Public Services and Procurement Canada

Requisition No:_____

DRAWINGS & SPECIFICATIONS

For:
Km 450.0 - 451.4 Slide Stabilization and Safety Improvements, Alaska Highway, BC

Project No. R.115165.001 May 2021

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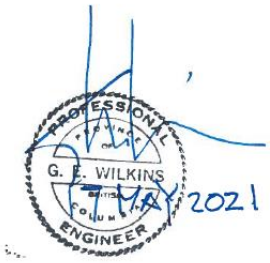

APPENDICES

REFERENCE DOCUMENTATION

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https://www.worksafebc.com/en/about-us/covid-19-updates/covid-19-industry-information/construction

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PART 1 – GENERAL

1.1 Order of Precedence

.1 In the event of any discrepancy or conflict, order of precedence shall be in accordance with GC1.2.2 – Order of Precedence and as follows:

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

.2 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.

.3 Any technical and manufacturer's standard, Government Act, Regulation or Code of practice referred to in the Contract documents shall be the version current (including applicable Amendments) available at the time of tender closing.

1.2 Work Covered by Contract Documents

.1 The Project includes construction of an ATV Trail and decommissioning of an existing ATV trail. Major associated construction with the ATV trail includes, road embankment widening, retaining walls, riprap ditches and an interceptor drainage system. The site is located between Km 450.0 – Km 451.4 on the Alaska Highway south of the Muskwa River bridge at Fort Nelson, BC.

For reference, Dawson Creek is at Km 0, Fort St. John is at approximately Km 75, Fort Nelson is at approximately Km 455, and Watson Lake is at approximately Km 986 on the Alaska Highway.

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

.1 Contract submittals (using "CentralCollab") prior to and during the work (see 3.8 – Contract Submittals, Section 01 25 20 – Mobilization and Demobilization and Section 01 33 00 – Submittal Procedures).

.2 Supply and maintain all traffic control for the duration of the works.

.3 Quality Management.

.4 Development of construction access and temporary berms to facilitate construction. Restoration of the disturbed areas following the construction.

.5 Tree Clearing and offsite disposal of existing vegetation within the proposed clearing limits within the Highway Right of Way and BC Hydro's Right of Way.

.6 Excavation of highway gravels, embankment, and natural ground, and disposal of excavated material offsite.

.7 Construction of an interceptor drain and four slot drains complete with 200 mm diameter Perforated and

Non-Perforated HDPE Drainage Tubing.

.8 Installation of 600 mm diameter, 800 mm diameter and 1400 mm diameter CSP culverts.

.9 Supply / installation of cast-in-place or precast concrete headwalls for culverts.

.10 Decommission and backfill existing 600 mm diameter culvert with Grout.

.11 Supply and construction of a Concrete Block Wall, including granular base, granular backfill (pit run), and 200 mm diameter CSP perforated drain pipe.

.12 Construction of a new ATV trail on the east side of the Alaska Highway, including crushed surfacing gravel, granular backfill (pit run), and nonwoven geotextile.

.13 Decommission the existing ATV Trail on the west side of the Alaska Highway and the existing gravel access to the highway at the south end of the Muskwa River bridge by backfilling and grading with imported topsoil.

.14 Realign the existing ATV Trail highway crossing on the southbound lane (opposite Sikanni Road) via the import and placement of crushed base gravel, riprap, and large boulders.

.15 Supply (or utilized owner supply as identified), load, transport, and place Precast Concrete Median Barrier – 810 mm, Precast Concrete Transition Barrier – 810 mm to 690 mm, Precast Concrete Transition Barrier – 690 mm to 460 mm, and Precast Concrete Bull-Nose – 460 mm.

.16 Installation of welded galvanized fence, welded galvanized railing, and lockable removable bollards with traffic signs.

.17 Relocation of existing traffic signs, including supply and installation of new permanent wood posts.

.18 Restoration to pre-construction conditions and Hydraulic Seeding of all disturbed areas.

.19 Surveys (construction layout, payment quantities, as-built survey, and others as required).

.20 Environmental protection.

.21 Work complete by Change Order (if required and approved by Departmental Representative).

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).

PART 2 – PRODUCTS

2.1 Owner Supplied Materials (Outside Limits of Work)

.1 PSPC is providing access to the "as is" Concrete Blocks and CSP Culverts located at PSPC's Fort Nelson Maintenance Yard, Airport Drive, Fort Nelson, for use by the Contractor on this project. See Section 32 32 34 – Concrete Block Wall and Section 33 42 13 – Pipe Culverts for more details. The Contractor shall provide PSPC a minimum of three (3) days' notice prior to requiring access to the Fort Nelson Maintenance Yard to collect materials. Access to the Fort Nelson Maintenance Yard will only be available Monday – Friday during the hours of 7:00 am to 3:30 pm, or as agreed to by the Departmental Representative. The following materials are available for use by the Contractor:

.1 750 mm × 750 mm × 1500 mm Concrete Blocks – approximately 800 units.

.2 600 mm dia. CSP Culverts and associated components.

.3 800 mm dia. CSP Culverts and associated components.

.4 1400 mm dia. CSP Culverts and associated components.

.3 PSPC is providing access to the stockpiled Concrete Median Barrier – 810 mm – CMB-E and CMB-H at PSPC's Mill Creek Pit (Km 554 of the Alaska Highway). See Section 34 71 13.01 – Precast Concrete Barriers for more details.

PART 3 – EXECUTION

3.1 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.

3.2 Work Completion

.1 Preparation of required submittals to commence immediately upon receipt of notice to proceed and to be completed prior to commencement of work (unless specified otherwise).

.2 Achieve Substantial Performance by September 28, 2021.

.3 Achieve Completion by October 5, 2021.

.4 Works may need to be temporally shut down during high flow, heavy rain events or other 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 the stream / ditch water level or poor weather conditions adversely affect the Contractor's 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 high water flows or adverse weather conditions.

.3 The Departmental Representative in conjunction with representatives from the British Columbia Ministry of Environment and Climate Change Strategy (MoE) may suspend instream works should they feel that it is not possible to achieve the environmental requirements or the Contract Specifications for quality of work due to the high water flows or 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 high water flows or adverse weather conditions in the construction schedule and in the unit prices. No payment for temporary work stoppages due to high water flows or adverse weather conditions will be made.

.7 The Contractor shall account for possible impacts of COVID-19 in the construction schedule and the unit prices. The Contractor shall keep informed with the latest Federal and Provincial recommendations and protocols regarding COVID-19 at all times during construction and shall modify their construction approach accordingly to ensure adherence to these recommendations and protocols.

.8 If Federal and/or Provincial recommendations require that the project work be stopped, the Contractor shall consult with the Departmental Representative and the Departmental Representative will advise as to the course of action the Contractor shall take. Any monetary impact to the Contractor from the work being stopped due to Federal and/or Provincial recommendations will be addressed in accordance with the contract general conditions.

3.3 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.

3.4 Special Precautions

.1 The Contractor's attention is drawn to the possibility of impacting utilities, etc., within the limits of work. The Contractor shall confirm the locations of all such utilities. 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 drawings or if they conflict with the construction, and await instructions from the Departmental Representative before proceeding with work in the vicinity of such encountered services and utilities.

.2 Existing structures, signs, utilities, asphalt, culverts, drainage structures, cut/fill slopes, ditches, bridges, street furniture 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.

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

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

.2 All layout survey, quantity surveys and as-built surveys shall be considered incidental to the work and not measured for payment.

.3 All layout surveys, 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 these 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 Prior to starting on-site construction work, complete a check of the survey control monument coordinates and elevations provided by the Departmental Representative via a static survey of each monument. Provide results to the Departmental Representative for review and acceptance. If deemed necessary by the Departmental Representative, design adjustments may be made by the Departmental Representative to suit the findings of the monument survey checks.

.5 Prior to starting affected work, complete a check of the survey control monument coordinates and elevations for any discrepancies relative to the design and existing conditions. Provide results to the Departmental Representative for review and acceptance as soon as they are discovered. Should a discrepancy be found, await written approval from the Departmental Representative prior to proceeding. If deemed necessary by the Departmental Representative, design adjustments may be made by the Departmental Representative to suit the findings of the survey checks undertaken.

.6 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.

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

.8 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.

.9 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.

.10 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.

.11 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.

.12 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.

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

3.6 Contract Drawings

.1 Upon award of the project, PSPC will at the request of the successful Contractor provide the successful Contractor with

up to 4 sets of 609.6 mm x 914.4 mm (24" x 36") and 6 sets of 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, PSPC 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.

3.7 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 Representative's 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 hardcopy Contract Drawings be discovered (at any time during the work), the hardcopy 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 hardcopy Contract Drawings. The Departmental Representative shall not be responsible for updating or correcting any discrepancies between the electronic Contract Drawings and the hardcopy Contract Drawings identified by the Contractor.

3.8 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 Contract 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 Project Schedule (see Section 01 32 16 – Construction Progress Schedules – Bar (Gantt) Chart).

.2 Traffic Management Plan (see Section 01 35 00 – Traffic Management).

.3 Project Specific Health and Safety Plan (see Section 01 35 33 – Health and Safety and Appendix B) including:

.1 Preliminary Hazard Assessment Form (Appendix 1 of Project Specific Health and Safety Plan template).

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

.3 Contractor's COVID-19 Safe Work Plan.

.4 Assurance of compliance with Occupational Health and Safety Regulation, part 19 (form 30M33), (see Reference Documentation – Table of Contents).

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

.6 Quality Management Plan and related Quality Management documentation (see Section 01 45 00 – Quality Management).

.7 Pre-Construction Survey.

.8 As-built Survey, As-built Drawing mark-ups, and Shop Drawing mark-ups (see Section 01 78 00 – Closeout Submittals).

.9 Shop Drawings (including professional seal for design work required), Product Data, / Samples, and Mix designs.

.10 Progress Payment Submittal Form (see Appendix E).

.11 Measurement for Payment Survey Details Form (see Appendix F).

3.9 Supervisory Personnel

.1 Within five days of Contract 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 workday 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 experienced in Quality Management, available to address quality matters from commencement of work until Substantial Performance and Completion of the Work, and remain onsite at all times the Contractor is performing work which must be tested or inspected in-process (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).

3.10 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 Contractors shall coordinate their operations with the other Contractors, including traffic management.

3.11 Use of Owner Gravel Pits and Maintenance Yards

.1 The Contractor may choose to use PSPC's gravel pits and maintenance yards as detailed elsewhere within the specifications to access the owner supplied Concrete Blocks,

Precast Concrete Barriers, and CSP Culverts. When using PSPC's gravel pits and maintenance yards, the Contractor shall be aware of the following:

.1 Other Contractors may be working in the gravel pits and maintenance yards completing similar or different types of work. Coordination with these other Contractors may be required.

.2 Laydown areas for equipment and stockpiles may be restricted due to other works ongoing or the existing size of the gravel pits and maintenance yards.

.3 The Contractor is responsible to provide all equipment required to load and haul the material from PSPC's gravel pits and maintenance yards.

.4 The security of equipment parked in the gravel pits and maintenance yards along with the safety of the Contractor's personnel, remains the Contractor's responsibility.

.5 If PSPC's gravel pits and maintenance yards are equipped with a vehicle gate, the Departmental Representative will provide the Contractor with a gate key upon commencement of the onsite work (excluding PSPC's Fort Nelson Maintenance Yard). The Contractor shall be responsible for locking the vehicle gate anytime the Contractor's personnel have vacated (regardless of duration) the gravel pits or maintenance yards. The contractor shall return the gate key upon completion of the work.

.6 The Contractor shall be responsible for maintaining access roads into the gravel pits and maintenance yards and for haul roads required to access the aggregate sources for the duration of the project. At a minimum, maintaining and developing access may include grading and snow removal. At the conclusion of the works all access roads and haul roads shall be left in an equal or better condition than when work started.

3.12 Contractor's Personnel

.1 Upon request of the Departmental Representative, the Contractor shall remove any personnel from the project work site who, in the opinion of the Departmental Representative, is incompetent or has been guilty of improper conduct.

END OF SECTION

SECTION INCLUDES:

PART 1 – GENERAL:

1.1 Use of Worksite.

1.2 Work Conducted in and Adjacent to Waterways.

1.3 Utilities.

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1.5 Use of Public Areas.

1.6 Construction Signage.

1.7 Access Development.

1.8 Construction Start-up.

1.9 Sequence of Work.

1.10 Construction Staging.

1.11 Restoration.

PART 1 – GENERAL

1.1 Use of Worksite

.1 The Worksite will be specified by the Departmental Representative and shall only be used for the purposes of the Work. The Worksite 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 and Equipment. The Contractor's construction camp will not be permitted within PSPC's ROW or other lands owned or leased by PSPC as identified in Section 01 59 10 – Construction Camp.

.3 While the Worksite is under the Contractor's control, the Contractor shall be entirely responsible for the security of the Worksite 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 the Contractor's expense.

.7 The Contractor may complete onsite highway work during daylight hours only, seven (7) days per week with the following restrictions.

.1 Work in excess of 12 hours 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 hours 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. Work during non-daylight hours shall be lit with suitable lighting.

.3 No hauling of material during inclement weather.

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. The Contractor shall be responsible to have utility locates completed in advance of the work.

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

.3 The Contractor shall allow the utility company the opportunity to locate and assess the potential proposed work / utilities conflict within the limits of the work. If it is determined by the Departmental Representative that Utilities are affected by the permanent Work, the utilities will be relocated by Other Contractors. The Contractor shall cooperate and coordinate as required with Other Contractors engaged in Utility relocation operations on the Worksite.

.4 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.

.5 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.

.6 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.

.7 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 (including equipment which 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. Steel tracked equipment with cleats will not be allowed on asphalt unless measures are taken to protect the existing asphalt road surface against any damage.

.2 The Contractor shall ensure that its vehicles and equipment do not cause nuisance in public areas. All vehicles and equipment leaving the Worksite and entering public roadways shall be cleaned of mud dirt, snow, and ice clinging to the body and wheels of the vehicle. All vehicles arriving at or leaving the Worksite 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, PSPC supplied signage, and portable electrically illuminated message signs are permitted onsite.

.2 Signs and notices for safety and instruction shall be provided by the Contractor (see Section 01 35 00 – Traffic Management 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. Any access roads or trails extending outside the limits of the work shall be submitted to the Departmental Representative for approval on the Construction Staging / Traffic Management Drawings. 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.

1.8 Construction Start-up

.1 The Contractor or his Sub-contractors shall not perform any on site work until all necessary submittals have been provided, reviewed, and accepted by the Departmental Representative and the Contractor has received from the Departmental Representative a completed version of the "On-site Construction Start-up Form" (see Appendix D) which has been completed and signed by PSPC's the Departmental Representative. PSPC reserves the right to refuse payment for any on-site work performed prior to issuing the completed and signed "On-site Construction Start-up Form".

1.9 Sequence of Work

.1 The project shall be completed per the dates provided in Subsection 3.2 Work Completion of Section 01 11 10 – Summary of Work

1.10 Construction Staging

.1 The Contractor shall stage the work ensuring that:

.1 All design requirements as specified in the Contract Drawings, Contractor prepared Shop Drawings, and Contract Specifications are achieved.

.2 All requirements of Section 01 35 00 – Traffic Management are achieved.

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

.4 The work is completed in accordance with the dates for Substantial Performance and Completion provided in Section 01 11 10 – Summary of Work.

.5 Upon award of the contract, the Contractor shall obtain from WorkSafeBC and then provide to the Departmental Representative, the complete "Assurance of Compliance with Occupational Health and Safety Regulation, part 19 (form 30M33) form (see form link in Reference Documentation). The Departmental Representative with then use this form to obtain a permit from BC Hydro for works with the BC Hydro Right-of-Way.

.6 Unless advised otherwise, receive from the Departmental Representative the FortisBC Right-of-Way Work Permit prior to undertaking work within 30 m of the underground FortisBC gas pipeline. The Contractor shall be responsible for contacting the FortisBC representative prior to undertaking work covered by the FortisBC Right-of-Way Work Permit and within the timelines noted on the FortisBC Right-of-Way Work Permit. The Contractor shall adhere to all requirements of the permit when working in the vicinity of the pipeline including but not limited to access to the site by the FortisBC representative during construction, excavation, backfill and compaction methodologies, equipment size used for excavation, backfill and compaction, and restrictions on equipment crossing the pipeline.

.7 The work is completed in accordance with the requirements for excavation and backfill as outlined in Section 31 23 33 – Excavation and Backfill, Subsection 3.3 Excavation – Interceptor Drain and Slot Drains, and Subsection 3.4 Backfilling – Interceptor Drain and Slot Drains work sequencing and precautions.

.8 The work (including stockpiling of excavated materials for offsite disposal or imported material prior to placement) is completed such that no part of the work, existing ground, or infrastructure is subject to a load or force which will endanger its safety or will cause deformation. To achieve this requirement, the Contractor may need to immediately load all excavated materials (no onsite stockpile) and immediately place and finish placement of each load of material brought to site prior to the arrival of subsequent loads of material.

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

1.11 Restoration

.1 Remove access points, roads, pads, and all other works installed during access development. Re-instate the work site 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 drainage patterns.

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

.5 Replacement of all temporary excavated materials including stripping. Return ground back to original contour elevations or as preapproved by the Departmental Representative.

.6 Hydraulic Seeding of all disturbed areas in accordance with Section 32 93 21 – Hydraulic Seeding.

END OF SECTION

SECTION INCLUDES:

PART 1 – GENERAL:

1.1 Definitions.

1.2 Measurement and Payment Procedures.

PART 1 – GENERAL

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, Project Specific 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 Worksite.

.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 Subsection 1.1 Definitions above.

.2 Measurement for Payment for completion of Mobilization and Demobilization will be made at the Lump Sum price and will be scheduled as follows:

.1 50% of the Lump Sum bid price to a maximum of 5% of the Total Tender price at the beginning of construction after the Contractor’s required submittals (including Construction Schedule, Traffic Management Plan, Quality Management Plan, Environmental Protection Plan, Project Specific Health and Safety Plan, and any other submittals noted in the Contract Specifications as being required prior to starting work) have been submitted for review, accepted for the work

in its entirety, and work onsite has commenced to the satisfaction of the Departmental Representative. Should the Departmental Representative allow the work to start prior to submission or acceptance by the Departmental Representative of any of submittals listed above, the Departmental Representative may choose to hold back a minimum of 5% of the 50% Mobilization and Demobilization payment for each outstanding submittal until an acceptable submission is provided.

.2 50% once the project has achieved "Completion" and all equipment has been demobilized from the site, 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

SECTION INCLUDES: PART 1 – GENERAL:

1.1 Terms of Payment.

1.2 Basis of Payment.

1.3 Survey.

PART 1 – GENERAL

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 PSPC's Request for Progress Payment – Construction Contracts form: PWGSC-TPSGC 1792, found online (see link to Public Works and Government Services Canada – Acquisition Forms within the Reference Documentation section of the Table of Contents for link).

With each progress payment, provide to the Departmental Representative the required documentation as listed below. Upon receipt of this required documentation, PSPC will commence a review of the progress payment request in accordance with General Conditions (GC) 5 – Terms of Payment.

.1 Documentation required by General Conditions (GC) 5 – Terms of Payment including signed statutory declaration.

.2 Progress Payment Submittal Form (see Appendix E) completed and signed by the Contractor's representative. Upon receipt of this form and all other required documentation, PSPC will commence review of the progress payment request in accordance with General Conditions (GC) 5 – Terms of Payment.

.3 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).

.4 Updated construction progress schedule (accepted project schedule shown as the baseline and actual start dates / completion dates / percent complete shown for each task, see Section 01 32 16 – Construction Progress Schedules – Bar (Gantt) Chart).

.5 All survey information (digital csv file with xyz data and breaklines in DXF file format) for each payment item claimed on the progress payment and measured by survey as defined in the Contract Specifications. For each payment item claimed on the progress payment and measured by survey, provide a Measurement for Payment Survey Details Form (Appendix F).

1.2 Basis of Payment

.1 Basis of payment shall be per the Measurement and Payment Procedures in the applicable Contract Specification section. Where not specified, basis of payment for all work included in these Contract 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), compacted (if required) surveyed, and accepted by the Departmental Representative in the field. Provide survey data at each stage of construction for each Unit Price Item to the Departmental Representative prior to payment approval.

.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 Subsection 1.2 Measurement and Payment Procedures of Section 01 25 20 – Mobilization and Demobilization).

.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. During or at the completion of the work any products purchased, manufactured, or delivered to the place of work but not incorporated into the work shall be removed from the site at the Contractor's cost and no payment (including adjustment to quantities on previous progress payments, see GC5.2 – Amount Payable) shall be made (excluding items resulting from changes to the work made by the Departmental Representative during the work and brought to the attention of the Departmental Representative by the Contractor at the time of the change).

.6 Any work called for in the Contract Specifications or shown on the Contract 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 preapproved 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 Representative's 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 Representative's survey data indicates that materials were excavated or placed outside / beyond the specified tolerances of the design lines and grades on the Contract Drawings.

.10 At any point throughout the project, the Departmental Representative may compile and review the survey data (individual surveys or multiple surveys of particular items of work) to reconcile the total quantities of items of work to date on the project. Adjustments to quantities on future progress payments may then be made per GC5.2 – Amount Payable.

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 these 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 locations of surveyed cross sections are subject to prior approval by the Departmental Representative. At a minimum, the Contractor shall survey all features at 20 m station intervals (may be reduced to 10 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, except for when quantifying excavation for the Interceptor Drain and Slot Drain which shall be surveyed at the completion of the work using a scanner capable of collecting a minimum of one hundred (100) survey points per square metre of excavation.

.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 Tree Clearing, after the Tree Clearing has been completed to the satisfaction of the Departmental Representative. The survey shall be provided to the Departmental Representative for review and acceptance. 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. At the Departmental Representative's sole discretion, payment for work completed and measured by survey may not be made should the Contractor fail to complete necessary surveys or surveys be of insufficient quality or detail.

.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 PSPC's monument / coordinate system as shown on the Contract Drawings.

.6 Survey data for each payment line item in the unit price table and area of work shall be provided to the Departmental Representative as follows:

.1 Digital csv files with the xyz data and an appropriate descriptor code as to the type of material surface or feature being surveyed.

.2 Breaklines for all survey data in DXF file formation or another format pre-approved by the Departmental Representative.

.3 A list of all point descriptors used in the survey data.

.7 Whenever survey data is provided, provide to the Departmental Representative the completed Measurement for Payment Survey Details Form (Appendix F) for each payment line item in the unit price table and area of work.

.8 Where surveys of an item of work or location of work have been completed multiple times (ex. multiple progress payments), compile individual survey point files into one complete survey file free of overlapping points and other inconsistencies resulting from the completion of individual surveys.

.9 The Contractor shall complete 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 upon request.

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

END OF SECTION

SECTION INCLUDES: PART 1 – GENERAL:

1.1 Pre-Construction Meeting.

1.2 On-Site Documents.

1.3 Schedules.

1.4 Construction Progress Meetings.

1.5 Written Communication / Document Management.

1.6 Submittals.

1.7 Close-Out Procedures.

PART 1 – GENERAL

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 (3) 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, proposed hours of work per day and number of working days per week.

.3 Contractor submissions (requirements and submissions schedule).

.4 Requirements for temporary facilities, site signage, 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 and Equipment.

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

.8 As-built 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 Project Specific Health and Safety Plan.

.14 List of proposed suppliers, sub-contractors, and sub-consultants.

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

.5 Within 14 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 five (5) working days.

1.2 On-Site Documents .1 Maintain at the job site, one (1) 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 Meeting minutes.

.11 Contractor's Project Specific Health and Safety Plan.

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

.13 Contractor's Traffic Management Plan.

.14 One set of "Issued for Construction" Contract Drawings (or "Issued for Tender" Contract Drawings if being used for construction), Contract Specifications, and 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 Construction Progress Meetings

.1 During the course of work, the Departmental Representative may schedule Construction Progress Meetings approximately every two (2) 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 (3) days prior to the meeting. The Contractor shall notify all concerned parties of the meeting.

.4 The meetings may be held onsite provided teleconference capabilities are available or at PSPC's office in Fort Nelson. If held onsite, 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 Maintenance of quality standards.

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

.12 Other business.

.6 Within 14 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 five (5) working days.

1.5 Written Communication / Document Management

.1 Written Communication and 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 A.

1.6 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 PSPC's cloud-based document filing system "CentralCollab". Support claims for payment with survey data and other evidence as required by the Departmental Representative.

.3 Submit requests for information (RFI) of Contract Documents and obtain instructions through Departmental Representative via PSPC's cloud-based document filing system "CentralCollab". If required by the Departmental Representative, provide supporting documents for proposed substitutions via PSPC's cloud-based document filing system "CentralCollab".

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

.5 Process Change Orders through the Departmental Representative via PSPC's cloud-based document filing system "CentralCollab".

.6 Deliver closeout submittals for review and preliminary inspections, for transmittal to Departmental Representative via PSPC's cloud-based document filing system "CentralCollab".

1.7 Close-Out Procedures

.1 Close-Out Procedures as per Section 01 77 00 – Close Out Procedures.

END OF SECTION

SECTION INCLUDES:

PART 1 – GENERAL:

1.1 Project Schedule.

1.2 Schedule Format.

1.3 Submission of Schedules.

1.4 Project Schedule Reporting During the Work.

PART 1 – GENERAL

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.

.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.

.4 Construction Site Access.

.5 Quality Management Plan.

.6 Project 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 Blasting submittals (if applicable).

.11 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 / Demobilization.

.8 Project Substantial Completion 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 item of work identified on the Unit Price Table or if acceptable to the Departmental Representative, each operation.

.3 Provide horizontal time scale identifying first workday of each week.

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

.5 Include complete sequence of construction activities and identify critical path and critical path work items in identifying colour.

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

1.3 Submission of Schedules

.1 Submit initial format of schedules within fifteen (15) days after award of Contract, but in all cases prior to starting onsite work.

.2 Submit schedules in electronic format via PSPC's cloud-based document filing system "CentralCollab" (login details to be provided by Departmental Representative at time of submission following contract award). Provide schedules as a single PDF file format document (multiple files will not be accepted) and native file format (ex. Microsoft Projects format)

if requested by the Departmental Representative.

.3 If requested, submit two (2) hardcopies to be retained by the Departmental Representative.

.4 The Departmental Representative will review the schedule and return any comments within ten (10) days after receipt.

.5 Resubmit finalized schedule within seven (7) days after return of review copy. Once accepted by the Departmental Representative, the accepted schedule shall form a baseline which all schedule updates shall be compared against.

.6 Distribute copies of revised schedule to:

.1 The Contractor's team including Project Superintendent, Deputy Project Superintendent, and others as required.

.2 Subcontractors.

.3 Other concerned parties.

.7 Instruct recipients to report to Contractor within seven (7) days any problems anticipated by timetable shown in the schedule.

1.4 Project Schedule Reporting During the Work

.1 Update project schedule on a monthly basis or with each progress payment (whichever is more frequent) reflecting activity changes and completions, as well as activities in progress.

.2 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.

.3 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 Contractors.

.4 Discuss project schedule at Construction Progress Meetings, identify activities that are behind schedule and provide measures to regain slippage. If requested by the Departmental Representative, provide a schedule recovery plan with details of the approach and changes the Contractor is planning on implementing to bring the project back on schedule.

END OF SECTION

SECTION INCLUDES:

PART 1 – GENERAL:

1.1 General Requirements.

1.2 Shop Drawings and Product Data.

1.3 Samples.

PART 1 – GENERAL

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 Completion Date, 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 PSPC'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 A). 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 (1) 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 onsite.

.13 Comments made from review of submittals are intended to ensure conformance with contract requirements and not intended to change contract price. If the Contractor feels the comments include requirements not required by the contract, the Contractor shall respond in writing to the Departmental Representative prior to undertaking the work.

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. Should the Contractor feel that the adjustments affect the value of work and are outside the contract requirements, the Contractor shall state such in writing to the Departmental Representative prior to proceeding with the 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 Contract Specification sections. Submit hardcopies as requested by the Departmental Representative.

.9 Submit electronic copies of product data sheets or brochures for requirements requested in Contract 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 the 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 or to a location as directed by the Departmental Representative.

.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

SECTION INCLUDES:

PART 1 – GENERAL:

1.1 Measurement and Payment Procedures.

1.2 References.

1.3 General.

1.4 Definitions.

1.5 Submittals.

PART 2 – PRODUCTS:

2.1 Temporary Traffic Control Devices.

PART 3 – EXECUTION:

3.1 General.

3.2 Traffic Management.

3.3 Protection of Public Traffic.

PART 1 – GENERAL

1.1 Measurement and Payment Procedures

.1 Payment for the cost of Traffic Management will be made on the basis of the Price per Unit Bid for Traffic Management 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 (if required), pilot vehicles (if required), temporary concrete barriers and privacy fence (if required), 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 Management will be made by Lump Sum based on the percentage of work completed and accepted by the Departmental Representative.

1.2 References

.1 British Columbia Ministry of Transportation and Infrastructure (BC MoTI).

.1 Traffic Management Manual for Work on Roadways – 2020 Edition.

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

.2 Transportation Association Canada.

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

1.3 General

.1 The traffic management standards and requirements included in these specifications shall be considered he minimum requirements which shall be achieved. The Contractor in conjunction with the Professional Engineer whom seals the Traffic Management Plan shall be responsible for ensuring the traffic management used on the project archives these Traffic Management specifications, is appropriate for the project requirements, and achieves the requirements of WorkSafeBC OHS Regulation Part 18: Traffic Control.

1.4 Definitions

.1 Delay – The total amount of time vehicles are 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 Item 3.2.4.

.2 Limits of Work – The limits of work for this project are as defined in the Contract Drawings.

.3 Drop-off – An abrupt change in elevation created by construction activity such as milling, paving, or excavation that is steeper than 3H:1V.

.4 Long-Duration Work: For Traffic Management purposes and applicable signage requirements, all work on the project shall be considered Long Duration as defined by the BC MoTI Traffic Management Manual for Work on Roadways – 2020 Edition.

1.5 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. 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 MoTI Traffic Management Manual for Work on Roadway – 2020 Edition, excluding Sections 3.4.1 and 3.4.3.

.4 Developed and conform to the standards for Category 2 Traffic Management Plans as defined in Section 3: Traffic Management Plans of the BC MoTI Traffic Management Manual for Work on Roadways – 2020 Edition. As defined by Section 3.4.2, the Category 2 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. The customized drawings shall further include the sign size used for each individual sign (see Subsection 2.1 Temporary Traffic Control Devices, Item 2.1.2 of this specification), the sign support used (see Subsection 2.1 Temporary Traffic Control Devices, Item 2.1.1.4 of this specification), and the use of flags (if applicable, see Subsection 2.1 Temporary Traffic Control Devices, Item 2.1.1.5 of this specification).

.5 Shall, at a minimum, include all headings, sub-headings, details, and presentation format as provided in the Category 2 Traffic Management Plan Template found in Appendix C (provided to the Contractor as a Word file upon award of contract). The Contractor shall add additional headings and content to the Traffic Management Plan as deemed necessary. PSPC has the right to reject the Traffic Management Plan if the headings from this document are not used in the

Contractor's Traffic Management Plan.

.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 MoTI Traffic Management Manual for Work on Roadways – 2020 Edition.

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

.8 If DMS message signs are used by the Contractor, include in the appendix of the traffic management plan a list of DMS messages which will be displayed on the DMS throughout the project. Messages used on the DMS shall be per Section 4 – Temporary Traffic Control Devices (Table 4.5 and Table 4.2) of the BC MoTI Traffic Management Manual for Work on Roadways – 2020 Edition plus other messages required or anticipated to be required on the project.

.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 MoTI Traffic Management Manual for Work on Roadways – 2020 Edition for further details. At a minimum, the text and figures included in Subsection 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.

.10 Shall include a table or list of each element of work on the project and the applicable traffic accommodation strategies and layout

drawing(s) which will be used during that element of work throughout all project locations. Example elements of work are to include but are not limited to unloading of equipment, paving, line painting, rumble strip installation, excavation on highway, excavation off highway, culvert installation, etc. The table or list of each element of work on the project shall also include the applicable traffic accommodation strategies and layout drawing(s) to be used during non-work hours.

.11 If using Traffic Control Persons (TCPs) during non-daylight hours (before sunrise after sunset), shall include details of the overhead lighting which will be used at each TCP location. Details to include the location, direction, height, brightness, and use of shields on the lights to suitably illuminate the TCP but not obstruct the visibility of drivers approaching the TCP.

.12 Shall include graphical representation of the sign supports planned for use on the project; Post Mounted Supports found in Figure 01 35 00 – 01 and or the Wind Resistant Sign Stand found in Figure 01 35 00 – 02.

.13 Shall include a copy of the "Daily Sign Check Form" as found in the appendices of the Category 2 Traffic Management Plan Template (see Appendix C of the specifications).

.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 fourteen (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 Daily Sign Check Form.

.1 Submit to the Departmental Representative for review the "Daily Sign Check Form" as found in Appendix C: Templates for Traffic Management Plans in the BC MoTI Traffic Management Manual for Work on Roadways – 2020 Edition. Submit via CentralCollab in accordance with the procedures outlined in Section 01 33 00 – Submittal Procedures.

.3 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 outlined 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 MoTI Traffic Management Manual for Work on Roadways – 2020 Edition and the following requirements.

.1 The use of portable dynamic message signs (DMS) for the duration of the work shall be at the Contractor's discretion.

.2 Unless preapproved by the Departmental Representative, where 45 cm, 70 cm, or 90 cm cones are called for by the BC MoTI Traffic Management Manual for Work on Roadways – 2020 Edition, 100 cm tubular markers shall be used.

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

.4 All sign supports shall either be a post mounted support per the requirements of Figure 01 35 00 – 01 or Wind Resistance Sign Stand per the requirements of Figure 01 35 00 – 02.

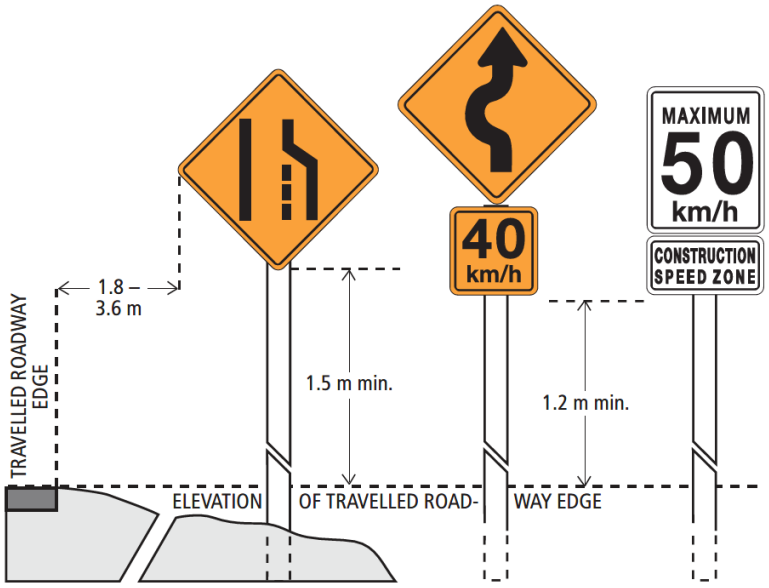


Figure 01 35 00 - 01: Post Mounted Supports

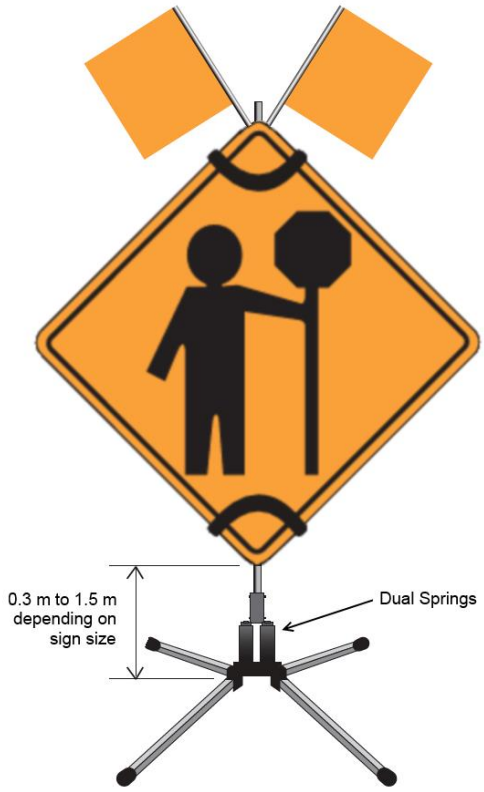


Figure 01 35 00 - 02: Wind Resistant Sign Stand

.5 Flags shall be used on the following signs:

.1 Traffic Control Person Ahead (C-001-1).

.2 Survey Crew Ahead (C-003).

.3 Crew Working Ahead (C-004).

.4 Accident Scene (C-058).

.6 Unless pre-approved by the Departmental Representative, one or more sandbags or weights shall be in used at all times to further stabilize all Wind Resistance Sign Stands.

.2 Where an option for a sign size is available, the sign size used shall be the larger dimension sign as listed in Appendix B.2: Sizes and Applications of Individual Signs of the BC MoTI Traffic Management Manual for Work on Roadways – 2020 Edition.

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 MoTI Traffic Management Manual for Work on Roadways – 2020 Edition.

.2 Responsibilities for traffic control shall be undertaken in accordance with Section 1.2.3 – Traffic Control Responsibilities of the BC MoTI Traffic Management Manual for Work on Roadways – 2020 Edition and as follows.

.1 Road Authority shall be Public Services and Procurement Canada (PSPC).

.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.

.3 Traffic Control Supervisors and Traffic Control Persons.

.3 PSPC will assist the Contractor with the Public Information Plan by notifying DriveBC of the work and posting notice of the project on PSPC's permanent variable message signs along the highway. All other requirements of the Public Information Plan (Section 3.2.3 of the BC MoTI Traffic Management Manual for Work on Roadways – 2020 Edition 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 Subsection 1.5 Submittals).

.2 Section 2: Fundamentals of Traffic Management and Traffic Control of the BC MoTI Traffic Management Manual for Work on Roadways – 2020 Edition and as follows.

.1 Section 2.5.3 – Road Authority Acceptance

shall be replaced with the requirements of Subsection 1.5 Submittals within this specification.

.2 References to Ministry shall be replaced with PSPC.

.3 Section 5: Traffic Control Persons of the BC MoTI Traffic Management Manual for Work on Roadways – 2020 Edition.

.4 Section 6: Traffic Control Layouts – General Instructions of the BC MoTI Traffic Management Manual for Work on Roadways – 2020 Edition and as follows:

.1 Per section 6.3 of the BC MoTI Traffic Management Manual for Work on Roadways – 2020 Edition, traffic management shall be managed as one continuous work zone where the work is one kilometer apart or less.

.2 Drop-off's shall be treated in accordance with Section 6.5 of the BC MoTI Traffic Management Manual for Work on Roadways – 2020 Edition whenever the drop-off is within 1.5 m of the edge of the travel lane. Additionally, the following requirements shall be achieved.

.1 Drop-offs ≥ 150 mm between 1.5 m and 3.0 m of the travel lane shall be signed with Low Shoulder (C-013) signs at least once every 1 kilometer for as long as the condition persists.

.2 A lane width of 3.7 shall be used at all times.

.5 Section 7: Traffic Control Layouts – Two-Lane, Two-Way Roadways of the BC MoTI Traffic Management Manual for Work on Roadways – 2020 Edition. The applicable traffic control layouts, revisions and details as listed below shall be used in conjunction with 7.2 Typical Construction Speed Zone Signing – Two-Lane, Two-Way Roadway (see Subsection 3.2 Traffic Management, Item 3.2.1.5.3 of this Specification) within the limits of construction.

.1 Section 7: Legend, Table A and Table B.

.2 The requirements of 7.1 General Information – Two-Lane, Two-Way Roadways shall apply subject to the following:

.1 A buffer space shall be used for all traffic control layouts.

.2 The use of a buffer vehicle when workers are present shall be at the Contractor's discretion.

.3 A portable dynamic message sign (DMS) shall be used in the location identified in 7.2 Typical Construction Speed Zone Signing – Two-Lane, Two-way Roadway (see Subsection 3.2 Traffic Management, Item 3.2.1.5.3 of this specification).

.3 7.2 Typical Construction Speed Zone Signing – Two-Lane, Two-way Roadway shall be used subject to the following:

.1 If used by the Contractor a DMS shall be positioned approximately 300 m prior to the sign C-018-2A.

.2 The sign C-035 shall be replaced with signs C-035-C and C-035-CT with the Contractor's name and phone numbers. Signs C-035-C and C-035-CT shall be in accordance with Figure 01 35 00 – 3.

Sign Item Number	Dimensions (W x H) mm	Reflectivity ASTM Type	Approval	Comment
C-035-C	2440 x 610	1	-	
C-035-CT	2440 x 305	1	-	

Figure 01 35 00 – 03: Sign C-035-C and C-035-CT Details

.3 Any duplicate signage resulting from the use of Section 7.2 Typical Speed Zone Signing – Two-Lane, Two-Way Roadway and other Section 7 traffic control layouts shall be removed.

.4 7.5 Work on Shoulder – Short and Long Duration can be used during the following:

- When work activities on part or all of the shoulder area (including parked vehicles, equipment, and equipment with components within reach of the shoulder) are on one side of the highway and do not encroach onto the driving lane.
- When work activities do not include unloading or loading of equipment or supplies on part or all of the shoulder area.

The use of 7.5 Work on Shoulder – Short and Long Duration is subject to the following:

.1 Advanced warning signs (Men Working (C-004) and Construction Ahead (C-018-1A)) shall be installed in the opposing direction of travel.

.2 Tubular markers shall replace cones and tubular markers can be used as a replacement for drums. Tubular markers may be omitted at the Contractor's discretion should the work be located behind precast concrete barriers which do not encroach into the travel lane.

.3 The use of a vehicle-mounted DMS or flashing arrow board can be omitted at the Contractor's discretion should the work be within the "Work Activity Area" as defined by Figure 7.2 – Typical Construction Speed Zone Signing – Two Lane, Two-Way Roadway of the BC MoTI Traffic Management Manual for Work on Roadways – 2020 Edition (see Subsection 3.2 Traffic Management, Item 3.2.1.5.3 of this specification).

.4 The traffic control signage layout shall include the Men Working (C-004) sign in advance of the Construction Ahead (C-018-1A) sign using the applicable Construction Sign Spacing (Dimension A as defined in Table B of Section 7 of the BC MoTI Traffic Management Manual for Work on Roadways – 2020 Edition) for the applicable speed (adjust all other sign spacing as required).

.5 7.8 Lane Closure with Traffic Control Persons – Single Lane Alternating Traffic – Short and Long Duration can be used when the work activity encroaches into a highway driving lane in an area of the highway with two lanes. The traffic control signage layout shall include the Men Working (C-004) sign in advance of the Construction Ahead (C-018-1A) sign using the applicable Construction Sign Spacing (Dimension A as defined in Table B of Section 7 of the BC MoTI Traffic Management Manual for Work on Roadways – 2020 Edition) for the applicable speed (adjust all other sign spacing as required).

.6 Section 8: Traffic Control Layouts – Multilane Undivided Roadways of the BC MoTI Traffic Management Manual for Work on Roadways – 2020 Edition. The traffic control layouts, revisions, and details as listed below shall be used in conjunction with 7.2 Typical Construction Speed Zone Signing – Two Lane, Two-Way Roadway (see Subsection 3.2 Traffic Management, Item 3.2.1.5.3 of this specification) within the Limits of Construction.

.1 Section 8: Legend, Table A and Table B.

.2 The requirements of 8.1 General Information – Multilane Undivided Roadway shall apply subject to the following:

.1 A buffer space shall be used for all traffic control layouts.

.2 The use of a buffer vehicle when workers are present shall be at the Contractor's discretion.

.3 8.5 Work on Shoulder – Short and Long Duration can be used during the following:

.1 When work activities on part or all of the shoulder area (including parked vehicles, equipment, and equipment with components within reach of the shoulder) are on one side of the highway and do not encroach onto the driving lane.

.2 When work activities do not include unloading or loading of equipment or supplies on part or all of the shoulder area.

.4 The use of 8.5 Work on Shoulder – Short and Long Duration is subject to the following:

.1 Advanced warning signs (Men Working (C-004) and Construction Ahead (C-018-1A)) shall be installed in the opposing direction of travel.

.2 Tubular markers shall replace cones and tubular markers can be used as a

replacement for drums.

.3 The use of a vehicle-mounted DMS or flashing arrow board can be omitted at the Contractor's discretion should the work be within the "Work Activity Area" as defined by Figure 7.2 – Typical Construction Speed Zone Signing – Two Lane, Two-Way Roadway of the BC MoTI Traffic Management Manual for Work on Roadways – 2020 Edition (see Subsection 3.2 Traffic Management, Item 3.2.1.5.3 of this Contract Specification).

.4 The traffic control signage layout shall include the Men Working (C-004) sign in advance of the Construction Ahead (C-018-1A) sign using the applicable Construction Sign Spacing (Dimension A as defined in Table B of Section 8 of the BC MoTI Traffic Management Manual for Work on Roadways – 2020 Edition) for the applicable speed (adjust all other sign spacing as required).

.5 8.6 Right Lane Closed – Short and Long-Term Duration can be used when can be used when the work activity encroaches into the outside highway driving lane in an area of the highway with two lanes in one direction. The traffic control signage layout in both directions shall include the Men Working (C-004) sign in advance of the Construction Ahead (C-018-1A) sign using the applicable Construction Sign Spacing (Dimension A as defined in Table B of Section 8 of the BC MoTI Traffic Management Manual for Work on Roadways – 2020 Edition) for the applicable speed (adjust all other sign spacing as required). All requirements for long-duration work shall be applied.

.6 8.14 Passing / Climbing Lanes – Lane Shift – Short and Long Duration can be used when the work activity encroaches into the driving lane in an area of the highway with two lanes in the

opposite direction. The traffic control signage layout in both directions shall include the Men Working (C-004) sign in advance of the Construction Ahead (C-018-1A) sign using the applicable Construction Sign Spacing (Dimension A as defined in Table B of Section 8 of the BC MoTI Traffic Management Manual for Work on Roadways – 2020 Edition) for the applicable speed (adjust all other sign spacing as required). All requirements for long-duration work shall be applied.

.7 Section 11: Traffic Control Layouts – Intersections of the BC MoTI Traffic Management Manual for Work on Roadways – 2020 Edition. The traffic control layouts, revisions, and details as listed below shall be used in conjunction with 7.2 Typical Construction Speed Zone Signing – Two Lane, Two-Way Roadway (see Subsection 3.2 Traffic Management, Item 3.2.1.5.3 of this specification) within the Limits of Construction.

.1 Section 11: Legend, Table A and Table B.

.2 The requirements of 11.1 General Information – Intersections shall apply.

.3 11.2 Intersection Lane Closure – Two-Lane, Two-Way Roadway with TCPs (Near Side) – Short and Long Duration shall be used when work activities (regardless of duration) extend onto part or all of the access road (cross street) driving lane (including parked vehicles, equipment, and equipment with components within reach of the driving lane). The use of 11.2 Intersection Lane Closure – Two-Lane, Two-Way Roadway with TCPs is subject to the following:

.1 Tubular markers shall replace cones.

.2 The traffic control signage layout shall include the Men Working (C-004) sign in advance of the Construction Ahead (C-018-1A) sign using the applicable Construction Sign Spacing (Dimension A as defined in Table B of Section 11 of the BC MoTI Traffic Management

Manual for Work on Roadways – 2020 Edition) for the applicable speed (adjust all other sign spacing as required).

.3 At the Contractor's discretion the TCPs on the access road (cross street) may be omitted as outlined in the BC MoTI Traffic Management Manual for Work on Roadways – 2020 Edition) due to low traffic volumes. TCPs are always required on the highway, adjacent to the intersection in both directions.

.4 7.5 Work on Shoulder – Short and Long Duration shall be used on the access road (cross street) when work activities (regardless of duration) extend onto part or all of the access road (cross street) shoulder area (including parked vehicles, equipment, and equipment with components within reach of the shoulder). The use of 7.5 Work on Shoulder – Short and Long Duration on the access road (cross street) shall be in compliance with Subsection 3.2 Traffic Management, Item 3.2.1.5.3 of this specification.

.8 Section 15: Traffic Control Layouts – Surveying of the BC MoTI Traffic Management Manual for Work on Roadways – 2020 Edition. 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.

.2 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 3.5 m lane width with 1.0 m shoulder on both sides) alternating traffic during completion of

on-highway work including, transport of material offsite, import and delivery of materials, unloading or loading of equipment, regrading, paving, shouldering, install of precast concrete barrier 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).

.3 During non-work hours, all construction hazards shall be removed from within the clear zone of the highway and access roads (cross streets) and the posted speed and all regular traffic movements shall be re-established.

.4 The maximum allowable delay to any individual motorist travelling through the project limits including access roads as a result of the Contractor's operations will be 10 minutes.

.5 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.

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 Contractor to complete and document checks of the signage using the "Daily Sign Check Form" found in Appendix C: Templates for Traffic Management Plans in the BC MoTI Traffic Management Manual for Work on Roadways – 2020 Edition. Complete checks a minimum of 3 times a day (start of workday, midday, and at completion of workday). Documentation / sign-off shall be completed by the person who did the checks. Submit completed "Daily Sign Check Form" to the Departmental Representative weekly or more frequently as required by the Departmental Representative.

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

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

.4 Keep travelled way and detours graded, free of potholes, and of sufficient width for required number of lanes of traffic.

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

.6 Provide dust control (if necessary).

.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

SECTION INCLUDES:

PART 1 – GENERAL:

1.1 Measurement and Payment Procedures.

1.2 References.

1.3 Workers' Compensation Coverage.

1.4 Compliance with Regulations.

1.5 Definitions.

1.6 Submittals.

1.7 Project Specific Health and Safety Plan.

1.8 Contractor's Responsibility.

1.9 Health and Safety Coordinator.

1.10 General.

1.11 Project / Site Conditions.

1.12 Regulatory Requirements.

1.13 Work Permits.

1.14 Filing of Notice.

1.15 Emergency Procedures.

1.16 Hazardous Products.

1.17 Overloading.

1.18 Fire Safety Requirements.

1.19 Unforeseen Hazards.

1.20 Posted Documents.

1.21 Correction of Non-Compliance.

1.22 Medical.

1.23 Accidents and Accident Reports.

1.24 COVID-19.

PART 1 – GENERAL

1.1 Measurement and Payment Procedures

.1 Payment for Health and Safety will not be made and shall be considered incidental to the applicable payment item of work.

1.2 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 Project Specific Health and Safety Plan Template (see Appendix B).

.8 Canadian Construction Association, COVID-19 – Standardized Protocols for All Canadian Construction Sites, Version 5, May 26, 2020.

.9 WorkSafeBC Construction and COVID-19 Safety

1.3 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.

1.4 Compliance with Regulations

.1 PSPC may terminate the Contract without liability to PSPC where the Contractor, in the opinion of PSPC, 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.

1.5 Definitions

.1 Workplace: As defined by WorkSafeBC Occupational Health and Safety Guidelines. The project shall be considered as having separate workplaces should the WorkSafeBC Occupational Health and Safety Guidelines - Location Factors provide "Yes" to "Indication of Separate Workplaces" including but not limited to "Locations of one employer are more than 20 minutes apart from each other".

1.6 Submittals

.1 The Contractor's Project Specific 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 Prior to commencing onsite work, Contractor to provide completed WorkSafeBC form: Assurance of Compliance with Occupational Health and Safety Regulation, Part 19 (form 30M33), (see Reference Documentation in Table of Contents).

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

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

.2 Copies of incident and accident reports.

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

.4 Emergency Procedures.

.5 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.

.6 If requested, complete versions of the Contractor's corporate Health and Safety Policies / Procedures manual.

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

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

.6 Submission of the Project Specific 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 their legal obligations for the provision of health and safety on the project.

.7 Should deficiencies in the Contractor's Project Specific 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 Project Specific Health and Safety Plan to ensure the correction of any deficiencies.

1.7 Project Specific Health and Safety Plan

.1 The Contractor shall prepare and comply with the Project Specific Health and Safety Plan. The preparation and details of the Project Specific Health and Safety Plan shall include conducting a site-specific hazard assessment based on review of Contract Documents, required work, and project site(s). The Project Specific Health and Safety Plan shall address all concerns / requirements identified in the Contract Documents and identify any known and potential health risks and safety hazards.

.2 The Project Specific Health and Safety Plan shall, at a minimum, include all headings and details provided in the template found in Appendix B (provided to the Contractor as a Word file upon award of contract). The Contractor shall add additional headings and content to the Project Specific Health and Safety Plan as deemed necessary. PSPC has the right to reject the Project Specific Health and Safety Plan if the headings from this document are not used in the Contractor's Project Specific Health and Safety Plan. Minimum requirements for the Project Specific Health and Safety Plan includes:

.1 Contractor's safety policy / statement.

.2 Identification of applicable compliance obligations.

.3 Identify personnel and alternates responsible for project site safety and health. List of health and safety responsibilities for all personnel listed.

.4 General safety rules for project and actions which will be taken by the Contractor should these safety rules be broken by the any workers on the project (includes workers employed by the General Contractor, sub-contractor, or sub-consultants).

.5 Identify health and safety risks / hazards and engineering and administrative control measures to be implemented at each "workplace" for managing identified risks / hazards including:

.1 Summary of health risks and safety hazards resulting from hazard assessment analysis with respect to site tasks and operations which must be performed as part of the work and hazard rating assignment (low, moderate, or high) for each "workplace" as defined by WorkSafeBC and applicable to the application of G3.16 of WorkSafeBC Occupational Health and Safety Regulations.

.2 List hazardous materials to be brought on site as required by the work.

.6 Job-specific safe work procedures that are not already included in the Contractor's corporate Health and Safety Polices / Procedures manual.

.7 Identify personal protective equipment (PPE) to be used by workers.

.8 Identify personnel training requirements and training plan, including site orientation for new workers and personnel designated by the Departmental Representative as needing to visit the site.

.9 Identification of the first aid requirements for each "workplace" on the project including:

.1 Estimated travel time from the "workplace" to the nearest hospital.

.2 Maximum numbers of workers at any time

per “workplace”.

.3 The first aid supplies, equipment, and facilities which will be available at each “workplace”.

.4 The first aid attendant certificate level onsite at each “workplace”.

.5 The first aid transportation which will be used on the project (i.e. ETV), if required by Contractor or WorkSafeBC requirements. Details of where the ETV will be located / parked relative to the location of the first air attendant(s) during the work.

.10 Inspection policy and procedures.

.11 Incident reporting and investigation policy and procedures.

.12 Occupational Health and Safety Committee/Representative procedures.

.13 Occupational Health and Safety meetings.

.14 Occupational Health and Safety communications and record keeping procedures.

.15 Emergency contact information including PSPC project personnel (including Consultants), Contractor office and field staff, fire, police, ambulance, air ambulance, and forest fire reporting.

.16 Identify employee training plans for wildlife encounters and prevention.

.17 Identify fire safety, fire reporting, and fire evacuation procedures.

.18 Confirmation through the review and signatures from the Contractor’s Project Manager, Superintendent, Health and Safety Manager, Quality Control Manager, representatives from all major Sub-Contractor’s, and other project roles that may be applicable, that they have reviewed the Project Specific Health and Safety plan, agree with its contents, and will be enforced by them for the duration of the project.

.19 Completed "Preliminary Hazard Assessment Form" (see Appendix 1 of the Project Specific Health and Safety Plan template).

.20 Completed "Confirmation of Prime Contractor's Main Responsibilities Under the WorkSafeBC Occupational Health and Safety Regulations and Worker's Compensation Act" form (see Appendix 2 of the Project Specific Health and Safety Plan template).

.21 Blank copy of Contractor's daily toolbox meeting Form.

.22 Blank copy of the Contractor's Site Safety Orientation Form.

.23 Blank copy of the Contractor's Incident/Accident Report template.

.24 Resume(s) or certification(s) of Health and Safety Coordinator(s) responsible for site safety and onsite First Aid Attendants.

.25 Maps identifying the location of the nearest hospital(s) to the project site. The maps shall be of appropriate scale and sufficient detail allowing for their use to navigate to the hospital(s) in the event of an emergency.

.3 Develop the plan in collaboration with all subcontractors. Ensure that work/activities of subcontractors are included in the hazard assessment and are reflected in the plan.

.4 Should health and safety requirements change throughout the project and require information not included in the Project Specific Health and Safety Plan, revise and update Project Specific Health and Safety Plan as required and re-submit to the Departmental Representative.

.5 Departmental Representative's review: the review of the Project Specific Health and Safety Plan by Public Services and Procurement Canada (PSPC) shall not relieve the Contractor of responsibility for errors or omissions in final Project Specific Health and Safety Plan or of responsibility for meeting all requirements of construction and Contract Documents.

.6 Contractor's COVID-19 Safe Work plan, describing the protocols and procedures the Contractor shall implement throughout the duration of the work to mitigate the spread and risk of exposure to COVID-19, in accordance with Federal and Provincial COVID-19 guidelines, WorkSafeBC and Canadian Construction Association.

.7 Should Federal and/or Provincial guidelines change during the project, the Contractor shall update the Project Specific Health and Safety Plan and the Contractor's COVID-19 Safe Work Plan accordingly and submit to the Departmental Representative for review and acceptance.

1.8 Contractor's Responsibility

.1 Be responsible for health and safety of persons onsite, safety of property onsite 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 Project Specific Health and Safety Plan.

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

1.9 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 Project Specific Health and Safety Plan.

.3 Be onsite during execution of critical elements of the work or as required by the Contractor.

.4 Have a minimum of two (2) 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.

1.10 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 persons, and temporary lighting as required.

.2 Secure site during non-work at nighttime 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 PSPC's cloud-based document filing system "CentralCollab" on a weekly or more frequent basis.

1.11 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 PSPC maintenance personnel travelling the highway.

.3 Local wildlife.

.4 Unpredictable and adverse weather conditions.

1.12 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.

1.13 Work Permits

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

1.14 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.

1.15 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.

1.16 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. If requested, submit applicable MSDS and WHMIS documents as per Section 01 33 00 – Submittal Procedures. Keep documents available for review on the project site as close as practical to where the hazardous and toxic product is being used.

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

.3 All explosive materials (if required on project) shall be stored, handled, and used as per Natural Resources Canada Explosives Act.

1.17 Overloading

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

1.18 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.

1.19 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.

1.20 Posted Documents

.1 Post legible versions of the following documents onsite:

.1 Project Specific Health and Safety Plan.

.2 Sequence of work.

.3 Emergency procedures.

.4 Corporate Health and Safety Policies and Procedures manual(s).

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

.6 Notice of Project.

.7 Floor plans or site plans.

.8 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.

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

.10 Material Safety Data Sheets (MSDS).

.11 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) onsite, 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.

1.21 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".

1.22 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 the 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 onsite 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 one (1) handheld emergency siren in all confined access locations.

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

1.23 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.

1.24 COVID-19

.1 The Contractor shall keep informed with the latest Federal and Provincial recommendations and protocols regarding COVID-19 at all times during construction and shall modify their construction approach accordingly to ensure adherence to these recommendations and protocols.

.2 If Federal and/or Provincial recommendations require that the project work be stopped, the Contractor shall consult with the Departmental Representative and the Departmental Representative will advise as to the course of action the Contractor shall take.

END OF SECTION

SECTION INCLUDES:

PART 1 – GENERAL:

1.1 Measurement and Payment Procedures.

1.2 Definitions.

1.3 References.

1.4 Regulatory Overview.

1.5 Submittals.

1.6 Environmental Protection Plan (EPP).

1.7 Breeding Bird and Bird Nest Survey (If Required).

1.8 Environmental Site Inspection Memo.

1.9 Notification.

PART 2 – PRODUCTS:

2.1 Products.

PART 3 – EXECUTION:

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 Drainage.

3.15 Site Clearing, Plant Protection, and Nesting Bird Protection.

3.16 Environmental Protection Supplies.

PART 1 – GENERAL

1.1 Measurement and Payment Procedures

.1 Payment for Environmental Protection shall not be made and shall be considered incidental to the work.

1.2 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. https://www.for.gov.bc.ca/hra/plants/legislation.htm
1.3 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 G).
	.4	Responsibility Checklist For Authorizations / Approvals / Notifications / Permitting (Appendix H).
	.5	Relevant Environmental Publications (Appendix I).
1.4 Regulatory Overview	.1	The Departmental Representative will complete the environmental permitting (if required) under provincial regulations 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 as part of the permitting process.
	.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 Rationale (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 (see Reference Documentation – Table of Contents).

1.5 Submittals

.1 The Contractor's EPP, Breeding Bird and Bird Nest Survey Memo and Environmental Site Inspection Memos (if any) 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 and Environmental Site Inspection Memos (if any) (first submission and if required all subsequent re-submissions) within 14 days of submission and the Breeding Bird and Bird Nest Survey (first submission and if required all subsequent re-submissions) within three (3) weekdays 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 and 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 FLNRORD / MoE.

.5 The review of the EPP, Breeding Bird and Bird Nest Survey memo and Environmental Site Inspection Memos 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 or Breeding Bird and Bird Nest Survey 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 or Breeding Bird and Bird Nest Survey to ensure the correction of any deficiencies.

1.6 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 Environmental Protection Plan (EPP) – Checklist (Appendix G) and as identified in this Section of the Contract 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 rationale 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. See Subsection 3.1 Environmental Monitoring of this Specification for further details of the required environmental monitoring.

.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 (FLNRORD / MoE) approval or notification for instream work or under FLNRORD / MoE guidelines, and all other applicable regulations including the requirements of these specifications. The Contractor may utilize marked-up contract drawings within the EPP to show the locations of the proposed activities.

.4 Typical drawings showing the 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. The Contractor may utilize marked-up contract drawings within the EPP to show the locations of the proposed activities.

.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 the 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 FLNRORD 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 Contract Specifications.

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

1.7 Breeding Bird and Bird Nest Survey (If Required)

.1 The Contractor is required to complete a Breeding Bird and Bird Nest Survey prior to the completion of Tree Clearing operations completed between April 24 and August 29. The results of the Breeding Bird and Bird Nest Survey shall be compiled in a memo. The Breeding Bird and Bird Nest Survey and memo shall achieve the following:

.1 Be completed by P.Biol, RPBio, or Qualified Environmental Professional (QEP). If a QEP completes the field component of the Breeding Bird and Bird Nest Survey and or memo, the memo must be signed off by a P.Biol or RPBio.

.2 Be completed within seven (7) days prior to the commencement of the Tree Clearing. Should the Tree Clearing work stop for any reason longer than 24 hours a new a Breeding Bird and Bird Nest Survey shall be completed.

.3 Be conducted in accordance with the Active Migratory Bird Nest Survey Program outlined by CWS (2008) and the Inventory Methods for Forest and Grassland Birds (RISC 1999).

.2 The Contractor shall contact the Departmental Representative for further instruction should a concern be identified during the Breeding Bird and Bird Nest Survey that would in the opinion of the QEP, P.Biol, or RPBio give cause for the delay or cancellation of the Tree Clearing. Details of the concerns shall be described and itemized in the memo by the QEP, P.Biol, or RPBio.

1.8 Environmental Site Inspection Memo

.1 The Contractor shall submit an Environmental Site Inspection Memo within three (3) weekdays of each site visit by the P.Biol. or RPBio or other qualified professional. The Environmental Site Inspection Memo shall include the following:

.1 Dates and times when the Environmental Monitor was 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 Monitor's 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 Other/Comments.

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

1.9 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 Contractor's site superintendent and or other onsite personnel shall be responsible for monitoring of environmental concerns or violations. The P.Biol or RPBio or other qualified professional whom prepared the Contractor's EPP shall be available to respond to queries from the Contractor or Departmental Representative or make revisions to the EPP throughout the project. Should the Contractor or the Departmental Representative determine that the Contractor is in violation of applicable regulatory requirements or these environmental specifications, the P.Biol or RPBio or other qualified professional whom prepared the Contractor's EPP shall visit the site at the Contractor's expense when requested by the Contractor or Departmental Representative to oversee the implementation of the corrective measures to bring the work back into compliance with applicable regulatory requirements or these environmental specifications.

.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.

3.2 Site Access and Parking .1 The Contractor shall review both short-term 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 onsite 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 clean-up and all other work shall be stopped, where appropriate, and personnel devoted to spill containment and clean-up.

.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 Subsection 3.5 Pollution Control, Item 3.5.4 of this Contract 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.

.9 Equipment shall use environmentally sensitive / biodegradable hydraulic fluid in case of accidental loss.

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 (outside the identified work limits).

.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 PSPC, 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 of the Contractor's construction equipment in the event of fire.

.3 The Contactor's staff shall receive basic training in early response to wildfire events during the "environmental briefing" presented by the Contractor.

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

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

.6 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.

.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 onsite 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 as defined by GC6.3 shall be reported to the Departmental Representative immediately. The Contractor and workers shall wait for instruction before proceeding with their work as per GC6.3.

.2 All historical or archaeological objects found in the project site 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 as per GC6.3.

.3 Human remains must be reported immediately to the local RCMP and Departmental Representative per GC6.3.

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 m from natural drainage courses and 100 m from fish bearing waters, and will conform to the discharge requirements set out in provincial regulations:

.2 Contractor must obtain approval from the provincial Water Act Officer prior to discharging any treated wastewater.

3.14 Drainage

.1 Stage the work and complete excavation work and placement of all materials in the dry. Provide temporary drainage, pumping and construct berms as necessary to keep excavations and the work area 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 coir logs, 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.

3.15 Site Clearing, Plant Protection, and Nesting Bird Protection

.1 Prior to any clearing done during nesting season April 24 to August 29, the Contractor shall have a Breeding Bird and Bird Nest survey completed first per the requirements of Subsection 1.7 Breeding Bird and Bird Nest Survey.

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

.3 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.

.4 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.

.5 Minimize stripping of topsoil.

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

3.16 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 coir

logs 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 coir logs 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

SECTION INCLUDES: PART 1 – GENERAL:

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 Check Sheets.

1.10 QC Testing / Survey Inspection.

1.11 Non-Conformance Reports.

1.12 Departmental Representative Inspection and Audits.

PART 1 – GENERAL

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 all Quality Control and all other items necessary for successful completion of the work.

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

1.2 References

.1 British Columbia Ministry of Transportation and Infrastructure (BC MoTI).

.1 2020 Standard Specifications for Highway Construction.

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

.1 ASTM C117, Test Method for Material Finer Than

75-µm (No. 200) Sieve in Mineral Aggregates by Washing.

.2 ASTM C124, Standard Test Method for Relative Density (Specific Gravity) and absorption of Coarse Aggregate.

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

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

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

.6 ASTM C1019, Standard Test Method for Sampling and Testing Grout.

.7 ASTM C940, Standard Test Method for Expansion and Bleeding of Freshly Mixed Grouts for Preplaced Aggregate Concrete in the Laboratory.

.8 ASTM D2487, Standard Practice for Classification of Soils for Engineering Purposes (United Soil Classification System).

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

.10 ASTM D5856, Standard Test Method for Measurement of Hydraulic Conductivity of Porous Material Using a Rigid-Wall, Compaction Mold Permeameter.

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

.12 ASTM D4832, Standard Test Methods for Preparation and Testing of Controlled Low Strength Material (CLSM) Test Cylinders.

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

.14 ASTM C566, Test Method for Total Evaporable Moisture Content of Aggregate by Drying.

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

.16 ASTM D5856, Standard Test Method for Measurement of Hydraulic Conductivity of Porous Material Using a Rigid-Wall, Compaction Mold Permeameter.

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

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

.19 ASTM D698, Test method for Laboratory Characteristics of Soil Using Standard Effort (12,000 ft-lbf/ft3 [600 kN-m/m³]).

.3 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.

.4 Canadian Standards Association (CSA):

.1 CSA-A23.1-M, Concrete Materials and Methods of Concrete Construction.

.2 CSA-A23.2-M, Methods of Test for Concrete.

.3 CSA-A5-M, Portland Cement.

.4 CSA A363-M, Cementitious Hydraulic Slag.

.5 CSA-G30.18-M, Billet-Steel Bars for Concrete Reinforcement.

.6 CSA-G401, Corrugated Steel Pipe Products.

.7 CSA-O86S1, Supplement No. 1 to CAN/CSA-O86-01, Engineering Design in Wood.

.8 CSA O121, Douglas Fir Plywood.

.9 CSA-O151, Canadian Softwood Plywood.

.10 CSA-O153, Poplar Plywood.

.11 CSA-O325.0, Construction Sheathing.

.12 CSA-O437 Series, Standards for OSB and Waferboard. CSA S269.1, Falsework for Construction Purposes.

.13 CSA-S269.3, Concrete Formwork, National Standard of Canada.

.14 CSA-W59, Welded steel construction (metal arc welding).

.15 CSA-W48, Filler metals and allied materials for metal arc welding.

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 Report: Prepared by the Contractor's QC in conjunction with the Contractor and if necessary prepared by 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 Quality Management Plan.

.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.

.2 Check sheets, 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 PSPC'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.

1.7 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 the 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 during 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.

.3 The Quality Management Plan shall 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 personnel (and agency) and survey personnel (and agency), 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 and survey 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 the project 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 a qualified and experienced Quality Control Manager and if necessary other staff who are responsible for quality matters, and who will report regularly to the Contractor's management at a level which shall ensure that Quality Management requirements are not subordinated to manufacturing, construction or delivery. The 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.

.2 The Quality Control Personnel (including 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.

.3 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.

.4 PSPC 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 Check Sheets and Daily QC Reports

.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. The check sheets shall be prepared assuming the Departmental Representative will only be providing spot checks of the work throughout the project and thus QC shall check all elements of the work for conformance with the requirements of the Contract Documents. Where the contract documents provide a requirement but then also indicate that the Departmental Representative may also accept an alternative (ex. "as approved by the Departmental Representative"), the check sheets shall assume that the requirement listed governs and the QC process shall check these requirements unless directed otherwise during the project by the Departmental Representative.

.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:

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

.2 Daily QC Reports

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

.2 The Daily QC Reports shall include a list of the QC activities completed that day (check 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 QC Report shall include photos of any QC concerns or non-conformances identified by the Quality Control Personnel.

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

1.10 QC Testing / Survey Inspection

.1 QC Testing and survey inspection required to assure that the work strictly complies with the Contract requirements shall be completed by the Contractor as follows:

.1 Be completed using a fully equipped laboratory (a field laboratory may be used at the Contractor's discretion) during times of construction activity and gravel manufacturing.

.2 Include all testing and survey inspection specified in the Contract Documents.

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

.2 The frequency of testing / survey inspection shall be outlined in the Quality Management Plan. At a minimum, the Contractor shall achieve the most stringent Quality Control Testing / Inspection frequencies as follows:

.1 The specific frequencies defined elsewhere in these Contract Specifications.

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

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

Activity	Test / Inspection	Frequency
Supply / Manufacture – Crushed Base Gravel, Granular Backfill (Pit Run), Filter Gravel & Crushed Surfacing Gravel	ASTM C136, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates	One (1) test per 250 m^3 of material supplied
Supply / Manufacture – Crushed Base Gravel & Crushed Surfacing Gravel	Fracture (ASTM D5821)	One (1) test per 250 m^3 of material supplied
Screening / Sorting or Supply - Impervious Fill	ASTM D5856, Standard Test Method for Measurement of Hydraulic Conductivity of Porous Material Using a Rigid-Wall, Compaction-Mold Permeameter	Three (3) tests evenly distributed over the duration of the project and at the direction of the Departmental Representative
Screening / Sorting / Manufacture - Riprap	ASTM D5519, Particle Size Analysis of Natural and Man-Made Riprap Materials	One (1) Test per every one (1) day of production
Screening / Sorting / Manufacture – Riprap	ASTM C124, Standard Test Method for Relative Density (Specific Gravity) and Absorption of Coarse Aggregate	One (1) Test during Riprap Production for each riprap source if requested by the Departmental Representative
Placement / Site Tolerance – Crushed Base Gravel, Granular Backfill (Pit Run), Filter Gravel & Crushed Surfacing Gravel	Survey	One (1) point every 2 m^2 of placed material
Placement / Site Tolerance – Topsoil	Survey	One (1) point every 5 m^2 of placed material and at the direction of the Departmental Representative where positive drainage is required
Placement / Site Tolerance – Riprap (Culvert End Protection)	Survey	Four (4) survey shots for each end of every Riprap Culvert End Protection installation
Placement / Site Tolerance – Riprap (Interceptor Drain)	Survey	Four (4) survey shots randomly located over the full width of material placed every 5 m stations
Placement / Site Tolerance – Culverts	Survey	Two (2) shots (invert or top) per 5 m length of culvert section installed
Placement / Site Tolerance – Precast Concrete Wall Blocks	Survey	All corners for each block installed
Compaction – Crushed Base Gravel, Crushed Surfacing Gravel, & Impervious Fill	ASTM D698, Standard Test Methods for Laboratory Compaction Characteristics	One (1) per material, or a variance of the material type as identified by the

	of Soil Using Standard Effort	Quality Control or Departmental Representative
Compaction – Granular Backfill (Pit Run)	By Count of the number of passes	Entire surface area of each lift
Compaction – Crushed Surfacing Gravel, Crushed Base Gravel, & Impervious Fill	ASTM D6938, Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)	Two (2) tests at representative locations over the full width of material placed every 10 m stations, per each lift of material placed
Cast-in-place Grout	ASTM C1019, Standard Test Method for Sampling and Testing Grout	One (1) set of three (3) (one 7-day and three 28-day) cubes for every culvert filled with Grout
Manufacture – Precast Concrete Barrier / Headwall (If Materials are Contractor Supplied)	Field Test of Plastic Properties (Air and Slump)	As per CSA Certified Manufacturing Plant QC Requirements
Manufacture – Precast Concrete Barrier / Headwall (If Materials are Contractor Supplied)	Compressive Strength Tests	As per CSA Certified Manufacturing Plant QC Requirements
Cast-In-Place Concrete	Field Test of Plastic Properties (Air and Slump)	Every load delivered to project site (unless advised otherwise by the Departmental Representative following review of mix design)
Cast-In-Place Concrete	Compressive Strength Tests	One (1) set of four (4) (one 7-day and three 28-day) cylinders every load of concrete (unless advised otherwise by the Departmental Representative following review of mix design)

.3 As defined in the BC MoTI 2020 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.

.4 If not specified elsewhere 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.

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

.3 Submit the test results to the Departmental Representative in accordance with Subsection 1.6 Submittals of this Specification.

.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 MoTI.

.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.

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 with the contract requirements (including the Contractor's submitted plans, Project Specific Health and Safety Plan, Traffic Management Plan, Environmental Protection Plan, Quality Control Plan, etc.), 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 immediately correct and substandard product remains or becomes part of the work, an internal Non-Conformance Report (NCR) shall be prepared by the Quality Control Manager and issued to the Contractor within 24 hrs. of the occurrence, with a copy to the Departmental Representative in accordance with Subsection 1.6 Submittals of this specification. 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 (starting with the second similar occurrence) and not in conformance with the contract requirements (including the Contractor's submitted plans [Project Specific Health and Safety Plan, Traffic Management Plan, Environmental Protection Plan, Quality Control Plan, etc.]), the Quality Control Manager shall issue an internal procedural Non-Conformance Report (NCR) to the Contractor within 24 hrs. of the occurrence, with a copy to the Departmental Representative in accordance with Subsection 1.6 Submittals of this specification. 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 may issue to the Contractor an NCR with a required response time or direct the Quality Control Manager to prepare an NCR.

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 Should the Departmental Representative find that any component of the Contractor's submitted plans (Project Specific Health and Safety Plan, Traffic Management Plan, Environmental Protection Plan, Quality Management Plan, etc.) are not being adhered to by the Contractor or any member of the Contractor's team, the Departmental Representative may issue an NCR to the Contractor.

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

.6 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.

1.12 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 the 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

SECTION INCLUDES: PART 1 – GENERAL:

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 Power.

1.12 Communications.

1.13 Temporary Heating, Ventilation, and Lighting.

1.14 Fire Protection.

PART 1 – GENERAL

1.1 Measurement and Payment Procedures

.1 Payment for Construction Facilities and Equipment will not be made and shall be considered incidental to the applicable payment item of work.

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 weatherproof 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 – Traffic Management, 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 preapproved by the Departmental Representative. .1 Within highway right of way, in areas previously disturbed, off the traveled potion of the highway, off travel portions of all nearby side roads such that access is not impeded, and outside the highway clear zone. .2 Other areas as preapproved by the Departmental Representative.
1.11 Power	.1	Provide and pay for power as required for the completion of the works and operations of construction offices.
1.12 Communications	.1	Ensure Contractor’s onsite representatives have suitable onsite phone communications allowing the Departmental Representative reliable communication to the Contractors onsite representative when onsite.

1.13 Temporary Heating, Ventilation, and Lighting	.1	Provide temporary heating, ventilation, and lighting as required during construction period to facilitate construction of the works.
1.14 Fire Protection	.1	Provide and maintain temporary fire protection equipment during performance of work.

END OF SECTION

SECTION INCLUDES: PART 1 – GENERAL:

1.1 Measurement and Payment Procedures.

1.2 Installation and Removal.

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.

PART 1 – GENERAL

1.1 Measurement and Payment Procedures	.1	Payment for Temporary Barrier and Enclosures shall not be made and shall be considered incidental to the applicable payment item of work.
1.2 Installation and Removal	.1	Provide temporary controls in order to execute Work expeditiously.
	.2	Remove from site all such work after use.
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) days prior to installation.

END OF SECTION

SECTION INCLUDES:

PART 1 – GENERAL:

1.1 Measurement and Payment Procedures.

1.2 General Requirements.

1.3 Requirements of Regulatory Agencies.

PART 2 – PRODUCTS:

2.1 Products.

PART 3 – EXECUTION:

3.1 Mobilization.

3.2 Maintenance.

3.3 Demobilization.

PART 1 – GENERAL

1.1 Measurement and Payment Procedures

.1 Payment for Construction Camp will not be made and shall be considered incidental to the applicable payment item of work.

1.2 General Requirements

.1 The Contractor to provide its own construction camp as necessary. Obtain approval from landowner should Contractor choose to setup construction camp. The construction camp shall not be located within PSPC's right-of-way, PSPC's maintenance yards, PSPC's gravel pits / quarries, or on any other land owned or leased by PSPC.

.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.

1.3 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

2.1 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 the 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

SECTION INCLUDES: PART 1 – GENERAL:

1.1 Measurement and Payment Procedures.

1.2 Project Cleanliness.

1.3 Final Cleaning.

PART 1 – GENERAL

1.1 Measurement and Payment Procedures

.1 Payment for Cleaning will not be made and shall be considered incidental to the applicable payment item of work.

1.2 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 offsite.

.6 Clear snow and ice from areas of work.

1.3 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

SECTION INCLUDES: PART 1 – GENERAL:

1.1 Substantial Performance.

1.2 Completion.

PART 1 – GENERAL

1.1 Substantial Performance

.1 Project "Substantial Performance" shall be attained through the following process:

.1 When the project work has achieved Substantial Performance as defined by GC1.1.4, the Contractor and all subcontractors shall conduct an inspection of work, identify deficiencies and defects and repairs as required to conform to Contract Documents. Correct deficiencies and defects and complete repairs identified.

.2 Notify the Departmental Representative in writing of completion of the Contractor's Inspection, correction of deficiencies, defects, and repairs, and request the Departmental Representative's Substantial Performance inspection.

.3 Upon request from the Contractor, the Departmental Representative will complete a Substantial Performance inspection. If requested by the Departmental Representative, the Contractor shall accompany Departmental Representative during the Substantial Performance inspection.

.4 Unless stated otherwise by the Departmental Representative, the Contractor shall correct all deficiencies, defects, and repairs identified during the Substantial Performance inspection by the Departmental Representative prior to the preparation of the "Certificate of Substantial Performance".

.5 Should the Departmental Representative determine that Substantial Performance as defined by GC1.1.4 has been achieved, the Contractor shall prepare a "Request for Progress Payment" with the final project quantities and all Progress Payment submissions as outlined in Section 01 29 00 – Payment Procedures. The Departmental Representative will use the submitted "Request for Progress Payment" to prepare a "Certificate of Substantial Performance" in accordance with GC5.5.

.6 Should the "Certificate of Substantial Performance" include remaining defects, faults, and incomplete work etc. the Contractor shall provide to the Departmental Representative a schedule for the completion / correction of each remaining defect, fault, and incomplete work etc. The "Certificate of Substantial Performance" will not be processed for payment until the Contractor's schedule has been provided, reviewed and accepted by the Departmental Representative. The Contractor's schedule shall be provided in writing as follows:

.1 Include the completion / correction dates for all items of defects, faults, incomplete work etc. identified by the Departmental Representative.

.2 Be provided in a letter with company letter head and be signed by an authorized representative of the Contractor.

1.2 Completion

.1 The project shall be deemed to have reached "Completion" when all requirements of GC1.1.5 have been achieved. The "Certificate of Completion" shall then be prepared by the Departmental Representative in accordance with GC5.6.

END OF SECTION

SECTION INCLUDES:

PART 1 – GENERAL:

1.1 Submissions.

1.2 Recording As-built Conditions (As-Built Drawings).

1.3 As-Built Survey.

PART 1 – GENERAL

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 (2) weeks of substantial performance:

.1 As-built drawing and Shop Drawing mark-ups.

.2 As-built survey.

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, ditches, and gravels placed).

.2 Culverts inverts at inlet and outlet, diameter, length, and type.

.3 Signage (new or modified).

.4 Concrete barriers.

.5 Edge of asphalt.

.6 Gravel Surfacing Material Limits and Shoulder.

.7 Retaining walls.

.8 Riprap.

.9 Concrete Blocks (shots at base and top (front and back)).

.10 Edge of tree clearing.

.11 Welded fence, welded railing, bollards and boulders.

.12 CSP Drain Pipe Outlets.

.13 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, and changes in terrain.

.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 PSPC's monument / coordinate system as shown on the Contract Drawings.

.4 The following files shall comprise the as-built survey provided to the Departmental Representative:

.1 Digital csv file with the xyz data and an appropriate descriptor code as to the type of material surface or

feature being surveyed.

.2 Breaklines for all survey data in DXF file formation or another format pre-approved by the Departmental Representative.

.3 A list of all point descriptors used in the survey data.

END OF SECTION

SECTION INCLUDES:

PART 1 – GENERAL:

1.1 Definitions.

1.2 Submittals.

1.3 Storage and Handling.

1.4 Transportation.

PART 2 – PRODUCTS:

2.1 Materials.

PART 3 – EXECUTION:

3.1 Disposal.

PART 1 – GENERAL

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 If requested by the Departmental Representative, 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 If requested by the Departmental Representative, 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

SECTION INCLUDES:

PART 1 – GENERAL:

1.1 Measurement and Payment Procedures.

1.2 References.

PART 2 – PRODUCTS:

2.1 Formwork Materials.

2.2 Form Ties.

2.3 Form Release Agent.

PART 3 – EXECUTION:

3.1 Delivery, Storage and Handling.

3.2 Fabrication and Erection.

3.3 Removal of Formwork.

3.4 Cleaning.

PART 1 – GENERAL

1.1 Measurement and Payment Procedures

.1 Payment for Concrete Formwork shall not be made and shall be considered incidental to Section 33 42 13 – Pipe Culverts.

1.2 References

.1 Canadian Standards Association (CSA International).

.1 CSA-A23.1/A23.2, Concrete Materials and Methods of Concrete Construction / Methods of Test and Standard Practices for Concrete.

.2 CSA-O86S1, Supplement No. 1 to CAN/CSA-O86-01, Engineering Design in Wood.

.3 CSA O121, Douglas Fir Plywood.

.4 CSA O151, Canadian Softwood Plywood.

.5 CSA O153, Poplar Plywood.

.6 CAN/CSA-O325.0, Construction Sheathing.

.7 CSA O437 Series, Standards for OSB and Waferboard. CSA S269.1, Falsework for Construction Purposes.

.8 CAN/CSA-S269.3, Concrete Formwork, National Standard of Canada.

.2 Underwriters' Laboratories of Canada (ULC)

.1 CAN/ULC-S701, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.

PART 2 – PRODUCTS

2.1 Formwork Materials

.1 Formwork materials in accordance with CSA-O121 with waterproof adhesive and smooth finish on face in contact with concrete.

2.2 Form Ties

.1 Form ties shall be removable or snap-off metal ties, fixed or adjustable length, free of devices leaving holes larger than 25 mm diameter in concrete surface.

2.3 Form Release Agent

.1 Non-staining compound, effective in preventing adhesion of concrete to forms and providing clean, oil, and grease free contact surfaces.

PART 3 – EXECUTION

3.1 Delivery, Storage and Handling

.1 Deliver, store, and handle forming materials such to prevent warping, twisting, and other damage.

.2 Waste Management and Disposal:

.1 Separate waste materials for reuse and recycling.

.2 Dispose of waste forming materials at a disposal facility approved by Departmental Representative.

3.2 Fabrication and Erection

.1 Verify lines, levels, and centres before proceeding with formwork and ensure dimensions are in accordance with the Contract Drawings.

.2 Construct formwork in accordance with CAN3-A23.1.

.3 Erect formwork true to line, brace and strut to prevent deformation under the weight and pressure of wet concrete, construction loads, wind, and other forces. Ensure deflection does not exceed 3 mm.

.4 Erect formwork such that variation in location, elevation, and alignment from established position / dimension on drawings is as follows:

.1 Of the contract work area in relation to the established benchmark and reference points: +/- 50 mm.

.2 Within the contract work area in relation to the proposed culverts: +/- 20 mm.

.3 Variations in plumb: 10 mm per 3 m but not more than 15 mm overall.

.4 Variation in elevation and level or grade shown on the Contract Drawings: 10 mm per 3 m but not more than 15 mm overall.

.5 Install all inserts including anchors, ties, bolts, nailers, anchor bolts, embedded plates as required.

.6 Provide all voids, openings, and blockouts required by the contract documents.

.7 Apply form-releasing agent to faces of formwork in contact with concrete.

.8 In general, make plywood forms from full sheets, cut sheets being used only where specifically indicated or necessary due to configuration of the structure.

.9 Carefully arrange panels and form screws so that joints are in continuous straight lines as far as possible.

.10 Butt and cover panel joints on the outside by whalers or wood strips to prevent leakage or fines.

.11 Ensure faces of form work for contact with concrete are clean and free from splits, projecting nails, and other defects.

.12 Strength and rigidity of forms shall be such that they will not leak mortar or result in visible irregularities in the finished concrete.

3.3 Removal of Formwork

.1 Remove formwork not structurally supporting concrete only after a period of not less than 24 hrs. at a surface temperature of the concrete of 10°C or such longer period as necessary to ensure that the concrete is sufficiently hard so as not to damage the concrete by removing formwork, and curing and protection operations are maintained.

.2 Use proper tools recommended by the manufacturer for the removal of form ties.

.3 Remove forms with care to prevent marring of concrete surfaces.

3.4 Cleaning

.1 Thoroughly clean surfaces, remove fins and laitance.

.2 Clean up debris to the satisfaction of the Departmental Representative and in accordance with Section 01 74 11 – Cleaning.

END OF SECTION

SECTION INCLUDES:

PART 1 – GENERAL:

1.1 Measurement and Payment Procedures.

1.2 References.

1.3 Submittals.

PART 2 – PRODUCTS:

2.1 Materials.

2.2 Fabrication.

PART 3 – EXECUTION:

3.1 Delivery, Storage and Handling.

3.2 Field Bending.

3.3 Placing Reinforcement.

PART 1 – GENERAL

1.1 Measurement and Payment Procedures

.1 Payment for Concrete Reinforcing shall not be made and shall be considered incidental to Section 33 42 13 – Pipe Culverts.

1.2 References

.1 British Columbia Ministry of Transportation and Infrastructure (BC MoTI):

.1 2020 Standard Specifications for Highway Construction.

.2 Canadian Standards Association (CSA International):

.1 CSA-A23.1/A23.2, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.

.2 CAN/CSA-G30.18-M92 (R2002), Billet-Steel Bars for Concrete Reinforcement, A National Standard of Canada.

.2 Reinforcing Steel Institute of Canada (RSIC).

.1 RSIC-2004, Reinforcing Steel Manual of Standard Practice.

1.3 Submittals

.1 Submittals in accordance with Section 01 33 00 – Submittal Procedures.

.2 Prepare and submit for acceptance approval shop drawings including placement of reinforcement. Shop drawings to indicate bar bending details, lists, quantities of reinforcement, sizes, spacing, locations of reinforcement, and mechanical splices if approved by the Departmental Representative, with identifying code marks to permit correct placement without reference to drawings (BC MoTI Standard Specifications for Highway Construction, Specification Drawing No. SP303-02, SP303-03, and SP303-08). Prepare reinforcement drawings in accordance with RSIC Manual of Standard Practice and ACI 315.

.3 Record drawings of reinforcement placement, including:

.1 Bar bending details.

.2 Lists.

.3 Quantities of reinforcement.

.4 Sizes, spacing, and locations of reinforcement.

.4 Quality Assurance: In accordance with Section 01 45 00 – Quality Management.

.5 Submit for acceptance approval Mill Test report of reinforcing steel, showing physical and chemical analysis.

PART 2 – PRODUCTS

2.1 Materials

.1 Reinforcing steel: billet steel, grade 400, deformed bars to CAN/CSA-G30.18, unless indicated otherwise.

.2 Chairs, bolsters, bar supports, spacers: to CSA-A23.1/A23.2.

.3 Splicing of reinforcing is not permitted.

2.2 Fabrication

.1 Fabricate reinforcing steel in accordance with CSA-A23.1/A23.2 ACI 315 and Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada.

PART 3 – EXECUTION

3.1 Delivery, Storage and Handling

.1 Store and handle reinforcing steel so as not to alter the shape and dimensions.

.2 Prevent contamination of reinforcing steel.

.3 Do not dump materials when unloading or handling.

3.2 Field Bending

.1 Do not field bend or field weld reinforcement except where pre-approved by the Departmental Representative.

.2 Should field bending be accepted, propose field bending methodology prior to field bending. Approval and acceptance of field bending methodology shall be provided by the Departmental Representative prior to field bending. Complete field bending per industry standards.

.3 Replace bars which develop cracks or splits.

3.3 Placing Reinforcement

.1 Place reinforcing steel in accordance with CSA-A23.1/A23.2 and the details on the drawings (BC MoTI 2020 Standard Specifications for Highway Construction, Specification Drawing No. SP303-02, SP303-03, and SP303-08).

.2 Prior to placing concrete, obtain Departmental Representative's approval of reinforcing material and placement.

.3 Ensure cover to reinforcement is maintained during concrete pour.

.4 Secure crossing bars at every intersection (unless notes on drawings) by using black tie wire of not less than No. 16 gauge.

.5 Concrete clear cover to reinforcing steel shall be 75 mm for all reinforcing.

.6 Splicing of reinforcing is not permitted.

END OF SECTION

SECTION INCLUDES:

PART 1 – GENERAL:

1.1 Measurement and Payment Procedures.

1.2 References.

1.3 Submittals.

1.4 Quality Management.

PART 2 – PRODUCTS:

2.1 Concrete.

2.2 Concrete Mixes.

PART 3 – EXECUTION:

3.1 General.

3.2 Delivery, Storage and Handling.

3.3 Preparation.

3.4 Placement and Finishing.

3.5 Curing.

3.6 Surface Tolerance.

3.7 Field Quality Control.

PART 1 – GENERAL

1.1 Measurement and Payment Procedures

.1 Payment for Cast-in-Place Concrete shall not be made and shall be considered incidental to Section 33 42 13 – Pipe Culverts, and Section 10 14 53 – Traffic Signs, Bollards, Welded Fence and Welded Railing.

1.2 References

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

.1 ASTM C309, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.

.2 Canadian Standards Association (CSA):

.1 CAN/CSA-A23.1-M, Concrete Materials and Methods of Concrete Construction.

.2 CAN/CSA-A23.2-M, Methods of Test for Concrete.

.3 CAN3-A266.1-M, Air-Entraining Admixtures for Concrete.

.4 CSA A283, Qualification Code for Concrete Testing Laboratories.

.5 CAN/CSA-A5-M, Portland Cement.

.6 CSA A363-M, Cementitious Hydraulic Slag.

.7 CAN/CSA-G30.18-M, Billet-Steel Bars for Concrete Reinforcement.

1.3 Submittals

.1 Submittals in accordance with Section 01 33 00 – Submittal Procedures.

.2 The Contractor shall provide a report outlining the proposed mix design for each classification of concrete, see Subsection 3.1 General below for more details.

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 Concrete

.1 Portland cement: to CAN3-A23.1-M.

.2 Water: to CAN3-A23.1-M.

.3 Aggregates: to CAN3-A23.1-M.

.4 Air entraining Admixtures: to CAN3-A266.1-M.

.5 In no case will batch adjustment relieve the Contractor of the responsibility for the durability, strength, or acceptability of Concrete concerned. The Departmental Representative reserves the right to reject any batch in case of confirmed unacceptability and to require immediate removal of any Concrete from this batch from the work.

2.2 Concrete Mixes

.1 Proportion concrete in accordance with CAN3-A23.1-M to yield the following properties.

.1 Max water to cement ratio 0.4.

.2 Minimum compressive strength at 28 days:

.1 Concrete Headwalls: 35 MPa.

.2 Welded Fence and Bollards: 30 MPa.

.3 Nominal size of coarse aggregate: 20 mm.

.4 Slump at time and point of discharge: 130 mm, +/- 30 mm.

.5 Air content: Category 1.

.6 Concrete exposure class: C-1.

.7 Calcium Chloride or admixtures containing chloride ions shall not be permitted.

.8 Consistency that will result in a flowable product at the time of placement which does not require manual means to move it into place.

.2 Do not change concrete mix without prior approval of the Departmental Representative. Should change in material source be proposed, new mix design to be submitted to the Departmental Representative for compliance acceptance.

PART 3 – EXECUTION

3.1 General

.1 Undertake the concrete mix design and pay for all costs associated with the development, testing, and submissions of the mix design.

.2 Submit mix design for each concrete plant proposed for use to the Departmental Representative for compliance acceptance at least 10 days prior to concrete placement. Mix design documentation shall include all components of the mix and quantities of the materials used. Additional requirements of the mix design:

.1 Expected method of batching, transporting, and placing concrete.

.2 Distance and expected travel time from batch plant location to project site.

.3 Acceptance of the mix design by the Departmental Representative does not constitute acceptance of the concrete. Acceptance of the concrete will be based upon the test results and the performance and quality of the concrete and concrete components placed on the project.

.4 No concrete shall be placed prior to receiving Departmental Representative's acceptance of the mix design.

.5 The Contractor should note that failure to demonstrate the specified concrete performance will result in delays for which no claims can be made against the Departmental Representative.

.6 The design and quality control testing of concrete mixes shall include assessment of compatibility of the Contractor's proposed materials, including cement and admixtures, adequate workability of the mixes, as well as the slump and air retention properties of the proposed mixtures.

.7 In no case will batch adjustment relieve the Contractor of the responsibility for the durability, strength, or acceptability of concrete concerned. The Departmental Representative reserves the right to reject any batch in case of confirmed unacceptability and to require immediate removal of any concrete from this batch from the work.

.8 All testing of the concrete shall be the responsibility of the Contractor and shall be performed by an independent, CSA-certified testing firm.

3.2 Delivery, Storage and Handling

.1 Concrete shall be fully discharged and placed within 3 hours after water and cement have been combined. Any proposed deviation from this requirement must be pre-approved by the Departmental Representative. To obtain pre-approval the contractor shall submit in writing the proposed methodology to ensure all concrete strength and other requirements are achieved. Regardless of the proposed methodology submitted, the Departmental Representative is under no obligation to deviate from this requirement.

.2 Concrete delivery: ensure that continuous concrete delivery from plant meets CSA A23.1/A23.2.

.3 Waste Management and Disposal:

.1 Divert unused concrete materials from the site to a local landfill facility approved by the Departmental Representative.

.2 Provide an appropriate area on the job site where concrete trucks can be safely washed.

.3 Unused admixtures and additive materials must not be disposed of into sewer systems, into lakes, streams, onto ground, or in other locations where it will pose health or environmental hazard.

.4 Prevent admixtures and additive materials from entering drinking water supplies or streams. Using appropriate safety precautions, collect liquid or solidify liquid with inert, non-combustible material and remove for disposal. Dispose of waste in accordance with applicable local, provincial/territorial, and national regulations.

3.3 Preparation

.1 Obtain the Departmental Representative's approval before placing concrete.

.1 Provide 24 hours' notice prior to placing of concrete.

3.4 Placement and Finishing

.1 Prior to placing concrete obtain approval from the Departmental Representative of proposed method of protection of concrete during placing and curing in adverse weather or when air temperatures are less than 5 degrees Celsius or greater than 30 degrees Celsius.

.2 Comply with hot / cold weather concrete fabrication, placement, and curing requirements as per CSA-23.1-09.

.3 Convey the concrete at the site utilizing equipment of the

design, size, and condition to deposit a continuous and adequate supply of concrete of the specified mix and consistency without segregation at the required locations.

.4 During concreting operations:

.1 Development of cold joints is not allowed.

.2 Ensure concrete delivery and handling facilitates placing with minimum of re-handling and without damage to existing structure or work.

.3 Addition of water to the batch is not permitted.

.4 One adjustment of air on site may be allowed provided that the adjustment is done under the supervision of the qualified personnel.

.5 Ensure reinforcement and inserts are not disturbed during concrete placement.

.6 Maintain accurate records of poured concrete items to indicate date, location of pour, quality, air temperature, and test samples taken.

.7 Vibrate all concrete to achieve proper consolidation during placement.

.8 Concrete finishes above finish grade shall receive a steel trowelled finish with edges neatly tooled.

.9 Honeycombed concrete shall be cut out and replaced.

.10 Ensure min cover to reinforcement is maintained during concrete pour.

3.5 Curing

.1 Maintain moist curing by approved means in accordance with CAN3-23.1-M.

.2 Curing compounds may only be applied at the acceptance of the Departmental Representative. Only curing compounds which meet the requirements of ASTM C309 will be accepted for use.

3.6 Surface Tolerance

.1 Concrete tolerance in accordance with CSA-A23.1/A23.2-09.

3.7 Field Quality Control

.1 Site tests: conduct the following tests and submit reports to Departmental Representative in accordance with Section 01 33 00 – Submittal Procedures:

.1 Concrete pours.

.2 Slump tests.

.3 Air content.

.4 Temperature.

.5 Compressive strength.

.2 Inspection and testing of concrete and concrete materials will be carried out by Contractor in accordance with CSA-A23.1/A23.2.

.1 Ensure that the testing laboratory is certified in accordance with CSA A283.

.3 The frequency of testing shall be as outlined in the Quality Management Plan but at a minimum achieve the frequency requirements of Section 01 45 00 – Quality Management.

.4 The Contractor will take additional test cylinders during cold weather concreting.

.5 Inspection or testing by the Departmental Representative will not augment or replace Contractor quality control nor relieve the Contractor of his contractual responsibility.

END OF SECTION

SECTION INCLUDES:

PART 1 – GENERAL:

1.1 Measurement and Payment Procedures.

1.2 References.

1.3 Definitions.

1.4 Submittals.

1.5 Quality Management.

PART 2 – PRODUCTS:

2.1 Grout.

2.2 Grout Mix.

PART 3 – EXECUTION:

3.1 General.

3.2 Site Preparation.

3.3 Delivery, Storage and Handling.

3.4 Placement.

3.5 Curing and Finishing.

PART 1 – GENERAL

1.1 Measurement and Payment Procedures

.1 Payment for Grout shall not be made and shall be considered incidental to Section 33 42 13 – Pipe Culverts.

1.2 References

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

.1 ASTM C1019, Standard Test Methods for Sampling and Testing Grout.

.2 ASTM C940, Standard Test Method for Expansion and Bleeding of Freshly Mixed Grouts for Preplaced Aggregate Concrete in the Laboratory.

.2 Canadian Standards Association (CSA International), latest edition.

.1 CSA 23.1/A23.2, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard

Practices for Concrete.

.2 CAN3-A266.1-M, Air-Entraining Admixtures for Concrete.

1.3 Definitions

.1 Grout: Ready-mix controlled, low strength material used as an alternative to compacted soil, and is also known as controlled density fill, and several other names, some of which are trademark names of material suppliers. Grout differs from Portland cement concrete as it contains a low cementitious content to reduce strength development for possible future removal.

1.4 Submittals

.1 Undertake the Grout mix design and pay for all costs associated with the development, testing, and submissions of the mix design. Additional requirements of the mix design:

.1 Expected method of batching, transporting, and placing concrete.

.2 Distance and expected travel time from batch plant location to project site.

.2 The Contractor's Grout mix design 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 mix design (first submission and if required all subsequent re-submissions) within 7 days of submission. Upon review of the mix design the Departmental Representative will do one of the following:

.1 Accept the mix design.

.2 Accept portions of the mix design 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 mix design and provide comments outlining required changes or additional information needed before the mix design will be reviewed in detail. Following completion of edits by the Contractor, re-submit the mix design for review.

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

.4 No Grout shall be placed prior to receiving Departmental Representative's acceptance of the Grout mix design.

.5 Acceptance of the Grout mix design by the Departmental Representative does not constitute acceptance of the Grout. Acceptance of the Grout will be based upon the test results and the performance and quality of the Grout and concrete components placed on the project.

1.5 Quality Management

.1 Quality Control and Quality Assurance in accordance with Section 01 45 00 – Quality Management.

.2 Quality Control testing frequency: Minimum test frequency as described in Table 01 45 00 – 01 unless advised otherwise by the Departmental Representative following a review of the Grout Mix Design but in advance of the work.

PART 2 – PRODUCTS

2.1 Grout

.1 Provide Grout containing, at minimum, cementitious materials and water. Cementitious materials shall be Portland cement, pozzolanic materials, or other self-cementing materials, or combinations thereof, at the Contractor's option. The Grout mix design may also contain, fine aggregate or filler provided the final product meets the strength, flow consistency, and shrinkage requirements included in this specification.

.2 Portland cement: to CAN3-A23.1-M

.3 Water: to CAN3-A23.1-M

.4 Aggregates: to CAN3-A23.1-M

.5 Air entraining Admixtures: to CAN3-A266.1-M

.6 In no case will batch adjustment relieve the Contractor of the responsibility for the durability, strength, or acceptability of Grout concerned. The Departmental Representative reserves the right to reject any batch in case of confirmed unacceptability and to require immediate removal of any Grout from this batch from the work.

2.2 Grout Mix

.1 Proportion Grout to yield the following properties.

.1 Maximum cementitious content of 90 kg/m3.

.2 Minimum compressive strength at 28 days: 2 MPa.

.3 Maximum compressive strength at 28 days: 5 MPa.

.4 Consistency that will result in a flowable product at the time of placement which does not require manual means to move it into place.

.5 Maximum evaporation of bleed water shall not result in shrinkage of more than 10.4 mm per m of Grout depth. Measurement of a final bleeding shall be as measured in Section 10 of ASTM C940.

.2 Do not change Grout Mix without prior approval of the Departmental Representative. Should change in material source be proposed, a new Grout mix design to be submitted to the Departmental Representative for compliance acceptance.

PART 3 – EXECUTION

3.1 General

.1 Provide 24 hours' notice and Obtain the Departmental Representative's approval before placing Grout.

.2 Prior to placing Grout obtain approval from the Departmental Representative of proposed method of protection of Grout during placing and curing in adverse weather or when air temperatures are less than 5 degrees Celsius or greater than 30 degrees Celsius.

3.2 Site Preparation

.1 Backfill ends of the existing culvert or use other means to ensure Grout does not escape the existing culvert and flow into ditch or watercourse.

.2 Use pumps and other means to ensure the existing culvert is clear of standing water and other debris until the Grout is placed.

3.3 Delivery, Storage and Handling

.1 Grout shall be fully discharged and placed within 3 hours after water and cement have been combined. Any proposed deviation from this requirement must be preapproved by the Departmental Representative. To obtain pre-approval the contractor shall submit in writing the proposed methodology to ensure all concrete strength and other requirements are achieved. Regardless of the proposed methodology submitted, the Departmental Representative is under no obligation to deviate from this requirement.

.2 Grout delivery: ensure that continuous Grout delivery from plant meets CSA A23.1/A23.2.

.3 Waste Management and Disposal:

.1 Divert unused Grout materials to a local landfill facility approved by the Departmental Representative.

.2 Provide an appropriate area on the job site where concrete trucks can be safely washed.

.3 Unused admixtures and additive materials must not be disposed of into sewer systems, into lakes, streams, onto ground, or in other locations where it could pose a health or environmental hazard.

.4 Prevent admixtures and additive materials from entering drinking water supplies or streams. Using appropriate safety precautions, collect liquid or solidify liquid with inert, non-combustible material and remove for disposal. Dispose of waste in accordance with applicable local, provincial/territorial, and national regulations.

3.4 Placement

.1 Comply with hot/cold weather Grout fabrication, placement, and curing requirements as per CSA-23.1-09.

.2 Convey the Grout at the site utilizing equipment of the design, size, and condition to deposit a continuous and adequate supply of Grout of the specified mix and consistency without segregation at the required locations.

.3 Ensure Grout has filled all areas of the existing culvert. If required use manual means to move Grout into areas of the culverts void of Grout.

3.5 Curing and Finishing

.1 Protect exposed surfaces of Grout from premature drying, wash by rain or running water, wind, mechanical injury, and excessively hot or cold temperatures. Curing method shall be subject to approval by the Departmental Representative.

.2 Ensure ends of existing culvert and Grout are encased with minimum 0.3 m of embankment or as shown on Contract Drawings through the import and placement of embankment over each culvert end or the shortening of the culvert into the embankment and then replacement of embankment.

.3 Re-establish existing ditch width and grades. Ensure positive drainage to new culvert.

.4 Hydraulic Seeding of all disturbed areas per Section 32 93 21 – Hydraulic Seeding.

END OF SECTION

SECTION INCLUDES:

PART 1 – GENERAL:

1.1 Measurement and Payment Procedures.

1.2 References.

1.3 Submittals.

PART 2 – PRODUCTS:

2.1 Signs.

2.2 Signposts and Hardware.

2.3 Lockable Removable Bollards.

2.4 Welded Galvanized Fence and Welded Galvanized Railing.

2.5 Concrete Bases.

2.6 Zinc-Rich Paint.

PART 3 – EXECUTION:

3.1 Lockable Removable Bollard Installation.

3.2 Welded Galvanized Fence Installation.

3.3 Welded Galvanized Railing Installation.

3.4 Relocate Existing Signs and Installation of New Signs.

PART 1 – GENERAL

1.1 Measurement and Payment Procedures

.1 Payment for the Relocation of Traffic Signs will be made on the basis of the Price per Unit Bid for Relocation of Traffic Signs in the Bid and Acceptance Form. The Price per Unit Bid shall include all costs for the removal and salvage of the existing sign, removal and disposal of the existing sign post and hardware, the supply and installation of new wood post and associated hardware, and the reinstallation of the existing sign, post hole drilling, and all other items necessary for successful completion of the work.

.2 Measurement for Payment for Relocation of Traffic Signs will be made by the count of each traffic sign relocated and accepted by the Departmental Representative.

.3 Payment for the installation of Traffic Signs will be made on the basis of the Price per Unit Bid for Traffic Signs in the Bid

and Acceptance Form. The Price per Unit Bid shall include all costs for the supply and installation of new wood post, sign, and associated hardware, post hole drilling, and all other items necessary for successful completion of the work.

.4 Measurement for Payment for Traffic Signs will be made by the count of each traffic sign supplied and installed and accepted by the Departmental Representative.

.4 Payment for the supply and installation of Lockable Removable Bollards will be made on the basis of the Price per Unit Bid for Lockable Removable Bollards in the Bid and Acceptance Form. The Price per Unit Bid shall include all costs for the supply and installation of the bollard, hardware, signs, excavation for concrete base, cast-in-place concrete base, and all other items necessary for successful completion of the work.

.5 Measurement for Payment for Lockable Removable Bollards will be made by the count of each bollard installed and accepted by the Departmental Representative.

.6 Payment for the supply and installation of the Welded Galvanized Fence will be made on the basis of the Price per Unit Bid for Welded Galvanized Fence in the Bid and Acceptance Form. The Price per Unit Bid shall include all costs for the supply and installation of the steel rails and posts (including preparation of shop drawings with custom design to conform with ATV trail grades and alignment), galvanizing, survey layout, excavation for concrete base, cast-in-place concrete bases, installation, and all other items necessary for successful completion of the work.

.7 Measurement for Payment for completion of the Welded Galvanized Fence will be made on the length of Welded Galvanized Fence surveyed in lineal meters and accepted by the Departmental Representative.

.8 Payment for the supply and installation of the Welded Galvanized Railing will be made on the basis of the Price per Unit Bid for Welded Galvanized Railing in the Bid and Acceptance Form. The Price per Unit Bid shall include all costs for the supply and installation of the railing units (including preparation of shop drawings with custom design to conform with ATV trail grades and alignment), galvanizing, installation to the precast concrete barrier, anchors, and all other items necessary for successful completion of the work.

.9 Measurement for Payment for completion of the Welded Galvanized Railing will be made by the count of the number sections of Welded Galvanized Railing supplied, installed, and accepted by the Departmental Representative.

1.2 References

.1 British Columbia Ministry of Transportation and Infrastructure (BC MoTI):

.1 Manual of Standard Traffic Signs & Pavement Markings (September 2000, or latest edition).

.2 2020 Standard Specifications for Highway Construction.

.2 Transportation Association of Canada (TAC):

.1 Manual of Uniform Traffic Control Devices for Canada (January 2014, or latest edition).

.3 Canadian Standard Association (CSA International), Latest edition:

.1 CSA G40.12, General Requirements for Rolled or Welded Structural Quality Steel / Structural Quality Steel

.2 CSA W59, Welded Steel Construction (Metal Arc Welding).

.3 CSA W48, Filler Metals and Allied Materials for Metal Arc Welding.

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

.1 ASTM A53, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

.2 ASTM A500, Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.

.3 ASTM A123, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

.4 ASTM A153, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

.5 ASTM A307, Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength.

1.3 Submittals

.1 Submit product data in accordance with Section 01 33 00 – Submittal Procedures.

.2 Prior to ordering / manufacture of the Lockable Removable Bollards, Welded Galvanized Fence and Welded Galvanized Railing, the Contractor shall submit manufacturer's Product Data / Shop Drawings for review and acceptance by the Departmental Representative.

PART 2 – PRODUCTS

2.1 Signs

.1 Signs supplied by the Contractor shall per the BC MoTI 2020 Standard Specification for Highway Construction, Section 635, Subsection 635.32 and the following requirements.

.1 All signs shall be sheet aluminum.

.2 All signs shall be per the BC MoTI Manual of Standard Traffic Signs and Pavement Markings. If not provided in the BC MoTI Manual of Standard Signs and Pavement Markings, the sign shall be per the Manual of Uniform Traffic Control Devices for Canada.

.3 All custom signs shall be to the dimensions and requirements shown on the Contract Drawings.

.2 All new signs supplied by the Contractor shall be completely covered with a suitable grade of polyethylene sheeting from the time they are installed until the roadway is in full operation, unless otherwise directed by the Departmental Representative. The polyethylene material shall prevent the sign messages from being visible.

.3 All signs shall be handled so as not to damage them in any way. Damaged signs shall be replaced by the Contractor at the Contractor's expense.

.4 The Contractor shall confirm that all signs have the correct messaging. The Contractor shall verify that all signs are free of cracks, dents or warpage prior to installation. Any sign flaws shall be immediately reported to the Departmental Representative prior to sign installation.

2.2 Signposts and Hardware

.1 Signposts and hardware shall be in accordance with the BC MoTI 2020 Standard Specifications for Highway

Construction, Section 635, Subsection 635.29 and following requirements:

.1 The signposts shall be 6" × 4" pressure treated Douglas Fir / Larch, No. 1 Grade. Posts shall be straight, free of cracks and supplied in complete lengths without any splices.

2.3 Lockable Removable Bollards

.1 Lockable Removable Bollards shall be in accordance with the Contract Drawings, and come complete with removable post, receiver, lock and keys, and signage.

2.4 Welded Galvanized Fence and Welded Galvanized Railing

.1 Welded Galvanized Fence and Welded Galvanized Railing shall be in accordance with all details provided on the Contract Drawings.

2.5 Concrete Bases

.1 Concrete for the Bollard and Welded Galvanized Fence Concrete Bases shall be in accordance with Section 03 30 00 – Cast-in-Place Concrete.

2.6 Zinc-Rich Paint

.1 Zinc-rich paint shall be brush on or spray on with a minimum of 95% metallic zinc content.

PART 3 – EXECUTION

3.1 Lockable Removable Bollard Installation

.1 Lockable Removable Bollards and concrete bases shall be installed plumb and to the depths, tolerances, and locations as indicated on the Contract Drawings and to the satisfaction of the Departmental Representative.

3.2 Welded Galvanized Fence Installation

.1 Install concrete bases in the locations, depths, tolerances as indicated on the Contract Drawings.

.2 Welded galvanized fence shall be installed plumb and at the proper offset and elevation, in accordance with the requirements indicated on the Contract Drawings and to the satisfaction of the Departmental Representative.

3.3 Welded Galvanized Railing Installation

.1 Welded galvanized railing shall be installed on the precast concrete barrier plumb and to the alignment and offset in accordance with the requirements indicated on the Contract Drawings and to the satisfaction of the Departmental Representative.

3.4 Relocate Existing Signs and Installation of New Signs

.1 Wood signposts shall be installed in the locations shown on the Contract Drawings. Install new Wood Posts in accordance with BC MoTI Manual of Standard Traffic Signs & Pavement Markings and BC MoTI Standard Specifications for Highway Construction, Section 635, subsection 635.29 and subsection 635.32 and the following requirements:

.1 Post embedment depth shall be 1600 mm.

.2 Green and white paint not required.

.3 The post hole shall be made via an auger with a diameter no greater than 100 mm larger than the post dimensions.

.4 Wood posts shall be installed plumb and at the proper offset and elevation, in accordance with the Contract Drawings and to the satisfaction of the Departmental Representative.

.2 The existing signs shall be removed and reinstalled on the new wood signposts. The reinstallation of the signs shall occur immediately following the removal of the sign and be installed at the location as shown on the Contract Drawings to the same height as the sign was before removal. Should the existing signs be damaged during relocation, the costs for the supply and installation of new signs shall be at the Contractor's expense.

.3 Following reinstallation of existing signs, remove and dispose of the existing signpost and associated hardware to an offsite location acceptable to the Departmental Representative.

.4 Install new traffic signs on the wood posts immediately following installation.

END OF SECTION

SECTION INCLUDES:

PART 1 – GENERAL:

1.1 Measurement and Payment Procedures.

1.2 References.

1.3 Submittals.

1.4 Quality Management.

PART 2 – PRODUCTS:

2.1 Aggregate Source.

2.2 Aggregates General.

2.3 Crushed Surfacing Gravel.

2.4 Crushed Base Gravel.

2.5 Granular Backfill (Pit Run).

2.6 Impervious Fill.

2.7 Filter Gravel.

2.8 Riprap.

PART 3 – EXECUTION:

3.1 Preparation.

3.2 Processing.

3.3 Handling and Transportation.

3.4 Stockpiling.

3.5 Cleaning.

PART 1 – GENERAL

1.1 Measurement and Payment Procedures

.1 Measurement and Payment for Aggregate Materials shall be per the applicable work included in Section 31 23 33 – Excavation and Backfill, Section 31 37 00 – Riprap, Section 32 11 24 – Crushed Base Gravel, Section 32 11 25 – Crushed Surfacing Gravel, Section 32 32 34 – Concrete Block Wall, Section 33 42 13 – Pipe Culverts, and any other section as required by these Contract Specifications.

1.2 References

.1 British Columbia Ministry of Transportation and Infrastructure (BC MoTI):

.1 2020 Standard Specifications for Highway Construction.

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

.1 ASTM C131/C131M, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.

.2 ASTM C136/C136M, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

.3 ASTM D2487, Standard Practice for Classification of Soils for Engineering Purposes (United Soil Classification System).

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

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

.6 ASTM D5856, Standard Test Method for Measurement of Hydraulic Conductivity of Porous Material Using a Rigid-Wall, Compaction Mold Permeameter.

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.

.2 The Contractor shall not produce aggregate until the Contractor's Quality Management Plan has been reviewed and accepted per Section 01 45 00 – Quality Management by the Departmental Representative and has in place testing facilities for aggregate production that are in accordance with the accepted Quality Control Plan.

.3 In addition to the Quality Control undertaken by the Contractor, the Departmental Representative may undertake, through an independent testing firm, random sampling, inspection, and testing for the purpose of Quality Assurance.

.4 Provide access to all portions of the work for sampling by the Departmental Representative.

.5 If requested, install sampling facilities at discharge end of production conveyor to allow Departmental Representative to obtain representative samples of items being produced. Stop or slow conveyor belt when directed by the Departmental Representative to permit full cross-section sampling.

.6 Aggregates that do not meet specified tolerance or quality for intended use are subject to rejection by the Quality Control and Quality Assurance processes.

PART 2 – PRODUCTS

2.1 Aggregate Source

.1 The Contractor shall provide their own source(s) for all aggregate and riprap materials for this project. The Contractor will be solely responsible for the ensuring that the aggregate source(s) selected by the Contractor continuously achieves all aggregate material properties, quality, and gradation requirements as outlined in this contract specification for the materials intended use.

.2 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 location, name, and owner of the material source.

2.2 Aggregates General

.1 All aggregate materials on the project shall at a minimum achieve the following requirements. Should more stringent requirements for a specific aggregate be provided elsewhere in this Contract Specification, the more stringent shall apply.

.1 Aggregate quality: sound, hard, durable material free from soft, thin, elongated or laminated particles, organic material, clay lumps or minerals or other substances that would act in deleterious manner for use intended.

.2 Flat and elongated particles of coarse aggregate (ASTM D4791) to:

.1 Flat and elongated particles are those whose greatest dimension exceeds five times their least dimension.

.3 Fine aggregates to be one or blend of the following.

.1 Natural sand.

.2 Manufactured sand.

.3 Screenings produced in crushing of quarried rock, boulders, gravel or slag.

.4 Coarse aggregates to be one or blend of following.

.1 Crushed rock.

.2 Gravel composed of naturally formed particles of stone.

.3 Light weight aggregate, including slag.

2.3 Crushed Surfacing Gravel

.1 Crushed Surfacing Gravel shall be manufactured by the Contractor and 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. Cohesion of this aggregate is achieved by plastic fines.

.2 When tested in accordance to ASTM C136, the material shall have a gradation conforming to the following gradation limits:

Table 31 05 16 – 01: 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
0.300	10 – 30
0.075	5 – 15

.3 Los Angeles degradation when tested in accordance to ASTM C131/C131M, maximum percent loss by weight 25.

.4 Fracture, at least 80% of particles by mass retained on 4.75 mm sieve to have at least one freshly fractured face.

2.4 Crushed Base Gravel

.1 Crushed Base Gravel shall be manufactured by the Contractor and 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/C136M, the material shall have a gradation conforming to the following gradation limits:

Table 31 05 16 – 02: 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

.3 Los Angeles degradation when tested in accordance to ASTM C131/C131M, maximum percent loss by weight 35.

.4 Fracture, at least 60% of particles by mass retained on 4.75 mm sieve to have at least one freshly fractured face.

2.5 Granular Backfill (Pit Run)

.1 Granular Backfill (Pit Run) shall conform to the following requirements and to the satisfaction of the Departmental Representative:

.1 The material shall be well graded, granular material free from clay lumps, organic matter and other extraneous material, screened to remove all stones in excess of maximum 100 mm diameter.

.2 When tested in accordance to ASTM C136/C136M, the material shall have a gradation conforming to the following gradation limits:

Table 31 05 16 – 03: Granular Backfill (Pit Run)	
Sieve Designation (mm)	**Percent Passing by Weight**
100	100
75	85 – 100
50	70 – 100
25	50 – 100
4.75	25 – 100
2.00	10 – 80
0.075	2 – 8

2.6 Impervious Fill

.1 Impervious Fill shall be material from onsite excavations or imported from offsite (at the Contractor's discretion). Regardless of the source the material shall conform to the following requirements:

.1 The material shall be compacted silty clay material.

.2 Hydraulic conductivity when tested in accordance to ASTM D5856 shall be less than 10^{-6} m/s.

2.7 Filter Gravel

.1 Filter Gravel shall be manufactured by the Contractor and shall conform to 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/C136M, the material shall have a gradation conforming to the following gradation limits:

Table 31 05 16 – 04: Filter Gravel Gradation Limits	
Sieve Designation (mm)	**Percent Passing by Weight**
75.0	100
50.0	70 – 100
25.0	50 – 100
9.5	0 – 5

.3 Grading of material shall not show marked fluctuations from opposite extremes of the limits given in Table 31 05 16 – 04: Filter Gravel Gradation Limits, and the curve plotted from the sieve analysis shall flow in a similar manner.

2.8 Riprap

.1 Riprap shall be in conformance with Section 31 37 00 – Riprap.

PART 3 – EXECUTION

3.1 Preparation

.1 Prior to excavating materials for aggregate production, strip off and stockpile unsuitable surface material.

.2 Strip area ahead of quarrying of excavating operation sufficient to prevent contamination of aggregate by deleterious material.

3.2 Processing

.1 Process aggregate uniformly using methods that prevent contamination, segregation, and degradation.

.2 Blend aggregates, if required, to obtain gradation requirements, percentage of crushed particles, or particle shapes, as specified in these Contract Specifications. Use methods and equipment approved by Departmental Representative.

.3 Wash aggregates, if required, to meet Contract Specifications. Use only equipment approved by Departmental Representative.

.4 When operating in stratified deposits use excavation equipment and methods that produce uniform, homogeneous aggregate.

3.3 Handling and Transportation

.1 Avoid segregation, contamination, and degradation of aggregate during handling and transportation.

.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.

.4 The Contractor shall be responsible for all haul roads required to access aggregate sources. All haul roads used shall be maintained at the Contractor's expense and at the conclusion of the works, left in a condition acceptable to the haul road owner.

3.4 Stockpiling

.1 Stockpile aggregates in locations approved by Departmental Representative and not closer than 2.5 m from the edge of the excavation slopes and not closer than 7.5 m from the edge of interceptor ditch / slot drain excavation. Do not stockpile on 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 Suitable measures shall be carried out to avoid excessive exposure of moisture to the aggregate stockpile. Treatment such as drying the wet aggregate or addition of lime may be required to lower the moisture content. Should treatment undertaken by the Contractor not be sufficient such that compaction can't be achieved, the aggregate shall be disposed and replaced at the expense of the Contractor.

.6 Separate different aggregates by strong, full depth bulkheads, or stockpile far enough apart to prevent intermixing.

.7 Do not use intermixed or contaminated materials. Remove and dispose of rejected materials as directed by Departmental Representative.

.8 Uniformly spot-dump aggregates delivered to stockpile in trucks and build up stockpiles as required to prevent segregation.

.9 Do not cone piles or spill material over edges of piles.

.10 Do not use conveying stackers.

.11 Prevent ice and snow from becoming mixed into stockpile or in material being removed from stockpile.

3.5 Cleaning

.1 Any stockpiles temporarily placed on the highway right-of-way or on property shall be completely removed and the site shall be restored to its original condition or better.

.2 The Contractor shall be responsible for any clean-up of aggregate sources.

END OF SECTION

SECTION INCLUDES:

PART 1 – GENERAL:

1.1 Measurement and Payment Procedures.

1.2 Definitions.

1.3 Protection.

PART 2 – PRODUCTS:

2.1 Products.

PART 3 – EXECUTION:

3.1 Preparation.

3.2 Tree Clearing.

PART 1 – GENERAL

1.1 Measurement and Payment Procedures

.1 Payment for Tree Clearing will be made on the basis of the Price per Unit Bid for Tree Clearing in the Bid and Acceptance Form. The Price per Unit Bid shall include all costs for clearing of trees and brush offsite, disposal, and all other items necessary for successful completion of the work as directed by the Departmental Representative.

.2 Measurement for Payment for completion of Tree Clearing will be made on the total area within the limits of Tree Clearing within the Alaska Highway Right-of-Way as shown in the Contract Drawings, surveyed in square metres, incorporated in the works, and accepted by the Departmental Representative. Any tree clearing required within the limits for excavation will not be measured for payment.

1.2 Definitions

.1 Tree Clearing: cutting off trees and previously uprooted stumps, and brushing vegetative growth and surface debris to within 100 mm of ground level. All material to be chipped or removed offsite. Disposal by burning will not be acceptable.

.2 License to Cut: License required under Province of British Columbia's Forest Act that authorizes a Contractor to salvage and remove timber from Crown Land.

1.3 Protection

.1 Prevent damage to natural features and man-made structures which are to remain.

.2 Repair any damage caused by Tree Clearing operations and if damaged, replace any trees designated to remain.

.3 Limit damage and disturbance to understory vegetation during the Tree Clearing operations.

PART 2 – PRODUCTS

2.1 Products

.1 Not used.

PART 3 – EXECUTION

3.1 Preparation

.1 Inspect the site and verify with the Departmental Representative the limits of the Tree Clearing and Tree Clearing in BC Hydro's Right-of-Way activities and any items designated to remain.

.2 Unless advised otherwise, receive from the Departmental Representative the License to Cut and, if applicable, BC Hydro Right-of-Way Vegetation Clearing permit prior to undertaking the work.

3.2 Tree Clearing

.1 Clear trees, uprooted stumps, vegetative growth, and surface debris designated for removal within the limits of Tree Clearing shown on the Contract Drawings and as directed by the Departmental Representative. All materials to be cleared to a height of 100 mm or less of adjacent ground level.

.2 All material to be chipped, mulched, or removed offsite such that all materials remaining onsite are smaller than 100 mm in any direction. Burning of cleared material shall not be permitted.

.3 Grubbing activities within the area designated for Tree Clearing shall not form part of the works.

END OF SECTION

SECTION INCLUDES:

PART 1 – GENERAL:

1.1 Measurement and Payment Procedures.

1.2 References.

1.3 Definitions.

PART 2 – PRODUCTS:

2.1 HDPE Drainage Tubing.

2.2 Filter Gravel.

2.3 Nonwoven Geotextile.

2.4 Impervious Fill.

2.5 Geosynthetic Clay Liner.

2.6 Granular Backfill (Pit Run).

2.7 Topsoil.

2.8 Riprap.

2.9 Excavator.

PART 3 – EXECUTION:

3.1 Geotechnical – General.

3.2 Excavation – General.

3.3 Excavation – Interceptor Drain and Slot Drains.

3.4 Backfilling – Interceptor Drain and Slot Drains.

3.5 Excavation and Backfill – Concrete Block Wall.

3.6 Granular Backfill (Pit Run).

3.7 Topsoil.

3.8 Decommission Existing ATV Trail and Access.

PART 1 – GENERAL

1.1 Measurement and Payment Procedures

.1 Payment for Interceptor Drain and Slot Drain Excavation will be made on the basis of the Price per Unit Bid for

Excavation (Interceptor Drain and Slot Drain) in the Bid and Acceptance Form. The Price per Unit Bid shall include all costs for excavation of vegetation, stripping, highway gravels, embankment, and natural ground as shown on the Contract Drawings for the Interceptor Drain and Slot Drains, shoring (if required), dewatering (if required), temporary stockpile of excavated material if being re-used as Impervious Fill, transport and offsite disposal of excavated material, removal of the existing piezometer, and all other items necessary for successful completion of the work.

.2 Measurement for Payment for completion of Excavation (Interceptor Drain and Slot Drain) will be made on the volume of material surveyed in cubic metres, excavated from the limits of the work, and accepted by the Departmental Representative. No separate measurement or payment for hauling of the material will be made. Any stripping shown on the Contract Drawings shall be measured and included in the Excavation quantity. Quantities of Excavation for the Interceptor Drain and Slot Drains shall be determined from survey using a scanner (see Section 01 29 00 – Payment Procedures). Should the sideslopes of the Interceptor Drain or Slot Drains be flattened by the Contractor from what is shown on the Contract Drawings, the additional excavation volume and resulting Filter Gravel needed as backfill will not be measured for payment.

.3 Payment for Excavation will be made on the basis of the Price per Unit Bid for Excavation in the Bid and Acceptance Form. The Price per Unit Bid shall include all costs for excavation of vegetation, stripping, highway gravels, embankment, and natural ground as shown on the Contract Drawings, dewatering (if required), temporary stockpile of excavated material if being re-used as Impervious Fill, transport and offsite disposal of excavated material, and all other items necessary for successful completion of the work.

.4 Measurement for Payment for completion of Excavation will be made on the volume of material surveyed in cubic metres, excavated from the limits of the work, and accepted by the Departmental Representative. No separate measurement or payment for hauling of the material will be made. Any stripping shown on the Contract Drawings shall be measured and included in the Excavation quantity. Should the side slopes of the Lock Block Wall Excavations be flattened by the Contractor from what is shown on the Contract Drawings, the additional excavation volume will not be measured for payment. Should material generated from the development of terraces on slopes stepper than 2H:1V not achieve the requirements for Granular Backfill

(Pit Run), the material shall be disposed offsite and measured as excavation.

.5 Payment for the supply and installation of Perforated and Non-Perforated 200 mm Diameter HDPE Drainage Tubing will be made on the basis of the Price per Unit Bid for HDPE Drainage Tubing – 200 mm Diameter in the Bid and Acceptance Form. The Price per Unit Bid shall include all costs included with the work, including supply, transport and installation of the HDPE Drainage Tubing (both Perforated and Non-Perforated as shown on the Contract Drawings) in the Interceptor Drain and Slot Drains (including cleanouts), and all other items (included but not limited to couplings, fittings, hardware, galvanized steel caps (cleanouts and animal guards)) necessary for the successful completion of the work in accordance with the Contract Drawings.

.6 Measurement for Payment for completion of 200 mm Diameter HDPE Drainage Tubing will be made on the total length of Perforated HDPE Drainage Tubing – 200 mm Diameter installed and surveyed in lineal metres, measured parallel to the direction of the Interceptor Drain and Slot Drains and accepted by the Departmental Representative. The total length measured for payment shall further include the length of Non-Perforated HDPE Drainage Tubing – 200 mm Diameter installed as cleanouts.

.7 Payment for Filter Gravel will be made on the basis of the Price per Unit Bid for Filter Gravel in the Bid and Acceptance Form. The Price per Unit Bid shall include all costs included with the work, including supply, manufacture, loading, hauling, delivery, placement and compaction of the Filter Gravel, supply and placement of the Nonwoven Geotextile, and all other items necessary for the successful completion of the work.

.8 Measurement for Payment for Filter Gravel will be made on the volume of material surveyed in cubic metres and accepted by the Departmental Representative. Should the sideslopes of the Interceptor Drain or Slot Drains be flattened by the Contractor from what is shown on the Contract Drawings, the additional volume of Filter Gravel backfill will not be measured for payment.

.9 Payment for the placement of Impervious Fill will be made on the basis of the Price per Unit Bid for Impervious Fill in the Bid and Acceptance Form. The Price per Unit Bid shall include all costs for the re-use of excavated material as Impervious Fill or supply from offsite sources (at the

Contractor's discretion), placement, spreading, and compaction of the Impervious Fill material, and all other items necessary for the successful completion of the work. No additional payment shall be made for re-using the excavated material (i.e. costs associated with sorting, stockpiling, and testing of excavated material to confirm that the excavated materials will achieve the requirements for Impervious Fill).

.10 Measurement for Payment for completion of the Impervious Fill will be made on the area of material surveyed in square metres incorporated into the works and accepted by the Departmental Representative.

.11 Payment for the placement of Geosynthetic Clay Liner will be made on the basis of the Price per Unit Bid for Geosynthetic Clay Liner in the Bid and Acceptance Form. The Price per Unit Bid shall include all costs for the supply and placement of the Geosynthetic Clay Liner and associated nonwoven geotextile and all other items necessary for the successful completion of the work.

.12 Measurement for Payment for completion of Geosynthetic Clay Liner will be made on the area of material surveyed in square metres incorporated into the works and accepted by the Departmental Representative. No separate payment will be made for the nonwoven geotextile wrapping above and below the geosynthetic clay liner.

.13 Payment for Granular Backfill (Pit Run) will be made on the basis of the Price per Unit Bid for Granular Backfill (Pit Run) and Granular Backfill (Pit Run) – ATV Connector Trail in the Bid and Acceptance Form. The Price per Unit Bid shall include all costs for the supply, transport, placement (including completion of benches in existing ground if required), compaction of the Granular Backfill (Pit Run), supply and install of nonwoven geotextile (where applicable), and all other items necessary for successful completion of the work.

.14 Measurement for Payment for completion of Granular Backfill (Pit Run) and Granular Backfill (Pit Run) – ATV Connector Trail will be made on the volume of material surveyed in cubic metres incorporated into the work at the completion of compaction and accepted by the Departmental Representative.

.15 Payment for Topsoil will be made on the basis of the Price per Unit Bid for Topsoil in the Bid and Acceptance Form. The Price per Unit Bid shall include all costs associated with

supply (import), loading, transport, spreading, racking and grooming of Topsoil, and all other items necessary for the successful completion of the work.

.16 Measurement for Payment for Topsoil will be made on the volume of material surveyed in cubic metres, incorporated in the works and accepted by the Departmental Representative.

.17 Payment for the supply and installation of 1000 mm Diameter Boulders will be made on the basis of the Price per Unit Bid for Boulders – 1000 mm Diameter in the Bid and Acceptance Form. The Price per Unit Bid shall include all costs for the supply and installation of the boulders, and all other items necessary for successful completion of the work.

.18 Measurement for Payment for 1000 mm Diameter Boulders will be made by the count of each Boulder installed and accepted by the Departmental Representative.

1.2 References

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

.1 ASTM-D4355, Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture, and Heat in a Xenon Arc-Type Apparatus.

.2 ASTM-D4491, Standard Test Methods for Water Permeability of Geotextiles by Permittivity.

.3 ASTM-D4533, Standard Test Method for Trapezoid Tearing Strength of Geotextiles.

.4 ASTM-D4632, Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.

.5 ASTM-D4751, Standard Test Methods for Determining Apparent Opening Size of a Geotextile.

.6 ASTM D5887, Standard Test Method for Measurement of Index Flux Through Saturated Geosynthetic Clay Liner Specimens Using a Flexible Wall Permeameter.

.7 ASTM D5890, Standard Test Method for Swell Index of Clay Mineral Component of Geosynthetic Clay Liners.

.8 ASTM D5891/D5891M, Standard Test Method for Fluid Loss of Clay Component of Geosynthetic Clay Liners.

.9 ASTM D5993, Standard Test Method for Measuring Mass per Unit Area of Geosynthetic Clay Liners.

.10 ASTM-D6241, Standard Test Method for Static Puncture Strength of Geotextiles and Geotextile-Related Products Using a 50-mm Probe.

.11 ASTM D6243, Standard Test Method for Determining the Internal and Interface Shear Strength of Geosynthetic Clay Liner by the Direct Shear Method.

.12 ASTM D6496, Standard Test Method for Determining Average Bonding Peel Strength Between Top and Bottom Layers of Needle-Punched Geosynthetic Clay Liners.

.13 ASTM D6768, Standard Test Method for Tensile Strength of Geosynthetic Clay Liners.

.14 ASTM D698, Test method for Laboratory Characteristics of Soil Using Standard Effort (12,000 ft-lbf/ft^3 (600 kN-m/m^3)).

.2 British Columbia Ministry of Transportation and Infrastructure (BC MoTI):

.1 2020 Standard Specifications for Highway Construction.

1.3 Definitions

.1 Embankment: Gravels and rock material containing no more than 3% organic matter by mass and free from weeds, sod, roots, logs, stumps, frozen lumps, snow, ice, or any other unsuitable material as determined by the Departmental Representative. The maximum size of embankment rock placed within 300 mm of final grade of embankment material shall be 200 mm in diameter.

.2 Excavation: Includes highway embankment materials, boulders, natural ground, vegetation, or loose rock fragments that are smaller than 1.5 m^3 or materials which can be excavated with a 20 tonne or smaller excavator equipped with a rock bucket.

.3 FortisBC Right-of-Way Work Permit: Permit provided by

FortisBC in compliance with the Oil and Gas Activities Act (Sec. 76) for work activities within 30 metres of a FortisBC Transmission Pressure (TP) pipeline.

.4 Organic Material: Soil in which plants can grow, comprising primarily of mineral particles mixed with decayed organic matter and having the capability of retaining water. Typically dark brown or black in colour.

.5 Perceptible Movement (Proof Rolls): Any movement that can be detected when observed with the naked eye.

.6 Rock Excavation: Includes bedrock, boulders, or loose rock fragments larger than 1.5 m^3 and require blasting to facilitate excavation with a 20 tonne or larger excavator equipped with a rock bucket.

.7 Stripping: Excavation of organic material covering the original ground.

.8 Topsoil: Organic material free of rocks greater than 150 mm diameter and other debris hindering good vegetative growth.

PART 2 – PRODUCTS

2.1 HDPE Drainage Tubing

.1 The HDPE Drainage Tubing shall be Armtec 200 mm diameter HDPE Drainage Tubing (Big "O") or preapproved equivalent, Perforated and Non-Perforated as shown on the Contract Drawings. Each section of HDPE Drainage Tubing shall be joined with a manufacturer approved coupler.

.2 The Perforated HDPE Drainage Tubing shall come complete with Geotextile Sock (as standard on the 200 mm Ø Armtec Perforated Big "O" Drainage Tubing) or be securely wrapped with Nonwoven Geotextile. If Nonwoven Geotextile is used, the Nonwoven Geotextile shall have a minimum 300 mm overlap to ensure complete coverage of the pipe and be secured to the drain pipe such that it does not move or shift during installation.

.3 Couplers, Tee's, 45° bends, End Caps, and Risers shall be used as necessary to facilitate the Perforated and Non-Perforated HDPE Drainage Tubing installation as shown on the Contract Drawings. All Couplers, Tee's, 45° bends, and Risers shall be approved by the manufacturer of the Perforated and Non-Perforated HDPE Drainage Tubing for the brand, type, supplier, and size of Perforated and Non-Perforated HDPE Drainage Tubing and come from a single supplier.

.4 Each cleanout riser shall come complete with a purpose-built 200 mm diameter galvanized steel cap at the top of the Non-Perforated HDPE Drainage Tubing. The Contractor shall propose a supplier and product for the purpose-built galvanized Steel Cap and provide the product details to the Departmental Representative for pre-approval prior to ordering.

.5 The outlet of the Perforated HDPE Drainage Tubing shall come complete with a galvanized steel cap / animal guard with suitable drainage mesh or holes. The Contractor shall propose a supplier and product for the purpose-built galvanized steel cap / animal guard and provide the product details to the Departmental Representative for pre-approval prior to ordering.

2.2 Filter Gravel

.1 Filter Gravel shall be in accordance with Section 31 05 16 – Aggregates: General.

2.3 Nonwoven Geotextile

.1 The Nonwoven Geotextile shall achieve or exceed the minimum requirements outlined in Table 31 23 33 – 01.

Table 31 23 33 – 01: Nonwoven Geotextile

Property	Test	Unit	Value
Grab Tensile Strength	ASTM-D4632	N (lb.)	712 (160)
Elongation	ASTM-D4632	%	50
CBR Puncture	ASTM-D6241	N (lb.)	1824 (410)
Trapezoidal Tear	ASTM-D4533	195	267 (60)
Apparent Opening Size	ASTM-D4751	Mm (US Sieve)	0.212 (#70)
Permittivity	ASTM-D4491	sec^{-1}	1.5
Water Flow Rate	ASTM-D4491	$l/m/m^2$ (gpm/ft^2)	4482 (110)
UV Resistance	ASTM-D4355	% retained at 500 hrs.	70

2.4 Impervious Fill

.1 Impervious Fill shall be in accordance with Section 31 05 16 – Aggregates: General.

2.5 Geosynthetic Clay Liner

.1 The Geosynthetic Clay Liner shall be a manufactured product consisting of a clay (bentonite) layer distributed between two mechanically bonded geotextiles.

.1 The Geosynthetic Clay Liner shall conform to the requirements of Table 31 23 33 – 02 and be free of any tears, holes or other defects that may affect is serviceability:

Table 31 23 33 - 02: Geosynthetic Clay Liner Properties		
Material	**Test**	**Requirement**
Bentonite	Swell Index Test (minimum), ASTM D5890	24 mL/2 g minimum
Bentonite	Fluid Loss (maximum), ASTM D5891/D5891M	18 mL max.
Bentonite	Mass/Unit Area (minimum), ASTM D5993	3.6 kg/m^2
Composite	Tensile Strength (minimum), ASTM D6768	88 N/cm
Composite	Peak Mid-Plane Shear Strength, ASTM D6243	24 kPa
Composite	Index Flux (maximum), ASTM D5887	1 x 10^{-8} m^3/m^2/sec
Composite	Peel Strength (minimum), ASTM D6496	6.1 N/cm
Composite	Hydraulic Conductivity (maximum), ASTM D5887	5 x 10^{-9} cm/sec

Note: Bentonite mass/unit area shall be computed at 0 percent moisture content and is exclusive of glues added to the bentonite.

.2 The encapsulating geotextile (above and below) shall be nonwoven geotextile meeting or exceeding the requirements for nonwoven geotextile as specified in Subsection 2.3 Nonwoven Geotextile of this specification section.

2.6 Granular Backfill (Pit Run)

.1 Granular Backfill (Pit Run) shall be in accordance with Section 31 05 16 – Aggregates: General.

2.7 Topsoil

.1 Material meeting the definition of Topsoil imported from other sources outside of the highway right-of-way.

2.8 Riprap

.1 Riprap shall be in accordance with Section 31 37 00 – Riprap.

2.9 Excavator

.1 The excavator used for the Excavation of the Interceptor Drain and Slot Drains shall meet or exceed all of the following requirements as specified in the manufacturer's specifications for the age of the equipment:

.1 Have a "maximum digging depth" of a minimum of 8.5 m as measured from the ground line per Figure 31 23 33 - 01.

.2 Have a operating weight of between 68.95 tonnes and 75 tonnes.

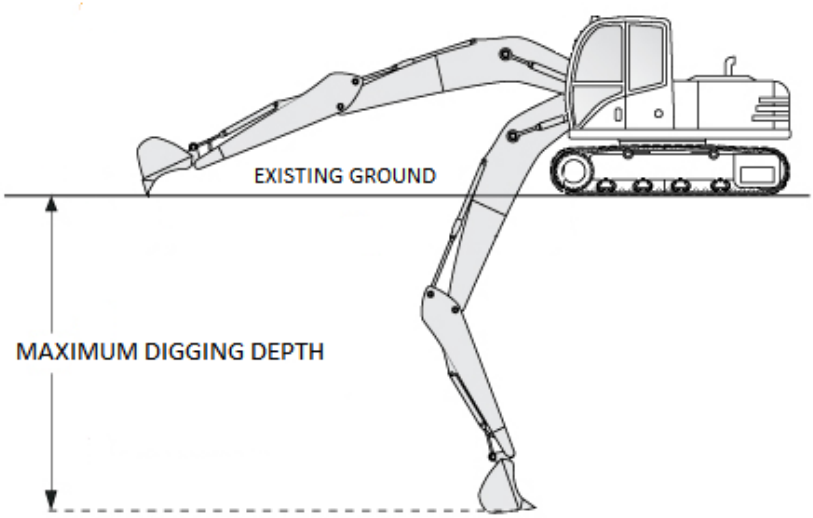


Figure 31 23 33 – 01: Excavator Digging Depth

PART 3 – EXECUTION

3.1 Geotechnical – General

.1 Reference Geotechnical information is available from the Factual Geotechnical Data Report – Km 450.6 Slide Area Mitigation, Alaska Highway, BC, Tetra Tech – July 2019 found in Appendix J. The Contractor may choose to supplement this geotechnical information through the completion of additional geotechnical investigations during the tendering process or prior to construction. Prior to undertaking such work, the Contractor shall obtain approval from the Departmental Representative. All costs for such investigation work shall be borne by the Contractor.

3.2 Excavation – General

.1 Remove and temporarily stockpile existing Riprap size material within the existing ditch that meets the requirements for Riprap, for later re-use as Riprap. The Contractor shall be responsible for selecting a suitable temporary stockpile location acceptable to the Departmental Representative. Re-handling of the material shall be at the Contractor's cost.

.2 Excavate native materials (including stripping) to within +/- 50 mm of the lines and grades as indicated on the Contract Drawings but not uniformly high or low. Excavation is not to exceed the excavation limits shown on the Contract

Drawing. Excavations (and backfill if applicable) completed beyond the limits shown on the Contract Drawings shall be at the Contractor's cost.

.3 Cut off existing piezometer a minimum 100 mm below the bottom of the excavation and dispose of detached piece at an off-site disposal facility acceptable to the Departmental Representative. Backfill and compact void with native excavated material to the satisfaction of the Departmental Representative.

.4 Dispose offsite all excavated materials unless the material has been selected by the Contractor for use as Impervious Fill and achieves the product requirements for Impervious Fill. The Contractor shall be aware that the excavated material is moisture sensitive and site observations of the material indicate that the material will need to be dried before it can be used as Impervious Fill. The Contractor shall be responsible for selecting a suitable temporary stockpile location. Re-handling of the material shall be at the Contractor's cost.

.5 Complete the excavations in compliance with the Occupational Health and Safety Regulations applicable to the location of the work. Temporary cut slopes required for excavation are the responsibility of the Contractor. All excavations shall be reviewed for slope safety by the Contractor. Use of dewatering sumps and pumps and/or divert surface runoff away from excavation as required to maintain a dry excavation.

.6 Should precipitation be expected prior to backfill of the excavation, cover the excavation slopes with a layer of polyethylene sheeting securely tied to resist wind action. Direct surface runoff away from excavation using appropriate erosion control measures.

.7 Complete all work within project limits in accordance with the EPP prepared for this work, see Section 01 35 43 – Environmental Protection for more details.

.8 If required, remove existing signage and posts within the limits of the work to facilitate the excavation.

.9 Use extreme care during excavation to prevent destabilizing the existing highway embankment / cut slopes.

.10 Rock excavation as defined by the provided definition of "Rock Excavation" is not anticipated on this project. The Contractor shall notify the Departmental Representative if

rock excavation is required and await instructions from the Departmental Representative before proceeding.

.11 Complete excavations in the vicinity of FortisBC's pipeline in accordance with the conditions of the FortisBC Right-of-Way Work Permit (see Section 01 14 00 – Work Restrictions, Access Development, Construction Staging, and Restoration, Subsection 1.10 Construction Staging for further information).

3.3 Excavation – Interceptor Drain and Slot Drains

.1 Carry out excavations in compliance with the requirements of Subsection 3.2 Excavation – General of this specification section and in compliance with the WorkSafeBC Workers' Compensation Act and/or the BC Occupational Health and Safety Regulations, as applicable. The design has been prepared such that the Contractor's personnel are not expected to enter into the Interceptor Drain or Slot Drain excavations. The Contractor personnel shall use caution when working around or near the Interceptor Drain and Slot Drain excavations. Should the Contractor choose to have personnel enter into the Interceptor Drain and Slot Drain excavations, the Contractor is reminded of the need to use appropriate shoring and or flatten the slopes in compliance with WorkSafeBC Workers' Compensation Act and/or the BC Occupational Health and Safety Regulations, as applicable. The costs for flattening of the Interceptor Drain or Slot Drains Excavations from what is shown on the Contract Drawings (if undertaken), or the use of shoring (if used) shall be borne by the Contractor.

.2 The Contractor shall complete the Interceptor Drain and Slot Drain excavations using an excavator achieving the requirements of Subsection 2.9 Excavator of this specification and in accordance with the following precautions. If the precautions as outlined below are followed, it is expected that the Contractor will be able to complete the excavations per the Contract Drawings.

.1 Excavate and backfill the Interceptor Drain and Slot Drains, ensuring that the maximum length of trench open at any given time is 10 m for a period less than 8 hours' duration.

.2 Time is of the essence when backfilling the Interceptor Drain and Slot Drain excavations. All vertical or near vertical Interceptor Drain and Slot Drain excavations shall be backfilled within 8 hours or less. Excavations shall not be left open overnight following the completion of the work for the day, during adverse weather conditions or at any other

times when the work is not active. If and where necessary, excavations shall be temporarily backfilled and later re-opened.

.3 Work shall not be undertaken in adverse weather conditions or when Environment Canada is forecasting an equal to or greater than 60% chance of rain showers for the day in Fort Nelson. The Contractor shall account for the possibility of not being able to start excavations during these adverse conditions and/or weather forecasts in their unit prices. Climate information is available for the Fort Nelson region on Environment Canada's website.

.4 Excavation work shall not be undertaken within 8 hours of the last sustained rainfall.

.5 The ground surface next to the excavation shall not be unnecessarily loaded by equipment, supplies or stockpiles of material. Furthermore, the unnecessary use of vibratory equipment around the excavation shall not be permitted.

.6 The Interceptor Drain shall be constructed starting at the downstream / outlet end (Sta. 5+786.390) and work upgrade (Sta. 5+631.200). The Slot Drains shall be constructed starting at the outlet end (i.e. at the Interceptor Drain) and progressing uphill away from the highway unless discussed and accepted otherwise by the Departmental Representative.

.7 All work shall be undertaken in accordance with WorkSafeBC Occupational Health and Safety Regulations.

.8 Prior to excavation, complete stripping of organics within the limits specified in the Contract Drawings.

.9 Complete excavations to the lines and grades indicated on the Contract Drawings. The extents and locations of the Interceptor Drain and Slot Drain excavations will be verified by the Departmental Representative in the field and may be increased, decreased, or adjusted at any time during the work to suit field conditions.

.10 Complete excavation to within + 50 mm / - 100 mm (but not uniformly high or low) of the lines, grades, elevations, and dimensions as indicated on the Contract Drawings or as directed by the Departmental Representative.

.11 Dewater excavation by sumps and pumps as required, to limit sloughing and allow for placement of materials in a dry condition.

3.4 Backfilling – Interceptor Drain and Slot Drains

.1 Carry out backfilling operations in compliance with the WorkSafeBC Workers' Compensation Act and / or the BC Occupational Health and Safety Regulations, as applicable. The design has been prepared such that the Contractor's personnel are not expected to enter into the Interceptor Drain or Slot Drain excavations. The Contractor personnel shall use extreme caution when working around or near the Interceptor Drain and Slot Drain excavations. Should the Contractor choose to have personnel enter into the Interceptor Drain and Slot Drain excavations, the Contractor shall use appropriate shoring and/or flatten the slopes in compliance with WorkSafeBC Workers' Compensation Act and/or the BC Occupational Health and Safety Regulations, as applicable. The costs for flattening of the Interceptor Drain or Slot Drains Excavations from what is shown on the Contract Drawings (if undertaken), or the use of shoring (if used) shall be borne by the Contractor.

.2 Complete backfilling of Interceptor Drains and Slot Drains using an excavator achieving the requirements of Subsection 2.9 Excavator of this specification.

.3 Nonwoven Geotextile Placement:

.1 Place Nonwoven Geotextile as shown on the Contract Drawings capping the full width and length of the Interceptor Drain and Slot Drains. A minimum of 300 mm nonwoven geotextile overlap shall be applied at all joints.

.4 HDPE Drainage Tubing Installation:

.1 Handle and store drainage tubing in a manner to avoid damage, alteration, deterioration, and soiling. Damaged drainage tubing shall be replaced at the Contractor's cost.

.2 Place Perforated HDPE Drainage Tubing with Geotextile Sock and Non-Perforated HDPE Drainage Tubing (cleanouts) starting at the downstream end of the Interceptor Drain, Slot Drains and cleanouts at the locations and elevations indicated on the Contract Drawings. Place HDPE Drainage Tubing to within +/- 200 mm of the lines and grades on the Contract Drawings and ensure positive drainage for the length of the installation.

.3 Place backfill material in 100 mm lifts or less to the full width of the trench, alternatively on each side of the drainage tubing, so as to not displace the

drainage tubing laterally or vertically. Hand compaction around the haunches of the drainage tubing is not required.

.4 Secure galvanized steel caps and animal guards to the HDPE Drainage Tubing in locations shown on the Contract Drawings. Set galvanized steel caps and animal guards flush with Riprap surface and ensure positive drainage following installation.

.5 Filter Gravel Backfill and Compaction:

.1 Upon acceptance of the depth and width of the Interceptor Drain and Slot Drains by the Departmental Representative, place Filter Gravel to the lines and grades shown on the Contract Drawings. Ensure Filter Gravel is free of contamination by other materials throughout the backfilling process. Finished surfaces of Filter Gravel shall be within + 75 mm / - 25 mm of the existing ground, but not uniformly high or low.

.2 Compact the Filter Gravel during backfilling via tamping of the excavator bucket during backfilling to the satisfaction of the Departmental Representative.

.6 Impervious Fill Placement and Compaction:

.1 Place Impervious Fill to the lines and grades shown on the Contract Drawings and maintain free of contamination by other materials including snow and ice throughout the construction process.

.2 Compact Impervious Fill to a density not less than 95% of the standard maximum dry density in accordance with ASTM D698.

.7 Geosynthetic Clay Liner, Riprap, and Crushed Base Gravel Placement:

.1 Install Geosynthetic Clay Liner and associated nonwoven geotextile to the extents shown on the Contract Drawings, placing from the downstream end and working upstream. Shingle (overlap) Geosynthetic Clay Liner sheets a minimum of 600 mm in direction of positive drainage (i.e. upstream sheet is place on top of downstream sheet).

.2 Place Riprap to the lines, grades and thicknesses

shown on the Contract Drawings and in accordance with Section 31 37 00 – Riprap. Maintain free of contamination by other materials throughout the construction process. 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 the Geosynthetic Clay Liner is concealed by the Riprap. Ensure positive drainage following Riprap placement.

.3 Place Crushed Base Gravel to the lines, grades, and thicknesses shown on the Contract Drawings and in accordance with Section 32 11 24 – Crushed Base Gravel. Maintain free of contamination by other materials throughout the construction process.

.4 Use care during placement of Riprap and Crushed Base Gravel to ensure Riprap does not damage the Geosynthetic Clay Liner.

3.5 Excavation and Backfill – Concrete Block Wall

.1 Complete excavation and backfill of Concrete Block Wall in accordance with Section 32 32 34 – Concrete Block Wall and Subsection 3.2 Excavation – General of this specification.

3.6 Granular Backfill (Pit Run)

.1 Following Excavation (including stripping), place Granular Backfill (Pit Run) to the design lines and grades, cross sections and dimensions as shown on the Contract Drawings.

.2 Bench existing ground where steeper than 2.5H : 1V with minimum 1.0 m wide cuts to provide a continuous series of steps prior to backfilling. Benches are to be excavated from the bottom of the slope one level at a time with the compacted fill placed to the height of the cut before the next bench is excavated.

.3 If the material excavated to generate the terraces achieves the requirements for Granular Backfill (Pit Run), the material excavated to generate the terraced / steps on hillsides can be spread, mixed, and compacted into the imported Granular Backfill (Pit Run). No additional payment will be made for excavation of terraces / steps in the existing embankment if the existing material achieves the requirements for Granular Backfill (Pit Run) and is used onsite. If the material excavated to generate the terraces does not achieve the requirements for Granular Backfill (Pit Run), the material excavated shall be removed and disposed offsite. All material removed shall be included in the

excavation quantity and quantified by survey.

.4 Do not place material which is frozen nor place material on frozen surfaces except in areas authorized by the Departmental Representative.

.5 Place and compact to full width in layers not exceeding 200 mm loose thickness. Compact each lift to achieve a minimum of 10 passes using a Plate Compactor with a nominal operating weight of 1000 lb. or larger and until the compacted surface exhibits no observed deflections or rutting.

.6 Break material down to sizes that enable required compaction and mix for uniform moisture to full depth of layer. Granular Backfill (Pit Run) materials which cannot be compacted to the required density due to high moisture content, or Granular Backfill (Pit Run) materials with a moisture content greater than optimum, shall not be used without prior aeration and drying.

.7 Add water or dry as required to bring moisture content of materials to optimum moisture levels for compaction.

.8 Shape Granular Backfill (Pit Run) to within 50 mm of design lines and grades as shown on the Contract Drawings, but not uniformly high or low. Finish slopes and ditch bottoms to neat condition, true to lines, grades and Contract Drawings where applicable.

.9 Remove rocks over 100 mm in any dimension from finished slopes and ditch bottoms.

.10 Hand-finish slopes that cannot be finished satisfactorily by machine.

.11 Maintain finished surfaces in condition conforming to this Section until acceptance by Departmental Representative and subsequent materials have been placed.

.12 Place, shape and compact Granular Backfill (Pit Run) in the vicinity of FortisBC's pipeline in accordance with the conditions of the FortisBC Right-of-Way Work Permit (see Section 01 14 00 – Work Restrictions, Access Development, Construction Staging, and Restoration, Subsection 1.10 Construction Staging for further information).

3.7 Topsoil

.1 Commence placement of Topsoil following the finishing of the preceding materials which have been accepted by the Departmental Representative and surveyed.

.2 Spread imported Topsoil in locations shown on the Contract Drawings, and as approved by the Departmental Representative. Place Topsoil to the thicknesses shown on the Contract Drawing +/- 50 mm, but not uniformly high or low, or to a thickness directed by the Departmental Representative.

.3 Neatly shape outside limits of Topsoil material to eliminate sharp changes in lines and grades. Ensure ready run-off of surface water.

.4 Remove rocks > 150 mm in diameter and other debris hindering good vegetative growth from the placed Topsoil.

.5 Finish surface even, free of large openings and neat in appearance.

.6 Maintain finished surfaces in condition conforming to this Section of the Contract Specifications until acceptance by Departmental Representative.

3.8 Decommission Existing ATV Trail and Access

.1 Backfill Existing ATV Trail and Access Road area with Topsoil and Granular Backfill (Pit Run) to the lines and grades shown on the Contract Drawings and to the satisfaction of the Departmental Representative.

.2 Place and compact to full width in layers not exceeding 200 mm loose thickness. Compact each lift with a minimum of 8 passes of the entire lift area using a Plate Compactor with a nominal operating weight of 1000 LB or larger.

.3 Place Topsoil in accordance with Subsection 3.7 Topsoil. Reinstate finished slope to match surrounding conditions and ensure positive drainage.

.4 Excavate ditches at existing access to the lines and grades shown on the Contract Drawings. Match neatly into existing drainage regime and ensure positive drainage.

.5 Complete decommissioning of the existing ATV Trail in the vicinity of FortisBC's pipeline in accordance with the conditions of the FortisBC Right-of-Way Work Permit (see Section 01 14 00 – Work Restrictions, Access Development, Construction Staging, and Restoration, Subsection 1.10 Construction Staging for further information).

END OF SECTION

SECTION INCLUDES:

PART 1 – GENERAL:

1.1 Measurement and Payment Procedures.

1.2 References.

1.3 Environmental.

PART 2 – PRODUCTS:

2.1 Riprap.

2.2 Nonwoven Geotextile.

2.3 Impervious Fill.

2.4 Geosynthetic Clay Liner.

PART 3 – EXECUTION:

3.1 Placement of Riprap.

PART 1 – GENERAL

1.1 Measurement and Payment Procedures

.1 Payment for the completion of Riprap will be made on the basis of the Price per Unit Bid for Riprap – 10 kg Class, and Riprap – 50 kg Class in the Bid and Acceptance form. The Price per Unit Bid shall include all costs for the manufacture, supply, transport and placement of Riprap, supply, transport and placement of nonwoven geotextile, and all other items necessary for the successful completion of the work. The price shall further include the cost for excavating, temporary storage, and reuse of existing riprap (if material is suitable and if desired by the Contractor).

.2 Measurement for Payment for Riprap – 10 kg Class, and Riprap – 50 kg Class will be made on the volume of Riprap placed surveyed in cubic metres and accepted by the Departmental Representative.

1.2 References

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

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

.2 British Columbia Ministry of Transportation and Infrastructure (BC MoTI):

.1 2020 Standard Specifications for Highway Construction.

1.3 Environmental

.1 Complete Riprap installation and related works in conformance with the requirements of Section 01 35 43 – Environmental Protection, and the Contractor's accepted Environmental Protection Plan (EPP).

.2 The Contractor shall account for the possibility of not being able to complete work due to high flows in the ditch / stream or adverse weather conditions in the construction schedule and in the unit prices. No payment for temporary work stoppages due to high flows or adverse weather conditions will be made. See Section 01 11 10 – Summary of Work, Subsection 3.2 Work Completion, Items 3.2.4 through 3.2.6 inclusive of this Specification for more information.

PART 2 – PRODUCTS

2.1 Riprap

.1 The Riprap shall conform with the following requirements:

.1 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:

Table 31 37 00 – 01:10 Kg Class Riprap

Mass (kg) *	Nominal Diameter @ 2640 kg/m^3 (mm)	Percent Larger Than
40	330	0
25	280	15
10	200	50
1	90	85
0.1	45	100

Table 31 37 00 – 02: 50 Kg Class Riprap		
Mass (kg) *	**Nominal Diameter @ 2640 kg/m³ (mm)**	**Percent Larger Than**
300	600	0
150	510	15
50	350	50
5	160	85
1	95	100

* Mass governs the gradation of Riprap. Nominal diameter is provided for informational purposes only. Nominal size is defined according to the following expression: Nominal Size (mm) = 1150 times the cube root of the mass (kg) divided by the density of the rock (kg/m^3).

.3 Neither the breadth or the thickness of any individual piece of Riprap 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 not less than 2.65 in accordance with ASTM C127

.2 Existing rock material that achieves the requirements for Riprap may be set aside by the Contractor and for re-use as Riprap.

.3 The Riprap shall be stockpiled at the project site for inspection by the Departmental Representative prior to placement. Stockpiles for inspection shall contain a minimum of 10 tonnes of material.

2.2 Nonwoven Geotextile .1 The Nonwoven Geotextile shall be in accordance with Section 31 23 33 – Excavation and Backfill.

2.3 Impervious Fill .1 Impervious Fill shall be in accordance with Section 31 05 16 – Aggregates: General.

2.4 Geosynthetic Clay Liner .1 Geosynthetic Clay Liner shall be in accordance with Section 31 23 33 – Excavation and Backfill.

PART 3 – EXECUTION

3.1 Placement of Riprap .1 The Riprap material shall be loaded, transported, and placed with care to ensure that material does not break or reduce in size smaller than the actual material size requirements when placed.

.2 Place Riprap in the vicinity of FortisBC's pipeline in accordance with the conditions of the FortisBC Right-of-Way Work Permit (see Section 01 14 00 – Work Restrictions, Access Development, Construction Staging, and Restoration, Subsection 1.10 Construction Staging for further information).

.3 Place nonwoven geotextile to the design lines and grades as shown on the Contract Drawings. Where required, place Impervious Fill and Geosynthetic Liner to the lines and grades shown on the Contract Drawings prior to placing Riprap.

.4 Place Riprap materials on a clean surface, properly shaped per the lines and grades shown in the Contract Drawings and free from debris, snow and ice or other deleterious material.

.5 Riprap materials shall be placed to the lines and thickness shown on the Contract Drawings. The finished surface of the Riprap shall be within +100 mm / -50 mm of the finished design grades but not uniformly high or low.

.6 Place Riprap material using methods that do not lead to segregation or degradation of aggregate. Do not place by end dumping from haul units. Ensure no damage to nonwoven geotextile, Impervious Fill and Geosynthetic Clay Liner occurs during placement of Riprap.

.7 Do not drop Riprap from a height greater than 0.5 m vertically from its final position.

.8 Place Riprap commencing at the downstream end of the Riprap Ditch and proceeding upstream. Material shall be densely placed and individual stones shall be worked with placement equipment to form a well-keyed surface.

.9 Riprap not conforming to the requirements of this Section shall be removed from the project site with the expense of the removal borne by the Contractor.

.10 The Contractor shall ensure that the construction methods adopted produce a finished surface that is comprised of the full spectrum of particle sizes continuously throughout its length and breadth.

.11 Dress all Riprap voids so that the final surface is well keyed, densely placed, and uniform. The Departmental Representative will require that all surface voids be filled into which a rock having a mass equal or greater than 25% of the maximum stone mass can be placed. Ensure no nonwoven

geotextile, Impervious Fill, and Geosynthetic Clay Liner is exposed following placement and dressing of Riprap.

.12 Construction equipment is not permitted on the Riprap at any stage of construction.

.13 Maintain finished material surfaces in a condition conforming to this section until acceptance by the Departmental Representative.

END OF SECTION

SECTION INCLUDES:

PART 1 – GENERAL:

1.1 Measurement and Payment Procedures.

1.2 References.

PART 2 – PRODUCTS:

2.1 Crushed Base Gravel.

2.2 Nonwoven Geotextile.

PART 3 – EXECUTION:

3.1 Inspection and Survey of Underlying Surface.

3.2 Placing.

3.3 Compaction.

3.4 Tolerances.

3.5 Protection.

PART 1 – GENERAL

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, supply and installation of Nonwoven Geotextile, 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 (to the design grades) 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 exclude Crushed Base Gravel used for Abandon Existing 600 mm Culvert and used as Culvert Bedding Material as shown on the Contract Drawings.

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))

PART 2 – PRODUCTS

2.1 Crushed Base Gravel

.1 Crushed Base Gravel shall be in accordance with Section 31 05 16 – Aggregates: General.

2.2 Nonwoven Geotextile

.1 Nonwoven Geotextile shall be in accordance with Section 31 23 33 – Excavation and Backfill.

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 inspected and accepted by Departmental Representative.

3.2 Placing

.1 Place Nonwoven Geotextile to the locations shown on the Contract Drawings for Concrete Block Wall Foundation. The Nonwoven Geotextile shall have a minimum 300 mm at all joints.

.2 Place Crushed Base Gravel material in the locations and to lines and grades shown on the Contract Drawings.

.3 Ensure no frozen material is placed.

.4 Place material only on clean unfrozen surface, properly shaped and compacted, and free from snow and ice.

.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 loose thickness. Departmental Representative may authorize thicker lifts (layers) after Contractor has shown that specified compaction at 150 mm lift thickness 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.

3.3 Compaction

.1 Compact to a density not less than 100% of the standard maximum dry density in accordance with ASTM D698. Where the Crushed Base Gravel is placed over saturated clay subgrade, 100% may be reduced to 98% as approved by the Departmental representative..

.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 to dry the material or replace the material (at the contractor's cost) with material with a desired moisture content.

.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 +/- 10 mm from the lines and grades shown on the Contract Drawings, 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

SECTION INCLUDES:

PART 1 – GENERAL:

1.1 Measurement and Payment Procedures.

1.2 References.

PART 2 – PRODUCTS:

2.1 Crushed Surfacing Gravel.

2.2 Nonwoven Geotextile.

PART 3 – EXECUTION:

3.1 Preparation.

3.2 Placing.

3.3 Compaction.

3.4 Tolerances.

3.5 Protection.

PART 1 – GENERAL

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 and Crushed Surfacing Gravel – ATV Connector Trail in the Bid and Acceptance Form. The Price per Unit Bid shall include all costs included with the manufacture, loading, transport, placing, shaping, watering and/or drying and compaction of the Crushed Surfacing Gravel, supply and installation of the nonwoven geotextile, and all other items necessary for successful completion of the work.

.2 Measurement for Payment for completion of Crushed Surfacing Gravel and Crushed Surfacing Gravel – ATV Connector Trail will be made on the volume of material incorporated in the works at the completion of compaction and grading, surveyed in cubic metres and accepted by the Departmental Representative.

1.2 References

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

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

.2 ASTM D698, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbf/ft3 (600 kN-m/m3)).

PART 2 – PRODUCTS

2.1 Crushed Surfacing Gravel

.1 Crushed Surfacing Gravel shall be in accordance with Section 31 05 16 – Aggregates: General.

2.2 Nonwoven Geotextile

.1 Nonwoven Geotextile shall be in accordance with Section 31 23 33 – Excavation and Backfill.

PART 3 – EXECUTION

3.1 Preparation

.1 Complete required excavations and placement of materials to facilitate the placement of Crushed Surfacing Gravel to the lines and grades shown on the Contract Drawings and in accordance with Section 31 23 33 – Excavation and Backfill.

3.2 Placing

.1 Place Nonwoven geotextile to the locations shown on the contract drawings.

.2 Place Crushed Surfacing Gravel to the lines and grades shown on the Contract Drawings.

.3 Ensure no frozen material is placed.

.4 Place material only on clean unfrozen surface, properly shaped and compacted, and free from snow and ice.

.5 Place Crushed Surfacing Gravel using methods which do not lead to segregation or degradation of the material.

.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.

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 / dry material as necessary during compacting to obtain appropriate moisture content.

.4 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers accepted by Departmental Representative.

.5 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.

3.4 Tolerances

.1 When compacted, finished surfaces of Crushed Surfacing Gravel shall be within +/- 25 mm of the lines and grades shown on the Contract Drawings, but not uniformly high or low.

3.5 Protection

.1 Maintain finished Crushed Surfacing Gravel in condition conforming to this Contract Specification until acceptance by the Departmental Representative. No separate payment will be made for maintenance.

.2 Place, shape and compact Crushed Surfacing Gravel in the vicinity of FortisBC's pipeline in accordance with the conditions of the FortisBC Right-of-Way Work Permit (see Section 01 14 00 – Work Restrictions, Access Development, Construction Staging, and Restoration, Subsection 1.10 Construction Staging for further information).

END OF SECTION

SECTION INCLUDES:

PART 1 – GENERAL:

1.1 Measurement and Payment Procedures.

1.2 References.

PART 2 – PRODUCTS:

2.1 Concrete Blocks.

2.2 Nonwoven Geotextile.

2.3 CSP Perforated Drain Pipe.

2.4 CSP Drain Pipe.

2.5 Crushed Base Gravel.

2.6 Granular Backfill (Pit Run).

2.7 Topsoil.

2.8 Filter Gravel.

2.9 Impervious Fill.

2.10 Geosynthetic Clay Liner.

PART 3 – EXECUTION:

3.1 Concrete Block Wall.

PART 1 – GENERAL

1.1 Measurement and Payment Procedures

.1 Payment for the supply and installation of 200 mm Diameter CSP Perforated Drain Pipe will be made on the basis of the Price per Unit Bid for CSP Perforated Drain Pipe – 200 mm Diameter in the Bid and Acceptance Form. The Price per Unit Bid shall include all costs included with the work, including supply, transport and installation of CSP Perforated Drain Pipe in the Concrete Block Wall Foundation, and all other items (included but not limited to couplings, fittings, and hardware) necessary for the successful completion of the work in accordance with the Contract Drawings.

.2 Measurement for Payment for completion of 200 mm Diameter CSP Perforated Drain Pipe will be made on the length of CSP Perforated Drain Pipe – 200 mm Diameter surveyed in lineal metres, measured parallel to the direction of the Concrete Block Wall Foundation, and accepted by the

Departmental Representative.

.3 Payment for the 200 mm Diameter CSP Drain Pipe will be made on the basis of the Price per Unit Bid for CSP Drain Pipe – 200 mm Diameter in the Bid and Acceptance Form. The Price per Unit Bid shall include all costs included with the work, including supply, transport and installation of CSP Drain Pipe, excavation and offsite disposal of excavated materials, supply and placement of the crushed base gravel backfill material, and all other items (including but not limited to couplings, fittings, hardware, animal guard end caps) necessary for the successful completion of the work and to the lines and grades shown on the Contract Drawings.

.4 Measurement for Payment for completion of CSP Drain Pipe will be made on the length of CSP Drain Pipe surveyed in lineal metres, and accepted by the Departmental Representative.

.5 Payment for Concrete Block Wall will be made on the basis of the Price per Unit Bid for Concrete Wall Blocks in the Bid and Acceptance Form. The Price per Unit Bid shall include all costs for the Loading, transport (from PSPC's Fort Nelson Maintenance Yard, Airport Drive, Fort Nelson), and installation of the Concrete Block Retaining Wall units, supply and installation of Nonwoven Geotextile, and all other components (excluding granular material) required for the construction of the wall to the lines and grades shown on the Contract Drawings and per the manufacturer's recommendations.

.6 Measurement for Payment for the Concrete Block Wall will be made by the count of each Concrete Wall Block installed, surveyed, and accepted by the Departmental Representative.

1.2 References .1 Canadian Standards Association (CSA):

.1 CSA-G401-01, Corrugated Steel Pipe Products.

PART 2 – PRODUCTS

2.1 Concrete Blocks .1 PSPC is providing access to the "as is" Concrete Blocks from PSPC's Fort Nelson Maintenance Yard, Airport Drive, Fort Nelson. The Contractor shall notify the Departmental Representative in writing a minimum of three (3) working days in advance of required access to the Fort Nelson Maintenance Yard.

2.2 Nonwoven Geotextile .1 Nonwoven Geotextile shall be in accordance with Section 31 23 33 – Excavation and Backfill.

2.3 CSP Perforated Drain Pipe

.1 The CSP Perforated Drain Pipe shall be Perforated Corrugated Steel Pipe Culvert (200 mm Ø, 1.6 mm wall thickness) conforming to CSA-G401-01. Each section of CSP Perforated Drain Pipe shall be joined with a manufacturer approved coupler.

.2 The CSP perforations shall be factory made and have a permeability equal to better than the permeability of 200 mm Ø Armtec Perforated Big "O" Drainage Tubing.

.3 The CSP Perforated Drain Pipe shall come complete with Geotextile Sock (as standard on the 200 mm Ø Armtec Perforated Big "O" Drainage Tubing) or be securely wrapped with Nonwoven Geotextile. If Nonwoven Geotextile is used, the Nonwoven Geotextile shall have adequate overlap to ensure complete coverage of the pipe and be secured to the drain pipe such that it does not move or shift during installation.

.4 Couplers, Tee's, and 45° bends shall be used as necessary to facilitate the CSP Perforated Drain Pipe as shown on the Contract Drawings. Each upstream end of CSP Perforated Drain Pipe shall come complete with a galvanized steel end cap. All Couplers, Tee's and End Cap shall be approved by the manufacturer for the brand, type, supplier, and size of CSP Perforated Drain Pipe and come from a single supplier.

2.4 CSP Drain Pipe

.1 The CSP Drain Pipe shall be Corrugated Steel Pipe Culvert (200 mm Ø, 1.6 mm wall thickness) conforming to CSA-G401-01. Each section of CSP Drain Pipe shall be joined with a manufacturer approved coupler.

.2 Couplers, Tee's, and 45° bends, and End Caps shall be used as necessary to facilitate the CSP Drain Pipe installation as shown on the Contract Drawings. All Couplers and Tee's shall be approved by the manufacturer for the brand, type, supplier, and size of CSP Perforated Drain Pipe and come from a single supplier.

.3 Each outlet of the CSP Drain Pipe shall come complete with a galvanized steel cap / animal guard with suitable drainage mesh or holes. The Contractor shall propose a supplier and product for the purpose-built galvanized Steel Cap and provide the product details to the Departmental Representative prior to ordering for preapproval.

2.5 Crushed Base Gravel

.1 Crushed Base Gravel shall be in accordance with Section 31 05 16 – Aggregates: General.

2.6 Granular Backfill (Pit Run)	.1	Granular Backfill (Pit Run) shall be in accordance with Section 31 05 16 – Aggregates: General.
2.7 Topsoil	.1	Topsoil shall be in accordance with Section 31 23 33 – Excavation and Backfill.
2.8 Filter Gravel	.1	Filter Gravel shall be in accordance with Section 31 05 16 – Aggregates: General.
2.9 Impervious Fill	.1	Impervious Fill shall be in accordance with Section 31 23 33 – Excavation and Backfill.
2.10 Geosynthetic Clay Liner	.1	Geosynthetic Clay Liner shall be in accordance with Section 31 23 33 – Excavation and Backfill.

PART 3 – EXECUTION

3.1 Concrete Block Wall	.1	Complete excavation of native materials to the lines and grades shown on the Contract Drawings and in accordance with Section 31 23 33 – Excavation and Backfill to facilitate the installation of subsequent materials forming the Concrete Block Wall.
	.2	Place Nonwoven Geotextile in the locations and to the lines shown on the Contract Drawings.
	.3	Place Crushed Base Gravel in the locations and to the lines and grades shown on the Contract Drawings and in accordance with Section 32 11 24 – Crushed Base Gravel.
	.4	Place CSP Perforated Drain Pipe within the Concrete Block Wall Foundation as shown on the Contract Drawings. Place within +/- 50 mm horizontally of the lines and grades shown on the Contract Drawings and ensure positive drainage for the length of the installation. Install galvanized steel end cap on the upstream end of CSP Perforated Drain Pipe. Install CSP Drain Pipe and animal guard end caps at the locations shown on the Contract Drawings. Backfill Crushed Base Gravel alternatively on each side of the drain pipe, so as to not displace the drain pipe laterally or vertically.
	.5	Following the Departmental Representative's review and acceptance of the Crushed Base Gravel and CSP Perforated Drain Pipe, install the Concrete Wall Blocks to the lines and grades shown on the Contract Drawings. Allowable vertical tolerance from the lines and grades shown on the Contract Drawings is +/- 25 mm per 1.5 m of horizontal wall length and vertical wall length, but not uniformly high or low.

.6 Place Nonwoven Geotextile to the locations shown on the Contract Drawings. Backfill behind the Concrete Block Wall with Granular Backfill (Pit Run) to the lines and grades shown on the Contract Drawings and in accordance with Section 31 05 16 – Aggregates: General and Section 31 23 33 – Excavation and Backfill and the following:

.1 Place Granular Backfill (Pit Run) materials on a properly shaped surface per the lines and grades shown in the Contract Drawings and free from debris, snow and ice, organic material, or other deleterious materials.

.2 Do not place material on frozen surfaces except if authorized by the Departmental Representative.

.3 Break material down to sizes that enable required compaction and mix for uniform moisture to full depth of layer. Granular Backfill (Pit Run) materials which cannot be compacted to the required density due to high moisture content, or Granular Backfill (Pit Run) materials with a moisture content greater than optimum, shall not be used without prior aeration and drying.

.4 Use care during placement of Granular Backfill (Pit Run) and use appropriately sized compaction equipment to ensure that the Concrete Block Wall does not deviate from design lines and grades during the backfill work. Prior to starting compaction, discuss with and gain approval from the Departmental Representative for the use of compaction equipment proposed to complete the compaction work. In all instances the compaction of the Granular Backfill (Pit Run) shall conform with the following:

.1 Place and compact to full width in layers not exceeding 200 mm loose thickness.

.2 Compact each lift with a minimum of 10 passes of the entire lift area using a Plate Compactor with a nominal operating weight of 400 LB to 700 LB. Care shall be applied during compaction to avoid displacement or rotation of the concrete block wall.

.3 Vibratory compaction shall not be used.

.4 The backfill material shall be compacted starting from the front face of the retaining wall and then move in a direction towards the back limit of the excavation.

.5 Where Concrete Block Wall Backfill intersects with the Slot Drain materials, backfilling shall be completed in accordance with Section 31 23 33 – Excavation and Backfill, Subsection 3.4 Backfilling – Interceptor Drain and Slot Drains.

.6 The top finished surface of Granular Backfill (Pit Run) to be within +/- 20 mm of the lines and grades shown in the Contract Drawings but not uniformly high or low. Ensure positive drainage within the drainage swale for the length of the Concrete Block Wall as shown in the Contract Drawings. Maintain finished surface in a condition conforming to this section until acceptance by the Departmental Representative.

.7 Place Topsoil to the lines and grades shown on the Contract Drawings, per the requirements of Section 31 23 33 – Excavation and Backfill, and maintain free of contamination by other materials throughout the construction process.

.8 Ensure all Nonwoven Geotextile is concealed by Granular Backfill (Pit Run) or Topsoil materials.

END OF SECTION

SECTION INCLUDES:

PART 1 – GENERAL:

1.1 Measurement and Payment Procedures.

1.2 References.

1.3 Product Data.

1.4 Scheduling.

1.5 Product Handling and Storage.

PART 2 – PRODUCTS:

2.1 Materials.

2.2 Equipment.

PART 3 – EXECUTION:

3.1 Workmanship.

3.2 Protection of Surfaces.

3.3 Preparation of Slurry.

3.4 Slurry Application.

3.5 Warranty and Maintenance.

PART 1 – GENERAL

1.1 Measurement and Payment Procedures

.1 Payment for Hydraulic Seeding will be made on the basis of the Price per Unit Bid for Hydraulic Seeding in the Bid and Acceptance Form. The Price per Unit Bid shall include all costs for supply, placement, and maintenance of the Hydraulic Seeding in all areas of topsoil, cut slopes, excavation and other disturbed areas as detailed in these specifications, Contract Drawings, or as directed by the Departmental Representative.

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

1.2 References

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

.1 ASTM 5338, Standard Test Method for Determining Aerobic Biodegradation of Plastic Materials Under Controlled Composting Conditions, Incorporating Thermophilic Temperatures.

.2 ASTM D6525, Standard Test Method for Measuring Nominal Thickness of Rolled Erosion Control Products.

.3 ASTM D6566, Standard Test Method for Measuring Mass Per Unit Area of Turf Reinforcement Mats.

.4 ASTM D6567, Standard Test Method for Measuring the Light Penetration of a Rolled Erosion Control Product (RECP).

.5 ASTM D7322, Standard Test Method for Determination of Erosion Control Product (ECP) Ability to Encourage Seed Germination and Plant Growth Under Bench-Scale Conditions.

.6 ASTM D7367, Standard Test Method for Determining Water Holding Capacity of Fiber Mulches for Hydraulic Planting.

.2 Environmental Protection Association (EPA):

.1 EPA 2021.0, Methods for Measuring Acute Toxicity to Freshwater and Marine Organisms, Daphnia puplex and Daphnia magna acute.

1.3 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 Biotic Soil Media.

.1 Shipping Bill: issued by supplier of material, identifying manufacturer and supplier, material, and net dry-air mass in each container.

.3 Hydraulic Erosion Control Product (HECP).

.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 Unless advised otherwise in advance of the work by the Departmental Representative, 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.

1.4 Scheduling

.1 Schedule Hydraulic Seeding to coincide with the completion of surface on which the hydraulic seeding shall be applied and Construction Staging requirements as outlined in Section 01 14 00 – Work Restrictions, Access Development, Construction Staging, and Restoration.

1.5 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:

Table 32 93 21 – 01: Grass Seed Mix

% By Weight	Species
30%	Creeping Red Fescue
20%	Slender Wheatgrass
15%	Smooth Brome Grass
10%	Alsike Clover
10%	Timothy
10%	Canada Bluegrass
5%	Sheep Fescue

.2 Fall rye.

.2 Biotic Soil Media shall be a Wood Fibre Based Product certified for use in Canada containing the following ingredients:

.1 Renewable Thermally Refined Bark and Wood Fibers

.2 Biochar

.3 Cross-Linked Polysaccharide Biopolymers

.4 Soil Building Components Containing Seaweed Extract, Humic Acid, and Endomycrrhizae.

.3 Hydraulic Erosion Control Product (HECP) shall be a Wood Fibre Product certified for use in Canada with the following properties as detailed in Table 32 93 21 – 02:

Table 32 93 21 – 02: HECP		
Physical Properties (1)	**Test Method**	**Test Value**
Thickness	ASTM D6525 (2)	≥ 4 mm
Ground Cover	ASTM D6567 (2)	≥ 98%
Mass/Unit Area	ASTM D6566 (2)	≥ 390 g/m²
Water Holding Capacity	ASTM D7367	≥ 1,400%
Material Color	Observed	Green
Physical Properties (1)	**Test Method**	**Test Value**
Cover Factor (3)	Large Scale (5)	≤ 0.05
Percent Effectiveness (4)	Large Scale (5)	≥ 95%
Cure Time	Observed	4 – 24 Hours
Vegetation Establishment	ASTM D7322 (2)	≥ 600%
Functional Longevity	ASTM 5338	≤ 12 Months
Environmental Properties (1)	**Test Method**	**Test Value**
Ecotoxicity	EPA 2021.0	48-hr LC_{50}> 100%
Biodegradability	ASTM D5338	Yes
Product Composition		**Typical Value**
Thermally Processed (7) (within a pressurized vessel) Virgin Wood Fiber		77%
Wetting Agents - including high-viscosity, colloidal polysaccharides, crossed-linked biopolymers and water absorbents (>10% of total formulation)		18%
Crimped, Biodegradable Interlocking Fibers		2.5%
Micro-Pore Granules		2.5%

Notes:

(1) When uniformly applied at a rate of 3,500 pounds per acre (3,900 kilograms/hectare) under laboratory conditions.

(2) ASTM test methods developed for Rolled Erosion Control Products that have been modified to accommodate Hydraulic Erosion Control Products.

(3) Cover Factor is calculated as soil loss ratio of treated surface versus an untreated control surface.

(4) % Effectiveness = One minus Cover Factor multiplied by 100%.

(5) Large scale testing conducted at Utah Water Research Laboratory and Texas Transportation Institute. For specific testing information please contact a Profile technical service representative at 800-508-8681.

(6) Functional Longevity is the estimated time period, based upon ASTM D5338 testing and field observations, that a material can be anticipated to provide erosion control and agronomic benefits as influenced by composition, as well as site-specific

conditions, including; but not limited to — temperature, moisture, light conditions, soils, biological activity, vegetative establishment and other environmental factors.

(7) Heated to a temperature greater than 380 degrees Fahrenheit (193 degrees Celsius) for 5 minutes at a pressure greater than 50 psi (345 kPa) in order to be Thermally Refined®/Processed and to achieve phytosanitization.

.3 Water: free of impurities that would inhibit germination and growth.

.4 Fertilizer:

.1 To Canada Fertilizers Act and Regulations.

.2 Complete synthetic, ratio: 18:18:18.

2.2 Equipment

1 Capable of mixing and evenly distributing seed, fertilizer, Biotic Soil Media, and HECP 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 or tower with appropriate nozzles.

PART 3 – EXECUTION

3.1 Workmanship

.1 Apply Hydraulic Seeding in all areas of topsoil, cut/fill slopes, disturbed areas, or other 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 the 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 unless otherwise preapproved by the Departmental Representative.

.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 Biotic Soil Media and HECP and charge slowly into seeder. Use optimum carrying capacity of water relative to Biotic Soil Media, and HECP as follows:

.1 Biotic Soil Media: 55kg/1000 L.

.2 HECP: 43kg/1000 L.

.4 Mix thoroughly to complete the slurry once all other material is in the seeder.

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 or tower with appropriate nozzles.

.2 The hydraulic seeding slurry mixture shall be applied in two separate applications. The second application shall be applied within 24 hours of the first application. The slurry mixture per hectare of each application shall be as follows:

.1 Application 1 (Biotic Soil Media and Seed):

.1 Biotic Soil Media: 3500 kg

.2 Fall rye: 110 kg.

.3 Fertilizer: 360 kg.

.2 Application 2 (HECP):

.1 HECP: 3900 kg.

.2 Grass Seed Mixture: 125 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

SECTION INCLUDES:

PART 1 – GENERAL:

1.1 Measurement and Payment Procedures.

1.2 References.

1.3 Definitions.

1.4 Submittals.

1.5 Environmental.

1.6 Delivery, Storage, and Handling.

PART 2 – PRODUCTS:

2.1 CSP Culverts and Couplers.

2.2 Concrete Headwalls.

2.3 Zinc-Rich Paint.

2.4 Crushed Base Gravel.

2.5 Culvert Bedding Material.

2.6 Nonwoven Geotextile.

2.7 Riprap.

2.8 Grout.

PART 3 – EXECUTION:

3.1 Culvert Bedding.

3.2 Culvert Placement.

3.3 Culvert Joints.

3.4 Concrete Headwall.

3.5 Culvert Inlet and Outlet Protection.

3.6 Abandon Existing 600 mm Culvert.

3.7 Clean-up and Protection.

PART 1 – GENERAL

1.1 Measurement and Payment Procedures

.1 Payment for the supply and installation of Culverts will be made on the basis of the Price per Unit Bid for Sta. 5+051 Culvert – 600 mm Diameter, Sta. 5+381 Culvert – 800 mm Diameter, Sta. 5+659 Culvert – 600 mm Diameter, Sta. 5+885 Culvert – 1400 mm Diameter, Sta. 0+020 Culvert – 1400 mm Diameter – ATV Connector Trail, and Sta. 0+100 Culvert – 600 mm Diameter – ATV Connector Trail in the Bid and Acceptance Form. The Price per Unit Bid shall include all costs included with the work, including excavation, supply, transport, and install of an CSP Culvert, supply and placement of culvert bedding material (Crushed Base Gravel), Inlet and Outlet Riprap Protection, and all other items (including but not limited to couplings, fittings, and hardware) necessary for the successful completion of the work.

.2 Measurement for Payment for completion of Sta. 5+051 Culvert – 600 mm Diameter, Sta. 5+381 Culvert – 800 mm Diameter, Sta. 5+659 Culvert – 600 mm Diameter, Sta. 5+885 Culvert – 1400 mm Diameter, Sta. 0+020 Culvert – 1400 mm Diameter – ATV Connector Trail, and Sta. 0+100 Culvert – 600 mm Diameter – ATV Connector Trail will be made on the length of culvert surveyed in lineal metres, measured parallel to the direction of the culvert along the invert of the culvert, and accepted by the Departmental Representative.

.3 Payment for the supply and installation of Concrete Headwall will be made on the basis of the Price per Unit Bid for Concrete Headwall and Concrete Headwall – ATV Connector Trail in the Bid and Acceptance Form. The Price per Unit Bid shall include all costs for the supply, transport, installation of precast or cast-in-place headwall, excavation and offsite disposal of native materials, Crushed Base Gravel, nonwoven geotextile, Geosynthetic Clay Liner, formwork, reinforcement, air entrained concrete, placing and tamping, curing, backfilling and all other items necessary for the successful completion of the work.

.4 Measurement for Payment for completion of Concrete Headwall and Concrete Headwall – ATV Connector Trail will be made by the count of each Precast Concrete Headwall installed and accepted by the Departmental Representative.

.5 Payment for Abandoning the Existing 600 mm Culvert will be made on the basis of the Price per Unit Bid for Abandon Existing Culvert – 600 mm Diameter in the Bid and Acceptance Form. The Price per Unit Bid shall include all

costs included with the work, including excavation and removal of existing culvert inlet and outlet segments, placement of Grout, backfill and compact abandoned culvert inlet and outlet with Crushed Base Gravel, regrading of the ditch, restoration and all other items necessary for the successful completion of the work.

.6 Measurement for Payment for completion of Abandon Existing Culvert – 600 mm Diameter will be made by Lump Sum based on the percentage of the work completed and accepted by the Departmental Representative.

1.2 References

.1 Canadian Standards Association (CSA International), latest edition:

.1 CSA-G401, Corrugated Steel Pipe Products.

.2 CSA W59, Welded steel construction (metal arc welding).

.3 CSA W48, Filler metals and allied materials for metal arc welding.

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

.1 ASTM A252, Standard Specification for Welded and Seamless Steel Pipe Piles.

.2 ASTM D4832, Standard Test Methods for Preparation and Testing of Controlled Low Strength Material (CLSM) Test Cylinders.

.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]).

.3 British Columbia Ministry of Transportation and Infrastructure (BC MoTI):

.1 2020 Standard Specifications for Highway Construction.

1.3 Definitions

.1 Grout: Ready-Mix Controlled Low Strength Material used as an alternative to compacted soil. Grout differs from Portland cement concrete as it contains a low cementitious content to reduce the strength development for possible future removal.

1.4 Submittals

.1 Submittals shall be in accordance with Section 01 33 00 – Submittal Procedures.

.2 Prior to ordering and manufacture of the Precast Concrete Headwalls or rebar for the cast-in-place concrete headwalls, submit to the Departmental Representative for review and acceptance the headwall Shop Drawings in accordance with Section 01 33 00 – Submittal Procedures. Shop Drawings to indicate reinforcement type, location, size and spacing.

1.5 Environmental

.1 Complete culvert installation and related works in conformance with the requirements of Section 01 35 43 – Environmental Protection, and the Contractor's accepted Environmental Protection Plan (EPP).

.2 The Contractor shall account for the possibility of not being able to complete work due to high flows or adverse weather conditions in the construction schedule and in the unit prices. No payment for temporary work stoppages due to high flows or adverse weather conditions will be made. See Section 01 11 10 – Summary of Work, Subsection 3.2 Work Completion, Items .4 through .6 inclusive of this Specification for more information.

1.6 Delivery, Storage, and Handling

.1 Handle and store pipe products and precast concrete headwalls 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.

PART 2 – PRODUCTS

2.1 CSP Culverts and Couplers

.1 PSPC is providing access to "as is" CSP Culverts and associated components from PSPC's Fort Nelson Maintenance Yard, Airport Drive, Fort Nelson.

.2 The Contractor shall return CSP Culvert sections and associated components not incorporated into the work to PSPC's Fort Nelson Maintenance Yard prior to demobilization from the site.

.3 The Contractor shall notify the Departmental Representative in writing a minimum of three (3) working days in advance of required access to the Fort Nelson Maintenance Yard.

2.2 Concrete Headwalls	.1	The cast-in-place or precast Concrete Headwalls shall be in accordance with the Contract Drawings, Section 03 30 00 – Cast-In-Place Concrete, and BC MoTI Standard Specifications for Highway Construction, Specification Drawing No. SP303-02, SP303-03 and SP303-08. The concrete headwalls shall come complete with an apron.
2.3 Zinc-Rich Paint	.1	Zinc-rich paint shall be brush on or spray on with a minimum of 95% metallic zinc content.
2.4 Crushed Base Gravel	.1	Crushed Base Gravel shall be in accordance with Section 31 05 16 – Aggregates: General.
2.5 Culvert Bedding Material	.1	Culvert Bedding Material shall be Crushed Base Gravel in accordance with Section 31 05 16 – Aggregates: General.
2.6 Nonwoven Geotextile	.1	The Nonwoven Geotextile shall be in accordance with Section 31 23 33 – Excavation and Backfill.
2.7 Riprap	.1	Riprap for culvert end protection shall be Class 10 kg Riprap and Class 50 kg Riprap and accordance with Section 31 37 00 – Riprap.
2.8 Grout	.1	Grout shall be in accordance with Section 03 40 00 – Grout.

PART 3 – EXECUTION

3.1 Culvert Bedding	.1	Complete excavation to allow placement of Culvert Bedding Material in dry conditions. Excavate to the lines and grades shown on the Contract Drawings.
	.2	Place Culvert Bedding Material in preparation for culvert placement on the bottom of excavation to the thickness and locations shown on Contract Drawings and compact. Compact final 150 mm lift of Culvert Bedding Material on bottom side of culvert in contact with corrugation to 95% of the standard maximum dry density in accordance with ASTM D698. Compact other lifts to a minimum 98% of the standard maximum dry density in accordance with ASTM D698.
	.3	Shape Culvert Bedding Material 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	Backfill with Culvert Bedding Material around and over culverts as indicated on the Contract Drawings.

.5 Place Culvert Bedding Material in 150 mm lifts to full width of trench alternating on each side of culvert, so as not to allow movement or uplift of the culvert.

.6 Compact each lift to a density not less than 98% of the standard maximum dry density in accordance with ASTM D698 taking special care to obtain required density under haunches. Hand tamp where necessary to obtain compaction.

.7 Place Culvert Bedding Material in an unfrozen condition, free of snow and ice.

3.2 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 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.

.5 Do not allow water to flow through pipes during construction except as permitted by Departmental Representative.

3.3 Culvert Joints

.1 Install culvert joints per the manufacturer's recommendation and following requirements:

.1 Repair spots where damage has occurred to coating by applying two coats of zinc rich paint. Allow each coat to dry before placing second coat, bedding or backfill.

3.4 Concrete Headwall

.1 Excavate native material and place Nonwoven Geotextile in accordance with Section 31 23 33 – Excavation and Backfill, and Crushed Base Gravel in accordance with Section 32 11 24 – Crushed Base Gravel.

.2 Place Geosynthetic Clay Liner and associated nonwoven geotextile on prepared Crushed Base Gravel directly below Concrete Headwall. Take case during construction of Concrete Headwall not to tear or puncture Geosynthetic Clay Liner.

.3 Construct Concrete Headwall in accordance with the Contract Drawings, Section 03 10 00 – Concrete Formwork,

Section 03 20 00 – Concrete Reinforcing and Section 03 30 00 – Cast-in-Place Concrete, Section 31 23 33 – Excavation and Backfill, and BC MoTI Standard Specifications Drawings No. SP303-02, SP303-03 and SP303-08.

3.5 Culvert Inlet and Outlet Protection

.1 Excavate ground to the lines and grades shown on the Contract Drawings to facilitate the installation of the Riprap. Ensure excavation will allow for positive drainage upon placement of Riprap.

.2 Install Geosynthetic Clay Liner and 50 Kg Class Riprap and Nonwoven Geotextile to the lines and grades shown on the Contract Drawings and in accordance with Section 31 37 00 – Riprap. Ensure positive drainage following riprap placement.

3.6 Abandon Existing 600 mm Culvert

.1 Excavate existing materials to expose culvert inlet and outlet segments as shown on the Contract Drawings. Detach / cut and remove culvert inlet and outlet segments to the extent shown on the Contract Drawings or to the satisfaction of the Departmental Representative.

.2 Backfill existing culvert with Grout in accordance with Section 03 40 00 – Grout.

.3 Backfill excavation with Crushed Base Gravel to the lines and grades shown on the Contract Drawings. Ensure Grout is encased with a minimum of 0.3 m of Crushed Base Gravel and is not visible at the conclusion of the work.

.4 Grade finished surfaces of Crushed Base Gravel to +/- 10 mm from the lines and grades shown on the Contract Drawings, but not uniformly high or low.

.5 Compact Crushed Base Gravel to 98% maximum dry density in accordance with ASTM D698.

3.7 Clean-up and Protection

.1 Clean-up all disturbed areas to an equal or better condition to that prior to construction.

.2 Hydraulically Seed all disturbed areas in accordance with Section 32 93 21 – Hydraulic Seeding.

.3 Protect installed culvert from damage from construction equipment and other nearby works for the duration of the project.

END OF SECTION

SECTION INCLUDES:

PART 1 – GENERAL:

1.1 Measurement and Payment Procedures.

1.2 References.

1.3 Submittals.

1.4 Quality Management.

PART 2 – PRODUCTS:

2.1 Precast Concrete Barrier.

PART 3 – EXECUTION:

3.1 Precast Concrete Barrier Installation.

PART 1 – GENERAL

1.1 Measurement and Payment Procedures

.1 Payment for the Precast Concrete Barriers will be made on the basis of the Price per Unit Bid for Precast Concrete Median Barrier – 810 mm, Precast Concrete Transition Barrier – 810 mm to 690 mm, Precast Concrete Transition Barrier – 690 mm to 460 mm, and Precast Concrete Bull-Nose – 460 mm in the Bid and Acceptance Form. The Price per Unit Bid shall include all costs for supply (excludes owner supplied Precast Concrete Median Barrier – 810 mm), loading, transport, and placement of the new and supplied precast concrete barriers, and all other items necessary for successful completion of the work.

.2 Measurement for Payment for completion of Precast Concrete Median Barrier – 810 mm, Precast Concrete Transition Barrier – 810 mm to 690 mm, Precast Concrete Transition Barrier – 690 mm to 460 mm, and Precast Concrete Bull-Nose – 460 mm will be made by the count of each Precast Concrete Barrier installed and accepted by the Departmental Representative.

.3 Payment for Custom 810 mm Precast Concrete Median Drainage Barrier will be made on the basis of the Price per Unit Bid for Precast Concrete Median Drainage Barrier – Custom 810 mm in the Bid and Acceptance Form. The Price per Unit Bid shall include all costs for supply (including preparation of shop drawings with custom design to conform to Contract Drawings), loading, transport, and placement of the Custom Precast Concrete Barrier, and all other items necessary for successful completion of the work.

.4 Measurement for Payment for completion of Precast Concrete Median Drainage Barrier – Custom 810 mm will be made by Lump Sum based on the percentage of work completed and accepted by the Departmental Representative.

1.2 References

.1 British Columbia Ministry of Transportation and Infrastructure (BC MoTI):

.1 2020 Standard Specifications for Highway Construction.

1.3 Submittals

.1 Submittals in accordance with Section 01 33 00 – Submittal Procedures.

.2 Prepare and submit Shop Drawings to the Departmental Representative for review and acceptance for Custom Precast Concrete Drainage Barrier – 810 mm. Shop Drawings to indicate reinforcement type, location, size and spacing.

.3 If requested by the Departmental Representative, submit concrete mix design to the Departmental Representative for review and acceptance should Contractor choose to enhance the mix through the use of 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 BC MoTI – 2020 Standard Specifications for Highway Construction. The precast concrete barrier units shall be per the following drawings and custom details as follows:

.1 PSPC supplied Precast Concrete Barrier:

.1 Precast Concrete Median Barrier – 810 mm – CMB-H and CMB-E: Drawings – SP941-02.01.01, SP941-02.01.02, SP941-02.01.03, and SP941-02.01.04. Note, the Contractor shall be responsible for selecting from Mill Creek Pit concrete barriers with the needed anchor detail (hook or eye) to suit the adjacent barriers.

.2 Contractor supplied Precast Concrete Barrier:

.1 Precast Concrete Transition Barrier – 810 mm to 690 mm – CTB-2H: Drawing – SP941-03.02.01.

.2 Precast Concrete Transition Barrier – 690 mm to 460 mm – CTB-1E: Drawing – SP941-03.01.01.

.3 Precast Concrete Bull-Nose – 460 mm – CBN-H: Drawing SP941-01.01.01.

.4 Custom Precast Concrete Median Drainage Barrier – 810 mm – CMDB-E: to the requirements of the Contract Drawings and satisfying Drawing - SP941-02.01.10.

.2 Precast concrete barrier shall be manufactured per the requirements of the applicable sections of Section 941 – Precast Reinforced Concrete Barriers of the BC MoTI – 2020 Standard Specifications for Highway Construction. Should the Contractor choose to enhance the mix through the use of admixtures or deviate from any of the quality standards listed in 941.02 of the BC MoTI – 2020 Standard Specifications for Highway Construction, 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 BC MoTI – 2020 Standard Specifications for Highway Construction be followed.

PART 3 – EXECUTION

3.1 Precast Concrete Barrier Installation

.1 Install Precast Concrete Barrier following completion and acceptance of Crushed Surfacing Gravel in accordance with Section 32 11 25 – Crushed Surfacing Gravel.

.2 Install Precast Concrete Barrier units in the locations and alignment shown on the Contract Drawings and in accordance with manufacturer's recommendations and instructions.

.3 Install Galvanized Welded Railing to the pre-cast concrete barrier units as shown on the contract drawings.

END OF SECTION

R.115165.001
Appendix A

Written Communication / Document Management Protocol

Alaska Highway Km 450.0 – 451.4 Slide Stabilization and Safety Improvements Project: Written Communication / Document Management Protocol

Communication for the Km 450.0 – 451.4 Slide Stabilization and Safety Improvements, Alaska Highway, BC Project (R.115165.001) will occur using CentralCollab, email, telephone, and through the delivery of hardcopy documents (if requested by PSPC). CentralCollab 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 PSPC. 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

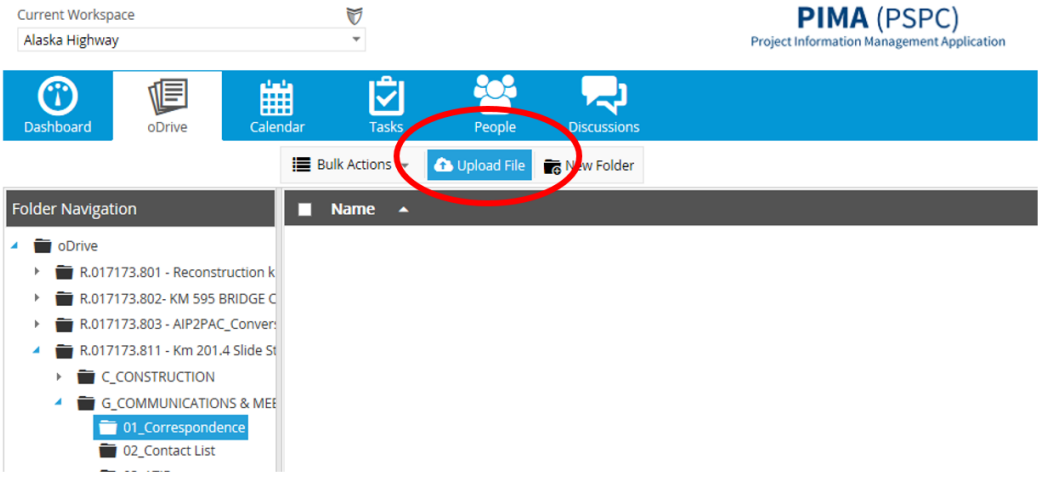
CentralCollab is a web-based collaborative platform that is used to submit and store project documentation. It is the responsibility of the submitting party to upload documents to CentralCollab in the correct folder and with the correct file naming convention.

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 PSPC throughout the project by contacting the PSPC 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.

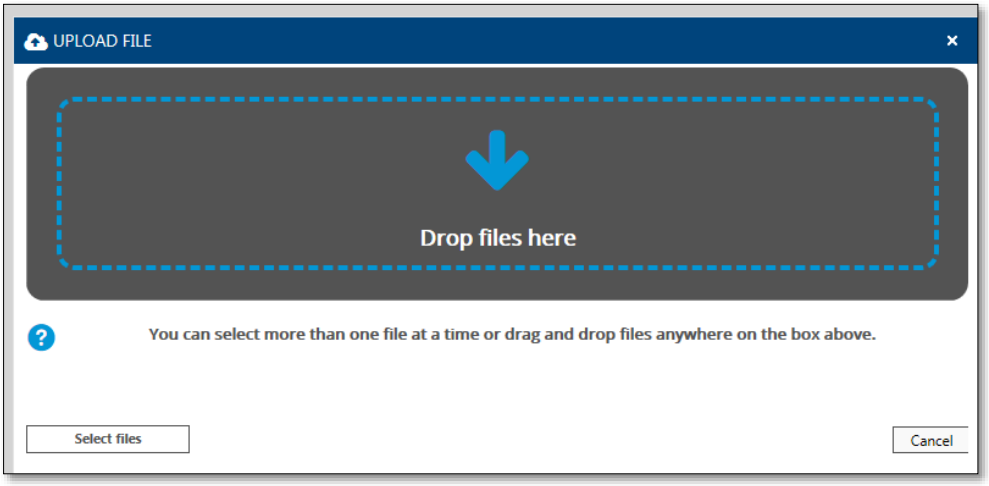
1. Uploading to CentralCollab

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**:

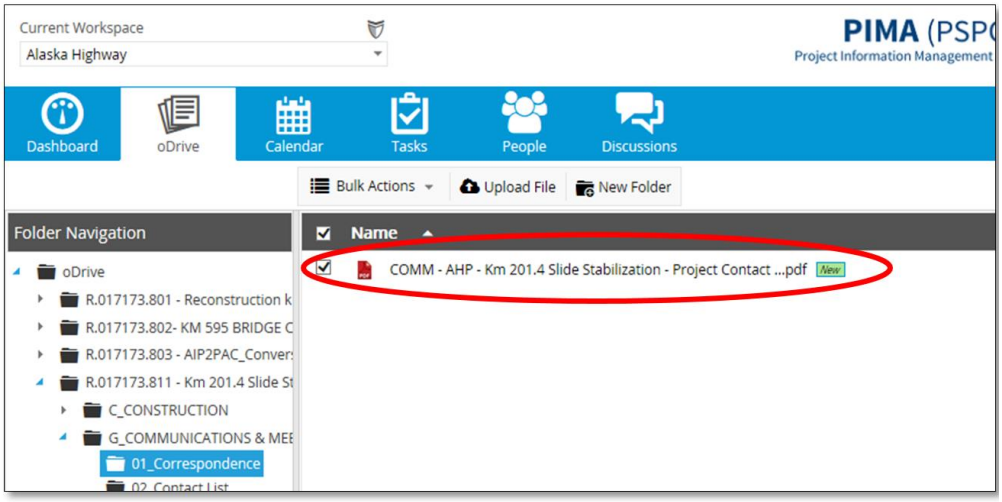


Drag and drop your document(s), then press Save.

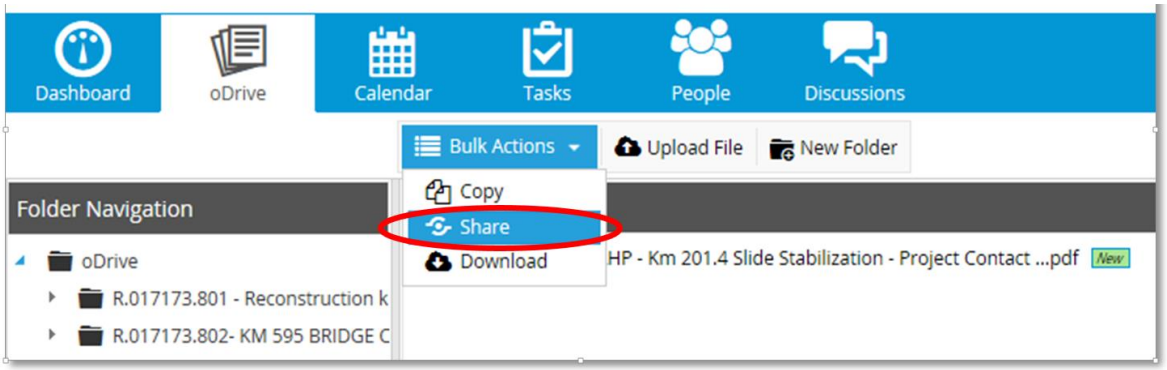
NOTE: Make sure you have named your document correctly, as explained in Section 2.2 CentralCollab File Naming Convention.



Once saved, you will see your new document (circled below), but no one else will be notified until you share it.

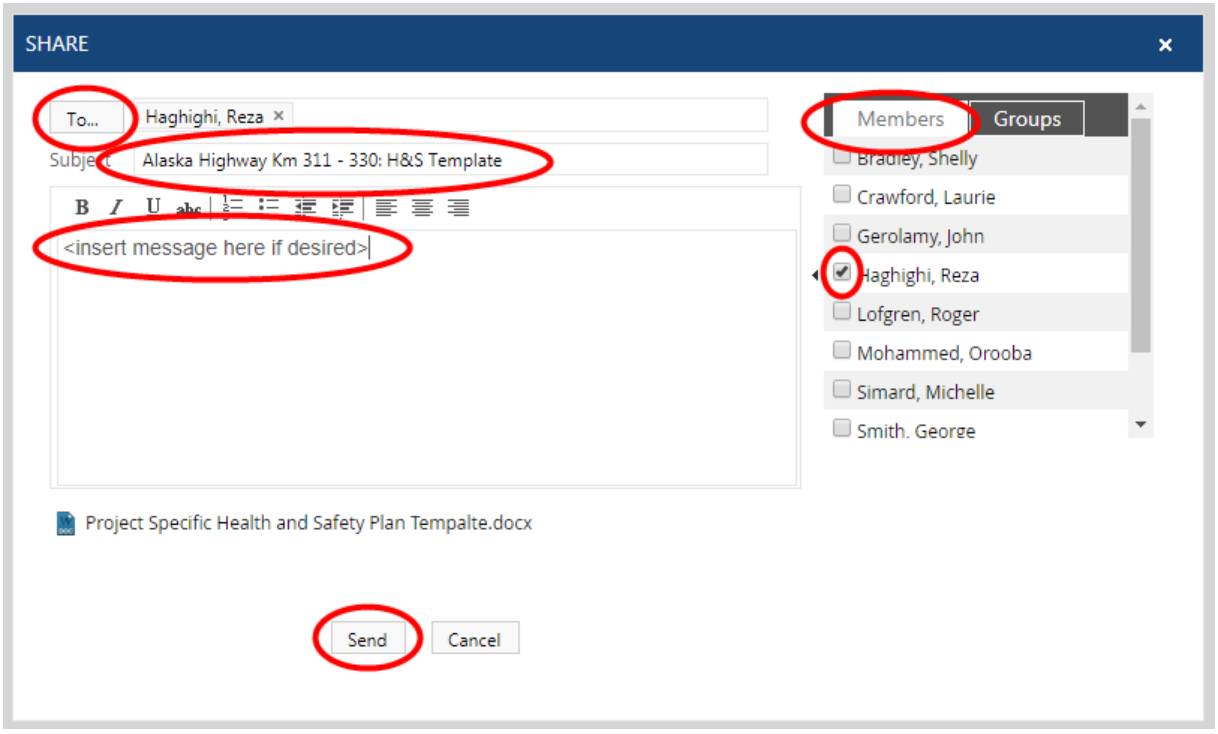


To **notify members** of the new document, check the box next to the document √ then click **Bulk Actions > Share**:

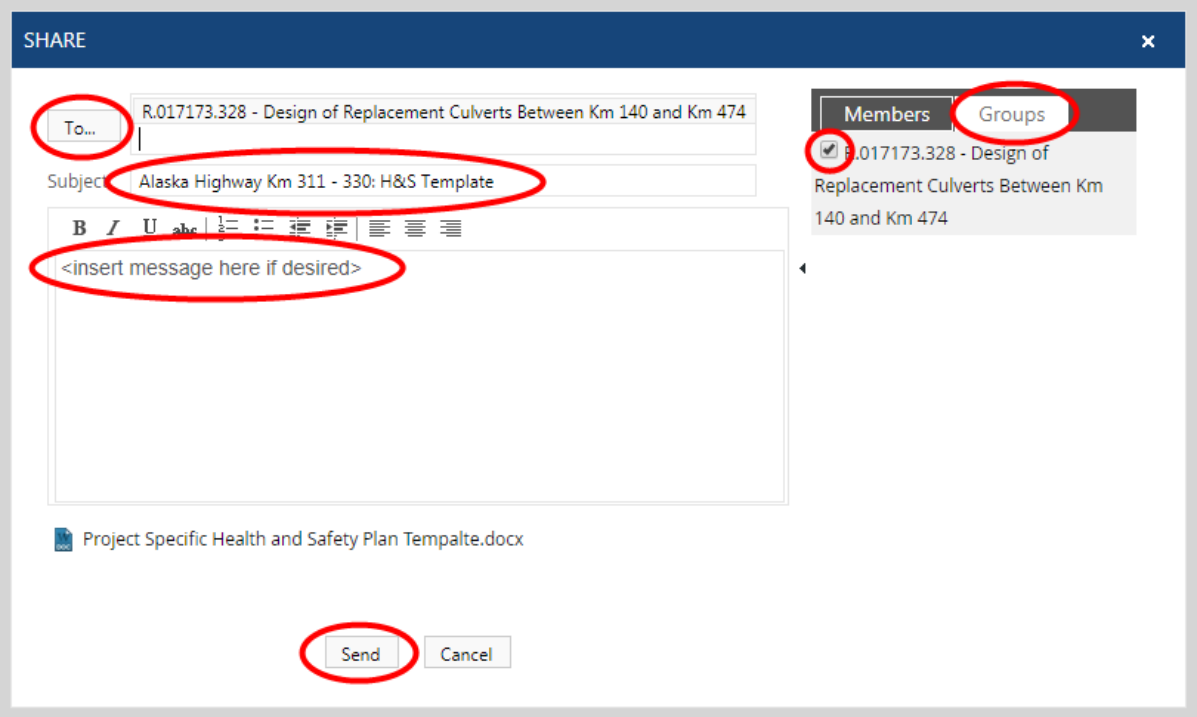


Once the new window opens, select **To,** and then select the **Members** tab and all Members from whom you wish to notify (as directed during the pre-constriction meeting or otherwise by PSPC) or select the **Groups** tab and select the pre-set group:

Example – Notification Members:


SHARE
To...
Haghighi, Reza
Subject
Alaska Highway Km 311 - 330: H&S Template
<insert message here if desired>
Members
Groups
Bradley, Shelly
Crawford, Laurie
Gerolamy, John
Haghighi, Reza
Lofgren, Roger
Mohammed, Orooba
Simard, Michelle
Smith, George
Project Specific Health and Safety Plan Tempalte.docx
Send
Cancel

Example – Notification Pre-set Group (if available):



Insert a message related to the uploaded submittal in the subject line and if desired in the form before sending. Then press **Send**. An email with the link to the document will then provide to all individuals notified with a copy of this email provided to the sender.

2. CentralCollab File Naming Convention:

All CentralCollab users shall upload files named according to the following convention:

Doc Type – AHP – Km 450.0 – 451.4 Slide Stabilization and Safety Improvements – File Description or Document Name – YYYY MM DD

Example file names:

- Plan – AHP – Km 450.0 – 451.4 Slide Stabilization and Safety Improvements – Quality Management Plan – 2021 02 15
- Schedule – AHP – Km 450.0 – 451.4 Slide Stabilization and Safety Improvements – Project Schedule – 2021 02 20
- Finance – AHP – Km 450.0 – 451.4 Project – Progress Payment 01 – 2021 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.115165.001 – Km 450.0 – 451.4 Slide Stabilization and Safety Improvements > 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 PSPC
04_Site Instructions	Site Instructions (typically generated by PSPC)

Table 2: Common Document Filing / Folder Locations	
Folder Names	**Description of Typical Documents**
05_CCN	Contemplated Change Notice forms generated by PSPC and pricing responses from Contractor
06_Change Orders	Change Orders (typically generated by PSPC)
07_Progress Payments	Progress Payment documents (as instructed by PSPC)
08_Field Reviews	Field Review forms (typically generated by PSPC)
09_Health & Safety	Health and Safety related documentation including Project Specific 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 PSPC)
16_Certificate of Substantial Performance	Certificate of Substantial Performance as generated by PSPC
17_Certificate of Completion	Certificate of Completion as generated by PSPC
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 PSPC.
21_Quality Management	Quality control and Quality Assurance documentation generated by the Contractor and PSPC • Quality Management Plan • Check Sheets

Table 2: Common Document Filing / Folder Locations	
Folder Names	**Description of Typical Documents**
	• Daily Reports • NCR's
CentralCollab folder: R.115165.001 – Km 450.0 – 451.4 Slide Stabilization and Safety Improvements > G_COMMUNICATIONS & MEETINGS >	
01_Correspondence	Emails and other correspondence requiring posting to CentralCollab, generated by the Contractor or PSPC
02_Contact List	Project contact list generated by PSPC
03_ATIP	
04_Communications Plan	Communication plan generated by PSPC
05_Supporting Documents	
06_Meeting Minutes	Meeting minutes as generated by PSPC
07_Inquiries	
08_Public Notices	
09_Other	
CentralCollab folder: R.115165.001 – Km 450.0 – 451.4 Slide Stabilization and Safety Improvements > Z_BASE DATA>	
01_Base Data	Digital drawings and other documentation required by the Contractor (typically generated by PSPC)

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**

R.115165.001
Appendix B

Project Specific Health and Safety Plan Template

<insert company logo/information>

PROJECT SPECIFIC HEALTH AND SAFETY PLAN

<Name of Project>
<PROJECT No.>

<Date>

<Rev. Number>

Prepared for:

Public Services and Procurement Canada
Services publics et Approvisionnement Canada

The Contractor shall ensure that this document is available on site for the project duration and available to all workers.

<This template is provided to aid the Contractor in preparing their project specific health and safety plan according to the contract requirements. It is the responsibility of the Contractor to ensure that all required information is presented in their project specific health and safety plan to meet the requirements of the project specifications and WorkSafeBC's health and safety obligations. The Contractor shall review all aspects of this template and make changes and additions as needed to suit the project requirements.>

Table of Contents

Appendix 6: Incident/Accident Report Template

Appendix 7: Key Member Resumes and Safety Certifications

Appendix 8: Local Hospital Maps

Appendix 9: Safe Work Procedures

1. Contractor Safety Policy / Statement

<A statement about the Contracting companies' policy regarding health and safety on the project site.>

2. Project Health and Safety Compliance Obligations

The submission of the Project Specific Health and Safety Plan indicates <*Contracting Company Name*> commitment to comply with all health and safety related obligations from the following:

- All procedures, rules and policies from this Project Specific Health and Safety Plan
- WorkSafeBC Requirements
- Project Specifications
- *<Other, add any other requirements that apply>*

3. Definition of Responsibilities

<A clear description of the health and safety related responsibilities for key members of the Contractor's project team. The table below is provided to assist with presenting this information.>

Position	Name(s)	Description of Health and Safety Responsibilities
Project Manager		
Project Superintendent		
Health and Safety Coordinator		
First Aid Attendant(s)		
Supervisors		
Workers		
Sub-Contractors		

4. General Project Safety Rules

<*A list of general construction safety rules and regulations that the company will adhere to. Additionally, a description of the disciplinary action procedure for disregard or negligence of the provide rules.****>***

5. Health and Safety Risks / Hazards and Engineering and Administrative Control Measures

5.1 Workplace Hazard Assessment – Health and Safety Risks Identified

<Summary of health risks and safety hazards resulting from hazard assessment analysis of the circumstances of each "workplace" including:

- *The number of workers who may require first aid at any time;*
- *The nature and extent of the risks and hazards in the workplace;*
- *The types of injuries likely to occur;*
- *Any barriers to first aid being provided to an injured worker or member of the public; and*
- *The time that may be required to obtain transportation and to transport an injured worker to medical treatment>*

<Statement from the Contractor indicating the hazard rating assignment (low, moderate, or high) for each "workplace" as defined by WorkSafeBC and applicable to the application of G3.16 of WorkSafeBC Occupational Health and Safety Regulations>

<The table below can be used as a template for the format of this section. Three workplaces are shown as an example, but the Contractor may extend or trim the table as applicable to the proposed work in the Contract.>

	Workplace 1
Number of Workers	
Risks / Hazards Descriptions	
Type of Injuries	
Barriers to First Aid	
Time to Obtain Transport	
WorkSafeBC Hazard Rating Assessment	*Low, Medium or High*
	Workplace 2
Number of Workers	
Risks / Hazards Descriptions	
Type of Injuries	
Barriers to First Aid	
Time to Obtain Transport	
WorkSafeBC Hazard Rating Assessment	*Low, Medium or High*
	Workplace 3
Number of Workers	
Risks / Hazards Descriptions	
Type of Injuries	
Barriers to First Aid	
Time to Obtain Transport	
WorkSafeBC Hazard Rating Assessment	*Low, Medium or High*

<WorkSafeBC Hazard Assessment Rating: The following links to the specific sections of the WorkSafeBC OHS regulations will assist in determining the Hazard Rating Assessment for each workplace.

https://www.worksafebc.com/en/law-policy/occupational-health-safety/searchable-ohs-regulation/ohs-guidelines/guidelines-part-03#SectionNumber:G3.16

https://www.worksafebc.com/en/law-policy/occupational-health-safety/searchable-ohs-regulation/ohs-regulation/part-03-rights-and-responsibilities#Schedule3A
>

5.2 Hazards Materials

<List of hazardous materials to be brought onsite as required by the work>

5.3 Job Specific Safe Work Procedures

<Review your company safe work procedures to ensure that there are procedures for all tasks relevant to the project. In the case that your company does not have an existing safe work procedure for a specific task please provide this procedure in Appendix 8.>

All job specific safe work procedures are available in <*Contracting Company Name*> corporate Health and Safety Plan and are available to all employees on site and the PSPC team upon request. Procedures that are not available in <Contracting Company Name> corporate Health and Safety Plan can be found in Appendix 8. *<remove last sentence if not required>.*

5.4 Required PPE and Training

<Identification of the PPE and description of the training required for any members of the contractor's project team and PSPC's team visiting the site.>

5.5 First Aid Requirements

<Identification of the First Aid Requirements for each "workplace" in compliance with WorkSafeBC and project requirements as follows:

.1 Estimated travel time from the "workplace" to the nearest hospital.

.2 Maximum numbers of workers at any time per "workplace".

.3 The first aid supplies, equipment, and facilities which will be available at each "workplace".

.4 The first aid attendant certificate level onsite at each "workplace".

.5 The first aid transportation which will be used on the project (i.e. ETV), if required by Contractor or WorkSafeBC requirements. Details of were the ETV will be located / parked relative to the locations of the first aid attendant(s) during the work.>

6. Inspection Policy and Procedures

<*A description of the site inspection policy and procedure. The procedure should include identification of investigator, completion of a site inspection form and how the findings of the inspection will be presented to the remainder of the construction team.***>**

7. Incident Reporting and Investigation Policy

<*A description of the procedure completed following an incident occurring on site. The procedure should include the completion of an incident/accident report (template to be provided by the contractor in Appendix 5)***>**

8. Occupational Health and Safety

8.1 Representative/Committee Procedures

<*A description of the procedures that will be completed regularly throughout the project to keep the project site safe for all contractor's personnel, travelling public and PSPC's project team members.>*

8.2 Meetings

<*A description of the health and safety meetings that will be completed throughout the project. This section could include the frequency of meetings and the agenda that will be followed.***>**

8.3 Communications and Record Keeping Policies

<*A description of the policies related to health and safety communications and record keeping. This needs to include a description of the files that will be kept and how communication regarding health and safety will proceed with the entire project team, including the owner's team, the prime contractor's team and all sub-contractors.****>***

9. Emergency Contact Information

9.1 Key Project Contact Numbers

Contractor's Team			
Name and Position	**Office Number**	**Cell Phone Number**	**Sat Phone (If Used)**
Project Superintendent			
Health and Safety Coordinator			
First Aid Attendant(s)			
Key Sub-Contractor Representatives			
PSPC Team			
Name and Position	**Office Number**	**Cell Phone Number**	**Satellite Phone**
George Smith – Contract Asset Performance Manager, Alaska Highway	250.774.6956	250.321.0174	600.700.0131
XXX – Onsite Inspection and QA Representative			

9.2 Emergency Response Agencies/Assistance

<Note: The contractor is responsible for verifying that all the numbers listed below are correct and up to date and that all required numbers are presented. Please remove any emergency numbers that are not in the project vicinity. ***911*** *is not available in the Fort Nelson Northern Rockies Regional Municipality. Contractor shall confirm if* ***911*** *is available in the project location. If not available in project location, make note in table as not available at project site>*

Agency/Assistance	**Contact**
RCMP	911
Local Police – Fort Nelson (emergency)	250.774.2777
Local Police – Fort Nelson (non-emergency)	250.774.2700
Local Police – Fort St. John (emergency)	250.787.8100
Local Police – Fort St. John (non-emergency)	250.787.8140
Local Police – Watson Lake (emergency)	867.536.5555

Local Police – Watson Lake (non-emergency)	867.536.2677
BC Ambulance (BC Emergency Health Services)	911 / 1.800.461.9911 / 250.374.5937
Ambulance – Fort Nelson	250.774.2344
Ambulance – Fort St. John	250.785.5559
Ambulance – Watson Lake	867.536.4444
S.T.A.R.S Ambulance	1.888.888.4567
Hospitals	
Local Hospital – Fort Nelson	250.774.8100
Local Hospital – Fort St. John	250.262.5200
Local Hospital – Watson Lake	867.536.4444
Fire and Rescue	911
Fire and Rescue – Fort St. John	250.785.4333
Fire and Rescue – Fort Nelson (emergency)	250.774.2222
Fire and Rescue – Fort Nelson (non-emergency)	250.774.3955
Fire and Rescue – Watson Lake (emergency)	867.536.2222
Fire and Rescue – Watson Lake (non-emergency)	867.536.8008
BC Forest Fire Reporting	1.800.663.5555 / *5555 (Cell)
Yukon Forest Fire Reporting	1.888.798.3473
WorkSafeBC Work Site Emergency 24 hr.	1.888.621.7233
WorkSafeBC Regional Office	1.800.663.4630 / 250.785.1283
HazMat 24 hr.	1.800.663.3456
BC Environmental - PEP 24 hr.	1.800.663.3456
BC Environmental Regional Office	250.787.3411
BC Hydro – Power (emergency) 24 hr.	911
BC Hydro – Power (non-emergency)	1.800.224.9376
Fortis BC – Natural Gas Emergencies 24 hr.	1.800.663.9911
NorthwesTel – Corporate Office (Whitehorse)	867.668.5300
BC One Call	1.800.474.6886 / *6868 (Cell)
Poison Control	1.800.567.8911 / *311 (Cell)
Commercial Vehicle Inspection and Standards (CVSE)	
Reporting Safety Violations 24 hr.	1.888.775.8785
Peace River Regional Office	250.784.2363

10. Wildlife Management

<Identify any training and processes for project members regarding wildlife encounters and prevention.>

11. Fire Safety, Reporting and Evacuation

<Identify any fire safety policies, project specific reporting and evacuation procedures.>

12. Contractor's Team Review and Acceptance

This document has been prepared through discussions with the Contractor's entire project team <*including sub-contractors (if applicable)*>, and will be enforced by the contractor for the duration of the project. By signing this document, the signee confirms that they have reviewed the document and agree with its contents.

Project Manager

Name	Signature	Date

Site Superintendent

Name	Signature	Date

Health and Safety Manager

Name	Signature	Date

Quality Control Manager

Name	Signature	Date

<*Major Sub-Contractor Representatives*>

Name	Signature	Date

<*Major Sub-Contractor Representatives*>

Name	Signature	Date

Appendix 1: Preliminary Hazard Assessment Form

PRELIMINARY HAZARD ASSESSMENT FORM

Project Number:	**R.115165.001**
Location:	**KM 450.0 – KM 451.4 of the Alaska Highway, BC**
Date:	
Name of Departmental Representative:	
Name of Client:	Public Services and Procurement Canada
Name of Client Project Co-ordinator	George Smith PH: 250.774.6956

Site Specific Orientation Provided at Project Location **Yes** ☐ **No** ☐

Notice of Project Required **Yes** ☐ **No** ☐

NOTE:
PSPC 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 PSPC 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. PSPC 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.	**PSPC, 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)					
Slip Hazards or Unsound Footing					
Working at Heights					
Working Over or Around Water					
Heavy overhead lifting operations, mobile cranes etc.					
Marine and/or Vehicular Traffic (site vehicles, public vehicles, etc.					

Fire and Explosion Hazards					
High Noise Levels					
Excavations					
Blasting					
Construction Equipment					
Pedestrian Traffic (site personnel, tenants, visitors, public)					
Multiple Employer Worksite					Example: Contractor working in an occupied Federal Employee space.

Electrical Hazards					**Comments**
Contact With Overhead Wires					
Live Electrical Systems or Equipment					
Other:					
Physical Hazards					
Equipment Slippage Due To Slopes/Ground Conditions					
Earthquake					
Tsunami					
Avalanche					
Forest Fires					
Fire and Explosion Hazards					
Working in Isolation					
Working Alone					
Violence in the Workplace					
High Noise Levels					
Inclement weather					
High Pressure Systems					
Other:					
Hazardous Work Environments					
Confined Spaces / Restricted Spaces					Review and provide confined space assessment(s) from PSPC or client confined space inventories. Refer to PSPC Standard on Entry into Confined Spaces. Contact the Regional Construction Safety Coordinator.
Suspended / Mobile Work Platforms					
Other:					
Biological Hazards					
Mould Proliferations					
Accumulation of Bird or Bat Guano					
Bacteria / Legionella in Cooling Towers / Process Water					
Rodent / Insect Infestation					
Poisonous Plants					
Sharp or Potentially Infectious Objects in Wastes					
Wildlife					
Chemical Hazards					

Asbestos Materials on Site					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					If “yes” a pre-project designated substance survey report is required.
Chemicals Used in work					
Lead in paint					If “yes” a pre-project lead survey report is required.
Mercury in Thermostats or Switches					If “yes” a pre-project mercury survey report is required.
Application of Chemicals or Pesticides					
PCB Liquids in Electrical Equipment					
Radioactive Materials in Equipment					
Other:					
Contaminated Sites Hazards					
Hazardous Waste					
Hydrocarbons					
Metals					
Other:					

Security Hazards					**Comments**
Risk of Assault					
Other:					
Other Hazards					

Other Compliance and Permit Requirements[1]	**YES**	**NO**	**Notes / Comments[2]**
Is a Building Permit required?			
Is an Electrical permit required?			
Is a Plumbing Permit required?			
Is a Sewage Permit required?			
Is a Dumping Permit required?			
Is a Hot Work Permit required?			
Is a Permit to Work required?			Mandatory for ALL AFD managed work sites.
Is a Confined Space Entry Permit required?			Mandatory
Is a Confined Space Entry Log required			Mandatory for all Confined Spaces
Discharge Approval for treated water required			

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 PSPC DEPARTMENTAL REPRESENTATIVE PRIOR TO ANY WORK COMMENCING			

Appendix 2: Confirmation of Prime Contractor's Main Responsibilities Under WorkSafeBC Occupational Health and Safety Regulations and Worker's Compensation Act Form

Public Services and Procurement Canada | Services publics et Approvisionnement Canada

Confirmation of Prime Contractor's Main Responsibilities Under the WorkSafeBC Occupational Health and Safety Regulations and *Worker's Compensation Act*

Name of Project: ___ Km 450.0 – 451.4 Slide Stabilization and Safety Improvements _____

Owner: Public Services and Procurement 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 PSPC 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

Appendix 3: Contractor's COVID-19 Safe Work Plan

<provided by the Contractor>

Appendix 4: Contractor Daily Toolbox Meeting Form

<provided by the Contractor>

Appendix 5: Site Safety Orientation Form

<provided by the Contractor>

Appendix 6: Incident/Accident Report Template

<*provided by the Contractor*>

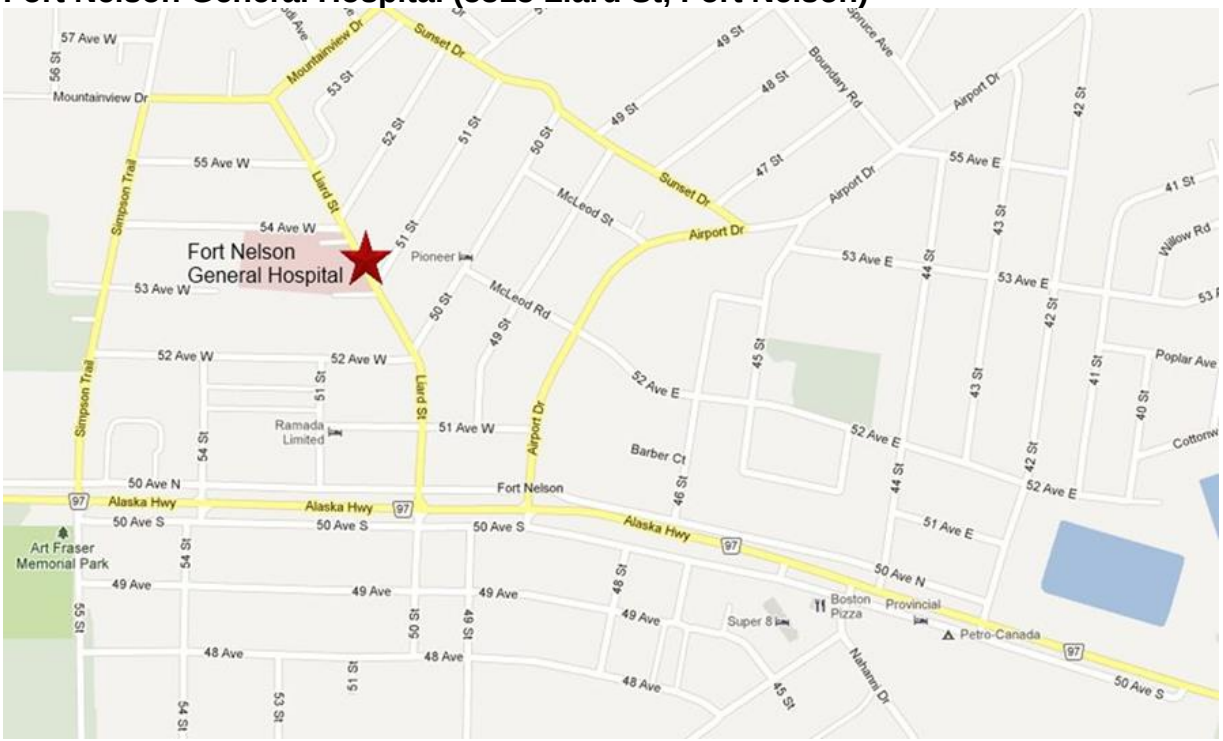
Appendix 7: Key Member Resumes and Safety Certifications

<*provided by the Contractor*>

Appendix 8: Local Hospital Maps

<remove unnecessary maps>

Fort Nelson General Hospital (5315 Liard St, Fort Nelson)



Directions

<If Project Site South of Fort Nelson>

<Head Northbound on the Alaska Highway

Turn Right onto Liard St.>

<If Project Site North of Fort Nelson>

<Head Southbound on the Alaska Highway

Turn Left onto Liard St.>

Appendix 9: Safe Work Procedures <*if required*>

R.115165.001
Appendix C

Category 2
Traffic Management Plan Template

<insert company logo/information>

Category 2
Traffic Management Plan

Km 450.0 – 451.4 Slide Stabilization and Safety Improvements, Alaska Highway, BC
R.115165.001

<Date>

Rev. *<Number>*

Prepared for:

Public Services and Procurement Canada | Services publics et Approvisionnement Canada

The Contractor shall ensure that this document is available on site to all workers for the project duration.

<This template is provided to aid the Contractor in preparing their traffic management plan according to the contract requirements. It is the responsibility of the Contractor to ensure that all required information is presented in their traffic management plan to meet the requirements of the project specifications and British Columbia Ministry of Transportation and Infrastructure's Traffic Management Manual for Work on Roadways – 2020 Edition. The Contractor shall review all aspects of this template and make changes and additions as needed to suit the project requirements.>

Table of Contents

1. Category Definition

Based on the steps outlined in Section 3.2: Project Category Determination in BC MoTI's Traffic Management Manual for Work on Roadways (2020 Edition), the <Project Name> Project calls for at Category <#> Traffic Management Plan.

A Category <#> Traffic Management Plan is characterized by:

-
-
-
-

<Add as many points as deemed required for the project>

A Category <#> Traffic Management Plan consists of:

-
-
-
-

<Add as many points as deemed required for the project>

The aim of the Category <#> Traffic Management Plan is to minimize the site-specific risks that were identified for the project.

2. Traffic Control Plan

See also Appendix A: Traffic Control Plan Drawings in this Traffic Management Plan for the proposed layouts of the traffic control devices for the project. A list of the drawings is provided in Section 2.4 Drawing List.

Plan Date	*<Date when plan was initiated.>*
Latest Revision	*<Date of latest revision.>*
Site Name	*<Name of project.>*
Plan Developed By	*<Name of person who developed the plan.>*
Exact location, direction, and distance to nearest landmarks	*<Highway number and name of location, etc.>*
Project Supervisor	*<Name of Project Supervisor.>*
Prime Contractor	*<Name of Prime Contractor.>*
Traffic Control Manager	*<Name of Traffic Control Manager (if applicable).>*
Traffic Engineer	*<Name of Traffic Engineer (if applicable).>*
Traffic Control Supervisor	*<Name of Traffic Control Supervisor and company.>*
Traffic Control Persons	*<Names of TCPs and company.>*
Project Start Date	*<Date>*
Project Completion Date	*<Date>*

2.1 Traffic Control Provisions

Traffic Control Supervisor	<*Name of Traffic Control Supervisor and company.*>
Traffic Control Persons	<*Name of TCPs and company.*> Automated Flagger Assistance Devices will not be used on the project.
Off-Hours Traffic Control	<*Types of traffic control devices.*>
Illumination	Traffic Control Persons (TCPs) will be used during non-daylight hours (before sunrise after sunset). Details of the overhead lighting to be used at each TCP location are included in <*Report Section/Appendix*>. Details shown include the location, direction, height, brightness, and use of shields on the lights to suitably illuminate the TCP but not obstruct the visibility of drivers approaching the TCP.
Means of Communication	<*How will TCPs communicate?*>
Signage	<*Are signs installed for short-duration or long-duration work?*> <*Are the signs spaced in accordance with posted speed?*> <*Are details provided for 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 Traffic Management Manual for Work on Roadways – 2020 Edition for further details. At a minimum, the text and figures included in Subsection 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.*> <*Are graphical representation of the sign supports planned for use on the project shown; including Post Mounted Supports found in Figure 01 35 00 – 01 and or the Wind Resistant Sign Stand found in Figure 01 35 00 – 02 (both shown below)?*> All sign supports shall either be a post mounted support per the requirements of Figure 01 or Wind Resistance Sign Stand per the requirements of Figure 02.

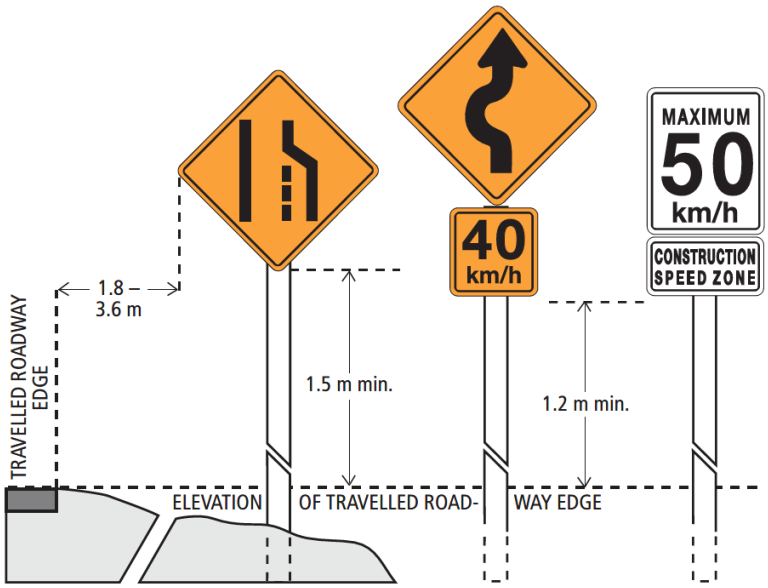


Figure 01: Post Mounted Supports

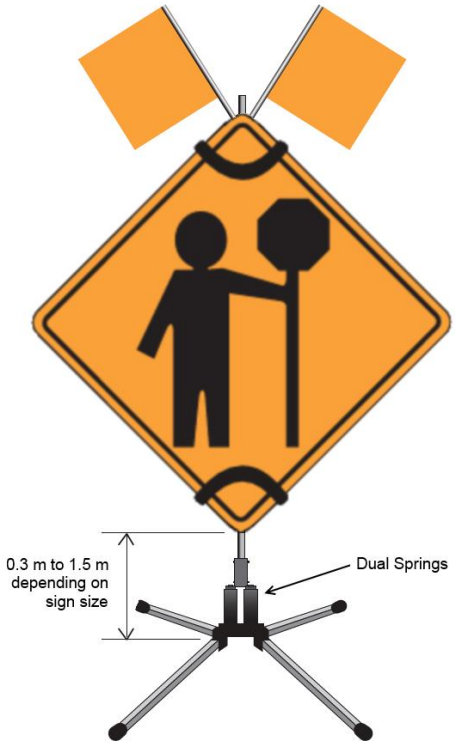


Figure 02: Wind Resistant Sign Stand

Flags will be used on the following signs:

.1 Traffic Control Person Ahead (C-001-1).
.2 Survey Crew Ahead (C-003).
.3 Crew Working Ahead (C-004).

	.4 Accident Scene (C-058). Unless pre-approved by the Departmental Representative, one or more sand bags or weights will be in used at all times to further stabilize all Wind Resistance Sign Stands. Where an option for a sign size is available, the sign size used will be the larger dimension sign as listed in Appendix B.2: Sizes and Applications of Individual Signs of the BC Ministry of Transportation and Infrastructure Traffic Management Manual for Work on Roadways – 2020 Edition. Signs will be positioned so that they do not block the sight lines of drivers entering a roadway from side roads or other access points.
Portable Dynamic Message Signs (DMS)	<*Are DMS required? Where will they be located?*> Two (2) portable dynamic message signs (DMS) will be used for the duration of the work. The DMS will have a minimum of 3 lines with 8 characters per line (minimum 450 mm character size) A portable dynamic message sign (DMS) will be used in the location identified in 7.2 Typical Construction Speed Zone Signing – Two-Lane, Two-way Roadway (Subsection 3.2 Traffic Management, Item 3.2.1.5.3 of the contract specification). A list of DMS messages which will be displayed on the DMS throughout the project is shown in Appendix D. Messages that will be used on the DMS are per Section 4 – Temporary Traffic Control Devices (Table 4.5 and Table 4.2) of the BC Ministry of Transportation and Infrastructure Traffic Management Manual for Work on Roadways – 2020 Edition plus other messages anticipated to be required on the project.
PSPC Permanent Variable Message Signs	PSPC will assist <*Name of Contractor*> with the Public Information Plan by notifying DriveBC of the work and posting notice of the project on PSPC's permanent variable message signs along the highway. <*Name of Contractor*> will inform PSPC a minimum 7 days in advance of any scheduled work to be posted. All other requirements of the Public Information Plan (Section 3.2.3 of the BC Ministry of Transportation and Infrastructure Traffic Management Manual for Work on Roadways – 2020 Edition has been included in the Traffic Management Plan and will be undertaken / implemented <*Name of Contractor*> prior to commencing work.
Intersections affected by work zone or traffic control devices	<*Are intersections affected by the work zone or traffic control devices?*> <*If so, how will the intersections be controlled?*> <*Will additional traffic control devices be required?*>

Flexible Drums	<*Will flexible drums be used to delineate lane drops?*> <*Will they be used to identify construction accesses to the work activity area?*> 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 Traffic Management Manual for Work on Roadways – 2020 Edition, 100 cm tubular markers will be used.
Traffic Stoppages	<*Are there any anticipated traffic stoppages?*> <*If so, for how long?*> <*Will there be single lane alternating traffic?*>
Layout of Devices	<*Identify spacing between traffic control devices.*>
Emergency Vehicles	<*Will emergency vehicles have clear, unobstructed access to the site.*> <*What procedures will be in place to ensure that emergency vehicles are able to access the site without delay?*>
Pilot Cars	Pilot cars will not be used when the length of the single lane alternating traffic does not exceed 300 m. The traffic control signage layout used in conjunction with pilot cars will include the Prepare to Stop (C-029) sign (sign spacing shall be adjusted to suit). During non-work hours temporary traffic signals, controlled by the Pilot Car Driver may be used to replace the traffic control persons. If this traffic control arrangement is used, the traffic control signage layout plan will be revised to include applicable signage from 7.10 Lane Closure with Temporary Signals – Single Lane Alternating Traffic – Short and Long Duration and submitted as part of the Traffic Management Plan. .4 The traffic control signage layout shall include the Men Working (C-004) sign in advance of the Construction Ahead (C-018-1A) sign. The spacing shall be per applicable Construction Sign Spacing (Dimension A as defined in Table B of Section 7 of the BC Ministry of Transportation and Infrastructure Traffic Management Manual for Work on Roadways – 2020 Edition) for the applicable speed (adjust all other sign spacing as required).

Drop-offs	Drop-off's are defined as an abrupt change in elevation created by construction activity such as milling, paving, or excavation that is steeper than 3H:1V. Drop-off's will be treated in accordance with Section 6.5 of the BC Ministry of Transportation and Infrastructure Traffic Management Manual for Work on Roadways – 2020 Edition whenever the drop-off is within 1.5 m of the edge of the travel lane. Additionally, drop-offs ≥ 150 mm between 1.5 m and 3.0 m of the travel lane will be signed with Low Shoulder (C-013) signs at least once every 1 kilometer for as long as the condition persists.

2.2 Work Activity Specific Risk Assessment and Traffic Plan

<A separate table and traffic control plan drawing (Table in Section 2.4 and drawings in Appendix A) is required for each unique element of work. Example elements of work are to include but are not limited to unloading of equipment, paving, line painting, rumble strip installation, excavation on highway, excavation off highway, culvert installation, etc. The Contractor is to add additional tables as necessary.>

Work Activity	*<Type of work: stationary, slow-moving, emergency, brief, short-duration, or long-duration work?>*
Station / Location	
Traffic Control Drawing	Appendix A – Drawing *<Drawing number of associated traffic control set-up>*
Identified Risks	*<What potential risks associated with the work have been identified?>*
Work On/Off Roadway	*<Is the work on or off the roadway?>*
Site Access/Egress	*<How will equipment access and exit from the site?>*
Intersections affected by work zone or traffic control devices	
Delays, Closures, Diversions, and Detours	*<Will delays, closures, diversions, and/or detours be in place?>* *<If so, illustrate in Appendix B: Detour Traffic Control Plan Drawing.>* *<What is the design speed for the detour?>* *<Can it withstand the traffic that will be using the road?>* *<For what duration will these be in place?>*
Hours of Work	*<The hours during which the work will occur.>* *<The time period during which the work will affect traffic.>*
Dump Site	*<Location of dump site and access/exit requirements.>*
Construction Equipment	*<How will construction equipment be protected during working hours? During off-hours?>*

2.3 Drawing List

Below is a table summarizing the of drawing(s) showing the applicable traffic accommodation strategies which will be used during specific elements of the work.

<Include a table or list of each element of work on the project and the applicable traffic accommodation strategies and layout drawing(s) which will be used during that element of work throughout all project locations. The table or list of each element of work on the project shall also include the applicable traffic accommodation strategies and layout drawing(s) to be used during non-work hours.>

Traffic Control Drawing(s)	**Corresponding Tender Drawing(s)**	**Project Location(s)**	**Construction Element(s)**
<Drawing No.>	*<Drawing No.>*	*<Station Range, ex.283+360 to 308+905>*	*<ex. ACP Placement, Rest Stop, Culvert Installation, etc.>*

3. Incident Management Plan

The Incident Management Plan defines processes for responding to unplanned events or traffic incidents in the work zone so that incident response operations within the work site are managed effectively.

The Incident Management Plan requirements are partially determined by the project category (see Section 3.2: Traffic Management Plan Sub-Plans and Section 3.4: Traffic Management Plan Requirements by Category in the **Traffic Management Manual for Work on Roadways).**

Traffic Control Supervisor and Qualifications	<*Name and qualifications.*>
Traffic Control Manager and Qualifications	<*Name and qualifications.*>
Emergency Response Agencies and Contact Information	<*Name and contact information (may be listed in Section 6: Contact List).*>
Types of traffic incident that could occur within work zone	<*Motor vehicle incident, motor vehicle incident with injuries, vehicle stalls, emergency vehicle transit of work zone, dangerous goods incident, wide load passing, etc.*>
Procedures for responding to traffic incident that occurs within work zone	<*Will there be a radio announcement?*> <*Who will evaluate the incident?*> <*Who will call 911?*> <*Will traffic be stopped, or will there be single lane alternating traffic?*> <*Who will assist the emergency responders through the site, and how?*> <*Who will assist if it is necessary to clear vehicles, and how?*>
Procedures to restore traffic flow around incident site as quickly as possible	<*How will traffic movement be restored?*> <*Will traffic control devices be used?*> <*If so, how?*>
Procedures to clear incident and restore normal project traffic	<*How will the incident be cleared to restore traffic movement?*> <*How many TCPs are required?*>

operations as soon as possible	
Procedure to inform and update PSPC regarding incident in work zone	*<What is the procedure for advising the PSPC that an incident occurred, what response measures are being taken, what clearance measures are required, and what the estimated clearance time will be?>*
Procedure to inform travelling public of estimated duration of delay and alternative routes (if applicable)	*<Will DMS be used to display information?>*
Incident Reporting	*<Who will provide details to the PSPC?>* *<What is the process for incident follow-up?>*
Investigation Process	*<Who will lead the incident investigation?>* *<What investigation process will be used to assess the incident and those involved?>*
Review and Continuous Improvement Process	*<How incidents will be reviewed and followed up to reduce the severity and frequency of future incidents?>*

4. Public Information Plan

The Public Information Plan identifies actions and procedures for informing the travelling public, project stakeholders, and the PSPC of current traffic operations and planned changes to traffic operations.

PSPC will assist the Contractor with the Public Information Plan by notifying DriveBC of the work and posting notice of the project on PSPC's permanent variable message signs along the highway. All other requirements of the Public Information Plan (Section 3.2: Traffic Management Plan Sub-Plans and Section 3.4: Traffic Management Plan Requirements by Category in the BC Ministry of Transportation and Infrastructure Traffic Management Manual for Work on Roadways – 2020 Edition) shall be included in the Traffic Management Plan and by undertaken / implemented by the Contractor prior to commencing work.

Process for routinely notifying PSPC of changes to scheduled work plans	<*Who will be responsible for the changes?*> <*What is the person's title?*>
Process for notifying travelling public of scheduled traffic delays and project duration	<*Identify the forms of communication to be used [radio, project signs, Permanent Dynamic Message Signs), Portable Dynamic Message Signs, public meetings, etc.].*>
Process for notifying travelling public of unscheduled traffic delays	<*Identify the forms of communication to be used [project signs, Permanent Dynamic Message Signs, Portable Dynamic Message Signs, public meetings, etc.].*>
Major user groups for alternating lane closures or road closures	<*Identify the major user groups (BC Trucking Association, BC Transit, emergency response agencies, school districts, etc.).*

5. Implementation Plan

The Implementation Plan identifies responsibilities and procedures for ensuring that traffic management sub-plans are developed and implemented in a coordinated manner.

It identifies the qualifications, responsibilities, and duties of supervisory and management personnel responsible for implementing the Traffic Management Plan and includes the designation of a Traffic Control Manager and a Traffic Control Supervisor.

See also Section 3.2: Traffic Management Plan Sub-Plans and Section 3.4: Traffic Management Plan Requirements by Category in the Traffic Management Manual for Work on Roadways.

Traffic Control Manager and Responsibilities	*<Name, qualifications, responsibilities, and duties.>*
Traffic Control Supervisor and Responsibilities	*<Name, qualifications, responsibilities, and duties.>*
Person who will manage emergency traffic control operations	*<Name and title.>*
Person who will maintain daily traffic control logs	*<Name and title.>*
Person who will manage Incident Management Plan	*<Name and title.>*
Person who will manage Public Information Plan	*<Name and title.>*
Person who will monitor inactive work site	*<Name, title, and responsibilities.>*

6. Contact List

6.1 Emergency Response Agencies/Assistance

Agency/Assistance		Contact 1	Contact 2
RCMP		**911**	
Local Police – Fort Nelson (emergency)		250.774.2777	
Local Police – Fort Nelson (non-emergency)		250.774.2700	
Local Police – Fort St. John (emergency)		250.787.8100	
Local Police – Fort St. John (non-emergency)		250.787.8140	
Local Police – Watson Lake (emergency)		867.536.5555	
Local Police – Watson Lake (non-emergency)		867.536.2677	
BC Ambulance			
Ambulance – Fort Nelson		250.774.2344	
Ambulance – Fort St. John		250.785.5559	
Ambulance – Watson Lake		867.536.4444	
S.T.A.R.S Ambulance		1.888.888.4567	
Fire and Rescue			
Fire and Rescue – Fort St. John		250.785.4333	
Fire and Rescue – Fort Nelson (emergency)		250.774.2222	
Fire and Rescue – Fort Nelson (non-emergency)		250.774.3955	
Fire and Rescue – Watson Lake (emergency)		867.536.2222	
Fire and Rescue – Watson Lake (non-emergency)		867.536.8008	
BC Forest Fire Reporting		1.800.663.5555	*5555 (Cell)
Yukon Forest Fire Reporting		1.888.798.3473	
WorkSafeBC Work Site Emergency	**24 hr.**	1.888.621.7233	1.800.663.4630 250.785.1283 (Non-emergency)
HazMat	**24 hr.**	1.800.663.3456	
BC Environmental Provincial Emergency Program	**24 hr.**	1.800.663.3456	
BC Environmental Regional Office		250.787.3411	
BC Hydro – Power (Emergency)	**24 hr.**	911	1.800.224.9376 (Non-emergency)
Fortis BC – Natural Gas Emergencies	**24 hr.**	1.800.663.9911	
BC One Call		1.800.474.6886	*6868 (Cell)
NorthwesTel (Corporate Office Whitehorse)		1.867.668.5300	
Poison Control		1.800.567.8911	*311 (Cell)
Reporting Safety Violations	**24 hr.**	1.888.775.8785	
Peace River Regional Office		250.784.2363	
Provincial Emergency Program	**24 hr.**	**1.800.663.3456**	

(Ground Search & Rescue)		
Commercial Vehicle Inspection and Standards (CVSE)	1.888.775.8785	
Towing Company	<Contact #>	
Road Maintenance Contractor – White Bear Industries	250.635.3169	
Other		
Northern Rockies Regional Municipality	250.774.2541	
School District 60	250.262.6000	
School District 81	250.774.2591	
Media		
Peace Sun / 101.5 The Bear	250.787.0669 (Studio)	250.785.6334 (Reception)
1001. Moose FM	250.787.2222 (Control Room)	250.787.100 (Office)
Alaska Highway News	250.785.5631	

6.2 Prime Contactor's Contact Numbers

Name and Position	Office Number	Cell Phone Number
<*Name*>, Project Superintendent	<Contact #>	<Contact #>
<*Name*>, Health and Safety Coordinator	<Contact #>	<Contact #>
<*Name*>, First Aid Attendant(s)	<Contact #>	<Contact #>
<*Name*>, Traffic Control Supervisor	<Contact #>	<Contact #>
<*Name*>, Traffic Control Company	<Contact #>	<Contact #>
<*Name*>, Key Subcontractor Representatives	<Contact #>	<Contact #>

6.3 PSPC Contact Numbers

Name and Position	Office Number	Cell Phone Number
George Smith – Operations Manager, Alaska Highway	250.774.6956	250.321.0174 600.700.0131 (Satellite Phone)
<*Name*> – Onsite Inspection and QA Representative	<Contact #>	<Contact #>

Appendix A: Traffic Control Plan Drawings

Appendix A: Traffic Control Plan Drawings

Site Diagram
<Use additional pages as necessary>

<Show all site factors affecting traffic control, traffic control devices, spacing, signs (including sizes), explanatory notes, North arrow, etc.>

<Per section 6.3 of the BC Ministry of Transportation and Infrastructure Traffic Management Manual for Work on Roadways – 2020 Edition, traffic management shall be managed as one continuous work zone where the work is one kilometer apart or less.>

Appendix B: Detour Traffic Control Plan Drawings

Appendix B: Detour Traffic Control Plan Drawings

Site Diagram
<Use additional pages as necessary>

<Show all site factors affecting traffic control, traffic control devices, spacing, signs (including sizes), explanatory notes, North arrow, etc.>

<Per section 6.3 of the BC Ministry of Transportation and Infrastructure Traffic Management Manual for Work on Roadways – 2020 Edition, traffic management shall be managed as one continuous work zone where the work is one kilometer apart or less.>

Appendix C: Daily Sign Check Form

Daily Sign Check Form

Project Name and Number	**Project Location**
Type of Work	**Highway Location**

Date yyyy/mm/dd	**Time of Inspection**	**Location and Deficiency Type**	**Comments**	**Initials**

Date yyyy/mm/dd	Time of Inspection	Location and Deficiency Type	Comments	Initials

Appendix D: DMS Message Library

Appendix D: DMS Message Library

<Provide a list of DMS messages which will be displayed on the DMS throughout the project. Messages that will be used on the DMS shall be per Section 4 – Temporary Traffic Control Devices (Table 4.5 and Table 4.2) of the BC Ministry of Transportation and Infrastructure Traffic Management Manual for Work on Roadways – 2020 Edition plus other messages anticipated to be required on the project.>

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Appendix D

On-site Construction Start-up Form

Public Services and Procurement Canada | Services publics et Approvisionnement Canada

On-site Construction Start-up Form

Project Name:	
Project Number:	
Departmental Representative:	Ph:
Contractor:	
Contractor Representative:	Ph:

The Contractor or its subcontractors shall not perform any on-site work until they receive a completed version of this form which has been signed by PSPC's Departmental Representative.
PSPC reserves the right to refuse payment for any on-site work performed prior to the receipt of the completed and signed form.
The list below is meant to be a guide and is not intended to be a comprehensive list of required submittal items for the project. Refer to Contract Documents and Contract Specifications for a Complete List.

Submission Item	**Reviewed & Accepted by PSPC**	**Date** (yyyy-mm-dd)	**Comments / Exclusions**
Contract, Bonding and Insurance	☐		
Health & Safety Plan	☐		
Traffic Management Plan	☐		
Environmental Protection Plan	☐		
Project Construction Schedule	☐		
Cash Flow Plan	☐		
Quality Management Plan	☐		
Construction Staging Plan	☐		
Construction Equipment List	☐		
Other:	☐		
Other:	☐		

Below to be completed by the Departmental Representative and returned to the Contractor

Has the Contractor submitted all required documents for construction work to commence? ☐ Yes ☐ No

Have all listed documents required prior to construction commencement been accepted by PSPC? ☐ Yes ☐ No

Comments: _____

_____

_____

_____

Name of Departmental Representative: _____

Signature: _____ Date: _____

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Appendix E

Progress Payment Submittal Form

Progress Payment Submittal Form

Project Name:	
Progress Payment Number:	
Departmental Representative:	Ph:
Contractor:	
Contractor Representative:	Ph:

This form, completed and signed by the Contractor's Representative, shall be submitted with all documentation listed below for each progress payment request.
Upon receipt of this form and all documents, PSPC will commence review of the progress payment request in accordance with General Conditions 5 – Terms of Payment.
The list below is meant to be a guide and is not intended to be a comprehensive list of required submittal items for each progress payment. PSPC may request additional documentation not listed below.

Submission Item	Submitted	Comments
Progress Payment	☐	
Statutory Declaration	☐	
WorkSafeBC Clearance Letter	☐	
Project Schedule (with baseline tasks and updates showing completion dates and % complete)	☐	
Updated Cash Flow Forecast	☐	
Survey Details for each quantity claimed (See Appendix E)	☐	
Other:	☐	
Other:	☐	

Prime Contractor Representative:

Name:_____

Title:_____ Signature:_____

Date:_____

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Appendix F

Measurement for Payment Survey Details Form

Public Services and Procurement Canada | Services publics et Approvisionnement Canada

Measurement for Payment Survey Details Form

Project Name:	
Progress Payment Number:	

This form shall be submitted with the progress payment request form to identify how the surveyed quantities for specific line items were obtained.

<Note: remove the examples below and add lines as needed to provide details for every item included in the progress payment measured by survey. Provide individual entries for each task (ex: a line for gravel placed at rest stop A and a separate line for gravel placed at rest stop B). A progress payment line item may have more than one entry – the total entries for a particular line item shall equal the quantity shown on the progress payment)>

Progress Payment Line Item	Specification Defining Payment Requirements	Work Description	Claimed Quantity for Payment	File Name(s) (include point files and break line files names to be compared to compute quantity)	Additional Details
13	*31 24 14*	*Excavation at Km 282 Rest Stop Sta. 282+020 to Sta. 282+070*	*1400 m^3*	• *Km 282 Rest Stop – OG.csv* • *Km 282 Rest Stop – OG Breaklines.dxf* • *Km 282 Rest Stop – Bottom Excavation.csv* • *Km 282 Rest Stop – Bottom Excavation Breaklines.dxf*	*In the provided csv files the difference between the 2 surfaces "OG" and "As-built" is equal to 1400 m^3*
14	*32 11 19*	*Crushed Base Gravel at Km 282 Rest Stop Sta. 282+020 to Sta. 282+070*	*800 m^3*	• *Km 282 Rest Stop – Bottom Excavation.csv"* • *Km 282 Rest Stop – Bottom Excavation Breaklines.dxf* • *Km 282 Rest Stop – As-Built Survey Data.csv* • *Km 282 Rest Stop – As-Built Survey Breaklines.dxf*	*In the provided csv files the difference between the 2 surfaces "OG" and "As-built" is equal to 800 m^3*

Canada

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Appendix G

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 PSPC 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 PSPC'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 H

Responsibility Checklist for Authorizations / Approvals / Notifications / Permitting

Responsibility Checklist For Authorizations/Approvals/Notifications/Permitting

Project Title	
Project Description	
Project Type	
Comments	

Issued By	Document Type	Yes	No	N/A
PSPC 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 groynes) or “waters” that are not large enough for vessel traffic (i.e. 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 PSPC CEAA Checklist, and will be the mechanism by which project information is submitted to PSPC 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, PSPC project managers1 will ensure that their projects are systematically evaluated for compliance with environmental legislation, policies and sustainable development requirements			

[1] Project Manager refers to anyone who leads, manages or delivers a project

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 FrontCounterBC at MoE who then send off to the appropriate departments for approval/notification/permitting – this does not apply to the archaeological.				
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, Natural Resource Operations, and Rural Development*	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 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, Natural Resource Operations, and Rural Development Archaeological	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			

http://www.for.gov.bc.ca/archaeology/requesting_archaeological_site_information/process_steps.htm *Contact: Hayley Bond (250) 953-3343*	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 *Ministry of Forests, Lands, Natural Resource Operations, and Rural Development* http://www.env.gov.bc.ca/bcparks/permits/	Permit to Collect Fish for a Scientific Purpose - Regulation Research activities in parks and protected areas, including: collection; monitoring; survey and inventory; and, other research trigger a Park Permit - Ministry of Forests, Lands, Natural Resource Operations, and Rural Development 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 I

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 J

Factual Geotechnical Data Report – Km 450.6 Slide Area Mitigation, Alaska Highway, BC, Tetra Tech – July 2019

Km 450.6 Slide Area Mitigation, Alaska Highway, BC
Data Report

PRESENTED TO

Public Works and Government Services Canada

Travaux Publics et Services gouvernementaux Canada

JULY 4, 2019
ISSUED FOR USE
FILE: TRN.VHWY03091-01

Tetra Tech Canada Inc.
Suite 1000 – 10th Floor, 885 Dunsmuir Street
Vancouver, BC V6C 1N5 CANADA
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LIMITATIONS OF REPORT

This report and its contents are intended for the sole use of Public Works & Government Services Canada and their agents. Tetra Tech Canada Inc. (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 & 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.

1.0 INTRODUCTION

Tetra Tech Canada Inc. (Tetra Tech) was retained by Public Works and Government Services Canada (PWGSC) under Contract No. EZ899-161629/001/TPV, Project No. R.017173.205 to provide geotechnical and transportation engineering services at km 450.6 of the Alaska Highway (the highway) located near the community of Fort Nelson, BC. The location of the project is shown in Figure 1.

Based on information provided by PWGSC, we understand that an approximately 100 m long section of the Alaska Highway at km ±450.6 is experiencing ongoing settlement issues which have resulted in cracking and distress to the southbound lanes. It is understood from PWGSC that the cracks in this area appeared two to three years ago.

Given the potential risks to corridor reliability and future maintenance costs, PWGSC wishes to determine the likely cause of the embankment movements and to identify potential solutions to reduce or eliminate further movements of the highway embankment, if economically feasible.

The Limitations on the Use of this Document, attached in Appendix A, forms an integral part of this report.

1.1 Work Scope

As outlined in the PWGSC Terms of Reference, and our July 31, 2017 work plan, our scope of work for "Component 1 – Preliminary Engineering" of this assignment entailed the following:

- Completion of a desktop study of the site including a review of existing information provided by PWGSC, readily available geologic maps and publications, and historic aerial photographs.
- Completion of a geotechnical site reconnaissance of the slide area.
- Completion of a geotechnical exploration of the site, including re-surveying of existing monitoring pins, drilling, laboratory testing and instrument monitoring.

This data report should be read in conjunction with the Technical Letter Report issued to PWGSC on October 12, 2017.

2.0 INFORMATION REVIEWED

The following information sources were reviewed as part of a geotechnical desktop study completed in the early stages of the project:

- Information provided by PWGSC, including site photos and topographic survey data.
- Aerial Photographs (obtained from the UBC Air Photo Library) for the years 1944, 1948, 1953, 1967, 1975, 1979, 1985, 1986 and 1997.
- Historical testhole logs and reports from previous Tetra Tech projects in the Fort Nelson area.
- Environment Canada Historical Climate Data.
- Google Earth Pro and Landsat 8 Satellite imagery.
- Published geological maps and papers from the Geological Survey of Canada and the BC Geological Survey.

2.1 Climate

The km 450.6 site is located at about 325 m above sea level and is contained within the Boreal White and Black Spruce (BWBSmk) biogeoclimatic ecosystem classification zone. Environment Canada weather records from the nearest station at Fort Nelson Airport (period 1986 to 2016) indicate that mean annual precipitation is about 450 mm and annual snowfall accumulation is 190 cm. Average daily temperatures range from about -20°C in the winter to 15°C in the summer.

The km 450.6 site lies within the "Sporadic Discontinuous" permafrost zone, corresponding to permafrost coverage of between 10% and 50% of the landscape (Heginbottom et al. 1995). Recent studies of permafrost along the Alaska Highway corridor (James et al. 2013) indicate that the area between Sikanni Chief and Fort Nelson has experienced significant permafrost degradation since the 1960s.

2.2 Bedrock Geology

Per Massey et al. (2005), bedrock at the site is comprised of mudstone, siltstone, shale and fine clastic sedimentary rocks of the Cretaceous Buckinghorse Formation. The available mapping does not show any faults or other significant bedrock features in the km 450 area.

2.3 Surficial Geology

The site was glaciated during the last ice age, which occurred between approximately 25,000 to 10,000 years ago. Per the Geological Survey of Canada Open File 7041 (Levson and Fournier 2012), the surficial geology of the km 450 area comprises undifferentiated organic deposits underlain by glacial till deposits. The glacial till deposits are described as "*glacial sediment (mainly basal till), typically a few to several metres thick, forming flat to gently undulating topography; generally fine-grained (silt and/or clay rich) and poorly drained; clasts commonly striated; drumlins and flutes rare in the map area; commonly overlain by, and interspersed with, organic deposits*".

2.4 Historical Aerial Photographs

Aerial photographs, obtained from the UBC air photo library, do not show any obvious evidence of historical slope instability or highway distress at km 450.6. The oldest air photos from the 1940s and 1950s, however, show a rectangular cut into the hillside on the upslope (east) side of the highway along a creek channel draining the adjacent hillside. The purpose of this cut is unclear, but was possibly constructed to capture and direct the creek flows into a culvert(s) across the highway. Thus, while open to conjecture, the air photos suggest that there may have been challenges with surface runoff and drainage at km 450.6 during original construction of the highway or shortly thereafter.

As shown on the following image, evidence of a relict landslide is also apparent from the air photos on the downslope (west) side of the highway at about km 450.3, involving the failure of an approximately 150 m long section of the bank of the Muskwa River. This failure appears to be unrelated to the recent slope movements at km 450.6, but is further evidence of the susceptibility of these slopes to mass movement.

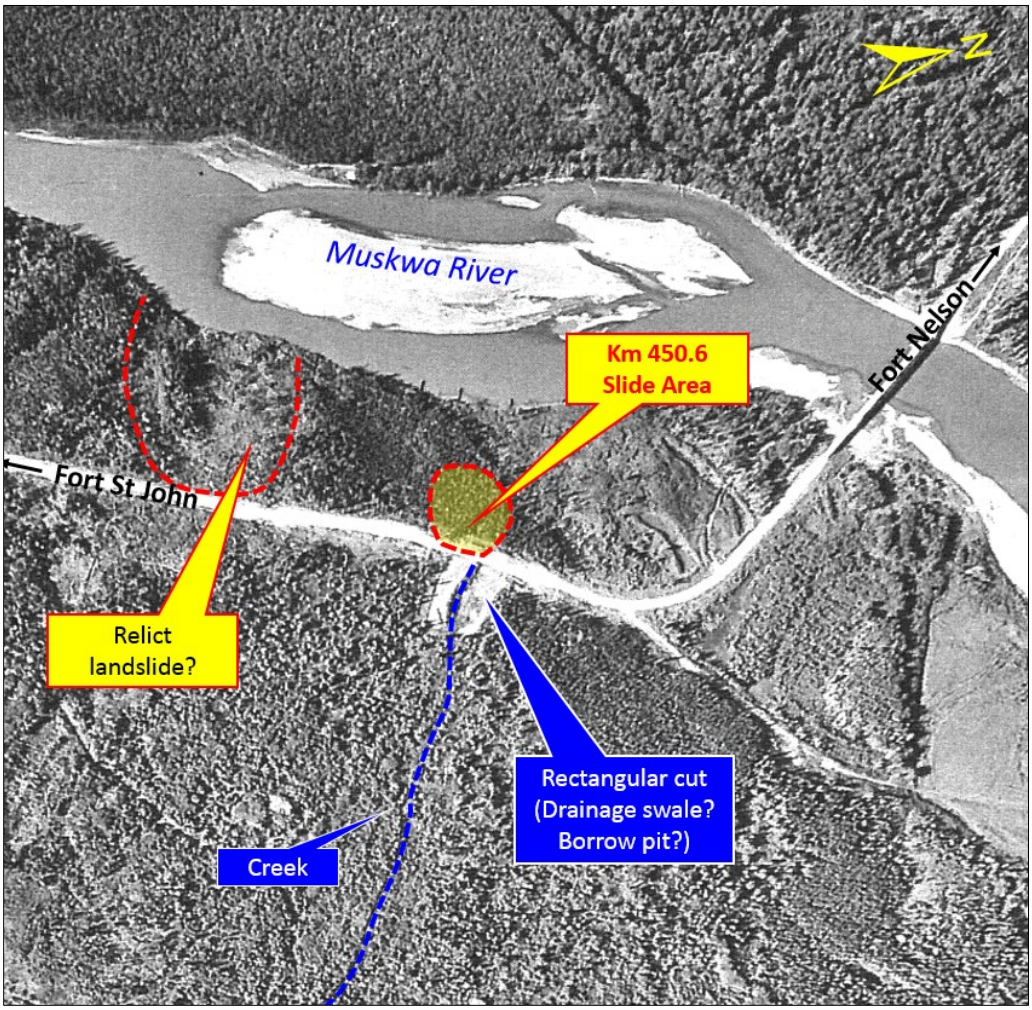

Plate 1. 1953 air photo of the km 450.6 slide area (image BC1767:99).

3.0 SITE RECONNAISSANCE

A visual reconnaissance of the km 450.6 site and the adjacent areas downslope of the highway was carried out on August 3 and September 29, 2017. Key observations from the site reconnaissance are summarized below.

- The highway is situated on a relatively straight alignment through km 450.6 and descends at a gradient of about 7% towards the Muskwa River bridge crossing at ~ km 451.3. Densely forested slopes with gradients of approximately 15% to 30% are present both upslope (east) and downslope (west) of the highway.

- A series of tension cracks forming an approximately 100 m long, bowl-shaped depression was observed along the southbound climbing lane and adjacent gravel shoulder. At the time of the August 3 site visit, the area encompassed by these tension cracks was vertically displaced (down-dropped) by up to about 75 to 100 mm (3 to 4 inches) relative to the adjacent areas of the highway.

- The cut slopes above the northbound lane are dissected by several small ephemeral creeks and natural depressions (swales). These features drain a broad plateau of wet, swampy terrain located several hundred meters upslope of the highway, and discharge into the drainage ditch next to the highway. Significant water flow (estimated to be on the order of 2 to 4 litres/second) was observed in the ditch during the August 3 visit.

- The same creeks and swales are also visible on the downslope side of the highway, where they form a topographic depression infilled by up to about 8 m of embankment fill up to the elevation of the driving surface. A culvert outlet was observed at the lowest point on the embankment fill, but was heavily obscured by willows and shrubs. No visible flow was observed from the culvert; however, an area of seepage discharge and "wet-site" vegetation (horsetails) was observed along a gravel access road below the southbound lane.
- The forested terrain downslope of the highway is hummocky with irregular 10% to 40% slopes. Occasional groundwater springs, soft ground and areas of "wet-site" vegetation were observed. Several mature spruce trees with bent/curved trunks were also observed, which suggests that the distress to the roadway at km 450.6 is part of a much larger slope failure extending beyond the treeline. The hummocky slopes give way to relatively flat and benign terrain approximately 150 m west of the highway.
- The right bank of the Muskwa River below km 450.6 exposes clay till-like soils covered by a mantle of topsoil and slope debris (colluvium). The river in this area forms a back-channel which is only active during periods of higher flow. Minor erosion of the bank was noted during the September 29th site visit, but it does not appear to be the direct cause of the observed slope movements affecting the highway, which appear to be more localized.
- The affected area of the southbound lane was resurfaced by PWGSC in the summer of 2017. No signs of cracking or other distress were observed within the resurfaced area during the September 29th site visit.

The image below shows a recent satellite image of km 450.6, overlain with the approximate limits of the slide area and other key features observed during the site reconnaissance.

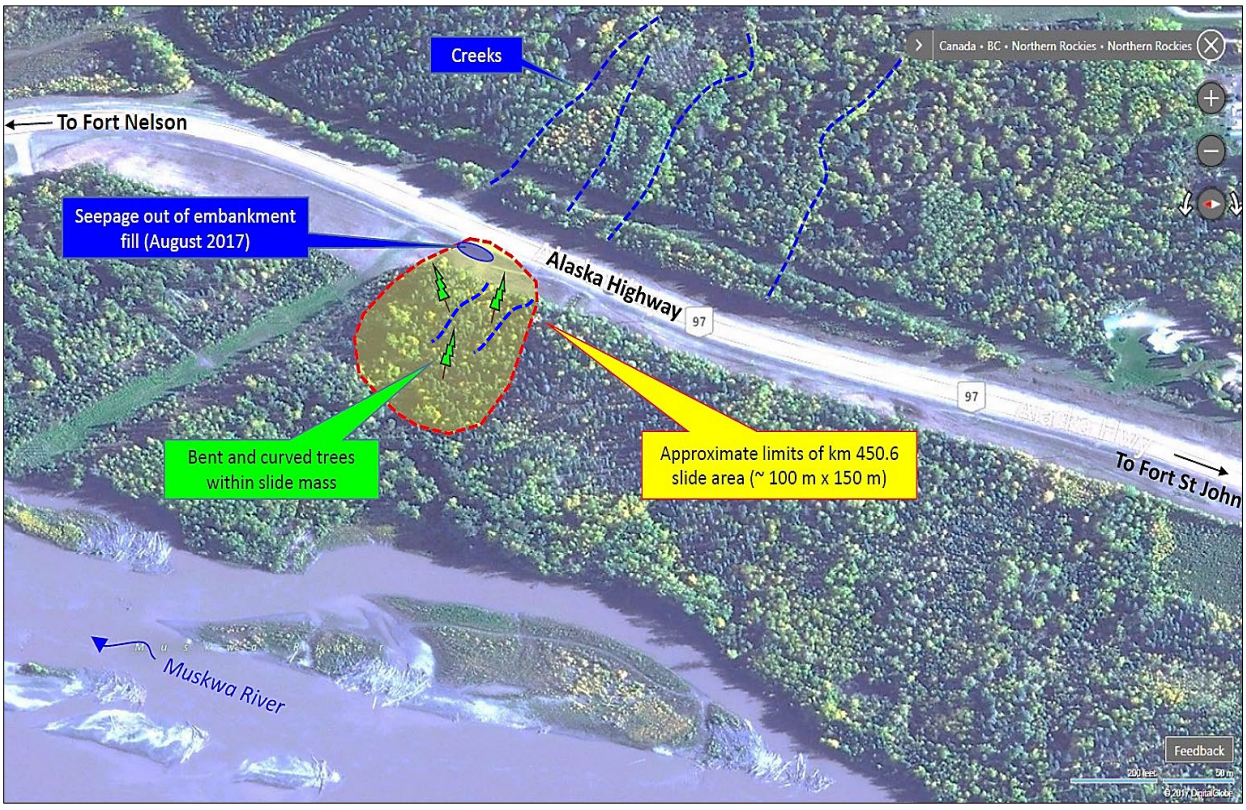

Plate 2. Recent satellite image of the km 450.6 slide area (imagery from Bing Maps).

4.0 GEOTECHNICAL SITE EXPLORATION

4.1 General

Drilling was undertaken in general accordance with the proposed exploration scope outlined in Tetra Tech's Technical Letter Report dated October 12, 2017. Tetra Tech arranged and contracted the drilling services provided by Geotech Drilling Services Ltd. (Geotech) of Prince George, BC and other arrangements with the assistance from PWGSC staff.

4.2 Drilling Program

The drilling program at km 450.6 was conducted from October 20 to 24, 2017 and consisted of a total of five (5) testholes drilled from a Fraste MDXL track-mounted rig. The testhole locations and drilling methods were selected based on our observations of the site and the extent of previous cracking along the southbound lane. A summary of the completed testholes is provided in Table 1 and on Figure 2, attached.

Table 1: Summary of Km 450.6 Drilling Program

Testhole	Collar Elevation (m.a.s.l.)	Location (UTM Zone 10) (1)		Final Depth (m)	Drilling Method(s)	Instrumentation Installed (2)	Location Comments (3)
		Easting	Northing				
BH17-01	+323	519730	6515753	20.3	Auger + HQ3 Coring	▪ VW Piezometer	Shoulder of SB lane ~ Km 450+698
BH17-02	+323	519727	6515749	20.4	Mud Rotary	▪ SI Casing	Shoulder of SB lane ~ Km 450+693
BH17-03	+326	519714	6515722	20.1	Mud Rotary	▪ 2 x VW Piezometers ▪ SI Casing	Shoulder of SB lane ~ Km 450+664
BH17-04	+326	519727	6515710	6.1	Auger	▪ None	Ditch along NB lane ~ Km 450+660
BH17-05	+323	519748	6515738	15.3	Auger	▪ VW Piezometer	Ditch along NB lane ~ Km 450+695

1. Testhole locations estimated from topographic survey data obtained prior to the start of drilling.
2. VW = Vibrating Wire; SI = Slope Inclinometer.
3. SB = Southbound; NB = Northbound.

4.3 Logging and Sampling

A Tetra Tech field engineer was on site during advancement of the testholes to sample the material encountered and to direct the sampling, in situ testing, termination depths and instrumentation installations. Details are shown on the attached testhole logs in Appendix B. Tetra Tech's field engineer also monitored the drill advancement rates and periodically sampled the soil cuttings to document the subsurface conditions at depths between the location of in situ testing and sampling.

In situ testing consisted of Standard Penetration Tests (SPTs), as shown on the testhole logs. Field Vane Tests and thin-walled (Shelby) tube sampling were also attempted but were not successful due to the relatively high stiffness and gravel content of the soil.

4.4 Instrumentation Installations

4.4.1 Slope Inclinometers

Standard slope inclinometer casings (70 mm diameter, manufactured by RST Instruments Ltd.) were installed in testholes BH17-02 and BH17-03 to monitor movements at various depths in the slope. Baseline measurements of the inclinometer casings were obtained using a portable inclinometer probe approximately 1 to 2 days after installation to allow time for the grout backfill to set. Details of the completed installations are shown on the testhole logs in Appendix B.

4.4.2 Piezometers

Vibrating wire piezometers (RST Instruments Ltd. Model VW2100 transducers) were installed in testholes BH17-01, BH17-03 and BH17-05 to monitor groundwater levels at the site. Prior to installation, baseline ("zero") readings were recorded for calibration purposes. Following installation, the piezometers were connected to single-channel data loggers. Details of the completed installations are shown on the testhole logs in Appendix B.

4.5 Laboratory Testing

Soil samples recovered from the drilling program were submitted to Tetra Tech's laboratory for geotechnical index testing. The following tests were conducted on selected samples:

- Water Content (ASTM D2216).
- Hydrometer (ASTM D7928).
- Atterberg Limits (ASTM D4318).

Laboratory test results are presented on the testhole logs in Appendix B and provided separately in Appendix C.

4.6 Instrumentation Readings

Tetra Tech returned to the site on December 19, 2017 to obtain a second set of inclinometer readings from BH17-02 and BH17-03, as well as to download the piezometer data from BH17-01, BH17-03 and BH17-05. Unfortunately, inclinometer readings could not be obtained from BH17-03 as the casing was found to be plugged by several inches of ice; repeated efforts to dislodge the ice plug were not successful.

The results of the instrumentation monitoring are presented in Appendix D.

4.7 Re-Surveying of Monitoring Pins

As discussed in Tetra Tech's Technical Letter Report dated October 12, 2017, a topographic survey of the km 450.6 slide area was completed by PWGSC crews on June 17, 2017. As part of this work, an array of 23 rebar monitoring pins was installed within the highway right-of-way downslope of the cracks on the southbound lane to measure the slope movements. Re-surveying of the monitoring pins was subsequently carried out by Tetra Tech's surveyor, Mr. Ferren Mohs, on August 4 and October 12, 2017. The survey results are presented on Figure 2.

5.0 RESULTS OF THE GEOTECHNICAL SITE EXPLORATION

5.1 Soil Stratigraphy

The testhole data from km 450.6 reveals native soil conditions that are generally consistent with the surficial geology of the area as described in Section 2.3. In brief, the subsurface conditions below the highway surface consist of 2 to 4 m of embankment fill (Unit 1), underlain by a thick deposit of silty clay with some sand and trace gravel. Based on the measured SPT blow counts, and the laboratory data, the silty clay can be subdivided into an upper unit (Unit 2), between 10 and 13 m thick, which is significantly softer compared to the material below (Unit 3). We interpret the softer nature of Unit 2 to be the result of surface weathering, winter freeze-thaw, saturation of the material by surface runoff and disturbance to the soil fabric from previous slope movement; however, it may also reflect a change in the geological setting in which the material was originally deposited.

The interpreted stratigraphy is presented in Table 2 and on Figure 2, attached. It can be seen from the table that Unit 2 exhibits slightly higher natural moisture contents and significantly lower SPT N-values compared to Unit 3.

Table 2: Interpreted Soil Stratigraphy (Below Highway Surface)

Unit		Thickness (m)	General Description	Natural Moisture Content (%)	Atterberg Limits (%) [1]	SPT N-Value [2]
1	Embankment Fill	2 to 4	SAND and GRAVEL, trace to some silt, damp to moist, brown	4 (one test)	-	-
2	Silty Clay (Upper Unit)	10 to 13	CLAY, silty, some sand, trace gravel, trace organics, damp, medium plastic, firm, grey	15 to 22 (avg. ~ 19)	LL = 37 to 39 (avg. ~ 38) PL = 14 to 15 (avg. ~ 15)	6 to 12 (avg. ~ 9)
3	Silty Clay (Lower Unit)	> 10	CLAY, silty, some sand, trace gravel, damp, medium plastic, very stiff, dark grey	14 to 21 (avg. ~ 16)	LL = 34 (one test) PL = 15 (one test)	21 to 32 (avg. ~ 26)

1. LL= Liquid Limit; PL = Plastic Limit.
2. SPT = Standard Penetration Test. The reported N-values (blows / 0.3 m) are based on uncorrected field blow counts.

5.2 Groundwater

The results of the water level monitoring from the vibrating wire piezometers are presented in Table 3 and in the attached graphs in Appendix D. As noted on the graphs, the piezometer readings have yet to stabilize due to the impermeable nature of the silty clay deposit. However, the readings obtained to date indicate that the water levels are relatively close to the ground surface, and that the groundwater regime exhibits a slightly downward hydraulic gradient (that is, the measured water levels are lower in the deeper piezometers compared to the water levels in the shallower piezometers). We interpret the downward hydraulic gradient to be the result of groundwater discharge out of the slope face.

Table 3: Vibrating Wire Piezometer Readings

Testhole	Installation Date	Piezometer Installation		Water Level		
		Depth (m)	Elevation (m.a.s.l.)	Date of Reading	Depth (m) (1)	Elevation (m.a.s.l.) (2)
BH17-01	21-Oct-17	20.0	+303	19-Dec-17	4.8	+318.2
BH17-03	24-Oct-17	9.2	+316.8	19-Dec-17	2.2	+323.8
		13.4	+312.6	19-Dec-17	2.9	+323.1
BH17-05	20-Oct-17	14.8	+308.2	*Unreliable data; piezometer readings have not stabilized*		

1. Depth to water, measured from ground surface at the collar of the testhole.
2. Elevation of the piezometric surface based on the estimated elevation of the installed piezometer.

At the time of our site reconnaissance, an area of seepage discharge was also observed on the southbound side of the highway embankment near Km 450+700. Areas of surficial “perched” water were also observed along the ditch back-slopes adjacent to the northbound lane. In general, the wet site conditions at km 450.6 appear to be the result of the local topography, the proximity of the site to the ephemeral creeks draining the hillside above the highway, and the impermeable nature of the silty clay deposit.

5.3 Slide Depth and Rate of Movement

The slope inclinometer readings from BH17-02 are presented in Appendix D. The results indicate that slope movements are occurring along a broad failure zone located between about 7 and 11 m depth below the shoulder of the southbound lane, within the upper unit of silty clay (Unit 2). Based on the inferred limits of the slide area (see Figure 2), the volume of the slide mass currently moving is estimated to be on the order of 80,000 to 120,000 m^3.

The slope inclinometer readings indicate that very minor slope movements (less than 2 mm) have occurred between October and December 2017. By comparison, the monitoring pin survey data reveals that the slope moved up to 35 mm horizontally and 45 mm vertically between August and October 2017. The direction of recorded movement, as shown on Figure 2, generally follows the fall line of the slope (i.e. perpendicular to the topographic contours). While the survey readings are not as accurate as the inclinometer readings, it is apparent from these data that the rate of slope movement has decreased significantly over the fall of 2017, likely in response to a seasonal decrease in groundwater levels and the onset of freezing temperatures.

6.0 CLOSURE

We trust this data 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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PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
K. L. JOHNSTON

July 4, 2019

FILE: 704-TRN.VHWY03091-01
FILE: 704-TRN.VHWY03091-01
FILE: 704-TRN.VHWY03091-01

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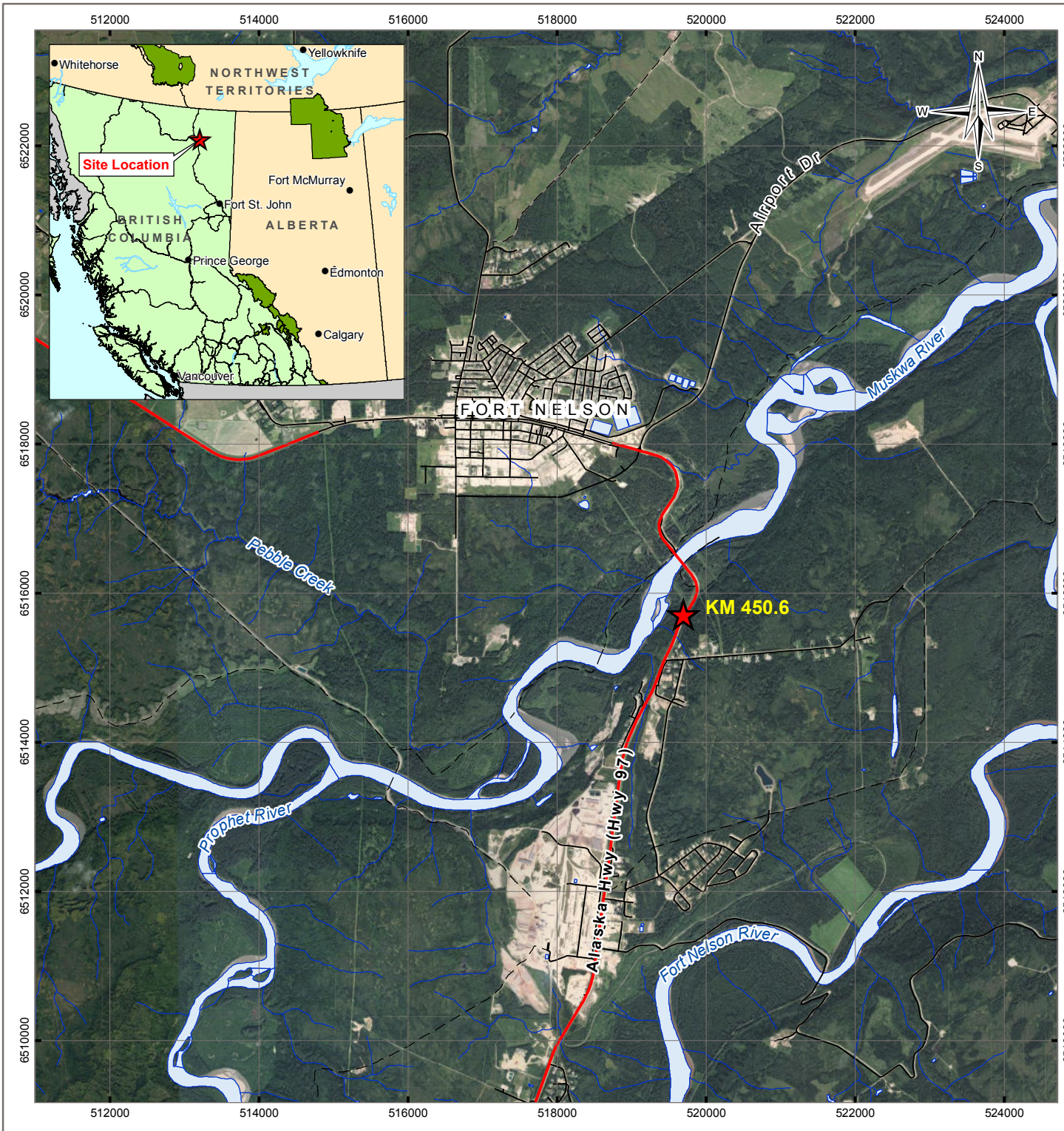
FIGURES



LEGEND

- Site Location (km 450.6)
- Highway
- Road
- Resource/Recreational Road
- Watercourse
- Waterbody

NOTES
Base data source:
CanVec 1:50,000
Imagery from Google; DigitalGlobe; Landsat/Copernicus.

STATUS
ISSUED FOR USE

KM 450.6 ALASKA HIGHWAY SLIDE AREA

Site Location Plan

PROJECTION	DATUM	CLIENT
UTM Zone 10	NAD83	Public Works and Government Services Canada / Travaux publics et Services gouvernementaux Canada

Scale: 1:75,000
1 0.5 0 1
Kilometres

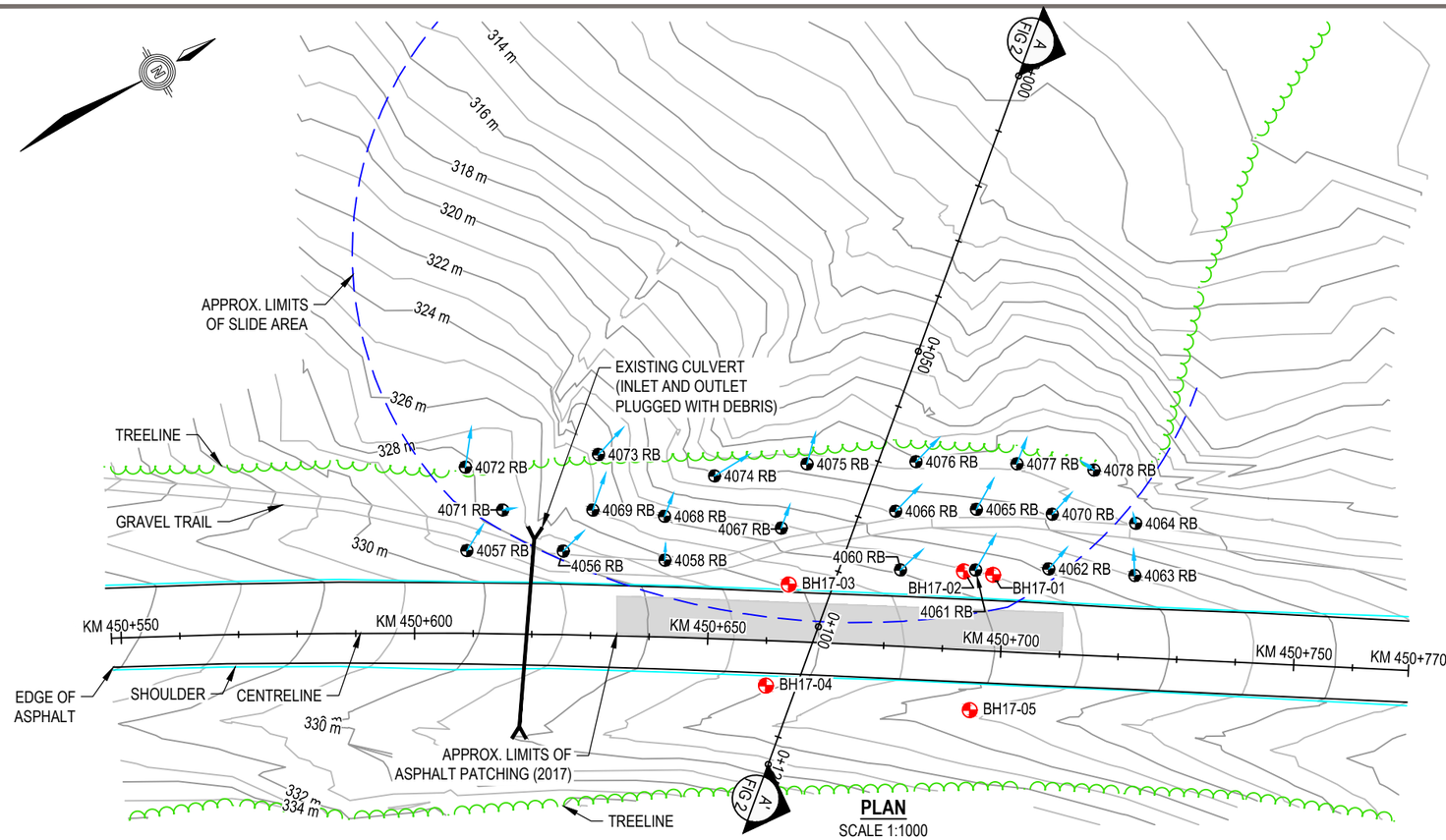
FILE NO.

OFFICE	DWN	CKD	APVD	REV
Tt-VANC	JP			0

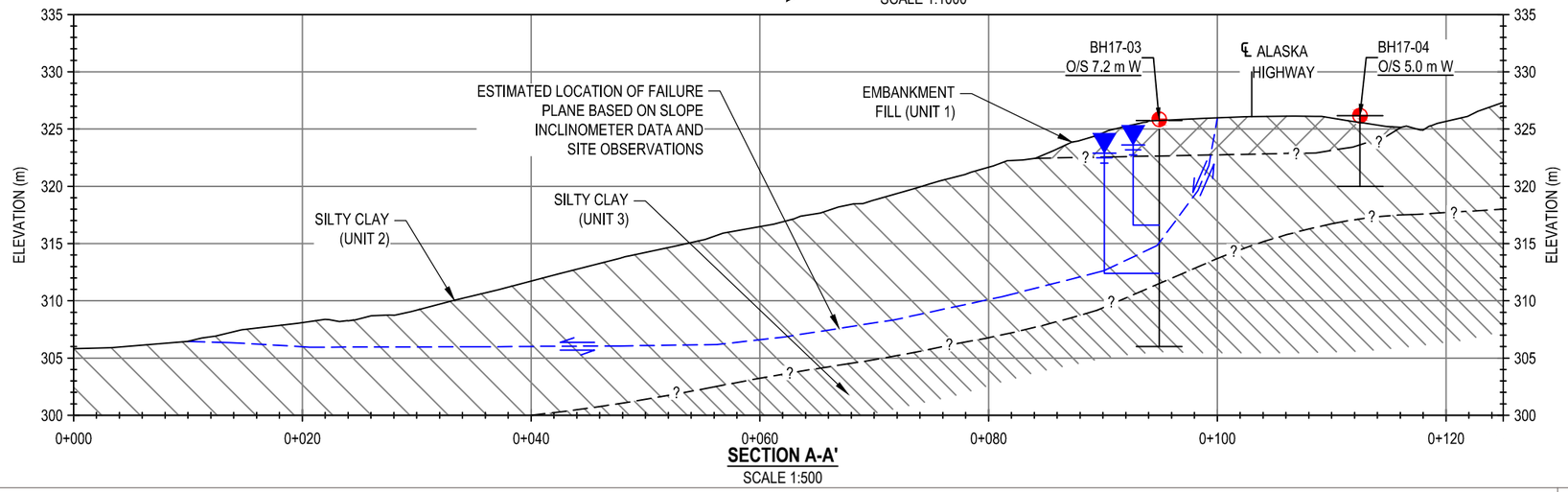
DATE	PROJECT NO.
July 3, 2019	TRN.VHWY03091-01

TETRA TECH

Figure 1



PLAN
SCALE 1:1000



SECTION A-A'
SCALE 1:500

REBAR POINT #	MOVEMENT (AUGUST 4, 2017 TO OCTOBER 12, 2017)			
	Δ N (mm)	Δ E (mm)	Δ HOR DIST (mm)	Δ Elev (mm)
4056	24	-6	25	-22
4057	24	-13	27	-19
4058	8	-13	15	-18
4060	26	-6	26	-33
4061	30	-18	35	-33
4062	23	-8	25	-34
4063	11	-20	23	-34
4064	2	-6	6	-43
4065	27	-16	31	-40
4066	31	-9	32	-32
4067	17	-14	22	-31
4068	17	-14	22	-18
4069	26	-22	34	-42
4070	24	-8	25	-19
4071	11	4	12	-3
4072	22	-27	35	-70
4073	31	-10	32	-29
4074	36	-1	36	-9
4075	20	-20	28	-47
4076	28	-8	29	-1
4077	19	-15	24	-19
4078	-6	-13	14	-43

LEGEND
- Borehole by TetraTech, Oct. 2017
- Rebar points
- Road centreline
- Vector indicating direction and magnitude of movement (200x exaggeration). August 4, 2017 to October 12, 2017.
- Edge of asphalt
- Embankment Fill (Unit 1)
- Road shoulder
- Silty Clay (Unit 2)
- Gravel trail
- Silty Clay (Unit 3)
- Treeline
- Piezometer water level

NOTES
1. Based on survey plan dwg "2017-029-171018 MUSKWA HILL TOPO_FM".

ISSUED FOR USE

SCALE 1:1000
10 0 10 20 40m

SCALE 1:500
5 0 5 10 20m

CLIENT
Public Works and Government Services Canada

TETRA TECH

ALASKA HIGHWAY KM 450.6 SLIDE AREA

SITE PLAN

PROJECT NO.	DWN	CKD	REV
TRN.VHWY03091-01	RH	JP	2
OFFICE: VANC	DATE: July 3, 2019		

Figure 2

APPENDIX A

TETRA TECH'S LIMITATIONS ON THE USE OF THIS DOCUMENT

LIMITATIONS ON USE OF THIS DOCUMENT

GEOTECHNICAL

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Electronic files submitted by TETRA TECH have been prepared and submitted using specific software and hardware systems. TETRA TECH makes no representation about the compatibility of these files with the Client's current or future software and hardware systems.

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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 persons 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 report, at or on the development proposed as of the date of the Professional Document requires a supplementary 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 investigate, address or consider and has not investigated, 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 and methods 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 historic 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 investigation 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

There is a direct correlation between construction activity and 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 are known.

1.14 OBSERVATIONS DURING CONSTRUCTION

Because of the nature of geological deposits, the judgmental nature of geotechnical engineering, as well as 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 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 BEARING CAPACITY

Design bearing capacities, loads and allowable stresses 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 assumed. Sufficient observations should be made by qualified geotechnical personnel during construction to assure that the soil and/or rock conditions assumed 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.

APPENDIX B

TESTHOLE LOGS

Public Works and Government Services Canada

Borehole No: **BH17-01**

Project: Alaska Highway km 450.6 Slide Area	Project No: 704-TRN.VHWY03091-01
Location: km 450+698 (o/s 13 m L)	Ground Elev: 323 m
Fort Nelson, BC	UTM: 519730 E; 6515753 N; Z 10

Depth (m)	Method	Core Diameter (mm)	Soil Description	Laboratory USCS	Sample Type	Sample Number	Recovery (%)	Particle Size Distribution: Gravel (%)	Sand (%)	Fines: Silt (%)	Clay (%)	Field Blowcount (blows/300 mm) SPT	Field Vane (kPa) Post-Peak / Peak	Plastic Limit / Moisture Content / Liquid Limit	VW46103	Elevation (m)
0												20 40 60 80	10 20 30 40	20 40 60 80		323
1	Solid Stem Auger	127	SAND and GRAVEL (ROAD FILL), trace silt, well graded, moist, brown; fine to coarse gravel; fine to coarse angular to sub-rounded gravel - becomes some silt below 0.8 m			B1										322
2			CLAY, silty, some sand, trace gravel, trace organics (decomposed grass), moist, firm to stiff, medium plastic, dark grey; fine to coarse sand; fine to coarse angular to sub-rounded gravel; laminations of brown silty sand			B2										321
3																320
4																319
5			- no organics observed below 4.6 m	CI		B3		1	19	42	38					318
6						B4										317
7						B5										316
8			- soft to firm from 7.6 m to 7.8 m			B6										315
9			SPT blow counts per 3 inches (8.08 m to 8.54 m) : 0/1//2/1/2/2 N-value (N): 7 Recovery: 0.22 m			SPT1										314
10	Triple-Tube Coring	61	RUN 1 (9.61 - 11.13 m) Recovery: 0.31 m - becomes damp, very stiff below 9.6 m				20									313
11			RUN 2 (11.13 - 12.66 m) Recovery: 0.34 m			A2										312
12							22									311

12/19/2017

12/19/2017

TETRA TECH

Contractor: Geotech Drilling Services Ltd.	Completion Depth: 20.3 m
Drilling Rig Type: Fraste MDXL	Start Date: 2017 October 21
Logged By: DG	Completion Date: 2017 October 21
Reviewed By: JP	Page 1 of 2

Public Works and Government Services Canada

Borehole No: **BH17-01**

Project: Alaska Highway km 450.6 Slide Area	Project No: 704-TRN.VHWY03091-01
Location: km 450+698 (o/s 13 m L)	Ground Elev: 323 m
Fort Nelson, BC	UTM: 519730 E; 6515753 N; Z 10

Depth (m)	Method	Core Diameter (mm)	Soil Description	Graphical Representation	Laboratory USCS	Sample Type	Sample Number	Recovery (%)	Particle Size Distribution: Gravel (%)	Sand (%)	Fines: Silt (%)	Fines: Clay (%)	Field Blowcount (blows/300 mm) SPT	Field Vane (kPa) Post-Peak / Peak	Plastic Limit / Moisture Content / Liquid Limit	VW46103	Elevation (m)
12													20 40 60 80	10 20 30 40	20 40 60 80		311
13	Triple-Tube Coring	61	RUN 3 (12.66 - 14.18 m) Recovery: 0.32 m - becomes some gravel below 12.7 m				A3	21									310
14			RUN 4 (14.18 - 15.71 m) Recovery: 1.29 m				A4	84									309
15																	308
16			RUN 5 (15.71 - 17.23 m) Recovery: 0.89 m				A5	59									307
17																	306
18			RUN 6 (17.23 - 18.76 m) Recovery: 0.64 m				A6	42									305
19			RUN 7 (18.76 - 20.28 m) Recovery: 0.29 m				A7	19									304
20							A8										303
21			End of borehole at 20.3 m (Target depth reached). - VW piezometer installed at 20.0 m upon completion and protected with a flush mount well cover. - Estimates of the soil consistency were determined from SPT blow counts, drill rig performance, and visual classification of recovered samples. - Reported SPT values are uncorrected field values. - SPT recovery is based on the length of the recovered sample compared to the distance driven. - Collar elevation and testhole coordinates are estimated based on existing topographic survey data.														302
22																	301
23																	300
24																	299

TETRA TECH

Contractor: Geotech Drilling Services Ltd.	Completion Depth: 20.3 m
Drilling Rig Type: Fraste MDXL	Start Date: 2017 October 21
Logged By: DG	Completion Date: 2017 October 21
Reviewed By: JP	Page 2 of 2

Public Works and Government Services Canada

Borehole No: **BH17-02**

Project: Alaska Highway km 450.6 Slide Area	Project No: 704-TRN.VHWY03091-01
Location: km 450+693 (o/s 13 m L)	Ground Elev: 323 m
Fort Nelson, BC	UTM: 519727 E; 6515749 N; Z 10

Depth (m)	Method	Core Diameter (mm)	Soil Description	Graphical Representation	Laboratory USCS	Sample Type	Sample Number	Field Blowcount (blows/300 mm) □ SPT (20 40 60 80)	Field Vane (kPa) Post-Peak / Peak (10 20 30 40); Plastic Limit / Moisture Content / Liquid Limit (20 40 60 80)	SI17-02	Elevation (m)
0											323
			ROAD FILL (inferred) - No sample recovery								
1											322
2											321
3											320
4			CLAY, silty, some sand, trace gravel, damp, firm, medium plastic, dark grey; fine to coarse sand; fine to coarse angular to sub-rounded gravel; with thin laminations of brown silty sand								319
			SPT blow counts per 3 inches (4.6 m to 5.2 m) : 1/2//1/2/2/2//1/2 N-value (N): 7 Recovery: 0.19 m				SPT1				
5											318
6	Mud-Rotary	100	SHELBY TUBE (6.1 m to 6.85 m) - plugged by gravel, visible damage to tube Recovery: 0.03 m				SH2				317
7											316
			SPT blow counts per 3 inches (7.6 m to 8.2 m) : 3/4//2/2/2/2//2/2 N-value (N): 8 Recovery: 0.18 m				SPT3				
8											315
9											314
			SPT blow counts per 3 inches (9.2 m to 9.8 m) : 1/2//1/2/2/3//3/3 N-value (N): 8 Recovery: 0.44 m				SPT4				
10											313
			SPT blow counts per 3 inches (10.7 m to 11.3 m) : 1/2//1/2/2/2//3/4 N-value (N): 7 Recovery: 0.27 m				SPT5				
11											312
12			CLAY, silty, some sand, trace gravel, damp, very stiff, medium plastic, dark grey; fine to coarse sand; fine to coarse gravel								311

TETRA TECH

Contractor: Geotech Drilling Services Ltd.	Completion Depth: 20.4 m
Drilling Rig Type: Fraste MDXL	Start Date: 2017 October 23
Logged By: DG	Completion Date: 2017 October 23
Reviewed By: JP	Page 1 of 2

Public Works and Government Services Canada

Borehole No: **BH17-02**

Project: Alaska Highway km 450.6 Slide Area	Project No: 704-TRN.VHWY03091-01
Location: km 450+693 (o/s 13 m L)	Ground Elev: 323 m
Fort Nelson, BC	UTM: 519727 E; 6515749 N; Z 10

Depth (m)	Method	Core Diameter (mm)	Soil Description	Graphical Representation	Laboratory USCS	Sample Type	Sample Number	Elevation (m)
12	Mud-Rotary	100	SPT blow counts per 3 inches (12.2 m to 12.8 m) : 2/4//5/5/7/6//9/11 N-value (N): 23 Recovery: 0.47 m				SPT6	311
13								310
14			SPT blow counts per 3 inches (13.7 m to 14.3 m) : 3/5//4/5/7/8//8/9 N-value (N): 24 Recovery: 0.50 m		CI		SPT7	309
15								308
16			SPT blow counts per 3 inches (15.3 m to 15.9 m) : 3/3//6/6/8/9//12/12 N-value (N): 29 Recovery: 0.50 m				SPT8	307
17								306
18								305
19			SPT blow counts per 3 inches (18.3 m to 18.9 m) : 1/4//5/6/6/9//9/10 N-value (N): 26 Recovery: 0.32 m				SPT9	304
20			SPT blow counts per 3 inches (19.8 m to 20.4 m) : 3/3//3/5/6/8//8/11 N-value (N): 22 Recovery: 0.57 m				SPT10	303
21			End of borehole at 20.4 m (Target depth reached). - 70 mm diameter Slope Inclinometer casing installed and grouted in testhole upon completion and protected with a flush mount well cover. - Estimates of the soil consistency were determined from SPT blow counts, drill rig performance, and visual classification of recovered samples. - Reported SPT values are uncorrected field values. - SPT recovery is based on the length of the recovered sample compared to the distance driven. - Collar elevation and testhole coordinates are estimated based on existing topographic survey data.					302
22								301
23								300
24								299

Field Blowcount (blows/300 mm) — SPT — 20 40 60 80

Field Vane (kPa) — Post-Peak / Peak — 10 20 30 40

Plastic Limit / Moisture Content / Liquid Limit — 20 40 60 80

SI17-02

TETRA TECH

Contractor: Geotech Drilling Services Ltd.	Completion Depth: 20.4 m
Drilling Rig Type: Fraste MDXL	Start Date: 2017 October 23
Logged By: DG	Completion Date: 2017 October 23
Reviewed By: JP	Page 2 of 2

Public Works and Government Services Canada

Borehole No: **BH17-03**

Project: Alaska Highway km 450.6 Slide Area	Project No: 704-TRN.VHWY03091-01
Location: km 450+664 (o/s 10 m L)	Ground Elev: 326 m
Fort Nelson, BC	UTM: 519714 E; 6515722 N; Z 10

Depth (m)	Method	Core Diameter (mm)	Soil Description	Graphical Representation	Laboratory USCS	Sample Type	Sample Number	Particle Size Distribution: Gravel (%)	Sand (%)	Fines: Silt (%)	Fines: Clay (%)	Field Blowcount (blows/300 mm)	Field Vane (kPa) / Plastic Limit / Moisture Content / Liquid Limit	SI17-03	VW46101	VW46102	Elevation (m)
0												SPT: 20 40 60 80	Post-Peak / Peak: 10 20 30 40; Plastic Limit / Moisture Content / Liquid Limit: 20 40 60 80				326
1			ROAD FILL (inferred) - No sample recovery														325
2																	324
3			CLAY, silty, trace to some sand, trace gravel, damp, firm, medium plastic, dark grey; fine to coarse sand; fine to coarse sub-rounded gravel														323
4			SPT blow counts per 3 inches (4.3 m to 4.9 m) : 1/2//3/2/2/2//2/3 N-value (N): 9 Recovery: 0.22 m				SPT1										322
5																	321
6	Mud-Rotary	100	SPT blow counts per 3 inches (5.8 m to 6.4 m) : 1/1//2/1/2/1//2/2 N-value (N): 6 Recovery: 0.37 m		CI		SPT2	3	20	40	37						320
7			- becomes stiff below 7 m														319
8			SPT blow counts per 3 inches (7.3 m to 7.9 m) : 1/2//2/2/3/3//3/3 N-value (N): 10 Recovery: 0.39 m				SPT3										318
9			SPT blow counts per 3 inches (8.9 m to 9.5 m) : 1/2//2/3/3/4//4/5 N-value (N): 12 Recovery: 0.42 m				SPT4										317
10																	316
11			SPT blow counts per 3 inches (10.4 m to 11.0 m) : 2/1//2/3/3/2//3/3 N-value (N): 10 Recovery: 0.42 m - becomes moist below 10.4 m		CI		SPT5	2	20	42	36						315
12																	314

VW46102 12/19/2017

VW46101 12/19/2017

12/19/2017 VW46102

12/19/2017 VW46101

TETRA TECH

Contractor: Geotech Drilling Services Ltd.	Completion Depth: 20.1 m
Drilling Rig Type: Fraste MDXL	Start Date: 2017 October 24
Logged By: DG	Completion Date: 2017 October 24
Reviewed By: JP	Page 1 of 3

Public Works and Government Services Canada

Borehole No: **BH17-03**

Project: Alaska Highway km 450.6 Slide Area	Project No: 704-TRN.VHWY03091-01
Location: km 450+664 (o/s 10 m L)	Ground Elev: 326 m
Fort Nelson, BC	UTM: 519714 E; 6515722 N; Z 10

Depth (m)	Method	Core Diameter (mm)	Soil Description	Graphical Representation	Laboratory USCS	Sample Type	Sample Number	Particle Size Distribution: Gravel (%)	Sand (%)	Fines: Silt (%)	Fines: Clay (%)	Field Blowcount (blows/300 mm)	Field Vane (kPa) / Plastic Limit, Moisture Content, Liquid Limit	SI17-03	VW46101	VW46102	Elevation (m)
12																	314
	Mud-Rotary	100	SPT blow counts per 3 inches (11.9 m to 12.5 m) : 1/2//3/2/3/3//4/3 N-value (N): 11 Recovery: 0.53 m				SPT6										
13			CLAY, silty, trace to some sand, trace gravel, damp, very stiff, medium plastic, dark grey; fine to coarse sand; fine to coarse sub-rounded gravel				SPT7										313
14			SPT blow counts per 3 inches (13.4 m to 14.0 m) : 2/3//6/6/7/9//11/15 N-value (N): 28 Recovery: 0.48 m														312
15																	311
16																	310
17			SPT blow counts per 3 inches (16.5 m to 17.1 m) : 2/3//5/4/6/6//9/10 N-value (N): 21 Recovery: 0.48 m - becomes damp below 16.9 m				SPT8										309
18																	308
19			SPT blow counts per 3 inches (19.5 m to 20.1 m) : 3/3//5/6/7/8//7/9 N-value (N): 26 Recovery: 0.49 m				SPT9										307
20			End of borehole at 20.1 m (Target depth reached). - 70 mm diameter Slope Inclinometer casing installed to 19.0 m and two VW piezometers installed at 9.2 m and 13.4 m. Installations protected with a flush mount well cover. - Estimates of the soil consistency were determined from SPT blow counts, drill rig performance, and visual classification of recovered samples. - Reported SPT values are uncorrected field values. - SPT recovery is based on the length of the recovered sample compared to the														306
21																	305
22																	304
23																	303
24																	302

Field Blowcount (blows/300 mm): SPT; 20 40 60 80

Field Vane (kPa): Post-Peak, Peak; 10 20 30 40

Plastic Limit, Moisture Content, Liquid Limit; 20 40 60 80

TETRA TECH

Contractor: Geotech Drilling Services Ltd.	Completion Depth: 20.1 m
Drilling Rig Type: Fraste MDXL	Start Date: 2017 October 24
Logged By: DG	Completion Date: 2017 October 24
Reviewed By: JP	Page 2 of 3

Public Works and Government Services Canada

Borehole No: **BH17-03**

Project: Alaska Highway km 450.6 Slide Area	Project No: 704-TRN.VHWY03091-01
Location: km 450+664 (o/s 10 m L)	Ground Elev: 326 m
Fort Nelson, BC	UTM: 519714 E; 6515722 N; Z 10

Depth (m)	Method	Core Diameter (mm)	Soil Description	Graphical Representation	Laboratory USCS	Sample Type	Sample Number	Particle Size Distribution: Gravel (%)	Particle Size Distribution: Sand (%)	Particle Size Distribution: Fines: Silt (%)	Particle Size Distribution: Fines: Clay (%)	Field Blowcount (blows/300 mm)	Field Vane (kPa) / Plastic Limit, Moisture Content, Liquid Limit	SI17-03	VW46101	VW46102	Elevation (m)
24			distance driven. - Collar elevation and testhole coordinates are estimated based on existing topographic survey data.									SPT 20 40 60 80	Post-Peak / Peak 10 20 30 40 Plastic Limit / Moisture Content / Liquid Limit 20 40 60 80				302
25																	301
26																	300
27																	299
28																	298
29																	297
30																	296
31																	295
32																	294
33																	293
34																	292
35																	291
36																	290

TETRA TECH

Contractor: Geotech Drilling Services Ltd.	Completion Depth: 20.1 m
Drilling Rig Type: Fraste MDXL	Start Date: 2017 October 24
Logged By: DG	Completion Date: 2017 October 24
Reviewed By: JP	Page 3 of 3

Public Works and Government Services Canada

Borehole No: **BH17-04**

Project: Alaska Highway km 450.6 Slide Area	Project No: 704-TRN.VHWY03091-01
Location: km 450+660 (o/s 8 m R)	Ground Elev: 326 m
Fort Nelson, BC	UTM: 519727 E; 6515710 N; Z 10

Depth (m)	Method	Core Diameter (mm)	Soil Description	Graphical Representation	Sample Type	Sample Number	Field Blowcount (blows/300 mm) □ SPT (20 40 60 80)	Field Vane (kPa) Post-Peak / Peak (10 20 30 40); Plastic Limit / Moisture Content / Liquid Limit (20 40 60 80)	Elevation (m)
0									326
	Solid Stem Auger	127	SAND and GRAVEL (ROAD FILL), trace silt, trace organics, well graded, moist, brown; fine to coarse sand; fine to coarse angular to sub-rounded gravel						
1			CLAY, silty, some sand, trace gravel, trace organics (roots, grass), damp, stiff, medium plastic, dark grey; fine to coarse sand; fine to coarse angular to sub-rounded gravel; frequent grystals of gypsum, up to 3 mm long, 1 mm wide						325
						1			
2			SPT blow counts per 3 inches (1.5 m to 2.1 m) : 2/2//2/4/3/3//3/3 N-value (N): 12 Recovery: 0.36 m						324
3			SPT blow counts per 3 inches (3.1 m to 3.7 m) : 0/1//2/2/3/3//4/4 N-value (N): 10 Recovery: 0.24 m						323
4						2			322
			- becomes trace sand, trace gravel below 4.6 m						
5									321
						3			
6									320
			End of borehole at 6.1 m (Target depth reached). - Testhole backfilled with cuttings and bentonite. - Estimates of the soil consistency were determined from SPT blow counts, drill rig performance, and visual classification of recovered samples. - Reported SPT values are uncorrected field values. - SPT recovery is based on the length of the recovered sample compared to the distance driven. - Collar elevation and testhole coordinates are estimated based on existing topographic survey data.						
7									319
8									318
9									317
10									316
11									315
12									314

TETRA TECH

Contractor: Geotech Drilling Services Ltd.	Completion Depth: 6.1 m
Drilling Rig Type: Fraste MDXL	Start Date: 2017 October 20
Logged By: DG	Completion Date: 2017 October 20
Reviewed By: JP	Page 1 of 1

Public Works and Government Services Canada

Borehole No: **BH17-05**

Project: Alaska Highway km 450.6 Slide Area	Project No: 704-TRN.VHWY03091-01
Location: km 450+695 (o/s 10 m R)	Ground Elev: 323 m
Fort Nelson, BC	UTM: 519748 E; 6515738 N; Z 10

Depth (m)	Method	Core Diameter (mm)	Soil Description	Graphical Representation	Sample Type	Sample Number	Field Blowcount (blows/300 mm) □ SPT	Field Vane (kPa) Post-Peak / Peak	Plastic Limit / Moisture Content / Liquid Limit	VW40758	Elevation (m)
0							20 40 60 80	10 20 30 40	20 40 60 80		323
1	Solid Stem Auger	127	SAND and GRAVEL (ROAD FILL), trace silt, frequent organics, well graded, moist, brown, organic odour; fine to coarse sand; fine to coarse subrounded gravel								
			CLAY, silty, some sand, trace to some gravel, frequent organics (decomposed wood pieces and fibres, roots and grass), moist to damp, firm, medium plastic, dark grey, slight organic odour; fine to coarse sand; fine to coarse sub-angular to sub-rounded gravel								322
2			SPT blow counts per 3 inches (1.5 m to 2.1 m) : 0/1//1/2/2/2//2/2 N-value (N): 6 Recovery: 0.21 m - becomes damp below 1.5 m, with lenses and laminations of brown fine sand - becomes no organics, stiff below 2.5 m			1					321
3			SPT blow counts per 3 inches (3.1 m to 3.7 m) : 0/1//2/3/2/4//3/5 N-value (N): 11 Recovery: 0.35 m			2					320
4											319
5			SPT blow counts per 3 inches (4.6 m to 6.2 m) : 1/1//2/2/3/4//4/4 N-value (N): 11 Recovery: 0.38 m			3					318
6			SPT blow counts per 3 inches (6.1 m to 6.7 m) : 1/2//2/3/3/4//3/5 N-value (N): 12 Recovery: 0.45 m - becomes trace gravel below 6.1 m			4					317
7											316
8			SPT blow counts per 3 inches (7.6 m to 8.2 m) : 1/2//2/3/3/3//4/4 N-value (N): 11 Recovery: 0.53 m			SPT5					315
9											314
10			SPT blow counts per 3 inches (9.2 m to 9.8 m) : 2/2//2/3/3/4//4/4 N-value (N): 12 Recovery: 0.57 m - becomes trace sand below 9.2 m			SPT6					313
11			CLAY, silty, some sand, some gravel, damp, very stiff to hard, medium plastic, dark grey; fine to coarse sand; fine to coarse gravel			SPT7					312
			SPT blow counts per 3 inches (10.7 m to 11.3 m) : 1/3//5/5/6/8//9/9 N-value (N): 24 Recovery: 0.55 m								
12											311

TETRA TECH

Contractor: Geotech Drilling Services Ltd.	Completion Depth: 15.3 m
Drilling Rig Type: Fraste MDXL	Start Date: 2017 October 20
Logged By: DG	Completion Date: 2017 October 20
Reviewed By: JP	Page 1 of 2

Public Works and Government Services Canada

Borehole No: **BH17-05**

Project: Alaska Highway km 450.6 Slide Area	Project No: 704-TRN.VHWY03091-01
Location: km 450+695 (o/s 10 m R)	Ground Elev: 323 m
Fort Nelson, BC	UTM: 519748 E; 6515738 N; Z 10

Depth (m)	Method	Core Diameter (mm)	Soil Description	Graphical Representation	Sample Type	Sample Number	Field Blowcount (blows/300 mm) SPT	Field Vane (kPa) Post-Peak / Peak; Plastic Limit / Moisture Content / Liquid Limit	VW40758	Elevation (m)
12							20 40 60 80	10 20 30 40; 20 40 60 80		311
13	Solid Stem Auger	127	SPT blow counts per 3 inches (12.2 m to 12.8 m) : 4/5//7/7/8/10//11/12 N-value (N): 32 Recovery: 0.62 m			SPT8				310
14										309
15						9				308
16			End of borehole at 15.3 m (Target depth reached). - VW piezometer installed at 14.8 m upon completion and protected with a flush mount well cover. - Estimates of the soil consistency were determined from SPT blow counts, drill rig performance, and visual classification of recovered samples. - Reported SPT values are uncorrected field values. - SPT recovery is based on the length of the recovered sample compared to the distance driven. - Collar elevation and testhole coordinates are estimated based on existing topographic survey data.							307
17										306
18										305
19										304
20										303
21										302
22										301
23										300
24										299

TETRA TECH

Contractor: Geotech Drilling Services Ltd.	Completion Depth: 15.3 m
Drilling Rig Type: Fraste MDXL	Start Date: 2017 October 20
Logged By: DG	Completion Date: 2017 October 20
Reviewed By: JP	Page 2 of 2

APPENDIX C

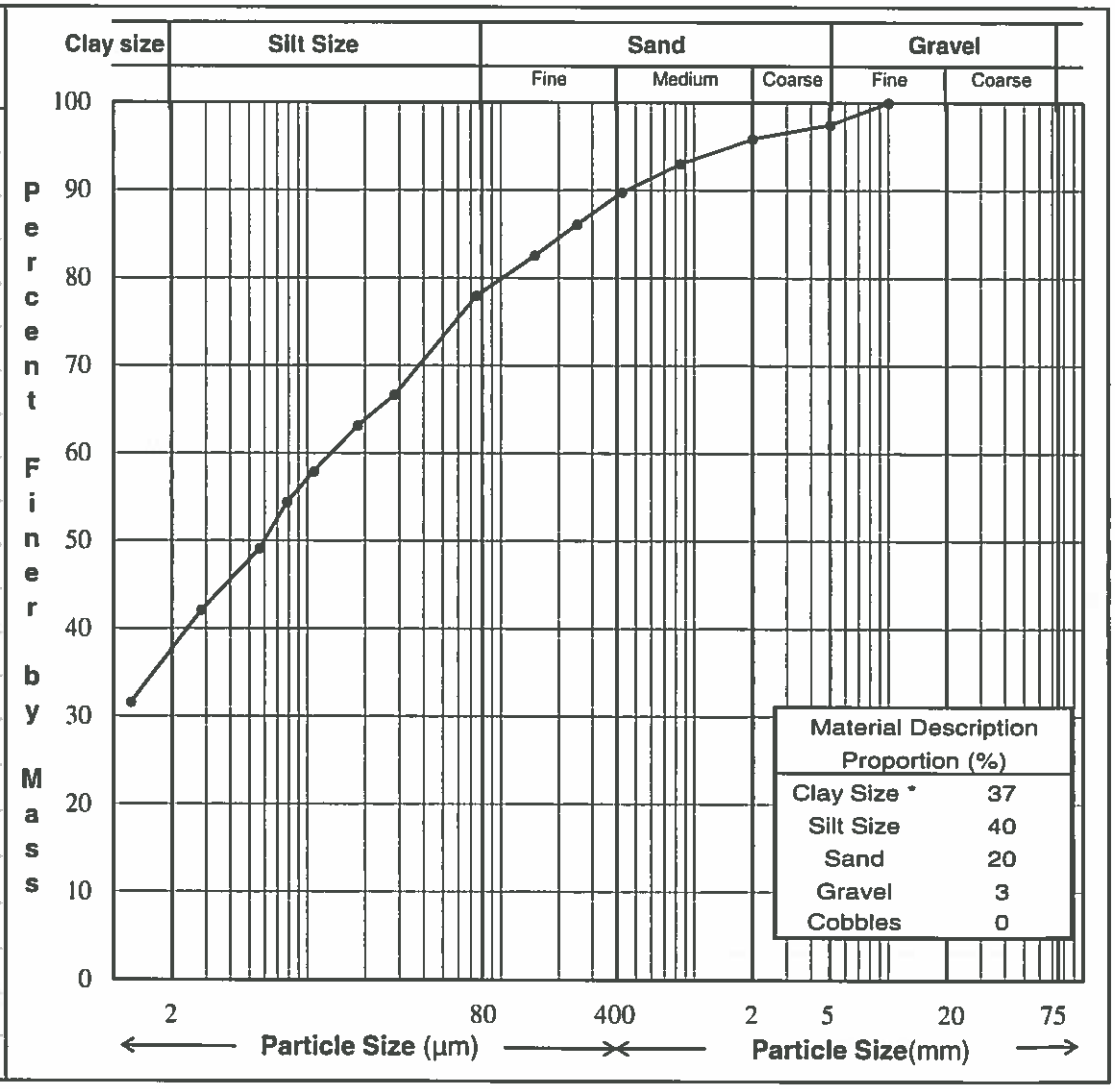
LABORATORY TEST RESULTS

PARTICLE SIZE ANALYSIS (Hydrometer) TEST REPORT

ASTM D7928

Project:	Alaska Highway Km 450.6	Sample No.:	420
Client:	Public Works And Government Services Canada	Borehole/ TP:	BH17-03
Project No.:	704-TRN.VHWY03091-01	Depth:	SPT 2 @ 5.8-6.4 m
Location:	Fort Nelson, BC	Date Tested	November 20, 2017
Description **:	CLAY, silty, some sand, trace gravel, stiff, moist, grey	Tested By:	BG

Particle Size	Percent Passing
100 mm	
75 mm	
50 mm	
38 mm	
25 mm	
19 mm	
13 mm	
10 mm	100
5 mm	97
2 mm	96
850 µm	93
425 µm	90
250 µm	86
150 µm	83
75 µm	78
28 µm	67
18 µm	63
11 µm	58
8 µm	54
6 µm	49
3 µm	42
1 µm	32



Remarks: * The description is behaviour based & subject to Tetra Tech Canada description protocols.

** Unless expressly stated, this test was performed by the Air Dry Method

Moisture Content= 18.5%

Reviewed By: _____ P.Eng.

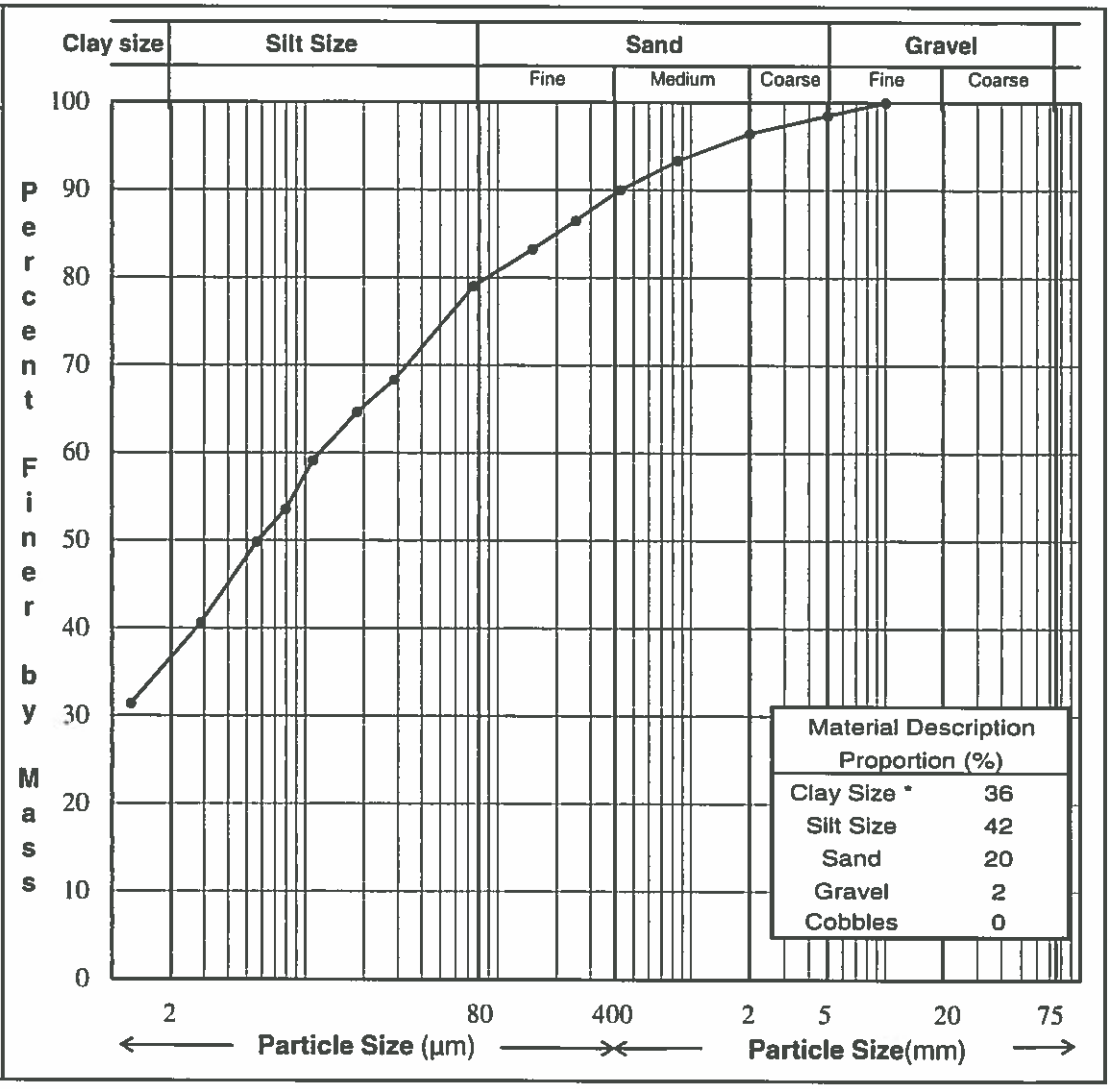
TETRA TECH

PARTICLE SIZE ANALYSIS (Hydrometer) TEST REPORT

ASTM D7928

Project:	Alaska Highway Km 450.6	Sample No.:	421
Client:	Public Works And Government Services Canada	Borehole/ TP:	BH17-03
Project No.:	704-TRN.VHWY03091-01	Depth:	SPT 5 @ 10.4-11.0 m
Location:	Fort Nelson, BC	Date Tested	November 20, 2017
Description **:	CLAY, silty, some sand, trace gravel, stiff, moist, grey	Tested By:	BG

Particle Size	Percent Passing
100 mm	
75 mm	
50 mm	
38 mm	
25 mm	
19 mm	
13 mm	
10 mm	100
5 mm	98
2 mm	96
850 µm	93
425 µm	90
250 µm	86
150 µm	83
75 µm	79
29 µm	68
18 µm	65
11 µm	59
8 µm	54
6 µm	50
3 µm	41
1 µm	31



Remarks: * The description is behaviour based & subject to Tetra Tech Canada description protocols.

** Unless expressly stated, this test was performed by the Air Dry Method

Moisture Content= 19.0%

Reviewed By: _____ P.Eng.

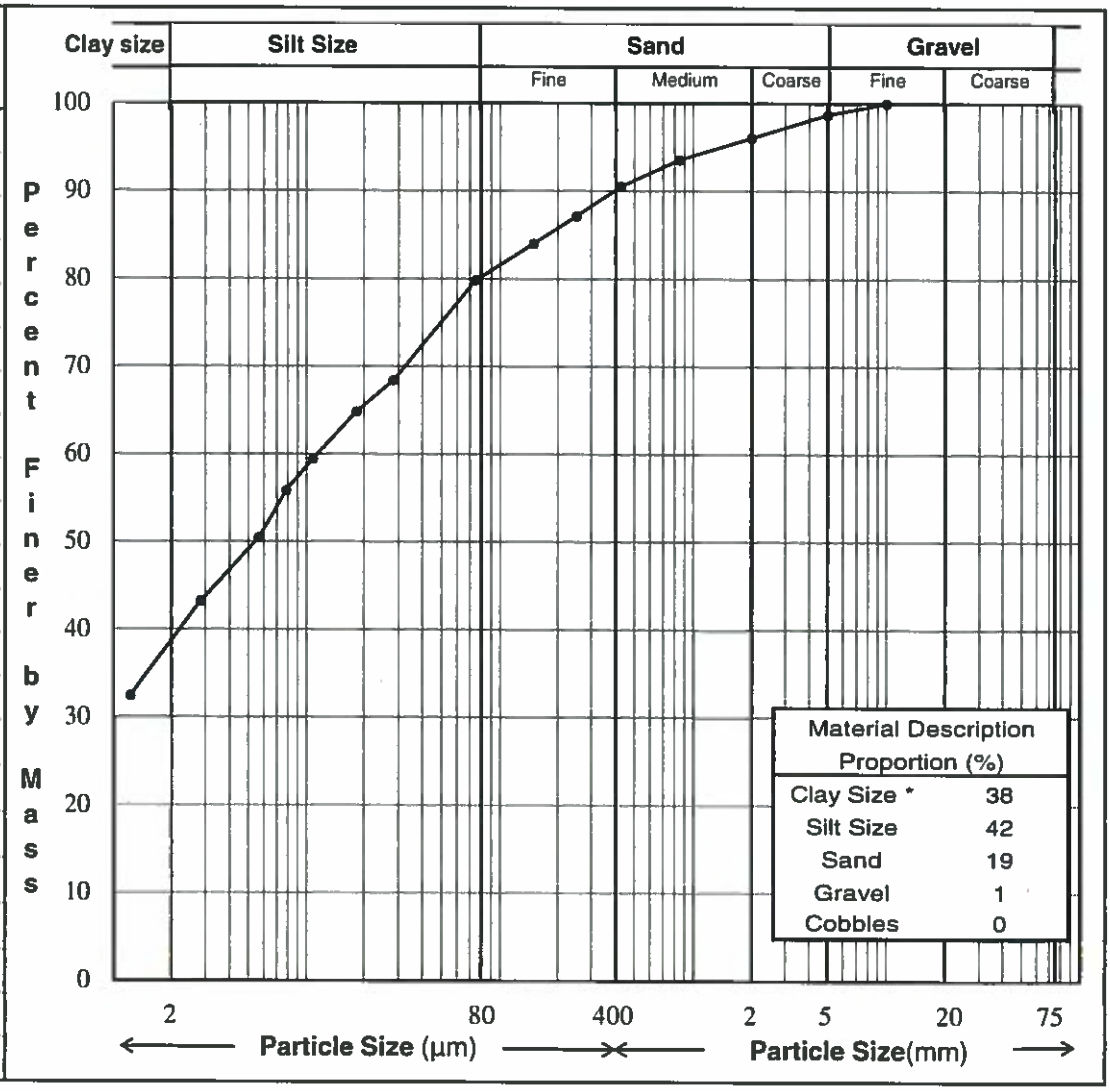
TETRA TECH

PARTICLE SIZE ANALYSIS (Hydrometer) TEST REPORT

ASTM D7928

Project:	Alaska Highway Km 450.6	Sample No.:	422
Client:	Public Works And Government Services Canada	Borehole/ TP:	BH17-01
Project No.:	704-TRN.VHWY03091-01	Depth:	B3 @ 4.4 m
Location:	Fort Nelson, BC	Date Tested	November 20, 2017
Description **:	CLAY, silty, some sand, trace gravel, stiff, moist, grey	Tested By:	BG

Particle Size	Percent Passing
100 mm	
75 mm	
50 mm	
38 mm	
25 mm	
19 mm	
13 mm	
10 mm	100
5 mm	99
2 mm	96
850 µm	94
425 µm	91
250 µm	87
150 µm	84
75 µm	80
28 µm	68
18 µm	65
11 µm	59
8 µm	56
6 µm	50
3 µm	43
1 µm	32



Remarks: * The description is behaviour based & subject to Tetra Tech Canada description protocols.

** Unless expressly stated, this test was performed by the Air Dry Method

Moisture Content= 15.8%

Reviewed By: _____ P.Eng.

TETRA TECH

APPENDIX D

INSTRUMENTATION DATA

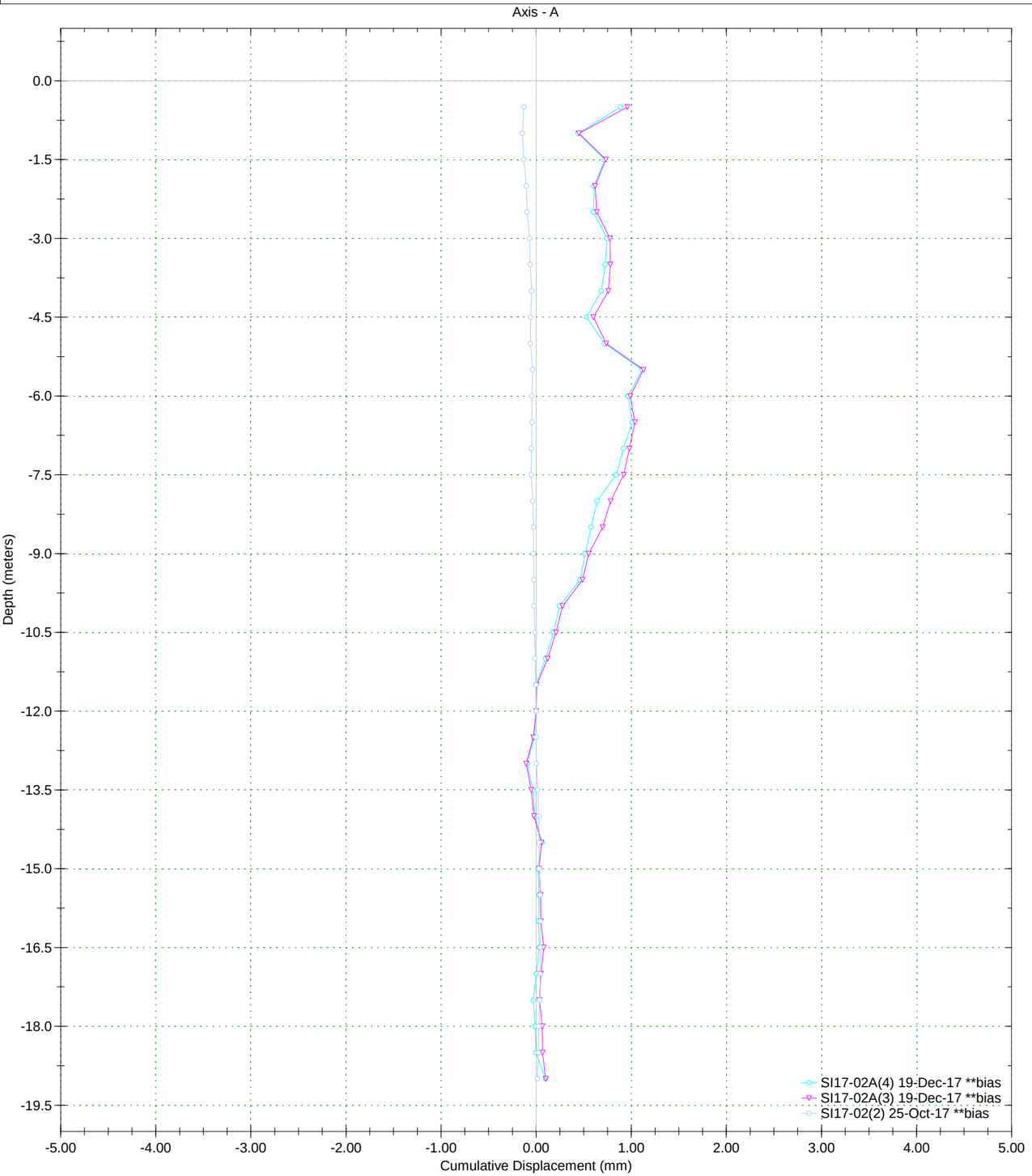
RST Instruments Ltd.

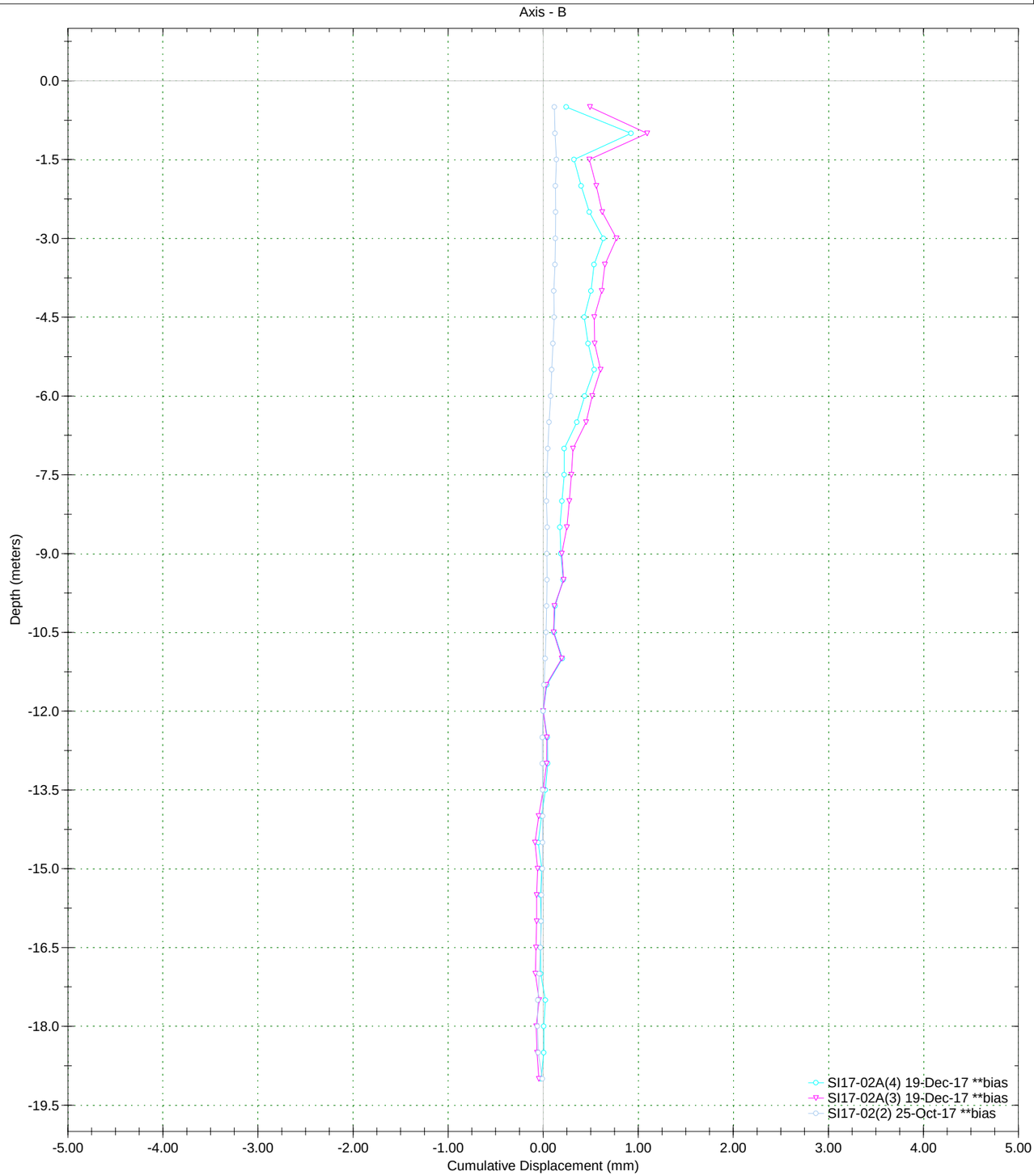
CUMULATIVE DISPLACEMENT

Inclinalysis v. 2.47.5

Borehole : SI17-02A
Project : Alaska Highway KM 450.6
Location :
Northing :
Easting :
Collar :

Spiral Correction : N/A
Collar Elevation : 0.0 meters
Borehole Total Depth : 19.0 meters
A+ Groove Azimuth :
Base Reading : 2017 Oct 25 11:59
Applied Azimuth : 0.0 degrees





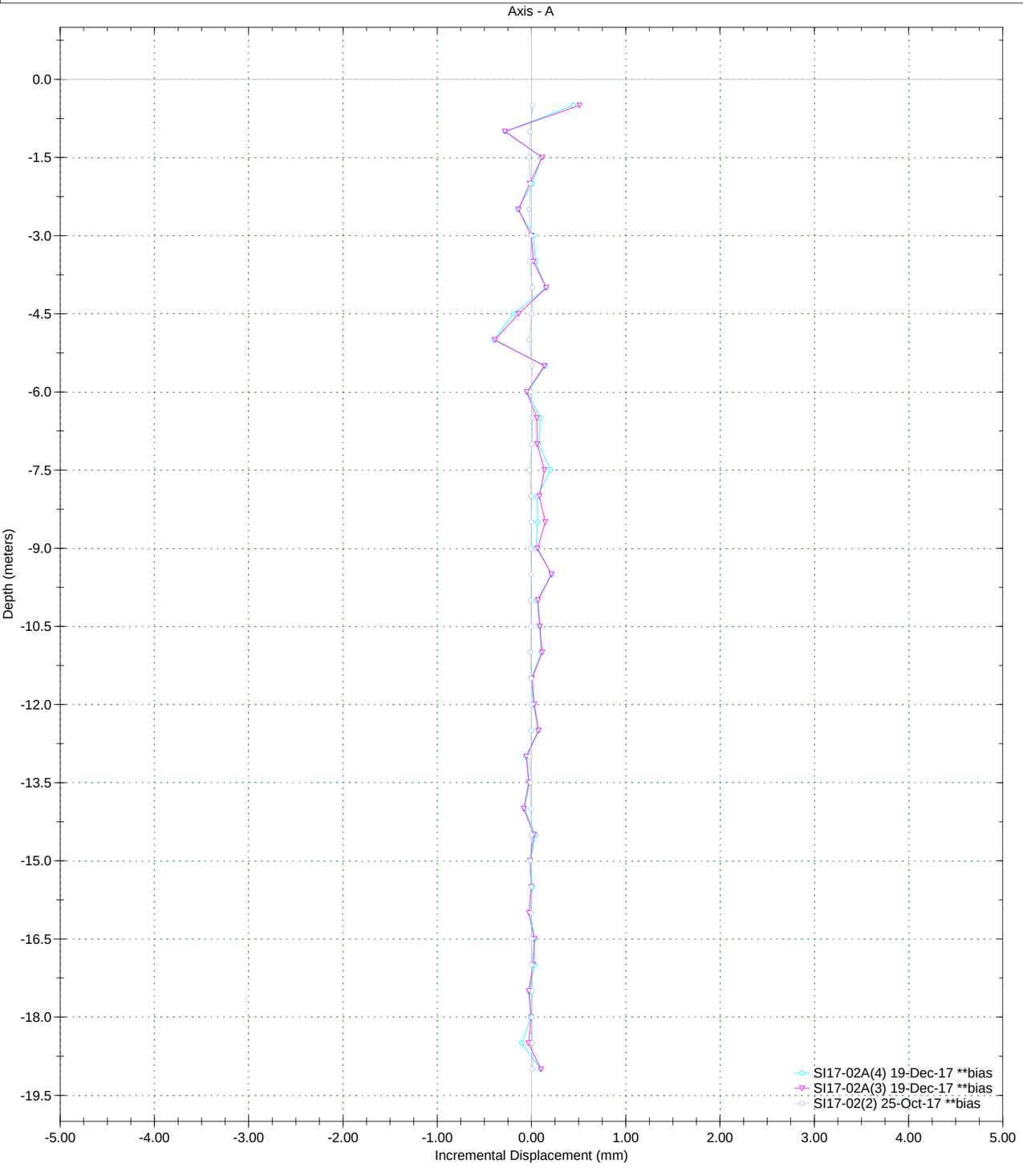
RST Instruments Ltd.

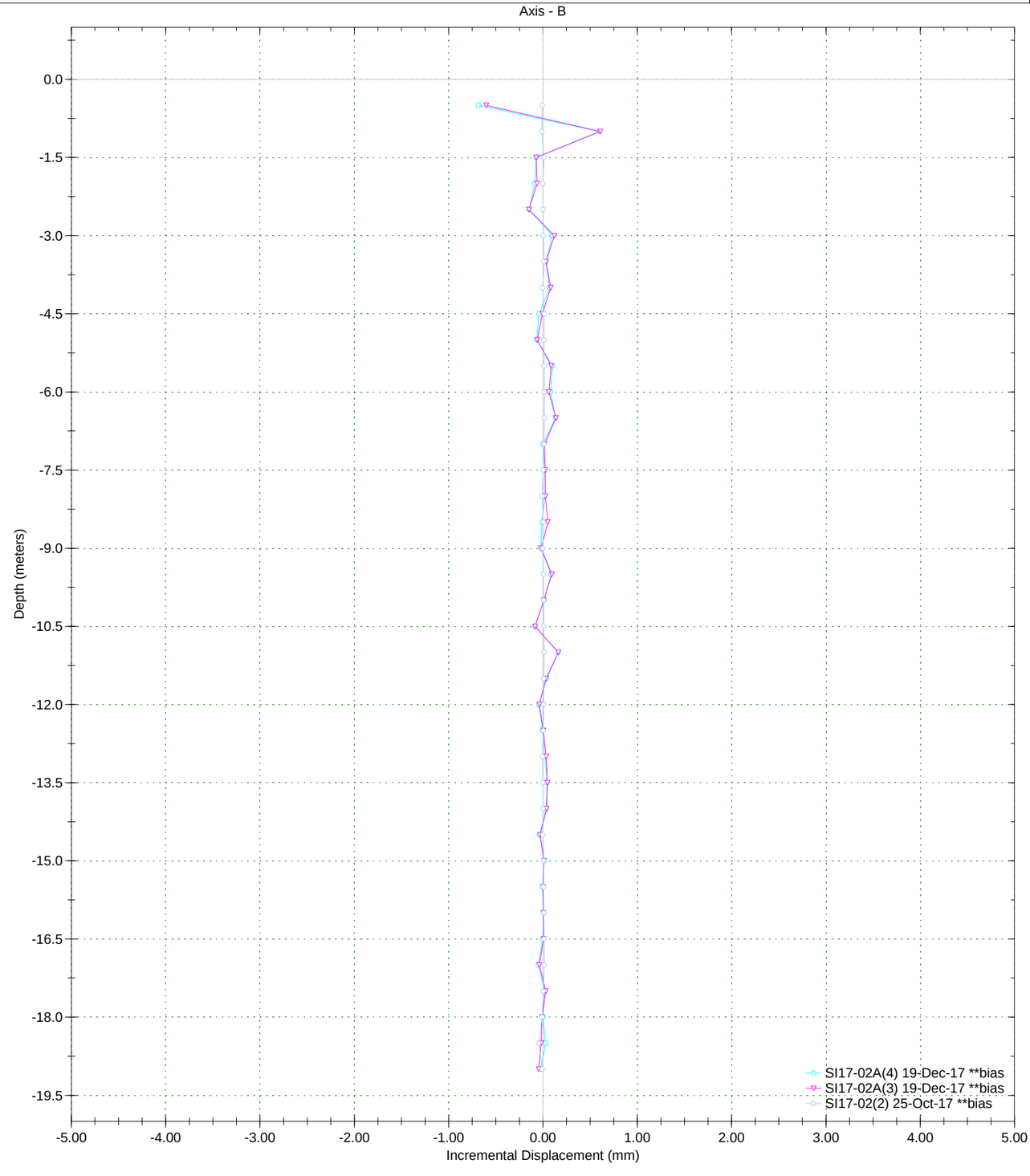
INCREMENTAL DISPLACEMENT

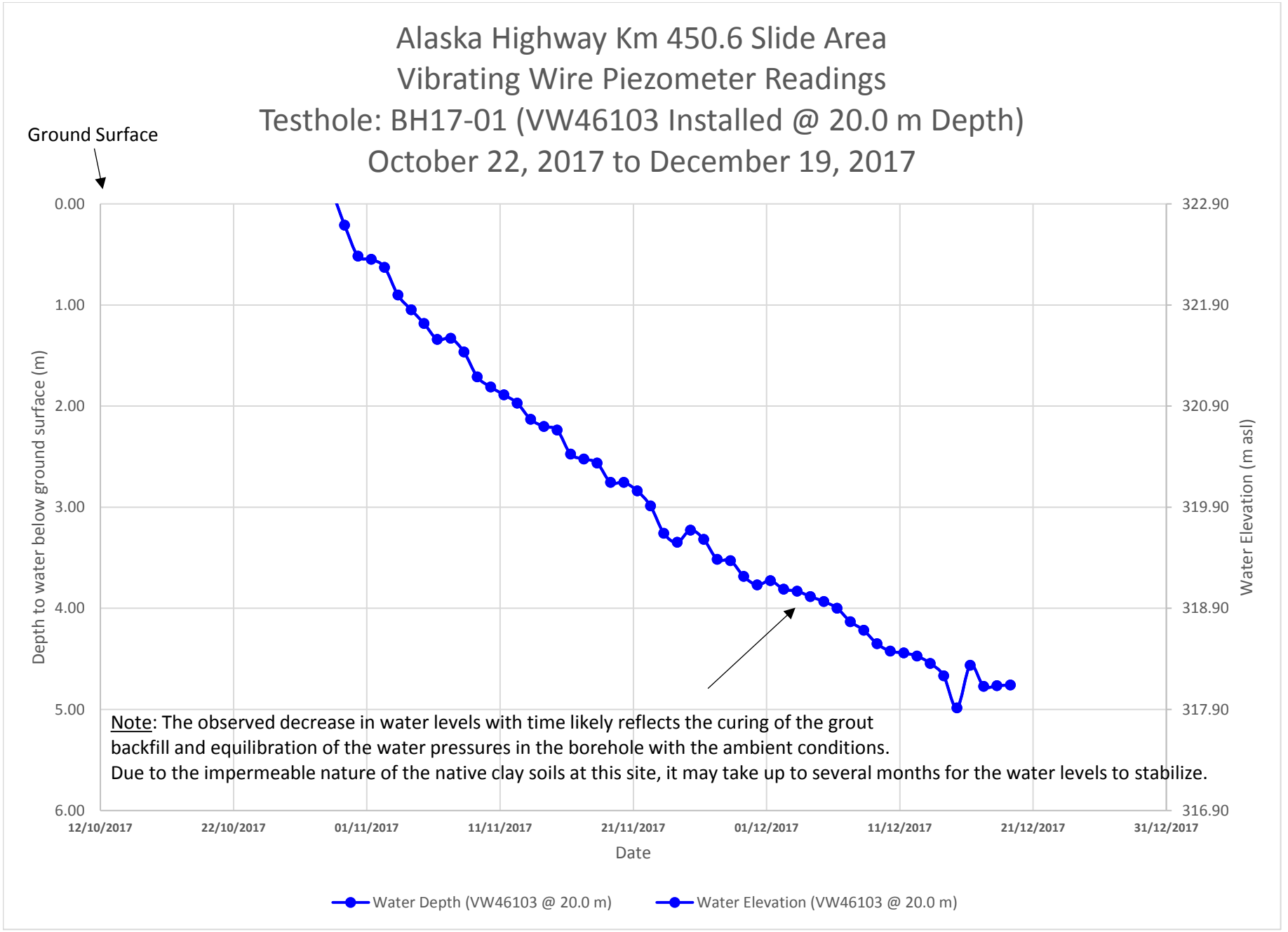
Inclinalysis v. 2.47.5

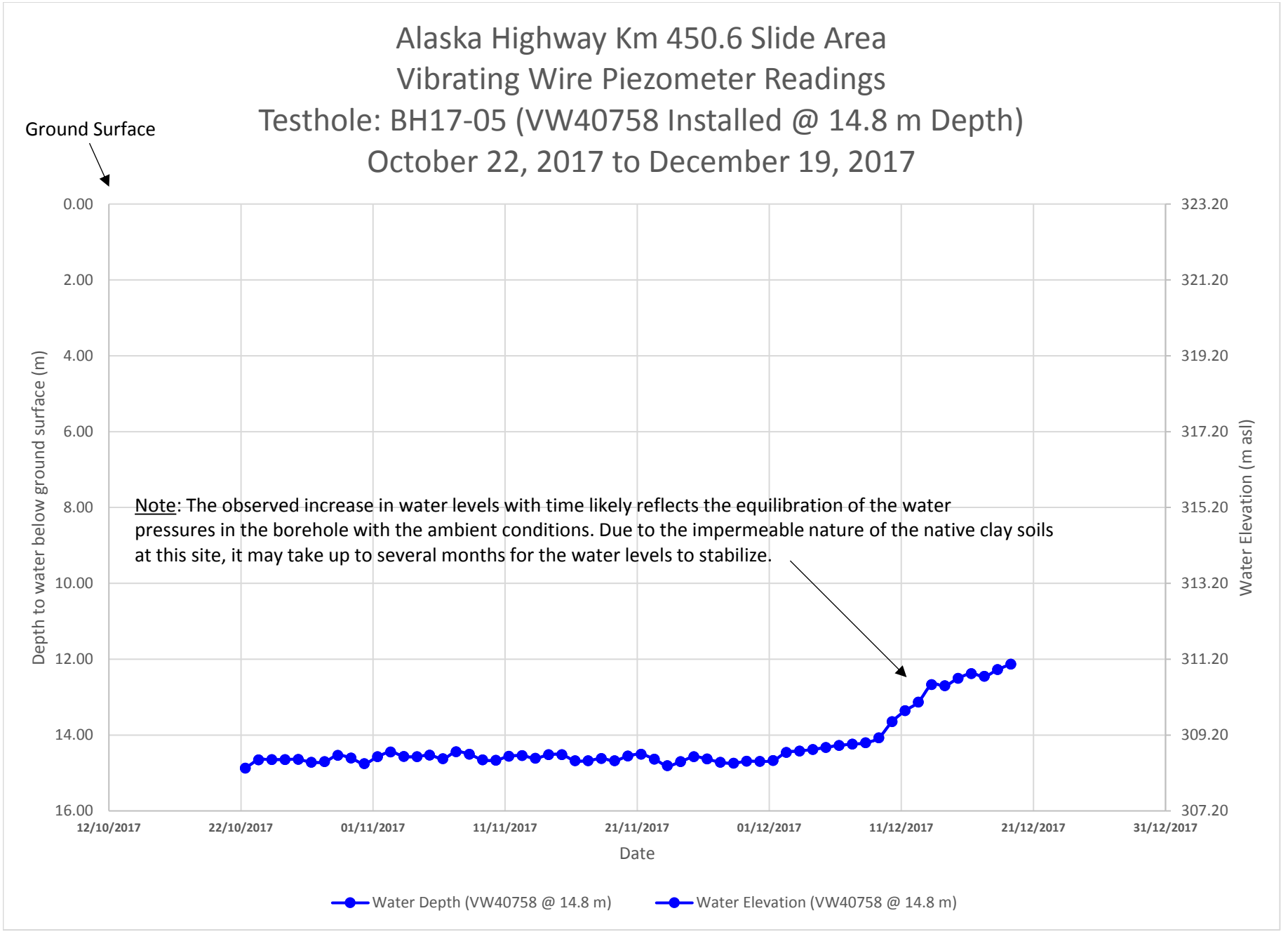
Borehole : SI17-02A
Project : Alaska Highway KM 450.6
Location :
Northing :
Easting :
Collar :

Spiral Correction : N/A
Collar Elevation : 0.0 meters
Borehole Total Depth : 19.0 meters
A+ Groove Azimuth :
Base Reading : 2017 Oct 25 11:59
Applied Azimuth : 0.0 degrees






Alaska Highway Km 450.6 Slide Area
Vibrating Wire Piezometer Readings
Testhole: BH17-01 (VW46103 Installed @ 20.0 m Depth)
October 22, 2017 to December 19, 2017
Ground Surface
Depth to water below ground surface (m)
0.00
1.00
2.00
3.00
4.00
5.00
6.00
Water Elevation (m asl)
322.90
321.90
320.90
319.90
318.90
317.90
316.90
12/10/2017
22/10/2017
01/11/2017
11/11/2017
21/11/2017
01/12/2017
11/12/2017
21/12/2017
31/12/2017
Date
Note: The observed decrease in water levels with time likely reflects the curing of the grout backfill and equilibration of the water pressures in the borehole with the ambient conditions.
Due to the impermeable nature of the native clay soils at this site, it may take up to several months for the water levels to stabilize.
Water Depth (VW46103 @ 20.0 m)
Water Elevation (VW46103 @ 20.0 m)


Alaska Highway Km 450.6 Slide Area
Vibrating Wire Piezometer Readings
Testhole: BH17-05 (VW40758 Installed @ 14.8 m Depth)
October 22, 2017 to December 19, 2017
Ground Surface
Note: The observed increase in water levels with time likely reflects the equilibration of the water pressures in the borehole with the ambient conditions. Due to the impermeable nature of the native clay soils at this site, it may take up to several months for the water levels to stabilize.
Depth to water below ground surface (m)
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
Water Elevation (m asl)
323.20
321.20
319.20
317.20
315.20
313.20
311.20
309.20
307.20
12/10/2017
22/10/2017
01/11/2017
11/11/2017
21/11/2017
01/12/2017
11/12/2017
21/12/2017
31/12/2017
Date
Water Depth (VW40758 @ 14.8 m)
Water Elevation (VW40758 @ 14.8 m)

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e-mail: info@rstinstruments.com • Website: www.rstinstruments.com

Calibration Record

Vibrating Wire Piezometer

Customer:	TETRA TECH EBA INC.	
Model:	VW2100-0.35	
Serial Number:	VW40758	
Mfg Number:	1637239	
Range:	350.0 kPa	
Temperature:	22.2 °C	
Barometric Pressure:	991.5 millibars	
Work Order Number:	212247	
Cable Length:	25 meters	
Cable Markings:	558342 m - 558366 m	
Cable Colour Code:	Red / Black (Coil)	Green / White (Thermistor)
Cable Type:	EL380004	
Thermistor Type:	3 kΩ	

Applied Pressure (kPa)	First Reading (B units)	Second Reading (B units)	Average Reading (B units)	Calculated Linear (kPa)	Linearity Error (% FS)	Polynomial Error (% FS)
0.0	8700	8700	8700	-0.2	-0.05	0.00
70.0	8014	8015	8015	70.0	0.01	0.00
140.0	7329	7329	7329	140.2	0.06	0.02
210.0	6647	6647	6647	210.0	0.01	-0.03
279.9	5964	5964	5964	280.0	0.02	0.01
350.0	5281	5282	5282	349.8	-0.05	0.00
			Max. Error (%):		0.06	0.03

Linear Calibration Factor:	**C.F.=**	**0.10239 kPa/B unit**
Regression Zero:	**At Calibration =**	**8698.4 B unit**
Temperature Correction Factor:	**Tk =**	**-0.1046 kPa/°C rise**

Polynomial Gage Factors (kPa) A: 1.0160E-07 B: -0.10381 C: 895.42

Pressure is calculated with the following equations:
Linear: $P(kPa) = C.F.(Li-Lc) - [Tk(Ti-Tc)] + [0.10(Bi-Bc)]$
Polynomial: $P(kPa) = A(Lc)^2 + BLc + C + Tk(Tc-Ti) - [0.10(Bc-Bi)]$

	Date (dd/mm/yy)	VW Readout Pos. B (Li)	Temp °C (Ti)	Baro (Bi)
Shipped Zero Readings:	13-Dec-16	8639	21.3	1026.8

Li, Lc = initial (at installation) and current readings
Ti, Tc = initial (at installation) and current temperature, in °C
Bi, Bc = initial (at installation) and current barometric pressure readings, in millibars
B units = B scale output of VW 2102, VW 2104, VW 2106 and DT 2011 readouts
B units = Hz^2 / 1000 ie: 1700Hz = 2890 B units

Technician: R. Zenteno

Date: 13-Dec-16

This instrument has been calibrated using standards traceable to the NIST in compliance with ANSI Z540-1

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Calibration Record

Vibrating Wire Piezometer

Customer:		Geotech Drilling Services Ltd.
Model:		VW2100-0.7
Serial Number:		**VW46101**
Mfg Number:		1732962
Range:		700.0 kPa
Temperature:		23.3 °C
Barometric Pressure:		998.8 millibars
Work Order Number:		215034
Cable Length:		35 meters
Cable Markings:		4110 m - 4144 m
Cable Colour Code:	Red / Black (Coil)	Green / White (Thermistor)
Cable Type:		EL380004
Thermistor Type:		3 kΩ

Applied Pressure (kPa)	First Reading (B units)	Second Reading (B units)	Average Reading (B units)	Calculated Linear (kPa)	Linearity Error (% FS)	Polynomial Error (% FS)
0.0	8776	8776	8776	-0.1	-0.01	0.01
140.0	7971	7971	7971	140.0	0.00	0.00
280.0	7167	7167	7167	279.9	-0.01	-0.02
420.0	6361	6361	6361	420.2	0.03	0.01
560.0	5557	5557	5557	560.1	0.02	0.02
700.0	4754	4755	4755	699.8	-0.03	-0.01
			Max. Error (%):		0.03	0.02

Linear Calibration Factor:	**C.F.=**	**0.17403 kPa/B unit**
Regression Zero:	**At Calibration =**	**8775.5 B unit**
Temperature Correction Factor:	**Tk =**	**0.02996 kPa/°C rise**

Polynomial Gage Factors (kPa) **A:** 6.0019E-08 **B:** -0.17485 **C:** 1529.9

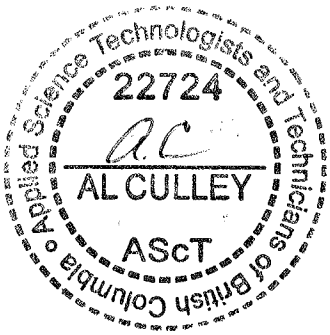
Pressure is calculated with the following equations:
Linear: $P(kPa) = C.F.(Li-Lc) - [Tk(Ti-Tc)] + [0.10(Bi-Bc)]$
Polynomial: $P(kPa) = A(Lc)^2 + BLc + C + Tk(Tc-Ti) - [0.10(Bc-Bi)]$

	Date (dd/mm/yy)	VW Readout Pos. B (Li)	Temp °C (Ti)	Baro (Bi)
Shipped Zero Readings:	6-Oct-17	8770	21.7	1018.0

Li, Lc = initial (at installation) and current readings
Ti, Tc = initial (at installation) and current temperature, in °C
Bi, Bc = initial (at installation) and current barometric pressure readings, in millibars
B units = B scale output of VW 2102, VW 2104, VW 2106 and DT 2011 readouts
B units = $Hz^2 / 1000$ ie: 1700Hz = 2890 B units

Technician: I. Kurchavov IK Date: 6-Oct-17

This instrument has been calibrated using standards traceable to the NIST in compliance with ANSI Z540-1



Document Number.: ELL0130K

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e-mail: info@rstinstruments.com • Website: www.rstinstruments.com

Calibration Record

Vibrating Wire Piezometer

Customer:		Geotech Drilling Services Ltd.
Model:		VW2100-0.7
Serial Number:		**VW46102**
Mfg Number:		1732963
Range:		700.0 kPa
Temperature:		23.3 °C
Barometric Pressure:		998.8 millibars
Work Order Number:		215034
Cable Length:		40 meters
Cable Markings:		4065 m - 4104 m
Cable Colour Code:	Red / Black (Coil)	Green / White (Thermistor)
Cable Type:		EL380004
Thermistor Type:		3 kΩ

Applied Pressure (kPa)	First Reading (B units)	Second Reading (B units)	Average Reading (B units)	Calculated Linear (kPa)	Linearity Error (% FS)	Polynomial Error (% FS)
0.0	8547	8547	8547	0.1	0.02	0.02
140.0	7719	7719	7719	139.8	-0.03	-0.03
280.0	6888	6889	6889	279.9	-0.02	-0.02
420.0	6058	6058	6058	420.0	0.00	-0.01
560.0	5225	5225	5225	560.5	0.07	0.07
700.0	4399	4400	4400	699.7	-0.04	-0.04
			Max. Error (%):		0.07	0.07

Linear Calibration Factor:	**C.F.=**	**0.16867 kPa/B unit**
Regression Zero:	**At Calibration =**	**8547.8 B unit**
Temperature Correction Factor:	**Tk =**	**-0.008536 kPa/°C rise**

Polynomial Gage Factors (kPa) **A:** 1.0729E-08 **B:** -0.16881 **C:** 1442.2

Pressure is calculated with the following equations:
Linear: $P(kPa) = C.F.(Li-Lc) - [Tk(Ti-Tc)] + [0.10(Bi-Bc)]$
Polynomial: $P(kPa) = A(Lc)^2 + BLc + C + Tk(Tc-Ti) - [0.10(Bc-Bi)]$

	Date (dd/mm/yy)	VW Readout Pos. B (Li)	Temp °C (Ti)	Baro (Bi)
Shipped Zero Readings:	6-Oct-17	8548	21.5	1018.0

Li, Lc = initial (at installation) and current readings
Ti, Tc = initial (at installation) and current temperature, in °C
Bi, Bc = initial (at installation) and current barometric pressure readings, in millibars
B units = B scale output of VW 2102, VW 2104, VW 2106 and DT 2011 readouts
B units = Hz^2 / 1000 ie: 1700Hz = 2890 B units

Technician: I. Kurchavov I.K. Date: 6-Oct-17

Applied Science Technologists and Technicians of British Columbia 22724 A.C. AL CULLEY ASCT

This instrument has been calibrated using standards traceable to the NIST in compliance with ANSI Z540-1

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e-mail: info@rstinstruments.com • Website: www.rstinstruments.com

Calibration Record

Vibrating Wire Piezometer

Customer:		Geotech Drilling Services Ltd.
Model:		VW2100-0.7
Serial Number:		**VW46103**
Mfg Number:		1732964
Range:		700.0 kPa
Temperature:		23.3 °C
Barometric Pressure:		998.8 millibars
Work Order Number:		215034
Cable Length:		40 meters
Cable Markings:		4024 m - 4063 m
Cable Colour Code:	Red / Black (Coil)	Green / White (Thermistor)
Cable Type:		EL380004
Thermistor Type:		3 kΩ

Applied Pressure (kPa)	First Reading (B units)	Second Reading (B units)	Average Reading (B units)	Calculated Linear (kPa)	Linearity Error (% FS)	Polynomial Error (% FS)
0.0	8719	8720	8720	0.2	0.03	0.01
140.0	7859	7860	7860	139.9	-0.01	-0.01
280.0	6999	6999	6999	279.7	-0.05	-0.03
420.0	6135	6135	6135	420.0	0.00	0.01
560.0	5271	5271	5271	560.3	0.04	0.04
700.0	4411	4411	4411	699.9	-0.01	-0.03
				Max. Error (%):	0.05	0.04

Linear Calibration Factor:	**C.F.=**	**0.16240 kPa/B unit**
Regression Zero:	**At Calibration =**	**8721.0 B unit**
Temperature Correction Factor:	**Tk =**	**-0.02518 kPa/°C rise**

Polynomial Gage Factors (kPa) **A:** -5.4722E-08 **B:** -0.16168 **C:** 1414.1

Pressure is calculated with the following equations:
Linear: $P(kPa) = C.F.(Li-Lc) - [Tk(Ti-Tc)] + [0.10(Bi-Bc)]$
Polynomial: $P(kPa) = A(Lc)^2 + BLc + C + Tk(Tc-Ti) - [0.10(Bc-Bi)]$

	Date (dd/mm/yy)	VW Readout Pos. B (Li)	Temp °C (Ti)	Baro (Bi)
Shipped Zero Readings:	6-Oct-17	8710	21.3	1018.0

Li, Lc = initial (at installation) and current readings
Ti, Tc = initial (at installation) and current temperature, in °C
Bi, Bc = initial (at installation) and current barometric pressure readings, in millibars
B units = B scale output of VW 2102, VW 2104, VW 2106 and DT 2011 readouts
B units = $Hz^2 / 1000$ ie: 1700Hz = 2890 B units

Technician: I. Kurchavov I K Date: 6-Oct-17

This instrument has been calibrated using standards traceable to the NIST in compliance with ANSI Z540-1

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