete Pavement.

.16 When two or more lifts of Hot Mix Asphalt Concrete Pavement are required, apply Asphalt Tack Coat between each lift in accordance with Section 32 12 13.16 - Asphalt Tack Coat.

.17 Asphalt Tack Coast shall be allowed to cure prior to placing subsequent lift of Hot Mix Asphalt Concrete Pavement.

3.6 Compaction

.1 All Hot Mix Asphalt Concrete Pavement shall be free from segregation, waves, hairline cracks, and other obvious defects after final rolling of mat.

.2 After final rolling is complete, Contractor shall ensure finished mat has cooled a minimum of 2 hours before opening to traffic.

.3 Lubricants such as light oil, fuel oil, detergent or lime solutions shall not be allowed on rollers. Hot Mix Asphalt Concrete Pavement will be rejected if Asphalt Concrete Mix is contaminated by any lubricants other than water.

.4 Contractor should take core samples to determine actual pavement density. At the start of paving, the Contractor should take a minimum of two pavement cores from each Sub-Lot. The Contractor may employ a nuclear densometer to ensure intermediate density control. Two nuclear densities may be determined for each Sub-Lot, based on accepted Asphalt Concrete Mix densities obtained from the most recent mix briquettes.

3.7 Temporary Line Markings

.1 The Contractor shall provide daily interim centreline painted traffic markings (spotting) on all newly constructed Hot Mix Asphalt Concrete Pavement to be exposed to traffic overnight.

.2 All temporary pavement marking shall be completed per the requirements of Section 4.4.2 of the British Columbia Ministry of Transportation Traffic Manual for Work on Roadways – 2015 Office Edition (Interim).

PART 4 – PAYMENT ADJUSTMENTS AND REJECTION LIMITS

4.1 General

.1 The Hot Mix Asphalt Concrete Pavement will be subject to the Payment Adjustments and Rejection Limits as detailed in this section. PWGSC's Quality Assurance testing results will be used to determine the Payment Adjustment amounts (bonus / penalty) and to determine if the minimum Rejection Limits are achieved (acceptance or rejection) of the Hot Mix Asphalt Concrete Pavement.

Payment Adjustment amounts will be made via change order following Substantial Performance of the project.

Hot Mix Asphalt Concrete Pavement which does not achieve minimum rejection limits will be subject to correction and or rejection without payment.

Unit Price Adjustments and Rejection Limits will apply to the following end product properties of the Hot Mix Asphalt

Concrete Pavement as detailed in Section 4.2 – 4.8 of this specification.

.1 Pavement Density (Unit Price Adjustments and Rejection Limits).

.2 Asphalt Content (Unit Price Adjustments and Rejection Limits).

.3 Aggregate Gradation (Rejection Limits only).

.4 Material Application Rate (Unit Price Adjustments and Rejection Limits).

.5 Surface Segregation (Rejection Limits only).

.6 Smoothness (Unit Price Adjustments and Rejection Limits.

.7 Workmanship Defects (Rejection Limits only).

.2 For the first 1000 tonnes of Asphalt Concrete Mix produced under a contract the following provisions take precedence over all other payment adjustment provisions of Section 4.2 – 4.8 of this specification, but do not take precedence over the rejection criteria.

.1 Unless requested otherwise by the Contractor in writing in advance of Asphalt Concrete Mix production, the first 1,000 tonnes of Asphalt Concrete Mix production and placement shall not be subject to the bonus/penalty payment adjustments for Asphalt Cement content, density and gradation. Payment adjustments will apply to smoothness, segregation and material application rate if the Hot Mix Asphalt Concrete Pavement is applied in a Top Lift location.

.2 Contrary to any other provision of this specification for Hot Mix Asphalt Concrete Pavement, any Asphalt Concrete Mix produced during the initial 1,000 tonnes will only be considered acceptable if.

.1 The Asphalt Mix Design has been reviewed and accepted by the Departmental Representative.

.2 Aggregate gradation per Item 2.1 – Aggregate of Contract Specification Section 32 12 16 – Hot Mix Asphalt

Concrete Pavement is within the gradation limits specified in Table 32 12 16 – 02, or in the banana formed by applying the Table 32 12 16 - 06.

.3 All other properties fall inside the allowable limits specified in this specification for the Hot Mix Asphalt Concrete Pavement including the marshal design, Table 32 12 16 – 03.

.4 Asphalt Cement content of the sample is within +/- 0.5% of the design value for top lift and is within +/- 0.55% of the design value for the bottom lift.

All values are measured against the Asphalt Mix Design value at the time the sampled mix was produced.

Any Asphalt Concrete Mix with any characteristic outside the limits listed above is Reject Mix. Additionally, rejection limits for smoothness, segregation, density, application rate, and workmanship defects shall apply in accordance with this specification.

4.2 Pavement Density

.1 Payment Adjustments: Payment Adjustments for pavement density will be made on the average Marshall Percent Density for each Lot as follows.

$$\text{Marshall Percent Density} = \frac{\text{In-place Density (core sample)}}{\text{Marshall Briquette Density}} \times 100$$

.1 In-Place Density: The average in-place density will be determined from core samples of the completed Lift of pavement. One random core sample from each Sub-Lot will be tested and the test results for the three (3) Sub-Lots will be averaged to determine the in-place density for the Lot.

.2 Marshall Briquette Density: The marshall briquette density will be determined by forming four (4) briquettes from one randomly selected loose sample from the samples available from each Sub-Lot. The test results will be averages (with one (1) outlier discarded and not used in the calculated average) to obtain a Marshall Briquette Density for the Lot.

Note: the samples shall be allowed to cool and then reheated to form briquettes.

.3 Should the initial test results for Marshall Percent Density in any Sub-Lot be lower than 97.0%, one additional core shall be taken within the Sub-Lot and tested, result shall be averaged with the initial result to determine the Marshall Percent Density for the Sub-Lot.

.4 Payment adjustment for pavement density will be the amount shown in Table 32 12 16 – 04 for the Sample Mean of the test results for that Lot.

Table 32 12 16 – 04: Payment Adjustment for Density

Marshall % Density (Lot Average)	Payment Adjustment ($ per tonne) for Design Lift Thickness
≥ 98.0	$1.50
≥ 97.5 to < 98.0	$1.00
≥ 97.0 to < 97.5	$0.50
≥ 96.5 to < 97.0	-$1.00
≥ 96.0 to < 96.5	-$2.00
< 96.0	Reject

.2 Rejection Limits: If any Sub-Lot has a Marshall Percent Density below 96.0%, the Sub-Lot will be considered rejectable (regardless of the values of other acceptance parameters) and subject to the Contractor's opportunity to correct the density, will be rejected and not paid for. The Contractor shall either overlay or remove and replace the previously placed area of reject Hot Mix Asphalt Concrete Pavement (see Item 4.10 – Asphalt Concrete Overlays as a Corrective Measure, subsection .1 and .2 of this specification). To minimize the cost of rejection to the Contractor, the Contractor will be provided the opportunity to isolate the area of low density within the Sub-Lot. The limits of the rejected area shall be verified and accepted by the Departmental Representative before remedial work proceeds.

.3 Payment Adjustments for Pavement Density Rejected Work Made Acceptable: Payment Adjustments for pavement density rejected work made acceptable will be based on testing of the replacement or Asphalt Concrete Overlay material where applicable. Where replacement or Asphalt Concrete Overlay material does not cover the entire Lot or Sub-Lot, prior tests of the uncovered area or remaining area will be averaged with new tests on the corrective work.

.4 Pavement Density Testing: Pavement density testing will be

completed in accordance with.

.1 ASTM D6926 (latest edition) – Standard Practice for Preparation of Bituminous Specimens Using Marshall Apparatus.

.2 ASTM D2726 (latest edition) - Standard Test Method for Bulk Specific Gravity and Density of Non-Absorptive Compacted Bituminous Mixtures.

4.3 Asphalt Content

.1 Payment Adjustments: Payment Adjustments for Asphalt Content will be made on the average Asphalt Content for each Lot obtained from all of the Sub-Lots samples as follows.

.1 Determination of Asphalt Content will be made from random loose Quality Assurance samples obtained from each Sub-Lot (3 per Lot) and tested in accordance with ASTM test procedures.

.2 Asphalt Content of Hot Mix Asphalt Concrete Pavement will be determined using average of results obtained from all Sub-Lot samples. The Actual Asphalt Content of Lot will be compared to Job Mix Formula Asphalt Content and the deviation will be used for Payment Adjustment purposes.

.3 Payment Adjustments for Asphalt Content will be the amount shown in Table 32 12 16 - 05.

Table 32 12 16 – 05: Payment Adjustment for Asphalt Content		
Deviation from Actual Asphalt Content from Approved Asphalt Content (% of Dry Aggregate, Lot Average)	**Payment Adjustment for Asphalt Content $ per tonne**	
Percent Greater than Specified in JMF	**Top Lift**	**Lower Lift**
≥ -0.05 to ≤ 0.35	$0.00	$0.00
> 0.35 to ≤ 0.40	-$2.00	-$2.00
> 0.40 to ≤ 0.45	-$3.50	-$3.50
> 0.45 to ≤ 0.50	-$5.00	-$5.00
> 0.50 to ≤ 0.55	Reject	-$6.50
> 0.55	Reject	Reject
Percent Less than Specified in JMF	**Top Lift**	**Lower Lift**
≥ -0.05 to ≤ 0.20	$0.00	$0.00
> 0.20 to ≤ 0.30	-$1.00	-$1.00
> 0.30 to ≤ 0.35	-$3.00	-$3.00
> 0.35 to ≤ 0.40	-$5.00	-$5.00
> 0.40 to ≤ 0.45	-$7.00	-$7.00
> 0.45 to ≤ 0.50	-$8.00	-$8.00
> 0.50 to ≤ 0.55	Reject	-$9.00
> 0.55	Reject	Reject

.2 Rejection Limits: Rejection limits for Asphalt Content are the limiting values of the sample mean as shown in Table 32 12 16 - 05, beyond which the Lot is rejected and not paid for. If Asphalt Content of a Lot is outside acceptance limits, the Lot is rejected automatically regardless of values of other acceptance parameters. For top lift deviation of more than 0.50%, the Contractor shall either overlay or remove and replace the Lot (see 4.10 – Asphalt Concrete Overlays as a Corrective Measure). For lower lift deviations of more than 0.55%, the Departmental Representative will determine whether removal and replacement is necessary. For material that is allowed to stay in place, a deduction at 50% of the unit price bid per tonne of material will be implemented.

.3 Payment Adjustments for Asphalt Content Rejected Work Made Acceptable: Payment Adjustments for Asphalt Content rejected work made acceptable will be based on testing of the replacement or Asphalt Concrete Overlay material where applicable. Where replacement or Asphalt Concrete Overlay material does not cover the entire Lot or Sub-Lot, prior tests of the uncovered area or remaining area will be averaged with new tests on the corrective work.

.4 Asphalt Content Testing: Asphalt Content testing will be completed in accordance with.

.1 ASTM D6307 – Standard Test Method for Asphalt Content of Asphalt Mixture by Ignition Method. Note: the ignition oven calibration factor will be

applied to Asphalt Content measured by the ignition oven, and the corrected Asphalt Content used to determine acceptability of the mix and any payment adjustments.

4.4 Aggregate Gradation.

.1 Payment Adjustments: Payment Adjustments for aggregate gradation will not be made.

.2 Rejection limits: Where one or more values of the sample mean for the specified sieves falls outside the Limits for Aggregate Gradation (Divergence from Job Mix Formula Grading Curve) specified in Table 32 12 16 - 06, or the requirements for fracture as specified in Table 32 12 16 - 01 is not achieved, the Lot is rejected and not paid for regardless of the values of other acceptance parameters. For top lifts the Contractor shall either overlay or remove and replace the Lot (see 4.10 – Asphalt Concrete Overlays as a Corrective Measure). For bottom lifts the lift shall remain in place, however no payment will be made for this lot.

.3 Payment Adjustments for Aggregate Gradation Rejected Work Made Acceptable will not be made.

.4 Rejection limits: Rejection limits for aggregate gradation rejected work made acceptable will be based on testing of the replacement or Asphalt Concrete Overlay material where applicable.

.5 Aggregate Gradation Testing: Aggregate Gradation testing will be completed in accordance with.

.1 ASTM C117 – Standard Test Method for Materials Finer than 75-µm (No. 200) Sieve in Mineral Aggregates by Washing.

.2 ASTM C136 – Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

Table 32 12 16 – 06: Reject Limits for Aggregate Gradation (Divergence from Job Mix Formula Grading Curve), Percentage passing by mass ASTM C117 and C136

Sieve Size (mm)	Limiting Values for Acceptance (%)
12.5	+/- 7.0
4.75	+/- 6.0
0.6	+/- 4.0
0.07	+/- 1.5

4.5 Material Application Rate

.1 Payment Adjustments: Payment Adjustments for material

application rate will be made on the actual material application rate, expressed as a percentage of the specified material application rate for each Lot as follows.

.1 Hot Mix Asphalt Concrete Pavement will be applied to roadway at rate specified on the drawings, contract specifications, or as directed in writing by Departmental Representative. Material application rates will be determined by tonnage delivered to paver as recorded by weigh tickets generated by automated scales, divided by the area covered by the Lot after allowances have been made for entrance letdowns and/or intersections. Contractor will provide material application rate calculations to Departmental Representative at end of each shift.

.2 Payment Adjustments for material application rate will be the amount shown in Table 32 12 16 – 07, based on the actual material application rate, expressed as a percentage of the specified material application rate.

Table 32 12 16 – 07: Payment Adjustments for Material Application Rates

Actual Application Rate Expressed as % of Specified Application Rate	Payment Adjustment $ Per Tonne of Material in the Lot	
	Bottom Lift or Single Lift	Top Lift or Multiple Lifts
≥ 110	-$7.00 for all material in the Lot up to 110% and no payment for product in excess of 110.0%	-$7.00 for all material in the Lot up to 106% and no payment for product in excess of 106.0%
≥ 106.0 to < 110.0	-$5.00	
≥ 105.0 to < 106.0		-$5.00
≥ 104.0 to < 105.0	-$1.00	-$3.00
≥ 96.0 to < 104.0	+$0.50	+$0.50
≥ 94.0 to < 96.0	-$2.00	-$2.00
≥ 92.0 to < 94.0	-$3.00	-$3.00
≥ 90.0 to < 92.0	-$4.00	-$4.00
≥ 85.0 to < 90.0	-$7.00	-$7.00
< 85.0	Reject	Reject

.2 Rejection Limits: Where actual material application rate for the Lot is within the reject zone as shown in Table 32 12 16 - 07, the Lot is rejected with no payment made for the Lot. A Lot rejected for material application rate may be corrected by

mill and fill (see 4.10 – Asphalt Concrete Overlays as a Corrective Measure), and/or rejected with no remedial work required at the discretion of Departmental Representative.

.3 Payment Adjustments for Material Application Rejected Work Made Acceptable: Payment Adjustments for material application rejected work made acceptable will be based on the material application rate of the final product (remedial mill and fill combined with any remaining Asphalt Concrete Mix) for the Lot.

4.6 Surface Segregation

.1 Payment Adjustments: Payment Adjustments for surface segregation will not be made.

.2 All top lift segregation (slight, moderate, and severe) shall be repaired such that the finished pavement surface is homogeneous, free from segregation and shall be uniform with respect to surface texture. A segregated area is defined as an area within the driving lanes of the pavement wherein the texture differs visually from the texture of the surrounding pavement.

.3 Determination of Segregation.

.1 The Contractor and Departmental Representative shall establish through use of photographs as contained in the Alberta Transportation – Paving Guidelines and Segregation Rating Manual (2002), the visual appearance as provided in Table 32 12 16 - 08, and / or other mutually agreed tools, the definition of slight, moderate and severe segregation.

.2 At the request of the Departmental Representative, the Departmental Representative and Contractor shall evaluate first two Lots upon completion of the second Lot, after opening to traffic, to confirm "agreed to" guidelines.

.3 Contractor and Departmental Representative will observe finished pavement to evaluate the existence, severity and extent of segregation and other defect only when all paving is complete.

.4 Evaluation will be completed following substantial performance of the work prior to Completion.

.4 Repair of Surface Segregation.

.1 On the top lift, all segregation, including any areas

outside the driving lanes assessed for Payment Adjustments shall be repaired according to Table 32 12 16 – 08.

.2 All segregated patch repairs shall be completed to a rectangular shape.

.3 Repairs shall be to the neat lines and dimensions of the segregated areas using sand cement slurry or other product acceptable to the Departmental Representative. Acceptable sand cement slurry can be made as follows, with proportions varied as needed for workability.

.1 25 liters of ss-1 (or equivalent) emulsions.

.2 4 – 5 kg (2 shovels) of ≤ 3 mm sand.

.3 2 – 3 kg (1 shovel) Type GU (general use) Portland Cement.

.4 Additional water, if needed for workability.

.5 Or other products preapproved by the Departmental Representative.

.4 After repairs, the Lot will be re-evaluated for acceptance, not for segregation Payment Adjustment.

.5 Continuous or semi-continuous longitudinal blemishes which have not been rated as segregated areas shall be repaired using a fog coat where directed by Departmental Representative.

.6 Repairs shall be carried out by the Contractor at his own expense and will not affect the assessment of Pay Adjustments for segregation.

.7 If an Asphalt Concrete Overlay is used as a corrective measure on a defective Lot, the Asphalt Concrete Overlay thickness will be subject to approval of Departmental Representative. Where an Asphalt Concrete Overlay is used as a corrective measure in any lane, adjacent lane(s) shall also be overlaid to same thickness and length, regardless of whether adjacent lanes were acceptable or not. The Asphalt Concrete Overlay will be subject to same specifications as original pavement. Minimum thickness of Asphalt Concrete Overlay shall be 40

mm.

.8 Whether the Asphalt Concrete Overlay is applied as a corrective measure or is placed over otherwise acceptable pavement in order to match an adjacent lane, acceptability and payment will be determined as follows.

.1 Acceptability, and eligibility for either positive or negative Payment Adjustment, will be determined entirely on the results of testing and observations conducted on the Asphalt Concrete Overlay, regardless of test results that have been obtained on the underlying, overlaid lift of pavement.

Table 32 12 16 – 08: Segregation - Remediation Methodology

Segregation Severity	Visual Appearance	Repair Procedures	Lift
None	Uniform surface texture	N/A	Top
Slight	Matrix of asphalt binder, coarse and fine aggregate exists, visually increased presence of stone sizes.	Sand, asphalt emulsion slurry	Top
Moderate	Significantly more stone than surrounding pavement; matrix of asphalt binder and coated sand particles is reduced	Seal coat or sand asphalt emulsion slurry patch or neat hot mix patch or mill and fill patch	Top
Severe	Appears as an area of very stony mix - stone against stone - little or no matrix	Remove and replace or overlay to limits defined by Departmental Representative	Top and bottom

4.7 Smoothness

.1 Smoothness Deficiencies: Smoothness deficiencies (bumps and dips) less than 12 mm over 3 m will not have remedial work required. Individual deficiencies between 8 mm and 12 mm over 3 m will result in a -$200.00 Payment Adjustment for each occurrence. Deficiencies exceeding 12 mm over 3 m will require remedial work.

.2 Remedial Work: If the test results on a Sub-Lot(s) of pavement indicate a payment reduction or rejection because of smoothness, the Contractor may propose remedial work to improve the smoothness. Such proposals are subject to approval of the Departmental Representative, but such approval does not imply the proposed remedy will be successful, and does not reduce the Contractor's responsibility for meeting the acceptance requirements. Grinding may be acceptable, but an Asphalt Concrete Overlay may be required. Only one attempt may be made to

improve smoothness, and this must be completed within ten (10) calendar days from the time the Contractor receives notification from the Departmental Representative of the original smoothness test results for that Sub-Lot.

No payment will be made for any material, equipment or labour used to improve, or attempt to improve, smoothness.

.3 Payment Adjustments for Smoothness Rejected Work Made Acceptable: Following any attempt to improve the smoothness of a Sub-Lot or Sub-Lots, the Departmental Representative will retest the Sub-Lot(s), and the new results will replace the previous data for the purposes of determining acceptance and payment.

4.8 Workmanship Defects

.1 Finished surface of any lift shall have a uniform close texture and be free of visible signs of poor workmanship. Any obvious defects as determined by Departmental Representative such as, but not limited to the following, will be cause for automatic rejection of Hot Mix Asphalt Concrete Pavement regardless of the values of any other control characteristic.

.1 Individual bumps and dips that exceed 12 mm over a 3 m length.

.2 Areas of excess or insufficient asphalt.

.3 Improper matching of longitudinal and transverse joints.

.4 Roller marks.

.5 Tire marks.

.6 Cracking or tearing.

.7 Improperly repaired sampling locations.

.8 Improperly constructed patches.

.2 When Hot Mix Asphalt Concrete Pavement is rejected by reason of obvious defects, the minimum area of rejection will be the actual length of the defect for the full width of the driving lane in which the defect exists.

.3 Rejected work shall be promptly repaired, remedied, overlaid, or removed and replaced all in a manner acceptable to Departmental Representative. Contractor shall be responsible for all costs including materials.

.4 No payment will be made for work in any Lot which has been rejected, until defects have been remedied.

4.9 Appeal Testing

.1 Density, Asphalt Content and Gradation.

.1 Contractor may appeal results of acceptance testing of density or Asphalt Content for any rejected or penalized Lot only once. Appeals will only be considered if cause can be shown. Appeal shall be for all tests within the Lot, and there will be no appeal allowed for single tests within a Lot. Quality Control tests for density which are provided to Departmental Representative subsequent to Contractor's receipt of Quality Assurance test results for that Lot will not be considered when evaluating cause for an appeal.

.1 Any attempt to improve density on the appeal Lot after Departmental Representative has tested the Lot for acceptance shall void the appeal and original test results will apply.

.2 Following procedures will apply for an appeal:

.1 Contractor shall serve notice of appeal to Departmental Representative, in writing, within 48 hours of receipt of test results with exception of appeals for gradation and Asphalt Content where appeal period will be within 72 hours of receipt of test results.

.2 Departmental Representative will arrange and pay for an independent testing laboratory to perform appeal testing. Neither personnel employed or testing laboratory retained by Contractor for Quality Control testing nor personnel employed or testing laboratory retained for quality assurance testing for PWGSC/Departmental Representative on project will be used for appeal testing.

.3 The appeal testing laboratory shall hold current certification from the Canadian Council of Independent Laboratories (CCIL) (http://www.ccil.com/) under both the Asphalt Laboratory and Aggregate Laboratory Certification Programs, and at

least one technician in the asphalt laboratory shall hold current certification under the Asphalt Technician Certification Program.

.4 For Density appeals the Contractor will within 2 working days of filing the appeal and in the presence of the Departmental Representative take 5 core samples from random locations from a Sub-Lot and provide the core samples to the Departmental Representative. The Departmental Representative will provide the core samples and the companion loose Asphalt Concrete Mix samples from the appealed Sub-Lots to the independent appeal testing laboratory.

.5 For Density, the appeal agency shall prepare new briquette densities from the previously taken companion samples. The appeal agency shall determine the BRD/MTD from the companion sample and the densities of the cores and report the results to the Departmental Representative and the Contractor. The original core test results will be discarded and a new sample mean will be calculated from the 5 random cores and shall be used for acceptance and Payment Adjustments for the Sub Lot. The new results will be binding on the Contractor and PWGSC.

.6 For Asphalt Content and gradation, the original test results will be discarded. A new sample mean for three new test results will be determined using the appeal samples and will be used for acceptance and Payment Adjustments. New results will be binding on the Contractor and PWGSC.

.2 Smoothness.

.1 The Contractor may appeal acceptance test results of smoothness of any rejected or penalized Lot once. The appeal shall be in writing and submitted within 72 hours of receipt of the test results.

.2 Any attempt to improve smoothness on the appealed Lot after the Departmental Representative has tested the Lot for acceptance shall void the appeal and the

original test results will apply.

.3 The appeal testing will be performed by the Departmental Representative, and the Contractor will be given the opportunity to witness, the appeal testing and new results will be binding on the Contractor and PWGSC.

.3 Surface Segregation, Material Application Rate, and Workmanship Defects.

.1 The Contractor's appeal of surface segregation ratings must be done in writing and submitted within 72 hours of receipt of Ratings.

.2 Appeal of surface segregation ratings will first be handled by a joint review with the Contractor within 14 calendar days of receipt of written notice of appeal.

.3 If consensus cannot be reached then PWGSC and the Contractor will engage a mutually agreed upon third party to assess the area(s) in question. New values will be binding on the Contractor and PWGSC.

.4 Payment for Appeal Testing

.1 If the new results indicate a change in the Payment Adjustment in the Contractor's favour, then sampling and testing costs incurred during the appeal procedures for that Lot will be borne by PWGSC.

.2 If the new results verify that any payment reductions or rejections remains valid for that Lot, then the costs of testing (plus 10% mark-up) incurred during the appeal procedure will be charged to the Contractor.

4.10 Asphalt Concrete Overlays as a Corrective Measure

.1 If an Asphalt Concrete Overlay is used as a corrective measure on a defective Lot or Sub-Lot, the overlay thickness will be subject to approval of Departmental Representative. Where an Asphalt Concrete Overlay is used as a corrective measure in any lane, adjacent lane(s) shall also be overlaid to same thickness and length, regardless of whether adjacent lanes were acceptable or not. The overlay will be subject to same specifications as original pavement, except minimum thickness of overlay shall be 40 mm.

.2 Whether the Asphalt Concrete Overlay is applied as a corrective measure or is placed over otherwise acceptable pavement in order to match an adjacent lane, acceptability

and payment will be determined as follows:

.1 Acceptability, and eligibility for either positive or negative Payment Adjustment, will be determined entirely on the results of testing and observations conducted on the Asphalt Concrete Overlay, regardless of test results that have been obtained on the underlying, overlaid lift of pavement; but

.2 The payment quantity, for application of the Unit Prices for Hot Mix Asphalt Concrete Pavement, and the quantity, to which any Payment Adjustment is to be applied, will be derived from the tonnage of Asphalt Concrete Mix in the underlying, overlaid lift.

END OF SECTION

PART 1 – GENERAL

Section Includes

PART 1:

1.1 Measurement and Payment Procedures.

PART 2:

2.1 Water.

PART 3:

3.1 Dust Control Using Water.

1.1 Measurement and Payment Procedures

.1 Measurement for Payment for the completion of dust control using water shall not be made and shall be considered incidental to the work.

PART 2 – PRODUCTS

2.1 Water

.1 If necessary, apply for necessary environmental permits for the extraction of water from local sources.

PART 3 – EXECUTION

3.1 Dust Control Using Water

.1 Complete dust control using water over the full width of all utilized driving lanes whenever:

.1 Dust from travelling vehicles impairs driver's vision such that objects greater than 150 m are obscured.

.2 As deemed necessary by the Departmental Representative.

END OF SECTION

PART 1 – GENERAL

Section Includes

PART 1:

1.1 Measurement and Payment Procedures.

PART 2:

2.1 Paint

PART 3:

3.1 Equipment.

3.2 Layout and Location of Work.

3.3 Dimensions of Lines.

3.4 Condition of Surfaces.

3.5 Application.

3.6 Tolerances.

3.7 Protection of Completed Work.

1.1 Measurement and Payment Procedures

.1 Payment for the Pavement Markings will be made on the basis of the Lump Sum Price in the Bid and Acceptance Form. The Lump Sum Price shall include all costs included with the layout, eradication of previous paint marks (where required), supply and installation of the line painting, traffic arrows, stop bars, median yellow hatches, and all other items necessary for successful completion of the work.

.2 Measurement for Payment for completion of Pavement Markings will be made on the Lump Sum Price.

PART 2 – PRODUCTS

2.1 Paint

.1 Paint.

.1 To CGSB 1 206 M89, alkyd traffic paint.

.2 Color: to CGSB 1-GP-12C, yellow 505 – 308 and 1-GP-12C, white 513 – 301.

.2 Thinner.

.1 To CGSB 1-GP-5M.

.3 Glass Beads.

.1 Overlay Type: to CGSB 1-GP-74M.

PART 3 – EXECUTION

3.1 Equipment

.1 Provide all equipment including but not limited to painting truck, pilot truck and ancillary equipment to load and transport materials.

.2 Painting truck to apply paint and beads as specified.

.3 Eradicator to remove lines if required as directed by Departmental Representative.

3.2 Layout and Location of Work

.1 Layout work as follows.

.1 Contractor shall be responsible for all pre-marking required to properly apply markings.

.2 Paint line types in the locations as provided on the Contract Drawings.

.2 Paint pavement markings as follows:

.1 Solid (white edge lines), Dashed (white lane lines), Dashed (white continuity lines), Solid (white left turn lines), Solid (white stop bars), Solid (yellow directional dividing lines), Double Solid (yellow directional dividing lines), Median Markings (yellow hatches), Lane Use Arrows.

3.3 Dimensions of Lines

.1 Dimensions of lines as per Contract Drawings.

3.4 Condition of Surfaces

.1 Contractor is to insure that pavement surface is free from surface water, frost, ice, dust, oil, grease and other foreign materials as required before painting.

3.5 Application

.1 Set up traffic control.

.2 Clean pavement surface of water, frost, ice, dust, gravel, oil or grease.

.3 Apply paint only when air temperature is above 10^{o}C and no rain is forecast for 6 hours.

.4 Apply paint evenly at a wet film thickness of 400 micrometres, or 45 litre/Km of solid 100 mm line.

.5 Do not thin paint unless approved by Departmental Representative.

.6 Symbols and letters to conform to Uniform Traffic Control Devices for Canada.

.7 Paint lines to be uniform color and density with sharp edges.

.8 Thoroughly clean distributor tank before refilling with paint of different color.

.9 Apply glass beads at rate of 700-grams/ litre of paint.

.10 Remove traffic control.

3.6 Tolerances

.1 Paint markings to be within plus or minus 12 mm of indicated dimensions.

.1 Paint thickness to be within plus or minus 10% of specified thickness or volume.

.2 Application of glass beads to be within 25 grams/litre of paint.

.3 Repaint or correct, as directed, markings that do not meet these tolerances.

3.7 Protection of Completed Work

.1 Protect pavement markings until dry.

END OF SECTION

PART 1 – GENERAL

Section Includes

PART 1:

1.1 Measurement and Payment Procedures.

1.2 References

PART 2:

2.1 Gate and Hardware

PART 3:

3.1 Equipment.

3.2 Site Preparation.

3.3 Installation of Gate.

3.4 Waste Management and Disposal.

1.1 Measurement and Payment Procedures

.1 Payment for chain link fence gate will be made on the basis of the Lump Sum Price for Chain Link Fence Gate in the Bid and Acceptance Form. The Lump Sum Price shall include all costs associated with supply, layout and installation of the Chain Link Fence Gate, and all other items necessary for successful completion of the work.

.2 Measurement for Payment for completion of Chain Link Fence Gate will be measured by Lump Sum based on the percentage of work completed and accepted by the Departmental Representative.

1.2 References

.1 American Society for Testing and Materials International, (ASTM).

.1 ASTM A53/A53M-[02], Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.

.2 ASTM A90/A90M-[01], Standard Test Method for Weight [Mass] of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings.

.3 ASTM A121-[99], Standard Specification for Zinc-Coated (Galvanized) Steel Barbed Wire.

.4 A653/A653M-[03], Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.2 BC Ministry of Transportation and Infrastructure 2016 Standard Specifications for Highway Construction (or latest edition), Section 741.

PART 2 – PRODUCTS

2.1 Gate and Hardware

.1 Gate and Hardware.

.1 Gate and hardware shall be in conformance with the BC MoTI 2016 Standard Specification for Highway Construction (or latest edition), Section 741 Drawing SP741-05.03 and SP741-05.04 and shall be equipped with hinges and locking hardware.

.2 Gate shall be double swing gate, 10 m wide in total and 1.5 m or 1.8 m high to suit existing chain link fence.

PART 3 – EXECUTION

3.1 Equipment

.1 Provide all equipment necessary for shipment, cutting existing chain link fence, site preparation, and installation of gate.

3.2 Site Preparation

.1 Contractor shall be responsible for all pre-installation preparatory works including grading and frontage roads.

3.3 Installation of Gate

.1 Install gate in location shown on the Contract Drawings.

.2 Cut existing chain link fence to suit the size of gate.

.3 Install hardware to permit the gate to operate correctly, shall be securely attached to prevent the easy removal of the gate and hardware. The gate shall be installed to permit the gate to swing back one-way against the fence.

.4 Level the ground between gate posts and set gate bottom approximately 40 mm above ground surface.

.5 Determine position of centre gate rest for double gate.

.1 Cast gate in concrete as directed.

.2 Dome concrete above ground level to shed water.

.3 Install gate stops where indicated.

3.4 Waste Management and Disposal

.1 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.2 Remove from site and dispose chain link fence materials cut from existing fence to an offsite disposal location approved by Departmental Representative.

END OF SECTION

PART 1 – GENERAL

Section Includes

PART 1:

1.1 Measurement and Payment Procedures.

1.2 Product Data.

1.3 Scheduling.

1.4 Product Handling and Storage.

PART 2:

2.1 Materials.

2.2 Equipment.

PART 3:

3.1 Workmanship.

3.2 Protection of Surfaces.

3.3 Preparation of Slurry.

3.4 Slurry Application.

3.5 Warranty and Maintenance.

1.1 Measurement and Payment Procedures

.1 Payment for hydraulic seeding will be made on the basis of the Price per Unit Bid for Hydroseeding in the Bid and Acceptance Form. The Price per Unit Bid shall include all costs for supply, placement, warranty, and maintenance of the Hydroseeding in all areas of decommissioned highway, topsoil, cut slopes, ditches, and other disturbed areas as detailed in these specifications or as directed by the Departmental Representative.

.2 Measurement for Payment for completion of Hydroseeding will be made on the area of material surveyed in hectares, incorporated in the works and accepted by the Departmental Representative. Areas of blending into the existing landscape will not be measured for payment.

1.2 Product Data

.1 Provide product data, prior to seeding for:

.1 Seed:

.1 Shipping Bill: issued by supplier of material,

identifying manufacturer and supplier, material, and net mass or volume in each container.

.2 Mulch.

.1 Shipping Bill: issued by supplier of material, identifying manufacturer and supplier, material, and net dry-air mass in each container.

.3 Tackifier.

.1 Shipping Bill: issued by supplier of material, identifying manufacturer and supplier, material, and net dry-air mass in each container.

.4 Fertilizer

.1 Shipping Bill: issued by supplier of material, identifying manufacturer and supplier, material, and net dry-air mass in each container.

.2 Guarantees.

.3 Chemical Analysis.

.2 Submit in writing to the Departmental Representative 14 days prior to commencing work:

.1 Volume capacity of hydraulic seeder in litres.

.2 Amount of material to be used per tank based on volume.

.3 Number of tank loads required per hectare to apply specified slurry mixture per hectare.

1.3 Scheduling

.1 Schedule hydraulic seeding to coincide with the completion of other related works on which the hydraulic seeding shall be applied.

1.4 Product Handling and Storage

.1 Deliver and store seed in original containers individually labeled in accordance with “Seeds Regulations” and indicating name of supplier.

.2 Deliver and store mulch, tackifier, and fertilizer in moisture-proof containers displaying product date.

.3 Protect all product as required during transportation and storage.

.4 Remove from project area, product that has become wet or otherwise damaged during transportation or storage, or does not meet requirements specified.

PART 2 – PRODUCTS

2.1 Materials

.1 Seed: "Canada pedigreed grade" in accordance with Government of Canada Seeds Act and Regulations.

.1 Grass Mixture: "Certified", Canada No. 1 seed for common cultivars in accordance with Government of Canada Seeds Act and Regulations and shall conform to the following:

Grass Seed Mix	
% By Weight	**Species**
30%	Creeping Red Fescue
20%	Slender Wheatgrass
10%	Alsike Clover
10%	Timothy
10%	Canada Bluegrass
15%	Smooth Brome Grass
5%	Sheep Fescue

.2 Fall rye.

.2 Wood Fiber Mulch shall be specifically manufactured for use in hydraulic seeding equipment, non-toxic, water activated, green colouring, free of germination and growth inhibiting factors with the following properties:

.1 Made from wood cellulose fibre.

.2 Organic matter content: 95% +/- 0.5%

.3 Value of pH: 6.0

.4 Potential water absorption: 900%

.3 Tackifier shall be powder produced from natural plant gum or acceptable equivalent and with the following properties:

.1 Free flowing.

.2 Non-corrosive.

.3 Biodegradable.

.4 Water dilutable.

.5 Liquid dispersion.

.4 Water: free of impurities that would inhibit germination and growth.

.5 Fertilizer:

.1 To Canada Fertilizers Act and Regulations.

.2 Complete synthetic, 50% slow release sulfur coated urea. Ratio: 18:18:18.

2.2 Equipment

.1 Capable of mixing and evenly distributing seed, fertilizer, and mulch mixtures for efficient treatment of areas to be seeded.

.2 Agitation system:

.1 To be built-in.

.2 To have sufficient capacity to agitate, suspend and homogeneously mix slurry of materials in amounts specified using slurry recirculation or mechanical agitation method.

.3 To be capable of operating during seeding and charging of the tank.

.3 Slurry tank to have working capacity of at least 4,500 litres with pump capable of maintaining continuous, nonfluctuating stream of slurry. Distribution lines to be equipped with appropriate nozzles and of sufficient diameter to prevent blockage. Tank volume to be certified by certifying authority and identified by authorities with the Volume Certification Plate.

.4 Capable of seeding by 50 m hand operated hose and appropriate nozzles.

PART 3 – EXECUTION

3.1 Workmanship

.1 Apply hydroseeding in all areas of decommissioned highway, topsoil, cut slopes and other disturbed areas as detailed in

these specifications or as directed by the Departmental Representative.

.2 Do not spray onto structures, signs, guiderails, plant material, and other than surfaces intended.

.3 Clean-up immediately, any material sprayed where not intended, to satisfaction of Departmental Representative.

.4 Do not perform work under adverse field conditions such as wind speeds over 10 km/h, frozen ground or ground covered with snow, ice or standing water, or other adverse conditions.

.5 Protect seeded areas from trespass until plants are established.

3.2 Protection of Surfaces

.1 Fine grade areas to be seeded free of humps and hollows. Ensure areas are free of deleterious and refuse materials.

.2 Obtain Departmental Representative's review of grade and topsoil depth before starting to seed.

3.3 Preparation of Slurry

.1 Measure quantities of materials by weight or weight-calibrated volume measurement. Supply equipment required for this work.

.2 Calculate amount of material to be used and area to be covered for each tank load utilizing size of slurry tank and carrying capacities of water.

.3 Charge required water into seeder. Add material into hydraulic seeder under agitation. Pulverize mulch and charge slowly into seeder. Use optimum carrying capacity of water relative to mulch as follows:

.1 Spray mulch 55 kg/1000 L.

.2 Silva-Fiber 43 kg/1000 L.

.3 Verdyol Standard 38 kg/1000 L.

.4 Fibramulch 47k g/1000 L.

.4 After all other material is in the seeder and well mixed, charge tackifier into seeder and mix thoroughly to complete slurry.

3.4 Slurry Application

.1 Hydraulic seeding equipment:

.1 Slurry tank.

.2 Agitation system for slurry to be capable of operating during charging of tank and during seeding, consisting of recirculation of slurry and /or mechanical agitation method.

.3 Capable of seeding by 50 m hand operated hoses and appropriate nozzles.

.2 Slurry mixture applied per hectare:

.1 Seed mixture: 125 kg.

.2 Fall rye: 110 kg.

.3 Mulch: 1500 kg/ha.

.4 Tackifier: 45 kg on slopes 3H:1V or steeper.

.5 Water: Minimum 30,000 L.

.6 Fertilizer: 360 kg.

.3 Thoroughly mix and uniformly apply slurry, at optimum angle of application for adherence to surfaces and germination of seed over area to be seeded.

.1 Using correct nozzle for application.

.2 Using hoses for surfaces difficult to reach and to control application.

.4 Blend application 300 mm into adjacent grass areas previous applications to form uniform surfaces.

.5 Re-apply where application is not uniform.

.6 Immediately remove slurry from items and areas not designated to be sprayed.

.7 Protect seeded areas from trespass and damage.

.8 Remove protection devices.

3.5 Warranty and Maintenance

.1 The Contractor shall warranty the Hydraulic Seeding free of defects in accordance with General Conditions (GC3.13), for one full growing season or 12 months from the date of Substantial Performance whichever is greater.

.2 It is the responsibility of the Contractor to complete

maintenance as the Contractor deems necessary on the Hydraulic Seeding such that a 90% survival rate is achieved at the end of the warranty period.

.3 If at the end or prior to the end of the warranty period a 90% survival rate is not achieved the Contractor shall at his own expense replace Hydraulic Seeding not surviving or in poor condition except when the loss or damage can be proven to be due to abnormal weather, or any causes beyond the control of the Contractor.

.4 An end-of-warranty inspection will be conducted by the Departmental Representative.

END OF SECTION

PART 1 – GENERAL

Section Includes

PART 1:

1.1 Measurement and Payment Procedures.

1.2 References.

1.3 Delivery, Storage, and Handling

1.4 Material Certification.

PART 2:

2.1 Aluminized CSP Culverts.

2.2 Zinc-rich Paint.

2.3 Culvert Bedding and Backfill.

2.4 Riprap.

PART 3:

3.1 General.

3.2 Culvert Bedding.

3.3 Culvert Placement.

3.4 Culvert Joints.

3.5 Culvert Backfilling.

3.6 Culvert End Treatment.

3.7 Culvert Inlet and Outlet Protection.

1.1 Measurement and Payment Procedures

.1 Payment for the supply and install of aluminized CSP culverts will be made on the basis of the Price per Unit Bid for Aluminized CSP Culverts in the Bid and Acceptance Form. The Price per Unit Bid shall include all costs included with the supply, transport, dewatering (as required), excavation, install, bedding and backfill materials (Crushed Base Gravel Bedding Material), couplings, fittings, and hardware for the Aluminized CSP Culverts, and all other items necessary for successful completion of the work.

.2 Measurement for Payment for completion of Aluminized CSP Culverts will be made on the length of culvert surveyed

in linear metres, measured parallel to the direction of the culvert along the invert of the culvert, and accepted by the Departmental Representative.

.3 Payment for riprap culvert end protection will be made on the basis of the Price per Unit Bid for Culvert Inlet and Outlet Riprap Protection in the Bid and Acceptance Form. The Price per Unit Bid shall include all costs for excavating and disposal of the native materials in preparation for the riprap, selecting, loading, transport, and placement of 50 Kg class riprap, the supply and install of nonwoven geotextile, and all other items necessary for successful completion of the work.

.4 Measurement for Payment for completion of the Culvert Inlet and Outlet Riprap Protection will be made by the count of each culvert inlet and outlet protection installed and accepted by the Departmental Representative. Each culvert shall receive both inlet and outlet protection which will be counted as one installation.

1.2 References

.1 Canadian Standards Association (CSA International).

.1 CSA-G401-01, Corrugated Steel Pipe Products.

.2 American Society for Testing and Materials (ASTM), latest edition:

.1 ASTM C127, Standard Test Method for Relative Density (Specific Gravity) and Absorption of Course Aggregate.

1.3 Delivery, Storage, and Handling

.1 Handle and store pipe products in a manner to avoid damage, alteration, deterioration and soiling.

.2 Where the material supplied is damaged, the Contractor shall immediately separate nested sections of the plate or pipe to facilitate more detailed inspection by the Departmental Representative. Culvert material designated by the Departmental Representative as unacceptable, due to damage or failure to meet specified requirements, shall be immediately repaired or replaced by the Contractor to the acceptance of the Departmental Representative.

1.4 Material Certification

.1 Prior to ordering materials, submit manufacturer's test data and certification in accordance with Section 01 33 00 – Submittal Procedures.

.2 Certification to be marked on pipe culverts.

PART 2 – PRODUCTS

2.1 Culverts

.1 Aluminized CSP Culverts shall be CSP with an aluminum coating such as Armtec Hel-Cor Aluminized Steel Type 2 CSP culverts, Atlantic Industries Limited Aluminized Type 2 CSP culverts, or a pre-approved equivalent. All culverts used on the project shall conform to the following.

.1 Corrugated steel pipe: to CSA-G401.

.2 Culverts to be annular or spiral with annular ends. Coupling bands to be two piece annular bolted with minimum width of nine corrugations.

.3 Corrugations to be.

.1 68 mm x 13 mm.

.4 Aluminized type 2 coating – provide 75 year service life in a low-abrasion environment with pH between 5 and 9 and resistivity above 1,500 ohm-cm.

.2 Alternate aluminized CSP culverts may be considered but must be pre-approved by the Departmental Representative. Should the Contractor propose an alternative aluminized CSP culvert product, it will be the Contractor's responsibility to prove that the product is equivalent or better than the product listed above.

.3 Ensure that all components for each particular Aluminized CSP Culvert comes from a single supplier.

2.2 Zinc-rich paint

.1 Zinc-rich paint shall be Galvacon™ or preapproved equivalent.

2.3 Culvert Bedding and Backfill

.1 Bedding and backfill material shall be Crushed Base Gravel in accordance with Section 32 11 24 – Crushed Base Gravel.

2.4 Riprap

.1 The Riprap shall conform with the following requirements:

.1 Crushed / blasted angular stone consisting of hard durable particles free from clay lumps, frozen material and other deleterious materials, and free from splits, seams or defects likely to impair its soundness during handling or under action of water.

.2 Is a graded material conforming with the following gradation limits:

.1 50 Kg Class Riprap:

Table 33 42 13 – 01: 50 Kg Class Riprap		
Mass (kg)	**Nominal Diameter (mm) @ 2650 kg/m³**	**Percent Larger Than**
300	600	0
150	500	15
50	350	50
5	160	85
1	95	100

.3 Neither the breadth or the thickness of any individual piece of material is to be less than one-third of its length. A maximum of 2.0 percent by weight of such pieces will be permitted.

.4 Have a relative density: to ASTM C127, not less than 2.65.

PART 3 – EXECUTION

3.1 General

.1 Complete culvert installation and related works in conformance with the requirements of Section 01 35 43 – Environmental Protection.

3.2 Culvert Bedding

.1 Complete excavation and dewater excavation, as necessary, to allow placement of culvert bedding in dry condition. Excavate to the lines and grades shown on the Contract Drawings.

.2 Place required bedding thickness (as shown on Contract Drawings) of Crushed Base Gravel on bottom of excavation and compact to minimum 95% maximum density to ASTM D698.

.3 Shape bedding to fit lower segment of pipe exterior so that width of at least 50% of pipe diameter is in close contact with bedding and to the camber as indicated on the Contract Drawings, free from sags or high points.

.4 Place bedding in unfrozen condition.

3.3 Culvert Placement

.1 Place culvert such that when complete the alignment, grade, camber, location, and inverts are in compliance with the alignment, grade, location, and inverts shown on the Contract Drawings.

.2 Begin pipe placing at downstream end.

.3 Ensure bottom of pipe is in contact with shaped bed or compacted fill throughout its length.

.4 Do not allow water to flow through pipes during construction except as permitted by Departmental Representative.

3.4 Culvert Joints

.1 Install culvert joints per the manufactures recommendation and following requirements.

.1 Repair spots where damage has occurred to coating in the field by applying two coats of zinc rich paint. Allow each coat to dry before placing second coat, bedding or backfill.

3.5 Culvert Backfilling

.1 Backfill around and over culverts as indicated on the Contract Drawings.

.2 Place Crushed Base Gravel in 150 mm layers to full width, alternately on each side of culvert, so as not to allow movement or uplift of the culvert.

.3 Compact each layer to 98% maximum density to ASTM D698 taking special care to obtain required density under haunches. Hand tamp where necessary to obtain compaction.

.4 Protect installed culvert with minimum 900 mm cover of compacted fill before heavy equipment is permitted to cross. During construction, width of fill, at its top, to be at least twice diameter or span of pipe and with slopes not steeper than 2H:1V.

.5 Place backfill in unfrozen condition.

3.6 Culvert End Treatment

.1 End treatment shall include all cut edges made smooth by grinding so that all the burrs are removed. Any damaged galvanizing shall be restored by zinc metallizing in accordance with CSA G401.

3.7 Culvert Inlet and Outlet Protection

.1 Prior to or during installation of the culverts, excavate ground to the lines and grades shown on the Contract Drawings to facilitate the installation of the Inlet and Outlet Riprap Protection. Ensure excavation will allow for positive drainage upon placement of riprap.

.2 Dispose of excavated material offsite in a location pre-approved by the Departmental Representative.

.3 Install 50 Kg Class Riprap and Nonwoven Geotextile to the lines and grades shown on the Contract Drawings. Ensure positive drainage following riprap placement.

.4 Dress all riprap voids to ensure that the final surface is well keyed, densely placed, uniform, and allows for positive drainage. Ensure that all surface voids are filled and nonwoven geotextile is concealed by the riprap.

END OF SECTION

PART 1 – GENERAL

Section Includes

PART 1:

1.1 Measurement and Payment Procedures.

1.2 References.

1.3 Submittals.

1.4 Quality Management.

PART 2:

2.1 Precast Concrete Barrier.

PART 3:

3.1 Preparation

3.2 Install Precast Concrete Barriers.

1.1 Measurement and Payment Procedures

.1 Payment for precast concrete barrier will be made on the basis of the Price per Unit Bid for Precast Concrete Barrier in the Bid and Acceptance Form. The Price per Unit Bid shall include all costs for supply, transport, temporary stockpile, placement and all other items necessary for successful completion of the work.

.2 Measurement for Payment for Precast Concrete Barrier will be made on the length of precast concrete barrier measured in linear metres and accepted by the Departmental Representative.

1.2 References

.1 British Columbia MoTI – 2016 Standard Specifications for Highway Construction (or latest edition).

1.3 Submittals

.1 Submittals in accordance with Section 01 33 00 – Submittal Procedures.

.2 Submit concrete mix design to the Departmental Representative for review and acceptance should contractor choose to enhance the mix using admixtures. Submit and receive approval of proposed mix design prior to casting or shipping of precast concrete barriers.

1.4 Quality Management

.1 Quality Control and Quality Assurance in accordance with Section 01 45 00 – Quality Management.

.2 In addition to the Quality Control undertaken by the Contractor, the Departmental Representative may undertake, through an independent CSA-certified testing firm, random sampling, inspection, and testing for the purpose of Quality Assurance.

.3 Provide access to all portions of the work and cooperate with the Departmental Representatives.

.4 Make space available for storage and curing of test samples.

.5 Allow ample time for notification and inspection before scheduling concrete placement.

.6 In the case of the ambiguity whether the product or work conforms to the applicable standard, the Departmental Representative reserves the right to have such product of system tested or re-inspected to ascertain the conformance.

.7 Upon request, the Contractor will furnish the Departmental Representative with the concrete production records used in the work.

PART 2 – PRODUCTS

2.1 Precast Concrete Barrier

.1 Precast concrete barrier shall be in accordance with Section 941 – Precast Reinforced Concrete Barriers of the British Columbia MoTI – 2016 Standard Specifications for Highway Construction (or latest edition). The precast concrete barrier units shall be per the following drawings and custom details as follows:

.1 Precast Concrete Bull-Nose 460 mm – CBN-H: Drawing – SP941-01.01.01.

.2 Precast Concrete Transition Barrier 690 mm to 460 mm - CTB-1E: Drawing – SP941-03.01.01.

.3 Precast Concrete Transition Barrier 810 mm to 690 mm - CTB-2H: Drawing – SP941-03.02.01.

.4 Precast Concrete Median Barrier 810 mm – CMB-H: Drawing – SP941-02.01.01.

.5 Precast Concrete Median Barrier 810 mm – CMB-E: Drawing – SP941-02.01.02.

.2 Precast concrete barrier shall be manufactured per the requirements of the applicable sections of Section 941 –

Precast Reinforced Concrete Barriers of the British Columbia MoTI – 2016 Standard Specifications for Highway Construction (or latest edition) as follows:

.1 941.02 – Concrete Quality (deviation from any quality standards (if desired by Contractor) will require the submission of a mix design prior to casting – see Item 2.1 - Precast Concrete Barrier, Subsection .3 of Contract Specification Section 34 71 13.01 – Precast Concrete Barriers).

.2 941.03 – Reinforced Steel, Fibrillated Fibres, Attached Hardware & Miscellaneous Items.

.3 941.05 – Placing and Finishing of Concrete.

.4 941.06 – Tolerances – Allowable.

.5 941.07 – Procedure of Manufacture.

.6 941.08 – Handling.

.7 Drawings as applicable: SP941-01.01.01 – SP941-04.02.01

.3 Should the Contractor choose to enhance the mix using admixtures or deviate from any of the quality standards listed in 941.02 of the British Columbia MoTI – 2016 Standard Specifications for Highway Construction (or latest edition), a concrete mix design from the Contractor shall be provided to the Departmental Representative for review and acceptance. Submit the proposed mix design and receive acceptance of the proposed mix design from the Departmental Representative prior to casting or shipping of precast concrete barriers. The Departmental Representative is not obligated to accept a mix design which in the Departmental Representative's opinion results in a product of lesser quality than would be provided had the standards detailed in Section 941 – Precast Reinforced Concrete Barriers of the British Columbia MoTI – 2016 Standard Specifications for Highway Construction (or latest edition) be followed.

PART 3 – EXECUTION

3.1 Preparation

.1 Prior to ordering Precast Concrete Barriers complete the following:

.1 Review the proposed precast concrete barrier anchors types and determine which anchor type (hook and eye connection) is needed on each end of

the new Precast Concrete Barriers to allow the barriers to be installed in the desired location and in the required length.

3.2 Install Precast Concrete Barriers

.1 Install precast concrete barriers following the completion and acceptance of the 100 mm Crushed Surfacing Gravel.

.2 Install precast concrete barrier units in the locations and alignment shown on the Contract Drawings.

END OF SECTION

R.017173.321
Appendix A

Preliminary Hazard Assessment Form

PRELIMINARY HAZARD ASSESSMENT FORM

Project Number: R.017173.321	**R.017173.321**
Location:	**Wonowon Intersection Improvements, Alaska Highway, BC**
Date:	2018 – 2019
Name of Departmental Representative:	Alex Taheri
Name of Client:	PWGSC
Name of Client Project Co-ordinator	Alex Taheri PH: (604)-666-9374

Site Specific Orientation Provided at Project Location **Yes** ☐ **No** ☒

Notice of Project Required **Yes** ☒ **No** ☐

NOTE:
PWGSC REQUIRES A Notice of Project FOR ALL CONSTRUCTION WORK RELATED ACTIVITIES

NOTE:
OHS law is made up of many municipal, provincial, and federal acts, regulations, bylaws and codes. There are also many other pieces of legislation in British Columbia that impose OHS obligations.

Important Notice: This hazard assessment has been prepared by PWGSC for its own project planning process, and to inform the service provider of actual and potential hazards that may be encountered in performance of the work. PWGSC does not warrant the completeness or adequacy of this hazard assessment for the project and the paramount responsibility for project hazard assessment rests with the service provider.

TYPES OF HAZARDS TO CONSIDER	Potential Risk for:				COMMENTS
Examples: Chemical, Biological, Natural, Physical, and Ergonomic Listed below are common construction related hazards. Your project may include pre-existing hazards that are not listed. Contact the Regional Construction Safety Coordinator for assistance should this issue arise.	**PWGSC, OGD's, or tenants**		**General Public or other contractors**		Note: When thinking about this pre-construction hazard assessment, remember a **hazard** is anything that may cause harm, such as chemicals, electricity, working from heights, etc.; the risk is the chance, high or low, that somebody could be harmed by these and other hazards, together with an indication of how serious the harm could be.
	Yes	**No**	**Yes**	**No**	

Typical Construction Hazards					
Concealed/Buried Services (electrical, gas, water, sewer etc.)	X		X		
Slip Hazards or Unsound Footing	X		X		
Working at Heights	X		X		
Working Over or Around Water		X		X	
Heavy overhead lifting operations, mobile cranes etc.	X		X		
Marine and/or Vehicular Traffic (site vehicles, public vehicles, etc.	X		X		
Fire and Explosion Hazards	X		X		
High Noise Levels	X		X		

Excavations	X		X		
Blasting		X		X	
Construction Equipment	X		X		
Pedestrian Traffic (site personnel, tenants, visitors, public)	X		X		
Multiple Employer Worksite	X		X		Example: Contractor working in an occupied Federal Employee space.

Electrical Hazards					**Comments**
Contact With Overhead Wires	X		X		
Live Electrical Systems or Equipment	X		X		
Other:					
Physical Hazards					
Equipment Slippage Due To Slopes/Ground Conditions	X		X		
Earthquake	X		X		
Tsunami		X		X	
Avalanche		X		X	
Forest Fires	X		X		
Fire and Explosion Hazards	X		X		
Working in Isolation	X		X		
Working Alone	X		X		
Violence in the Workplace	X		X		
High Noise Levels	X		X		
Inclement weather	X		X		
High Pressure Systems	X		X		
Other:					
Hazardous Work Environments					
Confined Spaces / Restricted Spaces	X		X		Review and provide confined space assessment(s) from PWGSC or client confined space inventories. Refer to PWGSC Standard on Entry into Confined Spaces. Contact the Regional Construction Safety Coordinator.
Suspended / Mobile Work Platforms	X		X		
Other:					
Biological Hazards					
Mould Proliferations		X		X	
Accumulation of Bird or Bat Guano		X		X	
Bacteria / Legionella in Cooling Towers / Process Water		X		X	
Rodent / Insect Infestation	X		X		
Poisonous Plants	X		X		
Sharp or Potentially Infectious Objects in Wastes	X		X		
Wildlife	X		X		
Chemical Hazards					
Asbestos Materials on Site		X		X	If “yes” a pre-project asbestos survey report is required. Provide Contractor with DP – 057 ELF Form

					16 “Contractor Notification and Acknowledgement”
Designated Substance Present		X		X	If “yes” a pre-project designated substance survey report is required.
Chemicals Used in work	X		X		
Lead in paint		X		X	If “yes” a pre-project lead survey report is required.
Mercury in Thermostats or Switches		X		X	If “yes” a pre-project mercury survey report is required.
Application of Chemicals or Pesticides	X		X		
PCB Liquids in Electrical Equipment		X		X	
Radioactive Materials in Equipment	X		X		
Other:					
Contaminated Sites Hazards					
Hazardous Waste		X		X	
Hydrocarbons	X		X		
Metals		X		X	
Other:					

Security Hazards					**Comments**
Risk of Assault	X		X		
Other:					
Other Hazards					

Other Compliance and Permit Requirements[1]	**YES**	**NO**	**Notes / Comments[2]**
Is a Building Permit required?		**X**	
Is an Electrical permit required?	**X**		
Is a Plumbing Permit required?		**X**	
Is a Sewage Permit required?		**X**	
Is a Dumping Permit required?	**X**		
Is a Hot Work Permit required?		**X**	
Is a Permit to Work required?	**X**		Mandatory for ALL AFD managed work sites.
Is a Confined Space Entry Permit required?		**X**	Mandatory
Is a Confined Space Entry Log required		**X**	Mandatory for all Confined Spaces
Discharge Approval for treated water required	**X**		

Notes:

(1) Does not relieve Service Provider from complying with all applicable federal, provincial, and municipal laws and regulations.

(2) TBD means To Be Determined by Service Provider.

Service Provider Acknowledgement: We confirm receipt and review of this Pre-Project Hazard Assessment and acknowledge our responsibility for conducting our own assessment of project hazards, and taking all necessary protective measures (which may exceed those cited herein) for performance of the work.			
Service Provider Name			
Signatory for Service Provider		**Date Signed**	

RETURN EXECUTED DOCUMENT TO PWGSC DEPARTMENTAL REPRESENTATIVE PRIOR TO ANY WORK COMMENCING

R.017173.321
Appendix B

Confirmation of Prime Contractor's Main Responsibilities Under the WorkSafeBC Occupational Health and Safety Regulations and Worker's Compensation Act

Public Works and Government Services Canada | Travaux publics et Services gouvernementaux Canada

Confirmation of Prime Contractor's Main Responsibilities Under the Worksafe B.C. Occupational Health and Safety Regulations and *Worker's Compensation Act*

Name of Project: Wonowon Intersection Improvements, Alaska Highway, BC

Owner: Public Works and Government Services Canada

Contractor: _____

Consulting Engineer: Tetra Tech	YES	NO
1.The Contractor acknowledges appointment as Prime Contractor on the construction project noted below	☐	☐
2.The name of the Prime Contractor's Qualified Coordinator of occupational health and safety activities for this project has been submitted to the Owner and is as shown below.	☐	☐
3. The Prime Contractor understands that in any conflict of directions, WCB OH&S Regulations and/or the Worker's Compensation Act shall prevail.	☐	☐
4. The Prime Contractor understands and will direct that all supervisors/coordinators must immediately report any apparent conflict as described above.	☐	☐
5. The Prime Contractor agrees that their supervisor shall immediately notify the consulting Engineer's representative of any reported conflict.	☐	☐
6. The Prime Contractor has requested and received information from the Owner regarding any known hazards to the health and safety of persons pre-existing at the workplace.	☐	☐
7. The Prime Contractor has conducted an inspection of the workplace to verify the presence of any hazards.	☐	☐
8. The Prime Contractor will communicate hazards information to any persons who may be affected and ensure that appropriate measures are taken to effectively control or eliminate the hazards.	☐	☐
9. The Prime Contractor accepts that written documentation such as notes, records, inspections, meeting minutes, etc., on all health and safety issues must be available upon request to the PWGSC departmental representatives and/or to a WCB officer at the workplace.	☐	☐
10. The Prime Contractor will confirm that all workers are suitably trained and competent to perform the duties for which they have been assigned.	☐	☐
11. The Prime Contractor confirms that safety orientation of all new workers will be conducted.	☐	☐
12. The Prime Contractor's written Safety Program has been provided to the Owner's representative.	☐	☐
13. The Prime Contractor confirms that meetings to exchange information on any safety issues, concerns, hazards or safety directives will be conducted weekly or more often if required.	☐	☐
14. The Prime Contractor confirms that before the commencement of work, crews will attend a daily crew safety meeting.	☐	☐
15. The Prime Contractor confirms that their supervisor has assessed and will coordinate the workplace first-aid requirements	☐	☐
16. The Prime Contractor confirms that the procedure to transport injured workers is established	☐	☐

Prime Contractor Representative's

Name:_____

Title:_____ Signature:_____

Date:_____

Prime Contractor's OH&S Coordinator

Name:_____

Title:_____ Signature:_____

Date:_____

Canada

R.017173.321
Appendix C

Written Communication / Document Management Protocol

Alaska Highway Wonowon Intersection Improvements Project: Written Communication / Document Management Protocol

Communication for the Alaska Highway Wonowon Intersection Improvements Project (R.017173.321) will occur using CentraCollab, email, telephone, and through the delivery of hardcopy documents (if requested by PWGSC). CentraCollab will act as the primary communication and document management tool throughout the project. It will act as the central file storage location for all project documents, allows for retrieval of these documents at any time during the project by group members and is capable of storing and sharing large electronic files.

Email and telephone may be used for general communication, transitory information and other communications where a record is not considered necessary (e.g. day-to-day coordination, in-depth discussion of project elements, etc.). Email shall not be used for the submission of deliverables or other project documentations. Email contact information for project members is provided in the project contact list.

Hardcopy documents are to only be provided if specifically requested by PWGSC. The Departmental Representative will provide the Contractor with the necessary address information at the time of the request. Material samples shall be provided directly to the testing lab specified by the Departmental Representative for Quality Assurance purposes or be delivered to the project site.

CentralCollab

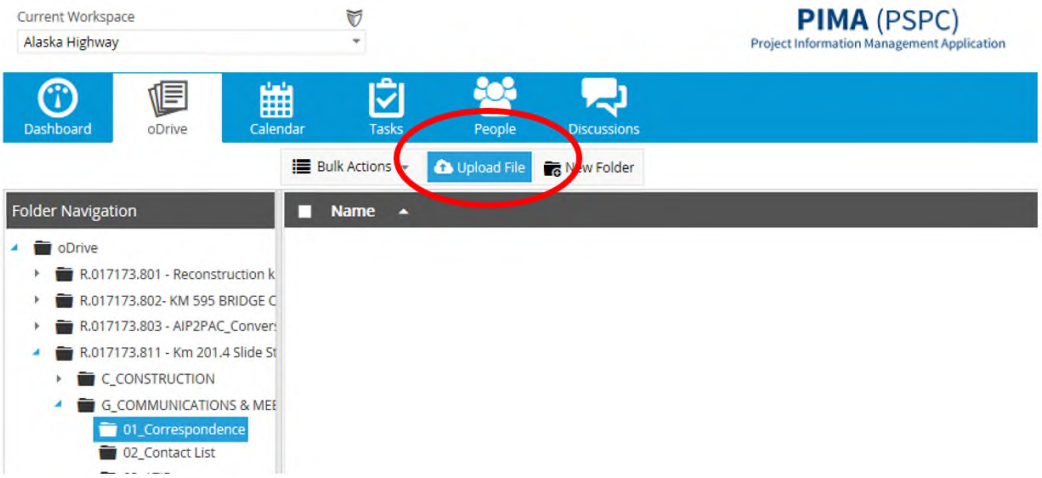
CentralCollab is a web-based collaborative platform that is used to submit and store project documentation. It is the responsibility of the submitting party to upload documents to CentralCollab in the correct folder and with the correct file naming convention.

CentralCollab can be accessed at the following address: https://app.centralcollab.com/
The contractor is encouraged to have CentralCollab accounts for project team members who are involved with accessing or posting project documentation. Accounts can be created by PWGSC throughout the project by contacting the PWGSC project team.

Project documentation includes but is not limited to: submittals, deliverables, drawings, reports, meeting minutes, project schedules, notifications, contemplated change notices, change orders, etc.

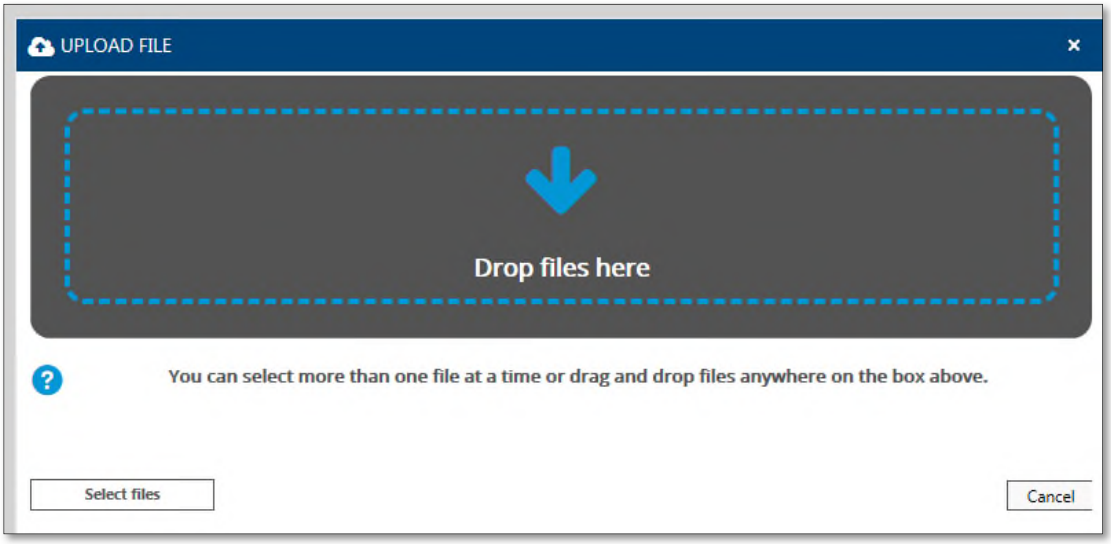
1 Uploading to CentralCollab

Upload individual documents to the appropriate folder on CentralCollab. For folder names, refer to Table 2 of this document. To add files, click on **Upload File**:

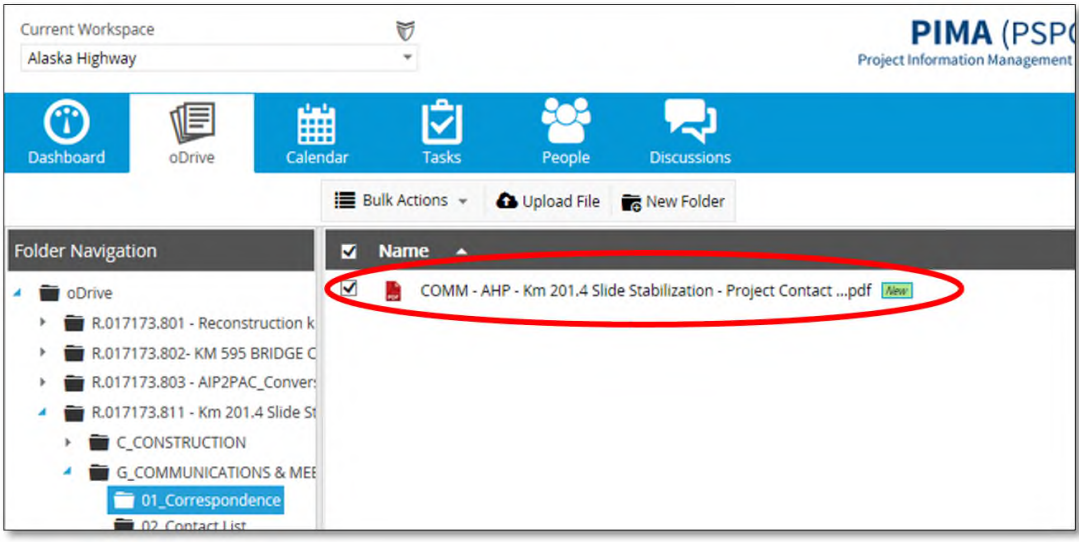


Drag and drop your document(s), then press Save.

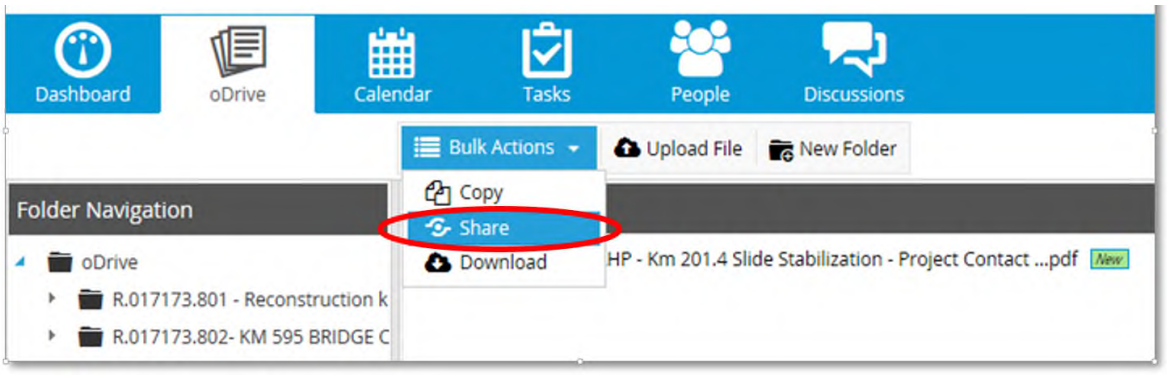
NOTE: Make sure you have named your document correctly, as explained in Section 2.2 CentralCollab File Naming Convention.



Once saved, you will see your new document (circled below), but no one else will be notified until you share it.



To **notify members** of the new document, check the box next to the document √ then click **Bulk Actions > Share** :

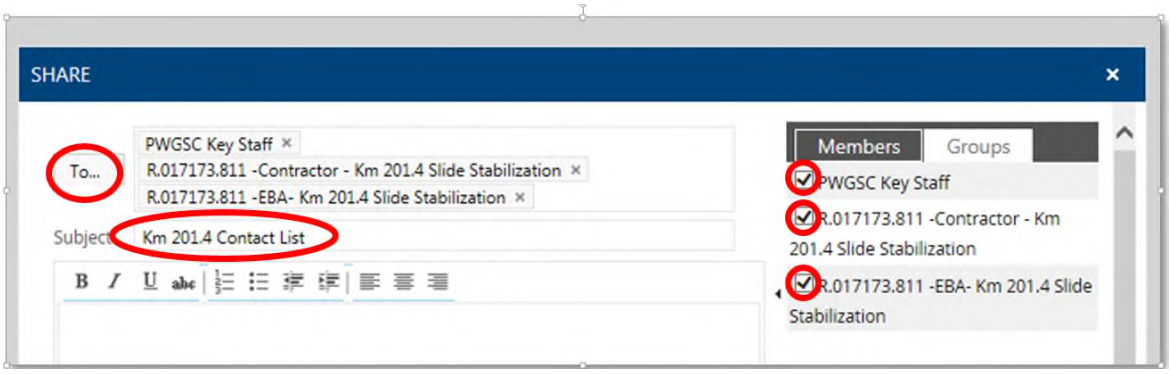


Once the new window opens, select **To,** and then <u>select all pre-set groups:</u>

√ PWGSC Key Staff

√ R.017173.XXX – Contractor – Km XXX Project

√ R.017173XXX – Consultant – Km XXX Project



If desired, insert a message related to the uploaded submittal in the form or **subject line** before sending. To ensure the entire project team is aware of CentralCollab postings, unless instructed otherwise, notification of the pre-set group is preferred rather than selection of individual users.

2. CentralCollab File Naming Convention:

All CentralCollab users shall upload files named according to the following convention:

Doc Type – AHP – Km XXX Project – File Description or Document Name – YYYY MM DD

Example file names:

- Plan – AHP – Km XXX Project – Quality Management Plan – 2017 02 15
- Schedule – AHP – Km XXX Project – Project Schedule – 2017 02 20
- Finance – AHP – Km XXX Project – Progress Payment 01 – 2017 02 26

The file description should clearly identify the document. The Document type should be selected from the options provided in Table 1:

Table 1: Document Type Options	
Document Type Acronym	**Description**
Comm	Communication related docs; correspondence, letters, memos, briefing notes, contact lists
Contract	Request for Information (RFI), Contemplated Change Notices (CCN), Change Orders (CO)
Email	Emails
Draw	Drawings and site plans
Finance	Project financial documentation
Image	All non-drawing images, photos etc.
Minutes	Meeting minutes, agendas, and associated documents
Plan	Planning documents, BMPs, SOPs, workplans
Report	Reports of all types- most frequently used for consultant deliverables
Schedule	Any project related schedules
Specs	Specs and terms of references
Other	Other document types, project specific, one-off documents

3. CentralCollab Folder Arrangement:

All files must be uploaded to the correct folder in CentralCollab. To aid in the filing of documents, a listing of common filing / folder locations has been prepared as shown in Table 2.

Table 2: Common Document Filing / Folder Locations	
Folder Names	**Description of Typical Documents**
CentralCollab folder: R.017173.321 – Wonowon Intersection Improvements Project > C_CONSTRUCTION > Contract >	
01_Contract	Contract Documents (typically related to documents posted to Buyandsell.gc.ca)
02_Request for Information	Request for Information from Contractor
03_Permits	Permits obtained by Contactor or PWGSC
04_Site Instructions	Site Instructions (typically generated by PWGSC)

Table 2: Common Document Filing / Folder Locations	
Folder Names	**Description of Typical Documents**
05_CCN	Contemplated Change Notice forms generated by PWGSC and pricing responses from Contractor
06_Change Orders	Change Orders (typically generated by PWGSC)
07_Progress Payments	Progress Payment documents (as instructed by PWGSC)
08_Field Reviews	Field Review forms (typically generated by PWGSC)
09_Health & Safety	Health and Safety related documentation including Health and Safety Plan, Tailgate Safety Meeting documentation, and other Health and safety related submittals.
10_Testing Services	Testing Reports completed by Contractor's QC
11_Environmental Plan	Environmental Protection Plan and other environmental related documents
12_Environmental Reporting	Environmental monitoring reports generated by the Contractor's environmental monitor
13_Shop Drawings	Shop drawing submissions provided by the Contractor as required by the contract specifications
14_Deliverables	Contractor Deliverables as required by the contract specifications throughout the project including such items as: • Project Schedule • Traffic Management Plan • Construction Staging Drawings • Culvert Mill Certificates • Other supplier information as needed
15_Deficiency List	Deficiency lists (typically generated by PWGSC)
16_Certificate of Substantial Performance	Certificate of Substantial Performance as generated by PWGSC
17_Certificate of Completion	Certificate of Completion as generated by PWGSC
18_Claims	Documentation related to any claims on the project
19_Contract Close out	Documentation related to contract closeout including closeout submittals such as: • As-built Surveys • As-built Redline Drawing Mark-ups • Warranties • Instruction Manuals
20_Advisory	Advisories in response to RFIs or other notices as generated by PWGSC.

Table 2: Common Document Filing / Folder Locations	
Folder Names	**Description of Typical Documents**
21_Quality Management	Quality control and Quality Assurance documentation generated by the Contractor and PWGSC • Quality Management Plan • Check Sheets • Daily Reports • NCR's
CentralCollab folder: R.017173.321 – Wonowon Intersection Improvements Project > G_COMMUNICATIONS & MEETINGS >	
01_Correspondence	Emails and other correspondence requiring posting to CentralCollab, generated by the Contractor or PWGSC
02_Contact List	Project contact list generated by PWGSC
03_ATIP	
04_Communications Plan	Communication plan generated by PWGSC
05_Supporting Documents	
06_Meeting Minutes	Meeting minutes as generated by PWGSC
07_Inquiries	
08_Public Notices	
09_Other	
CentralCollab folder: R.017173.321 – Wonowon Intersection Improvements Project > H_PROJECT MONITORING>	
01_Project Time Scope Budget	For PWGSC only
02_Progress Report	For PWGSC only
03_Photos	For PWGSC only
04_Project Commissioning	For PWGSC only
05_Compliance & Audits	For PWGSC only
CentralCollab folder: R.017173.321 – Wonowon Intersection Improvements Project > Z_BASE DATA>	
01_Base Data	Digital drawings and other documentation required by the Contractor (typically generated by PWGSC)

Typical folders Users are encouraged to create sub-folders and categorize documents of similar or related data.
Example sub-folders:

- 09_Health & Safety > **Tailgate Meetings > February**
- 14_Deliverables > **Project Schedule**
- 21_Quality Management > **Check Sheets > February**

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Appendix D

Environmental Protection Plan (EPP) – Checklist

Environmental Protection Plan (EPP) — Checklist

Note: This checklist was developed to assist the Contractor in determining and mitigating environmental issues at site. It is considered a generic checklist and it is in the Contractor's best interest to review the PWGSC Environmental Management Plan (EMP) or the Environmental Assessment (EA) as supporting documents in the completion of the site Environmental Protection Plan (EPP). This EPP Checklist does not need to be submitted for review by the Departmental Representative.

EPP Framework	Content Requirements	No	Yes	N/A
Project Setting and Site Activities				
Project Description	A brief description of the project and its location is provided.			
Environmental Sensitivities	Sensitive or protected features that could be impacted as a result of the Contractor's activities are described.			
Site Activities	A scope of work and a list of all construction or related activities to be undertaken during the project are provided.			
Project Schedule and Site Drawings				
Project Schedule	A project schedule is provided, including scheduled shut-downs and restricted work periods due to environmental requirements.			
Site Drawing	One or more site drawings(s) are provided, indicating the site location; site set-up and layout; erosion and sediment controls; in-stream work areas; and environmental sensitivities.			
Potential Environmental Impacts and Controls				
Potential Environmental Issues and Impacts	The potential environmental issues and impacts that may result from the construction activities are described. Environmental Reports (Environmental Assessments; Fish Habitat and Compensation etc) will be provided to the contractor especially with respect to any in-stream work procedures that will be required. For example, in-stream works will impact fish and fish habitat in the surrounding ecosystem. It is the Contractor's responsibility to ensure the work is completed in a manner that causes the least impact on the ecosystem (see section on Mitigation).			
Permits, Approvals, and Authorizations	List required permits, approvals and authorizations. As applicable, environmental mitigation measures prescribed by regulatory agencies and included in project permits, approvals and authorizations are described. NOTE: DFO, MoE and NWPA approvals and authorizations for in-stream works are PWGSC's responsibility however, the Contractor must be aware of the requirements of these approvals/authorizations. Permitting for water withdrawal from the waterbody as part of construction activities is part of the Contractor's responsibility.			
Mitigation Strategies	Procedures, controls or best management practices (BMPs) to prevent or reduce adverse impacts on the environment are provided. All work in BC must adhere to the BC MoE "Standards and Best Practices for Instream Works".			

Erosion and Sediment	Erosion and sediment controls are provided, as appropriate for the jurisdiction.			

Waste Management and Hazardous Materials				
Waste Management and Hazardous Materials	Hazardous materials that will be used and/or stored on site are listed. Expected hazardous and non-hazardous waste materials along with proper handling, containment, storage, transportation and disposal methods are listed. As appropriate for the jurisdiction, estimated waste quantities and specific handling procedures are also provided. For example, refueling of equipment will be conducted at least 100m away from any active drainage courses.			
EPP Implementation				
Site Representative	Name(s) and contact details for the person(s) who will be the Contractor's Site Representative(s) are provided.			
Training and Communication	Training and communication details are provided.			
Monitoring and Reporting	Monitoring and inspection procedures, including a schedule of monitoring activities and reporting procedures are provided. For example, this would include downstream monitoring activities for increased siltation during in-stream works.			
Documentation	Information and/or records that will be maintained relating to the EPP and end environmental matters on the project site are described.			
EPP Update	EPP review and update procedures are provided.			
Environmental Emergency Response Procedures				
Environmental Emergency Response Procedures	Potential incidents that may impact the environment are identified, and emergency response procedures to prevent and respond to incidents are provided. An environmental emergency response contact list is also provided.			

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Appendix E

Responsibility Checklist for Authorizations / Approvals / Notifications / Permitting

Responsibility Checklist For Authorizations/Approvals/Notifications/Permitting

Project Title	Wonowon Intersection Improvements, Alaska Highway, BC
Project Description	Improve intersection safety at Wonowon near Km 161.9, Alaska Highway, BC
Project Type	
Comments	

Issued By	Document Type	Yes	No	N/A
PWGSC Responsibility				
Federal				
DFO - Fisheries Act http://laws.justice.gc.ca/en/F-14/	Section 35(2) Authorization for Harmful Alteration Disruption or Destruction (HADD) to fish habitat (eg. new bridges that are not clear span; erosion protection works that extend into the river channel).			
	Section 32 Authorization for Destruction of Fish (when explosives are used). Protects fish from being destroyed except by fishing or as Authorized by DFO.			
	Section 20 Approval – The Need for Safe Fish Passage – Every obstruction across or in any stream where DFO determines it necessary that a fish-pass should exist requires either a fish way or canal around the obstruction.			
	Notification process required for culverts and those works that fall under DFO Operational Statements. Stream Crossings by Roads: • Clear Span Bridges • Temporary Ford Stream Crossing • Ice Bridges and Snow Fills • Bridge Maintenance • Maintenance of Riparian Vegetation in Existing Rights-of Way			

	Section 36 – under this Section of the Fisheries Act the proponent can be FINED resulting from deposition of substances deleterious to fish in waters frequented by fish – this includes release of silt laden waters from construction activities.			
Transport Canada NWPA http://laws.justice.gc.ca/en/N-22/text.html	Section 5(1) Formal Approval for construction of new structures (new bridges, culverts, scour protection).			
	Section 5(2) Work Assessment for work resulting in insignificant impacts on navigability.			
	Section 6(4) Formal Approval for existing structures (existing bridges).			
	Minor Works and Waters Order – This is an amendment to the NWPA that streamlines the federal review process by establishing classes of waters and works (projects) that do not require an Application or Approval through the NWPP because they are "minor" in nature. These would include such “works” as repairs to riprap (no gryones) or “waters” that are not large enough for vessel traffic (ie. Contact Creek). http://www.tc.gc.ca/eng/marinesafety/oep-nwpp-minorworks-menu-1743.htm			
Indian and Northern Affairs Canada – Indian Act	Approval for activities on lands under their jurisdiction. This is addressed under the EA review process in most cases. If the project is exempt from an EA it must be addressed by the PM or ES personnel.			
Migratory Birds Convention Act (MBCA)	Environment Canada is responsible for implementing the *Migratory Birds Convention Act*, which provides for the protection of migratory birds through the *Migratory Birds Regulations*. This is addressed under the EA review process in most cases. If the project is exempt from and EA it must be addressed by the PM or ES personnel.			
ECMP	Has taken over for our old CEAA form. The ECMP Checklist and the Preliminary Identification of Environmental Support Required (PIESR) Form have been developed to ensure that applicable environmental legislation and relevant aspects are identified during a project. The ECMP Checklist replaces the PWGSC CEAA Checklist, and will be the mechanism by which project information is submitted to PWGSC Environmental Services to determine whether environmental support is required. The ECMP Checklist is located in ELF (Form 183_e).			

	By completing and submitting the ECMP Checklist to Environmental Services, PWGSC project managers1 will ensure that their projects are systematically evaluated for compliance with environmental legislation, policies and sustainable development requirements			
Species at Risk Act (SARA) http://www.sararegistry.gc.ca/default_e.cfm	A list of federally-listed species at risk likely to occur at a given subject site must be compiled in order to identify potential impacts & propose mitigation measures for minimizing impacts to these species as a result of project activities. In cases where suitable habitat for a given species exists at/near the project site, mitigation measures are recommended, including avoidance of areas containing said habitat and informing site workers of these issues to prevent incidents.			
First Nations Notifications and Consultations http://clss.nrcan.gc.ca/googledata-donneesgoogle-eng.php	Natural Resources Canada has developed an overlay to be used with Google Earth & Google Maps to identify First Nations lands throughout the country. Notifications of projects within 5 km of such lands and/or directly upstream from such lands should be submitted to the relevant First Nations for a determination of their interest in a given project and/or to request any traditional knowledge they may have to offer.			
Provincial – **Note one submission package for instream works is sent to FrontCounter BC at MoE who then send off to the appropriate departments for approval/notification/permitting – this does not apply to the archeological.**				
Wildlife Act – WLAP – MoE http://www.qp.gov.bc.ca/statreg/stat/W/96488.01.htm	Wildlife Act – Section 34 – Birds, Nests and Eggs – vegetation clearing should not occur during critical bird nesting periods, which typically occur in the spring and summer. Contact the local WLAP for vegetation clearing timing windows.			
Water Act - Water Stewardship Division - Ministry of Forests, Lands and Natural Resources Operations	Section 11 – regulates changes in or about a stream and ensure that water quality, riparian habitat, and the rights of licensed water users are not compromised. This is an approval process and takes approximately 140 days. An application fee is also required. Works requiring approval include channel realignment, retaining wall or bank protection stabilization etc.			
Environmental Stewardship Division - MoE	Notification process for such works as replacement and maintenance of culverts and outfalls; temporary stream diversions around a			

[1] Project Manager refers to anyone who leads, manages or delivers a project

	worksite and takes approximately 45 days to receive notification approval. In general, those works requiring a notification are those that do not involve any diversion of water.			
Fish Protection Act – MoE http://wlapwww.gov.bc.ca/habitat/fishprotectionact/	This Act was passed in 1997 and is reviewed as part of the Water Act under Section 11 when applying for approval.			
Ministry of Forests, Lands and Natural Resources Operations Archaeological http://www.for.gov.bc.ca/archaeology/requesting_archaeological_site_information/process_steps.htm *Contact: Hayley Bond (250) 953-3343*	When completing projects such as quarry pits and new highway alignments, a request is put into the archaeological branch of MFLNSO via the EA process to search the data base. An archaeological assessment may be required on those areas that are previously undisturbed or undeveloped.			
BC Parks	Various permits are required when completing construction activities within the Parks. Please note that all works within 150 feet of the centreline of the highway (Right-of-Way) are NOT subject to construction permitting. (this does not include permitting for fish surveys).			
Canada-British Columbia Agreement for Environmental Assessment Cooperation http://www.ceaa.gc.ca/default.asp?lang=En&n=04A20DBC-1	Most Alaska Highway Projects will not trigger this agreement, as both the Vancouver CEAA office and the Victoria BC Environmental Assessment Office (EAO) have confirmed that the types and scopes of the projects are not described in the BC Environmental Assessment Act – Reviewable Projects Regulation. However, for due diligence, it is recommended that notifications for all Alaska Highway projects be submitted to CEAA (info@ceaa-acee.gc.ca) for review and, if necessary, a determination of whether or not CEAA and/or the BC EAO should be involved.			
BC Ministry of Environment – BC Species and Ecosystems Explorer http://a100.gov.bc.ca/pub/eswp/	A list of provincially-listed species at risk likely to occur at a given subject site must be compiled in order to identify potential impacts & propose mitigation measures for minimizing impacts to these species as a result of project activities. This process involves conducting a search of the BC Species and Ecosystems Explorer inventory for the specific area of BC containing the proposed project site.			
Consultant Responsibility				
Provincial				
BC Parks	Permit to Collect Fish For a Scientific Purpose - Regulation Research activities in parks and			

Ministry of Forests, Lands and Natural Resources Operations http://www.env.gov.bc.ca/bcparks/permits/	protected areas, including: collection; monitoring; survey and inventory; and, other research trigger a Park Permit - – Ministry of Forests, Lands and Natural Resources Operations is responsible for the administration of fish and wildlife permits. Note that these permits are taking approx 6 months to receive due to recent involvement and subsequent consultation with Treaty 8.			
Water Act – Regulation's Protection of Habitat - Section 42(1)	Permit to Collect Fish For a Scientific Purpose – Subsection 42(1)(e) – It is the responsibility of the salvage crew to obtain the necessary permit required to complete a fish and amphibian salvage – in conjunction with the BC Parks permitting.			
Note: research projects and inventory projects are under the same Permit and are applied for under the "Application to Collect Fish for a Scientific Purpose". **http://www.env.gov.bc.ca/pasb/applications/process/scientific_fish_collect.html#a5**				
Contractor Responsibility				
Federal				
DFO – End of Pipe Guidelines	End-of- pipe guidelines for freshwater intake to avoid fish entrainment.			
Provincial				
Water Act - MoE	Schedule A – Water License Applications – use of water from waterbody for road maintenance.			

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Appendix F

Relevant Environmental Publications

Relevant Environmental Publications

The below list of documents are those commonly used when determining how to design and advance a project with the potential to impact a waterbody.

Agency	Publications	Summary
DFO	***Land Development Guidelines for the Protection of Aquatic Habitat - 1993***	This document is a good reference guide for any works that are occurring in or around the water.
	Canada's Fish Habitat Law	Document explaining the fish and fish habitat laws under the Fisheries Act.
	Riparian Revegetation	Information on minimizing, stabilizing and revegetating construction areas.
	Freshwater Intake End-of Pipe Fish Screen Guideline - 1995	Provides guidelines for the contractor to follow to ensure fish screens are used during freshwater intake operations at construction sites.
	Operational Statements Stream Crossings by Roads: • Clear Span Bridges • Temporary Ford Stream Crossing • Ice Bridges and Snow Fills • Bridge Maintenance • Maintenance of Riparian Vegetation in Existing Rights-of Way	Fisheries and Oceans Canada has developed a series of Operational Statements to streamline the undertaking of low risk activities. The Operational Statements outline conditions and measures for avoiding harmful alteration, disruption and destruction (HADD) of fish habitat, and applying them will ensure the project complies with subsection 35(1) of the *Fisheries Act*. You are NOT required to submit a proposal for review by Fisheries and Oceans Canada when you incorporate the measures and conditions outlined in an appropriate Operational Statement into your plans. http://www.pac.dfo-mpo.gc.ca/habitat/os-eo/index-eng.htm
MoE	***Fish-stream Crossing Guidebook - 2002***	Guidelines in protection of fish and fish habitat and the safe passage of fish during construction at/on stream crossings.
	Standards and Best Practices for Instream Works - 2004	Guide to planning and carrying out the proposed construction activities to comply with relevant legislation, regulations and policies.
	A User's Guide to Working In and Around Water - 2005	Understanding the regulation under British Columbia's Water Act.
	Fish-Stream Identification Guidebook - 1998	Assists in providing information on determining fish streams.
	The Streamkeepers Handbook	A practical guide to stream and wetland care in regards to rehabilitation planting.

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Appendix G

Geotechnical Data Report for Wonowon Intersection Improvement (Km 161.9), Alaska Highway, BC. Tetra Tech, June 29, 2018

June 29, 2018

ISSUED FOR USE
FILE: TRN.VHWY03092-01
PWGSC PROJECT #: R.017173.321

Public Works and Government Services Canada
219, 800 Burrard St.
Vancouver, BC V6Z 0B9

Attention: Alex Taheri, P.Eng., PMP

Subject: Wonowon Intersection Improvements (km 161.6 to km 162.5), Alaska Highway, BC
Geotechnical Data Report

1.0 INTRODUCTION

Tetra Tech Canada Inc. (Tetra Tech) was retained by Public Works and Government Services Canada (PWGSC) to provide multi-disciplinary engineering services for the design of safety improvements at the above-noted intersection area located between approximately km 161.6 and km 162.5 of the Alaska Highway in northern British Columbia.

This letter report presents the results of a recent geotechnical exploration completed at the site and summarizes the soil and groundwater conditions encountered.

The Limitations on the Use of this Document, attached in Appendix A, forms an integral part of this report.

1.1 Background

Safety issues were identified along this section of the Alaska Highway in service road safety reviews conducted by Tetra Tech in 2010 and 2017. There are number of recorded collisions associated with the intersections near the Wonowon Esso Service Centre and a major contributing factor is the numerous access roads intersecting the highway within a relatively short distance. There are three separate accesses in close proximity of the Esso Service Centre and adjacent commercial development on the west side of the highway. As part of its ongoing program of improving highway safety and traffic operations to the traveling public, PWGSC requires engineering services to provide the rationale and associated design for improving the intersections in this area.

2.0 SURFICIAL GEOLOGY

According to the Geological Survey of Canada map 1460A (Mathews 1978), the soil conditions in the Wonowon area are anticipated to consist of glacial till-like deposits, described as “till and stony silty clay, locally including thin and patchy cover of lacustrine material”, over sandstone bedrock.

Tetra Tech Canada Inc.
Suite 1000 – 10th Floor, 885 Dunsmuir Street
Vancouver, BC V6C 1N5 CANADA
Tel 604.685.0275 Fax 604.684.6241

3.0 GEOTECHNICAL SITE EXPLORATION

3.1 General

The geotechnical site exploration at Wonowon was completed on October 15, 2017 and consisted of a total of thirteen (13) machine-excavated testpits completed using a CASE 580N rubber-tired backhoe supplied by Haab Contracting Ltd. of Baldonnel, BC. The testpits were excavated to terminus depths of up to 3.8 m below ground surface. A summary of the completed testpits is provided in Table 1. The testpit locations are shown on Figure 1.

Table 1: Testpit Locations – Wonowon Intersection Area

Testpit	Location (UTM Zone 10) (1)		Terminus Depth (m)	Location Comments
	Easting	Northing		
TP-01	573096	6287717	3.0	Southbound Hwy ROW (ditch slope)
TP-02	573143	6287678	3.0	Southbound Hwy ROW (ditch slope)
TP-03	573035	6287765	3.5	Southbound Hwy ROW (ditch slope)
TP-04	572965	6287823	3.5	Southbound Hwy ROW (ditch slope)
TP-05	572892	6287877	3.2	Southbound Hwy ROW (ditch slope)
TP-06	572808	6287947	3.2	Southbound Hwy ROW (ditch slope)
TP-07	572504	6288166	3.3	Southbound Hwy ROW (ditch slope)
TP-08	572521	6288180	3.8	Northbound Hwy ROW (ditch slope)
TP-09	572811	6287971	3.0	Northbound Hwy ROW (ditch slope)
TP-10	572878	6287918	3.4	Northbound Hwy ROW (ditch slope)
TP-11	572932	6287872	2.3	Northbound Hwy ROW (ditch slope)
TP-12	573064	6287764	3.1	Northbound Hwy ROW (ditch slope)
TP-13	573122	6287720	3.0	Northbound Hwy ROW (ditch slope)

1. Testpit locations were obtained from a hand-held GPS at the time of excavation and are approximate.

3.2 Logging and Sampling

A Tetra Tech field inspector was on site during advancement of the testpits to log and sample the material encountered as well as to direct the termination depths and backfilling. Details are shown on the attached testpit logs in Appendix B.

3.3 Laboratory Testing

Soil samples recovered from the testpits were sent to Tetra Tech's laboratory for geotechnical index laboratory testing. The following tests were conducted on selected samples:

- Water Content (ASTM D2216).
- Atterberg Limits (ASTM D4318).

The laboratory test results are presented on the testpit logs in Appendix B.

4.0 SUBSURFACE CONDITIONS

4.1 General

The results of the site exploration and laboratory testing are presented on the testpit logs in Appendix B. The logs provide a complete, detailed description of the subsurface conditions encountered and must be used in preference to the generalized descriptions given below.

4.2 Soil Stratigraphy

The results of the site exploration are generally consistent with the soil conditions indicated by the surficial geology mapping (Mathews 1978). The inferred soil stratigraphy is summarized below, listed in order of increasing depth below ground surface:

- **Topsoil**: A surficial veneer comprised of varying mixtures of grass, topsoil and organic silt was encountered in most of the testpits. This layer ranges from 0.1 to 0.2 m thick.
- **Fill**: Variable fill comprised of silty sand to sand and gravel was encountered in most of the testpits. This layer ranges from 0.2 to 0.9 m thick.
- **Stiff to Hard Silt:** The topsoil and fill layers are underlain by stiff to hard silt with some clay and trace sand and gravel.
- **Stiff to Hard Silty Clay**: The silt layer is interbedded with zones / pockets comprised of stiff to hard, low to medium plastic silty clay with trace sand and gravel.
- **Bedrock**: Testpits TP-02, TP-12 and TP-13, located at the southern end of the Wonowon Intersection Area, encountered inferred sandstone bedrock at the bottom of the excavation. Angular, cobble to boulder-sized sandstone fragments were also locally encountered in the silt and silty clay layers in some testpits.

4.3 Groundwater

Groundwater seepage was not observed within the testpits. However, we expect that perched groundwater is likely to accumulate on the surface of the silt / silty clay deposits during periods of wet weather.

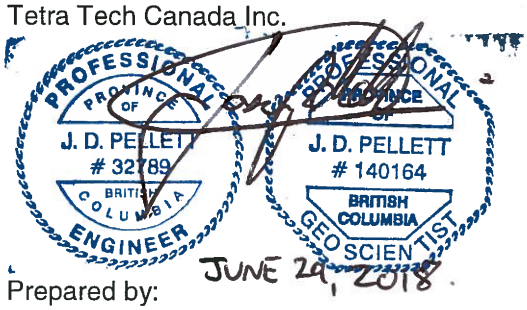
5.0 LIMITATIONS OF REPORT

This report and its contents are intended for the sole use of Public Works and Government Services Canada and their agents. Tetra Tech Canada Inc. (operating as Tetra Tech) does not accept any responsibility for the accuracy of any of the data, the analysis, or the recommendations contained or referenced in the report when the report is used or relied upon by any Party other than Public Works and Government Services Canada, or for any Project other than the proposed development at the subject site. Any such unauthorized use of this report is at the sole risk of the user. Use of this document is subject to the Limitations on the Use of this Document attached in the Appendix or Contractual Terms and Conditions executed by both parties.

6.0 CLOSURE

We trust this report meets your present requirements. If you have any questions or comments, please contact the undersigned.

Respectfully submitted,
Tetra Tech Canada Inc.



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/JP/KJ

REFERENCES

Mathews, W.H. 1978. Surficial Geology, Charlie Lake (094A), British Columbia. Geological Survey of Canada Map 1460A, Scale 1:250,000.

FIGURES

LEGEND

Testpit Locations

Highway ROW

NOTES

1. Imagery from Google Earth Pro.

ISSUED FOR USE

SCALE 1:2500

20 0 20 60 100m

CLIENT

Public Works and Government Services Canada

INTERSECTION IMPROVEMENTS ALASKA HIGHWAY, BC

TESTPIT LOCATION PLAN KM 161.9 (WONOWON)

TETRA TECH

PROJECT NO.	DWN	CKD	REV
ENG.VHWY03092-01	RH	JP	0
OFFICE: VANC	DATE: November 1, 2017		

Figure 1

Q:\Vancouver\Transportation\TRN.VHWY\Projects\TRN.VHWY03092 Alaska Hwy Wonowon Buckinghorse Intersection\40 - CAD\ENG.VHWY03092-01 Testpit Plans R0a.dwg [FIGURE 1 (W)] November 01, 2017 - 11:41:52 am (BY: HALL, ROBERT J.)

APPENDIX A

TETRA TECH'S LIMITATIONS ON THE USE OF THIS DOCUMENT

LIMITATIONS ON USE OF THIS DOCUMENT

GEOTECHNICAL

1.1 USE OF DOCUMENT AND OWNERSHIP

This document pertains to a specific site, a specific development, and a specific scope of work. The document may include plans, drawings, profiles and other supporting documents that collectively constitute the document (the "Professional Document").

The Professional Document is intended for the sole use of TETRA TECH's Client (the "Client") as specifically identified in the TETRA TECH Services Agreement or other Contractual Agreement entered into with the Client (either of which is termed the "Contract" herein). TETRA TECH does not accept any responsibility for the accuracy of any of the data, analyses, recommendations or other contents of the Professional Document when it is used or relied upon by any party other than the Client, unless authorized in writing by TETRA TECH.

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Where TETRA TECH submits electronic file and/or hard copy versions of the Professional Document or any drawings or other project-related documents and deliverables (collectively termed TETRA TECH's "Instruments of Professional Service"), only the signed and/or sealed versions shall be considered final. The original signed and/or sealed electronic file and/or hard copy version archived by TETRA TECH shall be deemed to be the original. TETRA TECH will archive a protected digital copy of the original signed and/or sealed version for a period of 10 years.

Both electronic file and/or hard copy versions of TETRA TECH's Instruments of Professional Service shall not, under any circumstances, be altered by any party except TETRA TECH. TETRA TECH's Instruments of Professional Service will be used only and exactly as submitted by TETRA TECH.

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1.3 STANDARD OF CARE

Services performed by TETRA TECH for the Professional Document have been conducted in accordance with the Contract, in a manner consistent with the level of skill ordinarily exercised by members of the profession currently practicing under similar conditions in the jurisdiction in which the services are provided. Professional judgment has been applied in developing the conclusions and/or recommendations provided in this Professional Document. No warranty or guarantee, express or implied, is made concerning the test results, comments, recommendations, or any other portion of the Professional Document.

If any error or omission is detected by the Client or an Authorized Party, the error or omission must be immediately brought to the attention of TETRA TECH.

1.4 DISCLOSURE OF INFORMATION BY CLIENT

The Client acknowledges that it has fully cooperated with TETRA TECH with respect to the provision of all available information on the past, present, and proposed conditions on the site, including historical information respecting the use of the site. The Client further acknowledges that in order for TETRA TECH to properly provide the services contracted for in the Contract, TETRA TECH has relied upon the Client with respect to both the full disclosure and accuracy of any such information.

1.5 INFORMATION PROVIDED TO TETRA TECH BY OTHERS

During the performance of the work and the preparation of this Professional Document, TETRA TECH may have relied on information provided by third parties other than the Client.

While TETRA TECH endeavours to verify the accuracy of such information, TETRA TECH accepts no responsibility for the accuracy or the reliability of such information even where inaccurate or unreliable information impacts any recommendations, design or other deliverables and causes the Client or an Authorized Party loss or damage.

1.6 GENERAL LIMITATIONS OF DOCUMENT

This Professional Document is based solely on the conditions presented and the data available to TETRA TECH at the time the data were collected in the field or gathered from available databases.

The Client, and any Authorized Party, acknowledges that the Professional Document is based on limited data and that the conclusions, opinions, and recommendations contained in the Professional Document are the result of the application of professional judgment to such limited data.

The Professional Document is not applicable to any other sites, nor should it be relied upon for types of development other than those to which it refers. Any variation from the site conditions present, or variation in assumed conditions which might form the basis of design or recommendations as outlined in this document, at or on the development proposed as of the date of the Professional Document requires a supplementary exploration, investigation, and assessment.

TETRA TECH is neither qualified to, nor is it making, any recommendations with respect to the purchase, sale, investment or development of the property, the decisions on which are the sole responsibility of the Client.

1.7 ENVIRONMENTAL AND REGULATORY ISSUES

Unless stipulated in the report, TETRA TECH has not been retained to explore, address or consider and has not explored, addressed or considered any environmental or regulatory issues associated with development on the subject site.

1.8 NATURE AND EXACTNESS OF SOIL AND ROCK DESCRIPTIONS

Classification and identification of soils and rocks are based upon commonly accepted systems, methods and standards employed in professional geotechnical practice. This report contains descriptions of the systems and methods used. Where deviations from the system or method prevail, they are specifically mentioned.

Classification and identification of geological units are judgmental in nature as to both type and condition. TETRA TECH does not warrant conditions represented herein as exact, but infers accuracy only to the extent that is common in practice.

Where subsurface conditions encountered during development are different from those described in this report, qualified geotechnical personnel should revisit the site and review recommendations in light of the actual conditions encountered.

1.9 LOGS OF TESTHOLES

The testhole logs are a compilation of conditions and classification of soils and rocks as obtained from field observations and laboratory testing of selected samples. Soil and rock zones have been interpreted. Change from one geological zone to the other, indicated on the logs as a distinct line, can be, in fact, transitional. The extent of transition is interpretive. Any circumstance which requires precise definition of soil or rock zone transition elevations may require further investigation and review.

1.10 STRATIGRAPHIC AND GEOLOGICAL INFORMATION

The stratigraphic and geological information indicated on drawings contained in this report are inferred from logs of test holes and/or soil/rock exposures. Stratigraphy is known only at the locations of the test hole or exposure. Actual geology and stratigraphy between test holes and/or exposures may vary from that shown on these drawings. Natural variations in geological conditions are inherent and are a function of the historical environment. TETRA TECH does not represent the conditions illustrated as exact but recognizes that variations will exist. Where knowledge of more precise locations of geological units is necessary, additional exploration and review may be necessary.

1.11 PROTECTION OF EXPOSED GROUND

Excavation and construction operations expose geological materials to climatic elements (freeze/thaw, wet/dry) and/or mechanical disturbance which can cause severe deterioration. Unless otherwise specifically indicated in this report, the walls and floors of excavations must be protected from the elements, particularly moisture, desiccation, frost action and construction traffic.

1.12 SUPPORT OF ADJACENT GROUND AND STRUCTURES

Unless otherwise specifically advised, support of ground and structures adjacent to the anticipated construction and preservation of adjacent ground and structures from the adverse impact of construction activity is required.

1.13 INFLUENCE OF CONSTRUCTION ACTIVITY

Construction activity can impact structural performance of adjacent buildings and other installations. The influence of all anticipated construction activities should be considered by the contractor, owner, architect and prime engineer in consultation with a geotechnical engineer when the final design and construction techniques, and construction sequence are known.

1.14 OBSERVATIONS DURING CONSTRUCTION

Because of the nature of geological deposits, the judgmental nature of geotechnical engineering, and the potential of adverse circumstances arising from construction activity, observations during site preparation, excavation and construction should be carried out by a geotechnical engineer. These observations may then serve as the basis for confirmation and/or alteration of geotechnical recommendations or design guidelines presented herein.

1.15 DRAINAGE SYSTEMS

Where temporary or permanent drainage systems are installed within or around a structure, the systems which will be installed must protect the structure from loss of ground due to internal erosion and must be designed so as to assure continued satisfactory performance of the drains. Specific design detail of such systems should be developed or reviewed by the geotechnical engineer. Unless otherwise specified, it is a condition of this report that effective temporary and permanent drainage systems are required and that they must be considered in relation to project purpose and function.

1.16 DESIGN PARAMETERS

Bearing capacities for Limit States or Allowable Stress Design, strength/stiffness properties and similar geotechnical design parameters quoted in this report relate to a specific soil or rock type and condition. Construction activity and environmental circumstances can materially change the condition of soil or rock. The elevation at which a soil or rock type occurs is variable. It is a requirement of this report that structural elements be founded in and/or upon geological materials of the type and in the condition used in this report. Sufficient observations should be made by qualified geotechnical personnel during construction to assure that the soil and/or rock conditions considered in this report in fact exist at the site.

1.17 SAMPLES

TETRA TECH will retain all soil and rock samples for 30 days after this report is issued. Further storage or transfer of samples can be made at the Client's expense upon written request, otherwise samples will be discarded.

1.18 APPLICABLE CODES, STANDARDS, GUIDELINES & BEST PRACTICE

This document has been prepared based on the applicable codes, standards, guidelines or best practice as identified in the report. Some mandated codes, standards and guidelines (such as ASTM, AASHTO Bridge Design/Construction Codes, Canadian Highway Bridge Design Code, National/Provincial Building Codes) are routinely updated and corrections made. TETRA TECH cannot predict nor be held liable for any such future changes, amendments, errors or omissions in these documents that may have a bearing on the assessment, design or analyses included in this report.

APPENDIX B

TESTPIT LOGS

TESTHOLE KEYSHEET

Water Level Measurement

 Measured in standpipe, piezometer or well

 Inferred

Sample Types

 A-Casing

 Core

 Disturbed, Bag, Grab

 HQ Core

 Jar

 Jar and Bag

 NQ Core

 No Recovery

 Split Spoon/SPT

 Tube

 CRREL Core

Backfill Materials

 Asphalt

 Bentonite

 Cement/ Grout

 Drill Cuttings

 Grout

 Gravel

 Sand

 Slough

 Topsoil Backfill

Lithology - Graphical Legend[1]

 Asphalt

 Bedrock

 Cobbles/Boulders

 Clay

 Coal

 Concrete

 Fill

 Gravel

 Limestone

 Mudstone

 Organics

 Peat

 Sand

 Sandstone

 Shale

 Silt

 Siltstone

 Till

 Topsoil

1. The graphical legend is an approximation and for visual representation only. Soil strata may comprise a combination of the basic symbols shown above. Particle sizes are not drawn to scale

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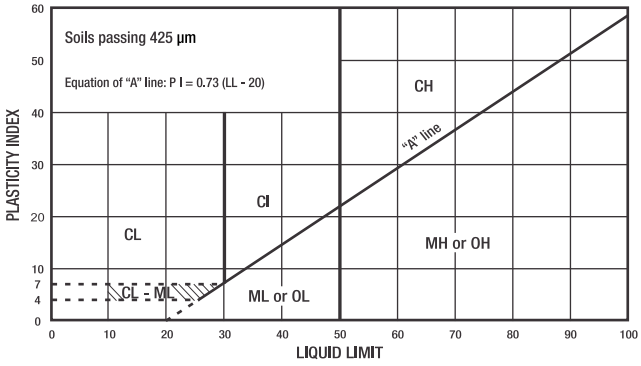
MODIFIED UNIFIED SOIL CLASSIFICATION

MAJOR DIVISION			GROUP SYMBOL	TYPICAL DESCRIPTION	LABORATORY CLASSIFICATION CRITERIA		
COARSE-GRAINED SOILS More than 50% retained on 75 µm sieve*	GRAVELS 50% or more of coarse fraction retained on 4.75 mm sieve	CLEAN GRAVELS	GW	Well-graded gravels and gravel-sand mixtures, little or no fines	Classification on basis of percentage of fines. Less than 5% Pass 75 µm sieve; More than 12% Pass 75 µm sieve; 5% to 12% Pass 75 µm sieve. GW, GP, SW, SP GM, GC, SM, SC Borderline Classification requiring use of dual symbols	$C_U = D_{60} / D_{10}$ Greater than 4; $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ Between 1 and 3	
			GP	Poorly graded gravels and gravel-sand mixtures, little or no fines		Not meeting both criteria for GW	
		GRAVELS WITH FINES	GM	Silty gravels, gravel-sand-silt mixtures		Atterberg limits plot below "A" line or plasticity index less than 4	Atterberg limits plotting in hatched area are borderline classifications requiring use of dual symbols
			GC	Clayey gravels, gravel-sand-clay mixtures		Atterberg limits plot above "A" line or plasticity index greater than 7	
	SANDS More than 50% of coarse fraction passes 4.75 mm sieve	CLEAN SANDS	SW	Well-graded sands and gravelly sands, little or no fines		$C_U = D_{60}/D_{10}$ Greater than 6; $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ Between 1 and 3	
			SP	Poorly graded sands and gravelly sands, little or no fines		Not meeting both criteria for SW	
		SANDS WITH FINES	SM	Silty sands, sand-silt mixtures		Atterberg limits plot below "A" line or plasticity index less than 4	Atterberg limits plotting in hatched area are borderline classifications requiring use of dual symbols
			SC	Clayey sands, sand-clay mixtures		Atterberg limits plot above "A" line or plasticity index greater than 7	
FINE-GRAINED SOILS (by behavior) 50% or more passes 75 µm sieve*	SILTS Liquid limit <50		ML	Inorganic silts, very fine sands, rock flour, silty or clayey fine sands of slight plasticity	For classification of fine-grained soils and fine fraction of coarse-grained soils.		
	SILTS Liquid limit >50		MH	Inorganic silts, micaceous or diatomaceous fine sands or silts, elastic silts			
	CLAYS Above "A" line on plasticity chart negligible organic content Liquid limit <30		CL	Inorganic clays of low plasticity, gravelly clays, sandy clays, silty clays, lean clays			
	CLAYS Above "A" line on plasticity chart negligible organic content Liquid limit 30-50		CI	Inorganic clays of medium plasticity, silty clays			
	CLAYS Above "A" line on plasticity chart negligible organic content Liquid limit >50		CH	Inorganic clays of high plasticity, fat clays			
	ORGANIC SILTS AND CLAYS Liquid limit <50		OL	Organic silts and organic silty clays of low plasticity			
	ORGANIC SILTS AND CLAYS Liquid limit >50		OH	Organic clays of medium to high plasticity			
HIGHLY ORGANIC SOILS			PT	Peat and other highly organic soils			

PLASTICITY CHART



*Based on the material passing the 75 mm sieve
Reference: ASTM Designation D2487, for identification procedure see D2488. USC as modified by PFRA

SOIL COMPONENTS

FRACTION	SIEVE SIZE PASSING	SIEVE SIZE RETAINED	DEFINING RANGES OF PERCENTAGE BY MASS OF MINOR COMPONENTS PERCENTAGE	DESCRIPTOR
GRAVEL			>35 %	"and"
coarse	75 mm	19 mm		
fine	19 mm	4.75 mm	21 to 35 %	"y-adjective"
SAND				
coarse	4.75 mm	2.00 mm	10 to 20 %	"some"
medium	2.00 mm	425 µm		
fine	425 µm	75 µm	>0 to 10 %	"trace"
SILT (non plastic) or CLAY (plastic)	75 µm		as above but by behavior	

OVERSIZE MATERIAL

Rounded or subrounded

COBBLES	75 mm to 300 mm
BOULDERS	> 300 mm

Not rounded

ROCK FRAGMENTS	>75 mm
ROCKS	> 0.76 cubic metre in volume

Tt_Modified Unified Soil Classification.cdr

TETRA TECH

Public Works and Government Services Canada

Testpit No: **TP-01**

Project: Intersection Improvements (Wonowon)	Project No: 704-TRN.VHWY03092-01
Location: Km 161.9 Alaska Highway	
Alaska Highway, BC	UTM: 573096.42 E; 6287716.9 N; Z 10

Depth (m)	Method	Core Diameter (mm)	Soil Description	Graphical Representation	Sample Type	Sample Number	Field Vane (kPa) Post-Peak ◇ Peak ◆ 40 80 120 160 / Plastic Limit Moisture Content Liquid Limit 20 40 60 80	Depth (ft)
0								0
	CASE 580N Rubber Tired Backhoe		GRAVEL and SAND (FILL), medium sand, coarse gravel, subangular, dry, brown					1
1			CLAY, silty, trace gravel, trace sand, very stiff to hard, moist, medium plastic, brown and grey, trace mottled organic streaks			1		3
			SILT, some clay, trace gravel, trace sand, hard, moist, brown					5
2						2		6
								7
								8
			- Gravelly, frequent cobbles below 2.8 m			3		9
3			Testpit terminated at 3.0 m due to practical refusal. - Upon completion, testpit was backfilled to surface with excavated cuttings. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from visual classification of testpit sidewalls and field classification of recovered samples. These estimates are based on engineering judgment. - Testpit elevation and coordinates were recorded using a handheld Garmin GPS.					10
								11
								12
4								13
								14
4.6								15

TETRA TECH

Contractor: Haab Contracting Ltd.	Completion Depth: 3 m
Drilling Rig Type: CASE 580N Rubber Tired Backhoe	Start Date: 15 October 2017
Logged By: OB	Completion Date: 15 October 2017
Reviewed By: JP	Page 1 of 1

Public Works and Government Services Canada

Testpit No: **TP-02**

Project: Intersection Improvements (Wonowon)	Project No: 704-TRN.VHWY03092-01
Location: Km 161.9 Alaska Highway	
Alaska Highway, BC	UTM: 573143.49 E; 6287677.7 N; Z 10

Depth (m)	Method	Core Diameter (mm)	Soil Description	Graphical Representation	Sample Type	Sample Number	Depth (ft)
0							0
	CASE 580N Rubber Tired Backhoe		GRAVEL and SAND (FILL), medium sand, coarse gravel, subangular, dry, brown				1
			CLAY, silty, trace gravel, trace sand, very stiff to hard, moist, medium plastic, brown and grey, trace mottled organic streaks			1	2
1							3
							4
							5
							6
2						2	7
							8
			BEDROCK (SANDSTONE), platy, slightly weathered, weak, yellowish brown			3	9
3							10
			Testpit terminated at 3.0 m due to practical refusal. - Upon completion, testpit was backfilled to surface with excavated cuttings. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from visual classification of testpit sidewalls and field classification of recovered samples. These estimates are based on engineering judgment. - Testpit elevation and coordinates were recorded using a handheld Garmin GPS.				11
							12
4							13
							14
4.6							15

Field Vane (kPa): Post-Peak ◇ / Peak ◆ — 40 80 120 160

Plastic Limit / Moisture Content / Liquid Limit — 20 40 60 80

TETRA TECH

Contractor: Haab Contracting Ltd.	Completion Depth: 3 m
Drilling Rig Type: CASE 580N Rubber Tired Backhoe	Start Date: 15 October 2017
Logged By: OB	Completion Date: 15 October 2017
Reviewed By: JP	Page 1 of 1

Public Works and Government Services Canada

Testpit No: **TP-03**

Project: Intersection Improvements (Wonowon)	Project No: 704-TRN.VHWY03092-01
Location: Km 161.9 Alaska Highway	
Alaska Highway, BC	UTM: 573034.86 E; 6287765.16 N; Z 10

Depth (m)	Method	Core Diameter (mm)	Soil Description	Graphical Representation	Sample Type	Sample Number	Field Vane (kPa) / Plastic Limit, Moisture Content, Liquid Limit	Depth (ft)
0			GRASS, loose organics				Post-Peak / Peak: 40 80 120 160; Plastic Limit / Moisture Content / Liquid Limit: 20 40 60 80	0
			GRAVEL and SAND (FILL), cobbly, medium sand, coarse gravel, subangular, dry, brown					1
								2
1	CASE 580N Rubber Tired Backhoe		SILT, some clay, trace gravel, trace sand, very stiff to hard, moist, brown			1		3
								4
2						2		5
								6
								7
								8
3						3		9
								10
								11
			Testpit terminated at 3.5 m due to practical refusal. - Upon completion, testpit was backfilled to surface with excavated cuttings. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from visual classification of testpit sidewalls and field classification of recovered samples. These estimates are based on engineering judgment. - Testpit elevation and coordinates were recorded using a handheld Garmin GPS.					12
4								13
								14
4.6								15

TETRA TECH

Contractor: Haab Contracting Ltd.	Completion Depth: 3.5 m
Drilling Rig Type: CASE 580N Rubber Tired Backhoe	Start Date: 15 October 2017
Logged By: OB	Completion Date: 15 October 2017
Reviewed By: JP	Page 1 of 1

Public Works and Government Services Canada

Testpit No: **TP-04**

Project: Intersection Improvements (Wonowon)	Project No: 704-TRN.VHWY03092-01
Location: Km 161.9 Alaska Highway	
Alaska Highway, BC	UTM: 572964.95 E; 6287822.77 N; Z 10

Depth (m)	Method	Core Diameter (mm)	Soil Description	Graphical Representation	Sample Type	Sample Number	Field Vane (kPa) / Plastic Limit, Moisture Content, Liquid Limit	Depth (ft)
0			GRASS, loose organics					0
			GRAVEL and SAND (FILL), cobbly, medium sand, coarse gravel, subangular, dry, brown					1
								2
1	CASE 580N Rubber Tired Backhoe		SILT, some clay, trace gravel, trace sand, very stiff to hard, moist, brown			1		3
								4
2						2		5
								6
								7
								8
3						3		9
								10
								11
			Testpit terminated at 3.5 m due to practical refusal. - Upon completion, testpit was backfilled to surface with excavated cuttings. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from visual classification of testpit sidewalls and field classification of recovered samples. These estimates are based on engineering judgment. - Testpit elevation and coordinates were recorded using a handheld Garmin GPS.					12
4								13
								14
4.6								15

Field Vane (kPa): Post-Peak ◇ / Peak ◆ — 40 80 120 160

Plastic Limit / Moisture Content / Liquid Limit — 20 40 60 80

TETRA TECH

Contractor: Haab Contracting Ltd.	Completion Depth: 3.5 m
Drilling Rig Type: CASE 580N Rubber Tired Backhoe	Start Date: 15 October 2017
Logged By: OB	Completion Date: 15 October 2017
Reviewed By: JP	Page 1 of 1

Public Works and Government Services Canada

Testpit No: **TP-05**

Project: Intersection Improvements (Wonowon)	Project No: 704-TRN.VHWY03092-01
Location: Km 161.9 Alaska Highway	
Alaska Highway, BC	UTM: 572892.39 E; 6287877.35 N; Z 10

Depth (m)	Method	Core Diameter (mm)	Soil Description	Graphical Representation	Sample Type	Sample Number	Depth (ft)
0	CASE 580N Rubber Tired Backhoe		GRASS, loose organics GRAVEL and SAND (FILL), trace cobbles, trace silt, medium sand, coarse gravel, subangular, dry, brown				0
1			SILT, some clay, trace sand, trace gravel, trace organics, damp, stiff to very stiff, non-plastic, brown, fine sand			1	1
2			CLAY, silty, trace sand, trace gravel, hard, medium plastic, brown and grey, trace mottled organic streaks			2	2
3						3	3
4			Testpit terminated at 3.2 m due to practical refusal. - Upon completion, testpit was backfilled to surface with excavated cuttings. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from visual classification of testpit sidewalls and field classification of recovered samples. These estimates are based on engineering judgment. - Testpit elevation and coordinates were recorded using a handheld Garmin GPS.				4
4.6							15

Pocket Pen. (kPa): 100 200 300 400

Field Vane (kPa): Post-Peak, Peak; 40 80 120 160

Plastic Limit, Moisture Content, Liquid Limit; 20 40 60 80

TETRA TECH

Contractor: Haab Contracting Ltd.	Completion Depth: 3.2 m
Drilling Rig Type: CASE 580N Rubber Tired Backhoe	Start Date: 15 October 2017
Logged By: OB	Completion Date: 15 October 2017
Reviewed By: JP	Page 1 of 1

Public Works and Government Services Canada

Testpit No: **TP-06**

Project: Intersection Improvements (Wonowon)	Project No: 704-TRN.VHWY03092-01
Location: Km 161.9 Alaska Highway	
Alaska Highway, BC	UTM: 572808.48 E; 6287947.44 N; Z 10

Depth (m)	Method	Core Diameter (mm)	Soil Description	Graphical Representation	Sample Type	Sample Number	Depth (ft)
0							0
	CASE 580N Rubber Tired Backhoe		GRAVEL and SAND (FILL), trace cobbles, trace silt, medium sand, coarse gravel, subangular, dry, brown				1
			SILT, some clay, trace sand, trace gravel, trace organics, hard, non-plastic, moist, brown				2
1						1	3
							4
							5
2						2	6
			SAND, some silt, moist, yellowish brown, fine sand				7
							8
							9
3						3	10
			Testpit terminated at 3.2 m due to practical refusal. - Upon completion, testpit was backfilled to surface with excavated cuttings. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from visual classification of testpit sidewalls and field classification of recovered samples. These estimates are based on engineering judgment. - Testpit elevation and coordinates were recorded using a handheld Garmin GPS.				11
							12
4							13
							14
4.6							15

Field Vane (kPa): Post-Peak ◇ / Peak ◆ — 40 80 120 160

Plastic Limit / Moisture Content / Liquid Limit — 20 40 60 80

TETRA TECH

Contractor: Haab Contracting Ltd.	Completion Depth: 3.2 m
Drilling Rig Type: CASE 580N Rubber Tired Backhoe	Start Date: 15 October 2017
Logged By: OB	Completion Date: 15 October 2017
Reviewed By: JP	Page 1 of 1

Public Works and Government Services Canada

Testpit No: **TP-07**

Project: Intersection Improvements (Wonowon)	Project No: 704-TRN.VHWY03092-01
Location: Km 161.9 Alaska Highway	
Alaska Highway, BC	UTM: 572504.06 E; 6288165.51 N; Z 10

Depth (m)	Method	Core Diameter (mm)	Soil Description	Graphical Representation	Sample Type	Sample Number	Field Vane (kPa) Post-Peak / Peak 40 80 120 160; Plastic Limit / Moisture Content / Liquid Limit 20 40 60 80	Depth (ft)
0								0
	CASE 580N Rubber Tired Backhoe		GRASS, loose organics GRAVEL and SAND (FILL), trace cobbles, trace silt, medium sand, coarse gravel, subangular, dry, brown					
			CLAY, silty, trace gravel, trace organics, moist, brown					
1						1		3
			GRAVEL AND SAND (POSSIBLE FILL), cobbly, platy sandstone, sand is medium grained, gravel is coarse grained and subangular					
			SAND and SILT, some clay, trace gravel, moist, brown, fine sand					
2						2		7
3						3		10
			Testpit terminated at 3.3 m due to practical refusal. - Upon completion, testpit was backfilled to surface with excavated cuttings. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from visual classification of testpit sidewalls and field classification of recovered samples. These estimates are based on engineering judgment. - Testpit elevation and coordinates were recorded using a handheld Garmin GPS.					11
4								13
4.6								15

TETRA TECH

Contractor: Haab Contracting Ltd.	Completion Depth: 3.3 m
Drilling Rig Type: CASE 580N Rubber Tired Backhoe	Start Date: 15 October 2017
Logged By: OB	Completion Date: 15 October 2017
Reviewed By: JP	Page 1 of 1

Public Works and Government Services Canada

Testpit No: **TP-08**

Project: Intersection Improvements (Wonowon)	Project No: 704-TRN.VHWY03092-01
Location: Km 161.9 Alaska Highway	
Alaska Highway, BC	UTM: 572520.68 E; 6288179.97 N; Z 10

Depth (m)	Method	Core Diameter (mm)	Soil Description	Graphical Representation	Sample Type	Sample Number	Depth (ft)
0			GRASS, loose organics				0
			GRAVEL and SAND (FILL), trace cobbles, trace silt, medium sand, coarse gravel, subangular, dry, brown				
1	CASE 580N Rubber Tired Backhoe		SILT, some clay, trace sand, trace gravel, hard, low plastic, moist, brown and grey, trace mottled organic streaks			1	3
2						2	7
3			SAND, some silt, trace gravel, moist, brown, fine sand			3	10
4			Testpit terminated at 3.75 m due to practical refusal. - Upon completion, testpit was backfilled to surface with excavated cuttings. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from visual classification of testpit sidewalls and field classification of recovered samples. These estimates are based on engineering judgment. - Testpit elevation and coordinates were recorded using a handheld Garmin GPS.				13
4.6							15

▲ Pocket Pen. (kPa) ▲
100 200 300 400

Field Vane (kPa)
Post-Peak ◇ Peak ◆
40 80 120 160

Plastic Limit | Moisture Content ● | Liquid Limit
20 40 60 80

TETRA TECH

Contractor: Haab Contracting Ltd.	Completion Depth: 3.75 m
Drilling Rig Type: CASE 580N Rubber Tired Backhoe	Start Date: 15 October 2017
Logged By: OB	Completion Date: 15 October 2017
Reviewed By: JP	Page 1 of 1

Public Works and Government Services Canada

Testpit No: **TP-09**

Project: Intersection Improvements (Wonowon)	Project No: 704-TRN.VHWY03092-01
Location: Km 161.9 Alaska Highway	
Alaska Highway, BC	UTM: 572810.54 E; 6287970.56 N; Z 10

Depth (m)	Method	Core Diameter (mm)	Soil Description	Graphical Representation	Sample Type	Sample Number	Depth (ft)
0			GRASS, loose organics				0
			SILT, some clay, trace gravel, trace cobbles, moist, brown			1	1
1	CASE 580N Rubber Tired Backhoe						2
			CLAY, silty, trace to some sand, trace gravel, dry, stiff, medium plastic, moist, brown and grey			2	3
2							4
							5
							6
							7
						3	8
3			Testpit terminated at 3 m due to practical refusal. - Upon completion, testpit was backfilled to surface with excavated cuttings. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from visual classification of testpit sidewalls and field classification of recovered samples. These estimates are based on engineering judgment. - Testpit elevation and coordinates were recorded using a handheld Garmin GPS.				9
							10
							11
							12
4							13
							14
4.6							15

Pocket Pen. (kPa): 100 200 300 400

Field Vane (kPa): Post-Peak ◇ Peak ◆ — 40 80 120 160

Plastic Limit — Moisture Content ● — Liquid Limit: 20 40 60 80

TETRA TECH

Contractor: Haab Contracting Ltd.	Completion Depth: 3 m
Drilling Rig Type: CASE 580N Rubber Tired Backhoe	Start Date: 15 October 2017
Logged By: OB	Completion Date: 15 October 2017
Reviewed By: JP	Page 1 of 1

Public Works and Government Services Canada

Testpit No: **TP-10**

Project: Intersection Improvements (Wonowon)	Project No: 704-TRN.VHWY03092-01
Location: Km 161.9 Alaska Highway	
Alaska Highway, BC	UTM: 572877.56 E; 6287917.51 N; Z 10

Depth (m)	Method	Core Diameter (mm)	Soil Description	Graphical Representation	Sample Type	Sample Number	Field Vane (kPa) Post-Peak / Peak 40 80 120 160; Plastic Limit / Moisture Content / Liquid Limit 20 40 60 80	Depth (ft)
0			GRASS, loose organics					0
			CLAY, some silt to silty, trace to some sand, trace gravel, dry, very stiff to hard, medium plastic, brown and grey					1
1	CASE 580N Rubber Tired Backhoe					1		3
2						2		7
			SILT, sandy, non-plastic, moist, brown, fine sand, grades to silty SAND with depth					8
3						3		10
			Testpit terminated at 3.35 m due to practical refusal. - Upon completion, testpit was backfilled to surface with excavated cuttings. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from visual classification of testpit sidewalls and field classification of recovered samples. These estimates are based on engineering judgment. - Testpit elevation and coordinates were recorded using a handheld Garmin GPS.					11
4								13
4.6								15

TETRA TECH

Contractor: Haab Contracting Ltd.	Completion Depth: 3.35 m
Drilling Rig Type: CASE 580N Rubber Tired Backhoe	Start Date: 15 October 2017
Logged By: OB	Completion Date: 15 October 2017
Reviewed By: JP	Page 1 of 1

Public Works and Government Services Canada

Testpit No: **TP-11**

Project: Intersection Improvements (Wonowon)	Project No: 704-TRN.VHWY03092-01
Location: Km 161.9 Alaska Highway	
Alaska Highway, BC	UTM: 572931.95 E; 6287872.46 N; Z 10

Depth (m)	Method	Core Diameter (mm)	Soil Description	Graphical Representation	Sample Type	Sample Number	Depth (ft)
0			GRASS, loose organics				0
	CASE 580N Rubber Tired Backhoe		SILT, some clay, trace sand, very stiff to hard, moist, brown			1	1
1							2
2			BEDROCK (SANDSTONE), platy, slightly weathered, weak, yellowish brown			2	3
			Testpit terminated at 2.25 m due to practical refusal. - Upon completion, testpit was backfilled to surface with excavated cuttings. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from visual classification of testpit sidewalls and field classification of recovered samples. These estimates are based on engineering judgment. - Testpit elevation and coordinates were recorded using a handheld Garmin GPS.				4
3							5
							6
4							7
							8
							9
							10
							11
							12
							13
							14
4.6							15

Pocket Pen. (kPa): 100 200 300 400

Field Vane (kPa): Post-Peak ◇ Peak ◆ — 40 80 120 160

Plastic Limit — Moisture Content — Liquid Limit: 20 40 60 80

Contractor: Haab Contracting Ltd.	Completion Depth: 2.25 m
Drilling Rig Type: CASE 580N Rubber Tired Backhoe	Start Date: 15 October 2017
Logged By: OB	Completion Date: 15 October 2017
Reviewed By: JP	Page 1 of 1

TETRA TECH

Public Works and Government Services Canada

Testpit No: **TP-12**

Project: Intersection Improvements (Wonowon)	Project No: 704-TRN.VHWY03092-01
Location: Km 161.9 Alaska Highway	
Alaska Highway, BC	UTM: 573063.54 E; 6287763.65 N; Z 10

Depth (m)	Method	Core Diameter (mm)	Soil Description	Graphical Representation	Sample Type	Sample Number	Depth (ft)
0			GRASS, loose organics				0
			SAND (FILL), silty, damp, brown, fine sand				
	CASE 580N Rubber Tired Backhoe		CLAY, silty, trace sand to sandy, trace gravel to gravelly with depth, trace cobbles, very stiff to hard, medium plastic, moist, brown and grey				
1						1	3
			- Large boulder observed in testpit sidewall from 1.5 to 1.8 m				
2						2	6
						3	9
3			BEDROCK (SANDSTONE), platy, slightly weathered, weak, yellowish brown				10
			Testpit terminated at 3.1 m due to practical refusal. - Upon completion, testpit was backfilled to surface with excavated cuttings. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from visual classification of testpit sidewalls and field classification of recovered samples. These estimates are based on engineering judgment. - Testpit elevation and coordinates were recorded using a handheld Garmin GPS.				11
4							13
4.6							15

Pocket Pen. (kPa): 100 200 300 400

Field Vane (kPa): Post-Peak ◇ Peak ◆ — 40 80 120 160

Plastic Limit | Moisture Content ● | Liquid Limit — 20 40 60 80

TETRA TECH

Contractor: Haab Contracting Ltd.	Completion Depth: 3.1 m
Drilling Rig Type: CASE 580N Rubber Tired Backhoe	Start Date: 15 October 2017
Logged By: OB	Completion Date: 15 October 2017
Reviewed By: JP	Page 1 of 1

Public Works and Government Services Canada

Testpit No: **TP-13**

Project: Intersection Improvements (Wonowon)	Project No: 704-TRN.VHWY03092-01
Location: Km 161.9 Alaska Highway	
Alaska Highway, BC	UTM: 573121.76 E; 6287720.46 N; Z 10

Depth (m)	Method	Core Diameter (mm)	Soil Description	Graphical Representation	Sample Type	Sample Number	Field Vane (kPa) Post-Peak / Peak 40 80 120 160; Plastic Limit / Moisture Content / Liquid Limit 20 40 60 80	Depth (ft)
0								0
	CASE 580N Rubber Tired Backhoe		GRASS, loose organics					
			SAND (FILL), sitly, damp, brown, fine sand					
			CLAY, silty, trace sand to sandy, trace gravel to gravelly with depth, very stiff to hard, low plastic, moist, brown and grey					
1						1		3
2						2		7
						3		9
			BEDROCK (SANDSTONE), platy, slightly weathered, weak, yellowish brown					
3			Testpit terminated at 3 m due to practical refusal. - Upon completion, testpit was backfilled to surface with excavated cuttings. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from visual classification of testpit sidewalls and field classification of recovered samples. These estimates are based on engineering judgment. - Testpit elevation and coordinates were recorded using a handheld Garmin GPS.					10
4								13
4.6								15

TETRA TECH

Contractor: Haab Contracting Ltd.	Completion Depth: 3 m
Drilling Rig Type: CASE 580N Rubber Tired Backhoe	Start Date: 15 October 2017
Logged By: OB	Completion Date: 15 October 2017
Reviewed By: JP	Page 1 of 1