



Public Services and Procurement Canada

Requisition No: EZ899-220517

DRAWINGS & SPECIFICATIONS

For:
Km 568-573 (Tetsa River) Reconstruction - Phase 2,
Alaska Highway, BC

Project No. R.112220.002

June 2, 2021

APPROVED BY:
Robertson, Ian

Digitally signed by: Robertson, Ian
DN: CN = Robertson, Ian C = CA O = GC OU = PWGSC-TPSGC
Date: 2021.06.04 07:25:50 -07'00'

Regional Manager, AES

Date

Chris Patterson

Digitally signed by Chris Patterson
Date: 2021.06.03 16:14:13 -07'00'

Construction Safety Coordinator

Date

TENDER:

Haghighi, Reza

Digitally signed by Haghighi, Reza
Date: 2021.06.03 16:16:13 -07'00'

Project Manager

Date

Contract Specifications		Page
DIVISION 1 - GENERAL REQUIREMENTS		
01 11 10	Summary of Work	1
01 14 00	Work Restrictions, Access Development, Construction Staging, and Restoration	17
01 25 20	Mobilization and Demobilization	25
01 29 00	Payment Procedures	28
01 31 00	Project Management and Coordination	33
01 32 16	Construction Progress Schedules – Bar (Gantt) Chart	39
01 33 00	Submittal Procedures	45
01 35 00	Traffic Management	51
01 35 33	Health and Safety	70
01 35 43	Environmental Protection	87
01 45 00	Quality Management	108
01 52 00	Construction Facilities and Equipment	125
01 56 00	Temporary Barrier and Enclosures	129
01 59 10	Construction Camp	131
01 74 11	Cleaning	133
01 77 00	Closeout Procedures	135
01 78 00	Closeout Submittals	137
DIVISION 2 – EXISTING CONDITIONS		
02 41 13	Selective Site Demolition	139
02 61 33	Hazardous Materials	143
DIVISION 10 – SPECIALTIES		
10 14 53	Traffic Signs and Gates	147



DIVISION 31 – EARTHWORKS

31 05 16	Aggregates: General	153
31 11 00	Tree Clearing	165
31 24 14	Roadway Excavation, Embankment, and Compaction	167
31 26 13	Pulverization of Existing BST	176
31 37 00	Riprap	180

DIVISION 32 – EXTERIOR IMPROVEMENTS

32 11 18	Select Subgrade Fill Material	189
32 11 19	Sub-Base Course	193
32 11 24	Crushed Base Gravel	197
32 15 60	Roadway Dust Control	201

DIVISION 33 – SPECIALTY

33 42 13	Pipe Culverts	202
----------	---------------	-----

APPENDICES

Appendix	Description
A	Written Communication / Document Management Protocol
B	Project Specific Health and Safety Plan Template <i>Note: The Project Specific Health and Safety Plan Template is provided to assist the Contractor. PSPC takes no responsibility for the completeness of this template. The Contractor is responsible for verifying that all required information is provided in their Project Specific Health and Safety Plan.</i>
C	Category 3 Traffic Management Plan Template <i>Note: The Category 3 Traffic Management Plan Template is provided to assist the Contractor. PSPC takes no responsibility for the completeness of this template. The Contractor is responsible for verifying that all required information is provided in their Traffic Management Plan.</i>
D	On-Site Construction Start-up Form
E	Progress Payment Submittal Form
F	Measurement for Payment Survey Details Form
G	General Contractor & Sub-Contractor Construction Equipment List
H	Environmental Protection Plan (EPP) – Checklist
I	Responsibility Checklist For Authorizations / Approvals / Notifications / Permitting
J	Relevant Environmental Publications
K	Environmental Overview Assessment (EOA)
L	Example Culvert Construction Staging and Traffic Detour Drawings
M	Pit Location Plan
N	Geotechnical Exploration Data Report – Alaska Highway Km 568-573 (Tetsa River) Reconstruction Phase 2, Tetra Tech – May 2021

REFERENCE DOCUMENTATION

Standards and Best Practices for Instream Works, British Columbia Ministry of Land and Air Protection Ecosystem Standards and Planning Biodiversity Branch – March 2004.

Available online at:

<http://www.env.gov.bc.ca/wld/documents/bmp/iswstdsbpsmarch2004.pdf>

Land Development Guidelines for the Protection of Aquatic Habitat, Fisheries and Oceans – September 1993.

Available online at:

<http://www.dfo-mpo.gc.ca/Library/165353.pdf>

Manual of Standard Traffic Signs & Pavement Markings, BC Ministry of Transportation and Highways – September 2000.

Available online at:

https://www2.gov.bc.ca/assets/gov/driving-and-transportation/transportation-infrastructure/engineering-standards-and-guidelines/traffic-engineering-and-safety/traffic-engineering/traffic-signs-and-pavement-markings/manual_signs_pavement_marking.pdf

BC Ministry of Transportation and Infrastructure, Traffic Management Manual for Work on Roadways (Office Edition) – 2020 Edition and applicable Amendments available at time of tender closing.

Available online at:

<https://www2.gov.bc.ca/gov/content/transportation/transportation-infrastructure/engineering-standards-guidelines/traffic-engineering-safety/trafficmanagementmanual>

2020 Standard Specifications for Highway Construction, BC Ministry of Transportation and Infrastructure – November 1, 2020 – Volume 1 and 2 and applicable Amendments available at time of tender closing.

Available online at:

<http://www2.gov.bc.ca/gov/content/transportation/transportation-infrastructure/engineering-standards-guidelines/standard-specifications-for-highway-construction>

BC Ministry of Transportation and Infrastructure, Recognized Product List.

Available online at:

<http://www2.gov.bc.ca/gov/content/transportation/transportation-infrastructure/engineering-standards-guidelines/recognized-products-list>

BC Ministry of Transportation and Infrastructure, Manual of Standard Traffic Signs & Pavement Markings.

Available online at:

<https://www2.gov.bc.ca/gov/content/transportation/transportation-infrastructure/engineering-standards-guidelines/traffic-engineering-safety/traffic-signs-markings>

Public Works and Government Services Canada – Acquisition Forms

Available online at:

<http://www.tpsgc-pwgsc.gc.ca/app-acq/forms/formulaires-forms-eng.html>

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

Available online at:

<https://www.cca-acc.com/wp-content/uploads/2020/06/CCA-COVID-19-Standardized-Protocols-for-All-Canadian-Construction-Sites-05-26-20.pdf>

WorkSafeBC Construction and COVID-19 Safety

Available online at:

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

Alberta Transportation, Alberta Transportation Test (ATT) procedures.

Available online at:

<https://www.alberta.ca/alberta-transportation-test-att-procedures.aspx>

LIST OF CONTRACT DRAWINGS

Sheet No.	Title	Drawing Number	Revision Number
1	Cover Page	C000	0
2	Project Location Plan, Project Key Plan, Drawing Index, Survey Control Monuments and Legend	C001	0
3	Highway Plan / Profile: Sta. 566+935 to Sta. 567+480	C101	0
4	Highway Plan / Profile: Sta. 567+480 to Sta. 568+140	C102	0
5	Highway Plan / Profile: Sta. 568+140 to Sta. 568+820	C103	0
6	Highway Plan / Profile: Sta. 568+820 to Sta. 569+480	C104	0
7	Highway Plan / Profile: Sta. 569+480 to Sta. 570+140	C105	0
8	Highway Plan / Profile: Sta. 570+140 to Sta. 570+320	C106	0
9	Tetsa River Lodge Access Plan	C107	0
10	Culvert Sta. 568+840 Plan / Profile	C201	0
11	Culvert Sta. 569+950 Plan / Profile	C202	0
12	Highway Typical Sections	C301	0
13	Access Road Typical Section and Profile	C302	0
14	Culvert Typical Sections and Details	C303	0
15	Culvert Sta. 568+840 Typical Sections	C304	0
16	Culvert Sta. 569+950 Typical Sections	C305	0
17	Culvert Fish Baffle Details	C306	0
18	Sign Details	C307	0
19	Highway Cross Sections: Sta. 566+940 to Sta. 567+320	C401	0
20	Highway Cross Sections: Sta. 567+340 to Sta. 567+560	C402	0
21	Highway Cross Sections: Sta. 567+580 to Sta. 567+760	C403	0

Sheet No.	Title	Drawing Number	Revision Number
22	Highway Cross Sections: Sta. 567+780 to Sta. 568+040	C404	0
23	Highway Cross Sections: Sta. 568+060 to Sta. 568+280	C405	0
24	Highway Cross Sections: Sta. 568+300 to Sta. 568+560	C406	0
25	Highway Cross Sections: Sta. 568+580 to Sta. 568+800	C407	0
26	Highway Cross Sections: Sta. 568+820 to Sta. 569+040	C408	0
27	Highway Cross Sections: Sta. 569+060 to Sta. 569+400	C409	0
28	Highway Cross Sections: Sta. 569+420 to Sta. 569+640	C410	0
29	Highway Cross Sections: Sta. 569+660 to Sta. 569+920	C411	0
30	Highway Cross Sections: Sta. 569+940 to Sta. 570+240	C412	0
31	Highway Cross Sections: Sta. 570+260 to Sta. 570+320	C413	0
32	Sta. 568+840 Culvert Environmental Construction Staging – Plan View Phase 1	C501	0
33	Sta. 568+840 Culvert Environmental Construction Staging – Plan View Phase 2	C502	0
34	Sta. 568+840 Culvert Environmental Construction Staging – Plan View Phase 3	C503	0
35	Sta. 569+950 Culvert Environmental Construction Staging – Plan View Phase 1	C504	0
36	Sta. 569+950 Culvert Environmental Construction Staging – Plan View Phase 2	C505	0
37	Environmental Construction Staging – Check Dam & Fish Stop Net Details	C506	0

SECTION INCLUDES:

PART 1 – GENERAL:

- 1.1 Order of Precedence.
- 1.2 Work Covered by Contract Documents.
- 1.3 Codes.

PART 2 – PRODUCTS:

- 2.1 Owner Supplied Materials (Outside Limits of Work).

PART 3 – EXECUTION:

- 3.1 Site Visit.
- 3.2 Work Completion.
- 3.3 Contractor's Use of Site.
- 3.4 Special Precautions.
- 3.5 Survey.
- 3.6 Contract Drawings.
- 3.7 Electronic Contract Drawings.
- 3.8 Contract Submittals.
- 3.9 Supervisory Personnel.
- 3.10 Special Requirements.
- 3.11 Work by Others.
- 3.12 Departmental Representative's Office Trailer.
- 3.13 Use of Owner Gravel Pits, Quarries and Maintenance Yards.
- 3.14 Contractor's Personnel.

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 33) and an item found in one of the Appendices (Reference Documents), the main body of the Specifications (Division 1 – Division 33) 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 highway realignment and reconstruction from Km 565.9 to Km 570.32 of the Alaska Highway, BC, between Fort Nelson, BC and Watson Lake, YT.
- 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 Project Management including all requirements of Section 01 31 00 – Project Management and Coordination.
- .2 Contract submittals (using “CentralCollab”) prior to and during the work (see 3.9 – Contract Submittals, Section 01 25 20 – Mobilization and Demobilization and Section 01 33 00 – Submittal Procedures).
- .3 Traffic management, including maintaining safe and efficient public traffic flow through the limits of the work via the implementation of the Contractor’s construction staging plans with the details of all required temporary lanes, traffic control, signage, and detours for the duration of the works.
- .4 Quality Management and Quality Control.
- .5 Environmental protection and monitoring.
- .6 Surveys (construction layout, payment quantities, as-built survey, and others as required).

-
- .7 Development of construction access and temporary berms to facilitate construction. Restoration of the disturbed areas following the construction.
 - .8 Clearing, chipping / mulching, removal, and disposal of trees, brush and other riparian vegetation within the construction footprint necessary to facilitate construction of the works.
 - .9 Grubbing of stumps and stripping of organic materials within the designated construction footprint, including loading, hauling and offsite disposal.
 - .10 Pulverization of existing and decommissioned portions of highway Bituminous Surface Treatment (BST).
 - .11 Excavation, transport, place, and compact material for roadway Embankment.
 - .12 Excavation, manufacture, transport, place and compact Crushed Base Gravel, Sub-Base Course, and Select Subgrade Fill material for roadway construction.
 - .13 Removal and offsite disposal of existing CSP culverts and Wood Stave (creosote treated wood) culverts.
 - .14 Supply and install drainage infrastructure including Corrugated Steel Pipe (CSP) Culverts and Steel Pipe Culverts, fish baffles, bentonite, natural substrate, culvert inlet and outlet riprap protection, inlet and outlet channel realignment, and ditch construction.
 - .15 Remove and stockpile for re-use by others existing signage and posts.
 - .16 Remove, temporarily stockpile and reinstall existing traffic signs.
 - .17 Supply and install permanent traffic signs and posts.
 - .18 Salvage and delivery of existing advertising signs.
 - .19 Remove, temporarily stockpile and reinstall existing gates.
 - .20 Restoration to pre-construction conditions.
 - .21 Roadway dust control.

- .22 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.
 - .3 Other codes of Local, Provincial, or Federal application (in the case of conflict or discrepancy, the more stringent requirements shall apply).
- .2 Perform all instream work and riparian work in accordance with the Ministry of Forests, Lands, Natural Resource Operations, and Rural Development (FLNRORD) Section 11 Approval for Instream Work (to be provided to the Contractor prior to the start of construction), the Environmental Overview Assessment (EOA) (Appendix K), and the Contract requirements.

PART 2 – PRODUCTS

- 2.1 Owner Supplied Materials (Outside Limits of Work) .1 PSPC is providing access to the “as-is” Corrugated Steel Pipe (CSP) culverts located at PSPC’s Fort Nelson Maintenance Yard (Airport Drive, Fort Nelson) and PSPC’s Liard Maintenance Yard (Km 762.5 of the Alaska Highway), for use by the Contractor on this project. See Section 33 42 13 – Pipe Culverts for more details. The Contractor shall provide a minimum of three (3) days’ notice prior to requiring access to PSPC’s maintenance yards to collect materials. Access to PSPC’s maintenance yards 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 diameters of CSP culverts are available for use by the Contractor:
- .1 600 mm diameter.
 - .2 800 mm diameter.
 - .3 900 mm diameter.
 - .4 1050 mm diameter.
 - .5 1200 mm diameter.
- .2 PSPC is providing access to the “as-is” granular materials stockpiled in PSPC’s pit (Km 565.9 of the Alaska Highway, see Pit Location Plan in Appendix M). Various sizes of

granular material may be available for use by the Contractor as Crushed Base Gravel, Sub-Base Course, Select Subgrade Fill, and Embankment, or the Contractor may have to manufacture Crushed Base Gravel, Sub-Base Course, and/or Select Subgrade Fill from the in-situ materials.

- .3 PSPC is providing access to in-situ materials from Wood Creek Rock Quarry (Km 651.0 of the Alaska Highway). Various sizes of Riprap may be available for use by the Contractor as Riprap, or the Contractor may have to manufacture Riprap from the in-situ materials. The Contractor will be responsible for sorting through and stockpiling rock and selecting the appropriate rock size or manufacturing the appropriate rock size (see Section 31 37 00 – Riprap for more details). Should the Contractor choose to manufacture the rock using blasting, the Contractor shall be responsible to obtain all necessary permits.
- .4 Should the Contractor choose to use the in-situ materials from Km 565.9 pit (see Pit Location Plan in Appendix M) and Wood Creek Rock Quarry, the Contractor will be responsible to ensure the selected materials achieve the gradation requirements and other product requirements as detailed for each product type within Section 31 05 16 – Aggregates: General, Section 31 37 00 – Riprap, Section 32 11 18 – Select Subgrade Fill Material, Section 32 11 19 – Sub-Base Course, and Section 32 11 24 – Crushed Base Gravel.
- .5 PSPC is providing the Contractor access to the cut slope between Km 572.3 and Km 572.5 for the excavation and screening / manufacture of Embankment (see Section 31 05 16 – Aggregates: General, and Section 31 24 14 – Roadway Excavation, Embankment, and Compaction for further details).
- .6 The Departmental Representative shall only approve the use of the cut slope between Km 572.3 and Km 572.5 for the excavation and screening / manufacture of Embankment should:
 - .1 The Contractor exhausts existing material (i.e. shale) stockpiled at PSPC's existing pit at Km 565.9 designated for use by the Departmental Representative.
 - .2 The Contractor show all suitable materials excavated within the limits of construction have been exhausted.

- .3 The Contractor shows that materials excavated within the limits of construction cannot achieve the required materials properties.

PART 3 – EXECUTION

3.1 Site Visit

- .1 There is no scheduled site visit. However, it is recommended that bidders make inquiries or investigations necessary to become thoroughly acquainted with the site, as well as the nature and extent of the work.
- .2 Submission of a bid 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 November 12, 2021.
- .3 Achieve Completion by November 15, 2021.
- .4 The project Notification and Change Approval permitting under the Provincial Water Sustainability Act for instream work has been submitted to the applicable regulatory authorities and is in process. The timeline for receipt of the Notification and Change Approval is not known. The very earliest PSPC expects to receive the Notification is early-June 2021. The very earliest PSPC expects to receive the Change Approval is mid-September 2021.
- .5 Onsite project work within 30 m of waterways, including removal and replacement of existing culverts, may not start until the applications for Notification and Change Approval under the provincial Water Sustainability Act, and all other environmental permits applied for by the Departmental Representative have been approved by the applicable regulatory authorities and the necessary documentation has been received by the Departmental Representative. Should the environmental permits not be approved by the applicable regulatory authorities within the timelines desired by the Departmental Representative, the Departmental Representative may at their sole discretion undertake changes to the work as per GC6.1 – Changes in the Work and/or termination of the Contract as per GC7.3 – Termination of Contract.
- .6 The instream construction on this project shall be completed within the dates indicated on the FLNRORD Section 11

Approval and “DFO Authorization for Instream Work” (to be provided to the Contractor prior to the start of construction), in conformance with Section 01 35 43 – Environmental Protection, and the Environmental Overview Assessment (EOA) (Appendix K).

- .7 Works may need to be temporarily 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 high water flows 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 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.
- .8 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.
- .9 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.
- .10 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.

-
- .11 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 Relocation of the existing fibre optic utility will be undertaken by others prior to or during the project work if it is determined that the fibre optic line interferes with the permanent work or if it may be damaged by the works. The Contractor shall allow the utility company the opportunity to locate and assess the potential proposed work / fibre optic line conflicts within the limits of the work. Where the fibre optic line interferes with the work the utility company may abandon the existing fibre optic line and install a new fibre optic line beyond the limits of work. See Subsection 1.3 Utilities in Section 01 14 00 – Work Restrictions, Access Development, Construction Staging, and Restoration for further details.
- .3 Unless where identified on the Contract Drawings, existing structures, signs, utilities, Bituminous Surface Treatment (BST), culverts, cut & fill slopes, ditches, 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 surveys, quantity surveys, and as-built surveys shall be considered incidental to the work and will not be 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 five (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 (other monuments not listed on the Contract Drawings shall not be used). Report to the Departmental Representative when a working control point is lost or destroyed as a result 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 all such property is covered by the survey or not.
- 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 four (4) sets of 609.6 mm x 914.4 mm (24" x 36") and six (6) sets of 279.4 mm x 431.8 mm (11" x 17") "Issued for Construction" or "Issued for Tender" hardcopy Contract Drawing sets. Preparation and plotting of the hardcopy 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 the Departmental Representative's review, all required Contract Submittals as detailed in the relevant sections of the Contract Specifications. Work affected by the submittals shall not proceed until the submittal is accepted by the Departmental Representative. The Contractor shall allow in the construction schedule 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 Cash flow forecasting (see Section 01 31 00 – Project Management and Coordination).
- .3 Traffic Management Plan (see Section 01 35 00 – Traffic Management).
- .4 Project Specific Health and Safety Plan (see Section 01 35 33 – Health and Safety and Appendix B), including:
 - .1 Appendix 1: Preliminary Hazard Assessment Form.
 - .2 Appendix 2: Confirmation of Prime Contractor's Main Responsibilities Under the WorkSafeBC Occupational Health and Safety Regulations and Worker's Compensation Act Form.
 - .3 Appendix 3: Contractor's COVID-19 Safe Work Plan.
 - .4 Appendix 4: Contractor Daily Toolbox Meeting Form.
 - .5 Appendix 5: Site Safety Orientation Form.
 - .6 Appendix 6: Incident / Accident Report Template.
 - .7 Appendix 7: Key Member Resumes and Safety Certifications.
 - .8 Appendix 8: Local Hospital Maps.

-
- .9 Appendix 9: Safe Work Procedures.
 - .5 Environmental Protection Plan (see Section 01 35 43 – Environmental Protection and Appendix H).
 - .6 Quality Management Plan and related Quality Management documentation (see Section 01 45 00 – Quality Management).
 - .7 Hazardous Materials Management Plan (see Section 02 61 33 – Hazardous Materials).
 - .8 Pre-Construction Survey (see Section 01 29 00 – Payment Procedures).
 - .9 As-built Survey, As-built Drawing mark-ups, and Shop Drawing mark-ups (see Section 01 78 00 – Closeout Submittals).
 - .10 Shop Drawings (if applicable, including professional seal for design work required), Product Data / and Samples.
 - .11 Construction Staging and Traffic Detour Drawings (see Section 01 14 00 – Work Restrictions, Access Development, Construction Staging, and Restoration).
 - .12 Progress Payment Submittal Form (see Appendix E).
 - .13 Measurement for Payment Survey Details Form (see Appendix F).
 - .14 General Contractor & Sub-Contractor Construction Equipment List (see Section 01 52 00 – Construction Facilities and Equipment and Appendix G).
 - .15 Fish Salvage Permit (see Section 01 35 43 – Environmental Protection).
- 3.9 Supervisory Personnel
- .1 Within five (5) 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 fulltime and shall be present on the Work Site each and every day that Work is being performed, from the commencement of work to Substantial Performance and Completion of the Work.
 - .2 Deputy Project Superintendent: shall have the authority of the Project Superintendent during the latter's absence for short periods of time.
 - .3 Health and Safety Coordinator: shall possess safety experience in general construction. Duties shall encompass all matters of safety activities from commencement of work until Substantial Performance and Completion of the Work (see Section 01 35 33 – Health and Safety for further requirements).
 - .4 Quality Control Manager: shall be independent from the Contractor, experienced in Quality Management, dedicated to 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 Special Requirements
- .1 The following special requirements for this project are emphasized for the Contractor's attention:
 - .1 Except as otherwise noted, all granular and rock material required on the project shall be manufactured from the in-situ materials from PSPC's Km 565.9 pit (see Pit Location Plan in Appendix M) or materials designated for excavation within the limits of the work as shown on the Contract Drawings. Use of other offsite sources (see Subsection 2.1 Owner

Supplied Materials (Outside Limits of Work)) will be approved for use should:

- .1 All suitable materials excavated within the limits of work be exhausted.
- .2 The Contractor shows that materials excavated within the limits of work cannot be manufactured to achieve the required material properties.

- .2 Utility relocations by others will be undertaken prior to the commencement of the project work. The existing fibre optic conduit and cable shown on the Contract Drawings will be abandoned and a new fibre optic conduit and cable installed beyond the proposed limits of construction. See Subsection 3.11 Work by Others in this Specifications section and Section 01 14 00 – Work Restrictions, Access Development, Construction Staging, and Restoration for further details.

3.11 Work by Others

- .1 The Contractor is advised that concurrent with this project there may be other Contractors working in nearby adjacent projects. Should other Contractors be working in nearby adjacent projects, the Contractor shall coordinate their operations with the other Contractors, including traffic management.
- .2 The Contractor is advised that utility relocations within the limits of the work will be undertaken by others before work on this project commences. New fibre optic conduit will be placed on the native ground surface on average 2-3 m beyond limits of the proposed construction on the south side of the highway. The Contractor may need to coordinate their operations with the owner of the fibre optic utility to ensure the fibre optic utility is not damaged (see Section 01 14 00 – Work Restrictions, Access Development, Construction Staging, and Restoration for further details).

3.12 Departmental Representative's Office Trailer

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

3.13 Use of Owner Gravel Pits, Quarries and Maintenance Yards

- .1 The Contractor may choose to use PSPC's gravel pits, quarries and maintenance yards as detailed elsewhere within the Specifications for the purposes of extraction / manufacture of granular materials. When using PSPC's gravel pits, quarries and maintenance yards, the Contractor shall be aware of the following:

- .1 Other Contractors may be working in the gravel pits, quarries and maintenance yards completing similar or different types of work. Coordination with these other Contractors will 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, quarries and maintenance yards.
- .3 The Contractor is responsible for providing all equipment required to excavate, screen, manufacture (as necessary), load, and haul the material from PSPC's gravel pits, quarries and maintenance yards.
- .4 The security of equipment parked and material manufactured and stockpiled in the gravel pits, quarries and maintenance yards along with the safety of the Contractor's personnel remains the Contractor's responsibility.
- .5 If PSPC's gravel pits, quarries 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. The Contractor shall be responsible for locking the vehicle gate any time the Contractor's personnel have vacated the gravel pits, quarries and maintenance yards (regardless of duration). The Contractor shall return the gate key to PSPC upon completion of the work.
- .6 The Contractor shall be responsible for maintaining access roads into the gravel pits, quarries 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 a condition equal to or better than when work started.

3.14 Contractor's Personnel

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

END OF SECTION

SECTION INCLUDES

PART 1 – GENERAL:

- 1.1 Use of Work Site.
- 1.2 Work Conducted in and Adjacent to Waterways.
- 1.3 Utilities.
- 1.4 Protection of Persons and Property.
- 1.5 Use of Public Areas.
- 1.6 Construction Signage.
- 1.7 Access Development.
- 1.8 Construction Start-up.
- 1.9 Construction Staging.
- 1.10 Restoration.

PART 1 – GENERAL

1.1 Use of Work Site

- .1 The Work Site will be specified by the Departmental Representative and shall only be used for the purposes of the Work. The Work Site will be made available to the Contractor for its exclusive use for the duration of the Work, unless otherwise provided in the Contract Documents.
- .2 The Contractor's office trailer may be set up in the locations identified in Section 01 52 00 – Construction Facilities 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 Work Site is under the Contractor's control, the Contractor shall be entirely responsible for the security of the Work Site and of the Work.
- .4 The Contractor shall keep the Work Site clean and free from accumulation of waste materials and rubbish regardless of the source. Snow / ice shall be removed by the Contractor as necessary for the performance and inspection of the Work.
- .5 The Contractor shall provide sanitary facilities for the 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 the 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 work 24 hours per day, 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 Quality Control (QC) work per the Contract requirements are 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.
- .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 for completing utility locates in advance of the work.
- .2 The locations of Utilities shown are not necessarily exact nor is there any guarantee that all Utilities in existence within the limits of the Work Site have been shown on the Drawings.
- .3 The Contractor shall allow the utility company the opportunity to locate and assess the potential proposed work / utilities conflicts within the limits of the work. If it is determined by the Departmental Representative and utility owner that the utilities are affected by the permanent Work, the utilities will be abandoned in place and a new utility cable placed on the native ground surface outside the limits of the work or the utility lowered / relocated at the time of construction by Other Contractors. The Contractor shall cooperate and coordinate as required with Other Contractors engaged in Utility relocation operations on the Work Site.

- .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.
 - .8 Prior to the commencement of onsite work, the existing fibre optic line shown on the drawing will be abandoned in place and a new fibre optic conduit and line will be placed on the native ground surface on average 2–3 m beyond limits of construction on the south side of the highway, or the utility will be lowered / relocated at the time of construction by Other Contractors.
- 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 further requirements).
 - .2 The Contractor shall take all necessary precautions and measures to prevent injury or damage to persons and property on or near the Work Site.
 - .3 The Contractor shall promptly take such measures as are required to repair, replace or compensate for any loss or damage caused by the Contractor to any property.
- 1.5 Use of Public Areas
- .1 Off-road construction equipment (equipment which exceeds legal highway load limits or dimensions) will not be allowed on the BST / travelled lanes of the Alaska Highway outside the project limits as shown on the Contract Drawings, except as outlined in the Contractor’s Traffic Management Plan accepted by the Departmental Representative. Off-road construction equipment will be permitted to travel within the Alaska

Highway Right-of-Way for the purposes of hauling excavated materials from PSPC's pit at Km 565.9 (see Pit Location Plan in Appendix M).

- .2 Steel tracked equipment with cleats will not be allowed on BST outside the limits of the work or BST designated for future use, unless measures are taken to protect the existing BST road surface against any damage. If any construction equipment or materials damage the BST outside the limits of the work or BST designated for future use beyond reasonable wear and tear as determined by the Departmental Representative, the cost of the repairs to the BST shall be borne by the Contractor.
- .3 The Contractor shall ensure that its vehicles and equipment do not cause nuisance in public areas. All vehicles and equipment leaving the Work Site and entering public roadways shall be cleaned of mud, dirt, snow, and ice clinging to the body and wheels of the vehicle. All vehicles arriving at or leaving the Work Site and transporting materials shall be loaded in a manner which will prevent dropping of materials or debris on the roadways, and, where contents may otherwise be blown off during transit, such loads shall be covered by tarpaulins or other suitable covers. Spills of material, including rocks and debris from loaded trucks, shall be removed or cleaned immediately by the Contractor at no cost to the Owner. All activities shall be in accordance with Section 01 35 43 – Environmental Protection and the Environmental Protection Plan (EPP) prepared by the Contractor for the project.
- .4 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, portable electrically illuminated message signs, and existing advertising signs are permitted on site.
- .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, the Environmental Overview Assessment (EOA) (see Appendix K), and the Contractor’s accepted Environmental Protection Plan.
- .2 Off-road construction equipment (including equipment which exceeds legal highway load limits or dimensions) will be permitted to travel within the Alaska Highway Right-of-Way for the purposes of hauling materials from PSPC’s pit at Km 565.9 (see Pit Location Plan in Appendix M). The Contractor is fully responsible for the implementation, maintenance and removal of all haul roads and temporary infrastructure (including drainage structures and access points / ramps, where required). Development of haul roads shall be completed in accordance with the requirements of Section 01 35 00 – Traffic Management and Section 01 35 43 – Environmental Protection. All areas of the Alaska Highway Right-of-Way impacted by the construction of haul roads shall be restored as described in Subsection 1.10 Restoration below.
- .3 Should the Departmental Representative approve the use of the cut slope between Km 572.3 and Km 572.5 of the Alaska Highway for the excavation and screening / manufacture of Embankment, the Contractor shall be responsible for developing access to the existing cut slope using the existing pioneer trail on the south side of the existing cut slope. This access uses steep grades but has been used in the past by equipment accessing the plateau at the top of the borrow area. The access road is not maintained, and the Contractor shall assume all responsibility for any maintenance or upgrades required to bring the access road to a condition suitable for use, including but limited to:
- .1 Clearing and disposal of trees and vegetation.
- .2 Development and removal of temporary culverts or other drainage structures (if required).
- .3 Construction and removal of temporary access ramps (if required).

-
- 1.8 Construction Start-up .1 The Contractor or their 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 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 Construction Staging .1 Onsite project work within 30 m of waterways, including removal and replacement of existing culverts, may not start until the applications for Notification and Change Approval under the provincial Water Sustainability Act, and all other environmental permits applied for by the Departmental Representative have been approved by the applicable regulatory authorities, and the necessary documentation has been received by the Departmental Representative. The timeline for receipt of the Notification and Change Approval is not known. The very earliest PSPC expects to receive the Notification is early-June 2021. The very earliest PSPC expects the Change Approval to be received is mid-September 2021.
- .2 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 Section 01 35 43 – Environmental Protection, the Environmental Overview Assessment (EOA) (see Appendix K), 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 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.

- .6 Proceed with Optional Work items only after receiving direction by the Departmental Representative via a written Change Order.

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

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

- .1 Describe and show graphically the proposed stages of construction to complete the work.
- .2 Describe and show graphically how vehicle traffic will be accommodated throughout all stages of the construction work (including vertical and horizontal alignments and representative sections).
- .3 Show details of cut and fill slopes and provide details of the lengths of culvert which will be installed during each stage of the work.

See Section 01 35 00 – Traffic Management for the vehicle operational requirements necessary during each stage of the culvert work.

- .4 Example construction staging and traffic detour drawings (for culvert construction works in another area of the highway) are provided in Appendix L to provide the Contractor with an example of the level of expected detail from the Contractor's submitted construction staging drawings and to show the complexity of the staging issues on this project. The staging drawings provided are only example(s) of select construction staging scenarios on the project (i.e. open cut method of culvert replacement). The Contractor is responsible to provide construction staging drawings covering all construction staging scenarios and situations on the project.

1.10 Restoration

- .1 Remove access points, roads, detours, laydown areas, pads, and all other works installed during access development and construction staging. Re-instate the worksite to a condition equal to or better than the site condition prior to construction by:
 - .1 Restoring organic soils (if removed or damaged during access development or other works).
 - .2 Eliminating uneven areas and low spots.
 - .3 Restoring existing and proposed drainage patterns as shown on the Contract Drawings.
 - .4 Removal of all gravels, other materials, and structures placed to create access points, temporary detour roads, or pads. Dispose of gravels, other materials, or structures at an off-site disposal facility acceptable to the Departmental Representative.

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, Construction Staging and Detour Plans, 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 work site.
 - .3 Work and cost incurred in the establishment and operation of offices, camps, and other facilities necessary to undertake the work.
 - .4 Removal and stockpiling of existing regulatory signage and posts designated for removal or relocation within the limits of the work. All signs identifying “Riparian Zone” and underground fibre optic utility shall remain in place. In addition to the signs being removed within the limits of work, the following signs outside the limits of the work (Sta. 566+935 – Sta. 570+320) shall be removed or relocated as indicated in Table 01 25 20 – 01.

Table 01 25 20 – 01: Traffic Signage Outside Limits of the Work			
Sign Type / Description	Station & Location	Action	Timing of the Work
R-3 "80 KM/H AHEAD" sign	Sta. 566+470 NB	Relocate to Sta. 568+270 NB	Following completion of Crushed Base Gravel highway surface
W-329 "NEW" tab	Sta. 566+470 NB	Relocate to Sta. 568+270 NB	Following completion of Crushed Base Gravel highway surface
R-4 "MAXIMUM 80 KM/H" sign	Sta. 566+670 NB	Relocate to Sta. 568+400 NB	Following completion of Crushed Base Gravel highway surface
W-329 "NEW" tab	Sta. 566+670 NB	Relocate to Sta. 568+400 NB	Following completion of Crushed Base Gravel highway surface
R-4 "MAXIMUM 100 KM/H" sign	Sta. 566+670 SB	Relocate to Sta. 568+400 SB	Following completion of Crushed Base Gravel highway surface
W-329 "NEW" tab	Sta. 566+670 SB	Relocate to Sta. 568+400 SB	Following completion of Crushed Base Gravel highway surface

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

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

1.2 Measurement and Payment Procedures

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

.2 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, Construction Staging and Traffic Detour Drawings, Project Specific Health and Safety Plan, and any other submittals noted in the 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.
- .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 Updated cash flow forecast (see Section 01 31 00 – Project Management and Coordination).

- .6 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 Specification section. Where not specified, basis of payment for all work included in these specifications or the 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.
- .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). Survey may be required to verify the work is completed to the design requirements (thickness, length, grade, volume, area, etc.).
- .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 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, or in the case of lump sum items to verify that work has been completed to the design requirements. Survey shall be considered incidental to the work and not measured for payment.
 - .2 All quantity surveys, quantity calculations, and surveys to verify the work is completed to the design requirements for the purposes of verifying progress payment quantities (m3, m2, L.M., or L.S.) shall be completed to the design requirements 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 five (5) years' experience working on projects of similar size, scope and cost. A resume detailing this experience shall be provided to the Departmental Representative for review and acceptance if requested.
 - .3 Survey data collected shall be of sufficient density to fully characterize the work. Survey methods and location of surveyed cross sections is subject to prior approval of the Departmental Representative. At a minimum the Contractor shall survey all features at 20 m station intervals (may be reduced to 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.
 - .4 A Pre-Construction Survey of the existing ground surfaces, stream channels, 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 the 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 (e.g. 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 Cash Flow Forecasting.
- 1.5 Construction Progress Meetings.
- 1.6 Written Communication / Document Management.
- 1.7 Submittals.
- 1.8 Close-Out Procedures.

PART 1 – GENERAL

- 1.1 Pre-Construction Meeting
 - .1 Following tender closing and prior to the construction start, 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, Surveyor, 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 (see Appendix B).
 - .14 Maintenance in accordance with Section 01 78 00 – Closeout Submittals.
 - .15 Other business as required by the Departmental Representative or Contractor.
 - .16 List of proposed suppliers and sub-contractor(s).
- .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 job site, one copy each of the following:
 - .1 Contract Drawings.
 - .2 Contract Specifications.
 - .3 Addenda.
 - .4 Reviewed and accepted submittals.
 - .5 Change orders.
 - .6 Other modifications to Contract.
 - .7 Field test reports.
 - .8 Copy of approved work schedule.
 - .9 Manufacturer's installation and application instructions (if applicable).
 - .10 All permits (FLNRORD, MoE, DFO, NWPA, and/or others as required for the project).
 - .11 Meeting minutes.
 - .12 Contractor's Project Specific Health and Safety Plan.
 - .13 Contractor's Environmental Protection Plan (EPP).
 - .14 Contractor's Traffic Management Plan.
 - .15 Current construction standards of workmanship listed in the Contract Specifications.
 - .16 One (1) set of "Issued for Construction" Contract Drawings (or "Issued for Tender" 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, provide schedule with original tasks shown as the baseline and actual work progress updated with

each submission (see Section 01 32 16 – Construction Progress Schedules – Bar (Gantt) Chart, Subsection 1.4 Project Schedule Reporting During the Work).

1.4 Cash Flow Forecasting

- .1 Provide detailed cash flow forecasting derived from the project schedule and the agreed upon project payment schedule (project unit prices). The cash flow forecast shall be broken out by line item to coincide with the project schedule. Submit cash flow forecast to the Departmental Representative within 15 days after award of Contract but in all cases prior to starting onsite work.
- .2 Update project cash flow forecasting on a monthly basis or for each submission of a progress payment reflecting changes to the schedule until project completion. Submit updated forecast to the Departmental Representative.

1.5 Construction Progress Meetings

- .1 During the course of work the Departmental Representative may schedule construction progress meetings approximately every week or 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, Surveyor, and Environmental Monitor shall attend in person or via teleconference.
- .3 The Departmental Representative shall establish a time, location, and teleconference number for the meeting and notify the Contractor a minimum of three days prior to the meeting. The Contractor shall notify all concerned parties of the meeting.
- .4 The meetings may be held on site provided teleconference capabilities are available or at 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 the following:
 - .1 Review and approval of minutes of previous meeting.
 - .2 Health and Safety Incidents and Concerns.
 - .3 Review of work progress since previous meeting.
 - .4 Field observations, problems, conflicts.

-
- .5 Problems which impede construction schedule.
 - .6 Review of off-site fabrication delivery schedules (if applicable).
 - .7 Corrective measures and procedures to regain projected schedule.
 - .8 Revision to construction schedule and project submittals.
 - .9 Progress schedule, during succeeding work period.
 - .10 Review submittal schedules: expedite as required.
 - .11 Cash flow forecasting including monthly updates.
 - .12 Maintenance of quality standards.
 - .13 Review proposed changes for effect on construction schedule and on completion date.
 - .14 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.
- 1.6 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.
- 1.7 Submittals
- .1 Provide submittals, Shop Drawings, product data and samples in accordance with Section 01 33 00 – Submittal Procedures for review for compliance with Contract Documents, field dimensions and clearances, compatibility and available space, and for relation to work of other contracts. If requested, after receipt of Departmental Representative comments, revise and resubmit.
 - .2 Submit requests for payment through the Departmental Representative via email or, if requested by the Departmental Representative or if desired by the Contractor, 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 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”.
- 1.8 Close-Out Procedures
- .1 Close-out procedures as per Section 01 77 00 – Closeout 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 / Detour Plan.
 - .4 Construction Staging Plan / 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 Test results.

-
- .4 Mobilization.
 - .5 Work activities and material purchases by segment / locations (unless accepted otherwise, at a minimum each line item of work identified in the unit price table shall be identified separately on the project schedule).
 - .6 Interim inspections.
 - .7 Site Clean-up / De-mobilization.
 - .8 Project Substantial 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 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 (e.g. Microsoft Project 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 10 days after receipt.
 - .5 Resubmit finalized schedule within seven (7) days after return of reviewed 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 Include as a baseline each line item and details from the initial project schedule accepted by the Departmental Representative at the start of the project. On an adjacent line indicate progress of each activity started and completed to the date of schedule submission by including actual start date / end date / percent complete. See example Figure 01 32 16 – 01 (example in Microsoft Project) and Figure 01 32 16 – 02 (example in Microsoft Excel) for further details.

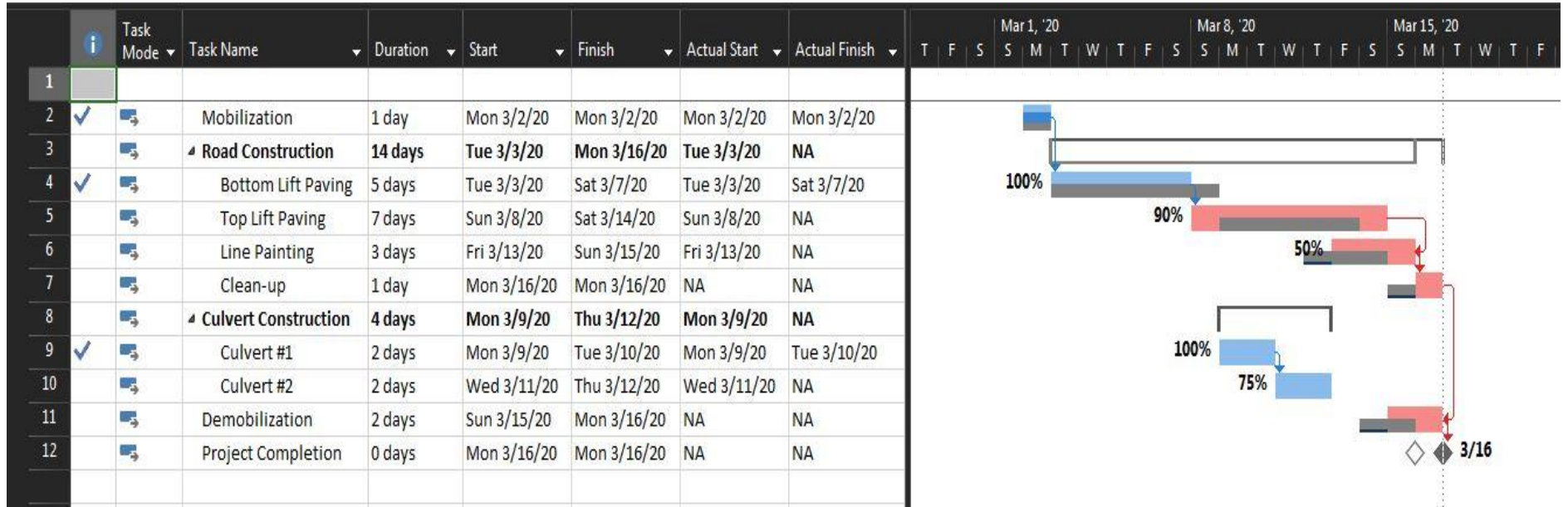


Figure 01 32 16 – 01: Example in Microsoft Project

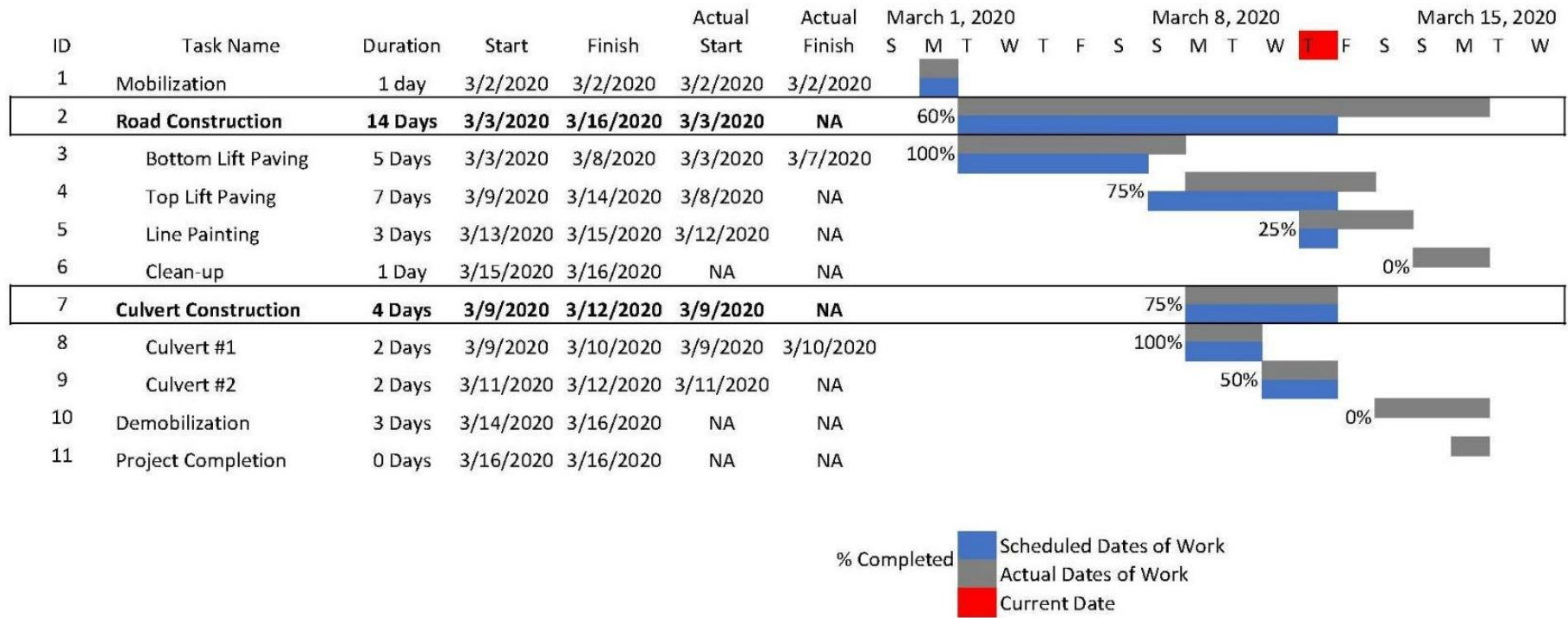


Figure 01 32 16 – 02: Example in Microsoft Excel

- .3 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.
- .4 Provide a narrative report to define:
 - .1 Problem areas, anticipated delays, and impact on schedule.
 - .2 Corrective action recommended and its effect.
 - .3 Effect of changes on schedules of other Prime Contractor's.
- .5 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 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 (1) reviewed copy of each submission on site.
 - .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 specification sections. Submit hardcopies as requested by the Departmental Representative.
- .9 Submit electronic copies of product data sheets or brochures for requirements requested in specification sections and as requested by the Departmental Representative where Shop Drawings will not be prepared due to standardized manufacture of product.

-
- .10 Delete information not applicable to project.
 - .11 Supplement standard information to provide details applicable to the project.
 - .12 If upon review by the Departmental Representative no errors or omissions are discovered or if only minor corrections are made, copies will be returned, and fabrication and installation of work may proceed. If Shop Drawings are rejected, noted copy will be returned. Resubmission of corrected Shop Drawings, through the same procedure as 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 the Departmental Representative approves the detail design inherent in Shop Drawings. Responsibility for detail design of Shop Drawings shall remain with the Contractor, and as such, reviews by the Departmental Representative shall not relieve the Contractor of responsibility for errors or omissions in Shop Drawings, or of responsibility for meeting all requirements of construction and Contract Documents. Without restricting generality of the foregoing, the Contractor is responsible for dimensions to be confirmed and correlated at job site, for information that pertains solely to fabrication processes or to techniques of construction and installation, and for coordination of work of all sub-trades.
 - .14 Work affected by Shop Drawing shall not proceed until the Shop Drawing is reviewed and accepted by the Departmental Representative.
- 1.3 Samples
- .1 Submit for review samples in duplicate, as requested in respective specification sections. Label samples with origin and intended use.
 - .2 Deliver samples prepaid to Departmental Representative's site office 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 and Access Development will be made on the basis of the Price per Unit Bid for Traffic Management and Access Development in the Bid and Acceptance Form. The Price per Unit Bid shall include the completion of the Traffic Management Plan, construction signage, traffic flaggers, automated traffic control devices, pilot vehicles, temporary concrete barriers and privacy fence (if required), shadow and escort vehicles, 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 and Access Development will be made by Lump Sum based on the percentage of the work completed and accepted by the Departmental Representative.

1.2 References

- .1 British Columbia Ministry of Transportation and Infrastructure (BC MoTI).
 - .1 Traffic Management Manual for Work on Roadways – 2020 Office Edition.

-
- .2 BC Supplement to TAC Geometric Design Guide for Canadian Roads (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 the 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 achieves 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 contractors 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 3.2.1.10 – Traffic Management (15 minutes).
 - .2 Drop-off: An abrupt change in elevation created by construction activity such as milling, paving, or excavation that is steeper than 3H:1V.
 - .3 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 Ministry of Transportation Traffic Management Manual for Work on Roadways – 2020 Office 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 Ministry of Transportation Traffic Management Manual for Work on Roadways – 2020 Office Edition, excluding Section 3.4.1 and 3.4.2.
- .4 Developed and conform to the standards for Category 3 Traffic Management Plans as defined in Section 3: Traffic Management Plans of the BC Ministry of Transportation Traffic Management Manual for Work on Roadways – 2020 Office Edition. As defined by Section 3.4.3, the Category 3 Traffic Management Plan shall be signed and sealed by a Professional Engineer who is licensed in British Columbia and qualified and experienced in traffic management. The customized drawings shall further include the sign size used for each individual sign (see Subsection 2.1 Temporary Traffic Control Devices, Item .2 of this specification), the sign support used (see Subsection 2.1 Temporary Traffic Control Devices, Item .1.4 of this specification), and the use of flags (if applicable, see Subsection 2.1 Temporary Traffic Control Devices, Item .1.5 of this specification).
- .5 Shall, at a minimum, include all headings, sub-headings, details, and presentation format as provided in the 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 Ministry of Transportation Traffic Management Manual for Work on Roadways – 2020 Office 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 required or 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 Ministry of Transportation Traffic Management Manual for Work on Roadways – 2020 Office 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 Ministry of Transportation Traffic Management Manual for Work on Roadways – 2020 Office Edition for further details. At a minimum, the text and figures included in Item 6.7.4 – Two-Lane, Two-Way Roadways shall be included within the Contractor's Traffic Management Plan for reference during the work (in main body of the plan or in Appendices of the plan with reference to applicable Appendix in main body of the plan). The Contractor shall customize the details of the steps for the project as required.

-
- .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, excavation / backfill on highway, excavation / backfill off highway, culvert installations, culvert removals, 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 (TCP) during non-daylight hours (before sunrise after sunset), the Traffic Management Plan 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 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 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 Ministry of Transportation Traffic Management Manual for Work on Roadways – 2020 Office 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 discussed in Section 01 33 00 – Submittal Procedures of these specifications.

PART 2 – PRODUCTS

2.1 Temporary Traffic Control Devices

.1

Temporary Traffic Control Devices shall be in accordance with Section 4: Temporary Traffic Control Devices of the BC Ministry of Transportation Traffic Management Manual for Work on Roadways – 2020 Office Edition and the following requirements.

- .1 Supply and maintain two (2) portable dynamic message signs (DMS) for the duration of the work. The DMS shall have a minimum of three (3) lines with eight (8) characters per line (minimum 450 mm character size).
- .2 Unless preapproved by the Departmental Representative, where 45 cm, 70 cm, or 90 cm cones are called for by the BC Ministry of Transportation Traffic Management Manual for Work on Roadways – 2020 Office 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.

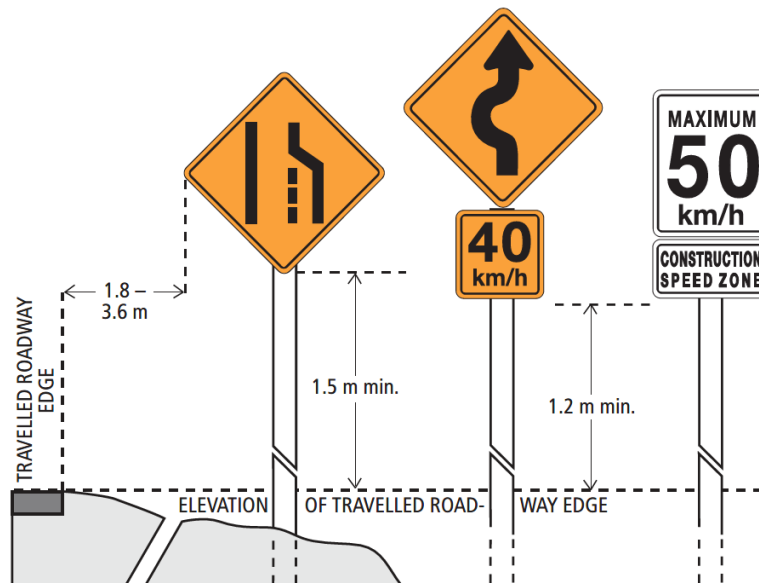


Figure 01 35 00 - 01: Post Mounted Supports

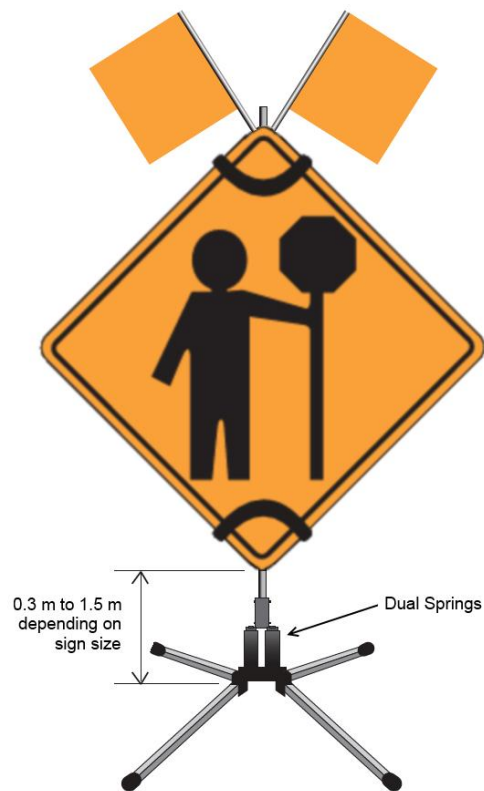


Figure 01 35 00 - 02: Wind Resistance Sign Stand

- .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 Ministry of Transportation Traffic Management Manual for Work on Roadways – 2020 Office 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 Ministry of Transportation Traffic Management Manual for Work on Roadways – 2020 Office Edition.
- .2 Responsibilities for traffic control shall be undertaken in accordance with Section 1.2.3 – Traffic Control Responsibilities of the BC Ministry of Transportation Traffic Management Manual for Work on Roadways – 2020 Office 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 Ministry of Transportation Traffic Management Manual for Work on Roadways – 2020 Office Edition) shall be included in the Traffic Management Plan and by undertaken / implemented by the Contractor prior to commencing work.

- .4 PSPC through their maintenance contractor will maintain "typical" snow plowing and sanding operations through the length of the project worksite for the duration of the project. "Typical" snow ploughing and sanding will be completed to the level and standard that would be undertaken in this area should there not be an active ongoing construction project. Any additional snow clearing and sanding desired by the Contractor for safety or other reasons shall be the responsibility of the Contractor to undertake.

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 Ministry of Transportation Traffic Management Manual for Work on Roadways – 2020 Office 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 Ministry of Transportation Traffic Management Manual for Work on Roadways – 2020 Office Edition.
 - .4 Section 6: Traffic Control Layouts – General Instructions of the BC Ministry of Transportation Traffic Management Manual for Work on Roadways – 2020 Office Edition and as follows:
 - .1 Per section 6.3 of the BC Ministry of Transportation Traffic Management Manual for Work on Roadways – 2020 Office 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 Ministry of Transportation Traffic Management Manual for Work on Roadways – 2020 Office 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 one (1) kilometer for as long as the condition persists.
 - .2 A lane width of 3.7 m shall be used at all times.
- .5 Section 7: Traffic Control Layouts – Two-Lane, Two-Way Roadways of the BC Ministry of Transportation Traffic Management Manual for Work on Roadways – 2020 Office 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 .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 .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 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 number. Signs C-035-C and C-035-CT shall be in accordance with Figure 01 35 00 – 3.

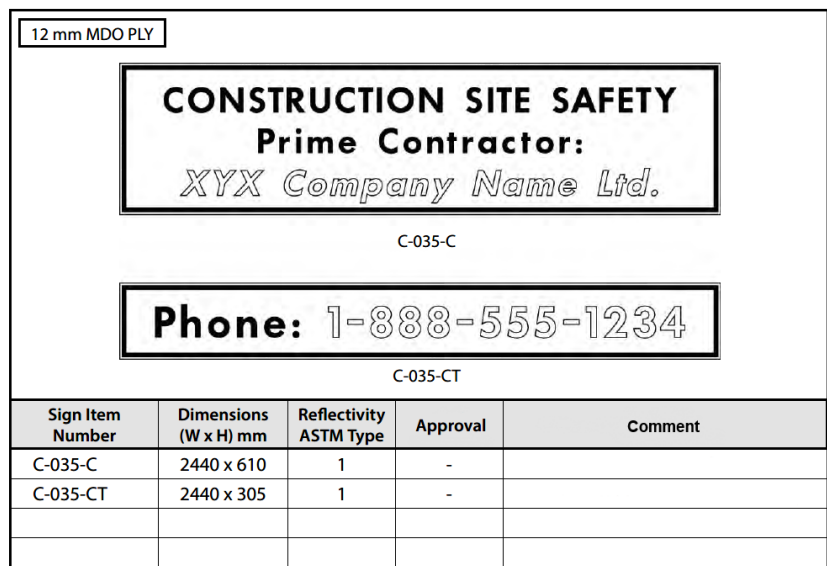


Figure 01 35 00 – 03: Sign C-035-C and C-035-CT Details

.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:

.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.

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.

- .5 7.8 Lane Closure with Traffic Control Persons – Single Lane Alternating Traffic – Short and Long Duration can be used when the length of the single lane alternating traffic does not exceed 300 m and access through the work area is not dangerous thus not requiring a pilot vehicle. 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 Ministry of Transportation Traffic Management Manual for Work on Roadways – 2020 Office Edition) for the applicable speed (adjust all other sign spacing as required).

- .6 7.10 Lane Closure with Temporary Signals – Single Lane Alternating – Short and Long Duration can be used subject to the following:

- .1 Shall only be used during non-working hours.
- .2 Temporary traffic signals shall only be used when the distance between the

- temporary signals is less than or equal to 150 m and a direct line of sight is available.
- .3 The signal timing and signal head locations shall be established / designed in accordance with Section 4.8 Portable Traffic Signals of the BC Ministry of Transportation Traffic Management Manual for Work on Roadways – 2020 Office Edition with the details included in the submitted and accepted Traffic Management Plan.
 - .4 A sign shall be installed on or near the temporary traffic signal indicating the maximum wait time (as determined by the signal timing plan).
 - .5 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 Ministry of Transportation Traffic Management Manual for Work on Roadways – 2020 Office Edition) for the applicable speed (adjust all other sign spacing as required).
- .7 7.14 Roadside Diversion – Long Duration can be used if applicable on the project subject to the following:
- .1 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 Traffic Management Manual for Work on Roadways – 2020 Office Edition) for the applicable speed (adjust all other sign spacing as required).

-
- .8 7.16 Pilot Cars can be used subject to the following:
 - .1 When the length of the single lane alternating traffic exceeds 300 m or where access through the work would be otherwise dangerous.
 - .2 The traffic control signage layout shall include the Prepare to Stop (C-029) sign (sign spacing shall be adjusted to suit).
 - .3 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 shall 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 Traffic Management Manual for Work on Roadways – 2020 Office Edition) for the applicable speed (adjust all other sign spacing as required).
 - .9 Any duplicate signage resulting from the use of Section 7 traffic control layouts shall be removed.
 - .10 No Road Lines (C-046), Temporary Road Lines (C-047-1), and Low Shoulder (C-013) shall be included in the Traffic Control Plan and installed at the applicable locations.

-
- .6 Section 15: Traffic Control Layouts – Surveying of the BC Ministry of Transportation Traffic Management Manual for Work on Roadways – 2020 Office 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.
 - .7 C-172-L/R signs shall be installed in advance of any gravel pit accesses, lay down area access, or other access road where long or slow-moving trucks frequently enter or leave the highway and the access is located outside the “Limits of Construction” signage.
 - .8 Maintain existing conditions for traffic throughout the period of Contract except that, when required for Contract construction and when measures have been taken as specified herein and reviewed by Departmental Representative to protect and control public traffic.
 - .9 Existing conditions for traffic may be restricted for the following work:
 - .1 Work including roadway excavation and backfill, regrading, or others works as preapproved by the Departmental Representative may be restricted to single lane alternating traffic (4.5 m wide lane with 0.5 m shoulder each side) with a speed limit reduced to during these times to 30 km/h (or 50 km/h, at the Contractor’s discretion).
 - .2 Work including culvert installation (when Open Cut method of culvert installation is used) may be restricted to:
 - .1 Single lane alternating traffic with horizontal and vertical geometrics in conformance with the requirements as defined in Table 01 35 00 – 01.

Table 01 35 00 – 01: Single Lane Alternating Traffic	
Criteria ⁽¹⁾	Value
Design Speed	30 km/h
Design Vehicle	WB-20
Max Grade	8%
Maximum Superelevation	6%
Minimum Lane Width	3.2 m
Minimum Shoulder Width (Open, without temporary barrier)	1.5 m
Minimum Shoulder Width (Edge of Travel Lane to Front of Temporary Barrier) ⁽²⁾	0.6 m

Note:

1. Other geometric requirements (not listed, e.g. off tracking and barrier flare requirements) shall be in conformance with the B.C. Supplement to TAC Geometric Design Guide for Canadian Roads (latest edition, use Low-Volume Roads Chapter when required for 30 km/h design speed), and the Transportation Association Canada Geometric Design Guide for Canadian Roads (latest edition) for a 30 km/h design speed and 3000 AADT.
2. Maintain 3H:1V or flatter embankment and gravel sideslopes on both sides of all two way or single lane traffic lanes. Should the Contractor choose to use temporary side slopes steeper than 3H:1V, temporary precast concrete barriers shall be installed with a minimum distance of 0.3 m from the back of the barrier to the top of the slope. All slopes shall be in conformance with WorkSafeBC regulations.
 - .2 Traffic management for culvert installation (where Open Cut method of culvert installation is used) shall be at all times consistent with the plan outlined on the accepted Construction Staging drawings.
 - .3 During non-work hours, in areas of two-way traffic with no construction hazards in the vicinity (with the exception of the use of temporary road lines, gravel road surface and a shoulder drop-off of ≤ 110 mm), the Contractor may use the posted speed of 80 km/h or restrict the posted speed 70 km/h at the Contractor's discretion.
- .10 The maximum allowable delay to any individual motorist travelling through the project limits as a result of the Contractor's operations will be 15 minutes.
- .11 The Contractor may use the C-082 sign ("Minimum \$196 Fine – Speeding in Work Zones" sign) as a speed

management tool in areas where drivers have been failing to adjust speed or are failing to adhere to the regulatory or construction speed limit. When used in work zones in which a Construction Speed Zone exists, the C-082 sign should be posted in the advance warning area ahead of the work activity area. The C-082 sign may also be installed ahead of TCP locations and/or used as a standalone sign for speed management throughout the work zone, at the Contractor's discretion or as directed by the Departmental Representative.

- .12 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 Ministry of Transportation Traffic Management Manual for Work on Roadways – 2020 Office Edition. Complete checks a minimum of three (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 Complete new grade as soon as practical after disturbing existing roadway surface.
- .8 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.
- .9 All existing signage that conflicts with the Contractor's temporary construction signage shall be covered over by the Contractor for the duration of the conflict.

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 Electrical Safety Requirements.
- 1.18 Electrical Lockout.
- 1.19 Overloading.
- 1.20 Hot Work and Fire Safety Requirements.
- 1.21 Unforeseen Hazards.
- 1.22 Posted Documents.
- 1.23 Correction of Non-Compliance.
- 1.24 Medical.

1.25 Accidents and Accident Reports.

1.26 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 as amended.

.2 Canada Occupational Health and Safety Regulations as amended.

.2 National Building Code of Canada (NBC) as amended:

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

.3 Canadian Electrical Code (CE Code) as amended.

.4 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 CSA Z1006-10 Management of Work in Confined Spaces.

.5 CSA Z462-19 Workplace Electrical Safety Standard.

.5 National Fire Code of Canada 2015 as amended:

.1 Part 5 – Hazardous Processes and Operations and Division B as applicable and required.

.6 Fire Protection Engineering Services, HRSDC:

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

- .2 FCC No. 302, Standard for Welding and Cutting.
- .7 American National Standards Institute (ANSI):
 - .1 ANSI A10.3, Operations – Safety Requirements for Powder-Actuated Fastening Systems.
- .8 Province of British Columbia:
 - .1 Workers Compensation Act Part 3 – Occupational Health and Safety (as amended).
 - .2 Occupational Health and Safety Regulation (as amended).
- .9 Project Specific Health and Safety Plan Template (Appendix B).
- .10 Canadian Construction Association, COVID-19 – Standardized Protocols for All Canadian Construction Sites, Version 5, May 26, 2020.
- .11 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, does not 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 Hot Work: Includes cutting / melting with use of a torch, flame, or other open flame devices and grinding equipment which produces a spark.
 - .2 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 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.

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

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

.5 Submission of the 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 his legal obligations for the provision of health and safety on the project.

.6 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 a 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, sub-headings, details, and presentation format as 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.
 - .3 Job-specific safe work procedures that are not already included in the Contractor's

-
- corporate Health and Safety Polices / Procedures manual.
- .4 Identify personal protective equipment (PPE) to be used by workers.
 - .5 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.
 - .6 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 aid attendant(s) during the work.
 - .6 Inspection policy and procedures.
 - .7 Incident reporting and investigation policy and procedures.
 - .8 Occupational Health and Safety Committee / Representative procedures.
 - .9 Occupational Health and Safety meetings.

-
- .10 Occupational Health and Safety communications and record keeping procedures.
 - .11 Emergency contact information, including PSPC project personnel (including Consultants), Contractor office and field staff, fire, police, ambulance, air ambulance, and forest fire reporting.
 - .12 Identify employee training plans for wildlife encounters and prevention.
 - .13 Identify fire safety, fire reporting, and fire evacuation procedures.
 - .14 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.
 - .15 Completed "Preliminary Hazard Assessment Form" (see Appendix 1 of the Project Specific Health and Safety Plan template).
 - .16 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).
 - .17 Blank copy of Contractor's daily toolbox meeting form.
 - .18 Blank copy of the Contractor's Site Safety Orientation Form.
 - .19 Blank copy of the Contractor's Incident / Accident Report template.
 - .20 Resume(s) or certification(s) of Health and Safety Coordinator(s) responsible for site safety and onsite First Aid Attendants.
 - .21 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 Sub-Contractors. Ensure that work / activities of Sub-Contractors 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 Assume responsibility as the Prime Contractor for work under this Contract.
- .2 Be responsible for health and safety of persons on site, safety of property on site, and for protection of persons adjacent to site and environment to extent that they may be affected by conduct of work.
- .3 Comply with and enforce compliance by employees with safety requirements of Contract documents, applicable Federal, Provincial and local statutes, regulations, and ordinances, and with Project Specific Health and Safety Plan.

-
- .4 The protection of persons off-site 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 personnel who do not successfully complete the required training are not permitted to enter the site to perform work.
 - .2 Be responsible for implementing, enforcing, and monitoring the Project Specific Health and Safety Plan.
 - .3 Be on site during execution of critical elements of the work or as required by the Contractor.
 - .4 Have a minimum of two (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 hours 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.
- .4 Design and construct falsework in accordance with CSA S269.1-1975 (R2003) as amended.
- .5 Carry out work in confined spaces in accordance with current Provincial regulations.
- 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.
- .5 Hazards, see "Preliminary Hazard Assessment Form" in the appendices of the Project Specific Health and Safety Plan template in Appendix B.
- 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.

-
- .7 Work in areas where sudden movement of native or placed materials may occur.
 - .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 2015) 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 2015 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 The Contractor shall ensure that the product is applied as per manufacturers' recommendations and ensure only pre-approved products are brought onto the work site in an adequate quantity to complete the work.
 - .3 All asbestos-containing materials are prohibited from use and shall not be incorporated into the work by the Contractor.
- 1.17 Electrical Safety Requirements
- .1 Comply with authorities and ensure that, when installing new facilities, all electrical personnel are completely

- familiar with existing and new electrical circuits and equipment and their operation.
- .1 Before undertaking any work, coordinate arc flash protection, required energizing and de-energizing of new and existing circuits with the Departmental Representative.
 - .2 Maintain electrical safety procedures and take necessary precautions to ensure safety of all personnel working under this Contract, as well as safety of other personnel on site.
- 1.18 Electrical Lockout
- .1 Develop, implement and enforce use of established procedures to provide electrical lockout and to ensure the health and safety of workers for every event where work must be done on any electrical circuit or facility.
 - .2 Prepare the lockout procedures in writing, listing step-by-step processes to be followed by workers, including how to prepare and issue the request / authorization form. The Contractor shall have electrical lockout procedures available for review upon request by the Departmental Representative.
 - .3 Keep the documents and lockout tags at the site and list in a logbook for the full duration of the Contract. Upon request, make such data available for viewing by Departmental Representative or by any authorized safety representative.
- 1.19 Overloading
- .1 Ensure no part of the work is subject to a load which will endanger its safety or will cause permanent deformation.
- 1.20 Hot Work and Fire Safety Requirements
- .1 Obtain Departmental Representative's authorization before undertaking any welding, cutting or other hot work operations on site. If requested by the Departmental Representative, provide hot works permits for any hot works activities.
 - .2 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.
 - .3 Handle, store, use and dispose of flammable and combustible materials in accordance with the National Fire Code of Canada.

-
- .4 Obtain approval from the Departmental Representative prior to bringing any portable gas and/or diesel fuel tanks on site.
- 1.21 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.
- 1.22 Posted Documents
- .1 Post legible versions of the following documents on site:
 - .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) on site, in a common area, visible to all workers and in locations

-
- accessible to tenants when work of this Contract includes construction activities adjacent to occupied areas.
- .3 Postings should be protected from the weather, and visible from the street or the exterior of the principal construction site shelter provided for workers and equipment, or as approved by the Departmental Representative.
- 1.23 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".
- 1.24 Medical
- .1 Provide and maintain first aid facilities for all workers as required by the Workers' Compensation Act or the Occupational Health and Safety Regulations.
- .2 Provide the appropriate first aid kit, based on the number of workers, in accordance with the Workers' Compensation Act or the Occupational Health and Safety Regulations.
- .3 Establish an emergency response plan acceptable to Departmental Representative, for the removal of any injured person to medical facilities or a doctor's care in accordance with applicable legislative and regulatory requirements.
- .4 Provide proof of First Aid credentials to Departmental Representative prior to the start of construction. Provide the appropriate number of first aid attendants on site in accordance with Workers' Compensation Act or the Occupational Health and Safety Regulations.
- .5 Emergency and First Aid Equipment:
- .1 Locate and maintain emergency and first aid equipment in appropriate location on site including first aid kit to accommodate number of site personnel; portable emergency eye wash; fire protection equipment as required by legislation.

-
- .2 Locate sufficient blankets and towels, stretcher, and one handheld emergency siren in all confined access locations.
 - .3 Provide a minimum of one qualified first aid attendant as per Workers' Compensation Act or the Occupational Health and Safety Regulations on site at all times when Work activities are in progress; duties of first aid attendant may be shared with other light duty Work related activities.
- 1.25 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 Provincial 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.
- 1.26 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.
- 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 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 the cost of Environmental Monitoring and Water Management will be made on the basis of the Price per Unit Bid for Environmental Monitoring and Water Management in the Bid and Acceptance Form. The Price per Unit Bid shall include the preparation of the Environmental Protection Plan, obtaining a fish salvage permit, environmental monitoring, water management including staging of the work and necessary pumps and berms as shown on the Environmental Construction Staging drawings, and all other items necessary for the successful completion of the task.
- .2 Measurement for Payment for completion of the Environmental Monitoring and Water Management will be made by Lump Sum based on the percentage of the work completed and accepted by the Departmental Representative.

1.2 Definitions

- .1 Qualified Environmental Professional (QEP): A qualified environmental professional as defined by Section 21 of the BC Riparian Areas Protection Regulations. An individual may serve as a qualified environmental professional if:
 - .1 The individual is one of the following professionals:
 - .1 An agrologist.
 - .2 An applied technologist or technician.
 - .3 A professional biologist.
 - .4 A professional engineer.
 - .5 A professional forester.
 - .6 A professional geoscientist.
 - .7 A registered forest technologist.
 - .2 The individual is registered and in good standing in British Columbia with the appropriate professional

- association constituted under an Act for the individual's profession.
- .3 When carrying out that part of the assessment, the individual is acting:
- .1 Within the individual's area of expertise.
 - .2 Within the scope of professional practice for the individual's profession.
 - .3 Under the code of ethics of the appropriate professional association and is subject to disciplinary action by that professional association.
- .2 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.
- .3 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.
- .4 Wetted Perimeter: area of stream where water is currently running or pooled.
- .5 In-stream Work: any work performed below the high-water mark, either within or above the Wetted Perimeter of any Fisheries Sensitive Zone.
- .6 Fisheries Sensitive Zone: in-stream aquatic habitats and out of stream habitat features such as side channels, wetlands, and riparian areas.
- .7 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.

-
- .8 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 H).
- .4 Responsibility Checklist For Authorizations / Approvals / Notifications / Permitting (Appendix I).
- .5 Relevant Environmental Publications (Appendix J).
- .6 Environmental Overview Assessment (EOA) (Appendix K).
- .7 British Columbia Ministry of Forests, Lands, Natural Resource Operations, and Rural Development (FLNRORD) Section 11 Approval for Instream Work (to be provided to the Contractor prior to the start instream construction).
- 1.4 Regulatory Overview
- .1 The Departmental Representative will complete the environmental Change Approval and Notification permitting required under the Provincial Water Sustainability Act with the British Columbia Ministry of Forests, Lands, Natural Resource Operations and Rural Development (FLNRORD) regulations prior to the start of the project. Work within 30 m of any fisheries sensitive zone cannot commence until the Departmental Representative has received the Change Approval and Notification permits from FLNRORD. The Contractor shall be aware that submission of the Contractor’s Environmental Protection Plan (EPP) to FLNRORD may be required as part of the Change Approval or Notification process and if submission is required, the approved EPP shall be provided to the Departmental Representative for submission a minimum of 15 days prior to the start of any construction within 30 m of any fisheries sensitive zone.
- .2 Permitting required under the Provincial Water Sustainability Act on the project comprises of the following:

- .1 Change Approval: culvert replacements / instream works at Sta. 568+840 and Sta. 569+950.
 - .2 Notification: culvert replacements / instream works at all other locations.
 - .3 The project Notification and Change Approval permitting under the Provincial Water Sustainability Act for instream work has been submitted to the applicable regulatory authorities and is in process. The timeline for receipt of the Notification and Change Approval is not known. The very earliest PSPC expects to receive the Notification is early-June 2021. The very earliest PSPC expects to receive the Change Approval is mid-September 2021.
 - .4 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.
 - .5 Comply with and be subject to those permits and approvals obtained from the Departmental Representative to conduct the Work.
 - .6 Pay specific attention to the provincial BC Land Use Permit, Water License and Quarry Permit.
 - .7 Pay specific attention to the Migratory Birds Convention Act, as amended in 1994.
 - .8 Pay specific attention to the provincial BC guidelines under Peace Region Least Risk Timing Windows: Biological Rational (2009).
 - .9 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).
 - .10 The Contractor is required to apply for and obtain a fish salvage permit from the applicable regulatory authorities for use on the project as needed.
- 1.5 Submittals
- .1 The Contractor's EPP, Breeding Bird and Bird Nest Survey Memo (if required), Redd Survey Memo, and Environmental Site Inspection Memos, shall be submitted to the Departmental Representative. Each plan / memo shall be submitted as single PDF documents (multiple files will not be

accepted) for review and acceptance in accordance with the procedures outlined in Section 01 33 00 – Submittal Procedures. The Departmental Representative will review the EPP, Environmental Site Inspection Memo(s), (first submission and if required all subsequent re-submissions) within 14 days of submission and the Breeding Bird and Bird Nest Survey and Redd Survey Memo (first submission and if required all subsequent re-submissions) within three (3) weekdays of submission. Upon review of the plan / memo the Departmental Representative will do one of the following:

- .1 Accept the plan / memo.
- .2 Accept portions of the plan / 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 / memo for review.
- .3 Reject the plan / memo and provide comments outlining required changes or additional information needed before the plan / memo will be reviewed in detail. Following completion of edits by the Contractor, the Contractor shall re-submit the complete plan / 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, Breeding Bird and Bird Nest Survey, and Redd Survey Memo 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.
- .5 The review of the EPP, Breeding Bird and Bird Nest Survey memo, Redd 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, Breeding Bird and Bird Nest Survey, or Redd Survey Memo 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, Breeding Bird and Bird Nest Survey, or Redd Survey Memo to ensure the correction of any deficiencies.

- .7 The Contractor's Fish Salvage Permit shall be submitted to the Departmental Representative.

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 (see Appendix H), Environmental Overview Assessment (EOA) (see Appendix K), environmental permitting approvals as provided by FLNRORD and provided to the Contractor prior to commencement of work, and as identified in this Section of the specifications. The EPP will require the Contractor to carefully think through the entire project, including identifying what activities and works will be occurring, both generally and at specific sites, and by what methods. The EPP shall be signed as being complete and appropriate for this project by a P.Biol or RPBio, and shall, at a minimum include the following:

- .1 The specifics of a detailed environmental 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) Change 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 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 mitigation measures which the Contractor will undertake and implement to avoid harm to fish and ensure compliance with the environmental regulations applicable to the project (which may include requirements provided in FLNRORD Change Approval or Notifications for Instream Work, NWPA Approval for Instream Work, DFO Fisheries Act requirements, etc.) and these Contract Specifications.

-
- .10 The procedures for stopping the work and implementing changes to the construction methods should the Contractor not be achieving the environmental requirements as outlined in these specifications.
- .11 The procedures for stopping work should the Contractor encounter archaeological anomalies or human remains.
- 1.7 Breeding Bird and Bird Nest Survey .1 The Contractor is required to complete a Breeding Bird and Bird Nest Survey prior to the completion of any clearing and grubbing operations conducted during the breeding bird nesting period (April 24 and August 29). If clearing and grubbing operations are conducted outside of the nesting period, no surveys are required. 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 clearing and grubbing. Should the clearing and grubbing 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 clearing and grubbing. Details of the concerns shall be described and itemized in a memo by the QEP, P.Biol, or RPBio and submitted to the Departmental Representative.
- 1.8 Environmental Site Inspection Memo .1 The Contractor shall submit an Environmental Site Inspection Memo within three (3) weekdays of each site visit or week of full time site inspections by the P.Biol, RPBio, or Other

Qualified Professional. The Environmental Site Inspection Memo shall include the following:

- .1 Date and times when 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 monitors review and inspection of environmentally sensitive activities including but not limited to:
 - .1 Fuel and Oil Storage and Fueling Practices.
 - .2 Care and Maintenance of Construction Equipment.
 - .3 Spill Response Preparedness.
 - .4 Construction Activities and Construction Site Management.
 - .5 Erosion and Sediment Issues.
 - .6 Wildlife Observations / Mitigation and Sensitive Habitat.
 - .7 Culvert / In-Stream Work.
 - .8 Camp management.
 - .9 Other / Comments.
- .4 Photos of any concerns, non-conformances with EPP, or items requiring attention.

1.9 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 environmental monitoring shall be completed by P.Biol, RPBio, or Qualified Environmental Professional (QEP). If a QEP completes the monitoring, the QEP must work under the direction of the P.Biol or RPBio who signed the accepted Environmental Protection Plan.
- .2 The monitoring program must be anticipatory and responsive to construction practices or environmental changes, reflecting the site-specific conditions, level of sensitivity of the receiving environment, potential adverse effects, and level of environmental risk. Submitted documents regarding the proposed monitoring program should clearly identify how monitoring will adhere to this approach.
- .3 The monitoring program shall satisfy all regulatory requirements and terms of these specifications. The onus is on the Contractor to monitor and ensure compliance, to identify arising problems, and to subsequently take responsibility and all necessary measures in response. At a minimum, the environmental monitor shall be onsite during all instream works and all works within 30 m of a waterway.
- .4 Upon receipt of the Provincial Change Approval, if instream works (i.e. at Sta. 568+840 and Sta. 569+950) are required to take place outside the Reduced Risk Timing Window (July 15 – August 15), the Contractor’s Environmental Monitor shall assess the watercourses and submit a Redd Survey Memo prior to commencing the instream work.
 - .1 If the Contractor’s Environmental Monitor confirms flows are not present within the watercourse (i.e. the watercourses are dry or frozen to bottom), work can proceed as planned.
 - .2 If flows are present, the Contractor’s Environmental Monitor shall evaluate the watercourses to identify potential spawning beds (i.e. redds).
 - .1 If no redds are detected, work can proceed as planned.

- .2 If redds are identified, the Contractor shall delay / alter their construction schedule until one of the following occurs:
 - .1 The juveniles have emerged from their redds and can be safely salvaged from the area.
 - .2 Flows are no longer present in the watercourse (i.e. dry or frozen to bottom).
 - .3 Work is completed during the next Reduced Risk Timing Window (July 15 – August 15). Instream work must be avoided in the Spring (April – June).
 - .5 The Contractor shall submit to the Departmental Representative for review and acceptance a Redd Survey Memo detailing the findings of the watercourse assessment. The Redd Survey Memo shall be prepared by the P.Biol, RPBio, or other Qualified Professional who assessed the watercourse. In addition to describing the stream conditions and results of the redd survey, the Redd Survey Memo shall also include the dates, times, general site conditions (i.e. temperatures / weather), and photographs from when the environmental monitor was onsite. Assessment of the watercourses, including completion redd survey(s), shall follow the methods outlined in the Environmental Overview Assessment (EOA) (see Appendix K).
- 3.2 Site Access and Parking
 - .1 The Contractor shall review both short- and long-term access requirements with the Departmental Representative, both at the start-up and on an on-going basis. In consultation with the Departmental Representative, the Contractor shall formulate an agreement for worker transportation to and from the work site and where workers shall park their private vehicles. Generally, personal vehicles shall be parked at least 10 m from any watercourse.
 - .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, waterbody, or wetland in the vicinity of the construction site are a critical element of the project and shall be implemented by the Contractor.
- .2 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. The Contractor's Erosion Control Plan shall incorporate the sediment and erosion control features as outlined on the Environmental Staging Drawings (C501 – C506).
- .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 m 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, grout, cement, concrete finishing agents, bituminous surface treatment, 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 m from any surface water.
 - .4 An impervious berm shall be constructed around fuel tanks and any other potential spill area. The berms shall be capable of holding 110% of tank storage volumes and shall be to the satisfaction of the Departmental Representative. Measures such as collection / drip trays and berms lined with occlusive material such as plastic and a layer of sand, and double lined fuel tanks can prevent spills into the environment.
 - .5 The Contractor shall prevent blowing dust and debris by covering and/or providing dust control for temporary roads and on-site work such as rock drilling and blasting by methods that are approved by the Departmental Representative.
 - .6 The Contractor shall provide spill kits, to the satisfaction of the Departmental Representative, at refueling, lubrication and repair locations that will be capable of dealing with 110% of the largest potential spill and shall be maintained in good working order on the construction site. The Contractor and site staff shall be informed of the location of the spill response kit(s) and be trained in its use.
 - .7 Timely and effective actions shall be taken to stop, contain and clean-up all spills as long as the site is safe to enter. The Departmental Representative shall be notified immediately of any spill as well as the provincial authorities. Basic instructions and phone numbers shall be part of the Contractor's EPP.
 - .8 In the event of a major spill, the Contractor shall prioritize the cleanup and all other work shall be stopped, where appropriate, and personnel devoted to spill containment and cleanup.
 - .9 The costs involved in a major spill incident (control, clean up, disposal of contaminants, and site remediation to pre-spill conditions), shall be the responsibility of the Contractor. The site will be inspected to ensure completion to the pre-spill condition to the satisfaction of the Departmental Representative.
- 3.6 Equipment Maintenance, Fueling, and Operation
- .1 The Contractor shall ensure that all soil, seeds and any debris attached to construction equipment to be used on the project

- site shall be removed (e.g. power washing) 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 m to any surface water (streams, wetlands, waterbodies 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 not be parked within 100 m from any surface water unless actively being used for refueling. Immediately following refueling, bulk tankers shall be moved to a location 100 m or greater from any surface water. Gravity fed fuel systems are not allowed. Manual or electric pump delivery systems shall be used.
 - .4 Mobile fuel containers (e.g. slip tanks, small fuel carboys) shall remain in the service vehicle at all times. Protection and containment of approved fuel storage sites is addressed in Item 3.5.4 of this specification.
 - .5 Equipment used 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 employ a security person 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. Where construction activities require working close to surface water, the Contractor is required to stage the work and employ the mitigation measures shown on the Environmental Staging Drawings (C501 – C506) and undertake other measures as deemed necessary by the Contractor to ensure fugitive materials (e.g. rocks, soil, branches) and especially deleterious substances (e.g. chemicals) does not enter any surface water areas.
- .2 The Contractor shall instruct workers to prevent pushing, placement, raveling, storage or stockpiling of any materials (e.g. slash, rock, fill or topsoil) 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 their 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 a fire.
 - .3 Construction equipment shall be operated in a manner and with all original manufacturers’ safety devices to prevent ignition of flammable materials in the area.
 - .4 Care shall be taken while smoking on the construction site to ensure that the accidental ignition of any flammable material is prevented.
 - .5 In case of fire, the Contractor or worker shall take immediate action to extinguish the fire provided it is safe to do so. The Departmental Representative shall be notified of any fire immediately as well as the applicable Provincial Authorities. Basic instruction and phone numbers will be provided on site by the Contractor and will be discussed in the project pre-construction meeting.
 - .6 Where fires or burning is permitted, prevent staining or smoke damage to structures, materials or vegetation which is to be preserved. Restore, clean and return to new condition stained or damaged Work.
 - .7 Provide supervision, attendance and fire protection measures as directed by the Departmental Representative or other authorities.
- 3.10 Wildlife
- .1 Avoid or terminate activities on site that attract or disturb wildlife and vacate the area and stay away from bears, cougars, wolves, elk, moose, or bison, or other animals that display aggressive behavior or persistent intrusion. Extra care to control materials that might attract wildlife (e.g. lunches and food scraps) must be exercised at all times.

-
- .2 Notify the Departmental Representative immediately about dens, litters, nests, carcasses (road kills), bear activity or encounters on or around the site or crew accommodations. Other wildlife related encounters are to be reported within 24 hours.
 - .3 Adhere to the requirements of the Caribou Protection Plan (see Environmental Overview Assessment (EOA) in Appendix K).
- 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 Provide temporary drainage and pumping as necessary to keep excavations and site free from water. Stage the work and complete excavation work and placement of all erosion protection materials in the dry. Provide temporary drainage, pumping, hoses, temporary coir logs and wood posts, fish stop nets, and check dams as shown on the Environmental Staging Drawings (C501 – C506) as necessary to keep excavations and the culvert 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 m from natural drainage courses and 100 m 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 performed during the breeding bird nesting period (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. No surveys are required if clearing is performed outside of the nesting period.
 - .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, and as required, of biodegradable coir logs, sized accordingly for use (minimum diameter of 0.3 m), and the necessary stakes (minimum one (1) stake per 1 m of coir log) and materials required by the manufacturer's installation specification. Prior to purchase of coir logs, submit manufacturer's product data and installation instructions to the Departmental Representative for review and acceptance. Store and handle in strict compliance with the manufacturer's instructions and recommendations. 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 and Daily QC Reports.
- 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 Quality Control and all other items necessary for successful completion of the work.
- .2 Measurement for Payment for Quality Management will be made by Lump Sum based on the percentage of the work completed and accepted by the Departmental Representative provided all of the associated Quality Management Requirements have been achieved with respect to check sheets, testing frequency, documentation and reporting, staffing etc.

1.2 References

- .1 British Columbia 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 C136, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 - .2 ASTM D5519, Standard Test Methods for Particle Size Analysis of Natural and Man-Made Riprap Materials.
 - .3 ASTM D698, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
 - .4 ASTM C143, Standard Test Method for Slump of Hydraulic-Cement Concrete.
 - .5 ASTM C173, Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
 - .6 ASTM C39, Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
 - .7 ASTM C117, Standard Test Method for Materials Finer than 75- μ m (No. 200) Sieve in Mineral Aggregates by Washing.
 - .8 ASTM D5821, Standard Test Method for Determining the Percentage of Fractured Particles in Coarse Aggregate.
 - .9 ASTM C127, Standard Test Method for Relative Density (Specific Gravity) and Absorption of Coarse Aggregate.
 - .10 ASTM C142, Standard Test Method Clay Lumps and Friable Particles in Aggregates.
 - .11 ASTM D6928, Standard Test Method for Resistance of Coarse Aggregate to Degradation by Abrasion in the Micro-Deval Apparatus.
 - .12 ASTM D4791, Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.
 - .13 ASTM D4318, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

- .14 ASTM D2419, Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate.
 - .15 ASTM C566, Standard Test Methods for Total Evaporable Moisture Content of Aggregate by Drying.
 - .16 ASTM D2216, Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass.
 - .17 ASTM D6938, Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).
 - .3 Alberta Transportation:
 - .1 Alberta Transportation Test procedure ATT-58/96 Density Test, Control Strip Method.
 - .4 American Association of State Highway and Transportation Officials (AASHTO), latest edition.
 - .1 AASHTO T 304, Standard Method of Test for Uncompacted Void Content of Fine Aggregate.
- 1.3 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).

-
- .5 Frozen Conditions: applies when the material or air temperature is less than zero degrees Celsius.
 - .6 Unfrozen Conditions: applies when the material or air temperature is greater than zero degrees Celsius
- 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 Departmental Representative.

.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 Non-Conformance Report (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 Contract requirements.
- .2 The Quality Management Plan is required to cover the work in its entirety, including without limitation all materials the Contractor and Subcontractors are supplying, monitoring and testing of the construction, documentation, and all items and phases of construction on the Project. At a minimum this shall include:
- .1 Procedures for verifying and documenting conformance of the work to the contract requirements including but not limited to review of the work and completion of check sheets and daily reports.
- .2 Procedure for immediately notifying the Contractor'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, 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, FLNRORD Section 11 Change Approval / Notification (to be provided to the Contractor prior to the commencement of instream work), and all other applicable regulations including the requirements of these specifications.
 - .5 All forms to be filled in by the Quality Control Personnel (e.g. check sheets, test forms, daily reports, NCR's, etc.).
 - .6 Procedures for the review of the project submissions by the QC Manager and Contractor to ensure accuracy and completeness of each submission against the project / specification requirements by the Contractor prior to submission to the Departmental Representative for review approval.
 - .7 Resumes of Quality Control Manager and designated replacement (if applicable) detailing the Quality Control Manager(s) past experience performing similar roles on similar projects.
 - .8 Details of the anticipated work schedule (onsite and breaks) for the Quality Control Manager and designate replacement Quality Control Manager.
 - .9 A winter backfill plan prepared by the Contractor including, at a minimum, procedures for snow and cold weather management, material handling, backfilling and compaction.
 - .10 Details (including frequencies) and records of the calibration and correlation of testing equipment (plant sensors, lab equipment, nuclear / density gauges, etc.) which have been undertaken or will be undertaken during the work.

- .11 Details of the procedure which will be undertaken by the Contractor to ensure that all workers are familiar with the Quality Management Plan, its goals, and their role under it, as well as the Contract Specifications associated with the work they are to undertake.
- .12 The Quality Management Plan should describe how the Quality Control Personnel are allocated to Project requirements, the tasks assigned to each, and how their work will be coordinated.
- .3 The Quality Management Plan will include the following information:
 - .1 The name of the Quality Control Manager, including designated replacement (if applicable), and details of their qualifications establishing a proven capability to provide the specific services required for the Project.
 - .2 The name of Quality Control testing personnel (and agency if being subcontracted) and survey personnel (and agency, if being subcontracted), 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 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 qualified, and experienced Quality Control Personnel (Quality Control Manager and Quality Control Staff as necessary to complete required QC workload), who are dedicated to quality matters, and work for a engineering consulting company which is owned and operates independently from the Contractor's organization. The Quality Control Manager and Quality Control Staff will report regularly to the Contractor's management and report on the Contractor's conformance with the quality requirements on the project.
 - .2 The Contractor shall designate one (1) person as the Quality Control Manager and if needed one (1) person as the designate replacement Quality Control Manager (when the Quality Control Manager is offsite on a break) who shall be responsible for the implementation of the QC Plan. The Quality Control Manager and designate replacement Quality Control Manager shall be a qualified Professional Engineer, Certified Engineering Technician, or Applied Science Technologist, or other person with knowledge, skills and abilities acceptable to the Departmental Representative.
 - .3 The Quality Control Manager, or a designated replacement Quality Control Manager, shall remain on site at all times the Contractor is performing work which must be tested or inspected in-process, and must be readily accessible and able to return when off-site. Unless preapproved by the Departmental Representative, the Quality Control Manager shall only be replaced by the designate replacement Quality Control Manager during scheduled breaks as outlined in the Quality Control Plan.
 - .4 At a minimum the Quality Control Manager shall:
 - .1 Be responsible to measure conformance of the work with the contract requirements and ensure that quality is not being compromised by production measures.
 - .2 Be empowered by the Contractor to resolve Quality Control matters.
 - .3 Direct and monitor Quality Control work completed by Quality Control testing agencies and Quality Control Staff.
 - .4 Review, sign, and be responsible for all reports (material and testing results).

- .5 Immediately notify the Contactor's management so work can be stopped and corrective action taken when material, product, processes or submittals are deficient or non-compliant with the contract requirements.
 - .6 Complete internal Non-conformance Reports (NCR's).
 - .7 Respond to NCR's issued by the Departmental Representative.
 - .8 Attend pre-construction and construction progress meetings.
- .5 PSPC reserves the right to reject one or more of the Contactor's Quality Control Personnel and require the Contactor 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 Contract Specification or in the opinion of the Departmental Representative is not adequately fulfilling the quality control requirements or independently reporting on the Contactor's conformance with the quality requirements on the project.

The Quality Control Personnel will be regularly reviewed by the PSPC team throughout the project to assess whether the Quality Control Personnel is providing the quality control services as required by this specification.

Should Quality Control Personnel be rejected by the Departmental Representative, any work which cannot undergo complete quality control as outlined in these specifications shall stop while the Contactor finds replacement Quality Control Personnel. Payment for Quality Control may be withheld at the discretion of the Departmental Representative should any concerns with Quality Control Personnel be identified.

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 (e.g. "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 be as follows:
- .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 and daily QC reports 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 provide Quality Control to assure that the work strictly complies with the Contract requirements shall be completed as follows:
- .1 Include all testing and survey inspection specified in the Contract Documents.
 - .2 Any other testing or survey inspection required as a condition for deviation from the specified Contract procedures.
- .2 The frequency of testing / survey inspections shall be outlined in the Quality Management Plan. At a minimum, the Contractor shall achieve the most stringent Quality Control testing / survey inspection frequencies as follows:
- .1 The specific frequencies defined elsewhere in these 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 / Survey Inspection Frequencies		
Activity	Test / Survey Inspection	Frequency
Manufacture – Crushed Base Gravel, Sub-Base Course, Select Subgrade Fill Material	ASTM C136, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates	The more stringent of one (1) test per 3000 m ³ or one (1) test for every two (2) hours of manufacturing.
Gradation – Embankment Material	ASTM C136, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates	Once per source at the discretion of the Departmental Representative
Manufacture / Screening / Sorting – Riprap, Natural Substrate	ASTM D5519, Particle Size Analysis of Natural and Man-Made Riprap Materials	One (1) Test per every one (1) day of production
Placement / Site Tolerance – Culvert Bedding Material / Crushed Base Gravel (Open Cut Method)	Survey Inspection	One (1) point every 3 m ² of placed material
Placement / Site Tolerance – Crushed Base Gravel	Survey Inspection	Final lift, five (5) points along each cross section at 10 m stations
Placement / Site Tolerance – Sub-Base Course, Select Subgrade Fill Material	Survey Inspection	Final lift, three (3) points along each cross section at 20 m stations
Placement / Site Tolerance – Embankment	Survey Inspection	Final lift, one (1) point every 5 m measured along the cross section at 20 m stations

Placement / Site Tolerance – Culverts Open Cut Method	Survey Inspection	One (1) survey shot (invert or top of culvert) every 5 m length of culvert section installed using Open Cut Method
Placement / Site Tolerance – Riprap	Survey Inspection	The more stringent of six (6) survey shots for each end of Inlet and Outlet Riprap Protection or one (1) point every 5 m ² or design change in grade of placed material
Compaction – Crushed Base Gravel, Sub-Base Course, Select Subgrade Fill Material, Embankment, Pulverized Existing BST for Reconstruction (unfrozen conditions)	Maximum Density (ASTM D698)	The more stringent of: <ul style="list-style-type: none"> - One (1) test per gravel pit / material source. - One (1) for any change in nature or source of material within a gravel pit.
Compaction – Crushed Base Gravel, Sub-Base Course, Select Subgrade Fill Material (unfrozen conditions)	In-Place Density (ASTM D6938)	Three (3) randomly located tests over the full width of material placed every 20 m station, per each lift of placed material
Compaction – Pulverized Existing BST for Reconstruction, Embankment (unfrozen conditions)	In-Place Density (ASTM D6938, Proof Rolling)	One (1) test per 200 m ² per lift of placed material or Proof Roll overfull width of each lift of material placed if 30% or more of the Embankment Material is oversized (> 19 mm)
Compaction – Culvert Bedding Material / Crushed Base Gravel (Open Cut Method) (unfrozen conditions)	In-Place Density (ASTM D6938)	Four (4) randomly located tests over the full length of the culvert per each lift of material placed if using Open Cut Method
Moisture Content – Crushed Base Gravel, Sub-base Course, Select Subgrade Fill Material (frozen conditions)	Moisture Content (ASTM D2216)	The more stringent of two (2) per source or as required by the Departmental Representative should a change in the material properties be detected
Compaction – Crushed Base Gravel, Sub-Base Course, Select Subgrade Fill Material, Pulverized Existing BST for Reconstruction, Embankment (frozen conditions)	Control Strip Method (ATT 58/96)	The more stringent of: <ul style="list-style-type: none"> - One (1) test per gravel pit / material source. - One (1) test for any change in nature or source of material within a gravel pit. - One (1) test for every freeze / thaw cycle during compaction.

.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. Onsite testing laboratories to conform to Subsection 1.10 QC Testing / Survey Inspection of this specification.
 - .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 Ministry of Transportation and Infrastructure.
 - .6 Initiate other Quality Control tests or procedures as necessary for ensuring production of a quality product and include them in the Quality Control Plan. Tests or procedures may also be introduced after the start of work as necessary as amendments to the Quality Control Plan.

-
- 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 corrected 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 hours 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 hours 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 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 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 Scaffolding.
- 1.3 Hoisting.
- 1.4 Site Storage / Loading.
- 1.5 Security.
- 1.6 Equipment, Tool, and Materials Storage.
- 1.7 Sanitary Facilities.
- 1.8 Construction Signage.
- 1.9 Construction Laydown Area, Construction Parking, and Site Office.
- 1.10 Departmental Representative’s Office Trailer.
- 1.11 Power.
- 1.12 Communications.
- 1.13 Temporary Heating, Ventilation, and Lighting.
- 1.14 Fire Protection.
- 1.15 Construction Equipment.

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 Scaffolding
 - .1 Provide and maintain scaffolding, ramps, ladders, swing staging, platforms, and temporary stairs as necessary to carry out work.
- 1.3 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.

-
- | | | |
|--|----|--|
| 1.4 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. |
| 1.5 Security | .1 | Provide and pay for responsible security personnel as required. |
| 1.6 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. |
| 1.7 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. |
| 1.8 Construction Signage | .1 | No other signs or advertisements, other than those required by Section 01 35 00 – Traffic Management and as shown on the Contract Drawings, are permitted on site. |
| 1.9 Construction Laydown Area, Construction Parking, and Site Office | .1 | Confine construction laydown areas, site office locations, and construction parking to the locations identified below in compliance with Section 01 35 43 – Environmental Protection and as pre-approved by the Departmental Representative. |
| | .1 | Within highway right of way, in areas previously disturbed, off the traveled portion of the highway, off travel portions of all nearby side roads such that access is not impeded, and outside the highway clear zone. |
| | .2 | PSPC's existing Gravel Pit at Km 565.9 of the Alaska Highway (see Pit Location Plan in Appendix M), or Wood Creek Rock Quarry at Km 651.0 of the Alaska Highway. |
| | .3 | Other areas as pre-approved by the Departmental Representative. |
| 1.10 Departmental Representative's Office Trailer | .1 | Provide Departmental Representative with office space within the Contractor's trailer or a standalone office trailer set up at a location pre-approved by the Departmental Representative. |

-
- .2 The office space within the Contractor's Trailer or standalone office trailer shall be:
 - .1 A minimum of 3.0 m long × 3.0 m wide × 2.4 m high, with floor 0.3 m above grade.
 - .2 Insulation and heating system to maintain 22°C inside temperature at -10°C outside temperature.
 - .3 Equip office with 1 m × 2 m table, and two (2) chairs.
 - .4 Install electrical lighting system to provide minimum 750 lx using surface mounted, shielded commercial fixtures with 10% upward light component.
 - .5 Power for the on-site trailer shall be available at all times when work at the site is ongoing by means of a generator or connection to power utility, supplied and maintained by the Contractor, or by other hook-ups as accepted by the Departmental Representative.
 - .3 If requested by the Departmental Representative, the Contractor is required to move the Departmental Representative's Office Trailer during the project a maximum of two (2) times. Any costs associated with this relocation of the Departmental Representative's Office Trailer is the responsibility of the Contractor. The new location will be directed by the Departmental Representative on or near the highway right-of-way between Km 565.0 and Km 570.5.
- 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 Contractor's 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.
- 1.15 Construction Equipment .1 Prior to commencement of construction and periodically throughout the work and whenever requested by the Departmental Representative, provide a detailed list of all construction equipment used on the project (including by sub-contractors). The list shall be as per the format of the General

Contractor & Sub-Contractor Construction Equipment List found in Appendix G of these specifications and include the size, make, model, and year of manufacture of all equipment. This document should include all equipment used on the project site, including trucks for hauling material.

- .2 The Departmental Representative has the right to request additional equipment and/or qualified operators be brought to site should the work appear to be delayed due to lack of equipment and/or qualified operators.

END OF SECTION

SECTION INCLUDES

PART 1 – GENERAL:

- 1.1 Measurement and Payment Procedures.
- 1.2 Installation and Removal.
- 1.3 Hoarding.
- 1.4 Guiderails and Barricades.
- 1.5 Access to Site.
- 1.6 Public Traffic Flow.
- 1.7 Fire Routes.
- 1.8 Protection for Off-site and Public Property.
- 1.9 Protection of Structure Finishes.

PART 1 – GENERAL

- 1.1 Measurement and Payment Procedures .1 Payment for Temporary Barrier and Enclosures will 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 Hoarding .1 Provide barriers around trees and plants designated to remain. Protect from damage by equipment and construction procedures (see Section 01 35 43 – Environmental Protection for more information).
- 1.4 Guiderails and Barricades .1 Provide secure, rigid guiderails and barricades around deep excavations and open shafts.
.2 Provide as required by governing authorities.
- 1.5 Access to Site .1 Provide and maintain access roads, sidewalk crossings, ramps and construction runways as may be required for access to Work.
- 1.6 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.
- 1.7 Fire Routes .1 Maintain access to property for use by emergency response vehicles.

- | | | |
|---|----|---|
| 1.8 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. |
| 1.9 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 and office as necessary. 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 off site.
- .6 Clear snow and ice from areas of work.
- .7 Ensure work site cleaning and worker hygiene practices are in accordance with the Contractor's COVID-19 Safe Work Plan.

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. Reinststate 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 Bituminous Surface Treatment (BST) finished 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 up by the Contractor 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 including cut and fill slopes, embankment and gravels placed).
 - .2 Culverts (inverts at inlet and outlet) and size, length, and type.
 - .3 Signage (new or modified).
 - .4 Gravel Shoulder.
 - .5 Riprap.
 - .6 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 Measurement and Payment Procedures.

PART 2 – PRODUCTS:

2.1 Embankment.

PART 3 – EXECUTION:

3.1 Signs.

3.2 Culverts.

3.3 Creosote Treated Wood and Surrounding Soil.

PART 1 – GENERAL

1.1 Measurement and Payment
Procedures

- .1 Payment for Existing Culvert Removal will be made on the basis of the Price per Unit Bid for Existing CSP Culvert Removal and Existing Wood Stave Culvert Removal in the Bid and Acceptance Form. The Price per Unit Bid shall include all costs for dewatering (as required), excavation, loading, hauling, and disposal offsite of excavated materials, removal, loading, transport and offsite disposal of culverts and associated components, placement of Embankment (when required), and all other items necessary for the successful completion of the work.
- .2 Measurement for Payment for Existing Culvert Removal will be made on the count of Existing CSP Culverts and Existing Wood Stave Culverts removed and disposed, and accepted by the Departmental Representative.
- .3 Measurement and Payment for removal of existing signage shall be made per the applicable payment item included in Section 10 14 53 – Traffic Signs and Gates.
- .4 Payment for the removal and disposal of existing concrete block, wood posts / poles, and steel posts and payment for salvage, loading and delivery of existing plough to the Tetsa River Lodge shall not be made and shall be considered incidental to the work.

PART 2 – PRODUCTS

2.1 Embankment

- .1 Embankment shall be in conformance with Section 31 24 14 – Roadway Excavation, Embankment, and Compaction.

PART 3 – EXECUTION

- 3.1 Signs .1 All existing regulatory signs and posts designated for removal on the Contract Drawings shall be removed by the Contractor and stockpiled in a location pre-approved by the Departmental Representative. The Contractor shall take necessary precautions to prevent damage to the signs during the removal, transport, and stockpiling process. The order and timing of sign removal shall be completed in conjunction with the Contractor's accepted Traffic Management Plan to ensure necessary signage for the protection and control of public traffic is available throughout the construction.
- 3.2 Culverts .1 Take all necessary precautions as outline in Section 01 35 43 – Environmental Protection and the Contractor's accepted Environmental Protection Plan (EPP) to mitigate against sediment transport and other environmental pollution or damage during construction.
- .2 Excavate and remove all existing culverts and associated components (screens, debris catchments etc., if present) within the limits of the work. Dispose of the culverts in an offsite disposal facility within British Columbia permitted to accept the culvert materials (steel and creosote treated timber) and acceptable to the Departmental Representative. If requested by the Departmental Representative, salvage the associated culvert components (screens, debris catchments etc.) and stockpile in a location directed by the Departmental Representative (see Section 33 42 13 – Pipe Culverts for further details).
- .3 Unless noted otherwise in Section 31 24 14 – Roadway Excavation, Embankment, and Compaction, re-use excavated material as Embankment (if suitable) or dispose of the material in an onsite location and condition acceptable to the Departmental Representative. If material is re-used, volume of material to be excluded from embankment volume for payment.
- 3.3 Creosote Treated Wood and Surrounding Soil .1 Dispose of Creosote Treated Wood Stave Culverts and surrounding soil in conformance with the Environmental Overview Assessment (EOA) in Appendix K, and the following:
- .1 Place all removed Creosote Treated Wood on poly sheeting while temporarily stockpiled to prevent the possibility of leached creosote from any newly exposed wood surfaces from gaining into the surface and substance soils which would potentially contaminate the soil with polycyclic aromatic hydrocarbons (PAH).

- .2 Soils exposed within an approximate 1.0 m radius from the treated wood shall be excavated and stockpiled on poly sheeting. If the soil beyond 1.0 m radius from the creosote treated wood presents visual or olfactory evidence of residual creosote, the Contractor's Environmental Monitor shall provide evidence and obtain permission from the Departmental Representative prior to performing the work. This soil should be sampled in accordance with accepted soil sampling procedures (i.e. BC Field Sampling Manual) by an appropriately Qualified Environmental Professional (QEP) and submitted to an accredited analytical laboratory for analysis of PAH and the analytes required to meet the receiving facility's disposal criteria (one sample for each: flashpoint, pH, total BTEX) to determine disposal options.

PAH are regulated substances per the CSR of the Environmental Management Act of BC and Canadian Council of Ministers of Environment (CCME) Canadian Environmental Quality Guidelines. At a minimum, one sample per site requiring creosote treated wood removal shall be submitted for analysis. All analysis results shall be submitted to PSPC prior to disposal of the creosote treated wood and surrounding soil. Should the Contractor encounter substances in the material to be disposed of that are not accepted by any facility within the Northern Rockies Municipality, inform the Departmental Representative and await further instructions.

- .3 Until such time that any stockpiled wood or soil is removed from the site, the stockpile(s) should be covered with poly sheeting to prevent precipitation from leaching PAH from the stockpile.
- .4 Prevent contact of creosote-treated wood with water within the watercourse.
- .5 Creosote treated wood and soil with residual creosote should be transported in accordance with the Transportation of Dangerous Goods Act and disposed of at a facility within BC approved to accept and store materials treated with creosote. The Contractor must provide the facility's certification with the Ministry of Environment and permit to accept the contaminated material to PSPC prior to disposing of any materials at the facility. The Contractor shall obtain ticket of waste

manifest upon disposal of contaminated material and
provide to the Departmental Representative.

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 Submit to the Departmental Representative a current Material Safety Data Sheet (MSDS) for each hazardous material required prior to bringing hazardous material on site.

- 1.3 Storage and Handling
- .3 Submit Hazardous Materials Management Plan to the Departmental Representative that identifies all hazardous materials, their use, their location, personal protective equipment requirements, and disposal arrangements.
 - .1 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 Traffic Signs.
- 2.2 Signposts and Hardware.
- 2.3 Embankment.
- 2.4 Crushed Base Gravel.

PART 3 – EXECUTION:

- 3.1 Existing Sign and Signpost Removal.
- 3.2 Signpost Installation.
- 3.3 Traffic Sign Installation.
- 3.4 Advertising Sign Salvage and Delivery.
- 3.5 Gate Removal and Reinstallation.

PART 1 – GENERAL

1.1 Measurement and Payment Procedures

- .1 Payment for Traffic Signage will be made on the basis of the Price per Unit Bid for Traffic Signage in the Bid and Acceptance Form. The Price per Unit Bid shall include all costs for supply and install of the sign, signpost and hardware, and all other items necessary for the successful completion of the work.
- .2 Measurement for Payment for Traffic Signage will be made by the count of each traffic sign (sign and post) installed and accepted by the Departmental Representative. A single sign post designated to hold multiple signs will be counted as one sign for payment.
- .3 Payment for Sign Relocation will be made on the basis of the Price per Unit Bid for Sign Relocation in the Bid and Acceptance Form. The Price per Unit Bid shall include all costs for:
 - .1 Removal, stockpile, transport and reinstallation of existing sign faces.

- .2 Removal and offsite disposal of existing signposts and hardware.
- .3 Supply and installation of new signposts and hardware.
- .4 All other items necessary for the successful completion of the work.
- .4 Measurement for Payment for Sign Relocation will be made by the count of each traffic sign (sign and post) removed, reinstalled and accepted by the Departmental Representative. A single signpost designated to hold multiple signs will be counted as one sign for payment. A single sign with multiple signposts will be counted as one sign for payment.
- .5 Payment for Sign Removal will be made on the basis of the Price per Unit Bid for Sign Removal in the Bid and Acceptance Form. The Price per Unit Bid shall include all costs for removal and offsite disposal, and all other items necessary for successful completion of the work.
- .6 Measurement for Payment for Sign Removal will be made on the count of each sign removed and accepted by the Departmental Representative. A single signpost designated to hold multiple signs will be counted as one sign for payment. A single sign with multiple signposts will be counted as one sign for payment.
- .7 Payment for Advertising Sign Salvage and Delivery will be made on the basis of the Price per Unit Bid for Advertising Sign Salvage and Delivery in the Bid and Acceptance Form. The Price per Unit Bid shall include all costs for excavation (if required), removal / salvage, loading, transporting and delivery / offloading of existing advertising signs and associated componentry to the Tetsa River Lodge, coordination with the Tetsa River Lodge representatives, and all other items necessary for the successful completion of the work.
- .8 Measurement for Payment for Advertising Sign Salvage and Delivery will be made on the count of each advertising sign salvaged and delivered to the Tetsa River Lodge, and accepted by the Departmental Representative.
- .9 Payment for Gate Removal and Reinstallation will be made on the basis of the Price per Unit Bid for Gate Removal and Reinstallation in the Bid and Acceptance Form. The Price per Unit Bid shall include all costs for the excavation (if required), removal, loading, temporary stockpiling, and

reinstallation of existing gates, and all other items necessary for the successful completion of the work.

- .10 Measurement for Payment for Gate Removal and Reinstallation will be made on the count of each gate removed and reinstalled, and accepted by the Departmental Representative.
- .11 Existing road signage removed and reinstalled to facilitate excavation at the existing cut slope between Km 572.3 and Km 572.5 (if required), shall not be measured for payment.

1.2 References

- .1 British Columbia Ministry of Transportation and Infrastructure (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:
 - .1 Manual of Uniform Traffic Control Devices for Canada (January 2014, or latest edition).

PART 2 – PRODUCTS

2.1 Traffic Signs

- .1 Signs shall be per the BC MoTI 2020 Standard Specifications for Highway Construction, see 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 & Pavement Markings. If not provided in the BC MoTI Manual of Traffic Signs & Pavement Markings the sign shall be per the Manual of Uniform Traffic Control Devices for Canada.

2.2 Signposts and Hardware

- .1 The signposts and hardware shall be in accordance with the BC MoTI 2020 Standard Specification for Highway Construction, Section 635, Subsection 635.27 and the 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 Embankment .1 Embankment shall be in conformance with Section 31 24 14 – Roadway Excavation, Embankment, and Compaction.
- 2.4 Crushed Base Gravel .1 Crushed Base Gravel shall be in conformance with Section 31 05 16 – Aggregates: General and Section 32 11 24 – Crushed Base Gravel.

PART 3 – EXECUTION

- 3.1 Existing Sign and Signpost Removal .1 Remove existing traffic signs designated for reinstallation and temporarily stockpile at a location acceptable to the Departmental Representative. Ensure existing signs are protected from damage during removal, stockpile, transport and reinstallation.
- .2 Remove and dispose of existing signposts and traffic signs not designated for reinstallation at an offsite facility permitted to accept the materials, and acceptable to the Departmental Representative.
- .1 If requested by the Departmental Representative, salvage existing traffic signs and stockpile at a location as directed by the Departmental Representative.
- 3.2 Signpost Installation .1 Wood signposts shall be installed in accordance with BC MoTI Manual of Standard Traffic Signs & Pavement Markings and BC MoTI Standard Specifications for Highway Construction, see Section 635, subsection 635.27 and subsection 635.32 and the following requirements.
- .1 Post embedment depth shall be 1600 mm.
- .2 Green and white paint not required.
- .3 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.
- 3.3 Traffic Sign Installation .1 Install new traffic signs and reinstall existing traffic signs in accordance with BC MoTI Standard Drawings SP635-3.5.6 through SP635-3.5.9 and SS 635.32.

- 3.4 Advertising Sign Salvage and Delivery
- .1 Confirm location of all Advertising Signs designated for salvaging within the limits of construction shown on the Contract Drawings.
 - .2 Handle Advertising Signs and associated componentry (e.g. posts, wires, etc.) with care and protect from damage at all times during excavation (if required), removal / salvage, loading, transportation and unloading. Securely restrain Advertising Signs during excavation (if required), removal / salvage, loading, transportation and unloading to ensure Advertising Signs are handled in a controlled manner.
 - .3 Excavate native ground at the base of Advertising Signs mounted on embedded posts to facilitate the removal of the full length of sign post, or implement other removal methods acceptable to the Departmental Representative. Neatly roll / bundle wire (where applicable).
 - .4 Deliver and unload the Advertising Signs and associated componentry to the Tetsa River Lodge. The Contractor shall coordinate all aspects of the delivery and unloading of the Advertising Signs and associated componentry with Tetsa River Lodge representatives. If requested by the Contractor, the Departmental Representative will provide contact information for representative(s) of the Tetsa River Lodge.
 - .5 The Contractor shall provide a minimum of five (5) days' notice to the Departmental Representative and Tetsa River Lodge representatives prior to the delivery and unloading of the Advertising Signs and associated componentry. Delivery and unloading of Advertising Signs and associated componentry shall occur at a time and day acceptable to the Tetsa River Lodge representatives.
 - .6 Upon removal of the Advertising Signs with embedded posts, backfill and compact any excavation with Embankment to the satisfaction of the Departmental Representative.
- 3.5 Gate Removal and Reinstallation
- .1 Remove / salvage for reinstallation existing gates, posts and associated hardware as shown on the Contract Drawings. Temporarily stockpile gates, posts and associated hardware onsite in a location acceptable to the Departmental Representative.
 - .2 Upon completion and acceptance of underlying work by the Departmental Representative (e.g. Embankment and Crushed Base Gravel), reinstall existing gates, posts and associated hardware in the locations shown on the Contract Drawings

and as directed by the Departmental Representative, and in conformance with the following requirements:

- .1 Post holes shall be made via an auger with a diameter no greater than 100 mm larger than the existing post dimensions. Backfill the void space with Crushed Base Gravel and tamp to achieve compaction to the satisfaction of the Departmental Representative.
- .2 Install gate posts plumb and embed post to a depth sufficient to permit the gate to operate smoothly. Ensure top of adjacent posts and gates are horizontal and level.
- .3 The Contractor shall take all necessary precautions to prevent damage to the existing gates, posts and associated hardware by equipment and construction procedures during the removal / salvage, temporary stockpiling and reinstallation. The Contractor will be responsible to repair or replace posts, gate, or associated hardware damaged when, in the opinion of the Departmental Representative, negligence on the part of the Contractor results in damage or destruction to the existing gates, posts or associated hardware.

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 Base Gravel.
- 2.4 Sub-Base Course.
- 2.5 Select Subgrade Fill Material.
- 2.6 Riprap.
- 2.7 Natural Substrate.

PART 3 – EXECUTION:

- 3.1 Material Excavated Between Km 572.3 and Km 572.5.
- 3.2 Preparation.
- 3.3 Processing.
- 3.4 QA Sampling by the Departmental Representative.
- 3.5 Handling and Transportation.
- 3.6 Stockpiling.
- 3.7 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 24 14 – Roadway Excavation, Embankment and Compaction, Section 31 37 00 – Riprap, Section 32 11 18 – Select Subgrade Fill Material, Section 32 11 19 – Sub-Base Course, Section 32 11 24 –

-
- Crushed Base Gravel, Section 33 42 13 – Pipe Culverts, and any other section as required by these 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 C117, Standard Test Method for Materials Finer than 75- μ m (No. 200) Sieve in Mineral Aggregates by Washing.
 - .2 ASTM C131, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
 - .3 ASTM C136, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 - .4 ASTM D2216, Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass.
 - .5 ASTM D4318, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
 - .6 ASTM D4791, Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.
 - 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 the 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 which do not meet specified tolerances 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 All materials are supplied to the Contractor “as-is”. The Contractor will be responsible for the manufacture, screening, blending, aeration or drying, or any other required processing to achieve all material requirements from the “as-is” material.
- .2 The Contractor may visit the site and take samples, complete drilling or complete test pits of the available materials to assist in defining the level of effort the Contractor will need to undertake to achieve gradation, compaction, and any other requirements or assist with any other concerns. The Contractor shall notify and obtain pre-approval from the Departmental Representative in advance of any drilling or test pit sampling undertaken by the Contractor.
- .3 A collection of previously collected geotechnical data from the materials in this area is available for the Contractors reference in the Geotechnical Exploration Data Report – Alaska Highway Km 568-573 (Tetsa River) Reconstruction Phase 2, Tetra Tech – May 2021 (Appendix N).
- .4 PSPC is providing access to as-is materials from PSPC’s Gravel Pit (Km 565.9 of the Alaska Highway), and Wood Creek Rock Quarry (Km 651.0 of the Alaska Highway) which the Contractor may choose to use as a source of granular material / rock to be manufactured / blasted / sorted / screened to meet project requirements (see Section 01 11 00 – Summary of Work, Subsection 2.1 Owner Supplied Materials (Outside Limits of Work)).
- .5 The Contractor will be solely responsible for ensuring that the aggregate source(s) selected by the Contractor continuously achieves all aggregate material properties, quality, and gradation

requirements as outlined in these specifications for the material's intended use.

- .6 Obtain Embankment from designated borrow areas outside the limits of construction (i.e. existing cut slopes between Km 572.3 and Km 572.5) only after the Contractor exhausts suitable right-of-way excavations within the limits of construction. Refer to Subsection 3.1 Material Excavated between Km 572.3 and Km 572.5 of this specification section, Subsection 2.1 Owner Supplied Materials (Outside Limits of Work) in Section 01 11 10 – Summary of Work, and Subsection 2.1 Embankment Material in Section 31 24 14 – Roadway Excavation, Embankment, and Compaction for further details.
- .7 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 material source.

2.2 Aggregates General

- .1 All aggregate materials on the project (regardless of the source) 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 requirement 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 a 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 a blend of the following.
 - .1 Crushed rock.
 - .2 Gravel comprised of naturally formed particles of stone.
 - .3 Light weight aggregate, including slag.

2.3 Crushed Base Gravel

- .1 Crushed Base Gravel shall be manufactured by the Contractor from the “as-is” material in PSPC’s Gravel Pit at Km 565.9 of the Alaska Highway.
- .2 The PSPC-supplied material shall be screened / manufactured by the Contractor to ensure the materials conform with the following requirements:
 - .1 The material shall consist of hard durable particles free from clay lumps, organic matter, and other deleterious materials.
 - .1 Where Crushed Base Gravel contains some frozen material acceptable to the Departmental Representative and/or the air temperature during placement and compaction is less than or equal to 0°C, the moisture content of the Crushed Base Gravel when tested in accordance with ASTM D2216 shall be less than or equal to 4%.
 - .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 – 01: 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 Grading of material shall not show marked fluctuations from opposite extremes of the limits given in Table 31 05 16 – 01 and Table 31 05 16 – 02, and the curve plotted from the sieve analysis shall flow in a similar manner free from acute changes in direction.

- .4 Even though particle sizes are within the limits of the grading sizes herein provided, materials will be considered unsuitable if particle shapes are thin or elongated or exhibit other characteristics precluding satisfactory compaction.
- .5 Liquid limit when tested in accordance to ASTM D4318, maximum 25.
- .6 Plasticity index when tested in accordance to ASTM D4318, maximum 6.
- .7 Los Angeles degradation when tested in accordance to ASTM C131/C131M, maximum percent loss by weight 35.
- .8 Fracture: at least 60% of particles by mass retained on 4.75 mm sieve to have at least one fractured face.

2.4 Sub-Base Course

- .1 Sub-Base Course shall be manufactured by the Contractor from the “as-is” material in PSPC’s Gravel Pit at Km 565.9 of the Alaska Highway.
- .2 The PSPC-supplied material shall be screened / manufactured by the Contractor to ensure the material conforms with the following requirements:
 - .1 The material shall consist of hard durable particles free from clay lumps, organic matter, and other deleterious materials.
 - .1 Where Sub-Base Course contains some frozen material acceptable to the Departmental Representative and/or the air temperature during placement and compaction is less than or equal to 0°C, the moisture content of the Sub-Base Course when tested in accordance with ASTM D2216 shall be less than or equal to 4%.
 - .2 When tested in accordance with ASTM C136 / C136M, the material shall have a gradation conforming to the following gradation limits:

Table 31 05 16 – 02: Gradation Limits: Sub-Base Course	
Sieve Designation (mm)	Percent Passing by Weight
100	100
4.75	20 – 65
0.075	0 – 8

- .3 Grading of material shall not show marked fluctuations from opposite extremes of the limits given in Table 31 05 16 – 03, and the curve plotted from the sieve analysis shall flow in a similar manner free from acute changes in direction.
 - .4 Even though particle sizes are within the limits of the grading sizes herein provided, materials will be considered unsuitable if particle shapes are thin or elongated or exhibit other characteristics precluding satisfactory compaction.
 - .5 Liquid limit when tested in accordance with ASTM D4318, maximum 25.
 - .6 Plasticity index when tested in accordance with ASTM D4318, maximum 6.
 - .7 Fracture: at least 20% of particles by mass retained on a 4.75 mm sieve to have at least one freshly fractured face.
- 2.5 Select Subgrade Fill Material
- .1 Select Subgrade Fill Material shall be manufactured by the Contractor from the “as-is” material excavated or available from any combination of the following sources:
 - .1 Materials designated to be excavated within the limits of the work.
 - .2 Materials within PSPC’s Gravel Pit at Km 565.9 of the Alaska Highway.
 - .2 The PSPC-supplied material shall be screened / manufactured by the Contractor to ensure the material conforms with the following requirements:
 - .1 The material shall consist of hard durable particles free from clay lumps, organic matter and other deleterious materials.
 - .1 Where Select Subgrade Fill Material contains some frozen material acceptable to the Departmental Representative and/or the air temperature during placement and compaction is less than or equal to 0°C, the moisture content of the Select Subgrade Fill Material when tested in accordance with ASTM D2216 shall be less than or equal to 4%.

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

Table 31 05 16 – 03: Gradation Limits: Select Subgrade Fill Material	
Sieve Designation (mm)	Percent Passing by Weight
100	100
0.075	0 – 10

- .3 Liquid limit when tested in accordance with ASTM D4318, maximum 25.
- .4 Plasticity index when tested in accordance with ASTM D4318, maximum 6.
- .5 Regardless that the material meets the above gradation, it will be rejected if the compacted material ruts when a loaded tandem truck passes over it.

2.6 Riprap

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

2.7 Natural Substrate

- .1 The Natural Substrate shall be imported from an offsite source and achieve the following requirements:

- .1 Natural Substrate shall be a 150 mm minimum material comprised of rounded aggregates produced from sorting, screening, and/or blending of materials. The materials shall have a generally uniform gradation conforming to the following gradation limits:

Table 31 05 16 – 04: Gradation Limits: Natural Substrate	
Sieve Designation (mm)	Percent Passing by Weight
150.0	100
75.0	50 – 80
50.0	30 – 60
25.0	20 – 50
9.5	0 – 5

- .2 Existing rock material that achieves the requirements for Natural Substrate may be set aside by the Contractor for re-use as Natural Substrate.

PART 3 – EXECUTION

3.1 Material Excavated
 Between Km 572.3 and
 Km 572.5

- .1 Obtain Departmental Representative’s approval prior to commencing excavation of materials from the existing cut slope between Km 572.3 and Km 572.5.

- .2 Prior to excavating material from the existing cut slope, install construction signage and traffic control personnel in conformance with the Contractor's accepted Traffic Management Plan and the requirements of Section 01 35 00 – Traffic Management. Temporarily remove existing warning sign(s) necessary to gain access to the cut slope.
- .3 The Contractor shall be responsible for developing access to the existing cut slope using the existing pioneer trail on the south side of the existing cut slope and in accordance with Section 01 14 00 – Work Restrictions, Access Development, Construction Staging, and Restoration. This access uses steep grades but has been used in the past by equipment accessing the plateau at the top of the borrow area. The access road is not maintained, and the Contractor shall assume all responsibility for any maintenance or upgrades required to bring the access road to a condition suitable for use, including but limited to:
 - .1 Clearing and disposal of trees and vegetation.
 - .2 Development and removal of temporary culverts or other drainage structures (if required).
 - .3 Construction and removal of temporary access ramps (if required).
- .4 Complete Tree Clearing as required to facilitate excavation of the in-situ materials. Complete Tree Clearing in conformance with the requirements of Section 31 11 00 – Tree Clearing.
- .5 Complete grubbing of stumps and roots and stripping of topsoil in conformance with the requirements of Section 31 24 14 – Roadway Excavation, Embankment, and Compaction. Limit Stripping to the minimal extents possible to facilitate excavation of the in-situ materials. Stripped materials shall be shall be treated in accordance with Subsection 3.4 Surplus Excavation Material in Section 31 24 14 – Roadway Excavation, Embankment, and Compaction.
- .6 Excavate and remove material from the cut slope as approved by the Departmental Representative. At the completion of the work, the finished cut slope shall be excavated such that the cut slope angle is constant from the toe of the slope to the top of slope and the slope is neatly trimmed to the satisfaction of the Departmental Representative.
- .7 At the completion of the excavation activities at the existing cut slope, immediately replace signage removed to gain access to

-
- the cut slope to the satisfaction of the Departmental Representative.
- 3.2 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.
- 3.3 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 Specifications. Use methods and equipment approved by Departmental Representative.
 - .3 Wash aggregates, if required, to achieve requirements of these specifications. Use only equipment approved by Departmental Representative.
 - .4 When operating in stratified deposits, use excavation equipment and methods that produce a uniform, homogeneous aggregate.
- 3.4 QA Sampling by the Departmental Representative
- .1 Provide Departmental Representative with access to source and processed material for sampling during production.
 - .2 Install sampling facilities at discharge end of production conveyor, to allow Departmental Representative to obtain representative samples of items being produced. Stop conveyor belt when directed by Departmental Representative to permit full cross section sampling.
 - .3 Pay cost for sampling and testing of aggregates which fail to meet specified requirements.
 - .4 Aggregates that do not meet specified tolerances for intended use are subject to rejection by the Departmental Representative as part of the QA process.
- 3.5 Handling and Transportation
- .1 Avoid segregation, contamination, and degradation of aggregate during handling and transporting.
 - .2 Load limit restrictions will be in accordance with British Columbia Highway Motor Vehicle 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.
- 3.6 Stockpiling
- .1 Stockpile aggregates in locations approved by the Departmental Representative and not closer than 5 m from the edge of the excavation slopes. Do not stockpile on BST finished 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 Base Gravel not less than 300 mm in depth to prevent contamination of aggregate. Do not incorporate compacted base of pile into work.
- .5 Separate different aggregates by strong, full depth bulkheads, or stockpile far enough apart to prevent intermixing.
- .6 Do not use intermixed or contaminated materials. Remove and dispose of rejected materials as directed by Departmental Representative.
- .7 Uniformly spot-dump aggregates delivered to stockpile in trucks and build up stockpiles as required to prevent segregation.
- .8 Do not cone piles or spill material over edges of piles.
- .9 Do not use conveying stackers.
- .10 Prevent ice and snow from becoming mixed into stockpile or in material being removed from stockpile.
- 3.7 Cleaning
- .1 Any stockpiles temporarily placed on the highway right-of-way or on PSPC property will be completely removed by the Contractor and the site restored to its natural condition.
- .2 The Contractor shall be responsible for any cleanup of aggregate sources. Leave aggregate stockpile site in a tidy, well-drained condition, free of standing water.
- .3 Leave any unused aggregates in neat, compact stockpiles in locations directed by the Departmental Representative.

- .4 For temporary or permanent abandonment of aggregate source, restore source to conditions directed by the Departmental Representative.

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 Clearing.
- 3.3 Removal and Disposal.
- 3.4 Finished Surfaces.

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, mulching, chipping, disposal, and all other items necessary for successful completion of the work.
- .2 Measurement for Payment for Tree Clearing will be made on the total area within the limits of Tree Clearing shown on the Contract Drawings, surveyed in square metres, incorporated into the works, and accepted by the Departmental Representative. Tree Clearing completed to facilitate extraction of materials at PSPC's Gravel Pit at Km 565.9 of the Alaska Highway or the existing cut between Km 572.3 and Km 572.5 of the Alaska Highway (if required) will not be measured for payment.
- .3 Measurement and Payment for grubbing of stumps and roots shall be made per the applicable work item (i.e. Stripping) included in Section 31 24 14 – Roadway Excavation, Embankment, and Compaction.

1.2 Definitions

- .1 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.

- .2 Clearing: cutting off trees, brushing vegetative growth to ground level and disposing of felled trees, previously uprooted trees and stumps and surface debris. All materials to be removed offsite. Disposal of material by burning will not be accepted.
- 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.

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 Tree Clearing and any items designated to remain.
 - .2 Unless advised otherwise, receive from the Departmental Representative the License to Cut prior to undertaking the work.
- 3.2 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.
 - .2 Cut off branches and cut down trees overhanging area cleared.
- 3.3 Removal and Disposal
 - .1 Dispose of cleared materials by chipping / mulching. Chip or mulch and spread cleared vegetative materials that are onsite as directed by the Departmental Representative.
 - .2 Burning of cleared materials shall not be permitted.
- 3.4 Finished Surfaces
 - .1 Leave ground surface in a condition suitable for stripping of topsoil and grubbing of stumps.

END OF SECTION

SECTION INCLUDES

PART 1 – GENERAL:

- 1.1 Measurement and Payment Procedures.
- 1.2 Definitions.
- 1.3 References.
- 1.4 Submittals.

PART 2 – PRODUCTS:

- 2.1 Embankment Material.
- 2.2 Surplus Excavation Material.

PART 3 – EXECUTION:

- 3.1 Stripping.
- 3.2 Excavating.
- 3.3 Embankment.
- 3.4 Surplus Excavation Material.

PART 1 – GENERAL

1.1 Measurement and Payment Procedures

- .1 Payment for Stripping (including Grubbing) will be made on the basis of the Price per Unit Bid for Stripping (including Grubbing) in the Bid and Acceptance Form. The Price per Unit Bid shall include all costs for stripping of organic materials, grubbing of stumps and roots within the stripped area, loading, hauling and offsite disposal of grubbed materials and stripped materials, and all other items necessary for the successful completion of the work.
- .2 Measurement for Payment for completion of Stripping (including Grubbing) will be made on the in-situ volume of material surveyed in cubic metres (surveyed prior to and upon completion of Stripping), excavated within the limits of the work, and accepted by the Departmental Representative. The volume will be determined by comparing the pre-Stripping survey (following Tree Clearing) and post-Stripping survey of the stripped area. Measurement for Payment shall not include material greater than 0.3 m from the pre-construction surface unless pre-approved by the Departmental Representative. No separate measurement or payment for hauling or offsite disposal will be made.

-
- .3 Payment for Embankment will be made on the basis of the Price per Unit Bid for Embankment in the Bid and Acceptance Form. The Price per Unit Bid shall include all costs for excavation, stockpiling, loading, transport, placement as Embankment, shaping, watering and/or drying and compaction of the Embankment, and all other items necessary for successful completion of the work.
- .4 Measurement for Payment for completion of Embankment will be made on the volume of material surveyed in cubic metres incorporated into the finished highway embankment (at the completion of compaction) and accepted by the Departmental Representative. No separate measurement or payment for excavation or hauling of the Embankment material will be made. Excess Embankment material resulting from excavation completed within the design lines and grades shown on the Contract Drawings will be placed as surplus excavation and counted as Embankment.
- 1.2 Definitions
- .1 Excavation: excavation of materials that are not rock excavation or stripping.
- .2 Grubbing: excavating and disposing stumps and roots to 200 mm below the ground surface, after completion of Stripping.
- .3 Native Material: material in place at the time of tender.
- .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. Organic material is typically dark brown or black in colour.
- .5 Rock excavation:
- .1 Material from solid masses of igneous, sedimentary or metamorphic rock which, prior to removal, was integral with parent mass. Material that cannot be ripped with reasonable effort from Caterpillar D9L or equivalent and considered integral with parent mass.
- .2 Boulder or rock fragments measuring in volume one cubic metre or more.
- .6 Stripping: excavation of organic material covering the original ground.
- 1.3 References
- .1 American Society for Testing Materials (ASTM), latest edition.

- .1 ASTM D4318-10 Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
 - .2 ASTM D698, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³) (600 kN-m/m³).
 - .3 ASTM D1556-07 Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.
 - .4 ASTM D2167-08 Standard Test Methods for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
 - .5 ASTM D2216 Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass.
 - .6 ASTM D6938-10 Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods.
 - .2 Alberta Transportation Testing (ATT):
 - .1 ATT-58/96 Density Test, Control Strip Method.
- 1.4 Submittals
- .1 Submittals shall be in accordance with the procedures outlined in Section 01 33 00 – Submittal Procedures.
 - .2 The Contractor shall submit survey of the ground surface to the Departmental Representative for review and acceptance at the following times during construction (see Section 01 29 00 – Payment Procedures, Subsection 1.3 Survey for further details):
 - .1 Upon completion of Tree Clearing (to the satisfaction of the Departmental Representative) but prior to commencement of Stripping.
 - .2 Upon completion of Stripping and Grubbing within the limits shown on the Contract Drawings.

PART 2 – PRODUCTS

- 2.1 Embankment Material
 - .1 Material containing no more than 3% organic matter by mass, weeds, sods, roots, logs, stumps or any other unsuitable material unless otherwise directed by Departmental Representative, excavated from design grades within the

limits of construction or other designated sources as detailed in this specification section.

- .1 Where Embankment contains some frozen material acceptable to the Departmental Representative and/or the air temperature during placement and compaction is less than or equal to 0°C, the moisture content of the Embankment when tested in accordance with ASTM D2216 shall be less than or equal to 4%.
- .2 The Contractor may utilize Embankment material sourced from the following locations and acceptable to the Departmental Representative:
 - .1 Existing highway embankment, gravels and pulverized BST located within the limits of decommissioned highway shown on the Contract Drawings.
 - .2 Existing highway gravels and BST located within the zone of the proposed:
 - .1 Crushed Base Gravel and Sub-Base Course.
 - .2 Select Subgrade Fill Material, except where the elevation of the existing highway driving surface (top of BST) is located within the zone of proposed Select Subgrade Fill Material and the material is pulverized and re-use in place as Select Subgrade Fill Material (refer to Section 31 26 13 – Pulverization of Existing BST and Section 32 11 18 – Select Subgrade Fill Material for further information).
 - .3 Existing material (i.e. shale) stockpiled at PSPC's existing pit at Km 565.9 designated for use by the Departmental Representative as Embankment.
 - .4 Once the Contractor exhausts suitable material from onsite excavations and suitable material located in PSPC's existing pit at Km 565.9, in-situ materials excavated at the existing cut slope between Km 572.3 and Km 572.5 of the Alaska Highway (see Subsection 2.1 Owner Supplied Materials (Outside Limits of Work) in Section 01 11 10 – Summary of Work for further details).

- 2.2 Surplus Excavation Material .1 Excavated material meeting the requirements of Embankment Material. Material shall not contain rock materials > 200 mm in diameter.

PART 3 – EXECUTION

- 3.1 Stripping
- .1 Following completion of Tree Clearing within the limits of excavation shown on the Contract Drawings, and prior to commencement of Stripping, submit to the Departmental Representative for review and acceptance survey of the existing ground surface (see Section 01 29 00 – Payment Procedures, Subsection 1.3 Survey for further details).
- .2 Complete Stripping of organic materials, including grubbing of stumps and roots within the limits of construction, to the lines, grades and depths indicated on the Contract Drawings and as directed by Departmental Representative.
- .3 Limits extend of Stripping as much as possible to facilitate completion of the work. Excessive Stripping as determined by the Departmental Representative will not be measured for payment.
- .4 During Stripping, grub out stumps, roots and wood debris including roots and embedded logs not less than 200 mm below ground surface after completion of Stripping.
- .5 Remove and dispose offsite grubbed materials and stripped materials to a location acceptable to the Departmental Representative.
- 3.2 Excavating
- .1 Complete excavation to the design lines and grades shown on the Contract Drawings. Notify the Departmental Representative should excavated materials not achieve the requirements for Embankment.
- .2 During excavation, maintain profiles, crowns and cross slopes to provide good surface drainage. Provide ditches as work progresses to provide drainage and construct interceptor ditches before excavating or placing embankment in adjacent area if required or as directed by the Departmental Representative.
- .3 If during excavation, material appearing to conform to classification for rock excavation is encountered, notify the Departmental Representative and provide sufficient time to enable measurements to be made to determine volume of rock. Payment for rock excavation (if required) will be completed via a change order.

-
- .4 Obtain Embankment from designated borrow areas outside the limits of construction (i.e. existing cut slopes between Km 572.3 and Km 572.5) only after the Contractor exhausts suitable right-of-way excavations within the limits of construction. See Subsection 2.1 Owner Supplied Materials in Section 01 11 10 – Summary of Work and Subsection 3.1 Material Excavated Between Km 572.3 and Km 572.5 in Section 31 05 16 – Aggregates: General.
- 3.3 Embankment
- .1 Place excavated material as Embankment following Stripping to the design lines and grades, cross sections and dimensions as shown on the Contract Drawings.
- .2 When embankments are made on hillsides or existing embankments steeper than 2H:1V, the slopes of the embankment shall be terraced in a continuous series of steps a minimum of 1.0 m wide.
- .3 If suitable, the material excavated to generate the terraced / steps on hillsides shall be spread and compacted into the adjoining embankment. No additional payment will be made for excavation of terraces / steps or for placing step material in the adjoining fill.
- .4 Do not place material which is frozen nor place material on frozen surfaces except where accepted by the Departmental Representative.
- .5 Maintain crowned surface during construction to ensure ready run-off of surface water.
- .6 Drain low areas before placing materials.
- .7 Place and compact to full width in layers not exceeding 200 mm loose thickness. Departmental Representative may authorize thicker lifts if specified compaction can be achieved and if material contains more than 25% by volume stone and rock fragments larger than 100 mm.
- .8 Where material consists of rock:
- .1 Place to full width in layers of sufficient depth to contain maximum sized rocks, but in no case is layer thickness to exceed 1 m.
- .2 Carefully distribute rock material to fill voids with smaller fragments to form compact mass.
- .3 Fill surface voids at subgrade level with rock spalls or selected material to form earth-tight surface.

- .4 Do not place boulders and rock fragments with dimensions exceeding 150 mm within 300 mm of subgrade elevation.

- .9 Break material down to sizes that enable required compaction and mix for uniform moisture to full depth of layer. The maximum size of Embankment rock placed within 300 mm of final grade of embankment material shall be 200 mm in diameter. Embankment materials which cannot be compacted to the required density due to high moisture content, or embankment materials with a natural moisture content greater than optimum, shall not be used without prior aeration and drying.

- .10 Compact Embankment in accordance with the following:
 - .1 Where Embankment is free of frozen material and the air temperature during placement and compaction is greater than 0°C:
 - .1 Compact each layer to minimum 95% maximum dry density in accordance with ASTM D698, except for the top 300 mm of Embankment which shall be compacted to a density not less than 98% of the standard maximum dry density in accordance with ASTM D698. If more than 30% of the Embankment material is oversized (retained on a 19 mm sieve), test compaction of the embankment using proof rolling.

Proof rolling shall require one (1) complete coverage of the entire embankment area for each lift by the tyres of a loaded truck having a 9-tonne single axle dual tyre or 17-tonne tandem axle group with dual tyres with a tyre pressure of 600 kPa.

When testing the compaction of the Embankment material using proof rolling, the material shall be within +/- 2% of optimum moisture content. The Embankment material will be considered compacted when upon completing a pass over the Embankment area, the Embankment exhibits no observed unsuitable deflections or rutting.

Add water or dry as required to bring moisture content of materials to level required to achieve specified compaction.

- .2 Where Embankment contains some frozen material acceptable to the Departmental Representative and/or the air temperature during placement and compaction is less than or equal to 0°C, the moisture content of Embankment when tested in accordance with ASTM D2216 shall be less than or equal to 4%, and compaction shall be undertaken as follows:
 - .1 Compact each lift of Embankment using the same equipment and rolling pattern used to achieve the maximum “Control Density” in accordance with Alberta Transportation – ATT 58/96 Density Test, Control Strip Method.
 - .11 Shape entire embankment to within 100 mm of design lines and grades. Finish slopes and ditch bottoms to neat condition, true to lines, grades and drawings where applicable.
 - .12 Remove rocks over 150 mm in any dimension from slopes and ditch bottoms.
 - .13 Hand finish slopes that cannot be finished satisfactorily by machine.
 - .14 Run dozer tracks over slopes exceeding 3 m in height to leave grouser tracks parallel to centerline of highway.
 - .15 Trim between constructed slopes and edge of Tree Clearing to provide drainage free of humps, sags, ruts, and protruding stones.
 - .16 Maintain finished surfaces in condition conforming to this Section until acceptance by Departmental Representative.
- 3.4 Surplus Excavation Material
- .1 Place surplus excavated material (if any) on the slopes of the finished Embankment in locations directed by the Departmental Representative.
 - .2 Place surplus excavation to a maximum thickness of 200 mm. Shape surplus excavation to remove high low spots within 50 mm of the average thickness. Neatly shape outside limits of placed material to eliminate sharp changes in lines and grades. Ensure ready run-off of surface water.

-
- .3 Ensure placed Surplus Excavation Material is not placed in ditches or interfering with established or design drainage patterns.
 - .4 Do not place material which is frozen nor place material on frozen surfaces except were accepted by the Departmental Representative.
 - .5 Do not place Surplus Excavation Material with boulders and rock fragments with dimensions exceeding 200 mm.
 - .6 Hand finish slopes that cannot be finished satisfactorily by machine.
 - .7 Run dozer tracks over placed Surplus Excavation Material and leave grouser tracks parallel to centerline of highway.
 - .8 Trim between constructed slopes and edge of Clearing to provide drainage free of humps, sags, ruts, and protruding stones.
 - .9 Maintain finished surfaces in condition conforming to this Section until acceptance by Departmental Representative.

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 Equipment.

PART 3 – EXECUTION:

- 3.1 Pulverization of Existing BST for Reconstruction.
- 3.2 Pulverization of Decommissioned Highway BST.

PART 1 – GENERAL

1.1 Measurement and Payment Procedures

- .1 Payment for Pulverization of Existing BST for Reconstruction will be made on the basis of the Price per Unit Bid for Pulverization of Existing BST for Reconstruction in the Bid and Acceptance Form. The Price per Unit Bid shall include all costs for scarifying, mixing, re-grading (if required), compaction, and all other items necessary for the successful completion of the work.
- .2 Measurement for Payment for Pulverization of Existing BST for Reconstruction will be made by Lump Sum based on the percentage of the work completed and accepted by the Departmental Representative.
- .3 Payment for Pulverization of Decommissioned Highway BST will be made on the basis of the Price per Unit Bid for Pulverization of Decommissioned Highway BST in the Bid and Acceptance Form. The Price per Unit Bid shall include all costs for scarifying, mixing, re-grading (if required), and all other items necessary for successful completion of the work.
- .4 Measurement for Payment for completion of Pulverization of Decommissioned Highway BST will be made on the area of material surveyed in square metres, incorporated in the works and accepted by the Departmental Representative.

- 1.2 References
- .1 American Society for Testing and Materials (ASTM), latest edition:
 - .1 ASTM D698, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (600 kN-m/m³).
- 1.3 Definitions
- .1 Base Preparation: in place reclamation procedure in which the existing BST and a predetermined portion of the underlying granular materials are scarified, mixed, and blended into a homogeneous material and incorporated into the road base. Re-grade as necessary.

PART 2 – PRODUCTS

- 2.1 Equipment
- .1 The base preparation process shall be completed using a pulvi-mixer or other equipment, included on the General Contractor & Sub-Contractor Construction Equipment List (see Appendix G) and acceptable to the Departmental Representative.
 - .2 In all cases the equipment selected by the Contractor shall be capable of scarifying the existing BST and granular materials into constituent particles and mixing the existing BST and granular materials into a single homogeneous material to the required depth.

PART 3 – EXECUTION

- 3.1 Pulverization of Existing BST for Reconstruction
- .1 Pulverization of the existing BST for Reconstruction shall be completed as follows:
 - .1 Only in areas where the existing highway driving surface (top of BST) is located in the 400 mm thick zone of proposed Select Subgrade Fill Material.

Note, where this situation occurs, and pulverization followed by compaction is completed, the material is re-used as Select Subgrade Fill Material, rather than excavating to the full depth of the proposed Select Subgrade Fill Material and placing new imported Select Subgrade Fill Material.
 - .2 Should the existing highway driving surface (top of BST) be located below the bottom of the proposed Select Subgrade Fill Material (i.e. > 1 m from top of Crushed Base Gravel), pulverization is not required.
 - .3 Should the existing highway driving surface (top of BST) be located in the zone of proposed Crushed

Base Gravel or Sub-Base Course, the existing highway BST and gravels shall be excavated to the full depth of the proposed Crushed Base Gravel, Sub-Base Course, and Select Subgrade Fill Material. This excavated material will be re-used as embankment elsewhere.

- .2 Complete pulverization by:
 - .1 Scarify and mixing the existing BST and granular materials to a depth of 200 mm.
 - .2 Reduce existing BST and granular materials to a 50 mm maximum particle size.
 - .3 Scarify and mix existing BST and granular materials such that the material is mixed and blended into a homogeneous material.
- .3 Reshape and grade the pulverized surface such that at a minimum the pulverized material (existing BST and granular materials) are situated below the bottom of the proposed Sub-base Course.
- .4 Compact the pulverized material (existing BST and granular materials) to a density not less than 95% maximum dry density in accordance with ASTM D698, except for the top 300 mm of pulverized material which shall be compacted to a density not less than 98% of the maximum dry density in accordance with ASTM D698. If more than 30% of the pulverized material is oversized (retained on a 19 mm sieve), test compaction of the embankment using proof rolling.

Proof rolling shall require one (1) complete coverage of the entire pulverized material area for each lift by the tyres of a loaded truck having a 9-tonne single axle dual tyre or 17-tonne tandem axle group with dual tyres with a tyre pressure of 600 kPa.

When testing the compaction of the pulverized material using proof rolling, the material shall be within +/- 2% of optimum moisture content. The pulverized material will be considered compacted when upon completing a pass over the pulverized material area, the pulverized material exhibits no observed unsuitable deflections or rutting.

- .5 Maintain reshaped surface in condition conforming to this section until succeeding material is applied.

3.2 Pulverization of
Decommissioned Highway BST

- .1 Pulverization existing highway BST designated on the Contract Drawings for decommissioning.
- .2 Complete pulverization by.
 - .1 Scarify and mix existing BST and granular materials to a depth of 200 mm.
 - .2 Reduce existing BST and granular materials to a 50 mm maximum particle size.
 - .3 Scarify and mix existing BST and granular materials such that the material is mixed and blended into a homogeneous material.
- .3 Reshaped the pulverized surface such that the finished surface is free of sharp changes in lines and grades and neat in appearance to the approval of the Departmental Representative.
- .4 Maintain reshaped surface in condition conforming to this section until succeeding material is applied (if applicable).

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 Crushed Base Gravel.
- 2.4 Embankment.

PART 3 – EXECUTION:

- 3.1 General.
- 3.2 Placement of Nonwoven Geotextile.
- 3.3 Placement of Riprap.
- 3.4 Ditch Construction Following Existing Culvert Removal.
- 3.5 Culvert Inlet and Outlet Riprap Protection.

PART 1 – GENERAL

1.1 Measurement and Payment Procedures

- .1 Payment for Culvert Inlet and Outlet Riprap Protection will be made on the basis of the Price per Unit Bid for Culvert Inlet and Outlet Riprap Protection (Culverts \leq 1200 mm Diameter), Culvert Inlet and Outlet Riprap Protection (Culvert 1650 mm Diameter), and Culvert Inlet and Outlet Riprap Protection (Culvert 2500 mm Diameter) in the Bid and Acceptance Form. The Price per Unit Bid shall include all costs for dewatering (as required), excavating, loading, hauling and disposal of the excavated materials in preparation for the Riprap, the supply and installation of Nonwoven Geotextile, selection, loading, transport and placement of 50 kg Class Riprap and 100 kg Class Riprap, supply, loading, transport and installation of Crushed Base Gravel, and all other items necessary for the successful completion of the work.
- .2 Measurement for Payment for Culvert Inlet and Outlet Riprap Protection will be made by the count of culvert inlet and

outlet protection installations completed and accepted by the Departmental Representative. Each culvert shall receive both inlet and outlet protection which will be counted as one installation.

- .3 Payment for Ditch Construction Following CSP Culvert / Wood Stave Culvert Removal will be made on the basis of the Price per Unit Bid for Ditch Construction Following CSP Culvert / Wood Stave Culvert Removal in the Bid and Acceptance Form. The Price per Unit Bid shall include all costs for excavating and shaping of the ditch, disposal of the native materials onsite, the supply and installation of Nonwoven Geotextile, selecting, loading, transport, and placement of 50 kg Class Riprap, and all other items necessary for the successful completion of the work.
- .4 Measurement for Payment for Ditch Construction Following CSP Culvert / Wood Stave Culvert Removal shall be made by the count of ditch construction following culvert removal completed and accepted by the Departmental Representative. A single ditch constructed following removal of two adjacent culverts shall be counted as the construction of one ditch.

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 C127, Standard Test Method for Relative Density (Specific Gravity) and Absorption of Coarse Aggregate.
 - .2 ASTM D4355, Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc-Type Apparatus.
 - .3 ASTM D4491, Standard Test Methods for Water Permeability of Geotextiles by Permittivity.
 - .4 ASTM D4533, Standard Test Method for Trapezoid Tearing Strength of Geotextiles.
 - .5 ASTM D4632, Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.

- .6 ASTM D4751, Standard Test Methods for Determining Apparent Opening Size of a Geotextile.
 - .7 ASTM D6241, Standard Test Method for Static Puncture Strength of Geotextiles and Geotextile-Related Products Using a 50-mm Probe.
- 1.3 Environmental
- .1 Complete Riprap installation and related works in conformance with the requirements of Section 01 35 43 – Environmental Protection, the Environmental Overview Assessment (EOA, see Appendix K), 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 .5 through .7 inclusive of this Specification for more information.

PART 2 – PRODUCTS

- 2.1 Riprap
- .1 The Contractor shall source Riprap for the project from the following options:
 - .1 PSPC’s Wood Creek Rock Quarry (Km 651.0 of the Alaska Highway). Various sizes of Riprap may be available for use by the Contractor as Riprap or the Contractor may have to manufacture Riprap from the in-situ materials. The Contractor will be responsible for sorting through and stockpiling rock and selecting appropriate rock size or manufacturing the appropriate rock size. Should the Contractor choose to manufacture the rock using blasting, the Contractor shall be responsible to obtain all necessary permits.
 - .2 Alternative sources outside the highway Right-of-Way.
 - .2 Regardless of the Riprap source, the Riprap shall conform with the following requirements:
 - .1 Crushed / blasted angular stone consisting of hard durable particles free from clay lumps, frozen material and other deleterious materials, and free from splits, seams or defects likely to impair its soundness during handling or under action of water.

.2 Is a graded material conforming with the following gradation limits:

.1 50 kg Class Riprap:

Table 31 37 00 – 01: 50 kg Class Riprap		
Mass (kg) *	Nominal Diameter @ 2640 kg/m ³ (mm)	Percent Larger Than
300	600	0
150	510	15
50	350	50
5	160	85
1	95	100

.2 100 kg Class Riprap:

Table 31 37 00 – 02: 100 kg Class Riprap		
Mass (kg) *	Nominal Diameter @ 2640 kg/m ³ (mm)	Percent Larger Than
750	760	0
300	560	15
100	390	50
10	180	85
1	90	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/m³).

.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.

.3 Existing rock material that achieves the requirements for Riprap may be set aside by the Contractor and re-used as Riprap.

.4 Should the Contractor choose, PSPC's Wood Creek Rock Quarry (Km 651.0 of the Alaska Highway) may be used by the Contractor as a source for rock which can be blasted and manufactured into the various sizes of Riprap required on the

project. The Contractor will be responsible for all blasting required (including permits), manufacture and sorting of rock to select the appropriately sized rock for use as Riprap, and all clean-up of the site to the Departmental Representative's satisfaction. See Section 01 11 10 – Summary of Work, Subsection 2.1 Owner Supplied Materials (Outside Limits of Work) for further details.

- .5 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 achieve or exceed the following minimum requirements:

Table 31 37 00 – 03: Nonwoven Geotextile			
Property	Test	Unit	Value
Grab Tensile Strength	ASTM-D4632	N (lb.)	1335 (300)
Elongation	ASTM-D4632	%	50
CBR Puncture	ASTM-D6241	N (lb.)	3671 (825)
Trapezoidal Tear	ASTM-D4533	195	512 (115)
Apparent Opening Size	ASTM-D4751	Mm (US Sieve)	0.150 (100)
Permittivity	ASTM-D4491	sec ⁻¹	1.0
Water Flow Rate	ASTM-D4491	l/m/m ² (gpm/ft ²)	3056 (75)
UV Resistance	ASTM-D4355	% retained at 500 hrs.	70

2.3 Crushed Base Gravel

- .1 Crushed Base Gravel shall be in accordance with Section 31 05 16 – Aggregates: General and Section 32 11 24 – Crushed Base Gravel.

2.4 Embankment

- .1 Embankment shall be in accordance with Section 31 24 14 – Roadway Excavation, Embankment and Compaction.

PART 3 – EXECUTION

3.1 General

- .1 Riprap extraction, processing, handling and transportation, stockpiling, and cleanup shall in accordance with the requirements of Section 31 05 16 – Aggregates: General.

3.2 Placement of Nonwoven Geotextile

- .1 Install temporary drainage and pumping and construct berms as outlined in the Contract Drawings and the Contractor's accepted EPP to keep excavations and the work area free from water to the maximum extent possible. See Section 01 35 43 – Environmental Protection for further details.

- .2 Complete excavation to the lines and grades shown on the Contract Drawings in accordance with Section 31 24 14 – Roadway Excavation, Embankment, and Compaction. Where required, place and compact Embankment and Crushed Base Gravel to the lines and grades shown on the Contract Drawings and in accordance with Section 31 24 14 – Roadway Excavation, Embankment, and Compaction and Section 32 11 24 – Crushed Base Gravel.
- .3 Place Nonwoven Geotextile on a clean surface, properly shaped to the lines and grades shown on the Contract Drawings and free from debris, snow and ice, or other deleterious material.
- .4 Place Nonwoven Geotextile material by unrolling onto excavated/ graded surface in orientation, manner and locations indicated on Contract Drawings and retain in position with pins. All Nonwoven Geotextile placed on a slope shall at a minimum be secured with pins a minimum 300 mm long every 2 m² of Nonwoven Geotextile.
- .5 Place Nonwoven Geotextile material smooth and free of tension stress, folds, wrinkles and creases.
- .6 Place Nonwoven Geotextile on sloping surfaces in one continuous length from toe of slope to upper extent of Nonwoven Geotextile.
- .7 Overlap each successive strip of Nonwoven Geotextile 1000 mm over previously laid strip. When Nonwoven Geotextile are placed on a slope, ensure Nonwoven Geotextile placed higher on slope is placed above Nonwoven Geotextile placed lower on slope.
- .8 Pin successive strips of Nonwoven Geotextile with securing pins at 1000 mm interval at midpoint of lap.
- .9 Protect installed Nonwoven Geotextile material from displacement, damage or deterioration before, during and after placement of material layers.
- .10 Replace damaged or deteriorated Nonwoven Geotextile to approval of the Departmental Representative.
- .11 Construction equipment is not permitted on the Nonwoven Geotextile at any stage of construction.
- .12 Upon acceptance by the Departmental Representative, place succeeding material as shown on the Contract Drawings.

-
- 3.3 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 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.
 - .3 Riprap materials shall be placed to the lines and thickness shown on the Contract Drawings. The finished surface of the Riprap shall be within +200 mm / -100 mm of the finished design grades but not uniformly high or low.
 - .4 Place Riprap material using methods that do not lead to segregation or degradation of aggregate. Do not place by end dumping from haul units. Do not drop Riprap from a height greater than 0.5 m vertically from its final position.
 - .5 Place Riprap commencing at the toe of the slope and proceeding up the slope. Material shall be densely placed, and individual stones shall be worked with placement equipment to form a well-keyed surface.
 - .6 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.
 - .7 The Contractor shall ensure that the construction methods adopted produces a finished surface that is comprised of the full spectrum of particle sizes continuously throughout its length and breadth.
 - .8 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.
 - .9 Construction equipment is not permitted on the Riprap at any stage of construction.
 - .10 Maintain finished material surfaces in a condition conforming to these specifications until acceptance by the Departmental Representative.
- 3.3 Ditch Construction
Following Existing Culvert
Removal
- .1 Following excavation, removal and disposal of the existing CSP culvert or Wood Stave Culvert in conformance with Section 02 41 13 – Selective Site Demolition, complete the

- ditch construction to the inverts of the existing culvert (now removed) and to the lines and grades shown on the Contract Drawings. Ensure excavation will allow for positive drainage upon placement of Riprap.
- .2 Install Nonwoven Geotextile and 50 kg Class Riprap to the lines and grades shown on the Contract Drawings and in conformance with this specification section. Ensure positive drainage following Riprap placement.
- .3 Dispose of excavated waste material onsite in a location and condition acceptable to the Departmental Representative.
- 3.4 Culvert Inlet and Outlet Riprap Protection
- .1 Prior to or during installation of the CSP Culverts and steel pipe culverts, excavate ground to the lines and grades shown on the Contract Drawings to facilitate the installation of the Inlet and Outlet Riprap Protection. Ensure excavation will allow for positive drainage upon placement of Riprap.
- .2 Re-use excavated material as embankment (if suitable) or dispose of the material in an onsite location and condition acceptable to the Departmental Representative.
- .3 Place Bentonite and Crushed Base Gravel to the thicknesses shown on the Contract Drawings.
- .4 Install Nonwoven Geotextile, 50 kg Class Riprap and 100 kg Class Riprap to the locations, lines and grades shown on the Contract Drawings and in conformance with this specification section. Ensure positive drainage following Riprap placement.
- .5 At Sta. 568+840 Steel Pipe Culvert (1650 mm) and Sta. 569+950 Steel Pipe Culvert (2500 mm) culvert installation locations, fill voids in the surface of the Riprap with Crushed Base Gravel.
- .1 Install Crushed Base Gravel after the Riprap has been placed to the full design thickness, is well keyed and densely placed in accordance with this specification Section and to the satisfaction of the Departmental Representative.
- .2 Spread the Crushed Base Gravel on top of the placed Riprap by raking or other means, ensuring the Crushed Base Gravel is worked into the voids between the Riprap.
- .3 Install Crushed Base Gravel over the full width of the channel bottom, extending up the side of the channel

a height of 0.5 m from the bottom of the channel.
Crushed Base Gravel is not required on Riprap placed
more than 0.5 m above the bottom of the channel.

END OF SECTION

SECTION INCLUDES

PART 1 – GENERAL:

1.1 Measurement and Payment Procedures.

1.2 References.

PART 2 – PRODUCTS:

2.1 Select Subgrade Fill.

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 Select Subgrade Fill Material will be made on the basis of the Price per Unit Bid for Select Subgrade Fill Material in the Bid and Acceptance Form. The Price per Unit Bid shall include all costs included with the excavation, manufacture, stockpiling, loading, transport, placing, shaping, watering and/or drying and compaction of the Select Subgrade Fill Material, and all other items necessary for successful completion of the work.

.2 Measurement for Payment for completion of Select Subgrade Fill Material will be made on the volume of material surveyed in cubic metres, incorporated in the works (at the completion of compaction and grading) and accepted by the Departmental Representative.

1.2 References

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

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

.2 ASTM D698, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lb/ft³ (600 kN-m/m³)).

- .3 ASTM D6938, Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).
- .2 Alberta Transportation Testing (ATT):
 - .1 ATT-58/96 Density Test, Control Strip Method.

PART 2 – PRODUCTS

- 2.1 Select Subgrade Fill
 - .1 Select Subgrade Fill Material shall be in accordance with Section 31 05 16 – Aggregates: General.

PART 3 – EXECUTION

- 3.1 Inspection and Survey of Underlying Surface
 - .1 Place Select Subgrade Fill Material after underlying surface has been surveyed by the Contractor and accepted by the Departmental Representative.
- 3.2 Placing
 - .1 Place Select Subgrade Fill Material to lines and grades shown on the contract drawings.
 - .2 Ensure material placed is free of ice and snow, or as acceptable to the Departmental Representative, and has a maximum moisture content less than or equal to 4%.
 - .3 Place material only on clean surfaces, properly shaped and compacted, and free from snow and ice acceptable to the Departmental Representative.
 - .4 Begin spreading Select Subgrade Fill Material on crown line or on high side of one-way slope.
 - .5 Place material in uniform layers not exceeding 200 mm compacted thickness. Departmental Representative may authorize thicker lifts (layers) if specified compaction can be achieved.
 - .6 Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.
 - .7 Remove and replace segregated material.
 - .8 Complete dust control using water as required throughout the work (see Section 32 15 60 – Roadway Dust Control).
- 3.3 Compaction
 - .1 Compact Select Subgrade Fill Material in accordance with the following:

-
- .1 Where Select Subgrade Fill Material is free of frozen material and the air temperature during placement and compaction is greater than 0°C:
 - .1 Compact to a density not less than 98% of the maximum dry density in accordance with ASTM D698.
 - .2 Apply water as necessary during compacting to obtain specified density. If Select Subgrade Fill Material is excessively moist, take remedial action as directed by Departmental Representative.
 - .2 Where Select Subgrade Fill Material contains some frozen material acceptable to the Departmental Representative and/or the air temperature during placement and compaction is less than or equal to 0°C, the moisture content of Select Subgrade Fill Material when tested in accordance with ASTM D2216 shall be less than or equal to 4%, and compaction shall be undertaken as follows:
 - .1 Compact each lift of Select Subgrade Fill Material using the same equipment and rolling patten used to achieve the maximum "Control Density" in accordance with Alberta Transportation ATT 58/96 Density Test, Control Strip Method.
 - .2 Shape and roll alternately to obtain smooth, even and uniformly compacted structure.
 - .3 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers approved by Departmental Representative.
 - .4 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.
- 3.4 Tolerances
- .1 Finished base surface to be within +/- 50 mm of the design lines and grades but not uniformly high or low.
- 3.5 Protection
- .1 Maintain finished base in condition conforming to this section until acceptance by the Departmental Representative and until succeeding material is applied. No separate payment will be made for maintenance.

- .2 Complete dust control using water as required succeeding material is applied in accordance with Section 32 15 60 – Roadway Dust Control.

END OF SECTION

SECTION INCLUDES

PART 1 – GENERAL:

1.1 Measurement and Payment Procedures.

1.2 References.

PART 2 – PRODUCTS:

2.1 Sub-Base Course.

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 Sub-Base Course will be made on the basis of the Price per Unit Bid for Sub-Base Course in the Bid and Acceptance Form. The Price per Unit Bid shall include all costs included with the excavation, manufacture, stockpiling, loading, transport, placing, shaping, watering and/or drying and compaction of the sub-base course material, and all other items necessary for successful completion of the work.

.2 Measurement for Payment for completion of Sub-Base Course will be made on the volume of material surveyed in cubic metres, incorporated in the works (at the completion of compaction and grading) and accepted by the Departmental Representative.

1.2 References

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

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

.2 ASTM D698, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lb/ft³ (600 kN-m/m³)).

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

.2 Alberta Transportation Testing (ATT):

.1 ATT-58/96 Density Test, Control Strip Method.

PART 2 – PRODUCTS

2.1 Sub-Base Course

.1 Sub-Base Course shall be in accordance with Section 31 05 16 – Aggregates: General.

PART 3 – EXECUTION

3.1 Inspection and Survey of Underlying Surface

.1 Place Sub-Base Course material after underlying surface has been surveyed by the Contractor and accepted by the Departmental Representative.

3.2 Placing

.1 Place Sub-Base Course material to lines and grades shown on the contract drawings.

.2 Ensure material placed is free of ice and snow, or as acceptable to the Departmental Representative, and has a maximum moisture content less than or equal to 4%.

.3 Place material only on clean surfaces, properly shaped and compacted, and free from snow and ice acceptable to the Departmental Representative.

.4 Begin spreading Sub-Base Course material on crown line or on high side of one-way slope.

.5 Place Sub-Base Course material using methods which do not lead to segregation or degradation.

.6 Place material in uniform layers not exceeding 150 mm compacted thickness. Departmental Representative may authorize thicker lifts (layers) if specified compaction can be achieved.

.7 Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.

.8 Remove and replace segregated material.

.9 Complete dust control using water as required throughout the work (see Section 32 15 60 – Roadway Dust Control).

-
- 3.3 Compaction .1 Compact Sub-Base Course in accordance with the following:
- .1 Where Sub-Base Course material is free of frozen material and the air temperature during placement and compaction is greater than 0°C:
 - .1 Compact to a density not less than 98% of the maximum dry density in accordance with ASTM D698.
 - .2 Apply water as necessary during compacting to obtain specified density. If Sub-base Course is excessively moist, take remedial action as directed by the Departmental Representative.
 - .2 Where Sub-Base Course contains some frozen material acceptable to the Departmental Representative and/or the air temperature during placement or compaction is less than or equal to 0°C, the moisture content of Sub-Base Course when tested in accordance with ASTM D2216 shall be less than or equal to 4%, and compaction shall be undertaken as follows:
 - .1 Compact each lift of Sub-Base Course using the same equipment and rolling pattern used to achieve the maximum "Control Density" in accordance with Alberta Transportation ATT 58/96 Density Test, Control Strip Method.
 - .2 Shape and roll alternately to obtain smooth, even and uniformly compacted structure.
 - .3 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers approved by the Departmental Representative.
 - .4 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.
- 3.4 Tolerances .1 Finished base surface to be within +/- 50 mm of the design lines and grades but not uniformly high or low.
- 3.5 Protection .1 Maintain finished base in condition conforming to this section until acceptance by the Departmental Representative and succeeding material is applied. No separate payment will be made for maintenance.

- .2 Complete dust control using water as required succeeding material is applied in accordance with Section 32 15 60 – Roadway Dust Control.

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.

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 Crushed Base Gravel, and all other items necessary for successful completion of the work.

.2 Measurement for Payment for completion of Crushed Base Gravel will be made on the volume of material surveyed in cubic metres (to the design grades), incorporated into 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 Inlet and Outlet Channel Realignment and Erosion Protection, Crushed Base Gravel used to infill voids in the surface of placed Riprap, and Crushed Base Gravel required for bedding and backfill of culverts, and shall be considered incidental to the applicable work item included in Section 31 37 00 – Riprap, Section 33 42 13 – Pipe Culverts, or other sections as required by these specifications.

- 1.2 References
- .1 American Society for Testing and Materials (ASTM), latest edition:
 - .1 ASTM D2216 Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass.
 - .2 ASTM D698, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
 - .3 ASTM D6938, Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).
 - .2 Alberta Transportation Testing (ATT):
 - .1 ATT-58/96 Density Test, Control Strip Method.

PART 2 – PRODUCTS

- 2.1 Crushed Base Gravel
- .1 Crushed Base Gravel shall be in accordance with Section 31 05 16 – Aggregates: General.

PART 3 – EXECUTION

- 3.1 Inspection and Survey of Underlying Surface
- .1 Place Crushed Base Gravel after underlying surface has been surveyed by the Contractor and approved by the Departmental Representative.
- 3.2 Placing
- .1 Place Crushed Base Gravel material in the locations and to lines and grades shown on the contract drawings.
 - .2 Ensure material placed is free of ice and snow, or as acceptable to the Departmental Representative, and has a maximum moisture content less than or equal to 4%.
 - .3 Place material only on clean surfaces, properly shaped and compacted, and free from snow and ice and acceptable to the Departmental Representative.
 - .4 Begin spreading Crushed Base Gravel material on crown line or on high side of one-way slope.
 - .5 Place Crushed Base Gravel using methods which do not lead to segregation or degradation.
 - .6 Place material in uniform layers not exceeding 150 mm compacted thickness.

-
- .7 Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.
 - .8 Remove and replace segregated material.
 - .9 Complete dust control using water as required throughout the work.
- 3.3 Compaction
- .1 Compact Crushed Base Gravel in accordance with the following.
 - .1 Where Crushed Base Gravel is free of frozen material and the air temperature during placement and compaction is greater than 0°C:
 - .1 For Crushed Base Gravel used as Culvert Bedding Material and Culvert Backfill Material:
 - .1 Compact final 150 mm lift on the bottom side of the CSP Culvert / Steel Pipe Culvert to a minimum 95% of the standard maximum dry density in accordance with ASTM D698.
 - .2 Compact other lifts of Crushed Base Gravel to a minimum 98% of the standard maximum dry density in accordance with ASTM D698. When compacting around the CSP Culvert / Steel Pipe Culvert, alternate on each side of the culvert, so as not to allow movement of the culvert. Take special care to obtain required density under haunches of the CSP Culvert / Steel Pipe Culvert. Hand tamp where necessary to obtain compaction and not allow uplift of the culvert.
 - .2 For all other Crushed Base Gravel installations, compact to a density not less than 100% of the standard maximum dry density in accordance with ASTM D698.
- Apply water as necessary during compaction to obtain specific density. If Crushed Base Gravel is excessively moist, take remedial action as directed by the Departmental Representative.

- .2 Where Crushed Base Gravel contains some frozen material acceptable to the Departmental Representative and/or the air temperature during placement and compaction is less than or equal to 0°C, the moisture content of Crushed Base Gravel when tested in accordance with ASTM D2216 shall be less than or equal to 4%, and compaction shall be undertaken as follows:
 - .1 Compact each lift of Sub-Base Course using the same equipment and rolling patten used to achieve the maximum “Control Density” in accordance with Alberta Transportation ATT 58/96 Density Test, Control Strip Method.
 - .2 Shape and roll alternately to obtain smooth, even and uniformly compacted structure.
 - .3 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers approved by the Departmental Representative.
 - .4 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.
- 3.4 Tolerances
- .1 Finished base surface to be within +/- 20 mm of the design lines and grades but not uniformly high or low.
- 3.5 Protection
- .1 Maintain finished base in condition conforming to this section until succeeding material is applied or until acceptance by Departmental Representative. No separate payment will be made for maintenance.
 - .2 Complete dust control using water as required succeeding material is applied in accordance with Section 32 15 60 – Roadway Dust Control.

END OF SECTION

SECTION INCLUDES

PART 1 – GENERAL:

- 1.1 Measurement and Payment Procedures.

PART 2 – PRODUCTS:

- 2.1 Water.

PART 3 – EXECUTION:

- 3.1 Dust Control Using Water.

PART 1 – GENERAL

1.1 Measurement and Payment Procedures

- .1 Measurement for Payment for the completion of Roadway Dust Control shall not be made and shall be considered incidental to the work.

PART 2 – PRODUCTS

2.1 Water

- .1 If necessary, apply for necessary environmental permits for the extraction of water from local sources.

PART 3 – EXECUTION

3.1 Dust Control Using Water

- .1 Complete Roadway Dust Control using water over the full width of all utilized driving lanes whenever:
- .1 Dust from travelling vehicles impairs driver's vision such that objects further than 150 m are obscured by dust.
- .2 As deemed necessary by the Departmental Representative.

END OF SECTION

SECTION INCLUDES

PART 1 – GENERAL:

- 1.1 General.
- 1.2 Measurement and Payment Procedures.
- 1.3 References.
- 1.4 Submittals.
- 1.5 Environmental.
- 1.6 Delivery, Storage, and Handling.

PART 2 – PRODUCTS:

- 2.1 CSP Culverts and Couplers.
- 2.2 Steel Pipe Culverts.
- 2.3 Welding Materials.
- 2.4 Fish Baffles.
- 2.5 Natural Substrate.
- 2.6 Culvert Bedding Material.
- 2.7 Crushed Base Gravel.
- 2.8 Embankment.
- 2.9 Bentonite.
- 2.10 Riprap.
- 2.11 Nonwoven Geotextile.

PART 3 – EXECUTION (Open Cut Method):

- 3.1 Excavation.
- 3.2 Culvert Bedding.
- 3.3 Culvert Placement.
- 3.4 Culvert Joints / Connections.
- 3.5 Fish Baffles and Natural Substrate.

- 3.6 Embankment.
- 3.7 Culvert Ditching and End Protection.
- 3.8 Existing Culvert Removal and Ditch Construction.
- 3.9 Clean-up.

PART 1 – GENERAL

- 1.1 General
 - .1 Complete CSP Culvert / Steel Pipe Culvert installation work in the dry. Provide temporary drainage, pumping, hoses, temporary coir logs, fish stop nets and check dams as shown on the Environmental Staging Drawings (C501 – C506) and the Contractor’s accepted EPP.
- 1.2 Measurement and Payment Procedures
 - .1 Payment for the install of new Corrugated Steel Pipe (CSP) Culverts will be made on the basis of the Price per Unit Bid for Sta. 567+246 CSP Culvert (600 mm), Sta. 567+516 CSP Culvert (600 mm), Sta. 567+696 CSP Culvert (600 mm), Sta. 567+824 CSP Culvert (600 mm), Sta. 568+084 CSP Culvert (800 mm), Sta. 568+638 CSP Culvert (1050 mm), Sta. 569+100 CSP Culvert (1200 mm), Sta. 569+570 CSP Culvert (900 mm), and Sta. 570+108 CSP Culvert (1050 mm) in the Bid and Acceptance Form. The Price per Unit Bid shall include all costs included with the work including excavation, dewatering (as required), loading, transport (from PSPC’s Fort Nelson Maintenance Yard and/or PSPC’s Liard River Maintenance Yard), and installation of the specified diameter CSP Culvert (i.e. 600 mm, 800 mm, 900 mm, 1050 mm, or 1200 mm), the supply, placement and compaction of culvert bedding material (Crushed Base Gravel), Embankment, and all other items (including but limited to couplings, fittings, and hardware) necessary for the successful completion of the work.
 - .2 Measurement for Payment for the supply and installation of new CSP Culverts will be made on the length of CSP culvert installed, 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 install of new Steel Pipe Culverts will be made on the basis of the Price per Unit Bid for Sta. 568+840 Steel Pipe Culvert (1650 mm), and Sta. 569+950 Steel Pipe Culvert (2500 mm) in the Bid and Acceptance Form. The Price per Unit Bid shall include all costs included with the work, including excavation, dewatering (as required), supply, transport, and installation of the specified diameter Steel Pipe Culvert (i.e. 1650 mm, or

2500 mm), welding, fabrication and installation of fish baffles via welding to the Steel Pipe Culverts, supply, haul and installation Natural Substrate materials, supply, installation and compaction of culvert bedding material (Crushed Base Gravel), Embankment, and Crushed Base Gravel, and all other items necessary for the successful completion of the work.

- .4 Measurement for Payment for the supply and install of new Steel Pipe Culverts 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.
- .5 Measurement and Payment for Existing CSP Culvert Removal and for Existing Wood Stave Culvert Removal will be made per the applicable payment item included in Section 02 41 13 – Selective Site Demolition.

1.3 References

- .1 Canadian Standards Association (CSA International), latest edition:
 - .1 CSA W59, Welded Steel Construction (metal arc welding).
 - .2 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 Products.
 - .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/ft³ [600 kN-m/m³]).
- .3 Canadian Welding Bureau Group (CWB):
 - .1 CWB Form 160 Welding Procedure Data Sheet.

1.4 Submittals

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

-
- .2 The following submittals are required for review and acceptance by the Departmental Representative for all culverts prior to undertaking the work:
 - .1 Submit to the Departmental Representative for review and acceptance the steel producer's certificates for the steel pipe culverts in accordance with ASTM A252.
 - .2 Welding submittals, including:
 - .1 A completed Canadian Welding Bureau Group (CWB) Form 160 Welding Procedure Data Sheet. The submitted CWB Form 160 shall be signed/ sealed by a person accredited with the CWB.
 - .2 Documentation confirming the welders performing the work are certified with CWB.
 - .3 Submit to the Departmental Representative for review and acceptance construction staging and traffic detour drawings as per Section 01 14 00 – Work Restrictions, Access Development, Construction Staging, and Restoration.
- 1.5 Environmental
- .1 Complete culvert installation and related works in conformance with permitting required under the Provincial Water Sustainability Act, the requirements of Section 01 35 43 – Environmental Protection, the Environmental Overview Assessment (EOA, see Appendix K), 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 Contract Specification Section 01 11 10 – Summary of Work, Subsection 3.2 Work Completion, Item .5 through .7 for further information.
- 1.6 Delivery, Storage, and Handling
- .1 Handle and store the CSP culverts and Steel Pipe Culverts, and associated components, in a manner to avoid damage, alteration, deterioration and spoiling.
 - .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) and PSPC’s Liard River Maintenance Yard (Km 762.5 of the Alaska Highway). The following diameters of CSP culvert are available for use by the Contractor:
- .1 600 mm diameter.
 - .2 800 mm diameter.
 - .3 900 mm diameter.
 - .4 1050 mm diameter.
 - .5 1200 mm diameter.
- .2 The Contractor shall return CSP culvert sections supplied by PSPC but not incorporated into the work to PSPC’s Fort Nelson Maintenance Yard or PSPC’s Liard River Maintenance Yard as accepted by the Departmental Representative, prior to demobilizing 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 PSPC’s Fort Nelson Maintenance Yard or PSPC’s Liard River Maintenance Yard.
- 2.2 Steel Pipe Culverts .1 Provide Steel Pipe Culverts of required diameter and length as shown on the Contract Drawings and the following wall thicknesses:
- .1 1650 mm diameter: 12.5 mm (0.5”).
 - .2 2500 mm diameter: 25.4 mm (1.0”).
- Substitution of pipe with larger diameter or thicker wall thickness shall be pre-approved by the Departmental Representative. The substitution of pipe with smaller diameter or thinner wall thickness will not be permitted.

- .2 Steel pipe culverts shall be seamless or welded pipe (spiral or seam) conforming with the requirements of ASTM A252 with a minimum yield strength of 310 MPa.
- .3 Steel pipe culverts shall be delivered to the site in uniform lengths.
- 2.3 Welding Materials .1 Welding materials to CSA W59.
- .2 Welding electrodes to CSA W48 Series.
- 2.4 Fish Baffles .1 Fish Baffles shall be 9.5 mm thick plate steel cut to match shape of 1650 mm diameter Steel Pipe Culvert (Sta. 568+840) and 2500 mm diameter Steel Pipe Culvert (Sta. 569+950) at the locations, angles, and spacing shown on the Contract Drawings.
- 2.5 Natural Substrate .1 Natural Substrate shall be in accordance with Section 31 05 16 – Aggregates: General.
- 2.6 Culvert Bedding Material .1 Culvert Bedding Material shall be Crushed Base Gravel when specified on Contract Drawings in accordance with Section 31 05 16 – Aggregates: General.
- 2.7 Crushed Base Gravel .1 Crushed Base Gravel shall be in accordance with Section 31 05 16 – Aggregates: General and Section 32 11 24 – Crushed Base Gravel.
- 2.8 Embankment .1 Embankment shall be in accordance with Section 31 24 14 – Roadway Excavation, Embankment, and Compaction.
- 2.9 Bentonite .1 The Contractor shall propose to the Departmental Representative a sodium bentonite product for use as self-sealing low permeability barrier. The sodium bentonite shall be provided in powder form, insoluble in water, and have a low thickening and good binding properties.
- 2.10 Riprap .1 Riprap shall be in accordance with Section 31 37 00 – Riprap.
- 2.11 Nonwoven Geotextile .1 Nonwoven Geotextile shall be in accordance with Section 31 37 00 – Riprap.

PART 3 – EXECUTION

- 3.1 Excavation .1 Setup temporary berms and/or pumps as required to ensure flows are contained within the existing culvert permitting the new CSP Culvert / steel pipe culvert installation is completed in the dry.

-
- .2 Complete excavation and dewater excavation, as necessary, to allow placement of Crushed Base Gravel (culvert bedding material) in a dry condition. Excavate to the lines and grades shown on the Contract Drawings and in accordance with the requirements of Section 31 24 14 – Roadway Excavation, Embankment, and Compaction.
 - .3 Temporarily stockpile excavated material for later disposal or reuse as Embankment provided the material excavated achieves the criteria for Embankment.
- 3.2 Culvert Bedding
- .1 Place required Culvert Bedding Material (Crushed Base Gravel) in preparation for culvert placement on the bottom of excavation to the thickness and locations shown on Contract Drawings and compact in conformance with Section 32 11 24 – Crushed Base Gravel.
 - .2 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.
 - .3 Backfill with Culvert Bedding Material around and over culverts as indicated on the Contract Drawings.
 - .4 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.
 - .5 Ensure Culvert Bedding Material placed is free from snow and ice, or as acceptable to the Departmental Representative, and has a maximum moisture content less than or equal to 4%.
- 3.3 Culvert Placement
- .1 Place culvert such that when complete the alignment, grade, camber, location, and inverts are in compliance with the alignment, grade, location, and inverts shown on the Contract Drawings.
 - .2 Begin pipe placing at downstream end.
 - .3 Ensure bottom of pipe is in contact with shaped bed or compacted fill throughout its length.
 - .4 Do not allow water to flow through pipes during construction except as permitted by Departmental Representative.
- 3.4 Culvert Joints / Connections
- .1 For CSP Culverts:

-
- .1 Install culvert joints per the manufacturer's recommendation.
 - .2 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.
- .2 For Steel Pipe Culverts:
- .1 Fuse Steel Pipe Culvert sections using Complete Penetration Groove welds. Complete all welds, including overhead welds, in accordance with CSA W59 and CSA W48, and provide weld certification in accordance with Subsection 1.4 Submittals of this specification section.
 - .2 The Departmental Representative may conduct random visual inspection and/or nondestructive testing of completed welds during culvert installation. Should any cracks in the welds develop either immediately following the welding or upon further installation of the pipe, the weld will be considered rejected and require replacement.
- 3.5 Fish Baffles and Natural Substrate
- .1 At the Sta. 568+840 and Sta. 569+950 culvert replacement locations, install Fish Baffles at the locations and spacings shown on the Contract Drawings. Fuse fish baffles to the Steel Pipe Culverts using fillet stitch welds as indicated on the Contract Drawings. Complete welding in accordance with CSA W48 and W49.
 - .2 At the Sta. 568+840 and Sta. 569+950 culvert replacement locations, install Natural Substrate in the bottom of the Steel Pipe Culverts to the depths and locations shown on the Contract Drawings. See Section 31 05 16 – Aggregates: General for further details.
- 3.6 Embankment
- .1 Place Embankment (material above Culvert Bedding Material and below highway gravels as shown on the Contract Drawings) in 150 mm lifts to full width of trench and compact each lift in accordance with Section 31 24 14 – Roadway Excavation, Embankment, and Compaction. Break Embankment material down to sizes that enable required compaction and mix for uniform moisture to full depth of lift. Add water or dry as required to bring moisture content of Embankment material to level required to achieve specified compaction. Embankment materials which cannot be compacted to the required density due to high moisture content, or Embankment materials with a natural moisture

- content greater than optimum, shall not be used without prior aeration and drying by the Contractor.
- .2 Protect installed culvert with minimum 600 mm cover of compacted fill before heavy equipment is permitted to cross. During construction, width of fill, at its top, to be at least twice diameter or span of pipe and with slopes not steeper than 2H:1V.
- .3 Ensure Embankment material placed in backfill is free of ice and snow, or as acceptable to the Departmental Representative, and has a maximum moisture content less than or equal to 4%.
- .4 Dispose of unused excavated material (Embankment material) or material not meeting the properties of embankment to a location approved by the Departmental Representative.
- 3.7 Culvert Ditching and End Protection
- .1 Re-establish channel to the alignment, widths, grades, and sideslopes shown on the Contract Drawings. Complete stream realignment in accordance with Section 31 24 14 – Roadway Excavation, Embankment, and Compaction.
- .2 Install culvert inlet and outlet riprap protection in accordance with Section 31 37 00 – Riprap.
- 3.8 Existing Culvert Removal and Ditch Construction
- .1 Excavate, remove and dispose of existing CSP culverts, Wood Stave culverts and associated components in accordance with Section 02 41 13 – Selective Site Demolition.
- .2 Following excavation and removal of existing culvert, backfill full width of trench with Embankment below highway gravels as shown on the Contract Drawings. Place Embankment in 150 mm lifts and compact each lift in accordance with Section 31 24 14 – Roadway Excavation, Embankment, and Compaction. Break Embankment material down to sizes that enable required compaction and mix for uniform moisture to full depth of lift. Add water or dry as required to bring moisture content of Embankment material to level required to achieve specified compaction. Embankment materials which cannot be compacted to the required density due to high moisture content, or Embankment materials with a natural moisture content greater than optimum, shall not be used without prior aeration and drying by the Contractor.

- .3 Where indicated on the Contract Drawings, construct ditch following existing culvert removal in accordance with Section 31 37 00 – Riprap.
- 3.9 Clean-up
- .1 Remove all damaged areas of existing BST driving surface to the limits acceptable to the Departmental Representative.
- .2 Clean-up all disturbed areas to an equal or better condition to that prior to construction (refer to Section 01 74 11 – Cleaning for further details).

END OF SECTION

R.112220.002

Appendix A

Written Communication / Document Management Protocol

Alaska Highway Km 568 – 573 (Tetsa River) Reconstruction – Phase 2 Project: Written Communication / Document Management Protocol

Communication for the Alaska Highway Km 568-573 (Tetsa River) Reconstruction – Phase 2 Project (R.112220.002) will occur using CentraCollab, email, telephone, and through the delivery of hardcopy documents (if requested by PSPC). CentraCollab will act as the primary communication and document management tool throughout the project. It will act as the central file storage location for all project documents, allows for retrieval of these documents at any time during the project by group members and is capable of storing and sharing large electronic files.

Email and telephone may be used for general communication, transitory information and other communications where a record is not considered necessary (e.g. day-to-day coordination, in-depth discussion of project elements, etc.). Email shall not be used for the submission of deliverables or other project documentations. Email contact information for project members is provided in the project contact list.

Hardcopy documents are to only be provided if specifically requested by 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.

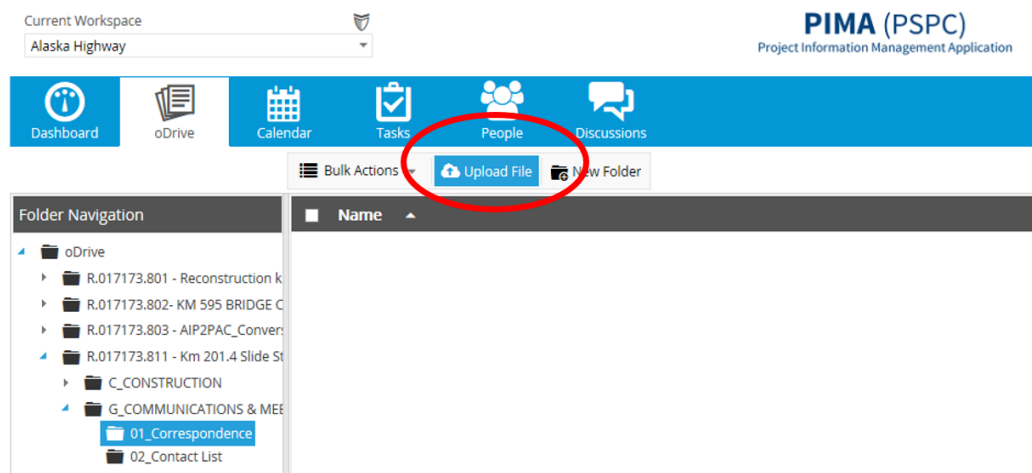
CentralCollab can be accessed at the following address: <https://app.centralcollab.com/>

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.

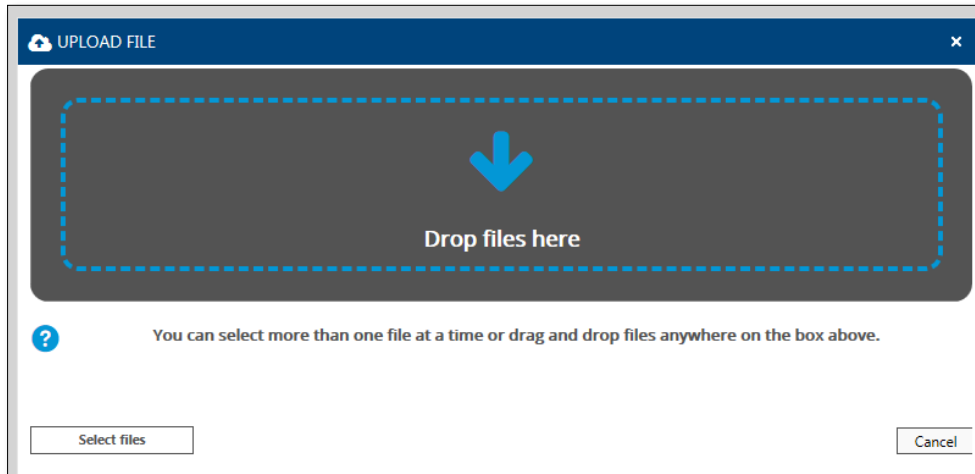
1 Uploading to CentralCollab

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**:

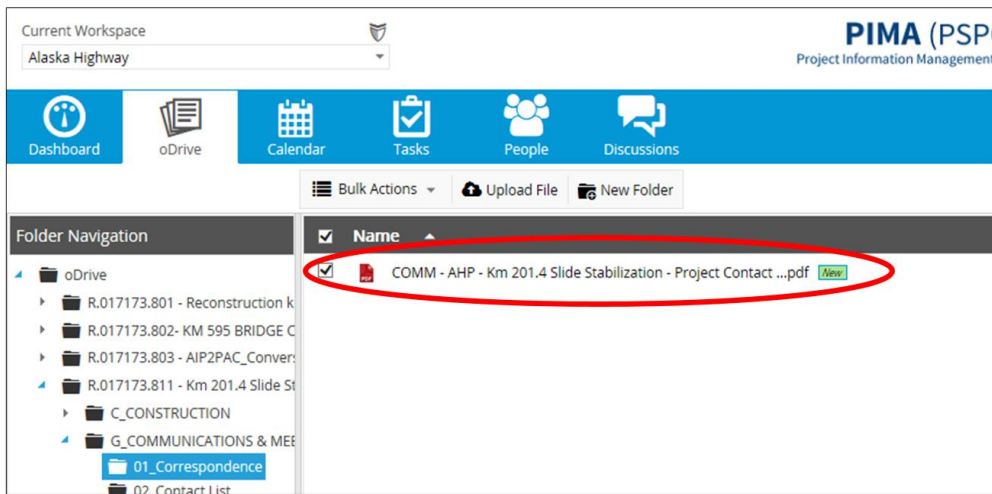


Drag and drop your document(s), then press Save.

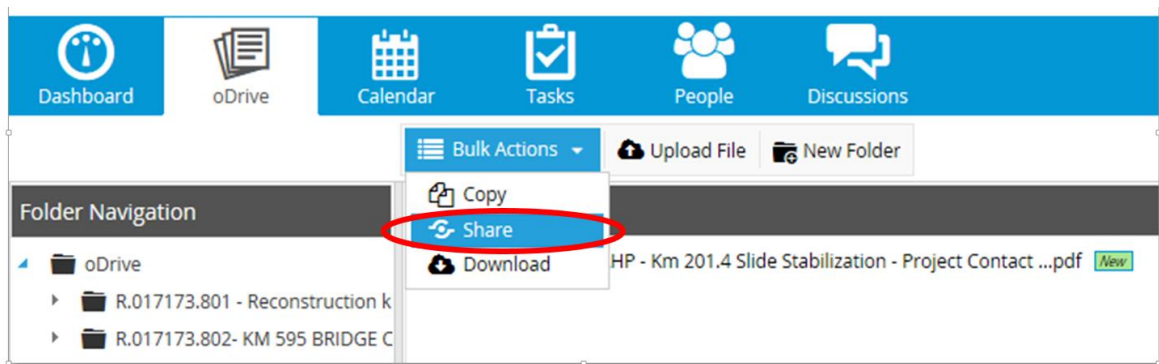
NOTE: Make sure you have named your document correctly, as explained in Section 2.2 CentralCollab File Naming Convention.



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-construction meeting or otherwise by PSPC) or select the **Groups** tab and select the pre-set group:

Example – Notification Members:

SHARE ×

To... Haghghi, Reza ×

Subject: Alaska Highway Km 311 - 330: H&S Template

B *I* U abc | | | | | | |

<insert message here if desired>

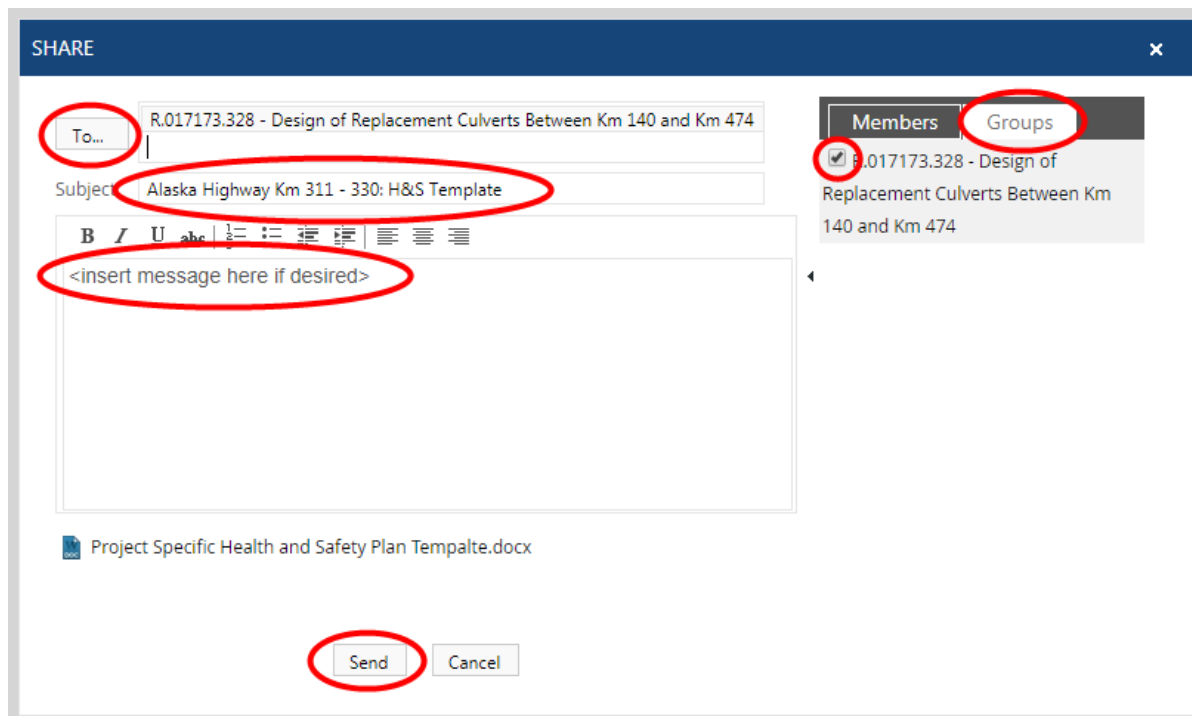
Members **Groups**

- Braudley, Shelly
- Crawford, Laurie
- Gerolamy, John
- Haghghi, 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 be provided 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 568-573 Project – File Description or Document Name – YYYY MM DD

Example file names:

- Plan – AHP – Km 568-573 Project – Quality Management Plan – 2021 02 15
- Schedule – AHP – Km 568-573 Project – Project Schedule – 2021 02 20
- Finance – AHP – Km 568-573 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.112220.002 – Km 568-573 Project > C_CONSTRUCTION > Contract >	
01_Contract	Contract Documents (typically related to documents posted to Buyandsell.gc.ca)
02_Request for Information	Request for Information from Contractor
03_Permits	Permits obtained by Contactor or PSPC
04_Site Instructions	Site Instructions (typically generated by PSPC)
05_CCN	Contemplated Change Notice forms generated by PSPC and pricing responses from Contractor

Table 2: Common Document Filing / Folder Locations	
Folder Names	Description of Typical Documents
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: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • 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 <ul style="list-style-type: none"> • Quality Management Plan • Check Sheets • Daily Reports • NCR's

Table 2: Common Document Filing / Folder Locations	
Folder Names	Description of Typical Documents
CentralCollab folder: R.112220.002 – Km 568-573 Project > 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.112220.002 – Km 568-573 Project > Z_BASE DATA>	
01_Base Data	Digital drawings and other documentation required by the Contractor (typically generated by PSPC)

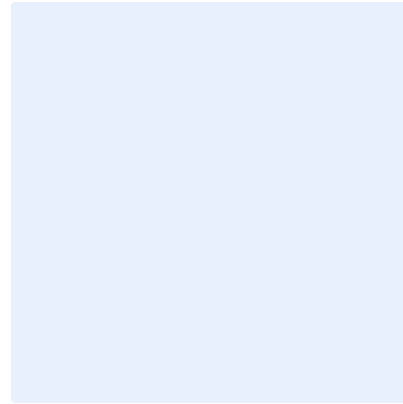
Typical folders Users are encouraged to create sub-folders and categorize documents of similar or related data.

Example sub-folders:

- 09_Health & Safety > **Tailgate Meetings > February**
- 14_Deliverables > **Project Schedule**
- 21_Quality Management > **Check Sheets > February**

R.112220.002
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

- 1. Contractors Safety Policy / Statement..... **XX**
- 2. Project Health and Safety Compliance Obligations **XX**
- 3. Definition of Responsibilities **XX**
- 4. General Project Safety Rules **XX**
- 5. Health and Safety Risks / Hazards and Engineering and Administrative Control Measures **XX**
 - 5.1 Workplace Hazard Assessment – Health and Safety Risks Identified **XX**
 - 5.2 Hazardous Materials **XX**
 - 5.3 Job Specific Work Procedures **XX**
 - 5.4 Required PPE and Training **XX**
 - 5.5 First Aid Requirements **XX**
- 6. Inspection Policy and Procedures **XX**
- 7. Incident Reporting and Investigation Policy **XX**
- 8. Occupational Health and Safety **XX**
 - 8.1 Representative/Committee Procedures **XX**
 - 8.2 Meetings **XX**
 - 8.3 Communications and Record Keeping Procedures **XX**
- 9. Emergency Contact Information **XX**
- 10. Wildlife Management **XX**
- 11. Fire Safety, Reporting and Evacuation **XX**
- 12. Contractor Review and Acceptance **XX**

Appendix 1: Preliminary Hazard Assessment Form

Note: The Preliminary Hazard Assessment Form is provided for the Contractor’s reference only and is not necessarily a comprehensive list of all hazards. PSPC takes no responsibility for the completeness or any misrepresentation by the Contractor of the on-site hazards based on the information found in the Preliminary Hazard Assessment Form. The Contractor shall remain responsible for the identifying and mitigating against all hazards on the project.

Appendix 2: Confirmation of Prime Contractor’s Main Responsibilities Under the WorkSafeBC Occupational Health and Safety Regulations and Worker’s Compensation Act Form

Appendix 3: Contractor’s COVID-19 Safe Work Plan

Appendix 4: Contractor Daily Toolbox Meeting Form

Appendix 5: Site Safety Orientation Form

<Project Name>

<Contractor>

<Date>

Project Specific Health and Safety Plan

<Revision Number>

Appendix 6: Incident/Accident Report Template

Appendix 7: Key Member Resumes and Safety Certifications

Appendix 8: Local Hospital Maps

Appendix 9: Safe Work Procedures

<Project Name>
<Contractor>
<Date>

Project Specific Health and Safety Plan
<Revision Number>

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 provide 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>

<Project Name>
<Contractor>
<Date>

Project Specific Health and Safety Plan
<Revision Number>

<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.>

<Project Name>
<Contractor>
<Date>

Project Specific Health and Safety Plan
<Revision Number>

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 (ie. ETV), if required by Contractor or WorkSafeBC requirements. Details of where 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

<Project Name>
 <Contractor>
 <Date>

Project Specific Health and Safety Plan
 <Revision Number>

<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

<Project Name>
 <Contractor>
 <Date>

Project Specific Health and Safety Plan
 <Revision Number>

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.>

<Project Name>
<Contractor>
<Date>

Project Specific Health and Safety Plan
<Revision Number>

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:	
Location:	
Date:	
Name of Departmental Representative:	
Name of Client:	
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
	PSPC, OGD's, or tenants		General Public or other contractors		
	Yes	No	Yes	No	
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.					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.

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			

<Project Name>
<Contractor>
<Date>

Project Specific Health and Safety Plan
<Revision Number>

**Appendix 2: Confirmation of Prime Contractor's Main Responsibilities Under
WorkSafeBC Occupational Health and Safety Regulations and Worker's Compensation
Act Form**



Confirmation of Prime Contractor’s Main Responsibilities Under the Worksafe B.C. Occupational Health and Safety Regulations and *Worker’s Compensation Act*

Name of Project: _____

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	<input type="checkbox"/>	<input type="checkbox"/>
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.	<input type="checkbox"/>	<input type="checkbox"/>
3. The Prime Contractor understands that in any conflict of directions, WCB OH&S Regulations and/or the Worker’s Compensation Act shall prevail.	<input type="checkbox"/>	<input type="checkbox"/>
4. The Prime Contractor understands and will direct that all supervisors/coordinators must immediately report any apparent conflict as described above.	<input type="checkbox"/>	<input type="checkbox"/>
5. The Prime Contractor agrees that their supervisor shall immediately notify the consulting Engineer’s representative of any reported conflict.	<input type="checkbox"/>	<input type="checkbox"/>
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.	<input type="checkbox"/>	<input type="checkbox"/>
7. The Prime Contractor has conducted an inspection of the workplace to verify the presence of any hazards.	<input type="checkbox"/>	<input type="checkbox"/>
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.	<input type="checkbox"/>	<input type="checkbox"/>
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.	<input type="checkbox"/>	<input type="checkbox"/>
10. The Prime Contractor will confirm that all workers are suitably trained and competent to perform the duties for which they have been assigned.	<input type="checkbox"/>	<input type="checkbox"/>
11. The Prime Contractor confirms that safety orientation of all new workers will be conducted.	<input type="checkbox"/>	<input type="checkbox"/>
12. The Prime Contractor’s written Safety Program has been provided to the Owner’s representative.	<input type="checkbox"/>	<input type="checkbox"/>
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.	<input type="checkbox"/>	<input type="checkbox"/>
14. The Prime Contractor confirms that before the commencement of work, crews will attend a daily crew safety meeting.	<input type="checkbox"/>	<input type="checkbox"/>
15. The Prime Contractor confirms that their supervisor has assessed and will coordinate the workplace first-aid requirements	<input type="checkbox"/>	<input type="checkbox"/>
16. The Prime Contractor confirms that the procedure to transport injured workers is established	<input type="checkbox"/>	<input type="checkbox"/>

Prime Contractor Representative’s

Name: _____

Title: _____ Signature: _____

Date: _____

Prime Contractor’s OH&S Coordinator

Name: _____

Title: _____ Signature: _____

Date: _____

<Project Name>
<Contractor>
<Date>

Project Specific Health and Safety Plan
<Revision Number>

Appendix 3: Contractor's COVID-19 Safe Work Plan
<provided by the Contractor>

<Project Name>
<Contractor>
<Date>

Project Specific Health and Safety Plan
<Revision Number>

Appendix 4: Contractor Daily Toolbox Meeting Form
<provided by the Contractor>

<Project Name>
<Contractor>
<Date>

Project Specific Health and Safety Plan
<Revision Number>

Appendix 5: Site Safety Orientation Form
<provided by the Contractor>

<Project Name>
<Contractor>
<Date>

Project Specific Health and Safety Plan
<Revision Number>

Appendix 6: Incident/Accident Report Template
<provided by the Contractor>

<Project Name>
<Contractor>
<Date>

Project Specific Health and Safety Plan
<Revision Number>

Appendix 7: Key Member Resumes and Safety Certifications
<provided by the Contractor>

<Project Name>
<Contractor>
<Date>

Project Specific Health and Safety Plan
<Revision Number>

Appendix 8: Local Hospital Maps

<Project Name>
<Contractor>
<Date>

Project Specific Health and Safety Plan
<Revision Number>

<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>

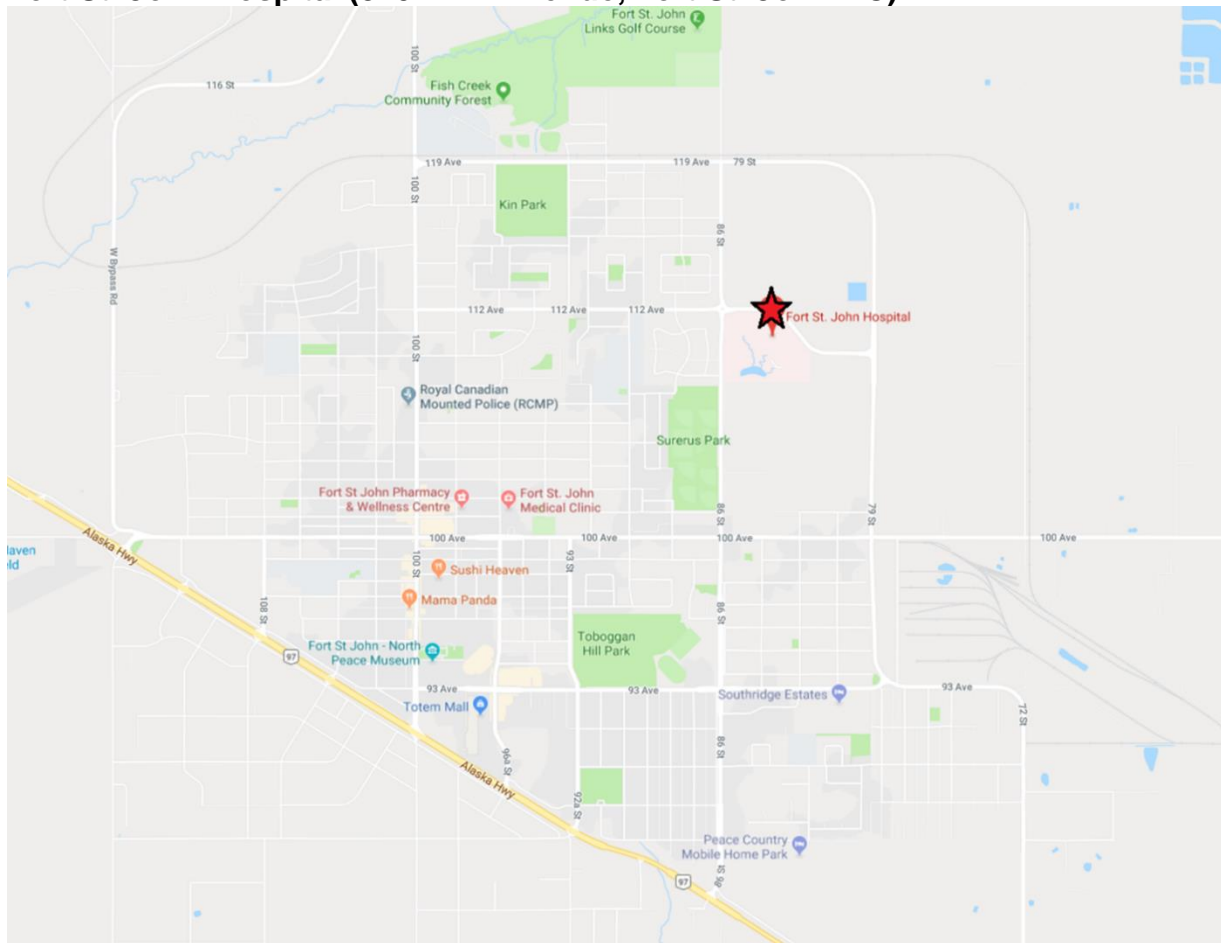
<Head Southbound on the Alaska Highway

Turn Left onto Liard St.>

<Project Name>
<Contractor>
<Date>

Project Specific Health and Safety Plan
<Revision Number>

Fort St. John Hospital (8407 112 Avenue, Fort St. John BC)



Directions

Head Southbound on the Alaska Highway

Turn Left onto 100 Ave.

Turn Left onto 86 St.

At the roundabout, take the 1st exit onto 112 Avenue

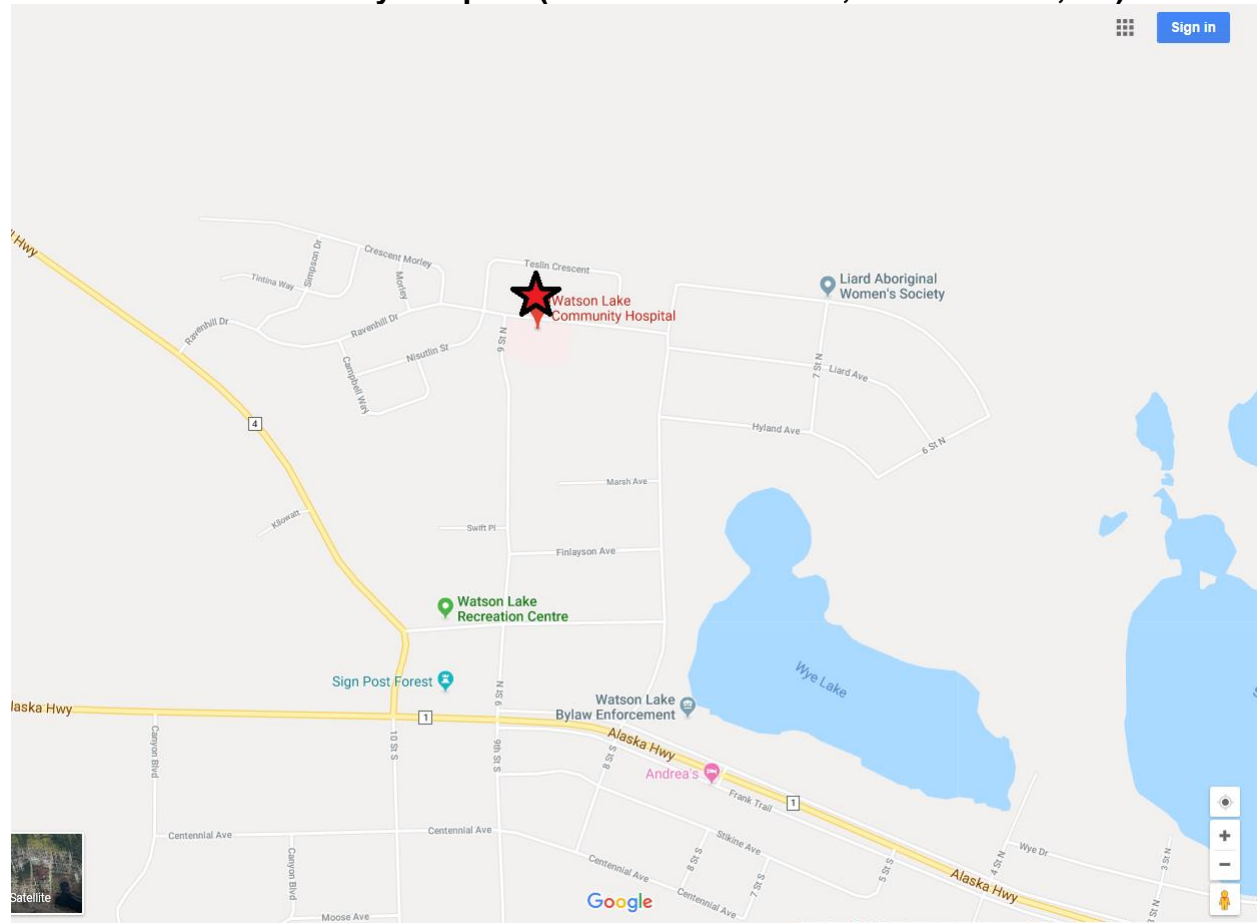
Turn Right toward Drop-off Loop

Continue straight onto Drop-off Loop

<Project Name>
<Contractor>
<Date>

Project Specific Health and Safety Plan
<Revision Number>

Watson Lake Community Hospital (801 Ravenhill Drive, Watson Lake, YT)



Directions

Head Northbound on the Alaska Highway

Turn Right onto 9 St N.

Turn Right onto Ravenhill Dr.

<Project Name>
<Contractor>
<Date>

Project Specific Health and Safety Plan
<Revision Number>

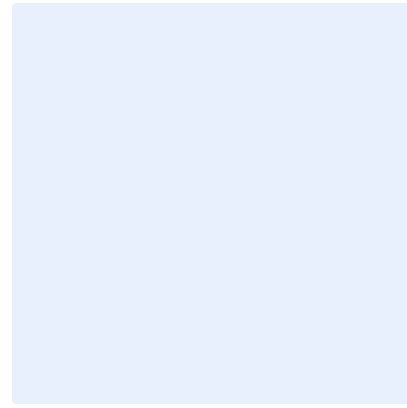
Appendix 9: Safe Work Procedures *<if required>*

R.112220.002

Appendix C

Category 3

Traffic Management Plan Template



<insert company logo/information>

Category 3 Traffic Management Plan

Km 568-573 (Tetsa River) Reconstruction – Phase 2,
Alaska Highway, BC
PSPC Project No. R.112220.002

<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 Office 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	XX
2. Traffic Control Plan	XX
2.1. Traffic Control Provisions	XX
2.2. Work Activity Specific Risk Assessment and Traffic Plan	XX
2.3. Drawing List	XX
3. Incident Management Plant	XX
4. Public Information Plan	XX
5. Implementation Plan	XX
6. Contact List	XX
6.1. Emergency Response Agencies / Assistance	XX
6.2. Prime Contractor’s Contact Numbers	XX
6.3. PSPC Contact Numbers	XX

Appendix A Traffic Control Plan Drawings

Appendix B Detour Traffic Control Plan Drawings

Appendix C Daily Sign Check Form

Appendix D DMS Message Library

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 (2015 Office Edition – Interim), 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.

<Project Name>
<Contractor>
<Date>

Traffic Management Plan
<Revision Number>

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>

<Project Name>
 <Contractor>
 <Date>

Traffic Management Plan
 <Revision Number>

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 Traffic Management Manual for Work on Roadways – 2020 Office Edition for further details. At a minimum the text and figures included in Item 6.7.4 – Two-Lane, Two-Way Roadways shall be included within the Contractor’s Traffic Management Plan for reference during the work (in main body of the plan or in Appendices of the plan with reference to applicable Appendix in main body of the plan). The Contractor shall customize the details of the steps for the project as required.> <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.

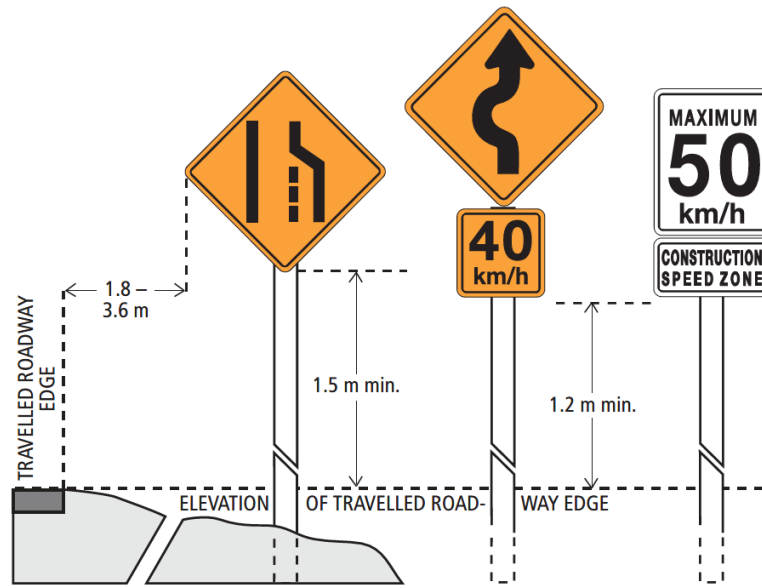


Figure 01: Post Mounted Supports

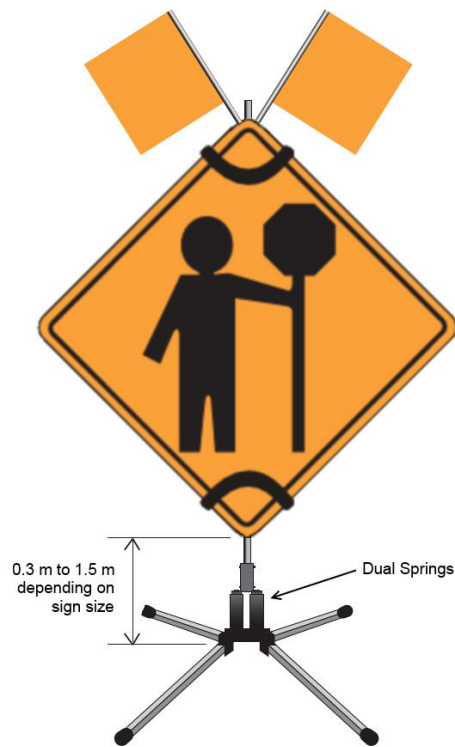


Figure 02: Wind Resistant Sign Stand

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).

<Project Name>
 <Contractor>
 <Date>

Traffic Management Plan
 <Revision Number>

	<p>.4 Accident Scene (C-058).</p> <p>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.</p> <p>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 Traffic Management Manual for Work on Roadways – 2020 Office Edition.</p> <p>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.</p>
<p>Portable Dynamic Message Signs (DMS)</p>	<p><Are DMS required? Where will they be located?></p> <p>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)</p> <p>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 (Section 01 35 00 – Traffic Management, Subsection 2.1 Temporary Traffic Control Devices, Item .1.1 of the contract specification).</p> <p>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 Traffic Management Manual for Work on Roadways – 2020 Office Edition plus other messages anticipated to be required on the project.</p>
<p>PSPC Permanent Variable Message Signs</p>	<p>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 seven (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 Traffic Management Manual for Work on Roadways – 2020 Office Edition has been included in the Traffic Management Plan and will be undertaken / implemented <Name of Contractor> prior to commencing work.</p>
<p>Intersections affected by work zone or traffic control devices</p>	<p><Are intersections affected by the work zone or traffic control devices?></p> <p><If so, how will the intersections be controlled?></p>

<Project Name>
 <Contractor>
 <Date>

Traffic Management Plan
 <Revision Number>

	<Will additional traffic control devices be required?>
Flexible Drums	<p><Will flexible drums be used to delineate lane drops?></p> <p><Will they be used to identify construction accesses to the work activity area?></p> <p>Unless preapproved by the Departmental Representative, where 45 cm, 70 cm, or 90 cm cones are called for by the BC Ministry of Transportation Traffic Management Manual for Work on Roadways – 2020 Office Edition, 100 cm tubular markers will be used.</p>
Traffic Stoppages	<p><Are there any anticipated traffic stoppages?></p> <p><If so, for how long?></p> <p><Will there be single lane alternating traffic?></p>
Layout of Devices	<Identify spacing between traffic control devices.>
Emergency Vehicles	<p><Will emergency vehicles have clear, unobstructed access to the site.></p> <p><What procedures will be in place to ensure that emergency vehicles are able to access the site without delay?></p>
Pilot Cars	<p>Pilot cars will not be used when the length of the single lane alternating traffic does not exceed 300 m.</p> <p>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).</p> <p>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.</p> <p>.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 Traffic Management Manual for Work on Roadways – 2020 Office Edition) for the applicable speed (adjust all other sign spacing as required).</p>

<Project Name>
<Contractor>
<Date>

Traffic Management Plan
<Revision Number>

Drop-offs	<p>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.</p> <p>Drop-off's will be treated in accordance with Section 6.5 of the BC Ministry of Transportation Traffic Management Manual for Work on Roadways – 2020 Office 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.</p>

<Project Name>
 <Contractor>
 <Date>

Traffic Management Plan
 <Revision Number>

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?>

<Project Name>
 <Contractor>
 <Date>

Traffic Management Plan
 <Revision Number>

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?>

<Project Name>
<Contractor>
<Date>

Traffic Management Plan
<Revision Number>

operations as soon as possible	
Procedure to inform and update PSPC regarding incident in work zone	<i><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?></i>
Procedure to inform travelling public of estimated duration of delay and alternative routes (if applicable)	<i><Will DMS be used to display information?></i>
Incident Reporting	<i><Who will provide details to the PSPC?></i> <i><What is the process for incident follow-up?></i>
Investigation Process	<i><Who will lead the incident investigation?></i> <i><What investigation process will be used to assess the incident and those involved?></i>
Review and Continuous Improvement Process	<i><How incidents will be reviewed and followed up to reduce the severity and frequency of future incidents?></i>

<Project Name>
<Contractor>
<Date>

Traffic Management Plan
<Revision Number>

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 Traffic Management Manual for Work on Roadways – 2020 Office 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.)>

<Project Name>
<Contractor>
<Date>

Traffic Management Plan
<Revision Number>

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.>

<Project Name>
 <Contractor>
 <Date>

Traffic Management Plan
 <Revision Number>

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	

<Project Name>
 <Contractor>
 <Date>

Traffic Management Plan
 <Revision Number>

(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	

<Project Name>
<Name of Contractor>
<Date>

Traffic Management Plan
<Revision Number>

Appendix A: Traffic Control Plan Drawings

<Project Name>
<Name of Contractor>
<Date>

Traffic Management Plan
<Revision Number>

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 Traffic Management Manual for Work on Roadways – 2020 Office 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

<Project Name>
<Contractor>
<Date>

Traffic Management Plan
<Revision Number>

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 Traffic Management Manual for Work on Roadways – 2020 Office 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

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 Traffic Management Manual for Work on Roadways – 2020 Office Edition plus other messages anticipated to be required on the project.>

R.112220.002

Appendix D

On-site Construction Start-up Form



On-site Construction Start-up Form

Project Name:	Km 568-573 (Tetsa River) Reconstruction – Phase 2, Alaska Highway, BC
Project Number:	R.112220.002
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	<input type="checkbox"/>		
Health & Safety Plan	<input type="checkbox"/>		
Traffic Management Plan	<input type="checkbox"/>		
Environmental Protection Plan	<input type="checkbox"/>		
Project Construction Schedule	<input type="checkbox"/>		
Cash Flow Plan	<input type="checkbox"/>		
Quality Management Plan	<input type="checkbox"/>		
Construction Staging Plan	<input type="checkbox"/>		
Construction Equipment List	<input type="checkbox"/>		
Other:	<input type="checkbox"/>		
Other:	<input type="checkbox"/>		

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: _____

PSPC

Appendices

Km 568-573 (Tetsa River) Reconstruction - Phase 2, Alaska Highway, BC

Project No. R.112220.002

R.112220.002

Appendix E

Progress Payment Submittal Form



Progress Payment Submittal Form

Project Name:	Km 568-573 (Tetsa River) Reconstruction – Phase 2, Alaska Highway, BC
Progress Payment Number:	R.11222.002
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	<input type="checkbox"/>	
Statutory Declaration	<input type="checkbox"/>	
WorkSafeBC Clearance Letter	<input type="checkbox"/>	
Project Schedule (with baseline tasks and updates showing completion dates and % complete)	<input type="checkbox"/>	
Updated Cash Flow Forecast	<input type="checkbox"/>	
Survey Details for each quantity claimed (See Appendix F)	<input type="checkbox"/>	
Other:	<input type="checkbox"/>	
Other:	<input type="checkbox"/>	

Prime Contractor Representative:

Name: _____

Title: _____ Signature: _____

Date: _____

PSPC

Appendices

Km 568-573 (Tetsa River) Reconstruction - Phase 2, Alaska Highway, BC

Project No. R.112220.002

R.112220.002

Appendix F

Measurement for Payment Survey Details Form

R.112220.002

Appendix G

General Contractor & Sub-Contractor Construction Equipment List

R.112220.002

Appendix H

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				
<i>Project Description</i>	A brief description of the project and its location is provided.			
<i>Environmental Sensitivities</i>	Sensitive or protected features that could be impacted as a result of the Contractor's activities are described.			
<i>Site Activities</i>	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				
<i>Project Schedule</i>	A project schedule is provided, including scheduled shut-downs and restricted work periods due to environmental requirements.			
<i>Site Drawing</i>	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				
<i>Potential Environmental Issues and Impacts</i>	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).			
<i>Permits, Approvals, and Authorizations</i>	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.			
<i>Mitigation Strategies</i>	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".			
<i>Erosion and Sediment</i>	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.			

R.112220.002

Appendix I

Responsibility Checklist for Authorizations / Approvals / Notifications / Permitting

Responsibility Checklist For Authorizations/Approvals/Notifications/Permitting

Project Title	Km 568-573 (Tetsa River) Reconstruction – Phase 2, Alaska Highway, BC
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 (E.g. 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: <ul style="list-style-type: none"> • 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	<p>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).</p> <p>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</p>			

¹ Project Manager refers to anyone who leads, manages or delivers a project

	legislation, policies and sustainable development requirements			
Species at Risk Act (SARA) http://www.sararegistry.gc.ca/default_e.cfm	A list of federally-listed species at risk likely to occur at a given subject site must be compiled in order to identify potential impacts & propose mitigation measures for minimizing impacts to these species as a result of project activities. In cases where suitable habitat for a given species exists at/near the project site, mitigation measures are recommended, including avoidance of areas containing said habitat and informing site workers of these issues to prevent incidents.			
First Nations Notifications and Consultations http://clss.nrcan.gc.ca/googledata-donneesgoogle-eng.php	Natural Resources Canada has developed an overlay to be used with Google Earth & Google Maps to identify First Nations lands throughout the country. Notifications of projects within 5 km of such lands and/or directly upstream from such lands should be submitted to the relevant First Nations for a determination of their interest in a given project and/or to request any traditional knowledge they may have to offer.			
Provincial – Note one submission package for instream works is sent to FrontCounter BC at MoE who then send off to the appropriate departments for approval/notification/permitting – this does not apply to the 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.			

<p>Ministry of Forests, Lands, Natural Resource Operations, and Rural Development Archaeological http://www.for.gov.bc.ca/archaeology/requesting_archaeological_site_information/process_steps.htm Contact: Hayley Bond (250) 953-3343</p>	<p>When completing projects such as quarry pits and new highway alignments, a request is put into the archaeological branch of MFLNSO via the EA process to search the data base. An archaeological assessment may be required on those areas that are previously undisturbed or undeveloped.</p>			
<p>BC Parks</p>	<p>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).</p>			
<p>Canada-British Columbia Agreement for Environmental Assessment Cooperation http://www.ceaa.gc.ca/default.asp?lang=En&n=04A20DBC-1</p>	<p>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.</p>			
<p>BC Ministry of Environment – BC Species and Ecosystems Explorer http://a100.gov.bc.ca/pub/eswp/</p>	<p>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.</p>			
Consultant Responsibility				
Provincial				
<p>BC Parks Ministry of Forests, Lands, Natural Resource Operations, and Rural Development http://www.env.gov.bc.ca/bcparks/permits/</p>	<p>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.</p>			
<p>Water Act – Regulation’s Protection of Habitat - Section 42(1)</p>	<p>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</p>			

	salvage – in conjunction with the BC Parks permitting.			
<p>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”.</p> <p>http://www.env.gov.bc.ca/pasb/applications/process/scientific_fish_collect.html#a5</p>				
Contractor Responsibility				
Federal				
<i>DFO – End of Pipe Guidelines</i>	End-of- pipe guidelines for freshwater intake to avoid fish entrainment.			
Provincial				
<i>Water Act - MoE</i>	Schedule A – Water License Applications – use of water from waterbody for road maintenance.			

R.112220.002

Appendix J

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	<i>Land Development Guidelines for the Protection of Aquatic Habitat - 1993</i>	This document is a good reference guide for any works that are occurring in or around the water.
	<i>Canada's Fish Habitat Law</i>	Document explaining the fish and fish habitat laws under the Fisheries Act.
	<i>Riparian Revegetation</i>	Information on minimizing, stabilizing and revegetating construction areas.
	<i>Freshwater Intake End-of Pipe Fish Screen Guideline - 1995</i>	Provides guidelines for the contractor to follow to ensure fish screens are used during freshwater intake operations at construction sites.
	<i>Operational Statements</i> Stream Crossings by Roads: <ul style="list-style-type: none"> • 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 <i>Fisheries Act</i> . 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	<i>Fish-stream Crossing Guidebook - 2002</i>	Guidelines in protection of fish and fish habitat and the safe passage of fish during construction at/on stream crossings.
	<i>Standards and Best Practices for Instream Works - 2004</i>	Guide to planning and carrying out the proposed construction activities to comply with relevant legislation, regulations and policies.
	<i>A User's Guide to Working In and Around Water - 2005</i>	Understanding the regulation under British Columbia's Water Act.
	<i>Fish-Stream Identification Guidebook - 1998</i>	Assists in providing information on determining fish streams.
	<i>The Streamkeepers Handbook</i>	A practical guide to stream and wetland care in regards to rehabilitation planting.

R.112220.002

Appendix K

Environmental Overview Assessment (EOA)

Environmental Overview Assessment Alaska Highway Realignment & Reconstruction KM 566+900 to KM 570+200



PRESENTED TO
Public Services and Procurement Canada

JANUARY 20, 2021
ISSUED FOR USE
FILE: 704-TRN.VHWY03172-02

This page intentionally left blank.

TABLE OF CONTENTS

1.0	INTRODUCTION	1
2.0	PROJECT DESCRIPTION	1
3.0	METHODOLOGY	3
3.1	Desktop Review	3
3.2	Field Assessment	3
4.0	RELEVANT ENVIRONMENTAL LEGISLATION	4
4.1	Provincial	4
4.1.1	BC Wildlife Act	4
4.1.2	BC Water Sustainability Act	4
4.1.3	BC Weed Control Act	5
4.1.4	BC Environmental Management Act	5
4.1.5	BC Heritage Conservation Act	6
4.2	Federal	6
4.2.1	Fisheries Act	6
4.2.2	Species at Risk Act	7
4.2.3	Migratory Birds Convention Act	7
4.2.4	Impact Assessment Act	8
5.0	EXISTING ENVIRONMENT	8
5.1	Air Quality and Noise	8
5.2	Soils	8
5.3	Vegetation	9
5.3.1	Ecological Communities at Risk Identified within 5 km of the Project	10
5.4	Wildlife	10
5.5	Fish and Aquatic Habitat	10
5.5.1	Watercourse Information	10
5.5.2	Fish Presence	12
5.6	Species at Risk	13
5.6.1	Habitat Requirements of SAR with Mapped Occurrences within 5 kms of the Project Sites	20
6.0	POTENTIAL ENVIRONMENTAL IMPACTS	21
6.1	Valued Environmental Components	21
7.0	CONCLUSION	26
8.0	CLOSURE	27
	REFERENCES	26

LIST OF TABLES IN TEXT

Table 2-1: Culverts to be Replaced Between KM 566.9 and KM 570.2.....	2
Table 4-1: Noxious Weeds Regulated in all Regions of Province.....	5
Table 5-1: Vegetation Observed During Field Assessment.....	9
Table 5-2: Watercourse Information Summary for the 11 Culvert Locations.	11
Table 5-3: Fish Species Documented Downstream of the Culvert Locations in the Tetsa River.....	12
Table 5-4: Species at Risk with Moderate to High Potential to Occur on Site	15
Table 6-1: Potential Effects Assessment and Associated Mitigation Measures Recommended for the Project.....	22

APPENDIX SECTIONS

FIGURES

- Figure 1 Project Location Overview
- Figure 2 KM 566+900 to KM 570+200 - BC CDC SAR Occurrences and Fish Presence
- Figure 3 Culvert Locations

PHOTOGRAPHS

- Photo 1 Culvert inlet at KM 568.84.
- Photo 2 The view of the channel upstream of the KM 568.84 culvert.
- Photo 3 Culvert outlet at KM 568.84.
- Photo 4 The view of the channel downstream of the KM 568.84 culvert.
- Photo 5 Inlet of the KM 569.95 culvert.
- Photo 6 The view upstream of the KM 569.95 culvert.
- Photo 7 Culvert outlet at KM 569.95.
- Photo 8 View of the downstream channel at the KM 569.95 culvert.

APPENDICES

- Appendix A Tetra Tech's Limitations on the Use of this Document
- Appendix B Species At Risk Search Results
- Appendix C Caribou Protection Plan
- Appendix D Environmental Management Plan
- Appendix E Engineering Design Drawings
- Appendix F Archaeological Overview Assessment

ACRONYMS & ABBREVIATIONS

Acronyms/Abbreviations	Definition
AQHI	Air Quality Health Index
BC CDC	British Columbia Conservation Data Centre
BC MoTI	British Columbia Ministry of Transportation and Infrastructure
BEC	Biogeoclimatic Ecosystem Classification
BMP	Best Management Practices
BWBS	Boreal White and Black Spruce Zone
CEAA	<i>Canadian Environmental Assessment Act</i>
CFP	Chance Find Protocol
CPP	Caribou Protection Plan
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
DFO	Fisheries and Oceans Canada
ECCE	Environment and Climate Change Canada
EMA	<i>Environmental Management Act</i>
EMP	Environmental Management Plan
EPP	Environmental Protection Plan
EOA	Environmental Overview Assessment
ESC	Erosion and Sediment Control
FISS	Fisheries Information Summary System
FLNRORD	BC Ministry of Forests, Lands and Natural Resource Operations and Rural Development
FWA	Freshwater Atlas
HADD	Harmful Alteration, Disruption or Destruction of Fish Habitat
MBCA	<i>Migratory Birds Convention Act</i>
BC MOE	Ministry of Environment and Climate Change Strategy
PSPC	Public Services and Procurement Canada
QEP	Qualified Environmental Professional
ROW	Right-of-Way
SAR	Species at Risk
SARA	<i>Species at Risk Act</i>
TAC	Transport Association of Canada
UTM	Universal Transverse Mercator
VCs	Valued Components
WSA	<i>Water Sustainability Act</i>

LIMITATIONS OF REPORT

This report and its contents are intended for the sole use of Public Services and Procurement 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 Services and Procurement Canada or for any Project other than the proposed work 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 A or Contractual Terms and Conditions executed by both parties.

1.0 INTRODUCTION

Tetra Tech Canada Inc. (Tetra Tech) was retained by Public Services and Procurement Canada (PSPC) to conduct an Environmental Overview Assessment (EOA) for planned highway realignment and reconstruction work located between KM 566.9 and KM 570.2 of the Alaska Highway (herein referred to as the “Project”).

The purpose of the EOA is to describe the Project, characterize existing environmental features, identify potential environmental impacts, present mitigation to minimize or avoid the identified impacts, and, facilitate regulatory submissions.

2.0 PROJECT DESCRIPTION

Since 1964, PSPC has been the federal custodian for the Alaska Highway and is responsible for the maintenance of the current highway. PSPC’s current operational jurisdiction of the Alaska Highway extends from KM 133 (north of Fort St. John) to the British Columbia-Yukon border at KM 968.

PSPC intends to realign a section of the Alaska Highway between KM 566.9 and KM 570.2 (Figure 1). Currently, this section of the Alaska Highway contains horizontal curves that do not achieve the requirements of the relevant highway geometric design guidelines for the regulatory speed limit, including Transport Association of Canada (TAC) Geometric Design Guide for Canadian Roads (2017) and British Columbia Ministry of Transportation and Infrastructure (BC MoTI) BC Supplement to TAC Geometric Design Guide, 3rd edition (2019). The objective of this Project is to improve safety of this section of the Alaska Highway by realigning the highway to achieve a design speed of 100 km/h in accordance with the relevant highway geometric design guidelines.

The highway realignment and reconstruction works between KM 566.9 and KM 570.2 will include the following:

- Early works will be conducted in advance of this Project in Winter 2020/2021 under a separate Tender:
 - Tree / vegetation clearing within PSPC’s right-of-way boundary, excluding areas within the 30 m riparian buffer of watercourses; and
 - Rock excavation and common excavation.
- Highway widening and realignment in Spring of 2021, including the following works:
 - Grubbing of stumps and roots, and stripping of organics within the construction limits of the proposed highway;
 - Placement and compaction of embankment fill material, sourced from excavations on-site and off-site;
 - Crushing, placement and compaction of crushed base gravel and sub-base course; and
 - Bituminous Surface Treatment (BST) application.
- Drainage improvements (see Table 2-1), including the following works:
 - Replacement of two large (>1,500 mm diameter) culverts via open cut method at KM 568.84 and KM 569.95. Both locations will feature fish friendly design (baffles, natural substrate, crushed base gravel in riprap voids);

- Replacement of ten small (<1,000 mm diameter) drainage culverts via open cut or trenchless installation methods;
- Minor channel realignment at the culvert inlet and outlet to redirect flow through new culverts;
- Erosion protection (e.g., riprap) installation around culvert inlets and outlets;
- Excavation, removal and off-site disposal of existing culvert structures; and
- Backfilling existing culvert excavations with crushed granular aggregate.

Construction for this Project is scheduled to begin in the Spring of 2021.

Table 2-1: Culverts to be Replaced Between KM 566.9 and KM 570.2.

Culvert ID	UTM Coordinates		Existing Culvert Specs	Proposed Culvert Specs	Approx. Construction Footprint ⁽¹⁾
	Easting	Northing			
KM 567+240 (Drainage)	429888.49	6502164.56	500 mm dia. CSP Culvert	600 mm dia. Steel Pipe Culvert	2,000 m ²
KM 567+515 (Drainage)	429618.56	6502157.21	500 mm dia. CSP Culvert	600 mm dia. Steel Pipe Culvert	2,000 m ²
KM 567+695 (Drainage)	429439.26	6502141.77	500 mm dia. CSP Culvert	600 mm dia. Steel Pipe Culvert	2,000 m ²
KM 567+820 (Drainage)	429312.13	6502126.89	500 mm dia. CSP Culvert	600 mm dia. Steel Pipe Culvert	2,000 m ²
KM 568+080 (Drainage)	429055.56	6502086.73	600 mm dia. CSP Culvert	750 mm dia. Steel Pipe Culvert	3,000 m ²
KM 568+630 (Drainage)	428515.28	6502132.47	900 mm dia. CSP Culvert	1,000 mm dia. Steel Pipe Culvert	2,500 m ²
KM 568+840	428310.76	6502089.41	1500 mm dia. CSP culvert	1,650 mm dia. Steel Pipe Culvert ⁽²⁾	2,000 m ²
KM 569+090 (Drainage) (Additional rock blasting work within 30 m of this site)	428066.27	6502040.07	900 mm dia. CSP Culvert	1,200 mm dia. Steel Pipe Culvert	2,000 m ²
KM 569+380 (Drainage)	427786.32	6502102.99	900 mm dia. CSP Culvert	1,000 mm dia. Steel Pipe Culvert	3,000 m ²
KM 569+565 (Drainage)	427609.04	6502151.85	750 mm dia. Wood Stave Culvert	900 mm dia. Steel Pipe Culvert	2,000 m ²
KM 569.95	427235.52	6502244.62	1200 mm dia. CSP culvert	2,500 mm dia. Steel Pipe Culvert ⁽²⁾	3,000 m ²
KM 570.10 (drainage)	427077.00	6502249.00	900 mm dia. CSP culvert	1,000 mm dia. Steel Pipe Culvert	2,500 m ²

Notes

- (1) Construction footprints given include the temporary construction footprint at the inlet and outlet (i.e., laydown area, equipment access, etc.) and the total permanent footprint of the riprapped areas.
- (2) Culvert embedded 0.31 m to accommodate fish passage, thus the effective culvert rise is 0.31 m less than listed.

3.0 METHODOLOGY

3.1 Desktop Review

Tetra Tech conducted a desktop review of existing information to determine known environmental conditions and potentially sensitive features in the Project area. Background information was obtained from publicly available databases and mapping services such as:

- BC Conservation Data Centre (CDC) Internet Mapping Service – iMapBC;
- BC CDC Species and Ecosystems Explorer;
- BC Ministry of Environment and Climate Change Strategy (MOE) Fisheries Information Summary System (FISS) databases;
- BC MOE Habitat Wizard;
- BC Ministry of Forest and Range Biogeoclimatic Ecosystem Classification (BEC);
- Government of Canada Species at Risk Public Registry (Environment Canada); and
- Other publicly available records and information that may exist for the Project area.

A 5 km search area was applied around each culvert to identify nearby watercourses and known occurrences of Species at Risk (SAR) and fish occurrences near to the Project area (Figure 2).

3.2 Field Assessment

The Project alignment was visited by Tetra Tech on June 18, 2020 to conduct the field assessment. The Project area was accessed by vehicle and each culvert location was assessed on foot. During the field assessment, both terrestrial and aquatic features were characterized within 100 m upstream and downstream of each culvert and within 30 m on either side of the watercourse or drainage.

A list of observed vegetation species and all incidental wildlife observations was compiled. Aquatic assessments were conducted at four of the 12 culvert locations along the Project alignment, following the methods outlined in the *Reconnaissance (1:20,000) Fish and Fish Habitat Inventory* (RIC 2001), and modified for the scale of the project. Aquatic characteristics recorded included visible shoreline substrates, channel morphology and pattern, bank shape and stability, instream cover, riparian vegetation and site modifications and/or disturbances. Based on the current characteristics present, observations were made on the overall quality of fish habitat. Photos, orthophotos and topography of the remaining eight culvert locations (located on unmapped drainages) were reviewed in the context of assessing if these drainages were solely conveying road run-off and seepage from the upland slopes or if they met the definition of a stream under the *Water Sustainability Act*.

Photos of the two larger culvert replacements are located at the end of this document. Photos of the drainage culverts are located on Figure 3.

4.0 RELEVANT ENVIRONMENTAL LEGISLATION

4.1 Provincial

4.1.1 BC Wildlife Act

The British Columbia (BC) *Wildlife Act* protects most vertebrate animals from direct harm or harassment except as allowed by regulation (e.g., hunting or trapping). Section 34 of the BC *Wildlife Act* specifically protects the nests of Eagles, Peregrine Falcons, Gyrfalcons, Osprey, Herons, and Burrowing owls year-round. This means that a tree or other structure containing such a nest must not be felled, even outside of the breeding season. Section 34 of the *Wildlife Act* also protects the nests of all species of birds when birds or eggs are present in the nest.

The Project will require construction works to be conducted within watercourses, which may provide habitat for fish and wildlife. To avoid undue harm to fish and wildlife under the *Wildlife Act*, fish and wildlife salvages must be completed to remove animals, from the construction area. As such, a General *Wildlife Act* Permit will have to be obtained through FrontCounter BC to allow for the capture and relocation of numerous potential wildlife species. In addition, a Fish Collection Permit must be obtained through FrontCounter BC for the capture and relocation of all potential fish species in watercourses affected by construction activities. Acquisition of this permit will be pursuant to the Angling and Scientific Collection Regulations of the *Wildlife Act*. For both of these permits, at minimum, 30 days should be allowed for permit processing.

4.1.2 BC Water Sustainability Act

Previously known as the *Water Act*, the BC *Water Sustainability Act* (WSA) was brought into force on February 29, 2016. The WSA is the main provincial statute regulating water resources in British Columbia. Under the WSA, it is an offence to divert or use water, or alter a stream, without formal approval from the Province. The WSA defines “stream” as a natural watercourse or source of water supply, whether usually containing water or not, and a lake, river, creek, spring, ravine, swamp or gulch. “Stream” is used to describe any watercourse that is considered to be fish habitat, including channelized streams, and ditches that provide fish habitat. Under the WSA, the *Water Sustainability Regulation* addresses the requirements to allocate both ground and surface water and identifies the requirements for using water or making changes to a stream.

Change Approvals, issued under Section 11 of the WSA, are written authorization required for complex works with substantial impacts. *Notifications* are typically used for low-risk works that do not include permanent water diversion, can be completed in a short period of time, and have minimal impacts. Submitted Notifications are subject to a 45-day review period. If there is no response from the assigned habitat officer within this time period, the proponent may proceed with the project. Notifications must meet the requirements of the Water Sustainability Regulation and comply with any additional conditions set out by a habitat officer.

Based on communication with the BC Ministry of Forests, Lands, Natural Resource Operations and Rural Development (FLNRORD) and recent experience with similar projects, Tetra Tech anticipates that the two larger culvert replacements along mapped watercourses (KM 568+840 and KM 569+950) will require a *Notification*. It was determined that the remaining ten drainage culvert replacements were not located on ‘streams’ as defined by the WSA (see section 5.5.1 for more detail) and therefore the replacement of these culverts does not trigger the need to secure an approval under the WSA, however Best Management Practices outlined below in Table 6-1 (i.e., erosion and sediment control measures; isolation of the work area etc.) must still be applied during construction. Until the 45 day Notification period has passed without comment from FLNRORD on the two culvert replacements, no Project works (including blasting proximate to these watercourses) should be conducted.

4.1.3 BC Weed Control Act

The BC *Weed Control Act* identifies invasive plant species defined as “noxious weeds” at the regional and provincial level. All of these species are non-native plants that can be problematic for agriculture and/or natural habitats. Private property owners and government agencies are required to control these species that occur on their property or jurisdiction. Contractors must verify that any invasive species that are identified are controlled and not allowed to spread. Information related to the control and management of invasive species can be found on the Invasive Plant Council of BC’s website (<http://www.invasiveplantcouncilbc.ca/>).

Under the *Weed Control Act*, Schedule A of the Weed Control Regulation designates 39 plant species as noxious weeds within all regions of the province (Table 4-1) and a further 28 are classified as noxious within the boundaries of specific regional districts. This Project is located in the Northern Rockies Regional Municipality (NRRM). There are no additional noxious weeds listed for the NRRM.

Table 4-1: Noxious Weeds Regulated in all Regions of Province

Annual Sow Thistle (<i>Sonchus oleraceus</i>)	Bohemian Knotweed (<i>Fallopia bohemica</i>)	Bur Chervil (<i>Anthriscus caucalis</i>)	Canada Thistle (<i>Cirsium arvense</i>)
Common Crupina (<i>Crupina vulgaris</i>)	Common Reed (<i>Phragmites australis</i> subsp. <i>Australis</i>)	Common Toadflax (<i>Linaria vulgaris</i>)	Dalmatian Toadflax (<i>Linaria dalmatica</i>)
Dense Flowered Cordgrass (<i>Spartina densiflora</i>)	Diffuse Knapweed (<i>Centaurea diffusa</i>)	Dodder (<i>Cuscuta</i> spp.)	English Cordgrass (<i>Spartina angelica</i>)
Flowering Rush (<i>Butomus umbellatus</i>)	Garlic Mustard (<i>Alliaria petiolata</i>)	Giant Hogweed (<i>Heracleum mantegazzianum</i>)	Giant Knotweed (<i>Fallopia sachalinensis</i>)
Giant Mannagrass/Reed Sweetgrass (<i>Glyceria maxima</i>)	Gorse (<i>Ulex europaeus</i>)	Himalayan Knotweed (<i>Polygonum polystachyum</i>)	Hound’s-tongue (<i>Cynoglossum officinale</i>)
Japanese Knotweed (<i>Fallopia japonica</i>)	Jointed Goatgrass (<i>Aegilops cylindrica</i>)	Leafy Spurge (<i>Euphorbia esula</i>)	Milk Thistle (<i>Silybum marianum</i>)
North Africa Grass (<i>Ventenata dubia</i>)	Perennial Sow-thistle (<i>Sonchus arvensis</i>)	Purple Loosestrife (<i>Lythrum salicaria</i>)	Purple Nutsedge (<i>Cyperus rotundus</i>)
Rush Skeletonweed (<i>Chondrilla juncea</i>)	Saltmeadow Cordgrass (<i>Spartina patens</i>)	Scentless Chamomile (<i>Matricaria maritima</i>)	Smooth Cordgrass (<i>Spartina alterniflora</i>)
Spotted Knapweed (<i>Centaurea stoebe</i>)	Tansy Ragwort (<i>Senecio jacobaea</i>)	Velvetleaf (<i>Abutilon theophrasti</i>)	Wild Oats (<i>Avena fatua</i>)
Yellow Flag Iris (<i>Iris pseudacorus</i>)	Yellow Nutsedge (<i>Cyperus esculentus</i>)	Yellow Starthistle (<i>Centaurea solstitialis</i>)	

4.1.4 BC Environmental Management Act

The BC *Environmental Management Act* (EMA) was enacted in July 2004 and combined the *Waste Management Act* and EMA. The EMA governs solid waste and manages the introduction of waste into the environment by providing an authorization framework and environmental management tools to protect human health and environmental quality.

Under the *Waste Discharge Regulations* of the EMA, certain industries, trades, businesses and operations require authorization to discharge waste into the environment. However, even if an industry, trade, business or operation does not require an authorization, waste discharge must not cause pollution (EMA, Section 6 (4)).

The *Spill Reporting Regulations* of the EMA establishes a protocol for reporting the unauthorized release of substances into the environment as well as a schedule detailing reportable amounts for certain substances.

The *Hazardous Waste Regulations* of the EMA ensures that the generators, carriers and receivers of hazardous waste handle, store, transport, treat and dispose of hazardous waste in a safe manner. Hazardous wastes must be disposed of properly to ensure human health and environmental protection.

4.1.5 BC Heritage Conservation Act

The BC *Heritage Conservation Act* confers automatic protection upon archaeological and historic heritage sites that meet the definitions within section 13(2) of the *Act*. These include:

- All sites pre-dating AD1846;
- All sites of unknown age or origin which may pre-date AD1846;
- All burial places and rock art sites of historical or archaeological value; and
- All vessels or aircraft wrecked for two or more years.

All areas within the boundaries of a heritage site are protected under the *Act*, including areas without archaeological deposits or other kinds of heritage remains (e.g., land without archaeological deposits between several culturally modified trees at one site, or between several storage pits at one site).

An Archaeological Overview Assessment (AOA) was completed for this Project and is provided in Appendix F. The AOA determined that no archaeological sites had been identified within the Project footprint and that the existing highway right-of-way exhibited low archaeological potential.

A Chance Find Protocol (CFP) has been developed for this Project in the event that cultural artifacts or anthropogenic deposits (e.g., remains of hearths, dwellings, storage pits) are uncovered during construction. It is the responsibility of the Contractor to follow the CFP should this occur. The CFP has been included as Appendix 2 of the appended Environmental Management Plan (EMP).

There is always a limited possibility for unknown archaeological sites to exist. Archaeological sites (both recorded and unrecorded) are protected under the *Heritage Conservation Act* and must not be altered or damaged without a site alteration permit from the Archaeology Branch. If an archaeological site is encountered during Project works, activities must be halted, the CFP enacted, and the BC Archaeology Branch contacted at **250-953-3334** for direction.

4.2 Federal

4.2.1 Fisheries Act

The *Fisheries Act* is the main federal legislation providing protection for all fish, fish habitat, and water quality. The *Act* is administered federally by Fisheries and Oceans Canada (DFO) and Environment Canada. The new Federal *Fisheries Act* came into force on August 28, 2019. It includes amendments to restore lost protections and incorporate modern safeguards. This *Act* provides protection against the ‘death of fish, other than by fishing’ and the ‘harmful alteration, disruption or destruction of fish habitat’ (HADD), unless authorized by DFO.

Fish habitat is defined as spawning grounds and nursery, rearing, food supply, and migration areas on which fish depend directly or indirectly in order to carry out their life processes. This definition indicates that a watercourse (which includes but is not limited to streams, ditches, ponds and wetlands), which provides water, food or nutrients

to a fish-bearing stream, is considered fish habitat even if it does not contain fish and/or if it only has temporary or seasonal flows. The definition also indicates that not only the watercourse itself but also the vegetated stream side or riparian areas which provide nutrients and shade to the stream are considered fish habitat.

Fisheries and Oceans Canada encourages all project proponents to avoid and mitigate the impacts of projects to fish. A self-assessment process to be carried out by a Qualified Environmental Professional (QEP) includes the documentation of measures and best practices to avoid or minimize impacts to fish and fish habitat. If impacts can be avoided or mitigated the project does not require further review from DFO. If impacts cannot be mitigated, a Request for Review must be submitted to the Fisheries Protection Program office and DFO will work with the proponent to find additional ways to reduce those impacts. If the project cannot be designed to avoid a HADD, a *Fisheries Act* authorization is required.

Based on Tetra Tech's understanding of the Project and based on our assessment of the proposed activities, it is unlikely that the Project will cause serious harm to fish if, at a minimum, standard best management practices and mitigation as presented in Table 6-1 are implemented. The two larger culvert replacements at KM 568+840 and KM 569+950) will be treated as if they are fish-bearing and will undergo isolation of the work area and concurrent fish salvages if there is water present within the channel. As such, a Request for Review to DFO will not be required for this Project.

4.2.2 Species at Risk Act

The *Species at Risk Act* (SARA) prohibits the killing, harming, harassing, capturing or taking of species at risk, or destruction of their critical habitats. Species are designated 'at risk' by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), an independent body of experts that assesses species according to a broad range of scientific data. The federal Cabinet then decides whether those species should receive legal protection under the *Act*.

The SARA protects listed mammals, reptiles, amphibians, molluscs, lepidopterans, and plants on federally managed areas, migratory songbirds (as listed under the *Migratory Birds Convention Act* [MBCA]) and fish in all areas in Canada. Species that are legally protected under SARA are those listed as Endangered or Threatened and are listed in Schedule 1 of the *Act*. Those species listed as Special Concern and all species listed in Schedule 3, regardless of their status, are not legally protected by SARA.

A permit is required when works either affect a migratory bird or aquatic species or its residence, that is listed as 'Endangered' or 'Threatened' or 'Extirpated' on Schedule 1 of SARA; or affect any Schedule 1 'Endangered' or 'Threatened' or 'Extirpated' species or its residence on federal land.

Several occurrences of SAR have been identified within 5 km of one or more of the Project sites or have the potential to be found in the area (see Section 5.6 and Appendix B). Should a SARA-listed species or any other rare species be identified on site prior to or during works, the Canadian Wildlife Service and the BC MOE should be notified immediately for direction on appropriate action as measures employed would vary greatly with the species encountered, its sensitivity to the Project and its proximity to the works.

4.2.3 Migratory Birds Convention Act

The *Migratory Birds Convention Act* (MBCA) restricts the disturbance or destruction of migratory birds and their nests, eggs, and shelters, except in accordance with a permit. It prohibits the taking or killing of migratory bird nests and eggs, and the deposition of harmful substances in areas frequented by migratory birds. Vegetation removal that will affect trees used by all birds and other wildlife should be avoided while they are breeding, nesting, roosting or rearing young. According to Environment Canada, the breeding bird nesting period for the Boreal Taiga Plains Region (which is where the Project area is located) is generally late April to mid-August.

4.2.4 Impact Assessment Act

In 2019 the *Impact Assessment Act* (IAA) was enacted, replacing the *Canadian Environmental Assessment Act* (CEAA). The new IAA takes a broader approach to assessing the environmental, social and health effects of a proposed project and aims to enhance sustainability while avoiding or minimizing harmful effects.

Under the IAA, an impact assessment may be required for designated projects. A designated project includes one or more physical activities that are listed in the *Physical Activities Regulations* (commonly known as the Project List), as well as any physical activity incidental to those listed physical activities.

The Government of Canada continues to refine and update guidance documents to reflect the requirements of the new IAA. However, **the Project is not subject to an environmental assessment under the IAA or under the previous CEAA 2012.** However, this EOA generally conforms to the format of assessments conducted under Section 67 of CEAA 2012 for non-designated projects and utilizes the methods and definitions provided in the IAA and associated practitioner documents. This EOA was limited to the assessment of the natural environment and does not include components such as health, heritage, economic, aesthetics or other social factors.

5.0 EXISTING ENVIRONMENT

The existing environment at each culvert location was characterized through a desktop study and field assessment. Photos from the field assessment are provided at the end of this document.

5.1 Air Quality and Noise

Air quality is typically determined by the concentrations of pollutants in the atmosphere, which are, in turn, affected by the dispersion of pollutants from emission sources. The Air Quality Health Index (AQHI) is an initiative of Environment Canada, Health Canada, the BC MOE, the BC Ministry of Healthy Living and Sport, the BC Ministry of Health Services and the BC Lung Association that identifies the level of health risk associated with local air quality. The nearest AQHI monitoring station is in Fort St. John where mean annual AQHI ratings rank towards the “low risk” end of the spectrum, however, sporadic, short-lived increases may occur.

The Project area is open to the outdoors and vehicles are the primary source of air emissions in the immediate vicinity. During summer months, forest fires are another primary contributor to air emissions in the region. Other potential emission sources at or near the Project area may include off-road traffic (e.g., ATVs), aviation (e.g., fixed wing and rotary-wing aircraft); and commercial or industrial sources. Intermittent sources such as fugitive dust from soil disturbances, paving or other construction activities may also contribute emissions. The Alaska Highway is a traffic corridor and is the primary source of noise in the Project area.

5.2 Soils

Soils in northern British Columbia are variable and differ across the region. It should be noted that soils in road rights-of-ways are typically disturbed and often contain imported gravels. The following soil classification is derived from Luttmending’s (1995) “Soil Landscapes of Canada” map and the Soil Landscapes of Canada web map (Gov. of Canada 2017).

The Project location is located in the Muskwa Plateau ecoregion, which is part of the larger Taiga Plains ecozone. The dominant soil development type is Eutric Brunisolic soils (70%) developed on sand-textured parent material. The mode of deposition is alluvial and the main surface form is terraced with slopes of 4-9%. These mineral soils are well to moderately well drained.

5.3 Vegetation

The Biogeoclimatic Ecosystem Classification (BEC) is a land classification system that groups similar ecosystems based on climate, soils and vegetation. This classification system was developed in British Columbia and is widely used as a framework for resource management as well as for scientific research. Vegetation of mature ecosystems is emphasized in BEC as it is considered the best indicator of the combined influence of the environmental factors affecting a site.

The project is located within the moist cool unit of the Boreal White and Black Spruce (BWBS) zone. The BWBS zone covers approximately 16 million hectares of British Columbia and is part of the circumpolar boreal zone. Two main ecosystem types make up the BWBS, upland forests (common to the Alberta Plateau (east) and mountainous regions of the west), and extensive poorly drained muskeg of the northeastern lowlands (DeLong et al. 2011). Upland forests are dominated by trembling aspen (*Populus tremuloides*) and white spruce (*Picea glauca*). Poorly drained wetland areas consist of forests dominated by black spruce (*Picea mariana*) and tamarack (*Larix laricina*) and unforested areas with scrub birch (*Betula nana* ssp. *Exilis*) and sedges (*Carex* spp.) Other common species include balsam poplar (*Populus balsamifera*) and paper birch (*Betula papyrifera*) at moist and/or riverine locations and lodgepole pine (*Pinus contorta* var. *latifolia*) in drier areas (DeLong et al. 2011).

All construction work will be taking place within the highway right-of-way (ROW). The vegetation communities adjacent to the ROW were consistent with the BWBS zone. Vegetation observed within the ROW, which is frequently mowed for highway maintenance, were consistent across all culvert locations and were dominated by agronomic grasses, invasive species and perennial herbs. Vegetation observed during the 2020 field assessment is listed in Table 5-1.

Table 5-1: Vegetation Observed During Field Assessment

Common Name	Scientific Name	Common Name	Scientific Name
Trees			
paper birch	<i>Betula papyrifera</i>	white spruce	<i>Picea glauca</i>
black spruce	<i>Picea mariana</i>		
Shrubs			
green alder	<i>Alnus crispa</i>	low birch	<i>Betula pumila</i>
prickly rose	<i>Rosa acicularis</i> ssp. <i>sayi</i>	willow sp.	<i>Salix</i> sp.
red osier dogwood	<i>Cornus stolonifera</i>	kinnikinnick	<i>Arctostaphylos uva-ursi</i>
red raspberry	<i>Rubus idaeus</i>	Labrador-tea	<i>Rhododendron groenlandicum</i>
Herbs			
fireweed	<i>Chamaenerion angustifolium</i>	larkspur sp.	<i>Delphinium</i> sp.
common horsetail	<i>Equisetum arvense</i>	Northern bedstraw	<i>Galium boreale</i>
yellow avens	<i>Geum aleppicum</i>	cow-parsnip	<i>Heracleum lanatum</i>
creamy peavine	<i>Lathyrus ochroleucus</i>	pineapple weed	<i>Matricaria discoidea</i>
alfalfa	<i>Medicago sativa</i>	yellow sweet-clover	<i>Melilotus officinalis</i>
tall bluebells	<i>Mertensia paniculata</i> var. <i>paniculata</i>	sweet coltsfoot	<i>Petasites frigidus</i> var. <i>palmatus</i>
common plantain	<i>Plantago major</i>	common dandelion	<i>Taraxacum officinale</i>
few-flowered meadowrue	<i>Thalictrum sparsiflorum</i>	alsike clover	<i>Trifolium hybridum</i>
red clover	<i>Trifolium pratense</i>	American vetch	<i>Vicia americana</i>
Graminoids			
agronomic grass	-	foxtail barley	<i>Hordeum jubatum</i>
common timothy	<i>Phleum pratense</i> ssp. <i>pratense</i>		

5.3.1 Ecological Communities at Risk Identified within 5 km of the Project.

White spruce / Red swamp currant / Horsetails (*Picea glauca* / *Ribes triste* / *Equisetum*)

This ecological community is blue-listed by the BC CDC and the desktop study identified a documented occurrence (Occurrence ID: 12652) approximately 1.7 km east of the project area overlapping the highway corridor (Figure 2). This wet, coniferous-dominated ecosystem is often found on lower to toe slopes or on level ground and along smaller watercourses. Within the BWBSmw, this ecosystem can also sometimes be found on steep cool aspects. Soils are often derived from fluvial and lacustrine parent materials (BC CDC 2010).

5.4 Wildlife

Common wildlife found within the BWBS biogeoclimatic zone, and potentially at the Project location, include American Black Bear (*Ursus americana*), Grey Wolf, Coyote (*Canis latrans*), Canada Lynx (*Lynx canadensis*), Northwestern Moose, Rocky Mountain Elk, Woodland Caribou, and American Beaver. Very few reptiles and amphibians are found in the BWBS zone due to the northern latitude. Terrestrial Garter Snake (*Thamnophis elegans*) and Common Garter Snake (*Thamnophis sirtalis*) are found only in warmer valleys, and amphibians such as Wood Frog, and Western Toad are commonly found in wetlands and moist upland habitats. The forested areas provide habitat for numerous songbird species including the Black-throated Green Warbler (*Setophaga virens*), White-throated Sparrow (*Zonotrichia albicollis*), and Rose-breasted Grosbeak (*Pheucticus ludovicianus*). Nearby wetlands are important habitats for Sora (*Porzana carolina*), Red-winged Blackbird (*Agelaius phoeniceus*) and a number of waterfowl species. Raptors found in the area include the Broad-winged Hawk (*Buteo platypterus*), Northern Goshawk (*Accipiter gentilis*), and Great Horned Owl (*Bubo virginianus*) (DeLong et al. 1991).

During the June 2020 field assessment, no wildlife was observed in the Project area. Incidental observations along the highway *en route* to the Project area included: Black Bear, Moose, Common Crow (*Corvus brachyrhynchos*), Mountain Goat (*Oreamnos americanus*) and Coyote.

5.5 Fish and Aquatic Habitat

Existing fish and fish habitat conditions at the Project location were evaluated using available information from government databases.

5.5.1 Watercourse Information

Eleven culverts are going to be replaced as part of the highway realignment works. Ten of these culverts are drainage culverts and the two larger culverts are located on mapped watercourses (Table 5-2).

Table 5-2: Watercourse Information Summary for the 11 Culvert Locations.

Culvert ID	Stream Name/ Watershed Code 50K	Stream Info	Documented Fish Presence ¹
KM 567 + 240	Not mapped in Provincial Databases	Drainage culverts that convey seepage from the north side of the highway and road run-off during rainy periods. No defined channels present downstream and infiltrate to ground. Does not meet the definition of a 'stream' under WSA.	No Information Available
KM 567 + 515			
KM 567 + 695			
KM 567 + 820			
KM 568 + 080			
KM 568 + 630			
KM 568 + 840	Unnamed Watercourse No 50K Watershed Code FWA ² Watershed Code: 200-692231-350733- 577347-304228-412951	2 nd order watercourse that drains the slopes to the north of the highway into the Tetsa River. The culvert is located approximately 460 m upstream of the confluence with the Tetsa River. After crossing under the Alaska Highway, this watercourse flows through the small developed area at Milepost 375.	No fish have been documented in the culverted watercourse. 6 fish species have been documented downstream in the Tetsa River (Table 5-3).
KM 569 + 090	Not mapped in Provincial Databases	Drainage culverts that convey seepage from the steep slopes immediately adjacent to the north side of the highway and road run-off during rainy periods. Linearized manmade channels downstream of the culverts convey water away from the road before infiltrating to ground. Does not meet the definition of a 'stream' under WSA.	No Information Available
KM 569 + 380			
KM 569 + 565			
KM 569 + 950	Unnamed Watercourse 50K Watershed Code: 212-580800-30200- 43500	2 nd order watercourse that drains the slopes to the north of the highway into the Tetsa River. The culvert is located approximately 950 m upstream of the confluence with the Tetsa River.	No fish have been documented in the culverted watercourse. 6 fish species have been documented downstream in the Tetsa River (Table 5-3).
KM 570 + 100	Not mapped in Provincial Databases	Drainage culverts that convey seepage from the north side of the highway and road run-off during rainy periods. No defined channels present downstream and infiltrate to ground. Does not meet the definition of a 'stream' under WSA.	No Information Available

¹As documented in government databases; ²FWA – Fresh Water Atlas

Two of the culvert replacements will be larger diameter culverts (>1500 mm) and are located on mapped watercourses.

The KM 568 + 840 culvert is located on a 2nd order watercourse that flows north to south across the Alaska Highway (Photos 1 – 4). The watercourse has a riffle-pool morphology downstream of the culvert, and a cascade-pool morphology on the upstream side of the culvert. The substrates were dominated by gravels and fines with a lesser component of cobbles and boulders. The watercourse had defined banks and flows in a sinuous pattern. At the time of assessment, the water was lightly turbid, the wetted width was 2 m to 3 m, the wetted depth was 0.3 m, the bankful width was 7 to 10 m, and the bankful depth was 2.5 m. Downstream of the culvert, instream cover was provided by undercut banks, boulders, overhead vegetation and deeper pools. Upstream of the culvert, this instream cover was restricted to the inlet pool. There was a 0.25 m perch at the culvert outlet, which may impede movement of fish upstream. Riparian vegetation both upstream and downstream of the culvert was comprised of mature conifer-dominated forest with an understory of shrubs and herbaceous vegetation.

The KM 569 + 950 culvert is located on a 2nd order watercourse that flows north to south across the Alaska Highway (Photos 5 – 8). This watercourse has a riffle-pool morphology, flows in a sinuous pattern and has defined banks. The substrates were comprised of 50% fines, 40% gravels and 10% cobbles. At the time of the assessment, the water was turbid, the wetted width varied from 1 m to 2 m, the wetted depth was 0.4 m, the bankful width was 7 m and the bankful depth was 1 m. There was a pool at the culvert outlet that was approximately 5 m² and 1 m deep. Abundant overhead vegetation, large woody debris, deep pools and slight undercut banks provide instream cover. The riparian vegetation was typical for the area with abundant hellebore, stinging nettle, black spruce and balsam poplar.

The ten drainage culvert replacements along the alignment were not located on mapped watercourses. It was determined that all ten of these culverts simply convey seepage from the slopes immediately adjacent to the north side of the highway and/or road run-off during periods of rain to the southern side of the road. Many of the drainage culverts have no defined channel downstream of the culvert outlet, and if there is a channel present downstream it is a brief, linearized, man-made channel that was created during the highway construction to convey water away from the highway before dissipating to the ground. As such, these ten culverts do not meet the definition of a ‘stream’ under the WSA and do not require any submittals under the WSA.

Photos of the two larger culvert replacements are located at the end of this document. Photos of the drainage culverts are located on Figure 3.

5.5.2 Fish Presence

Provincial mapping databases did not have records of fish observations in the watercourses identified at the culvert locations; however, all of these watercourses flow towards the Tetsa River which is a known fish-bearing stream. No obstacles to fish passage are recorded between known fish-bearing watercourses and the culvert locations in the mapping databases; therefore, it is possible that fish species found in the larger watercourses could be present in the crossing locations. Downstream observations of fish species are provided in Table 5-3. Figure 2 shows the location of each culvert along with the surrounding watercourse network and documented fish occurrences within 5 km of the culvert locations.

Table 5-3: Fish Species Documented Downstream of the Culvert Locations in the Tetsa River

Common Name	Scientific Name
Arctic Grayling	<i>Thymallus arcticus</i>
Bull Trout	<i>Salvelinus confluentus</i>
Lake Chub	<i>Couesius plumbeus</i>
Longnose Sucker	<i>Catostomus catostomus</i>
Mountain Whitefish	<i>Prosopium williamsoni</i>
Slimy Sculpin	<i>Cottus cognatus</i>

5.5.2.1 Fish Habitat Requirements of Bull Trout (*Salvelinus confluentus*)

One fish SAR, Bull Trout, was identified downstream of the culvert locations in the Tetsa River. Bull Trout is designated as Special Concern by COSEWIC and provincially blue-listed.

Bull Trout are generally found within cool inland rivers. Life histories are complex and at least four patterns exist: fluvial (spends life within flowing water but will migrate within large rivers), ad fluvial (migrates between rivers and lakes), stream-resident (spends all of life within small rivers, often isolated by barriers), and anadromous (migrates between fresh and marine systems, but only occurs on the south coast of British Columbia)(McPhail, 2007). Spawning occurs in the fall and typically involves migration beginning in August and egg-laying when temperatures

drop below 10°C (McPhail 2007). Nest building occurs in water 30 cm to 40 cm deep with a velocity of 0.20 m/s to 0.60 m/s, while substrates used depend on the size of the female but, generally consists of gravels or larger material (McPhail 2007). As development rates correspond to water temperature, it is expected that Bull Trout in northeast British Columbia would hatch following an extended period of incubation and would be expected sometime in early summer. Adult Bull Trout often occur in the tail-outs of pools and in association with overhead cover (McPhail 2007). However, in large, turbid, northern mainstems of British Columbia, such as the Tetsa River, fluvial adults are more widely dispersed than in other areas and not as strongly associated with specific habitats as in the south (McPhail and Baxter 1996). Juveniles are strongly associated with deep pools and side channels (McPhail 2007). Fry, in particular, are almost always found close to the substrate. In general, Bull Trout are very sensitive to stream perturbations, particularly sedimentation of substrate and increases in water temperature (McPhail and Baxter 1996).

To minimize the potential that these culvert replacement works harm Bull Trout or their redds, the Contractor should have an aquatic biologist evaluate the two mapped watercourses (i.e., KM 568.84 and KM 569.95) before any instream work occurs to identify potential spawning beds (i.e., redds). If no redds are detected, work can proceed as planned. Alternatively, if redds are identified, the work schedule will have to be delayed/alterd until the juvenile Bull Trout have emerged from their redds and can be safely salvaged from the area, or until the next Reduced Risk Timing Window (July 15 – August 15). Redd surveys should follow the methods outlined in section 2.3.2 of Decker et al. (2005). The other ten culvert sites are simply conveying seepage or road run-off and do not provide direct connectivity to the Tetsa River.

5.6 Species at Risk

Although species provincially ranked as Red or Blue are considered to be a conservation priority, there is no legislation providing formal protection, with the exception of those wildlife species specifically listed under the BC *Wildlife Act* or listed under Schedule 1 of the federal SARA.

For the purposes of this EOA, Species at Risk were considered any wildlife or vegetation element that met one or more of the following criteria:

- Present on the Red or Blue List in the provincial Species Ranking system (BC CDC 2020a);
- Assessed as Special Concern, Threatened, or Endangered by the Committee on the Status of Endangered Species in Canada (COSEWIC; Government of Canada 2020); or
- Listed as Special Concern, Threatened, or Endangered in Schedule 1 of SARA.

Database search results are included as Appendix B and summarized below:

- BC CDC Internet Mapping tool (BC CDC 2020b):
 - Area search for known SAR occurrences within a 5 km radius of the each of the Project location. Both non-sensitive and masked-sensitive occurrences were queried. Non-sensitive occurrences are observations whose exact locations are provided in the mapping service. Masked-sensitive occurrences are observations whose exact location is not provided in the mapping service, rather, a general area is provided. To obtain the exact location of an occurrence, a regional biologist at the BC MOE must be contacted.
 - Two non-sensitive SAR were mapped within 5 km of the Project area. These SAR and their habitat requirements are described below in Section 5.6.1.
 - No masked-sensitive species occurrences were noted to occur within 5 km of the Project area.

- BC CDC Species and Ecosystems Explorer (BC CDC 2020a):
 - The search for SAR was conducted using the following search criteria: Ecosections: Muskwa Foothills and Muskwa Upland; Habitat Types: Agriculture, Anthropogenic, Forest, Grassland/Shrub, Riparian, Stream/River and Wetland. The search was restricted to species listed on the BC List as Red or Blue and species designated as endangered, threatened or special concern on Schedule 1 of the SARA.
 - Based on the above search criteria, a total of 24 vascular plant species and 86 wildlife species were identified as having the potential to occur at the Project location (Appendix B). These search results were then manually filtered for species found within the BWBS biogeoclimatic unit.
 - While a variety of species have the potential to occur within the region, the Project area itself does not necessarily support all the SAR identified during the desktop search. Based on distribution, known occurrences and habitat requirements, 24 SAR were identified with **moderate or high potential to occur** at one or more of the Project sites. Species identified in the searches above *and* whose range and general habitat requirements are included at one or more Project sites are listed in Table 5-4. Species with low potential of being found at Project sites are not presented in Table 5-4, but can be found in Appendix B.

Table 5-4: Species at Risk with Moderate to High Potential to Occur on Site

Scientific Name	English Name	COSEWIC	SARA	BC List	Habitat Requirements ¹	Likelihood Near Project ¹
Reptiles and Amphibians						
<i>Anaxyrus boreas</i>	Western Toad	Special Concern	Special Concern	Yellow	<ul style="list-style-type: none"> Can be found in a variety of aquatic habitats including lakes, wetlands, and roadside ditches. Also found in wet terrestrial areas including a variety of forest types, shrubland, and riparian areas, grasslands, and fallow fields. 	<p>High</p> <p>Suitable habitat at or near the Project location. Documented occurrences along the Alaska Highway north of Fort Nelson.</p>
Birds						
<i>Asio flammeus</i>	Short-eared Owl	Special Concern	Special Concern	Blue	<ul style="list-style-type: none"> Found in open areas with low vegetation and include grassy plains, old fields, river valleys and marshes. 	<p>Moderate</p> <p>Suitable habitat at or near the Project site. There are documented occurrences along the Alaska Highway between Fort Nelson and Toad River.</p>
<i>Buteo platypterus</i>	Broad-winged Hawk	-	-	Blue	<ul style="list-style-type: none"> Breed in dense, broadleaf or mixed-wood forests. Perches under or in tree canopy, forages at openings, edges, and wet areas. Generally, arrives in northern breeding areas mid-April through early May, departs by September-October. 	<p>Moderate</p> <p>Suitable habitat at or near one or more Project sites. Project is within the known breeding range of this species. Documented occurrences near Fort Nelson.</p>
<i>Cardellina canadensis</i>	Canada Warbler	Threatened	Threatened	Blue	<ul style="list-style-type: none"> Found in wet, unstable slopes in deciduous and mixed-wood forests with a good shrub layer and abundant woody debris. Nests are on or near the ground. 	<p>Moderate</p> <p>Suitable habitat present at or near the Project location. Numerous documented occurrences near Fort Nelson, and west along the Alaska Highway.</p>
<i>Chordeiles minor</i>	Common Nighthawk	Special Concern	Threatened	Yellow	<ul style="list-style-type: none"> Associated with open areas with gravel/rock substrates such as old revegetated gravel bars, logged forest areas, clearings, and open forests. 	<p>Moderate</p> <p>Suitable habitat at or near the Project location. Known occurrences along the Alaska highway between Fort Nelson and Toad River.</p>

Scientific Name	English Name	COSEWIC	SARA	BC List	Habitat Requirements ¹	Likelihood Near Project ¹
<i>Coccothraustes vespertinus</i>	Evening Grosbeak	Special Concern	Special Concern	Yellow	<ul style="list-style-type: none"> Spruce and fir coniferous forests, mixed coniferous forests, or deciduous woodland, second growth. During migration found in parks and around human habitation. 	<p>Moderate</p> <p>Suitable habitat at or near the Project location. Numerous documented occurrences around Fort Nelson, and one by the Liard River.</p>
<i>Contopus cooperi</i>	Olive-sided Flycatcher	Special Concern	Threatened	Blue	<ul style="list-style-type: none"> Associated with open areas (forest openings/edges, bogs, swamps, burned or logged areas etc.) with tall trees or snags for perching. 	<p>Moderate</p> <p>Suitable habitat at or near the Project location. Species recorded throughout most forested areas of BC.</p>
<i>Euphagus carolinus</i>	Rusty Blackbird	Special Concern	Special Concern	Blue	<ul style="list-style-type: none"> Breeding habitat includes moist woodland (primarily coniferous), bushy bogs and fens, and wooded edges of water courses and beaver ponds. Nests are in trees or shrubs, usually in or near water, frequently in a conifer to about 6 m above ground 	<p>Moderate</p> <p>Suitable habitat at or near the Project location. Documented occurrences between Fort Nelson and Toad River along the Alaska Highway.</p>
<i>Hirundo rustica</i>	Barn Swallow	Threatened	Threatened	Blue	<ul style="list-style-type: none"> Breeding resident over most of BC. Prefers open habitats near water. Nests in caves, cliffs and often utilizes human-made structures such as buildings, bridges and even culverts. 	<p>Low – Moderate</p> <p>Suitable habitat at or near the Project site and have been known to utilize culverts for nesting. Numerous documented occurrences between Fort Nelson and Toad River along the Alaska Highway.</p>
<i>Setophaga castanea</i>	Bay-breasted Warbler	-	-	Red	<ul style="list-style-type: none"> Breeding resident of northeastern BC that utilizes boreal coniferous forest and occasionally adjoining second growth or deciduous scrub. 	<p>Moderate</p> <p>Suitable habitat at the Project location. Documented occurrences in northeastern BC, around Fort Nelson.</p>
<i>Setophaga tigrina</i>	Cape May Warbler	-	-	Blue	<ul style="list-style-type: none"> Breed in mature (>50 yr) stands of spruce or fir. 	<p>Moderate</p> <p>Suitable habitat at or near the Project location. Documented occurrences in northeastern BC, between Fort Nelson and Toad River.</p>

Scientific Name	English Name	COSEWIC	SARA	BC List	Habitat Requirements ¹	Likelihood Near Project ¹
<i>Setophaga virens</i>	Black-throated Green Warbler	-	-	Blue	<ul style="list-style-type: none"> Breed in coniferous, mixed or deciduous forests in northern British Columbia. 	<p>Moderate</p> <p>Suitable habitat at or near the Project location. Documented occurrences in northeastern BC, particularly around Fort. St. John, but also north of Fort Nelson.</p>
Mammals						
<i>Gulo gulo luscus</i>	Wolverine, <i>luscus</i> subspecies	Special Concern	Special Concern	Blue	<ul style="list-style-type: none"> Occur in remote wilderness habitats, particularly the boreal forests and arctic tundra of the north, but it also occurs in montane forests and alpine tundra in the southern portions of its range. 	<p>Moderate</p> <p>Suitable habitat near to the Project location but this species would likely avoid spending much time near the highway. Known occurrences between Fort Nelson and Fort St. John.</p>
<i>Myotis lucifugus</i>	Little Brown Myotis	Endangered	Endangered	Yellow	<ul style="list-style-type: none"> Found in a variety of forests, including boreal and mixed-wood forests. Roost in trees or man-made structures. Hibernacula found in caves and mines. 	<p>Moderate</p> <p>Suitable roosting and hunting habitat at or near the Project location; however, construction would not be taking place during times this species is most active (i.e., 2-3 hours after sunset). Documented occurrences around Fort Nelson.</p>
<i>Myotis septentrionalis</i>	Northern Myotis	Endangered	Endangered	Blue	<ul style="list-style-type: none"> Found in boreal forests with lakes, ponds, and wetlands. Often associated with old-growth forest. Roost in trees or man-made structures. Hibernacula found in caves and mines. 	<p>Moderate</p> <p>Suitable roosting and hunting habitat at or near the Project location; however, construction would not be taking place during times this species is most active (i.e., 2-3 hours after sunset). Documented occurrences along the Alaska Highway between Fort Nelson and Toad River.</p>

Scientific Name	English Name	COSEWIC	SARA	BC List	Habitat Requirements ¹	Likelihood Near Project ¹
<i>Rangifer tarandus</i> pop. 15	Caribou (Northern Mountain Population)	Special Concern	Special Concern	Blue	<ul style="list-style-type: none"> This population generally migrates twice each year, descending to low elevations in fall or early winter and spend spring/summer in alpine areas. During the winter months they utilize low-elevation pine-lichen stands or high-elevation alpine habitats, where they rely primarily on terrestrial lichens for forage. During calving season, female northern mountain caribou will migrate long distances to subalpine ridges. 	<p>High</p> <p>Suitable habitat at or near the Project location. The Project is located within provincially mapped caribou range (Muskwa Herd) and this population may be found along the Alaska Highway in winter.</p>
<i>Ursus arctos</i>	Grizzly Bear	Special Concern	Special Concern	Blue	<ul style="list-style-type: none"> Found mostly in the alpine tundra, subalpine mountain forests and boreal forests. Common only where food is abundant and concentrated (e.g., caribou calving grounds). 	<p>High</p> <p>Suitable habitat at or near the Project location. Project is within the known range and there are numerous occurrences along the Alaska Highway. Commonly seen along the highway during the spring and summer months.</p>
Invertebrates						
<i>Carterocephalus palaemon mandan</i>	Arctic Skipper, <i>mandan</i> subspecies	-	-	Red	<ul style="list-style-type: none"> In BC, primarily a boreal species. Found in swampy areas, damp grassy habitats, streams and along roadsides in northern forests. 	<p>Low - Moderate</p> <p>Suitable habitat present at the Project location. Documented occurrences of Arctic Skipper throughout northeastern BC, but the <i>mandan</i> subspecies has only been documented near Fort St. John.</p>
<i>Cercyonis pegala nephele</i>	Common Wood-nymph, <i>nephele</i> subspecies	-	-	Blue	<ul style="list-style-type: none"> Found in open woodlands and grassy areas including along roads and streams. 	<p>Low – Moderate</p> <p>Suitable habitat present at the Project location. Known occurrences are restricted to along the Peace River.</p>
<i>Lycaena hyllus</i>	Bronze Copper	-	-	Blue	<ul style="list-style-type: none"> Marshes, sedge meadows, moist to wet grassy meadows, ditches, fens, streamsides, wetlands, or roads and right of ways through marshlands 	<p>Moderate</p> <p>Suitable habitat at or near the Project location. One documented occurrence just north of Fort Nelson.</p>

Scientific Name	English Name	COSEWIC	SARA	BC List	Habitat Requirements ¹	Likelihood Near Project ¹
<i>Planorbula armigera</i>	Thicklip Rams-horn	-	-	Red	<ul style="list-style-type: none"> Occurs in the Fort Nelson Forest District in white or black spruce forests. Lives in flowing, but sluggish streams among the vegetation and in mud. 	<p>Moderate</p> <p>Suitable habitat at or near the Project location. No occurrence data available.</p>
Plants						
<i>Oxytropis campestris</i> var. <i>davisii</i>	Davis' locoweed	-	-	Blue	<ul style="list-style-type: none"> Dry to mesic sandy, gravelly or rocky sites, including river bars, terraces, rock outcrops, grassy slopes, meadows, clearings, roadsides, alpine tundra and heath, and open forests in the steppe, montane, subalpine and alpine zones. 	<p>Moderate</p> <p>Frequently found in far northern BC. Suitable habitat at or near the Project location. Documented occurrences between Fort Nelson and Toad River near the Alaska Highway.</p>
<i>Salix raupii</i>	Raup's willow	-	-	Red	<ul style="list-style-type: none"> Found in moist, open white spruce / trembling aspen woods and in trembling aspen / balsam poplar woods, Also found on gravel floodplains and terraces of creeks. 	<p>Moderate</p> <p>Suitable habitat at or near the Project location. Documented occurrences near Toad River.</p>
<i>Tephroses palustris</i>	marsh fleabane	-	-	Blue	<ul style="list-style-type: none"> Grows in the riparian areas along streams, ponds, and marshes in montane areas. Thought to be well adapted to heavily disturbed habitats. 	<p>Moderate</p> <p>Suitable habitat at or near one the Project location. No documented occurrences nearby project sites.</p>

¹ Habitat information and documented occurrence data gathered from the following sources: E-Fauna BC (Klinkenberg 2020a) and E-Flora BC (Klinkenberg 2020b), and BC Species and Ecosystem Explorer (BC CDC 2020a)

Should a SARA-listed species or any other rare species be identified on site prior to, or during works, the Canadian Wildlife Service and the BC MOE should be notified immediately for direction on appropriate action as measures employed would vary greatly with the species encountered, its sensitivity to the Project, and its proximity to the works.

5.6.1 Habitat Requirements of SAR with Mapped Occurrences within 5 kms of the Project Sites

5.6.1.1 Woodland Caribou

The Project is located within the provincially mapped range of the Woodland Caribou, more specifically, within the range of the Muskwa Herd which is part of the Northern Mountain Ecotype (*Rangifer tarandus* pop. 15; Figure 2). As such, there is potential for caribou to be present within the Project area. Caribou likely occur infrequently along the highway, especially in winter when lower elevation habitats are used more for foraging (COSEWIC 2014).

The populations and critical habitats of Woodland Caribou are protected under federal legislation. Northern Mountain Caribou are provincially blue-listed and designated as 'Special Concern' under the Federal SARA. Northern mountain caribou spend the winter months in low-elevation pine-lichen stands or high-elevation alpine habitats, where they rely primarily on terrestrial lichens for forage. During calving season, female northern mountain caribou will migrate long distances to subalpine ridges, where they give birth to their calves at high elevation to avoid the threat of predation (FLNRORD 2014).

Caribou are most sensitive to disturbance during late winter (pre-calving season), due to the poor body condition of pregnant females, and the calving season in the spring. FLNRORD has identified this time period (January 15 to July 15) as a critical timing window for caribou and the fall rut (September 15 to January 14) has been identified as a cautionary timing window (FLNRORD 2014).

A more in-depth review of Woodland Caribou in British Columbia along with Best Management Practices (BMPs) specific to working within caribou habitat and a figure showing mapped caribou range within the Project area are provided in the appended Caribou Protection Plan (Appendix C).

5.6.1.2 Cape May Warbler

One occurrence of the provincially blue-listed Cape May Warbler (*Setophaga tigrina*) was identified during the desktop search within 5 km of the Project location (Figure 2). This warbler overwinters in mature tropical forest habitats between the Bahamas and Puerto Rico, migrating north to breed in coniferous forests (>50 years old) located between northeastern BC and Nova Scotia. They construct their nests in the uppermost branches of conifers (usually spruce) and lay a clutch of 6-7 eggs in June. This warbler is mostly insectivorous and will forage high in trees within its breeding range (BC CDC 1990). Impacts to this species will be avoided by conducting all tree and vegetation clearing outside of the general nesting period for breeding birds.

6.0 POTENTIAL ENVIRONMENTAL IMPACTS

6.1 Valued Environmental Components

Following the review of existing environmental information, potential Valued Components (VCs) that could be affected were identified for this Project. Valued components are “environmental features that may be affected by a project and that have been identified to be of concern by the proponent, government agencies, Aboriginal peoples or the public. The value of a component not only relates to its role in the ecosystem, but also to the value people place on it” (CEAA 2012). The *Canadian Environmental Assessment Act*, which was repealed on August 28, 2019 and replaced with the *Impact Assessment Act (IAA)*, further defines VCs as a “Fundamental element of the physical, biological or socio-economic environment, including the air, water, soil, terrain, vegetation, wildlife, fish, birds and land use that may be affected by a designated project, and may be assessed in an environmental assessment” (CEAA 2012).

The Government of Canada continues to refine and update guidance documents to reflect the requirements of the new *IAA*. However, **the Project is not subject to an environmental assessment under the IAA or under the previous CEAA 2012**. This EIA generally conforms to the format of assessments conducted under Section 67 of the CEAA 2012 for non-designated projects and utilizes the methods and definitions provided in CEAA 2012 and its associated practitioner documents. This EOA was limited to assessment of the natural environment and does not include components such as health, heritage, economic, aesthetics or other social factors.

The VCs selected for this EOA were based largely on Tetra Tech’s past experience with similar assessments. These VCs demonstrate ecological importance and/or value to the existing environment, the relative sensitivity of components to potential Project influences and their relative social, cultural, or economic importance.

Valued components for which there is potential for Project effects include:

- Air Quality and Noise
- Surface Water Quality
- Fish and Fish Habitat
- Soil
- Terrestrial Flora and Fauna

An Environmental Management Plan (EMP; Appendix D) has been prepared for the Project and includes a summary of Project-specific environmental considerations in Table 2. Table 6-1 below and Section 4.1 of the EMP identify general measures and “industry standards” to protect the identified VCs. Engineering design drawings, complete with environmental staging for site isolation and stream diversion can be found in Appendix E.

The selected contractor(s) will be required to prepare an Environmental Protection Plan (EPP) to protect VCs in accordance with BMPs and mitigation measures specific to their activities. While general mitigation recommendations are presented below, the EPP must provide specific measures to reduce potential Project related effects. The EPP must also be compliant with contract Special Provisions as detailed in the forthcoming Tender Package, the mitigation measures outlined in Table 6-1 below, and the EMP, along with any conditions that may result from regulatory permits and notifications.

Both the EMP and EPP should be treated as living documents. Effective environmental protection requires an adaptive management strategy to accommodate specific site conditions and unforeseen circumstances.

Table 6-1: Potential Effects Assessment and Associated Mitigation Measures Recommended for the Project

Potential Effect	Interaction	Suggested Mitigation	Residual Effect	Comment
Air Quality and Noise				
Decreased ambient air quality.	Mobilizing equipment and people to and from site and use of equipment (generators, vehicles, etc.) during Project will contribute to air emissions.	<ul style="list-style-type: none"> Mobilization should be planned and managed to maximize efficiency. Utilize well-maintained equipment operated at optimum loads. No burning of oils, rubber, tires and any other material should take place. Stationary emission sources (e.g., portable diesel generators, compressors, etc.), equipment and vehicles should be turned off when not in use. Vehicles or equipment producing excessive exhaust pollution should be repaired or replaced prior to being used on the Project. 	Equipment will produce air emissions that contribute to decreased air quality.	<ul style="list-style-type: none"> Air emissions produced by equipment used for the Project are expected to be within the limits of typical construction activities. Increases in air emissions anticipated to be temporary.
	Project activities may result in decreased air quality due to dust/particulates created by soil disturbances, rock blasting, asphalt grinding and removal etc.	<ul style="list-style-type: none"> Dust-generating activities should be minimized as much as possible during windy periods. If dust suppression is necessary, water should be used in a controlled manner (to avoid sediment mobilization). 	Project activities cause temporary increases in airborne particulate matter.	<ul style="list-style-type: none"> Increases in particulate matter are anticipated to be temporary and localized.
Increase ambient noise levels.	Mobilization to and from site, increased human presence, use of equipment and deactivation works contribute to increased noise.	<ul style="list-style-type: none"> All equipment should be properly maintained to limit noise emissions and fitted with functioning exhaust and muffler systems. Machinery covers and equipment panels should be well fitted and remain in place to muffle noise. Bolts and fasteners should be tight to avoid rattling. Equipment should be operated at optimum loads. Engines and equipment should be turned off when not in use or reduced to idle. Personnel operating equipment or working in the vicinity of equipment will wear appropriate Personal Protective Equipment 	Noise levels will be temporarily elevated during Project.	<ul style="list-style-type: none"> Increased noise levels are expected to be temporary and within acceptable limits of typical equipment usage and construction activities. Noise levels are not expected to exceed <i>BC Occupational Health and Safety Regulations</i> for noise exposure levels. Because of the remote location of the Project area, noise exposure is not expected to affect the general population; noise impacts will primarily be limited to Project personnel.
Soils				
Disturbance to ground surface (e.g., compaction and/or erosion).	<p>Project activities include ground disturbance (e.g., roadworks, blasting, excavations, pipe jacking, minor channel realignment).</p> <p>Exposed and loose soils may be subject to erosion.</p> <p>Ground surface may be compacted by equipment, material laydown or other Project activities.</p>	<ul style="list-style-type: none"> Limit equipment movement to existing access routes (e.g., current highway and ROW). Minimize the movement of equipment by planning work and situating in locations to maximize efficiency. Limit access and movement to only necessary personnel and equipment. Equipment and material laydown should be placed on a stable surface. The EPP should contain erosion and sediment control measures specific to each Project site. General erosion and sediment control may include: <ul style="list-style-type: none"> Halting works during periods of heavy precipitation. Use of silt fencing Temporarily stabilizing ground surface with plastic sheeting, straw mulch (from a clean, weed-free source), erosion control matting etc. Restore ground disturbances to pre-existing conditions at Project completion (e.g., recontour significant disturbances). Permanently stabilize disturbed surfaces with an appropriate seed mixture as soon as possible. Conduct works in dry weather and halting works during periods of inclement weather. 	Temporary disturbances (compaction and/or erosion) to ground surface.	<ul style="list-style-type: none"> Soil disturbances are required for roadworks and culvert replacements. Disturbed soils will be seeded with an approved mixture to deter weed growth and allowed to naturally revegetate. Soil disturbances will be limited to the Alaska Highway ROW around culvert inlets and outlets, the old alignment and the new alignment.
Soil contamination.	<p>Accidental spill or release of deleterious substances:</p> <ul style="list-style-type: none"> Equipment with engines and/or hydraulics have a potential for leaks and spills (may include: diesel/gas, hydraulic fluids, lubricating oil, glycols.) 	<ul style="list-style-type: none"> The contractor should have a Spill Response Plan in place as a component of their overall EPP. All equipment should be in good operating condition, power washed, and free of leaks, excess oil, and grease prior to arriving at the Project area. Appropriately stocked spill kits should be available in the staging area and on all mobile equipment. Trained personnel should be available to deploy spill kits. The refueling area (if one is required) should have a spill containment kit immediately accessible and personnel should be knowledgeable in its use. Two people should be present during refueling (one person conducting fueling/ready to stop spill source and one person ready to deploy spill containment). 	Soils exposed to deleterious substances.	<ul style="list-style-type: none"> Although an accidental spill or release would have a high impact, it is considered to be unlikely to occur and would be an isolated event. This potential effect would be localized within the ROW and is considered reversible with remediation effort (e.g., soil removal).

Table 6-1: Potential Effects Assessment and Associated Mitigation Measures Recommended for the Project

Potential Effect	Interaction	Suggested Mitigation	Residual Effect	Comment
		<ul style="list-style-type: none"> Equipment utilized should be placed within secondary containment capable of holding the full volume of fluids within the equipment in the event of a spill (e.g., place within a plastic or metal tray). Motorized equipment should be parked over a surface capable of containing leaks and minor spill (e.g., plywood, heavy plastic sheeting). Hydrocarbon and coolant storage, if required on site, should be within an impermeable containment facility capable of holding 110% of the storage tank contents. Small containers (e.g., jerry cans) should be stored in a secure location, protected from weather. These containers must be designed solely for the purpose of storing and pouring fuel and should not be more than 5 years old. Containers should not leak and should be sealed with a proper fitting cap or lid. If feasible, hydraulic fluids for on-site equipment should be biodegradable (e.g., vegetable based) in case of accidental loss of fluids. Hazardous materials should be labelled and disposed of according to the Workplace Hazardous Materials Information System criteria and the Transportation of Dangerous Goods (TDG) Regulations. Any spill to ground of a reportable quantity of a substance that is toxic, polluting, or deleterious to life must be immediately reported to Emergency Management BC (EMBC) 24-hour phone line at 1-800-663-3456. 		
Surface Water Quality				
Changes to water quality because of accidental spill or release of deleterious substances.	Equipment with engines and/or hydraulics have a potential for leaks and spills (may include diesel/gas, hydraulic fluids, lubricating oil, glycols).	<ul style="list-style-type: none"> Measures to minimize the potential for an accidental spill or release of a harmful substance should be implemented (see "Soil Contamination" effect in <i>Soils</i>, above). Equipment re-fueling and servicing should be undertaken greater than 30 m away from a watercourse or drainage. If a 30 m distance is not possible, a location as far as possible from the watercourse should be chosen and appropriate secondary containment established. Topographic features and slope must be considered. A spill of any quantity to water of a substance that is toxic, polluting, or deleterious to aquatic life must be immediately reported to the EMBC 24-hour phone line at 1-800-663-3456 	Decreased water quality (e.g., contaminated water).	<ul style="list-style-type: none"> Although an accidental spill or release would have a high impact and could spread beyond the immediate Project area, it is considered to be unlikely to occur and would be an isolated event. This potential effect would be contained with appropriately and timely implementation of the Contractor's Spill Response Plan and is considered partly reversible with remediation effort (e.g., sediment removal).
Decreases to water quality because of increased turbidity.	Project activities will disturb soils and sediments that could mobilize to watercourse(s).	<ul style="list-style-type: none"> The contractor should have a Project specific Erosion and Sediment Control Plan in place as a component of their overall EPP. Recommended measures will be installed prior to starting Project work. Conduct works in dry weather and halt works during periods of inclement weather. Operate equipment from a stable surface above the high-water mark and situate machinery to minimize track movement. All instream work (e.g., culvert replacements) must occur "in-the-dry" and the work area must be isolated from flow (see Appendix E for environmental staging drawings). If flows are present during instream activities, turbidity should be monitored to assess compliance with BC MOE <i>Approved Water Quality Guidelines</i> for turbidity and total suspended solids. If turbidity levels in excess of the guideline occur, all works must be halted and the source of the input addressed prior to re-initiation of the works. 	Temporary increase of total suspended solids (increased turbidity) in surface water.	<ul style="list-style-type: none"> Any turbidity increases are anticipated to be temporary and dissipate relatively quickly and would be a temporary impact.
Terrestrial Flora and Fauna				
Introduction or spread of non-native or invasive plant species.	Non-native or invasive plant seeds/fragments may be transported to Project area, or spread off-site from the Project area, on vehicles and equipment.	<ul style="list-style-type: none"> All vehicles and equipment arriving to and leaving from the Project should be inspected and cleaned so that soil and plant materials are not being transported. Where invasive plants are known to occur, rig matting should be laid prior to equipment mobilization. Upon demobilization, the rig matting must be inspected and cleaned of soil and plant material. 	Introduction or spread of non-native or invasive plants.	<ul style="list-style-type: none"> Introduction of new non-native or invasive plants by Project activities considered unlikely. Disturbed areas will be seeded at an appropriate time (e.g., spring) with an approved mix to discourage weed growth and facilitate natural revegetation.

Table 6-1: Potential Effects Assessment and Associated Mitigation Measures Recommended for the Project

Potential Effect	Interaction	Suggested Mitigation	Residual Effect	Comment
Disturbance or destruction of vegetation.	Project activities (e.g., highway realignment, equipment movement, material laydown, pipe jacking and channel realignment) may damage or destroy vegetation.	<ul style="list-style-type: none"> Avoid vegetation removal where possible. Vegetation removal within 30 m of the two mapped watercourses (KM 568+840 and KM 569+950) should be retained until the WSA Notification has been obtained. Where vegetation removal is necessary, clearly delineate work areas to minimize accidental disturbances. Limit equipment movement to the Alaska Highway ROW. Use existing access routes to move equipment and existing cleared areas to store materials. Avoid situating equipment or materials on vegetated surfaces. 	Individual specimens of vegetation may be disturbed or destroyed.	<ul style="list-style-type: none"> Majority of Project occurs in previously disturbed transportation corridor. Disturbed areas will be seeded at an appropriate time (e.g., spring) with an approved mix to discourage weed growth and facilitate natural revegetation. With the exception of the access road, disturbances are expected to be temporary and reversible.
Disturbance to wildlife (avoidance, harm, or mortality).	Mortality of individuals (e.g., vehicle collisions) during mobilization to or from site.	<ul style="list-style-type: none"> Mobilization should occur in compliance with <i>BC Transportation Acts and Regulations</i>. Vehicles and equipment should be operated in a safe manner to reduce the potential for wildlife mortality. Measures to reduce noise from Project activities should be implemented (see <i>Air Quality and Noise</i> above). Food should not be made available to wildlife at any time. Food, food waste and packaging should be stored appropriately and disposed of daily so as not to attract wildlife. Such wildlife attractants shall not be stored in the Project area overnight. <ul style="list-style-type: none"> Off-site disposal of food scraps, food wrappers, pop cans, domestic waste, and other potential wildlife attractants should be conducted regularly. The Project Manager and/or the Environmental Monitor should be notified if any nests, dens, burrows or wildlife interactions are encountered in the Project area. Report all <i>dangerous</i> human-wildlife interactions to the BC Conservation Officer Service via the Report All Poacher and Polluters (RAPP) hotline at 1-877-952-7277. This includes incidents: <ul style="list-style-type: none"> Accessing garbage or other human supplied food sources. Instances where wildlife cannot be easily scared off. When a bear, cougar or wolf is seen in an urban area. Feeding, harassment or destruction of any wildlife is strictly prohibited. Wildlife encountered at or near Project area should be allowed to passively disperse without undue harassment. 	Mortality of individuals.	<ul style="list-style-type: none"> Although mortality of wildlife would have a high impact, it is considered unlikely to occur and would be an isolated event.
	Avoidance behaviors from local wildlife, including SAR, may occur as a result of increased noise and human presence from Project activities resulting in disruption or impediment to wildlife movement.	<ul style="list-style-type: none"> Report all <i>dangerous</i> human-wildlife interactions to the BC Conservation Officer Service via the Report All Poacher and Polluters (RAPP) hotline at 1-877-952-7277. This includes incidents: <ul style="list-style-type: none"> Accessing garbage or other human supplied food sources. Instances where wildlife cannot be easily scared off. When a bear, cougar or wolf is seen in an urban area. Feeding, harassment or destruction of any wildlife is strictly prohibited. Wildlife encountered at or near Project area should be allowed to passively disperse without undue harassment. 	Wildlife exhibit avoidance behavior during Project.	<ul style="list-style-type: none"> Project occurs in an area subject to frequent noise and human presence (e.g., traffic). Project activities are anticipated to be within acceptable limits of typical usage. Noise disturbances are limited spatially and temporally (e.g., occur in immediate area of the Project and infrequently for a short time). Human presence will be limited in number and time. Wildlife present will likely return to area once Project activities are completed.
	Garbage and waste generated by the Project activities may attract local wildlife and lead to human-wildlife interactions.	<ul style="list-style-type: none"> For Project activities that occur within Caribou range, the contractor must implement the Caribou Protection Plan (Appendix C). Measures to reduce the potential for an accidental spill of a harmful substance should be implemented (see <i>Soils</i>, above). 	Human-wildlife interactions occur.	<ul style="list-style-type: none"> The Project is not expected to generate significant amounts of wildlife attractants. Interactions would be localized and temporary.
Direct or indirect harm to wildlife by accidental spill or release of a deleterious substance.	Local wildlife may be harmed or killed by an accidental spill of a harmful substance in Project area.	<ul style="list-style-type: none"> See measures recommended in <i>Soils</i> and <i>Surface Water Quality</i> above to minimize potential for an accidental spill. 	Wildlife physically harmed by contact with a deleterious substance Wildlife habitat quality affected by spill.	<ul style="list-style-type: none"> Although a spill interaction would have a high impact, it is considered to be unlikely to occur and would be an isolated event. Because the spill would be cleaned immediately, it may also be considered a temporary effect.
Disturbance or destruction of habitat.	<p>There is potential for loss or disturbance of bird nests, which are protected under the <i>Migratory Birds Convention Act</i> (MBCA), if vegetation clearing is required and occurs during the general bird nesting period.</p> <p>Unknown dens, burrows or nests may be encountered.</p>	<ul style="list-style-type: none"> Vegetation removal, if required, should be conducted outside the breeding bird nesting period. Environment and Climate Change Canada (ECCC) suggests that the least risk window for the region including the Project area, is approximately <i>August 20 to April 30</i>. Any vegetation to be removed outside of the least risk window (i.e., during the breeding bird nesting period) should be surveyed in advance by an appropriately qualified environmental professional to identify any breeding, nesting, roosting or rearing birds and determine the appropriate BMPs. The Project Manager and/or the Environmental Monitor should be notified if any nests, dens, burrows or wildlife interactions are encountered in the Project area. 	Undetected nests may be destroyed. Potential habitat or use of habitat may be altered.	<ul style="list-style-type: none"> Vegetation disturbances are anticipated to be limited. The highway ROW consists mostly of grasses and shrubs. The ROW is mowed regularly. Project activities are temporary and are not anticipated to change the long-term habitat quality/potential use of the area.

Table 6-1: Potential Effects Assessment and Associated Mitigation Measures Recommended for the Project

Potential Effect	Interaction	Suggested Mitigation	Residual Effect	Comment
Fish and Fish Habitat (KM 568+840 and KM 569+950)				
Direct or indirect harm to fish by accidental spill or release of a deleterious substance (e.g., hydrocarbons, uncured concrete).	Fish may be harmed or killed by physical contact with deleterious substance and/or because of habitat degradation.	<ul style="list-style-type: none"> Measures to minimize the potential for an accidental spill of a harmful substance will be implemented (see <i>Soils</i> and <i>Surface Water Quality</i>, above). 	Fish may be exposed to contamination from spills which may harm/kill fish or cause fish to leave area.	<ul style="list-style-type: none"> Although a spill interaction would have a high impact, it is considered to be unlikely to occur and would be an isolated event.
Direct or indirect harm to fish by increases in turbidity because of mobilized sediments from soil disturbances.	Increased sediments in water may harm or kill fish directly (e.g., gill abrasion, smothering of incubating eggs) or indirectly (e.g., reduced feeding/foraging).	<ul style="list-style-type: none"> Erosion and sediment control measures will be implemented (see <i>Soils</i> and <i>Surface Water Quality</i>, above). 	Fish may be exposed to increased total suspended solids in water which may harm/kill fish or cause fish to leave area.	<ul style="list-style-type: none"> If there is flow in the watercourse at the time of construction, the area will be isolated, fish salvaged from the area, and works will be conducted in the dry. Any turbidity increases are anticipated to be temporary and short term.
Disturbance or destruction of habitat.	Project activities conducted below the high-water mark may alter existing aquatic habitat.	<ul style="list-style-type: none"> Prior to starting construction, an aquatic biologist trained in identifying spawning beds should evaluate the two larger culvert sites (KM 568+840 and KM 569+950) to identify the presence of Bull Trout redds. If redds are present, work must be delayed until after the Bull Trout have emerged from their redds and can be safely salvaged from the area, or until the next reduced risk timing window for Bull Trout. Conduct works in the dry. If flows are present, then work site isolation will be required (see Appendix E for environmental staging drawings). Isolation activities at KM 568+840 and KM 569+950 will require fish salvage and ongoing turbidity monitoring. Works below the high-water mark are ideally conducted during the Reduced Risk Timing Windows for Fish and Wildlife for Northeast BC. Because both spring and fall spawners are potentially present, the least risk window is July 15 to August 15. Tetra Tech understands that the Project activities are planned to occur outside of the Reduced Risk Timing Window in Spring of 2021. It is unlikely that the Project would negatively impact fish or fish habitat if works are conducted outside the reduced risk window if the mitigation detailed in the preceding sections is applied. Disturbances below the high-water mark will be remediated as soon as possible and should emulate pre-disturbance conditions as closely as possible. 	Temporary disturbances below the high-water mark.	<ul style="list-style-type: none"> Project works are temporary and not anticipated to result in permanent changes to habitat quality or quantity.


7.0 CONCLUSION


The potential impacts of the Project were considered within the limits of typical, routine construction activities and are generally localized and temporary. It is anticipated that there will be ***no adverse residual environmental effects*** as a result of the Project activities provided industry standard BMPs and mitigation measures are applied, the mitigation recommended in this Environmental Overview Assessment and the attached Environmental Management Plan are implemented, and, that the contractor develops and effectively implements a Project specific Environmental Protection Plan.

8.0 CLOSURE

We trust this document meets your present requirements. If you have any questions or comments, please contact the undersigned.

Respectfully submitted,
Tetra Tech Canada Inc.



FILE: 704-TRN.VHWY03172-02
FILE: 704-TRN.VHWY03172-02
FILE: 704-TRN.VHWY03172-02


FILE: 704-TRN.VHWY03172-02
FILE: 704-TRN.VHWY03172-02
FILE: 704-TRN.VHWY03172-02

Prepared by:
Elyse Hofs, B.Sc., Dipl.T.
Junior Environmental Scientist
Environment and Water Practice
Direct Line: 778.945.5724
Elyse.Hofs@tetrattech.com

Prepared by:
Shawneen Walker, B.Sc., R.P.Bio., P.Bio.
Biologist
Environment and Water Practice
Direct Line: 778.744.5939
Shawneen.Walker@tetrattech.com


FILE: 704-TRN.VHWY03172-02
FILE: 704-TRN.VHWY03172-02
FILE: 704-TRN.VHWY03172-02


FILE: 704-TRN.VHWY03172-02
FILE: 704-TRN.VHWY03172-02
FILE: 704-TRN.VHWY03172-02

Reviewed by:
Jeff Matheson, M.Sc., R.P.Bio.
Senior Biologist
Environment and Water Practice
Direct Line: 604.608.8909
Jeff.Matheson@tetrattech.com

Reviewed by:
Nigel Cavanagh, M.Sc., R.P.Bio., P.Biol.
Senior Aquatic Biologist
Environment and Water Practice
Direct Line: 250.713.3837
Nigel.Cavanagh@tetrattech.com

/sy

REFERENCES

- B.C. Conservation Data Centre [BC CDC]. 1990. Species Summary: *Setophaga tigrina*. B.C. Ministry of Environment. Available: <http://a100.gov.bc.ca/pub/eswp/> (accessed Sep 30, 2020).
- BC Conservation Data Centre [BC CDC]. 2010. Ecological Community Summary: *Picea glauca* / *Ribes triste* / *Equisetum* spp. BC Ministry of Environment. Available: <http://a100.gov.bc.ca/pub/eswp/> (accessed Sep 30, 2020).
- BC Conservation Data Centre [BC CDC]. 2020a. BC Species and Ecosystems Explorer. BC Ministry of Environment. Victoria, BC. Available: <http://a100.gov.bc.ca/pub/eswp/>.
- BC Conservation Data Centre [BC CDC]. 2020b. CDC iMap [web application]: Mapped Known Locations of Species and Ecological Communities at Risk. Available at: <http://maps.gov.bc.ca/ess/hm/cdc/>
- BC Ministry of Environment [BC MOE]. 2020. Habitat Wizard. Available: <http://www.env.gov.bc.ca/habwiz/>.
- BC Ministry of Forests, Lands and Natural Resource Operations and Rural Development [FLNRORD]. 2014. A Compendium of Wildlife Guidelines for Industrial Development Projects in the North Area, British Columbia. Government of British Columbia. Available at: <http://a100.gov.bc.ca/pub/eirs/lookupDocument.do?fromStatic=true&repository=BDP&documentId=12121>
- BC Ministry of Transportation and Infrastructure [MOTI]. 2019. BC Supplement to TAC Geometric Design Guide, 2019 3rd Edition. Available at: <https://www2.gov.bc.ca/gov/content/transportation/transportation-infrastructure/engineering-standards-guidelines/highway-design-survey/tac-bc>.
- CEAA. 2012. Practitioner's Glossary for the Environmental Assessment of Designated Projects Under the Canadian Environmental Assessment Act, 2012. Available at: <https://www.canada.ca/content/dam/ceaa-acee/documents/policy-guidance/practitioners-glossary-environmental-assessment-designated-projects-under-canadian-environmental-assessment-act-2012/practitioners-glossary-environmental-assessment-designated-projects-ceaa.pdf>
- COSEWIC. 2014. COSEWIC assessment and status report on the Caribou *Rangifer tarandus*, Northern Mountain population, Central Mountain population and Southern Mountain population in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xxii + 113 pp. Available at: <https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry/cosewic-assessments-status-reports/caribou-2014/chapter-1.html>
- Decker, Scott, J. Hagan, and J. Baxter. 2005. Feasibility of Juvenile and Adult Bull Trout Abundance Monitoring in Selected Tributaries of the Arrow Lakes Reservoir. Prepared for Columbia Basin Fish and Wildlife Compensation Program and BC Hydro and Power Authority. Available at: http://www.sgrc.selkirk.ca/bioatlas/pdf/Feasibility_of_Juvenile_and_Adult_Bull_Trout_Abundance_Monitoring_in_Selected_Tributaries_of_the_Arrow_Lakes_Reservoir.pdf.
- DeLong, C., Annas, R. M., & Stewart, A. C. 1991. Chapter 16: Boreal White and Black Spruce Zone. In D. Meidinger & J. Pojar (Eds.), *Ecosystems of British Columbia*. Ministry of Forests. Available at: <https://www.for.gov.bc.ca/hfd/pubs/Docs/Srs/Srs06/chap16.pdf>.
- Delong, S. C., Banner, A., Mackenzie, W. H., Rogers, B. J., & Kaytor, B. 2011. Land Management Handbook 65: A Field Guide to Ecosystem Identification for the Boreal White and Black Spruce Zone of British Columbia. BC Ministry of Forests. Available at: <https://www.for.gov.bc.ca/hfd/pubs/Docs/Lmh/Lmh65.pdf>.
- Department of Fisheries and Oceans (DFO). 1995. Guidelines for the Use of Explosives in Canadian Fisheries Waters. Government of Canada. Available at: <https://waves-vagues.dfo-mpo.gc.ca/Library/40684246.pdf>.
- Government of Canada [Gov. of Canada]. 2017. Soil Landscapes of Canada Web Map. Available at: <https://www.agr.gc.ca/atlas/agpv?webmap-en=c225cc78d5b142d58eacefae91cc535b&webmap-fr=ad0b6822a33e411683f99979a1167efa>

- Government of Canada. 2020. Database of wildlife species assessed by COSEWIC. Committee on the Status of Endangered Wildlife in Canada. Available at: http://www.cosewic.gc.ca/eng/sct1/searchform_e.cfm.
- Klinkenberg, Brian. (Editor) 2020a. *E-Fauna BC: Electronic Atlas of the Fauna of British Columbia* [www.efauna.bc.ca]. Lab for Advanced Spatial Analysis, Department of Geography, University of British Columbia, Vancouver.
- Klinkenberg, Brian (Editor). 2020b. *E-Flora BC: Electronic Atlas of the Plants of British Columbia* [eflora.bc.ca]. Lab for Advanced Spatial Analysis, Department of Geography, University of British Columbia, Vancouver.
- Luttmerding, H.A., E. Kennedy, A.J. Green. 1995. Soil Landscapes of Canada. Cartographic Design and Reproduction Unit, Centre for Land and Biological Resources Research, Agriculture and Agri-food Canada, Ottawa. Available at:
http://sis.agr.gc.ca/cansis/publications/maps/slc/1m/v1/slc_1m_v1_bc_north.jpg.
- McPhail, J.D. and J.S. Baxter. 1996. A Review of Bull Trout (*Salvelinus confluentus*) Life-history and Habitat Use in Relation to Compensation and Improvement Opportunities. Fisheries Management Report No. 104. 35 pp. Department of Zoology, UBC. Vancouver, BC.
- McPhail, J.D. 2007. The Freshwater Fishes of British Columbia. The University of Alberta Press. 620 pp.
- Resource Inventory Committee [RIC]. 2001. Reconnaissance (1:20 000) Fish and Fish Habitat Inventory: Standards and Procedures. Province of British Columbia. Available at:
<https://www2.gov.bc.ca/assets/gov/environment/natural-resource-stewardship/nr-laws-policy/risc/recce2c.pdf>.
- Transport Association of Canada [TAC]. 2017. Geometric Design for Canadian Roads. Available at:
<https://www.tac-atc.ca/en/publications-and-resources/geometric-design-guide-canadian-roads>.

FIGURES

- Figure 1 Project Location Overview
- Figure 2 KM 566+900 to KM 570+200 - BC CDC SAR Occurrences and Fish Presence
- Figure 3 Culvert Locations



LEGEND

- Realignment/Reconstruction Work
- Populated Place
- Alaska Highway
- Park or Protected



NOTES
 Base data sources:
 Imagery from ESRI; Maxar.

STATUS
 ISSUED FOR USE

**ALASKA HIGHWAY
 REALIGNMENT AND RECONSTRUCTION
 KM 566+900 TO KM 570+200**

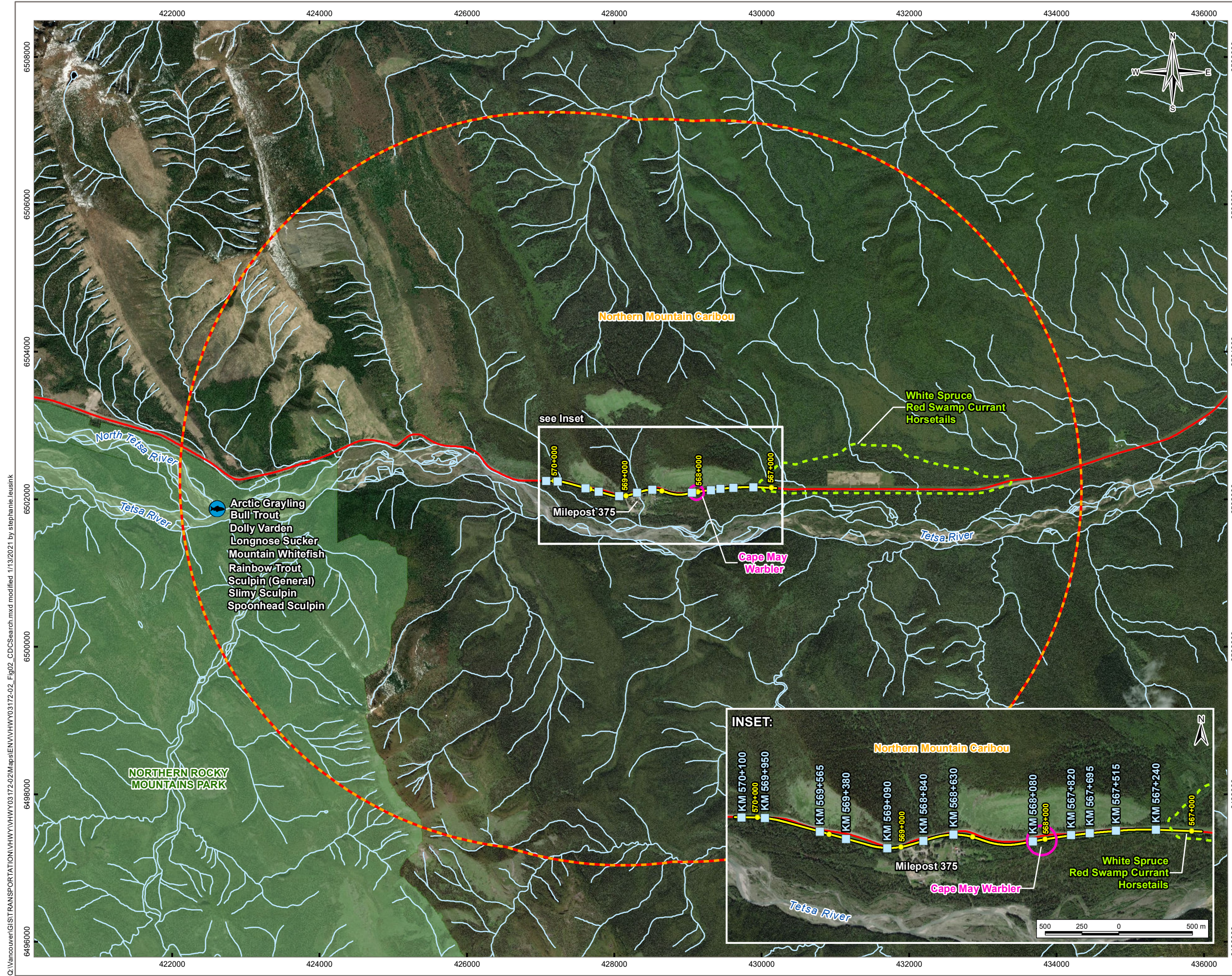
Project Location Overview

PROJECTION UTM Zone 10		DATUM NAD83		CLIENT Public Services and Procurement Canada	
Scale: 1:250,000					
FILE NO. VHWY03172-02_Fig01_Overview.mxd					
OFFICE TL-VANC		DWN SL	CKD YL	APVD EH	REV 0
DATE January 13, 2021		PROJECT NO. TRN.VHWY03172-02			



Figure 1

Q:\Vancouver\GIS\TRANSPORTATION\HWY\HWY03172-02\Mapas\EN\HWY03172-02_Fig01_Overview.mxd modified 1/13/2021 by stephanie.leusink



LEGEND

- Kilometre Marker
- Realignment/Reconstruction Work
- 5 km Search Area
- Culvert
- Fish Occurrence

CDC Species and Ecosystems at Risk Occurrences

- Cape May Warbler (Blue-listed)
- Northern Mountain Caribou (Blue-listed)
- White Spruce / Red Swamp Currant / Horsetails (Blue-listed)

Base Data

- Alaska Highway
- Watercourse/Waterbody
- Park or Protected Area

- Arctic Grayling
Bull Trout
Dolly Varden
Longnose Sucker
Mountain Whitefish
Rainbow Trout
Sculpin (General)
Slimy Sculpin
Spoonhead Sculpin

see Inset

Milepost 375

INSET:

Northern Mountain Caribou

White Spruce
Red Swamp Currant
Horsetails

Cape May Warbler

Milepost 375

Tetsa River

KM 570+100
KM 569+950
KM 569+565
KM 569+380
KM 569+090
KM 568+840
KM 568+630
KM 568+080
KM 567+820
KM 567+695
KM 567+515
KM 567+240

Scale: 1:50,000

500 250 0 500 m

NOTES
Base data sources:
CanVec 1:50,000 (2019).
Species and Ecosystems at Risk and Fish Observations from DataBC (accessed January 2020).
Imagery from ESRI; DigitalGlobe (2010-2016).

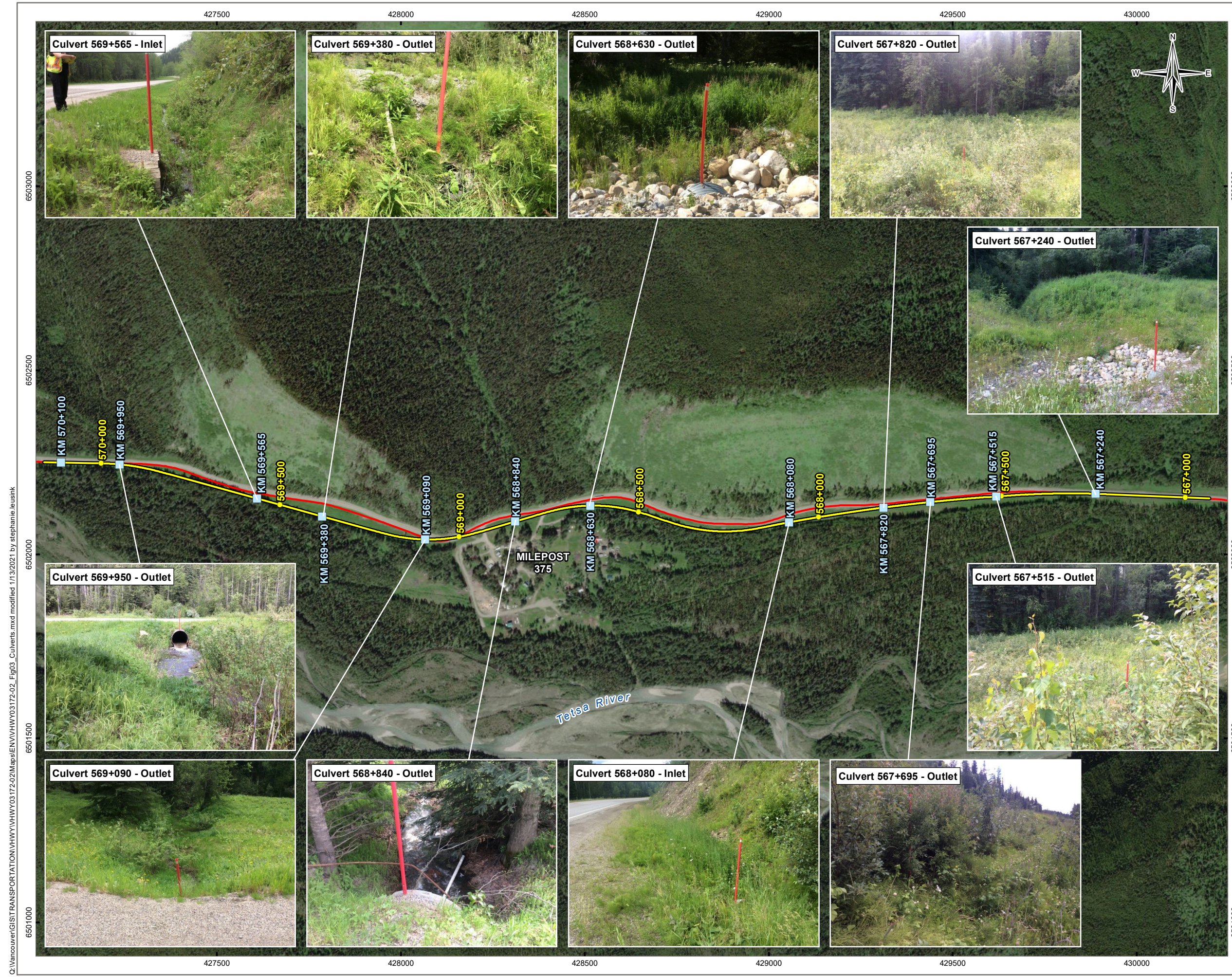
STATUS
ISSUED FOR USE

**ALASKA HIGHWAY
REALIGNMENT AND RECONSTRUCTION
KM 566+900 TO KM 570+200**

**CDC Species and Ecosystems at Risk
Occurrences and Fish Presence**

PROJECTION UTM Zone 10	DATUM NAD83	CLIENT Public Services and Procurement Canada
Scale: 1:50,000 1 0.5 0 1 Kilometres		Tetra Tech
FILE NO. VHWY03172-02_Fig02_CDCSearch.mxd		
OFFICE TL-VANC	DWN SL	CKD YL
DATE January 13, 2021	APVD EH	REV 0
PROJECT NO. TRN.VHWY03143-01		Figure 2

Q:\vancouver\GIS\TRANSPORTATION\HWY\HWY03172-02\Mapas\EN\VHWY03172-02_Fig02_CDCSearch.mxd modified 1/13/2021 by stephanie.leuisink



LEGEND

- Culvert
- Kilometre Marker
- Realignment/Reconstruction Work
- Alaska Highway

NOTES
 Base data sources:
 CanVec 1:50,000 (2019).
 Imagery from ESRI; DigitalGlobe (2013).

STATUS
 ISSUED FOR USE

**ALASKA HIGHWAY
 REALIGNMENT AND RECONSTRUCTION
 KM 566+900 TO KM 570+200**

Culvert Locations

PROJECTION UTM Zone 10	DATUM NAD83	CLIENT Public Services and Procurement Canada
Scale: 1:10,000 200 100 0 200 Metres		
FILE NO. VHWY03172-02_Fig03_Culverts.mxd	TETRA TECH	
OFFICE TL-VANC	DWN SL	CKD YL
DATE January 13, 2021	APVD EH	REV 0
PROJECT NO. TRN.VHWY03143-01		Figure 3

Q:\varcouvert\GIS\TRANSPORTATION\VHWY03172-02\Mapas\EN\VHWY03172-02_Fig03_Culverts.mxd modified 1/13/2021 by stephanie.leusink

PHOTOS

- Photo 1 Culvert inlet at KM 568.84.
- Photo 2 The view of the channel upstream of the KM 568.84 culvert.
- Photo 3 Culvert outlet at KM 568.84.
- Photo 4 The view of the channel downstream of the KM 568.84 culvert.
- Photo 5 Inlet of the KM 569.95 culvert.
- Photo 6 The view upstream of the KM 569.95 culvert.
- Photo 7 Culvert outlet at KM 569.95.
- Photo 8 View of the downstream channel at the KM 569.95 culvert.



Photo 1: Culvert inlet at KM 568.84. The inlet is located on the north side of the highway.



Photo 2: The view of the channel upstream of the KM 568.84 culvert.



Photo 3: Culvert outlet at KM 568.84.



Photo 4: The view of the channel downstream of the KM 568.84 culvert.



Photo 5: Inlet of the KM 569.95 culvert.



Photo 6: The view upstream of the KM 569.95 culvert.



Photo 7: Culvert outlet at KM 569.95.



Photo 8: View of the downstream channel at the KM 569.95 culvert.

APPENDIX A

TETRA TECH'S LIMITATIONS ON THE USE OF THIS DOCUMENT

LIMITATIONS ON USE OF THIS DOCUMENT

NATURAL SCIENCES

1.1 USE OF DOCUMENT AND OWNERSHIP

This document pertains to a specific site, a specific development, and a specific scope of work. The document may include plans, drawings, profiles and other supporting documents that collectively constitute the document (the "Professional Document").

The Professional Document is intended for the sole use of TETRA TECH's Client (the "Client") as specifically identified in the TETRA TECH Services Agreement or other Contractual Agreement entered into with the Client (either of which is termed the "Contract" herein). TETRA TECH does not accept any responsibility for the accuracy of any of the data, analyses, recommendations or other contents of the Professional Document when it is used or relied upon by any party other than the Client, unless authorized in writing by TETRA TECH.

Any unauthorized use of the Professional Document is at the sole risk of the user. TETRA TECH accepts no responsibility whatsoever for any loss or damage where such loss or damage is alleged to be or, is in fact, caused by the unauthorized use of the Professional Document.

Where TETRA TECH has expressly authorized the use of the Professional Document by a third party (an "Authorized Party"), consideration for such authorization is the Authorized Party's acceptance of these Limitations on Use of this Document as well as any limitations on liability contained in the Contract with the Client (all of which is collectively termed the "Limitations on Liability"). The Authorized Party should carefully review both these Limitations on Use of this Document and the Contract prior to making any use of the Professional Document. Any use made of the Professional Document by an Authorized Party constitutes the Authorized Party's express acceptance of, and agreement to, the Limitations on Liability.

The Professional Document and any other form or type of data or documents generated by TETRA TECH during the performance of the work are TETRA TECH's professional work product and shall remain the copyright property of TETRA TECH.

The Professional Document is subject to copyright and shall not be reproduced either wholly or in part without the prior, written permission of TETRA TECH. Additional copies of the Document, if required, may be obtained upon request.

1.2 ALTERNATIVE DOCUMENT FORMAT

Where TETRA TECH submits electronic file and/or hard copy versions of the Professional Document or any drawings or other project-related documents and deliverables (collectively termed TETRA TECH's "Instruments of Professional Service"), only the signed and/or sealed versions shall be considered final. The original signed and/or sealed electronic file and/or hard copy version archived by TETRA TECH shall be deemed to be the original. TETRA TECH will archive a protected digital copy of the original signed and/or sealed version for a period of 10 years.

Both electronic file and/or hard copy versions of TETRA TECH's Instruments of Professional Service shall not, under any circumstances, be altered by any party except TETRA TECH. TETRA TECH's Instruments of Professional Service will be used only and exactly as submitted by TETRA TECH.

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.

1.3 STANDARD OF CARE

Services performed by TETRA TECH for the Professional Document have been conducted in accordance with the Contract, in a manner consistent with the level of skill ordinarily exercised by members of the profession currently practicing under similar conditions in the jurisdiction in which the services are provided. Professional judgment has been applied in developing the conclusions and/or recommendations provided in this Professional Document. No warranty or guarantee, express or implied, is made concerning the test results, comments, recommendations, or any other portion of the Professional Document.

If any error or omission is detected by the Client or an Authorized Party, the error or omission must be immediately brought to the attention of TETRA TECH.

1.4 DISCLOSURE OF INFORMATION BY CLIENT

The Client acknowledges that it has fully cooperated with TETRA TECH with respect to the provision of all available information on the past, present, and proposed conditions on the site, including historical information respecting the use of the site. The Client further acknowledges that in order for TETRA TECH to properly provide the services contracted for in the Contract, TETRA TECH has relied upon the Client with respect to both the full disclosure and accuracy of any such information.

1.5 INFORMATION PROVIDED TO TETRA TECH BY OTHERS

During the performance of the work and the preparation of this Professional Document, TETRA TECH may have relied on information provided by 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 ISSUES

The ability to rely upon and generalize from environmental baseline data is dependent on data collection activities occurring within biologically relevant survey windows.

It is incumbent upon the Client and any Authorized Party, to be knowledgeable of the level of risk that has been incorporated into the project design or scope, in consideration of the level of the environmental baseline information that was reasonably acquired to facilitate completion of the scope.

1.8 NOTIFICATION OF AUTHORITIES

TETRA TECH professionals are bound by their ethical commitments to act within the bounds of all pertinent regulations. In certain instances, observations by TETRA TECH of regulatory contravention may require that regulatory agencies and other persons be informed. The client agrees that notification to such bodies or persons as required may be done by TETRA TECH in its reasonably exercised discretion.

APPENDIX B

SPECIES AT RISK SEARCH RESULTS



Search Results 110 records

Modify Search (/pub/eswp/search.do?method=change)





































New Search (/pub/eswp/search.do?method=reset)































Export Results
























Help






































Show 100 rows Column Visibility Sort Order Scientific Name Ascending


































Scientific Name	English Name	Biogeoclimatic Units	Provincial	BC List	Global	COSEWIC	SARA	Provincial FRPA	Land Use Objectives	CDC Mapped Locations	Reports
<i>Aechmophorus occidentalis</i> (/pub/eswp/reports.do?elcode=ABNCA04010)	Western Grebe	BG BWBS CDF CWH ICH IDF MS PP SBPS SBS	S1B,S2N (2015)	Red	G5 (2016)	SC (2014)	1-SC (2017)			(/pub/eswp/eoMap.do?id=19726)	(/pub/eswp/reports.do?elcode=ABNCA04010)
<i>Agriades glandon lacustris</i> (/pub/eswp/reports.do?elcode=IILEPH0053)	Arctic Blue, <i>lacustris</i> subspecies	BWBS	S3 (2013)	Blue	G5TNR					(/pub/eswp/eoMap.do?id=13912)	(/pub/eswp/reports.do?elcode=IILEPH0053)
<i>Agriades optilete</i> (/pub/eswp/reports.do?elcode=IILEPG9010)	Cranberry Blue	BWBS MH SBPS SBS SWB	S3S4 (2020)	Blue	G5 (2016)						(/pub/eswp/reports.do?elcode=IILEPG9010)
<i>Alopecurus magellanicus</i> (/pub/eswp/reports.do?elcode=PMPOA07020)	alpine meadow-foxtail	BWBSmw SWBmk	S1S2 (2019)	Red	G5 (2015)					(/pub/eswp/eoMap.do?id=18097)	(/pub/eswp/reports.do?elcode=PMPOA07020)
<i>Ammospiza nelsoni</i> (/pub/eswp/reports.do?elcode=ABPBXA0070)	Nelson's Sparrow	BWBS CWH	S2B (2018)	Red	G5 (2016)	NAR (1998)		Y		(/pub/eswp/eoMap.do?id=17615)	(/pub/eswp/reports.do?elcode=ABPBXA0070)
<i>Anaxyrus boreas</i> (/pub/eswp/reports.do?elcode=AAABB01030)	Western Toad	BG BWBS CDF CWH ESSF ICH IDF PP SBS SWB	S4 (2016)	Yellow	G4 (2008)	SC (2012)	1-SC (2018)				(/pub/eswp/reports.do?elcode=AAABB01030)
<i>Archilochus colubris</i> (/pub/eswp/reports.do?elcode=ABNUC45010)	Ruby-throated Hummingbird		S3B (2015)	Blue	G5 (2016)						(/pub/eswp/reports.do?elcode=ABNUC45010)
<i>Ardea herodias herodias</i> (/pub/eswp/reports.do?elcode=ABNGA04012)	Great Blue Heron, <i>herodias</i> subspecies	BG ICH IDF MS PP SBS	S3? (2017)	Blue	G5T5 (2016)			Y		(/pub/eswp/eoMap.do?id=17626)	(/pub/eswp/reports.do?elcode=ABNGA04012)
<i>Asio flammeus</i> (/pub/eswp/reports.do?elcode=ABNSB13040)	Short-eared Owl	BG BWBS CDF CWH ICH IDF MS PP SBPS SBS SWB	S3B,S2N (2015)	Blue	G5 (2016)	SC (2008)	1-SC (2012)	Y		(/pub/eswp/eoMap.do?id=14271)	(/pub/eswp/reports.do?elcode=ABNSB13040)
<i>Bartramia longicauda</i> (/pub/eswp/reports.do?elcode=ABNNF06010)	Upland Sandpiper	BG BWBS CDF CWH ICH IDF SBPS SBS SWB	S2B (2015)	Red	G5 (2016)					(/pub/eswp/eoMap.do?id=15956)	(/pub/eswp/reports.do?elcode=ABNNF06010)
<i>Bos bison athabasca</i> (/pub/eswp/reports.do?elcode=AMALE01011)	Wood Bison	BWBS	S2 (2015)	Red	G4T3Q (2018)	SC (2013)	1-T (2003)			(/pub/eswp/eoMap.do?id=14422)	(/pub/eswp/reports.do?elcode=AMALE01011)
<i>Bos bison bison</i> (/pub/eswp/reports.do?elcode=AMALE01012)	Plains Bison	BWBS SWB	SX (2015)	Red	G4T4 (2016)	T (2013)					(/pub/eswp/reports.do?elcode=AMALE01012)











































Scientific Name	English Name	Biogeoclimatic Units	Provincial	BC List	Global	COSEWIC	SARA	Provincial FRPA	Land Use Objectives	CDC Mapped Locations	Reports
 <i>Botaurus lentiginosus</i> (/pub/eswp/reports.do?elcode=ABNGA01020)	American Bittern	BG BWBS CDF CWH ICH IDF MS PP SBPS SBS	S3B, SNRN (2015)	Blue	G5 (2016)					 (/pub/eswp/eoMap.do?id=17185)	 (/pub/eswp/reports.do?elcode=ABNGA01020)
 <i>Buteo lagopus</i> (/pub/eswp/reports.do?elcode=ABNKC19130)	Rough-legged Hawk	BAFA BG BWBS CDF CWH ESSF ICH IDF IMA MS PP SBPS SBS SWB	S3N (2015)	Blue	G5 (2016)	NAR (1995)					 (/pub/eswp/reports.do?elcode=ABNKC19130)
 <i>Buteo platyterus</i> (/pub/eswp/reports.do?elcode=ABNKC19050)	Broad-winged Hawk	BWBS ICH IDF SBS	S3?B (2015)	Blue	G5 (2016)					 (/pub/eswp/eoMap.do?id=14687)	 (/pub/eswp/reports.do?elcode=ABNKC19050)
 <i>Buteo swainsoni</i> (/pub/eswp/reports.do?elcode=ABNKC19070)	Swainson's Hawk	BG BWBS CDF ICH IDF MS PP SBPS SBS	S2B (2015)	Red	G5 (2016)					 (/pub/eswp/eoMap.do?id=19230)	 (/pub/eswp/reports.do?elcode=ABNKC19070)
 <i>Calcarius pictus</i> (/pub/eswp/reports.do?elcode=ABPBXA6030)	Smith's Longspur	BAFA BG BWBS CDF CMA CWH IDF MS PP SBS SWB	S3S5B (2015)	Blue	G4G5 (2016)						 (/pub/eswp/reports.do?elcode=ABPBXA6030)
 <i>Callophrys niphon</i> (/pub/eswp/reports.do?elcode=IILEPE2240)	Eastern Pine Elfyn	BWBS	S1S3 (2020)	Red	G5 (2016)						 (/pub/eswp/reports.do?elcode=IILEPE2240)
 <i>Calopteryx aequabilis</i> (/pub/eswp/reports.do?elcode=IIOD065010)	River Jewelwing	BWBS IDF	S3 (2015)	Blue	G5 (2016)					 (/pub/eswp/eoMap.do?id=17372)	 (/pub/eswp/reports.do?elcode=IIOD065010)
 <i>Cardellina canadensis</i> (/pub/eswp/reports.do?elcode=ABPBX16030)	Canada Warbler	BWBS CDF CWH	S3S4B (2015)	Blue	G5 (2016)	T (2008)	1-T (2010)			 (/pub/eswp/eoMap.do?id=14627)	 (/pub/eswp/reports.do?elcode=ABPBX16030)
 <i>Carex sprengelii</i> (/pub/eswp/reports.do?elcode=PMCYP03CT0)	Sprengel's sedge	IDFxm SBSmh	S3 (2019)	Blue	G5 (2016)					 (/pub/eswp/eoMap.do?id=19434)	 (/pub/eswp/reports.do?elcode=PMCYP03CT0)
 <i>Carex torreyi</i> (/pub/eswp/reports.do?elcode=PMCYP03DT0)	Torrey's sedge	BWBSmw	S3? (2019)	Blue	G4G5 (2016)					 (/pub/eswp/eoMap.do?id=16404)	 (/pub/eswp/reports.do?elcode=PMCYP03DT0)
 <i>Carex xerantica</i> (/pub/eswp/reports.do?elcode=PMCYP03EX0)	dry-land sedge	BWBSmw IDFdm MSxk MSxv SBPSxc	S3 (2019)	Blue	G5 (2016)					 (/pub/eswp/eoMap.do?id=16627)	 (/pub/eswp/reports.do?elcode=PMCYP03EX0)
 <i>Cartocephalus palaemon mandan</i> (/pub/eswp/reports.do?elcode=IILEP42011)	Arctic Skipper, <i>mandan</i> subspecies	BWBS	S2 (2013)	Red	G5T5 (2016)					 (/pub/eswp/eoMap.do?id=19608)	 (/pub/eswp/reports.do?elcode=IILEP42011)
 <i>Cercyonis pegala nephele</i> (/pub/eswp/reports.do?elcode=IILEPN7012)	Common Wood-nymph, <i>nephele</i> subspecies	BWBS	S3 (2013)	Blue	G5T5 (2016)					 (/pub/eswp/eoMap.do?id=17798)	 (/pub/eswp/reports.do?elcode=IILEPN7012)

Scientific Name	English Name	Biogeoclimatic Units	Provincial	BC List	Global	COSEWIC	SARA	Provincial FRPA	Land Use Objectives	CDC Mapped Locations	Reports
 <i>Chondestes grammacus</i> (/pub/eswp/reports.do?elcode=ABPBX96010)	Lark Sparrow	BG BWBS CDF CWH ICH IDF MS PP SBPS SBS	S3S4B (2015)	Blue	G5 (2016)					(/pub/eswp/eoMap.do?id=16229) 	(/pub/eswp/reports.do?elcode=ABPBX96010) 
 <i>Chordeiles minor</i> (/pub/eswp/reports.do?elcode=ABNTA02020)	Common Nighthawk	BG BWBS CDF CWH ESSF ICH IDF MH MS PP SBPS SBS SWB	S4B (2015)	Yellow	G5 (2016)	SC (2018)	1-T (2010)				(/pub/eswp/reports.do?elcode=ABNTA02020) 
 <i>Coccothraustes vespertinus</i> (/pub/eswp/reports.do?elcode=ABPBY09020)	Evening Grosbeak	BG BWBS CDF CWH ESSF ICH IDF MH MS PP SBPS SBS SWB	S5 (2015)	Yellow	G5 (2016)	SC (2016)	1-SC (2019)				(/pub/eswp/reports.do?elcode=ABPBY09020) 
 <i>Coenagrion angulatum</i> (/pub/eswp/reports.do?elcode=IIODO70030)	Prairie Bluet	BWBS ESSF	S3S4 (2015)	Blue	G5 (2016)						(/pub/eswp/reports.do?elcode=IIODO70030) 
 <i>Coenonympha tullia benjamini</i> (/pub/eswp/reports.do?elcode=IILEPN6034)	Common Ringlet, <i>benjamini</i> subspecies	BWBS	S3 (2013)	Blue	G5T5 (2016)					(/pub/eswp/eoMap.do?id=16740) 	(/pub/eswp/reports.do?elcode=IILEPN6034) 
 <i>Colias meadii</i> (/pub/eswp/reports.do?elcode=IILEPA8060)	Mead's Sulphur	BAFA ESSF IMA MS	S3 (2020)	Blue	G5 (2017)						(/pub/eswp/reports.do?elcode=IILEPA8060) 
 <i>Contopus cooperi</i> (/pub/eswp/reports.do?elcode=ABPAE32010)	Olive-sided Flycatcher	BWBS CDF CWH ESSF ICH IDF MH MS PP SBPS SBS SWB	S3S4B (2015)	Blue	G4 (2016)	SC (2018)	1-T (2010)				(/pub/eswp/reports.do?elcode=ABPAE32010) 
 <i>Coturnicops noveboracensis</i> (/pub/eswp/reports.do?elcode=ABNME01010)	Yellow Rail	BWBS MS	S2B (2015)	Red	G4 (2016)	SC (2009)	1-SC (2003)			(/pub/eswp/eoMap.do?id=14150) 	(/pub/eswp/reports.do?elcode=ABNME01010) 
 <i>Dolichonyx oryzivorus</i> (/pub/eswp/reports.do?elcode=ABPBXA9010)	Bobolink	BG BWBS CDF CWH ICH IDF PP SBS	S3B (2015)	Blue	G5 (2016)	T (2010)	1-T (2017)			(/pub/eswp/eoMap.do?id=16574) 	(/pub/eswp/reports.do?elcode=ABPBXA9010) 
 <i>Drosera linearis</i> (/pub/eswp/reports.do?elcode=PDDRO02060)	slender-leaf sundew	SBSdh	S2S3 (2019)	Blue	G4G5 (2016)					(/pub/eswp/eoMap.do?id=22143) 	(/pub/eswp/reports.do?elcode=PDDRO02060) 
 <i>Epilobium davuricum</i> (/pub/eswp/reports.do?elcode=PDONA06070)	northern swamp willowherb	BAFA CMA SWBun	SH (2019)	Red	G5 (2012)					(/pub/eswp/eoMap.do?id=16714) 	(/pub/eswp/reports.do?elcode=PDONA06070) 
 <i>Erebia pawloskii</i> (/pub/eswp/reports.do?elcode=IILEPN8070)	Yellow-dotted Alpine	BWBS SWB	S2? (2020)	Red	G5 (2016)						(/pub/eswp/reports.do?elcode=IILEPN8070) 

Scientific Name	English Name	Biogeoclimatic Units	Provincial	BC List	Global	COSEWIC	SARA	Provincial FRPA	Land Use Objectives	CDC Mapped Locations	Reports
 <i>Euphagus carolinus</i> (/pub/eswp/reports.do?elcode=ABPBXB5010)	Rusty Blackbird	BG BWBS CDF CWH ESSF MS PP SBPS SBS SWB	S3S4B (2015)	Blue	G4 (2016)	SC (2017)	1-SC (2009)				 (/pub/eswp/reports.do?elcode=ABPBXB5010)
 <i>Falco mexicanus</i> (/pub/eswp/reports.do?elcode=ABNKD06090)	Prairie Falcon	BG BWBS CDF CWH ESSF ICH IDF MS PP SBS	S1 (2018)	Red	G5 (2016)	NAR (1996)		Y			 (/pub/eswp/reports.do?elcode=ABNKD06090)
 <i>Falco peregrinus anatum</i> (/pub/eswp/reports.do?elcode=ABNKD06071)	Peregrine Falcon, <i>anatum</i> subspecies	BG BWBS CDF CWH IDF MS PP SBS	S2? (2011)	Red	G4T4 (2016)	NAR (2017)	1-SC (2012)				 (/pub/eswp/reports.do?elcode=ABNKD06071)
 <i>Falco rusticolus</i> (/pub/eswp/reports.do?elcode=ABNKD06080)	Gyr Falcon	BAFA BG BWBS CDF CWH ICH IDF SBPS SBS SWB	S3S4B, SNRN (2015)	Blue	G5 (2016)	NAR (1987)					 (/pub/eswp/reports.do?elcode=ABNKD06080)
 <i>Gulo gulo luscus</i> (/pub/eswp/reports.do?elcode=AMAJF03011)	Wolverine, <i>luscus</i> subspecies	BAFA BWBS CMA CWH ESSF ICH IDF IMA MH MS SBPS SBS SWB	S3 (2010)	Blue	G4T4 (2016)	SC (2014)	1-SC (2018)	Y			 (/pub/eswp/reports.do?elcode=AMAJF03011)
 <i>Hesperia assinihoa</i> (/pub/eswp/reports.do?elcode=IILEP65190)	Assiniboine Skipper	BWBS MSxv	S2 (2020)	Red	G5 (2016)					 (/pub/eswp/eoMap.do?id=20101)	 (/pub/eswp/reports.do?elcode=IILEP65190)
 <i>Hirundo rustica</i> (/pub/eswp/reports.do?elcode=ABPAU09030)	Barn Swallow	BAFA BG BWBS CDF CWH ESSF ICH IDF IMA MH MS PP SBPS SBS SWB	S3S4B (2015)	Blue	G5 (2016)	T (2011)	1-T (2017)				 (/pub/eswp/reports.do?elcode=ABPAU09030)
 <i>Hydroprogne caspia</i> (/pub/eswp/reports.do?elcode=ABNNM08020)	Caspian Tern	BG BWBS CDF CWH ICH IDF PP SBS	S3B (2015)	Blue	G5 (2016)	NAR (1999)					 (/pub/eswp/reports.do?elcode=ABNNM08020)
 <i>Icteria virens</i> (/pub/eswp/reports.do?elcode=ABPBX24010)	Yellow-breasted Chat	BG CDF CWH ICH IDF PP SBS	S2B (2018)	Red	G5 (2016)	E (2011)	1-E (2003)	Y		 (/pub/eswp/eoMap.do?id=18365)	 (/pub/eswp/reports.do?elcode=ABPBX24010)

Scientific Name	English Name	Biogeoclimatic Units	Provincial	BC List	Global	COSEWIC	SARA	Provincial FRPA	Land Use Objectives	CDC Mapped Locations	Reports
 <i>Icterus galbula</i> (/pub/eswp/reports.do?elcode=ABPBXB9190)	Baltimore Oriole	BAFA BWBS ESSF SBS	S3?B (2015)	Blue	G5 (2016)						 (/pub/eswp/reports.do?elcode=ABPBXB9190)
 <i>Larus californicus</i> (/pub/eswp/reports.do?elcode=ABNNM03110)	California Gull	BG BWBS CDF CWH ICH IDF MS PP SBS	S2S3B (2015)	Blue	G5 (2016)						 (/pub/eswp/reports.do?elcode=ABNNM03110)
 <i>Limnodromus griseus</i> (/pub/eswp/reports.do?elcode=ABNNF16010)	Short-billed Dowitcher	BG BWBS CDF CWH ICH IDF PP SWB	S2S3B (2015)	Blue	G5 (2016)					 (/pub/eswp/eoMap.do?id=14983)	 (/pub/eswp/reports.do?elcode=ABNNF16010)
 <i>Limosa haemastica</i> (/pub/eswp/reports.do?elcode=ABNNF08020)	Hudsonian Godwit	BWBS CDF CWH IDF MS SWB	S1S2B (2015)	Red	G4 (2016)	T (2019)					 (/pub/eswp/reports.do?elcode=ABNNF08020)
 <i>Lomatium foeniculaceum</i> var. <i>foeniculaceum</i> (/pub/eswp/reports.do?elcode=PDAP11B0M3)	fennel-leaved desert-parsley	BWBSmw	S3 (2019)	Blue	G5T5 (2016)					 (/pub/eswp/eoMap.do?id=17947)	 (/pub/eswp/reports.do?elcode=PDAP11B0M3)
 <i>Lycaena hyllus</i> (/pub/eswp/reports.do?elcode=IILEPC1070)	Bronze Copper	BWBS ESSF ICH MS	S3 (2020)	Blue	G5 (2013)					 (/pub/eswp/eoMap.do?id=15420)	 (/pub/eswp/reports.do?elcode=IILEPC1070)
 <i>Melanitta perspicillata</i> (/pub/eswp/reports.do?elcode=ABNJB17020)	Surf Scoter	BG BWBS CDF CWH ICH IDF MS PP SBPS SBS SWB	S3B,S4N (2015)	Blue	G5 (2016)					 (/pub/eswp/eoMap.do?id=14699)	 (/pub/eswp/reports.do?elcode=ABNJB17020)
 <i>Micranthes hieraciifolia</i> (/pub/eswp/reports.do?elcode=PDSAX0U0Q0)	hawkweed-leaved saxifrage	BAFA CMA	S2S3 (2019)	Blue	G4G5 (2017)					 (/pub/eswp/eoMap.do?id=17525)	 (/pub/eswp/reports.do?elcode=PDSAX0U0Q0)
 <i>Myotis lucifugus</i> (/pub/eswp/reports.do?elcode=AMACC01010)	Little Brown Myotis	BG BWBS CDF CWH ESSF ICH IDF MH MS PP SBPS SBS SWB	S4 (2015)	Yellow	G3 (2016)	E (2013)	1-E (2014)				 (/pub/eswp/reports.do?elcode=AMACC01010)
 <i>Myotis septentrionalis</i> (/pub/eswp/reports.do?elcode=AMACC01150)	Northern Myotis	BWBS ICH MH SBS	S3S4 (2015)	Blue	G1G2 (2016)	E (2013)	1-E (2014)			 (/pub/eswp/eoMap.do?id=16442)	 (/pub/eswp/reports.do?elcode=AMACC01150)
 <i>Oeneis alberta</i> (/pub/eswp/reports.do?elcode=IILEPP1060)	Alberta Arctic	BWBS	S2 (2020)	Red	G5 (2015)					 (/pub/eswp/eoMap.do?id=20034)	 (/pub/eswp/reports.do?elcode=IILEPP1060)
 <i>Oeneis philipi</i> (/pub/eswp/reports.do?elcode=IILEPP1140)	Philip's Arctic	BWBS SWB	S1S3 (2020)	Red	G3G5 (2020)						 (/pub/eswp/reports.do?elcode=IILEPP1140)
 <i>Oeneis uhleri</i> (/pub/eswp/reports.do?elcode=IILEPP1050)	Uhler's Arctic	BWBS	S2S3 (2020)	Blue	G5 (2016)					 (/pub/eswp/eoMap.do?id=15684)	 (/pub/eswp/reports.do?elcode=IILEPP1050)
 <i>Oporornis agilis</i> (/pub/eswp/reports.do?elcode=ABPBX11020)	Connecticut Warbler	BWBS CWH	S3B (2015)	Blue	G4G5 (2016)			Y		 (/pub/eswp/eoMap.do?id=15834)	 (/pub/eswp/reports.do?elcode=ABPBX11020)

Scientific Name	English Name	Biogeoclimatic Units	Provincial	BC List	Global	COSEWIC	SARA	Provincial FRPA	Land Use Objectives	CDC Mapped Locations	Reports
 <i>Oreamnos americanus</i> (/pub/eswp/reports.do?elcode=AMALE02010)	Mountain Goat	BAFA BG BWBS CDF CMA CWH ESSF ICH IDF IMA MH MS PP SBPS SBS SWB	S3 (2015)	Blue	G5 (2016)						 (/pub/eswp/reports.do?elcode=AMALE02010)
 <i>Ovis canadensis</i> (/pub/eswp/reports.do?elcode=AMALE04010)	Bighorn Sheep	BAFA BG ESSF ICH IDF IMA MS PP	S3? (2015)	Blue	G4 (2016)			Y			 (/pub/eswp/reports.do?elcode=AMALE04010)
 <i>Ovis dalli stonei</i> (/pub/eswp/reports.do?elcode=AMALE04023)	Stone's Sheep		S3S4 (2017)	Blue	G5T4 (2016)						 (/pub/eswp/reports.do?elcode=AMALE04023)
 <i>Oxytropis campestris</i> var. <i>davisii</i> (/pub/eswp/reports.do?elcode=PDFAB2X04A)	Davis' locoweed	BAFA BWBSdk BWBSmw CMA IMA SBSmh SWBmk	S3? (2019)	Blue	G5T3 (2015)					 (/pub/eswp/eoMap.do?id=18478)	 (/pub/eswp/reports.do?elcode=PDFAB2X04A)
 <i>Papilio machaon hudsonianus</i> (/pub/eswp/reports.do?elcode=IILEP94085)	Old World Swallowtail, <i>hudsonianus</i> subspecies	ESSF MS SBS	S1S3 (2013)	Red	G5T5 (2016)						 (/pub/eswp/reports.do?elcode=IILEP94085)
 <i>Papilio machaon pikei</i> (/pub/eswp/reports.do?elcode=IILEP94081)	Old World Swallowtail, <i>pikei</i> subspecies	BWBS	S2? (2013)	Red	G5T3 (2000)					 (/pub/eswp/eoMap.do?id=17319)	 (/pub/eswp/reports.do?elcode=IILEP94081)
 <i>Pelecanus erythrorhynchos</i> (/pub/eswp/reports.do?elcode=ABNFC01010)	American White Pelican	BG BWBS CDF CWH ICH IDF MS PP SBPS SBS	S1B (2015)	Red	G4 (2016)	NAR (1987)		Y		 (/pub/eswp/eoMap.do?id=16622)	 (/pub/eswp/reports.do?elcode=ABNFC01010)
 <i>Penstemon gormanii</i> (/pub/eswp/reports.do?elcode=PDSCR1L2P0)	Gorman's penstemon	BWBSdk	S3? (2019)	Blue	G4 (2016)					 (/pub/eswp/eoMap.do?id=19960)	 (/pub/eswp/reports.do?elcode=PDSCR1L2P0)
 <i>Penstemon gracilis</i> (/pub/eswp/reports.do?elcode=PDSCR1L2R0)	slender penstemon	BWBSmw	S3 (2019)	Blue	G5 (2016)					 (/pub/eswp/eoMap.do?id=17282)	 (/pub/eswp/reports.do?elcode=PDSCR1L2R0)
 <i>Phalacrocorax auritus</i> (/pub/eswp/reports.do?elcode=ABNFD01020)	Double-crested Cormorant	BWBS CDF CWH ICH IDF PP SBPS SBS	S3S4 (2015)	Blue	G5 (2016)	NAR (1978)				 (/pub/eswp/eoMap.do?id=15641)	 (/pub/eswp/reports.do?elcode=ABNFD01020)
 <i>Phalaropus lobatus</i> (/pub/eswp/reports.do?elcode=ABNNF20020)	Red-necked Phalarope	BG BWBS CDF CWH ICH IDF MS PP SBPS SBS SWB	S3S4B (2015)	Blue	G4G5 (2016)	SC (2014)					 (/pub/eswp/reports.do?elcode=ABNNF20020)
 <i>Phyciodes batesii</i> (/pub/eswp/reports.do?elcode=IILEPK3040)	Tawny Crescent	BWBS SWB	S3 (2020)	Blue	G5 (2017)					 (/pub/eswp/eoMap.do?id=18794)	 (/pub/eswp/reports.do?elcode=IILEPK3040)
 <i>Planorbula armigera</i> (/pub/eswp/reports.do?elcode=IMGASN0020)	Thicklip Rams-horn	BWBS	S1S3 (2015)	Red	G5 (2017)						 (/pub/eswp/reports.do?elcode=IMGASN0020)

Scientific Name	English Name	Biogeoclimatic Units	Provincial	BC List	Global	COSEWIC	SARA	Provincial FRPA	Land Use Objectives	CDC Mapped Locations	Reports
 <i>Pluvialis dominica</i> (/pub/eswp/reports.do?elcode=ABNNB02030)	American Golden-Plover	BAFA BG BWBS CDF CWH ICH IDF MS PP SBS SWB	S3S4B (2015)	Blue	G5 (2016)						 (/pub/eswp/reports.do?elcode=ABNNB02030)
 <i>Podiceps nigricollis</i> (/pub/eswp/reports.do?elcode=ABNCA03030)	Eared Grebe	BAFA BG BWBS CMA CWH ESSF ICH IDF IMA MH MS PP SBPS SBS	S3B (2015)	Blue	G5 (2016)						 (/pub/eswp/reports.do?elcode=ABNCA03030)
 <i>Polemonium boreale</i> (/pub/eswp/reports.do?elcode=PDPLM0E010)	northern Jacob's-ladder	BAFA BWBSdk BWBSvk CMA ESSFmv IMA	S3 (2019)	Blue	G5 (2016)					 (/pub/eswp/eoMap.do?id=18294)	 (/pub/eswp/reports.do?elcode=PDPLM0E010)
 <i>Potentilla biflora</i> (/pub/eswp/reports.do?elcode=PDROS1B090)	two-flowered cinquefoil	BAFA CMA SBSmk	S3 (2019)	Blue	G4G5 (2016)					 (/pub/eswp/eoMap.do?id=19852)	 (/pub/eswp/reports.do?elcode=PDROS1B090)
 <i>Progne subis</i> (/pub/eswp/reports.do?elcode=ABPAU01010)	Purple Martin	BWBS CDF CWH ICH	S3S4B (2019)	Blue	G5 (2016)					 (/pub/eswp/eoMap.do?id=17812)	 (/pub/eswp/reports.do?elcode=ABPAU01010)
 <i>Rangifer tarandus</i> pop. 1 (/pub/eswp/reports.do?elcode=AMALC04013)	Caribou (Southern Mountain Population)	BAFA ESSF ICH IMA	S1 (2017)	Red	G5TNR	E (2014)	1-T (2003)	Y		 (/pub/eswp/eoMap.do?id=16822)	 (/pub/eswp/reports.do?elcode=AMALC04013)
 <i>Rangifer tarandus</i> pop. 14 (/pub/eswp/reports.do?elcode=AMALC0401E)	Caribou (Boreal Population)	BWBS	S2? (2017)	Red	G5TNR	T (2014)	1-T (2003)	Y		 (/pub/eswp/eoMap.do?id=14385)	 (/pub/eswp/reports.do?elcode=AMALC0401E)
 <i>Rangifer tarandus</i> pop. 15 (/pub/eswp/reports.do?elcode=AMALC0401G)	Caribou (Northern Mountain Population)	BWBS ESSF MH SBS	S2S3 (2017)	Blue	G5T4T5 (2013)	SC (2014)	1-SC (2005)	Y		 (/pub/eswp/eoMap.do?id=15648)	 (/pub/eswp/reports.do?elcode=AMALC0401G)
 <i>Ranunculus cardiophyllus</i> (/pub/eswp/reports.do?elcode=PDRAN0L0K0)	heart-leaved buttercup	BWBSmw	S2? (2019)	Red	G5 (2016)					 (/pub/eswp/eoMap.do?id=18544)	 (/pub/eswp/reports.do?elcode=PDRAN0L0K0)
 <i>Ranunculus rhomboideus</i> (/pub/eswp/reports.do?elcode=PDRAN0L2D0)	prairie buttercup	BWBSmw	S2S3 (2019)	Blue	G5 (2016)					 (/pub/eswp/eoMap.do?id=17157)	 (/pub/eswp/reports.do?elcode=PDRAN0L2D0)
 <i>Ranunculus sulphureus</i> (/pub/eswp/reports.do?elcode=PDRAN0L2K0)	sulphur buttercup	BAFA CMA	S3 (2019)	Blue	G5 (2016)					 (/pub/eswp/eoMap.do?id=16692)	 (/pub/eswp/reports.do?elcode=PDRAN0L2K0)
 <i>Recurvirostra americana</i> (/pub/eswp/reports.do?elcode=ABNND02010)	American Avocet	BG BWBS CDF CWH ICH IDF MS PP SBPS	S2S3B (2015)	Blue	G5 (2016)					 (/pub/eswp/eoMap.do?id=13908)	 (/pub/eswp/reports.do?elcode=ABNND02010)
 <i>Sabulina stricta</i> (/pub/eswp/reports.do?elcode=PCCAR0G0U0)	rock sandwort	BAFA CMA SWBmk SWBun SWBuns	S3 (2019)	Blue	G5 (1984)						 (/pub/eswp/reports.do?elcode=PCCAR0G0U0)
 <i>Salix raupii</i> (/pub/eswp/reports.do?elcode=PDSAL022H0)	Raup's willow	BWBSdk BWBSmw SWBmk SWBun	SH (2019)	Red	G3 (2016)					 (/pub/eswp/eoMap.do?id=15601)	 (/pub/eswp/reports.do?elcode=PDSAL022H0)
 <i>Sarracenia purpurea</i> ssp. <i>purpurea</i> (/pub/eswp/reports.do?elcode=PDSAR020S1)	common pitcher-plant	BWBSmw	S2? (2019)	Red	G5T5 (2015)					 (/pub/eswp/eoMap.do?id=14763)	 (/pub/eswp/reports.do?elcode=PDSAR020S1)

Scientific Name	English Name	Biogeoclimatic Units	Provincial	BC List	Global	COSEWIC	SARA	Provincial FRPA	Land Use Objectives	CDC Mapped Locations	Reports
<i>Satyrium liparops</i> (/pub/eswp/reports.do?elcode=IILEPD4100)	Striped Hairstreak	BWBS	S2 (2020)	Red	G5 (2020)					(/pub/eswp/eoMap.do?id=19404)	(/pub/eswp/reports.do?elcode=IILEPD4100)
<i>Satyrium titus titus</i> (/pub/eswp/reports.do?elcode=IILEPD4144)	Coral Hairstreak, <i>titus</i> subspecies	BWBS ESSF IMA	S2 (2013)	Red	G5T4T5 (2000)					(/pub/eswp/eoMap.do?id=17774)	(/pub/eswp/reports.do?elcode=IILEPD4144)
<i>Saxifraga hirculus</i> (/pub/eswp/reports.do?elcode=PDSAX0U0R0)	yellow marsh saxifrage	BAFAun	S3 (2019)	Blue	G5 (2016)					(/pub/eswp/eoMap.do?id=15442)	(/pub/eswp/reports.do?elcode=PDSAX0U0R0)
<i>Setophaga castanea</i> (/pub/eswp/reports.do?elcode=ABPBX03220)	Bay-breasted Warbler	BWBS CWH ICH MS SBS	S2B (2015)	Red	G5 (2016)			Y		(/pub/eswp/eoMap.do?id=18965)	(/pub/eswp/reports.do?elcode=ABPBX03220)
<i>Setophaga tigrina</i> (/pub/eswp/reports.do?elcode=ABPBX03040)	Cape May Warbler	BWBS MS SBS	S3S4B (2018)	Blue	G5 (2016)			Y		(/pub/eswp/eoMap.do?id=16727)	(/pub/eswp/reports.do?elcode=ABPBX03040)
<i>Setophaga virens</i> (/pub/eswp/reports.do?elcode=ABPBX03100)	Black-throated Green Warbler	BWBS CDF CWH ESSF ICH SBS	S3B (2015)	Blue	G5 (2016)			Y		(/pub/eswp/eoMap.do?id=13973)	(/pub/eswp/reports.do?elcode=ABPBX03100)
<i>Somatochlora brevicincta</i> (/pub/eswp/reports.do?elcode=IODO32020)	Quebec Emerald	ESSF ICH MH MS	S3 (2015)	Blue	G4 (2006)						(/pub/eswp/reports.do?elcode=IODO32020)
<i>Somatochlora forcipata</i> (/pub/eswp/reports.do?elcode=IODO32080)	Forcipate Emerald	ESSF MS SBPS SBS	S3? (2015)	Blue	G5 (2015)						(/pub/eswp/reports.do?elcode=IODO32080)
<i>Somatochlora kennedyi</i> (/pub/eswp/reports.do?elcode=IODO32140)	Kennedy's Emerald	BWBS ESSF MS SBPS SBS SWB	S3S4 (2015)	Blue	G5 (2015)						(/pub/eswp/reports.do?elcode=IODO32140)
<i>Speyeria aphrodite manitoba</i> (/pub/eswp/reports.do?elcode=IILEPJ6033)	Aphrodite Fritillary, <i>manitoba</i> subspecies	BWBS ESSF MS	S3 (2013)	Blue	G5T5 (2016)					(/pub/eswp/eoMap.do?id=19755)	(/pub/eswp/reports.do?elcode=IILEPJ6033)
<i>Speyeria cybele pseudocarpenteri</i> (/pub/eswp/reports.do?elcode=IILEPJ6023)	Great Spangled Fritillary, <i>pseudocarpenteri</i> subspecies	BWBS	S2 (2013)	Red	G5T5 (2016)					(/pub/eswp/eoMap.do?id=19345)	(/pub/eswp/reports.do?elcode=IILEPJ6023)
<i>Speyeria mormonia eurynome</i> (/pub/eswp/reports.do?elcode=IILEPJ6136)	Mormon Fritillary, <i>eurynome</i> subspecies	ESSF IMA MS	S1S3 (2013)	Red	G5TNR						(/pub/eswp/reports.do?elcode=IILEPJ6136)

Showing 1 to 100 of 110 entries

First Previous **1** 2 Next Last

Search Criteria

Plants OR Animals
 AND BC Conservation Status:Red (Extirpated, Endangered, or Threatened) OR Blue (Special Concern)
 OR COSEWIC Status:Endangered OR Threatened OR Special Concern
 AND 'Ecosections':Muskwa Foothills,Muskwa Upland
 AND Habitat Types: Agriculture,Anthropogenic,Forest,Grassland/Shrub,Riparian,Stream/River,Wetland
 Sort Order:Scientific Name Ascending

Notes

1. Citation: B.C. Conservation Data Centre. 2020. BC Species and Ecosystems Explorer. B.C. Minist. of Environ. Victoria, B.C. Available: <http://a100.gov.bc.ca/pub/eswp/> (<http://a100.gov.bc.ca/pub/eswp/>) (accessed Sep 25, 2020).
2. The data contained in the Results Export in BCSEE are provided under the Open Government License - BC (<http://www.data.gov.bc.ca/local/dbc/docs/license/OGL-vbc2.0.pdf>).
3. We welcome your comments at cdccdata@gov.bc.ca.



Search Results 110 records

Modify Search (/pub/eswp/search.do?method=change)

New Search (/pub/eswp/search.do?method=reset)

Export Results

Help

Show 100 rows Column Visibility Sort Order Scientific Name Ascending

Scientific Name	English Name	Biogeoclimatic Units	Provincial	BC List	Global	COSEWIC	SARA	Provincial FRPA	Land Use Objectives	CDC Mapped Locations	Reports
<i>Sterna forsteri</i> (/pub/eswp/reports.do?elcode=ABNNM08090)	Forster's Tern	BG BWBS CDF CWH ICH IDF PP	S1B (2015)	Red	G5 (2016)	DD (1996)				(/pub/eswp/eoMap.do?id=15407)	(/pub/eswp/reports.do?elcode=ABNNM08090)
<i>Tephrosieris frigida</i> (/pub/eswp/reports.do?elcode=PDAST8H0B1)	purple-haired groundsel	BAFA CMA SWBun SWBuns	S3 (2019)	Blue	G5T5 (2016)					(/pub/eswp/eoMap.do?id=17417)	(/pub/eswp/reports.do?elcode=PDAST8H0B1)
<i>Tephrosieris palustris</i> (/pub/eswp/reports.do?elcode=PDAST8H0U0)	marsh fleabane	BWBSdk BWBSmw	S3 (2019)	Blue	G5 (2016)					(/pub/eswp/eoMap.do?id=14078)	(/pub/eswp/reports.do?elcode=PDAST8H0U0)
<i>Tephrosieris yukonensis</i> (/pub/eswp/reports.do?elcode=PDAST8H3C0)	Yukon groundsel	BAFA CMA	S3 (2019)	Blue	G4G5 (2016)					(/pub/eswp/eoMap.do?id=15761)	(/pub/eswp/reports.do?elcode=PDAST8H3C0)
<i>Tringa incana</i> (/pub/eswp/reports.do?elcode=ABNNF03010)	Wandering Tattler	BWBS CDF CWH IDF SBS SWB	S3B (2015)	Blue	G4G5 (2016)						(/pub/eswp/reports.do?elcode=ABNNF03010)
<i>Tyto alba</i> (/pub/eswp/reports.do?elcode=ABNSA01010)	Barn Owl	BG BWBS CDF CWH ICH IDF PP	S2? (2015)	Red	G5 (2016)	T (2010)	1-T (2018)				(/pub/eswp/reports.do?elcode=ABNSA01010)
<i>Ursus arctos</i> (/pub/eswp/reports.do?elcode=AMAJB01020)	Grizzly Bear	BAFA BWBS CMA CWH ESSF ICH IDF IMA MH MS SBPS SBS SWB	S3? (2015)	Blue	G4 (2016)	SC (2012)	1-SC (2018)	Y			(/pub/eswp/reports.do?elcode=AMAJB01020)
<i>Utricularia ochroleuca</i> (/pub/eswp/reports.do?elcode=PDLNT020E0)	ochroleucous bladderwort	BWBSdk CDFmm ESSFmv ICHmw	S2S3 (2019)	Blue	G4G5 (2016)					(/pub/eswp/eoMap.do?id=14086)	(/pub/eswp/reports.do?elcode=PDLNT020E0)
<i>Valvata tricarinata</i> (/pub/eswp/reports.do?elcode=IMGASE5080)	Threeridge Valvata	BAFA BWBS ESSF ICH IDF IMA MS SBS	S1S2 (2015)	Red	G5 (2015)						(/pub/eswp/reports.do?elcode=IMGASE5080)
<i>Vertigo arthuri</i> (/pub/eswp/reports.do?elcode=IMGAS20500)	Callused Vertigo	BWBS IDF	S3S4 (2015)	Blue	G5 (2010)						(/pub/eswp/reports.do?elcode=IMGAS20500)

Showing 101 to 110 of 110 entries

First Previous 1 2 Next Last

Search Criteria

Plants OR Animals
 AND BC Conservation Status:Red (Extirpated, Endangered, or Threatened) OR Blue (Special Concern)
 OR COSEWIC Status:Endangered OR Threatened OR Special Concern
 AND 'Ecoactions':Muskwa Foothills,Muskwa Upland
 AND Habitat Types: Agriculture,Anthropogenic,Forest,Grassland/Shrub,Riparian,Stream/River,Wetland
 Sort Order:Scientific Name Ascending

Notes

1. Citation: B.C. Conservation Data Centre. 2020. BC Species and Ecosystems Explorer. B.C. Minist. of Environ. Victoria, B.C. Available: <http://a100.gov.bc.ca/pub/eswp/> (<http://a100.gov.bc.ca/pub/eswp/>) (accessed Sep 25, 2020).
2. The data contained in the Results Export in BCSEE are provided under the Open Government License - BC (<http://www.data.gov.bc.ca/local/dbc/docs/license/OGL-vbc2.0.pdf>).
3. We welcome your comments at cdccdata@gov.bc.ca.

APPENDIX C

CARIBOU PROTECTION PLAN

Caribou Protection Plan Alaska Highway Realignment & Reconstruction KM 566+900 and KM 570+200



PRESENTED TO
Public Services and Procurement Canada

JANUARY 20, 2021
ISSUED FOR USE
FILE: 704-TRN.VHWY03172-02

This page intentionally left blank.

TABLE OF CONTENTS

1.0 INTRODUCTION	1
2.0 CARIBOU AND CARIBOU HABITAT PROTECTION	1
2.1 Conservation Status	1
2.2 Habitat Use and Distribution	2
2.3 Caribou Habitat Management in British Columbia.....	2
2.3.1 Critical Habitat Areas	2
2.3.2 Ungulate Winter Range	2
2.3.3 Wildlife Habitat Areas	3
3.0 PROJECT DESCRIPTION	3
3.1 Project Activities.....	3
3.2 Project Footprint in Caribou Range	4
3.3 Project Schedule.....	4
4.0 CARIBOU-RELATED MITIGATION COMMITMENTS	4
4.1 Caribou Protection Plan.....	5
5.0 CLOSURE	7
REFERENCES	8

LIST OF TABLES IN TEXT

Table 2-1: The Conservation Status of the Four Caribou Ecotypes in British Columbia	2
Table 4-1: Best Management Practices for Working in Woodland Caribou Habitat	5

APPENDIX SECTIONS

FIGURES

Figure 1 Location Plan and Project Footprint within Caribou Range

APPENDICES

Appendix 1 Tetra Tech’s Limitations on the Use of this Document
 Appendix 2 Map of Caribou Distribution in British Columbia by Ecotype

ACRONYMS & ABBREVIATIONS

Acronyms/Abbreviations	Definition
BMP	Best Management Practices
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CPP	Caribou Protection Plan
ECCC	Environment and Climate Change Canada
EMP	Environmental Management Plan
FLNRORD	BC Ministry of Forests, Lands and Natural Resource Operations and Rural Development
FRPA	<i>Forest, Range and Practices Act</i>
GWM	General Wildlife Measures
km	kilometre
m	metre
MOE	BC Ministry of Environment and Climate Change Strategy
PSPC	Public Services and Procurement Canada
SARA	<i>Species at Risk Act</i>
SAR	<i>Species at Risk</i>
UWR	Ungulate Winter Range
WHA	Wildlife Habitat Area

LIMITATIONS OF REPORT

This report and its contents are intended for the sole use of Public Services and Procurement 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 Services and Procurement 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 report is subject to the terms and conditions stated in Tetra Tech Canada Inc.'s Services Agreement. Tetra Tech's Limitations on the Use of this Document are provided in Appendix 1 of this report.

1.0 INTRODUCTION

Tetra Tech Canada Inc. (Tetra Tech) was retained by Public Services and Procurement Canada (PSPC) to prepare this Caribou Protection Plan (CPP) for planned highway realignment and reconstruction work located between KM 566.9 and KM 570.2 of the Alaska Highway (herein referred to as the “Project”).

Woodland caribou (*Rangifer tarandus*) are federally designated as Species at Risk (SAR) under the *Species at Risk Act* (SARA), and as such, their populations and critical habitats are legally protected. The Project falls within the range of the Woodland Caribou and there is potential for the northern mountain ecotype (*Rangifer tarandus* pop. 15) to be present within the Project area (Figure 1). Caribou likely occur infrequently along the highway, especially in winter when lower elevation habitats are used more for foraging (COSEWIC 2014).

The CPP objectives are to provide strategies and best management practices to:

1. Avoid, where practical, and reduce potential Project-related effects on caribou and caribou habitat;
2. Support provincial caribou conservation objectives; and
3. Provide a practical construction planning and mitigation checklist.

This CPP includes the project overview, a description of proposed work, a summary of caribou management in British Columbia, mitigation measures to protect caribou and caribou habitat, and a map of the culvert replacement locations in relation to known caribou habitat. Mitigation considers reducing sources of human-related caribou mortality, reducing excessive predation on both calves and adults, limiting habitat loss, and reducing potential increases to alternate prey species abundance and distribution.

2.0 CARIBOU AND CARIBOU HABITAT PROTECTION

British Columbia is home to 54 herds of Woodland Caribou, which have been separated into four ecotypes, or populations, based on range and habitat use (Gov. of British Columbia 2018). The four ecotypes are as follows:

1. Southern mountain population (*Rangifer tarandus* pop. 1);
2. Boreal population (*Rangifer tarandus* pop. 14);
3. Northern mountain population (*Rangifer tarandus* pop. 15); and
4. Central mountain population (*Rangifer tarandus* pop. 18).

A map showing the distribution of each woodland caribou ecotype is presented in Appendix 2 (FLNRORD 2018a).

2.1 Conservation Status

Woodland Caribou (*Rangifer tarandus*) are federally designated under the SARA as either as ‘Threatened’ (boreal, southern mountain, and central mountain populations) or ‘Special Concern’ (northern mountain population) and as such, their populations and critical habitat are legally protected from harm. In 2012, the federal government released the *Recovery Strategy for the Woodland Caribou (Rangifer tarandus), Boreal Mountain Population in Canada* and the *Management Plan for the Northern Mountain Population of Woodland Caribou (Rangifer tarandus caribou) in Canada*. These documents aim to recover, maintain, and or increase the size and distribution of self-sustaining local populations (ECCC 2012a; ECCC 2012b).

Provincially in British Columbia, the southern mountain, central mountain, and boreal caribou ecotypes are red-listed, and the northern mountain ecotype is blue-listed. The British Columbia Government is currently preparing a Caribou Recovery Program to meet the requirements outlined by the federal government (under the authority of the SARA) in the Federal Recovery Strategy for Woodland Caribou (FLNRORD 2018b).

Table 2-1: The Conservation Status of the Four Caribou Ecotypes in British Columbia

Ecotype	Population	BC List	COSEWIC	SARA
Southern mountain	Pop. 1	Red	Endangered	Threatened
Boreal	Pop. 14	Red	Threatened	Threatened
Northern mountain	Pop. 15	Blue	Special Concern	Special Concern
Central mountain	Pop. 18	Red	Endangered	Threatened

By definition, woodland caribou are likely to become endangered if factors leading to their decline are not reversed. Natural and human-related habitat loss and alteration (e.g., fragmentation, degradation) leading to an increase in predation is the primary factor contributing to caribou population declines (ECCC 2012a, GOA 2016).

2.2 Habitat Use and Distribution

The Project is located within the provincially mapped range of the Muskwa herd, which is part of the Northern Mountain ecotype. As such, there is potential for northern mountain caribou to be present within the Project area.

Northern mountain caribou spend the winter months in low-elevation pine-lichen stands or high-elevation alpine habitats, where they rely primarily on terrestrial lichens for forage. During calving season, female northern mountain caribou will migrate long distances to sub-alpine ridges, where they give birth to their calves at high elevation to avoid the threat of predation (FLNRORD 2014).

Caribou are most sensitive to disturbance during late winter (pre-calving season), due to the poor body condition of pregnant females, and during the calving season in the spring. FLNRORD has identified the period between January 15 and July 15 as a critical timing window for caribou. The fall rut, typically from September 15 to January 14, has been identified as a cautionary timing window.

2.3 Caribou Habitat Management in British Columbia

2.3.1 Critical Habitat Areas

Under SARA, critical habitat is defined as habitat that is “necessary for the survival or recovery of a listed wildlife species” and has been identified as such in the recovery strategy for that species (SARA 2002). Environment and Climate Change Canada (ECCC) has determined that on federal lands managed outside of the jurisdiction of Parks Canada Agency “existing federal laws and regulations do not currently provide for mandatory, enforceable prohibitions against the destruction of boreal caribou critical habitat” (ECCC 2018). The Project is not located within critical caribou habitat (Figure 1).

2.3.2 Ungulate Winter Range

Ungulate Winter Ranges (UWR) are established under the *Forest and Range Practices Act* (FRPA) with the objective of meeting the winter habitat requirements of an ungulate species (BC MOE 2018a). Work that is to occur within a UWR must follow the General Wildlife Measures (GWM) outlined in the UWR order (FLNRORD 2011a). The Project is not located within UWR.

2.3.3 Wildlife Habitat Areas

As Species at Risk, Woodland Caribou are considered “Identified Wildlife” under the FRPA. Wildlife Habitat Areas (WHAs) are designated areas that the British Columbia Government considers critical habitat (i.e., necessary to fulfill the habitat requirements) of Identified Wildlife. To protect critical habitat within the WHAs, certain activities such as forestry and industrial developments are limited and/or prohibited within these areas (BC MOE 2018b). No WHAs for Woodland Caribou are located within the Project area.

3.0 PROJECT DESCRIPTION

Since 1964, PSPC has been the federal custodian for the Alaska Highway and is responsible for the maintenance of the current highway. PSPC’s current operational jurisdiction of the Alaska Highway extends from KM 133 (north of Fort St. John) to the British Columbia-Yukon border at KM 968.

PSPC intends to realign a section of the Alaska Highway between KM 566.9 and KM 570.2 (Figure 1). Currently, this section of the Alaska Highway contains horizontal curves that do not achieve the requirements of the relevant highway geometric design guidelines. The objective of this Project is to improve safety of this section of the Alaska Highway by realigning the highway to achieve a design speed of 100 km/h in accordance with the relevant highway geometric design guidelines.

3.1 Project Activities

Project activities will be restricted entirely within the Alaska Highway right-of-way. In general, habitat located immediately adjacent to roads is effectively lost to many species (Jalkotzy and Nasserden 1997), including caribou. Anticipated Project-related effects on caribou and caribou habitat are expected to be limited due to the Project’s location immediately adjacent to the Alaska Highway. Nonetheless PSPC is committed to mitigating Project-related effects to caribou and caribou habitat.

The highway realignment and reconstruction works between KM 566.9 and KM 570.2 will include the following:

- Early works will be conducted in advance of this Project in Winter 2020/2021 under a separate Tender:
 - Tree / vegetation clearing within PSPC’s right-of-way boundary, excluding areas within the 30 m riparian buffer of watercourses;
 - Rock excavation and common excavation;
- Highway widening and realignment in Spring of 2021, including the following works:
 - Grubbing of stumps and roots, and stripping of organics within the construction limits of the proposed highway;
 - Placement and compaction of embankment fill material, sourced from excavations onsite and offsite;
 - Crushing, placement and compaction of crushed base gravel and sub-base course; and,
 - Bituminous Surface Treatment (BST) application.

- Drainage improvements including the following works:
 - Replacement of two large (>1500 mm diameter) culverts via open cut method at KM 568.84 and KM 569.95. Both locations will feature fish friendly design (baffles, natural substrate, crushed base gravel in riprap voids);
 - Replacement of ten small (<1000 mm diameter) drainage culverts via open cut or trenchless installation methods;
 - Minor channel realignment at the culvert inlet and outlet to redirect flow through new culverts;
 - Erosion protection (e.g., riprap) installation around culvert inlets and outlets;
 - Excavation, removal and offsite disposal of existing culvert structures; and
 - Backfilling existing culvert excavations with crushed granular aggregate.

3.2 Project Footprint in Caribou Range

The entire Project is located within the provincially mapped range of the Muskwa Herd, which is part of the Northern Mountain ecotype (Figure 1). At each site, the construction activities will occur entirely within the Alaska Highway right-of-way, which will help avoid new impacts to caribou habitat. None of the culvert replacements will be occurring within critical caribou habitat.

3.3 Project Schedule

The Project is scheduled to occur in the Spring of 2021 which is during the critical risk periods for Woodland Caribou (see CPP #1.3 in Section 4.0). Special care should be taken for construction activities conducted during these times.

4.0 CARIBOU-RELATED MITIGATION COMMITMENTS

Caribou may be directly and indirectly affected by the proposed Project and its activities. There is the potential that some individuals from the surrounding caribou populations may be present near the Alaska Highway during the timing of proposed Project activities (Spring of 2021). During this time, caribou may be directly or indirectly affected or disturbed to the point of avoiding the area as a result of Project activities such as sustained or repeated noise or light disturbances. Behavioral responses to Project activities may vary depending on the frequency, timing, and severity of the disturbing activity, as well as the receptor (e.g., bull vs. pregnant female). Caribou, especially pregnant cows and young calves are particularly sensitive to disturbances that might occur during late winter to early summer.

The Project might also indirectly affect caribou by changing habitat quality (e.g., through changes to local hydrology and increasing habitat fragmentation), quantity (through direct loss of habitat from disturbance), availability/accessibility to habitat, and potentially altering predator-prey dynamics. The localized nature of the activities associated with this Project, and their restriction to the existing highway right-of-way, however, make these potential effects unlikely to occur.

Effects to caribou may include the following:

- Permanent habitat loss and/or alteration as a result of the Project footprint;
- Direct mortality from collisions with Project-related traffic (including equipment);
- Indirect mortality from increased predation risk if the following occur along linear corridors:
 - Caribou visibility to predators is enhanced;
 - Predator mobility is enhanced; or
 - Forage for other ungulate prey species is enhanced in revegetated areas.
- Sensory disturbance and restricted movement from equipment operation (i.e., noise and light disturbance) and human presence during all project activities.

4.1 Caribou Protection Plan

To mitigate potential caribou habitat, mortality, disturbance, and movement effects, various strategies in the form of best management practices (BMPs) should be implemented throughout the duration of the Project. Mitigations considered for this CPP follow those outlined the following documents:

- A Compendium of Wildlife Guidelines for Industrial Development Projects in the North Area, British Columbia (FLNRO 2014);
- Recovery Strategy for the Woodland Caribou (*Rangifer tarandus caribou*), Boreal population in Canada (EC 2014);
- Interim Operating Practices for Oil and Gas Activities in Identified Boreal Caribou Habitat in British Columbia (FLNRORD 2011b); and
- A Caribou Protection Plan that Tetra Tech prepared for a Project along Highway 40 in Alberta, following the caribou management guidelines and BMPs developed by the Alberta Government (Tetra Tech 2017).

Caribou-specific mitigation commitments that should be followed and implemented throughout the duration of the Project are summarized in Table 4-1.

Table 4-1: Best Management Practices for Working in Woodland Caribou Habitat

CPP #	Mitigation Measures
1.0 General Measures	
1.1	<ul style="list-style-type: none"> ▪ Adhere to approved Environmental Management Plan (EMP) for the Project. This includes requiring all contractors working within the caribou range to be responsible for retaining an Environmental Monitor and to provide adequate education and training to their employees of the mitigation commitments to address caribou and caribou habitat conservation (i.e., training and orientation programs, kickoff, and tailgate meetings).
1.2	<ul style="list-style-type: none"> ▪ Follow the BMPs for working in Woodland Caribou habitat that are outlined in the Compendium of Wildlife Guidelines for Industrial Development Projects in the North Area, British Columbia (FLNRORD 2014).

CPP #	Mitigation Measures
1.3	<ul style="list-style-type: none"> ▪ Be aware of the risk periods for Woodland Caribou and try to work outside of the critical-use periods. The late winter and calving period, occurring from mid-January to mid-July, is identified as critical for both northern and mountain caribou. The winter/rut period is identified as a cautionary timing window. ▪ The risk periods for Woodland Caribou in northern BC are as follows: <ul style="list-style-type: none"> – Low risk: July 16 – September 14 – Caution: September 15 – January 14 – Critical: January 15 – July 15
1.4	<ul style="list-style-type: none"> ▪ Ensure caribou and caribou habitat mitigations are implemented throughout the Project by retaining an Environmental Monitor to be on-call during construction activities and to train the Contractor in caribou identification and mitigation.
2.0 Measures to Protect Caribou	
2.1	<ul style="list-style-type: none"> ▪ Monitor for caribou presence during construction activities and report all caribou observed and worker/wildlife conflicts and incidents to the EM and PSPC.
2.2	<ul style="list-style-type: none"> ▪ If caribou are observed within the Project area, a stop-work order must be issued until the individual has left the area.
2.3	<ul style="list-style-type: none"> ▪ Limit collision related mortality by obeying speed restrictions and signage.
2.4	<ul style="list-style-type: none"> ▪ Equipment and truck traffic to yield the right-of-way to wildlife.
2.5	<ul style="list-style-type: none"> ▪ Sequence to avoid/reduce repeat operations or multiple entries in caribou range.
2.6	<ul style="list-style-type: none"> ▪ Prohibit workers feeding, harassing, and approaching wildlife.
2.7	<ul style="list-style-type: none"> ▪ Prohibit temporary work camps inside caribou range to minimize predator attraction.
2.8	<ul style="list-style-type: none"> ▪ Prohibit firearms or hunting and fishing by workers.
2.9	<ul style="list-style-type: none"> ▪ Avoid idling equipment and trucks.
2.10	<ul style="list-style-type: none"> ▪ Ensure all exhaust systems have mufflers and all equipment operates as per specifications.
3.0 Measures to Protect Caribou Habitat	
3.1	<ul style="list-style-type: none"> ▪ Limit all Project-related footprints and activities to existing disturbances within the current Alaska High-way right-of-way.
3.2	<ul style="list-style-type: none"> ▪ Avoid constructing new linear features (i.e., roads) to facilitate access to the construction sites. Use existing access whenever possible. If needed, use helicopter access to avoid the creation of new access corridors.
3.3	<ul style="list-style-type: none"> ▪ If working in winter, avoid plowing or packing snow in caribou habitat.
3.4	<ul style="list-style-type: none"> ▪ Reduce the risk of wildfire by properly maintaining equipment and vehicles and regularly cleaning flammable material from the exhaust system. Similarly, have approved firefighting equipment (i.e., fire extinguishers and shovels) on hand.
3.5	<ul style="list-style-type: none"> ▪ Brief on-site personnel on proper cigarette (and match) field handling procedures.
3.6	<ul style="list-style-type: none"> ▪ Clean all construction equipment prior to on-site arrival to minimize the risk of weed or disease introduction.
3.7	<ul style="list-style-type: none"> ▪ Maintain proper waste handling and removal practices to minimize predator attraction and contaminating caribou habitat.
3.8	<ul style="list-style-type: none"> ▪ Avoid use of road salts or chemical dust control chemicals to prevent impacts to the water quality of surrounding watercourses.
3.9	<ul style="list-style-type: none"> ▪ Avoid or minimize vegetation clearing and wherever possible. Minimize the amount of physical disturbance to soil and vegetation.
3.10	<ul style="list-style-type: none"> ▪ Fell trees in a manner to avoid adjacent timber damage. No trees will be felled into watercourses or waterbodies.
3.11	<ul style="list-style-type: none"> ▪ Maintain the integrity of the root layer (i.e., avoid grubbing), to the extent possible.
3.12	<ul style="list-style-type: none"> ▪ Support the rapid natural revegetation of temporary disturbances immediately after Project completion.

5.0 CLOSURE

We trust this report meets your present requirements. If you have any questions or comments, please contact the undersigned.

Respectfully Submitted,
Tetra Tech Canada Inc.

FILE: 704-TRN.VHWY03172-02
FILE: 704-TRN.VHWY03172-02
FILE: 704-TRN.VHWY03172-02

FILE: 704-TRN.VHWY03172-02
FILE: 704-TRN.VHWY03172-02
FILE: 704-TRN.VHWY03172-02

Prepared by:
Elyse Hofs, B.Sc., Dipl.T.
Junior Environmental Scientist
Environment and Water Practice
Direct Line: 778.945.5724
Elyse.Hofs@tetrattech.com

Reviewed by:
Jeff Matheson, M.Sc., R.P. Bio.
Senior Biologist
Environment and Water Practice
Direct Line: 604.608.8909
Jeff.Matheson@tetrattech.com

/sy

REFERENCES

- BC Ministry of Environment and Climate Change Strategy [MOE]. 2018a. Ungulate Winter Ranges. Government of BC. Available at: <http://www.env.gov.bc.ca/wld/frpa/uwr/index.html>.
- BC Ministry of Environment and Climate Change Strategy [MOE]. 2018b. Approved Wildlife Habitat Areas. Government of BC. Available at: <http://www.env.gov.bc.ca/wld/frpa/iwms/wha.html>.
- BC Ministry of Forests, Lands and Natural Resource Operations and Rural Development [FLNRORD]. 2011a. Order - Ungulate Winter Range # U-9-010: Boreal Caribou, Fort Nelson Timber Supply Area. Government of British Columbia. Available at: http://www.env.gov.bc.ca/wld/documents/uwr/RATA_U-9-010_Order_GWMs_only.pdf
- BC Ministry of Forests, Lands and Natural Resource Operations and Rural Development [FLNRORD]. 2011b. Interim Operating Practices for Oil and Gas Activities in Identified Boreal Caribou Habitat in British Columbia. Government of British Columbia. Available at: <http://www.env.gov.bc.ca/wld/speciesconservation/bc/documents/Operating%20Practices.pdf>
- BC Ministry of Forests, Lands and Natural Resource Operations and Rural Development [FLNRORD]. 2014. A Compendium of Wildlife Guidelines for Industrial Development Projects in the North Area, British Columbia. Government of British Columbia. Available at: <http://a100.gov.bc.ca/pub/eirs/finishDownloadDocument.do?subdocumentId=9921>
- BC Ministry of Forests, Lands, Natural Resource Operations and Rural Development [FLNRORD]. 2018a. Provincial Caribou Recovery Program: Discussion Paper. Government of British Columbia. Available at: https://engage.gov.bc.ca/app/uploads/sites/373/2018/04/Provincial-Caribou-Recovery-Program-Apr18_Rev.pdf
- BC Ministry of Forests, Lands, Natural Resource Operations and Rural Development [FLNRORD]. 2018b. Provincial Caribou Recovery Program – 2017/2018 Annual Report. Province of British Columbia. Available at: https://www.for.gov.bc.ca/ftp/HTH/external/!publish/Caribou%20Recovery%20Program/Reports/17_18_Caribou%20Annual%20Report.pdf
- COSEWIC. 2014. COSEWIC assessment and status report on the Caribou *Rangifer tarandus*, Northern Mountain population, Central Mountain population and Southern Mountain population in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xxii + 113 pp. (www.registrelep-sararegistry.gc.ca/default_e.cfm)
- Environment and Climate Change Canada [ECCC]. 2012a. Recovery Strategy for the Woodland Caribou, Boreal Mountain populations (*Rangifer tarandus caribou*) in Canada. *Species at Risk Act* Recovery Strategy Series. Government of Canada. Available at: https://wildlife-species.canada.ca/species-risk-registry/document/default_e.cfm?documentID=2253
- Environment and Climate Change Canada [ECCC]. 2012b. Management Plan for the Northern Mountain Population of Woodland Caribou (*Rangifer tarandus caribou*) in Canada. Government of Canada. Available at: https://wildlife-species.canada.ca/species-risk-registry/document/default_e.cfm?documentID=2244
- Environment and Climate Change Canada [ECCC]. 2018. Progress report on unprotected critical habitat for the Woodland Caribou (*Rangifer tarandus caribou*), Boreal population, in Canada - April 2018. Government of Canada. Available at: <https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry/critical-habitat-reports/woodland-caribou-boreal-population-2018.html#toc2>. (Accessed August 28, 2018)
- Forest and Range Practices Act, SBC 2002, c 69, <<http://canlii.ca/t/531k8>> retrieved on 2019-01-29

Government of BC [Gov. of BC]. 2018. Caribou. Government of BC. Available at:

<https://www2.gov.bc.ca/gov/content/environment/plants-animals-ecosystems/wildlife/wildlife-conservation/caribou>. (Accessed on Jan 22, 2019).

Government of Alberta [GOA]. 2016. Draft Little Smoky and A La Peche Caribou Range Plan. Web access:

<http://aep.alberta.ca/fish-wildlife/wildlife-management/caribou-management/caribou-action-range-planning/documents/LittleSmokeyAlaPecheRangePlan-Draft-Jun2-2016.pdf>.

Jalkotzy, M.P. and R.M. Nasserden. 1997. The Effects of Linear Development on Wildlife: A Review of Selected Scientific Literature. Prepared for the Canadian Association of Petroleum Producers. Arc Wildlife Services Ltd., Calgary, Alberta. 115 pp.

Species at Risk Act [SARA], SC 2002, c 29, <<http://canlii.ca/t/535ts>> retrieved on 2019-01-29

Tetra Tech. 2017. Caribou Protection Plan: Alberta Highway 40:34, Muskeg Cabins to East of Grande Cache MD of Greenview, Alberta. Prepared for Alberta Transportation. 42 pp.

FIGURES

Figure 1 Location Plan and Project Footprint within Caribou Range

APPENDIX 1

TETRA TECH'S LIMITATIONS ON THE USE OF THIS DOCUMENT

LIMITATIONS ON USE OF THIS DOCUMENT

NATURAL SCIENCES

1.1 USE OF DOCUMENT AND OWNERSHIP

This document pertains to a specific site, a specific development, and a specific scope of work. The document may include plans, drawings, profiles and other supporting documents that collectively constitute the document (the "Professional Document").

The Professional Document is intended for the sole use of TETRA TECH's Client (the "Client") as specifically identified in the TETRA TECH Services Agreement or other Contractual Agreement entered into with the Client (either of which is termed the "Contract" herein). TETRA TECH does not accept any responsibility for the accuracy of any of the data, analyses, recommendations or other contents of the Professional Document when it is used or relied upon by any party other than the Client, unless authorized in writing by TETRA TECH.

Any unauthorized use of the Professional Document is at the sole risk of the user. TETRA TECH accepts no responsibility whatsoever for any loss or damage where such loss or damage is alleged to be or, is in fact, caused by the unauthorized use of the Professional Document.

Where TETRA TECH has expressly authorized the use of the Professional Document by a third party (an "Authorized Party"), consideration for such authorization is the Authorized Party's acceptance of these Limitations on Use of this Document as well as any limitations on liability contained in the Contract with the Client (all of which is collectively termed the "Limitations on Liability"). The Authorized Party should carefully review both these Limitations on Use of this Document and the Contract prior to making any use of the Professional Document. Any use made of the Professional Document by an Authorized Party constitutes the Authorized Party's express acceptance of, and agreement to, the Limitations on Liability.

The Professional Document and any other form or type of data or documents generated by TETRA TECH during the performance of the work are TETRA TECH's professional work product and shall remain the copyright property of TETRA TECH.

The Professional Document is subject to copyright and shall not be reproduced either wholly or in part without the prior, written permission of TETRA TECH. Additional copies of the Document, if required, may be obtained upon request.

1.2 ALTERNATIVE DOCUMENT FORMAT

Where TETRA TECH submits electronic file and/or hard copy versions of the Professional Document or any drawings or other project-related documents and deliverables (collectively termed TETRA TECH's "Instruments of Professional Service"), only the signed and/or sealed versions shall be considered final. The original signed and/or sealed electronic file and/or hard copy version archived by TETRA TECH shall be deemed to be the original. TETRA TECH will archive a protected digital copy of the original signed and/or sealed version for a period of 10 years.

Both electronic file and/or hard copy versions of TETRA TECH's Instruments of Professional Service shall not, under any circumstances, be altered by any party except TETRA TECH. TETRA TECH's Instruments of Professional Service will be used only and exactly as submitted by TETRA TECH.

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.

1.3 STANDARD OF CARE

Services performed by TETRA TECH for the Professional Document have been conducted in accordance with the Contract, in a manner consistent with the level of skill ordinarily exercised by members of the profession currently practicing under similar conditions in the jurisdiction in which the services are provided. Professional judgment has been applied in developing the conclusions and/or recommendations provided in this Professional Document. No warranty or guarantee, express or implied, is made concerning the test results, comments, recommendations, or any other portion of the Professional Document.

If any error or omission is detected by the Client or an Authorized Party, the error or omission must be immediately brought to the attention of TETRA TECH.

1.4 DISCLOSURE OF INFORMATION BY CLIENT

The Client acknowledges that it has fully cooperated with TETRA TECH with respect to the provision of all available information on the past, present, and proposed conditions on the site, including historical information respecting the use of the site. The Client further acknowledges that in order for TETRA TECH to properly provide the services contracted for in the Contract, TETRA TECH has relied upon the Client with respect to both the full disclosure and accuracy of any such information.

1.5 INFORMATION PROVIDED TO TETRA TECH BY OTHERS

During the performance of the work and the preparation of this Professional Document, TETRA TECH may have relied on information provided by 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 ISSUES

The ability to rely upon and generalize from environmental baseline data is dependent on data collection activities occurring within biologically relevant survey windows.

It is incumbent upon the Client and any Authorized Party, to be knowledgeable of the level of risk that has been incorporated into the project design or scope, in consideration of the level of the environmental baseline information that was reasonably acquired to facilitate completion of the scope.

1.8 NOTIFICATION OF AUTHORITIES

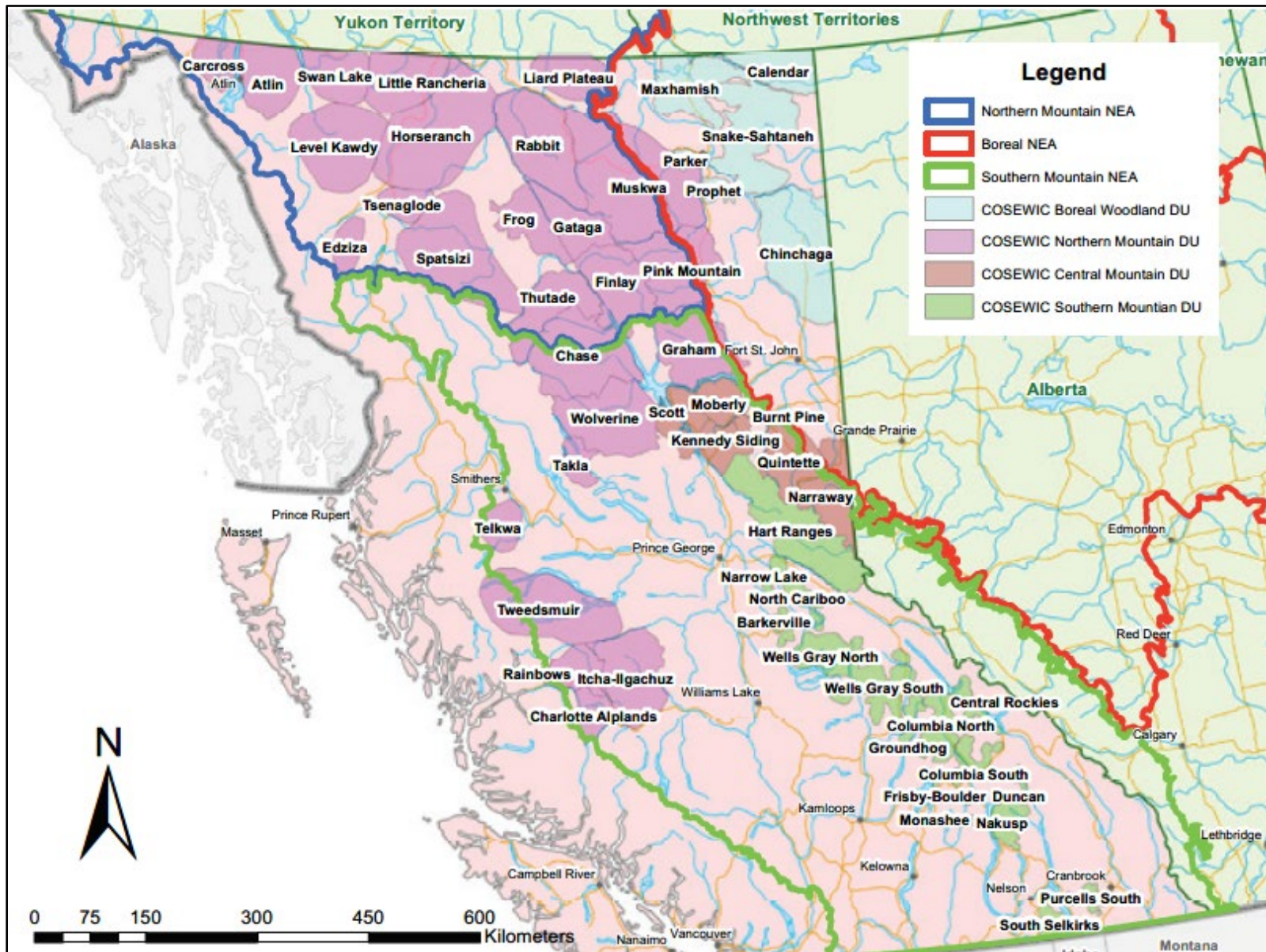
TETRA TECH professionals are bound by their ethical commitments to act within the bounds of all pertinent regulations. In certain instances, observations by TETRA TECH of regulatory contravention may require that regulatory agencies and other persons be informed. The client agrees that notification to such bodies or persons as required may be done by TETRA TECH in its reasonably exercised discretion.

APPENDIX 2

MAP OF CARIBOU DISTRIBUTION IN BRITISH COLUMBIA BY ECOTYPE

Source:

BC Ministry of Forests, Lands, Natural Resource Operations and Rural Development [FLNRORD]. 2018. Provincial Caribou Recovery Program – 2017/2018 Annual Report. Province of British Columbia. Available at:
https://www.for.gov.bc.ca/ftp/HTH/external!/publish/Caribou%20Recovery%20Program/Reports/17_18_Caribou%20Annual%20Report.pdf



Distribution of Caribou in British Columbia

APPENDIX D

ENVIRONMENTAL MANAGEMENT PLAN

Environmental Management Plan Alaska Highway Realignment & Reconstruction KM 566+900 to KM 570+200



PRESENTED TO
Public Services and Procurement Canada

JANUARY 20, 2021
ISSUED FOR USE
FILE: 704-TRN.VHWY03172-02

This page intentionally left blank.

TABLE OF CONTENTS

1.0 INTRODUCTION	1
2.0 PROJECT INFORMATION	1
2.1 Project Location	1
2.2 Project Activities	1
2.3 Project Schedule	3
3.0 ENVIRONMENTAL SENSITIVITIES	3
4.0 ENVIRONMENTAL REGULATORY REQUIREMENTS	9
4.1 Federal	9
4.2 Provincial	11
5.0 ENVIRONMENTAL MITIGATION MEASURES	14
5.1 General	15
5.2 Site Access, Mobilization, and Laydown Areas	15
5.3 Protection of Fish, Fish Habitat and Aquatic Resources	16
5.4 Protection of Wildlife and Wildlife Habitat	17
5.5 Vegetation and Soil Management	18
5.6 Erosion and Sediment Control	19
5.7 Water Quality	20
5.8 Waste Management (Including Hazardous Wastes and Potentially Contaminated Soils)	20
5.9 Concrete	21
5.10 Fuel Storage and Spill Response	22
5.11 Air Quality	23
5.12 Noise and Vibration	23
5.13 Archaeological Resources and Historical Sites	23
6.0 ENVIRONMENTAL MANAGEMENT ROLES AND RESPONSIBILITIES	24
6.1 Key Project Personnel	24
6.2 Contractor Responsibilities	24
6.3 Environmental Monitor Responsibilities	25
6.4 Public Services and Procurement Canada Responsibilities	26
6.5 Environmental Auditor (Tetra Tech) Responsibilities	27
7.0 ENVIRONMENTAL COMMUNICATION / REPORTING REQUIREMENTS	27
7.1 Environmental Protection Plan	27
7.2 Environmental Monitoring Reports	28
7.3 Emergency Response and Environmental Incident Reporting	28
8.0 CLOSURE	31
REFERENCES	32

LIST OF TABLES IN TEXT

Table 2-1: Culverts to be Replaced Between KM 566.9 and KM 570.2.....	2
Table 3-1: Project-specific Environmental Considerations	4
Table 4-1. Noxious Weeds Regulated in all Regions of Province.....	12
Table 6-1: Project Contact List.....	24
Table 7-1: Emergency Contact List.....	29

LIST OF FIGURES IN TEXT

Figure 1. Map of Nesting Zones in Canada (ECCC 2018).....	10
Figure 2. Nesting Calendars for Nesting Zone B6 (ECCC 2018).....	10

APPENDIX SECTIONS

APPENDICES

Appendix 1	Tetra Tech’s Limitations on the Use of this Document
Appendix 2	Archaeology Chance Find Protocol
Appendix 3	Example Spill Response Plan
Appendix 4	Environmental Incident Report Form

ACRONYMS & ABBREVIATIONS

Acronyms/Abbreviations	Definition
BCAWQG	BC Aquatic Water Quality Guidelines
BC ENV	Ministry of Environment and Climate Change Strategy
BMP	Best Management Practices
CFP	Chance Find Protocol
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
DFO	Fisheries and Oceans Canada
EC	Environmental Coordinator
ECCC	Environment and Climate Change Canada
EIR	Environmental Incident Report
EM	Environmental Monitor
EMA	<i>Environmental Management Act</i>
EMBC	Emergency Management BC
EMP	Environmental Management Plan
EPP	Environmental Protection Plan
EOA	Environmental Overview Assessment
ESC	Erosion and Sediment Control
FLNRORD	BC Ministry of Forests, Lands and Natural Resource Operations and Rural Development
HADD	Harmful Alternation, Disturbance or Destruction of Fish Habitat
km	kilometre
m	metre
MBCA	<i>Migratory Birds Convention Act</i>
MSDS	Material Safety Data Sheet
PSPC	Public Services and Procurement Canada
QEP	Qualified Environmental Professional
SAR	Species at Risk
SARA	<i>Species at Risk Act</i>
TDG	Transport of Dangerous Goods
WHMIS	Workplace Hazardous Materials Information System
WSA	<i>Water Sustainability Act</i>

LIMITATIONS OF REPORT

This report and its contents are intended for the sole use of Public Services and Procurement 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 Services and Procurement Canada or for any Project other than the proposed work 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 1 or Contractual Terms and Conditions executed by both parties.

1.0 INTRODUCTION

Tetra Tech Canada Inc. (Tetra Tech) has been retained by Public Services and Procurement Canada (PSPC) to prepare an Environmental Management Plan (EMP) for planned highway realignment and reconstruction work located between KM 566.9 and KM 570.2 of the Alaska Highway (herein referred to as the “Project”).

The EMP is the primary document that guides overall environmental management practices that are to be implemented by the Contractor during all phases of the Project. Developed from federal, provincial, and industry standards and regulations, EMPs provide guidance, general mitigation measures and best management practices (BMPs) to protect the receiving environment. They are based on the known environmental conditions along the Alaska Highway and the nature of the Project; and make recommendations to mitigate Project-related effects to the receiving environment during construction.

It will be the responsibility of the successful Contractor to develop activity-specific mitigation measures in an Environmental Protection Plan (EPP). That is, the EMP identifies the features that must be protected during the Project and provides recommendations for how to protect them in terms of “industry standards,” while the Contractor’s EPP will detail exactly how the recommendations will be implemented based on the specific designs and construction methodology/equipment used. For example, an EMP may recommend that refuelling occurs more than 30 m from a watercourse and the EPP will identify exactly where the refuelling will occur for the project, while meeting that recommendation.

It is recommended that the successful contractor read this EMP in full, to ensure that they will meet the environmental requirements of this Project and that the EMP requirements are met in the EPP.

2.0 PROJECT INFORMATION

The following subsections include relevant Project information as it relates to this EMP.

2.1 Project Location

Since 1964, PSPC has been the federal custodian for the Alaska Highway and is responsible for the maintenance of the current highway. PSPC’s current operational jurisdiction of the Alaska Highway extends from KM 133 (north of Fort St. John) to the British Columbia-Yukon border at KM 968.

PSPC is planning on realigning a section of the Alaska Highway between KM 566.9 and KM 570.2 (Figure 1). This section of highway is situated approximately 115 km west of Fort Nelson, British Columbia at Map Grid (NAD 83) coordinates 10V E 427940, N 6502096. The Project is bounded by boreal forest to the north, and the Tetsa River to the south. Along the alignment on the southern side of the highway is a small developed area called Milepost 375 which includes the Tetsa River Lodge. Photos of the Project location are included at the end of this report.

2.2 Project Activities

Currently, this section of the Alaska Highway contains horizontal curves that do not achieve the requirements of the relevant highway geometric design guidelines for the regulatory speed limit. The objective of this Project is to improve safety of this section of the Alaska Highway by realigning the highway to achieve a design speed of 100 km/h in accordance with the relevant highway geometric design guidelines.

The highway realignment and reconstruction works between KM 566.9 and KM 570.2 will include the following:

- Early works will be conducted in advance of this Project in Winter 2020/2021 under a separate Tender:
 - Tree / vegetation clearing within PSPC’s right-of-way boundary, excluding areas within the 30 m riparian buffer of watercourses; and
 - Rock excavation and common excavation.
- Highway widening and realignment in Spring of 2021, including the following works:
 - Grubbing of stumps and roots, and stripping of organics within the construction limits of the proposed highway;
 - Placement and compaction of embankment fill material, sourced from excavations on-site and off-site;
 - Crushing, placement and compaction of crushed base gravel and sub-base course; and
 - Bituminous Surface Treatment (BST) application.
- Drainage improvements (see Table 2-1), including the following works:
 - Replacement of two large (>1500 mm diameter) culverts via open cut method at KM 568.84 and KM 569.95;
 - Replacement of ten small (<1000 mm diameter) drainage culverts via open cut or trenchless installation methods;
 - Minor channel realignment at the culvert inlet and outlet to redirect flow through new culverts;
 - Erosion protection (e.g., riprap) installation around culvert inlets and outlets;
 - Excavation, removal and off-site disposal of existing culvert structures; and
 - Backfilling existing culvert excavations with crushed granular aggregate.

Construction for this Project is scheduled to begin in the Spring of 2021.

Table 2-1: Culverts to be Replaced Between KM 566.9 and KM 570.2.

Culvert ID	UTM Coordinates		Existing Culvert Specs	Proposed Culvert Specs	Construction Footprint ⁽¹⁾
	Easting	Northing			
KM 567+240 (Drainage)	429888.49	6502164.56	500 mm dia. CSP Culvert	600 mm dia. Steel Pipe Culvert	2,000 m ²
KM 567+515 (Drainage)	429618.56	6502157.21	500 mm dia. CSP Culvert	600 mm dia. Steel Pipe Culvert	2,000 m ²
KM 567+695 (Drainage)	429439.26	6502141.77	500 mm dia. CSP Culvert	600 mm dia. Steel Pipe Culvert	2,000 m ²
KM 567+820 (Drainage)	429312.13	6502126.89	500 mm dia. CSP Culvert	600 mm dia. Steel Pipe Culvert	2,000 m ²
KM 568+080 (Drainage)	429055.56	6502086.73	600 mm dia. CSP Culvert	750 mm dia. Steel Pipe Culvert	3,000 m ²
KM 568+630 (Drainage)	428515.28	6502132.47	900 mm dia. CSP Culvert	1,000 mm dia. Steel Pipe Culvert	2,500 m ²

Culvert ID	UTM Coordinates		Existing Culvert Specs	Proposed Culvert Specs	Construction Footprint ⁽¹⁾
	Easting	Northing			
KM 568+840	428310.76	6502089.41	1500 mm dia. CSP culvert	1,950 mm dia. Steel Pipe Culvert ⁽²⁾	2,000 m ²
KM 569+090 (Drainage) (Additional rock blasting work within 30 m of this site)	428066.27	6502040.07	900 mm dia. CSP Culvert	1,200 mm dia. Steel Pipe Culvert	2,000 m ²
KM 569+380 (Drainage)	427786.32	6502102.99	900 mm dia. CSP Culvert	1,000 mm dia. Steel Pipe Culvert	3,000 m ²
KM 569+565 (Drainage)	427609.04	6502151.85	750 mm dia. Wood Stave Culvert	900 mm dia. Steel Pipe Culvert	2,000 m ²
KM 569.95	427235.52	6502244.62	1200 mm dia. CSP culvert	2,700 mm Span × 2100 Rise Precast Concrete Box Culvert ⁽²⁾	3,000 m ²
KM 570.10 (drainage)	427077.00	6502249.00	900 mm dia. CSP culvert	1,000 mm dia. Steel Pipe Culvert	2,500 m ²

Notes

- (1) Construction footprints given include the temporary construction footprint at the inlet and outlet (i.e., laydown area, equipment access, etc.) and the total permanent footprint of the riprapped areas.
- (2) Culvert embedded 0.31 m to accommodate fish passage, thus the effective culvert rise is 0.31 m less than listed.

2.3 Project Schedule

The early works will be conducted in advance of this Project in Winter 2020/2021 under a separate Tender. Construction for this Project is scheduled to begin in the Spring of 2021.

3.0 ENVIRONMENTAL SENSITIVITIES

This Project entails work within environmentally sensitive areas, including Woodland Caribou habitat, watercourses, and riparian areas. In particular, the culvert replacements will require instream works and may pose a risk to fish or fish habitat. In addition, there is the potential that Species at Risk (SAR) will be encountered during construction. As such, it is important that the Contractor is aware of these sensitivities and is diligent in regard to environmental planning and mitigation to avoid deleterious effects to the environment. The most likely environmental concerns and potential impacts related to the Project are summarized in Table 3-1.

A full review of the existing environment at the Project location can be found in Tetra Tech’s (2020a) Environmental Overview Assessment (EOA) report: *Environmental Overview Assessment, KM 566 + 900 to KM 570 + 200 Highway Realignment and Reconstruction*.

Table 3-1: Project-specific Environmental Considerations

Environmental Concern	Project-Specific Considerations	Mitigation Summary*
Wildlife and Wildlife Habitat		
Woodland Caribou	<p>The populations and critical habitats of Woodland Caribou are protected under federal legislation. Northern Mountain Caribou are provincially blue-listed and designated as 'special concern' under the Federal <i>Species At Risk Act</i> (SARA).</p> <p>There is potential for Woodland Caribou to be encountered during construction since the Project is located within the provincially-mapped range of Northern Mountain Caribou (Muskwa Herd).</p> <p>Best Management Practices specific to working within caribou habitat and a figure showing mapped caribou range within the Project area are provided in the Caribou Protection Plan (Appendix C of the Environmental Overview Assessment [EOA]).</p>	<ul style="list-style-type: none"> ▪ Implement the mitigation measures outlined in the Caribou Protection Plan. ▪ Retain an Environmental Monitor (EM) to monitor for Caribou within the Project area during construction. ▪ If Caribou are observed within the Project area, cease all Project activities until they have left the area. ▪ See Section 5.4 and the Caribou Protection Plan for further mitigation strategies.
Wildlife and Species at Risk (SAR)	<p>The BC Conservation Data Centre (CDC) iMap search revealed two documented occurrences of wildlife SAR within 5 km of the Project, one of which, Woodland Caribou (Special Concern) are listed under the SARA. An additional 24 wildlife SAR (13 of which are listed under SARA as either Special Concern, Threatened or Endangered) were identified as having potential to be present or near to the Project based on their habitat requirements and range (See section 5.6 of the EOA for more details).</p> <p>Instream works may negatively impact amphibians that utilize these habitats for part or all of their life cycle, such as Western Toad. As such, prior to instream works, the impacted area should be isolated and amphibians should be salvaged and relocated by the contractor's EM. A General Wildlife Permit will have to be obtained from FrontCounter under the <i>Wildlife Act</i>.</p>	<ul style="list-style-type: none"> ▪ Inspect culverts for wildlife (especially for bats and birds) prior to their removal. ▪ Wildlife salvages should be conducted prior to conducting instream works. ▪ Should a rare or sensitive species be identified at the site at any time during the Project, the EM should be notified immediately for further direction. ▪ See Section 5.4 for further mitigation strategies.
Birds and Their Nests	<p>Section 34 of the BC <i>Wildlife Act</i> protects nests when occupied by a bird or an egg and the nests of Eagles, Peregrine Falcons, Gyrfalcons, Osprey, Herons, and Burrowing Owls year-round, regardless of whether they are active. The <i>Migratory Bird Convention Act</i> (MBCA) prohibits the disturbance or destruction of migratory birds and their nests or eggs.</p> <p>If vegetation removal is required during construction, it is important that these clearing activities do not disturb birds or their nests.</p>	<ul style="list-style-type: none"> ▪ Minimize vegetation clearing ▪ When possible, clear vegetation outside of the breeding bird nesting period for the region which extends from April 30 until August 20. If this is not possible, a QEP-led nest survey will be required prior to clearing. ▪ See Section 5.4 for further mitigation strategies.

Environmental Concern	Project-Specific Considerations	Mitigation Summary*
Fish and Fish Habitat		
<p>Instream Works</p>	<p>This Project will require instream works such as minor channel realignment and placement of riprap to stabilize stream channels near the culvert inlets and outlets.</p> <p>Ten of the culverts that will be replaced as part of the Project are drainage culverts that simply convey slope seepage and road runoff during periods of precipitation from one side of the road to the other. As such, these ten culverts do not meet the definition of a ‘stream’ under the WSA and do not connect to fish-bearing watercourses. However, when replacing these ten drainage culverts, Best Management Practices outlined below in Section 5.0 (i.e., erosion and sediment control (ESC) measures; isolation of the work area; wildlife salvage etc.) must still be applied during construction</p> <p>The two larger culvert replacements at KM 568+840 and KM 569+950 are on mapped watercourses and are considered to be ‘streams’ under the WSA. Based on the Project activities, Tetra Tech anticipates that a Notification will have to be obtained by PSPC for these two culverts under the <i>Water Sustainability Act</i>. If there is water within the watercourse at the time of construction, the work area must be isolated from flowing water and fish and wildlife must be salvaged from the work area before instream works can begin. If there is no water in the watercourse at the time of instream works, no isolation will be required. To avoid deleterious effects to the affected watercourses within the Project area, the mitigation measures outlined in this EMP must be followed</p>	<ul style="list-style-type: none"> ▪ Any work within 30 m of water requires the close oversight of the Environmental Monitor (EM). ▪ Ten drainage culverts: <ul style="list-style-type: none"> – Proper ESC measures should be implemented during construction; – If there is flow through the culvert at the time of construction, the work area must be isolated from flow under the oversight of the EM; – If necessary, amphibians must be salvaged from the work zone by the EM. ▪ KM 568+840 and KM 569+950 Culvert Replacements <ul style="list-style-type: none"> – Proper ESC measures should be implemented during construction; – Any work conducted below the high-water mark of streams containing water must occur in isolation of flow. – If there is water within the watercourse during the instream works, a qualified EM must conduct fish and amphibian salvage operations. ▪ See Section 5.3, 5.7 and 5.10 for further mitigation strategies.
<p>Disturbance to Fish</p>	<p>The ten drainage culverts are not located on fish-bearing watercourses and do not have connectivity to downstream fish-bearing watercourses. As such, disturbance to fish is not anticipated and fish salvage is not required for these replacements.</p> <p>The two larger culvert replacements (KM 568+840 & KM 569+950) are located on small, 2nd order streams that flow into the Tetsa River. Regardless of the habitat quality at these two culvert locations, each stream must be treated as if there is the potential for fish to be present, since these small streams connect to larger fish-bearing watercourses downstream. As such, they are still considered “Fish Habitat” under the <i>Fisheries Act</i>. If there is water within these two watercourses at the time of construction, the work area must be isolated, and a</p>	<ul style="list-style-type: none"> ▪ Prior to construction, an Aquatic Biologist should evaluate the two larger culvert sites (KM 568+840 and KM 569+950) to identify the presence of Bull Trout redds as per the methods outlined in Decker et al. (2005). If no redds are present, construction may continue as planned. If redds are identified, construction must be delayed until the Bull Trout juveniles have emerged from their redds and can be safely salvaged from the area, or until the next Reduced Risk Timing Window. ▪ Ideally, instream work should be timed to occur within the window of least risk for fish in the

Environmental Concern	Project-Specific Considerations	Mitigation Summary*
	<p>concurrent fish salvage must be conducted to avoid potential harm to fish prior to dewatering. To perform fish salvages, a scientific fish collection permit will be required from FLNRORD.</p>	<p>Project Area (July 15 – August 15) or when water is frozen or at its lowest levels.</p> <ul style="list-style-type: none"> ▪ Tetra Tech understands that the Project activities are proposed to occur outside of the Reduced Risk Timing Window. It is unlikely that the Project would negatively impact fish or fish habitat if works are conducted outside the reduced risk windows as long as the mitigation detailed within this EMP is applied. ▪ Fish salvages must be conducted at KM 568+840 and KM 569+950 after isolation of the work site and before dewatering. An EM must be on-site to conduct the fish salvage operations. ▪ See Section 5.3, 5.7 and 5.10 for further mitigation strategies.
<p>Erosion and Sediment Control</p>	<p>This Project has the potential to create sediment-laden runoff which if introduced into a stream, could harm fish or fish habitat. The contractor must complete the Project works in such a manner that the risk of releasing sediment-laden water into nearby streams is minimized.</p>	<ul style="list-style-type: none"> ▪ ESC measures should be implemented at all eleven culvert replacement locations. ▪ Avoid construction during periods of poor weather and phase work appropriately. ▪ The Contractor should prepare an ESC Plan and ensure proper installation of ESC structures (i.e., silt fences). ▪ Frequent field water quality monitoring at pre-determined stations or as required by weather conditions. ▪ See Section 5. 6 and 5.7 for further mitigation strategies.

Environmental Concern	Project-Specific Considerations	Mitigation Summary*
Accidental Spills	There is potential for accidental spills or releases of deleterious substances to occur as a result of the Project. Equipment with engines and/or hydraulics have a potential for leaks and spills (May include: diesel/gas, hydraulic fluids, lubricating oil, glycols.). If released to water, these substances can cause harm to fish and fish habitat.	<ul style="list-style-type: none"> ▪ Any work conducted below the high-water mark of streams containing water must occur in isolation of flow and under the supervision of an EM. ▪ Machinery and equipment should be clean and in good operating condition. ▪ The Contractor is responsible for ensuring that a project-specific Spill Response Plan is prepared and that it is on-site at all times. ▪ See Section 5.10 for further mitigation strategies.
Vegetation and Invasive Species Management		
Vegetation	<p>The EOA identified three vegetation SAR that have potential to occur near or at the Project location; however, due to the disturbed nature of the highway ROW, it is unlikely that these species will be found at the Project area.</p> <p>Minimal vegetation removal is expected as a result of this project since the construction will be contained within the existing highway ROW. The majority of vegetation along the sides of the highway are grasses, herbs and small shrubs.</p> <p>After construction is complete, any disturbed and exposed soils will be seeded with a native grass mixture.</p>	<ul style="list-style-type: none"> ▪ Limit vegetation removal. ▪ Contain construction activities within the existing highway right-of-way (ROW). ▪ Machinery and vehicles should be restricted to defined travel routes to avoid excess trampling/compaction of vegetation. ▪ Disturbed vegetated areas should be restored through seeding or planting as soon as possible. ▪ Implement standard ESC measures and dust-suppression measures during construction to minimize impacts to surrounding vegetation. ▪ See Section 5.5 for further mitigation strategies.
Non-native or Invasive Plant Spread	Many invasive species grow well in disturbed areas, and can be spread through vehicle traffic, making them commonly found along roadways. Therefore, there is potential for invasive species to be found along the highway at the Project location. Measures must be taken to prevent spread of invasive species between sites.	<ul style="list-style-type: none"> ▪ Vehicles and equipment must be inspected prior to arriving on site to ensure they are free of soil and plant material. ▪ In areas of known invasive plant infestations, matting should be laid down prior to mobilization of machinery to the work area. ▪ See Section 5. 5 for further mitigation strategies.

Environmental Concern	Project-Specific Considerations	Mitigation Summary*
Soil Management		
Erosion and Sediment Control	This Project has the potential to disturb soils which could result in erosion and/or sediment mobilization. The contractor must complete the culvert maintenance work in such a manner that minimizes disturbances during construction and remediates exposed soils post-construction.	<ul style="list-style-type: none"> ▪ Avoid construction during periods of poor weather and phase work appropriately. ▪ The Contractor should prepare an ESC Plan and ensure proper installation of ESC structures (i.e., silt fences). ▪ See Section 5.6 for further mitigation strategies.
Accidental Spills	There is potential for accidental spills or releases of deleterious substances to occur as a result of the Project. Equipment with engines and/or hydraulics have a potential for leaks and spills (May include: diesel/gas, hydraulic fluids, lubricating oil, glycols.). Release of these substances could result in soil contamination.	<ul style="list-style-type: none"> ▪ Machinery and equipment should be clean and in good operating condition. ▪ See Section 5.4 for further mitigation strategies.
Archaeological Resources		
Damage to Historical or Archaeological Artifacts.	There is potential to encounter archaeological sites and artifacts during project activities (i.e., excavations and culvert removals) which are protected under the <i>Heritage Conservation Act</i> .	<ul style="list-style-type: none"> ▪ Follow the Chance Find Protocol (CFP) included in Appendix 2. ▪ See Section 5.13 for further mitigation strategies.

*This summary of mitigation measures is not comprehensive. For a full list of mitigation measures, please refer to Environmental Mitigation Measures in Section 5.0.

4.0 ENVIRONMENTAL REGULATORY REQUIREMENTS

The Project will be subject to the terms and conditions of any regulatory permit or approval obtained. At the time this EMP was prepared, all permits/approvals for the Project were in the process of being secured from the applicable regulatory agencies. The Project is subject to various environmental legislation, as described in the subsections below.

4.1 Federal

Fisheries Act

The *Fisheries Act* is the main federal legislation providing protection for all fish, fish habitat, and water quality. The *Act* is administered federally by Fisheries and Oceans Canada (DFO) and Environment Canada. The new Federal *Fisheries Act* came into force on August 28, 2019. It includes amendments to restore lost protections and incorporate modern safeguards. This *Act* provides protection against the ‘death of fish, other than by fishing’ and the ‘harmful alteration, disruption or destruction of fish habitat’ (HADD), unless authorized by DFO.

Fish habitat is defined as spawning grounds and nursery, rearing, food supply, and migration areas on which fish depend directly or indirectly in order to carry out their life processes. This definition indicates that a watercourse (which includes but is not limited to streams, ditches, ponds and wetlands), which provides water, food or nutrients to a fish-bearing stream, is considered fish habitat even if it does not contain fish and/or if it only has temporary or seasonal flows. The definition also indicates that not only the watercourse itself but also the vegetated stream side or riparian areas which provide nutrients and shade to the stream are considered fish habitat.

DFO encourages all project proponents to avoid and mitigate the impacts of projects to fish. A self-assessment process to be carried out by a Qualified Environmental Professional includes the documentation of measures and best practices to avoid or minimize impacts to fish and fish habitat. If impacts can be avoided or mitigated the project does not require further review from DFO. If impacts cannot be mitigated, a Request for Review must be submitted to the Fisheries Protection Program office and DFO will work with the proponent to find additional ways to reduce those impacts. If the project cannot be designed to avoid a HADD, a *Fisheries Act* authorization is required.

Based on Tetra Tech’s understanding of the Project and based on our assessment of the proposed activities, it is unlikely that the Project will cause serious harm to fish if, at a minimum, standard best management practices and mitigation as presented in this EMP are implemented. The two larger culvert replacements at KM 568+840 and KM 569+950 will be treated as if they are fish-bearing and will undergo isolation of the work area and concurrent fish salvages if there is water present within the channel. As such, a Request for Review to DFO will not be required for this Project.

Species at Risk Act

The *Species at Risk Act* (SARA) prohibits the killing, harming, harassing, capturing or taking of species at risk, or destruction of their critical habitats. Species are designated ‘at risk’ by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), an independent body of experts that assesses species according to a broad range of scientific data. The federal Cabinet then decides whether those species should receive legal protection under the *Act*.

The SARA protects listed mammals, reptiles, amphibians, molluscs, lepidopterans, and plants on federally managed areas, migratory songbirds (as listed under the *Migratory Birds Convention Act* [MBCA]) and fish in all areas in Canada. Species that are legally protected under SARA are those listed as Endangered or Threatened

and are listed in Schedule 1 of the *Act*. Those species listed as Special Concern and all species listed in Schedule 3, regardless of their status, are not legally protected by SARA.

A permit is required when works either affect a migratory bird or aquatic species or its residence, that is listed as ‘Endangered’ or ‘Threatened’ or ‘Extirpated’ on Schedule 1 of SARA; or affect any Schedule 1 ‘Endangered’ or ‘Threatened’ or ‘Extirpated’ species or its residence on federal land.

Several occurrences of species at risk (SAR) have been identified within 5 km of the Project location or have the potential to be found in the area. Should a SARA-listed species or any other rare species be identified by the EM prior to or during works, the Canadian Wildlife Service and the British Columbia Ministry of Environment and Climate Change Strategy (BC MOE) should be notified immediately for direction on appropriate action as measures employed would vary greatly with the species encountered, its sensitivity to the Project and its proximity to the works.

Migratory Birds Convention Act

The MBCA restricts the disturbance or destruction of migratory birds and their nests, eggs, and shelters, except in accordance with a permit. The *Act* (1994) prohibits the taking or killing of migratory bird nests and eggs, and the deposition of harmful substances in areas frequented by migratory birds. Vegetation removal that will affect trees used by all birds and other wildlife should be avoided while they are breeding, nesting, roosting or rearing young.

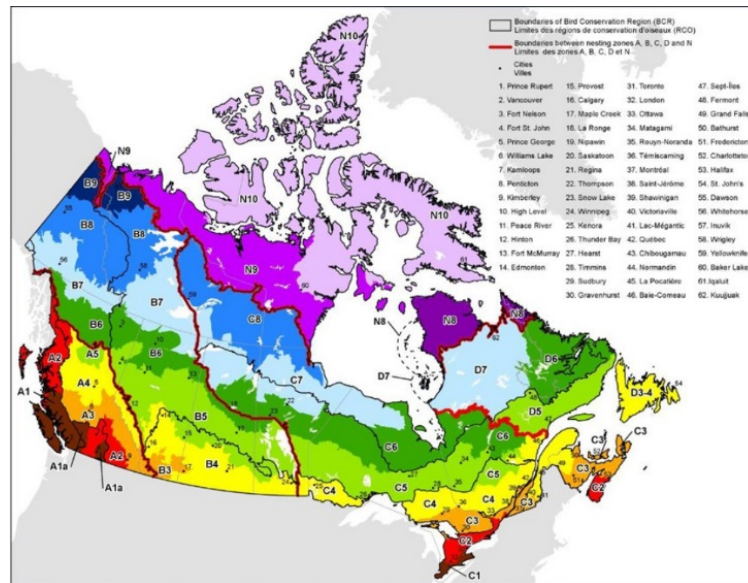


Figure 1. Map of Nesting Zones in Canada (ECCC 2018)

Vegetation removal/clearing should be conducted outside of the bird nesting season, which is considered April 30 to August 20 for the Project area (Zone B6) (ECCC 2018; Figure 1). If clearing is to occur within the bird nesting season (April 30 – August 20), a nest survey by the on-site EM will be required prior to clearing.

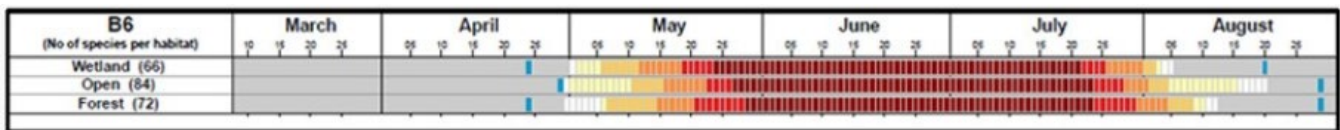


Figure 2. Nesting Calendars for Nesting Zone B6 (ECCC 2018)

Transportation of Dangerous Goods Act

The transportation of dangerous goods is regulated by the BC *Transport of Dangerous Goods Act* and Transport of Dangerous Goods (TDG) Regulation. The transportation of dangerous goods is also regulated federally by the Transportation of Dangerous Goods Program and Regulations, administered by Transport Canada. The provincial TDG program is limited to transportation via roads. Nine categories of substances are regulated within the provincial TDG Regulation: explosives, gases, flammable and combustible liquids, flammable solids, oxidizing substances, poisonous and infectious substances, radioactive material, corrosive substances and miscellaneous substances.

It is the responsibility of Contractor to ensure that all materials within the TDG Schedule are transported in accordance with TDG Regulations.

4.2 Provincial

Water Sustainability Act

Previously known as the *Water Act*, the British Columbia (BC) *Water Sustainability Act* (WSA) was brought into force on February 29, 2016. The WSA is the main provincial statute regulating water resources in British Columbia. Under the WSA, it is an offence to divert or use water, or alter a stream, without formal approval from the Province. The WSA defines “stream” as a natural watercourse or source of water supply, whether usually containing water or not, and a lake, river, creek, spring, ravine, swamp or gulch. “Stream” is used to describe any watercourse that is considered to be fish habitat, including channelized streams, and ditches that provide fish habitat. Under the WSA, the *Water Sustainability Regulation* addresses the requirements to allocate both ground and surface water and identifies the requirements for using water or making changes to a stream.

Change Approvals, issued under Section 11 of the WSA, are written authorization required for complex works with substantial impacts. *Notifications* are typically used for low-risk works that do not include permanent water diversion, can be completed in a short period of time, and have minimal impacts. Submitted notifications are subject to a 45 day review period. If there is no response from the assigned habitat officer within this time period, the proponent may proceed with the project. Notifications must meet the requirements of the Water Sustainability Regulation and comply with any additional conditions set out by a habitat officer.

Based on communication with the BC Ministry of Forests, Lands, Natural Resource Operations and Rural Development (FLNRORD) and recent experience with similar projects, Tetra Tech anticipates that the two larger culvert replacements along mapped watercourses (KM 568+840 and KM 569+950) will require a *Notification*. It was determined that the remaining ten drainage culvert replacements were not located on ‘streams’ as defined by the WSA (See the EOA report for more detail) and therefore the replacement of these culverts does not trigger the need to secure an approval (Notification) under the WSA, however Best Management Practices outlined below in Section 5.0 (i.e., erosion and sediment control measures; isolation of the work area etc.) must still be applied during construction. Until the 45-day Notification period has passed without comment from FLNRORD on the two culvert replacements, no Project works (including blasting proximate to these watercourses) should be conducted.

Wildlife Act

The BC *Wildlife Act* protects most vertebrate animals from direct harm or harassment except as allowed by regulation (e.g., hunting or trapping). Section 34 of the BC *Wildlife Act* specifically protects the nests of Eagles, Peregrine Falcons, Gyrfalcons, Osprey, Herons, and Burrowing owls year-round. This means that a tree or other structure containing such a nest must not be felled, even outside of the breeding season. Section 34 of the *Wildlife Act* also protects the nests of all species of birds when birds or eggs are present in the nest.

The Project will require construction works to be conducted within watercourses, which may provide habitat for fish and wildlife. To avoid undue harm to fish and wildlife under the *Wildlife Act*, fish and wildlife salvages must be completed to remove animals, from the construction area. As such, a General *Wildlife Act* Permit will have to be obtained through FrontCounter BC to allow for the capture and relocation of numerous potential wildlife species (at all locations). In addition, a Fish Collection Permit must be obtained through FrontCounter BC for the capture and relocation of all potential fish species in the streams affected by construction activities (specifically KM 568+840 and KM 569+950). Acquisition of this permit will be pursuant to the Angling and Scientific Collection Regulations of the *Wildlife Act*. For both of these permits, at minimum, 30 days should be allowed for permit processing.

Weed Control Act

The BC *Weed Control Act* consists of legislation that states private landowners, private companies, utility companies, regional districts and municipalities, and provincial government agencies or anyone in physical possession of land, except federal lands, have a responsibility to manage weeds in the province (ISBC 2007). Therefore, the *Weed Control Act* does not apply to the lands occupied by the Alaska Highway. Nonetheless, land stewardship principles and practices advocate that PSPC should implement weed and invasive species best practices during construction and operation of the Alaska Highway given federal involvement in multi-jurisdictional strategies and planning sessions (ISBC 2007).

Therefore, this information is provided to educate and address the potential for the spread of invasive species from federal lands to provincial lands adjacent to it. The BC *Weed Control Act* currently designates 39 plant species as noxious weeds within all regions of the province (Table 4-1). This Project is located within the Northern Rockies Regional Municipality (NRRM). There are no additional noxious weeds listed for the NRRM.

Table 4-1. Noxious Weeds Regulated in all Regions of Province

Annual Sow Thistle (<i>Sonchus oleraceus</i>)	Bohemian Knotweed (<i>Fallopia bohemica</i>)	Bur Chervil (<i>Anthriscus caucalis</i>)	Canada Thistle (<i>Cirsium arvense</i>)
Common Crupina (<i>Crupina vulgaris</i>)	Common Reed (<i>Phragmites australis subsp. australis</i>)	Common Toadflax (<i>Linaria vulgaris</i>)	Dalmatian Toadflax (<i>Linaria dalmatica</i>)
Dense Flowered Cordgrass (<i>Spartina densiflora</i>)	Diffuse Knapweed (<i>Centaurea diffusa</i>)	Dodder (<i>Cuscuta spp.</i>)	English Cordgrass (<i>Spartina angelica</i>)
Flowering Rush (<i>Butomus umbellatus</i>)	Garlic Mustard (<i>Alliaria petiolata</i>)	Giant Hogweed (<i>Heracleum mantegazzianum</i>)	Giant Knotweed (<i>Fallopia sachalinensis</i>)
Giant Mannagrass/Reed Sweetgrass (<i>Glyceria maxima</i>)	Gorse (<i>Ulex europaeus</i>)	Himalayan Knotweed (<i>Polygonum polystachyum</i>)	Hound's-tongue (<i>Cynoglossum officinale</i>)
Japanese Knotweed (<i>Fallopia japonica</i>)	Jointed Goatgrass (<i>Aegilops cylindrica</i>)	Leafy Spurge (<i>Euphorbia esula</i>)	Milk Thistle (<i>Silybum marianum</i>)
North Africa Grass (<i>Ventenata dubia</i>)	Perennial Sow-thistle (<i>Sonchus arvensis</i>)	Purple Loosestrife (<i>Lythrum salicaria</i>)	Purple Nutsedge (<i>Cyperus rotundus</i>)
Rush Skeletonweed (<i>Chondrilla juncea</i>)	Saltmeadow Cordgrass (<i>Spartina patens</i>)	Scentless Chamomile (<i>Matricaria maritima</i>)	Smooth Cordgrass (<i>Spartina alterniflora</i>)
Spotted Knapweed (<i>Centaurea stoebe</i>)	Tansy Ragwort (<i>Senecio jacobaea</i>)	Velvetleaf (<i>Abutilon theophrasti</i>)	Wild Oats (<i>Avena fatua</i>)
Yellow Flag Iris (<i>Iris pseudacorus</i>)	Yellow Nutsedge (<i>Cyperus esculentus</i>)	Yellow Starthistle (<i>Centaurea solstitialis</i>)	

These species are non-native plants that create problems for agriculture and/or natural habitats. Therefore, Contractors should ensure that any identified invasive species are controlled and not allowed to spread. Information related to the control and management of invasive species can be found on the Invasive Plant Council of British Columbia's website (<http://www.invasiveplantcouncilbc.ca/>).

Environmental Management Act

The BC *Environmental Management Act* (EMA) governs solid waste and manages introduction of waste into the environment by providing an authorization framework and environmental management tools to protect human health and environmental quality.

Under the Waste Discharge Regulations of the EMA, certain industries, trades, businesses and operations require authorization to discharge waste into the environment. However, even if an industry, trade, business or operation does not require an authorization, waste discharge must not cause pollution [EMA, Section 6 (4)].

The Spill Reporting Regulations of the EMA establishes a protocol for reporting the unauthorized release of substances into the environment as well as a schedule detailing reportable amounts for certain substances. A **Spill Response Plan**, including reportable quantities for spills, is provided below.

The Hazardous Waste Regulations of the EMA ensures that the generators, carriers and receivers of hazardous waste handle, store, transport, treat and dispose of hazardous waste in a safe manner. Hazardous wastes must be disposed of properly to ensure human health and environmental protection.

Heritage Conservation Act

The BC *Heritage Conservation Act* confers automatic protection upon archaeological and historic heritage sites that meet the definitions within section 13(2) of the Act. These include:

- All sites pre-dating AD1846;
- All sites of unknown age or origin which may pre-date AD1846;
- All burial places and rock art sites of historical or archaeological value; and
- All vessels or aircraft wrecked for two or more years.

All areas within the boundaries of a heritage site are protected under the Act, including areas without archaeological deposits or other kinds of heritage remains (e.g., land without archaeological deposits between several culturally modified trees at one site, or between several storage pits at one site).

A Preliminary Field Reconnaissance (PFR) was conducted for this Project and is provided as an appendix to the EOA report. The PFR determined that no archaeological sites had been identified near the Project location, and that no further Archaeology Assessment was required for the Project.

A Chance Find Protocol (CFP) has been developed for this Project in the event that cultural artifacts or anthropogenic deposits (e.g., remains of hearths, dwellings, storage pits) are uncovered during construction. It is the responsibility of the Contractor to follow the CFP should this occur. The CFP has been included as Appendix 2.

There is always a limited possibility for unknown archaeological sites to exist. Archaeological sites (both recorded and unrecorded) are protected under the *Heritage Conservation Act* and must not be altered or damaged without a site alteration permit from the Archaeology Branch. If an archaeological site is encountered during Project works, activities must be halted, the CFP enacted, and the BC Archaeology Branch contacted at **250.953.3334** for direction.

5.0 ENVIRONMENTAL MITIGATION MEASURES

The BMPs and mitigation measures included in the EMP provide general instructions for managing Project activities to minimize potential environmental effects by limiting their duration, frequency, and intensity. Throughout all phases of the Project, the Contractors are expected to comply with all federal, provincial, and municipal regulations, conditions, and agreements with respect to environmental protection. Additional guidance for project-related environmental management practices and activities will be determined by the terms and conditions of relevant permits, licenses and approvals as they are acquired. It should be recognized that the employment of site personnel experienced in implementation of BMPs, particularly at the Site Superintendent level, is integral to the successful implementation of the Project EPP.

This EMP, in its current form, has been prepared in advance of a Contractor being identified. Therefore, following selection of the successful Contractor, the Contractor should prepare an EPP to meet all legislative requirements detailed above. Additionally, the EPP should specifically, in relation to the work methods proposed and equipment used during construction, incorporate DFO's measures to avoid causing harm to fish and fish habitat, and detail the measures that will be taken to protect Woodland Caribou and other Species at Risk.

General requirements of applicable environmental legislation, regulations, standards, guidelines, and BMPs will be adhered to throughout the duration of the Project. Supplementary environmental standards, guidelines, and BMPs are also contained in the following documents:

- DFO. 1992. Land Development Guidelines for the Protection of Aquatic Habitat.
- DFO. 2018. Measures to Avoid Causing Harm to Fish and Fish Habitat.
- FLNRORD. 2014. A Compendium of Wildlife Guidelines for Industrial Development Projects in the North Area, British Columbia – Interim Guidance.
- FLNRORD. 2019. Terms and Conditions for Water Sustainability Act Changes in and about a Stream as specified by the Ministry of Forests, Lands & Natural Resource Operations (FLNRORD) Habitat Officers, Northeast Region.
- BC MOE. 2014. Develop with Care: Environmental Guidelines for Urban and Rural Land Development in British Columbia.
- BC MOE. 2005. A User's Guide to Working In and Around Water: Understanding the Regulation under British Columbia's *Water Act*. Water Management Branch.
- BC MOE. 2004. Standards and Best Management Practices for Instream Works.
- BC MOE. 2016. Best Management Practices for Bats in British Columbia.
- Northwest Response Ltd. 2018. BC Fuel Guidelines (8th Edition).
- Tetra Tech. 2020b. Caribou Protection Plan (Appendix C of the EOA).

It is the responsibility of the Contractor to acquire and familiarize themselves with the requirements of the guideline documents and of the legislation discussed in Section 4.0.

The following sections outline general best management practices and mitigation measures that should be implemented to minimize the potential environmental impacts discussed in Section 3.0. Activity specific mitigation measures should be developed by each contractor in an EPP specific to the highway realignment work.

5.1 General

5.1.01	The successful contractor must review this EMP and the applicable guidelines prior to starting construction
5.1.02	The Contractor is responsible for ensuring that a Qualified Environmental Professional (QEP) prepares an EPP following the provisions outlined in this EMP.
5.1.03	All relevant federal and provincial acts, regulations, guidelines, and BMPs will apply to all work and activities associated with the Project.
5.1.04	The Contractor must be aware of and implement all permitting and approval requirements/conditions. No work should commence until all permits have been obtained for the projects (e.g., WSA Notification acknowledgement or following review period of 45 days).
5.1.05	Contractors must hold a pre-construction meeting that includes the EM and all persons undertaking work on site to facilitate a common understanding of the contents of this EMP, the EPP and all BMPs for the Project.
5.1.06	Daily tailboard meetings should make reference to environmental issues that may arise and inform new employees about environmental compliance on site.
5.1.07	Plan and schedule project activities for dry weather whenever possible to minimize potential ESC issues.
5.1.08	Ensure Contractor employees know how to properly install any protection measure and understand BMPs used on the Project. Improperly installed measures/BMPs do not perform their intended functions and will not achieve desired environmental protection outcomes.
5.1.09	Adopt an “adaptive management” management strategy for the Project. Adaptive management evaluates and adjusts management decisions (i.e., mitigation measures) to reflect the actual interactions. Contractors should be prepared to change existing measures and BMPs should they fail or in the event additional measures are warranted. The EM should be notified of any changes to assess that they are adequate and installed properly.
5.1.10	All construction will be maintained within the existing Alaska Highway alignment. Upon completion of activities, all equipment, supplies, materials and waste will be removed from the work site.
5.1.11	All environmental incidents must be reported to the EM, the Contractor Site Superintendent, and PSPC’s Project Manager and Environmental Coordinator as soon as possible.
5.1.12	The work area should be established and clearly marked. Orange construction (snow) fence installed on rebar stakes or highly visible flagging can be used to delineate the active work area. Ensure all Contractor employees are familiar with the marking system and are given clear instructions/training before work begins. Augment and replace field markers as needed.

5.2 Site Access, Mobilization, and Laydown Areas

5.2.01	Mobilization should be planned to minimize the number of trips to and from the site.
5.2.02	A laydown area for storage of equipment and materials must be established. It should be located on a flat, stable area at least 30 m from the top of bank any nearby watercourses.
5.2.03	Ensure all equipment is brought to site clean (power washed) and in good working order free of sediment, oil and grease staining/leaks, weeds/seeds. Equipment servicing with environmentally sensitive hydraulic fluids is recommended.

5.3 Protection of Fish, Fish Habitat and Aquatic Resources

All of the aquatic mitigation measures detailed in the section below need to be considered when working in and around the two streams located at the KM 568+840 and KM 569+950 culverts. Only when indicated in the text below, do these mitigation measures apply to all eleven sites, including the ten drainage culverts.

5.3.01	The Contractor is responsible for implementing the terms and conditions outlined in the forthcoming WSA Notification documentation (should FLNRORD provide such documentation). No work can occur before securing the permits, or after the permits expire.
5.3.02	Ideally, instream work should be timed to occur within the window of least risk for fish in the Project Area (July 15 to August 15) or when water is frozen or at its lowest levels. If work is planned to occur outside the window of least risk for fish, the Contractor must work with a QEP to develop proper mitigation to avoid harm to fish. If the streams are dry (i.e., no flow) at the time of the construction, instream work can occur outside of the least risk window for fish without consultation of a QEP.
5.3.03	The EM must be on-site when work is occurring within 30 m of water, during site isolation and implementation of ESC measures, during instream works, and during fish/wildlife salvage operations.
5.3.04	Any work conducted below the high-water mark must occur in isolation of flow (including at the ten drainage locations). Flow isolation can be achieved by constructing temporary dams upstream and downstream of the work area, and then pumping or temporarily redirecting the stream around this isolation area. Flow must be maintained upstream and downstream of the work area at all times. Flow isolation can only occur after fish salvage activities are complete. Additional guidance for stream diversion can be found in DFO's (2020a) "Interim Code of Practice: Temporary Cofferdams and Diversion Channels". Engineering design drawings, complete with environmental staging drawings for site isolation and stream diversion can be found in Appendix E of the Environmental Overview Assessment (EOA) prepared for this project.
5.3.05	If a "dam and pump" system is used to isolate instream work areas, all water intakes must be screened according to DFO's (2019) "Interim Code of Practice: End-of-pipe Fish Protection Screens for Small Water Intakes in Freshwater" to prevent entrainment or impingement of fish and other aquatic organisms. (Available at: https://www.dfo-mpo.gc.ca/pnw-ppe/codes/screen-ecran-eng.html)
5.3.06	Follow the applicable BMPs outlined in DFO's Measures to Avoid Causing Harm to Fish and Fish Habitat (Available at: https://www.dfo-mpo.gc.ca/pnw-ppe/measure-mesures-eng.html) and; BC MOE's (2004) Standards and Best Management Practices for Instream Works (Available at: https://www2.gov.bc.ca/assets/gov/environment/natural-resource-stewardship/best-management-practices/iswstdsbpsmarch2004.pdf).
5.3.07	All fish must be salvaged (i.e., captured and relocated to appropriate upstream habitat) by QEPs prior to dewatering. A Scientific Fish Collection Permit must be obtained from FLNRORD prior to conducting salvage activities.
5.3.08	Equipment and vehicles should avoid crossing watercourses (including the ten drainage locations). If crossing is unavoidable, every effort should be made to limit machinery crossing to a one-time event (i.e., over and back). If crossings are necessary, a temporary crossing structure will have to be built to facilitate these movements. All temporary stream crossings must be conducted according to DFO's (2020b) "Interim Code of Practice: Temporary Stream Crossings".
5.3.09	Equipment should operate above the high-water mark of any watercourse. While working instream, equipment should work from a dry location, such as above the bank or from an area that has been isolated. Minimize the area of disturbance below the high-water mark as much as possible. Limit equipment movement and ensure it is situated on stable surfaces (e.g., coarse substrates or rig mats).
5.3.10	Refuelling and maintenance of equipment as well as the storage of any excess fuels, oils, lubricants or other petrochemical products should occur at least 30 m from water (including the ten drainages).

5.3.11	Equipment and machinery used in or near a watercourse should be inspected daily to ensure they are in good operating condition and free of leaks, excess oil, grease and invasive or noxious weeds and seeds (power wash off site if necessary).
5.3.12	If feasible, machinery used in proximity to any watercourse should use environmentally friendly fluids (i.e., non-toxic, biodegradable or vegetable oil based).
5.3.13	No water should be extracted from any watercourse for Project use (including the ten drainages locations).
5.3.14	The Project involves activities, such as soil disturbance and excavation, that have potential to contribute sediments to nearby watercourses, which may either contain fish or drain into streams that contain fish. Transportation of sediments or sediment-laden runoff downstream should be prevented by implementing the appropriate ESC measures as discussed below (see section 5.6) and detailed more fully within the Contractor's ESC Plan.
5.3.15	Water quality will be frequently monitored by the Contractor's EM to ensure TSS/turbidity are maintained at an acceptable level (see section 5.7 for additional details).
5.3.16	No deleterious materials or Project-related debris are allowed to enter any watercourse (including the ten drainage locations). Debris generated from the Project must be contained, collected and disposed of properly off-site.
5.3.17	In the event of any fluid spills or leaks into water (including the ten drainage locations), the Spill Response Plan (Appendix 3) must be enacted and notifications are to begin immediately.
5.3.18	Prior to construction, an aquatic biologist will evaluate the two mapped watercourses (i.e., KM 568.84 and KM 569.95) before any instream work occurs to identify potential spawning beds (i.e., redds). If no redds are present, construction may continue as planned. If redds are identified, construction must be delayed until the Bull Trout juveniles have emerged from their redds and can be safely salvaged from the area, or until the next Reduced Risk Timing Window.
5.3.19	Vegetation removal within 30 m of the two mapped watercourses (KM 568+840 and KM 569+950) should be retained until the WSA Notification has been obtained.

5.4 Protection of Wildlife and Wildlife Habitat

5.4.01	The SARA protects rare and sensitive wildlife species. Should a rare or sensitive species be identified at the site at any time during the Project, the EM should be notified immediately for further direction. The BMPs to be employed to mitigate the potential effects would vary greatly depending on the identified species, its sensitivity to the activities, and its proximity of habitat to the Project footprint.
5.4.02	To avoid and minimize impacts to Woodland Caribou, it is recommended that caribou mitigation efforts follow the guidelines presented in FLNRORD's Compendium of Wildlife Guidelines for Industrial Development Projects in the North Area, British Columbia (2014). (Available at: http://a100.gov.bc.ca/pub/eirs/finishDownloadDocument.do?subdocumentId=9921)
5.4.03	For construction occurring within known Caribou ranges, the Contractor is responsible for implementing the provisions outlined in the Caribou Protection Plan (Appendix C of the EOA).
5.4.04	An EM should be on site to give a stop work order if caribou, or any other SARA-listed species are observed nearby during construction.
5.4.05	The MBCA (1994) prohibits the taking or killing of migratory bird nests and eggs, and the deposition of harmful substances in areas frequented by migratory birds. Likewise, the Wildlife Act also prohibits the possession, taking, injury, molestation or destruction of a bird or its eggs. No vegetation removal or disturbance is anticipated to occur within the breeding bird nesting period (generally April 30 to August 20). If vegetation clearing occurs in this period, pre-clearing bird nest surveys will be required to minimize the potential that active nests are destroyed. If an active nest of any bird species is found, a no-disturbance zone will be established, and the area will remain undisturbed until young have fledged.
5.4.06	Any active nests or roosts of species protected by the SARA or the MBCA detected on-site must not be disturbed and consultation with the EM will occur to determine appropriate mitigation. Under the <i>Wildlife Act</i> , heron and

	raptor nests are protected all year round, regardless of whether they are active or inactive, and must not be disturbed.
5.4.07	Wildlife species have been known to roost/den in culverts and structures. Prior to removal, all culverts and collapsed structures should be inspected (both inside and outside) for denning wildlife. If any denning, roosting or nesting wildlife is detected on-site, work should be stopped until a QEP can be consulted.
5.4.08	All food waste and other materials that may attract wildlife are to be removed from the site daily. Lunches, coolers, and food products, including waste food products should be securely stored to prevent access by animals.
5.4.09	Notify the EM immediately if dens, burrows, or nests, are detected within the Project area or if there are encounters with bears, coyotes, cougars, or any species at risk. The following should be reported to the EM: (i) aggressive encounters involving any species, (ii) nuisance wildlife, (iii) sightings of large carnivores, (iv) wildlife deaths or (v) observations of carcasses.
5.4.10	Feeding, harassment, or destruction of any wildlife is strictly prohibited. Wildlife encountered at or near the Project should be allowed to passively disperse without undue harassment.
5.4.11	All wildlife (e.g., amphibians) must be salvaged (i.e., captured and relocated to appropriate upstream habitat) from the work area by QEPs prior to dewatering. Wildlife salvage must be done at all eleven culvert locations. A General Wildlife Permit must be obtained from FLNRORD prior to conducting salvage activities.

5.5 Vegetation and Soil Management

5.5.01	Any vegetation to be removed should be surveyed by the EM, or other QEP, to identify any breeding, nesting, roosting or rearing birds and determine the appropriate BMPs.
5.5.02	Vegetation removal that will affect trees, low shrubs and aquatic plants used by all birds and other wildlife should be avoided while they are breeding, nesting, roosting, or rearing young. Adherence to the nesting windows for clearing activities is required (see section 5.4).
5.5.03	To prevent the spread of invasive plant species, vehicles and equipment must be inspected prior to arriving on site to ensure they are free of soil and plant material (power washed if necessary).
5.5.04	In areas of invasive plant infestations identified by the EM, rig matting should be laid down prior to mobilization of machinery to the work area. The bottom of the rig mats should be fully inspected and cleaned of any vegetative matter or soils before being moved from each location.
5.5.05	Machinery and vehicles should be restricted to defined travel routes to avoid excess trampling/compaction of vegetation and soil. Construction should be contained within the existing Alaska Highway ROW.
5.5.06	To minimize the establishment and spread of invasive plants, a post-construction vegetation monitoring and control program should be developed as part of the EPP.
5.5.07	Vegetated areas disturbed by Project related works (including laydown sites, temporary work sites, and material stockpile sites) should be restored as quickly as possible. Disturbed areas should be restored by replacing any excavated topsoil, recontouring and seeding with an approved seed mix appropriate to the site and following approval by PSPC. A revegetation and site restoration plan should be included in the Contractor's EPP.
5.5.08	To prevent soil compaction around the root zone, avoid storing machinery within the drip-line of trees.
5.5.09	Minimize use of equipment on exposed soils and when possible, restrict vehicle traffic to existing roadways or disturbed areas to avoid unnecessary soil compaction.
5.5.10	A fire prevention plan should be developed as part of the EPP. The fire prevention plan should comply with applicable fire prevention policies.

5.6 Erosion and Sediment Control

The following Erosion and Sediment Control measures are applicable at all eleven culvert locations.

5.6.01	The Contractor is responsible for developing an Erosion and Sediment Control Plan as part of their EPP prior to starting construction.
5.6.02	ESC devices (such as, but not limited to, silt fencing, geotextiles, polyethylene sheeting, straw, mulch, approved grass seed, gravel for check dams, etc.) should be available for use on-site. The Site should be prepared to quickly install devices and Project members should be trained in the installation and use of the devices. The EM should confirm appropriate use and location of ESC measures prior to start of Project activities.
5.6.03	Sediments must not be tracked off site. Contractors should ensure that materials tracked onto public roadways adjacent to the Project area are swept at the end of each workday. Tracked materials should be removed by sweeping, shoveling, or vacuuming; materials should not be removed by hosing or sweeping sediments into drainage channels.
5.6.04	All instream works must occur in the dry, isolated from flowing water. Erodible materials should not be used in construction of the isolation structure.
5.6.05	Prior to starting work, appropriate ESC measures should be implemented to prevent sediment from entering into any surface water feature or watercourse within the Project area.
5.6.06	Periods of heavy precipitation are probable during the proposed construction schedule. As much as possible, earthworks should be scheduled to be conducted and completed during dry weather. Excavation activities should be halted during heavy or prolonged rainfall events resulting in evident sediment mobilization such as sloughing of exposed soils or overland flow of sediment-laden water. Work may be stopped completely or works may require the implementation of additional ESC measures to permit work to continue. <i>A rainfall event is considered significant when 25 mm or greater falls within a 24-hour period, or when 10 mm or greater falls within a one-hour period.</i>
5.6.07	All ESC measures should be routinely inspected, especially during or after intense or prolonged rainfall events, to ensure proper function. A quick response to assess and correct damages of the controls is required, especially before subsequent precipitation events. The integrity of the structural components should be verified, and the accumulated sediment be measured. Generally, if sediment levels exceed half the volume or one-third the height of a sediment barrier, the sediments should be removed to ensure continued operating effectiveness. Any structural failures should be repaired, and any major defective sections replaced upon detection.
5.6.08	Soil stockpiling, if necessary, will occur within designated areas that are a reasonable distance (i.e., > 30 m) from high-water mark of any flowing watercourse. The designated location(s) should be approved by the EM. Stockpile volume and area should be minimized where possible and should not be placed on sloped terrain.
5.6.09	Stockpiles required to remain in place for an extended period will be protected by covering them with polyethylene sheeting and a sediment barrier, such as silt fencing or a lined, sandbag berm, should be installed within 1 m around the perimeter.
5.6.10	All ESC structures will be decommissioned once the Project area has been reclaimed to a level where surface erosion and sedimentation have been stabilized, and potential adverse effects to receiving aquatic systems during peak precipitation events are deemed unlikely by the EM. Non-degradable materials will be removed and disposed of off-site.
5.6.11	Vegetation outside of the work area should be protected. Surface disturbance should be kept to within the limits of work area and the amount of time surfaces are exposed should be minimized.
5.6.12	Any exposed soils created as a result of the Project must be protected from erosion by implementing the appropriate ESC measures (i.e., ESC blanket, straw etc.)

5.7 Water Quality

5.7.01	Water quality should be frequently monitored downstream of the work area during instream works to ensure turbidity is at an acceptable level. When turbidity exceeds the established acceptable levels outlined in BC MOE's (2018) Approved Water Quality Guidelines (BCAWQG) for Aquatic Life, the EM must direct activities, such as requiring additional sediment control measures be installed or halting work.
5.7.02	Establishing a background level of turbidity in the affected watercourses is necessary to ensure that guidelines are not exceeded. According to BC MOE's Technical Appendix Addendum Sampling Strategy for Turbidity, Suspended and Benthic Sediment baseline (or background) conditions can be established before project activities commence or by establishing appropriate upstream sites that can be referenced throughout the Project.
5.7.03	The BCAWQG for Turbidity state that turbidity should not increase from background levels by more than 8 NTU at any one time in a 24-hour period during low/clear flows (i.e., dry weather).
5.7.04	The BCAWQG state that turbidity should not increase from background levels by more than 5 NTU at any one time when background is 8 to 50 NTU during high/turbid flows (i.e., wet weather).
5.7.05	The BCAWQG state that turbidity should not increase from background levels by greater than 10% at any one time when background is over 50 NTU during high/turbid flows (i.e., wet weather).
5.7.06	Proper ESC measures should be installed prior to starting construction to protect adjacent watercourses from sediment runoff. If sediment-laden runoff is observed entering nearby watercourses, the EM should be notified and water quality measurements (i.e., turbidity) obtained.
5.7.07	Debris from the Project must not enter adjacent watercourses. Generated debris must be contained, collected and disposed of properly off site.
5.7.08	Any spill into or nearby a watercourse, of a substance that is toxic, polluting, or deleterious to aquatic life must immediately be reported to Emergency Management BC (EMBC) 24-hour phone line at 1-800-663-3456. For proper spill response procedures, refer to the Spill Response Plan (Appendix 3).

5.8 Waste Management (Including Hazardous Wastes and Potentially Contaminated Soils)

5.8.01	The Contractor is expected to adhere to all applicable legislation with respect to the handling, transportation, and/or disposal of all materials related to this Project (waste or otherwise). This legislation may include (but not be limited to) the BC Environmental Management Act, BC Hazardous Waste Regulations (HWR), Spill Reporting Regulations, Workers Compensation Board Regulations, TDG Regulations, BC Contaminated Site Regulation (CSR) in the event contaminated soil is generated or encountered, etc.
5.8.02	The Contractor is expected to abide by the general 'leave no trace' rule. All Project personnel are responsible for removing all litter, domestic garbage, recyclables and organic wastes that are brought to site for appropriate off-site disposal. General housekeeping should be monitored by the EM.
5.8.03	Should garbage containers be required on site, they should be made inaccessible to wildlife, including bear-proof lids.
5.8.04	Non-hazardous construction waste should be collected at designated areas on the site and removed to appropriate facilities on a regular basis.
5.8.05	Maintain a tidy work area to minimize loose waste from leaving the site. The site should be cleaned upon the completion of work daily.
5.8.06	Recycle materials whenever possible.
5.8.07	Waste materials must not be buried or burned.
5.8.08	Sanitary facilities must be utilized by all personnel on-site, located 30 m from any watercourse, stable and secured to avoid tipping, and emptied on a regular basis.

5.8.09	Hazardous wastes generated could include waste petroleum products (engine oils, lubricants) from machinery and equipment, spent batteries, solvents and cleaning agents, etc. The Contractor should provide labelled separate container(s) for potentially hazardous waste such as oily rags and hydrocarbon absorbent pads.
5.8.10	All hydrocarbon products and other hazardous wastes potentially present during project activities should be identified and the associated Workplace Hazardous Materials Information System (WHMIS) and Materials Safety Data Sheets (MSDS) made available to all Project members.
5.8.11	If hazardous or contaminated material (including suspect soils) is encountered, stop work immediately and report it to the Site Superintendent and EM who will determine appropriate BMPs. Hazardous materials should only be handled by appropriately trained personnel.
5.8.12	Any waste considered to be hazardous will be labelled and disposed of off-site according to the WHMIS criteria and the <i>BC Environmental Management Act</i> and TDG Regulations.
5.8.13	All work sites must have emergency spill kits (stocked with pads and sorbent booms) available on site. The kits should be suitable for the quantities and types of material in use and stored at the site. All mobile equipment must contain fully stocked, dedicated spill kits. Contractors must be trained in the proper use of the kits in case of a spill.
5.8.14	Soils suspected of contamination, should be sampled in accordance with accepted soil sampling procedures. The sample(s) should be submitted via Chain of Custody protocol to an accredited analytical laboratory to confirm it is not contaminated. If parameter concentrations exceed applicable standard(s), the contaminated soil should be remediated in accordance with the applicable standards and/ or guidelines under the supervision of an appropriately Qualified Environmental Professional or disposed of at a licensed facility in accordance with the CSR and/or HWR.

5.9 Concrete

5.9.01	Keep materials out of the rain. Store both dry and wet materials under cover, protected from rainfall and runoff. Also, protect dry materials from the wind.
5.9.02	Wash large concrete handling equipment, such as concrete trucks, chutes, pumps, and internals at an approved off-site location or in designated concrete washout areas only. Do not wash out concrete trucks onto the ground or into storm drains, open ditches, streets, or streams. Wash small concrete handling equipment, such as hand tools, screens, shovels, rakes, floats, trowels, and wheelbarrows into designated concrete washout areas.
5.9.03	Designated concrete washout areas, if required on site, should be located as far from the high-water mark and catch basins as possible (preferably at least 30 m). Appropriate containment facilities for wash-down water must be available to ensure the runoff does not enter the aquatic environment.
5.9.04	Cast in place concrete must remain isolated from water inside sealed formed structures until cured (approximately 48-72 hours), as concrete leachate is highly toxic to fish and other aquatic life.
5.9.05	A carbon dioxide (CO ₂) tank with regulator, hose and gas diffuser must be available on site during concrete work to neutralize pH levels should a concrete spill to water occur. Project members must be trained in its proper use.
5.9.06	Prevent any water that contacts deleterious uncured or partly cured concrete (during activities like exposed aggregate wash-off, wet curing, or equipment washing) from directly or indirectly entering any watercourse or stormwater system.
5.9.07	Hold any water that contacts uncured or partly cured concrete until the pH is between 6.5 and 8.0 pH units and the turbidity is less than 25 nephelometric turbidity units (NTU), measured to an accuracy of +/- 2 NTU.
5.9.08	Use biodegradable release oil on the forms, where possible. Ensure that the form release oil does not enter the aquatic environment when applying it.

5.10 Fuel Storage and Spill Response

5.10.01	Handle, store and transfer fuel in accordance with the BC Fuel Guidelines (Available at: http://www.northwestresponse.ca/resources/2018%20BC%20Fuel%20Guidelines.pdf)
5.10.02	Equipment and machinery should be inspected on a daily basis to ensure that they are in good operating condition, free of leaks, and excess oil and grease.
5.10.03	If feasible, machinery used in proximity to watercourses should use environmentally friendly hydraulic fluids (i.e., biodegradable or vegetable oil based).
5.10.04	When vehicles and equipment are not in use and/or left on site overnight, place drip trays or absorbent pads should be placed beneath the vehicle/equipment to capture any drips or leaks.
5.10.05	Refuelling and maintenance of equipment as well as the storage of any excess fuels, oils, lubricants or other petrochemical products should occur at least 30 m from any watercourse and/or drainage system. Topographic features and slope should be considered; flat surfaces are recommended.
5.10.06	Hydrocarbon and coolant storage, if required on site, should be within a secondary impermeable containment facility capable of holding 110% of the storage tank contents. This may be achieved through the use of double-walled storage tanks. These containment basins should be inspected daily for leaks and wear points, kept clean and any measurable rainwater removed and disposed of appropriately. If practical, the containment area should be covered to prevent infilling with rainwater. Where leaks and/or wear points are found, they should be repaired promptly to restore full containment.
5.10.07	Tanks, hoses, and connections should be inspected before fuel transfers. All hose connections should be wrapped and secured with absorbent pads during fuel/oil transfers and remain wrapped, contained, and in an upright orientation during all other times. All hoses, valves, and equipment should be kept in a containment area whenever possible. Minimize hose length and the number of connections - use dripless connections if possible. Drain hoses when finished.
5.10.08	Contractors should ensure that small containers (i.e., jerry cans) will be stored within secondary containment in a secure location, protected from weather. These containers must be designed solely for the purpose of storing and pouring fuel and should not be more than 5 years old. Containers must not leak and must be sealed with a proper fitting cap or lid.
5.10.09	The Contract is responsible for ensuring that site-specific Spill Response Plan is prepared and on-site at all times (see Appendix 3 which presents an Example Spill Response Plan).
5.10.10	All spill containment kits should be readily accessible both on-site and on each piece of equipment in the event of a release of a deleterious substance to the environment. Spill kits should be capable of dealing with 110% of the largest potential spill.
5.10.11	All Project personnel should be trained in the use of spill kit materials and supplies and be aware of their location. Any spill to water of a substance that is toxic, polluting, or deleterious to aquatic life must immediately be reported to the EMBC 24-hour phone line at 1-800-663-3456 (see Spill Response Plan, Appendix 3). A spill to ground of reportable quantities (as detailed in Appendix 3) of a substance that is toxic, polluting, or deleterious to life must immediately be reported to the EMBC 24-hour phone line.
5.10.12	A pre-construction meeting should be held to identify all materials of a deleterious nature that could be spilled. The Contractor's EPP should provide a list of all materials that may be hazardous or of a deleterious nature and include the WHMIS paperwork.
5.10.13	Hazardous materials and wastes should be stored in covered containers and in secondary containment.
5.10.14	Minimize the potential for spills through proper use, handling, storage, and disposal of products. If a spill occurs, stop work immediately to respond and follow the protocol outlined in the Spill Response Plan (Appendix 3). Action should be taken to contain the spill and then, if necessary, reported.

5.11 Air Quality

5.11.01	All equipment, vehicles and stationary emission sources should be well-maintained and operated at optimum rated loads and be turned off when not in use to minimize exhaust emissions.
5.11.02	Vehicles or equipment producing excessive exhaust pollution should be repaired or replaced.
5.11.03	Dust-generating activities will be minimized as much as possible, especially during windy periods and dry weather, to minimize airborne dust emissions. Given the habitat sensitivity of the area, water is considered the only appropriate dust suppressant (e.g., a sprinkler system) and should be used as needed. Unless PSPC holds a permit that allows water extraction from certain locations, water must not be withdrawn from surrounding watercourses for this purpose. Only that amount of water necessary to suppress dust must be utilized so as to avoid causing overland flow of sediment-laden water.
5.11.04	When hauling materials with the potential to generate dust, loads should be tarped to avoid blow-off.
5.11.05	The burning of oils, rubber, tires and any other material is not permitted to take place at the site.
5.11.06	Stationary emission sources (e.g., portable diesel generators, compressors, etc.) should be used only as necessary and turned off when not in use.
5.11.07	Equipment and vehicles should be turned off when not in active use so to reduce idling.

5.12 Noise and Vibration

5.12.01	Noise exposure levels should comply with Part 7, Division 1 of the Occupational Health and Safety Regulation. WorkSafeBC has several publications regarding noise in the workplace and are available at: <ul style="list-style-type: none"> ▪ http://www.worksafebc.com/publications/health_and_safety/by_topic/assets/pdf/basic_noise_calculations.pdf ▪ http://www.worksafebc.com/publications/health_and_safety/by_topic/assets/pdf/occupational_noise_surveys.pdf
5.12.02	All equipment should be properly maintained to limit noise emissions and fitted with functioning exhaust and muffler systems. Machinery covers and equipment panels should be well fitted and remain in place to muffle noise. Bolts and fasteners should be tight to avoid rattling.
5.12.03	Engines should be turned off when not in use or reduced to idle, and equipment operators should avoid unnecessary revving and use of engine breaks.

5.13 Archaeological Resources and Historical Sites

5.13.01	A Chance Find Procedure (CFP) has been developed by Tetra Tech and should be part of the Contractor's EPP, in the event that cultural artifacts or anthropogenic deposits (e.g., remains of hearths, dwellings, storage pits) are uncovered during construction (Appendix 2).
5.13.02	If an archaeological site is encountered during construction, activities must be halted within 30 m of the find, and the Contractor must follow the CFP. The Archaeology Branch should be contacted at 250.953.3334 for direction.

6.0 ENVIRONMENTAL MANAGEMENT ROLES AND RESPONSIBILITIES

The effective environmental management of this Project requires a coordinated effort from all individuals involved. The following sections outline the responsibilities of key personnel involved with the Project.

6.1 Key Project Personnel

The Project contact list (Table 6-1) for the works proposed in this EMP should be completed as soon as the information is known and made available to all parties. The successful contractor should provide details to complete and update this list as part of their EPP.

Table 6-1: Project Contact List

Name	Role	Phone Number	Email
TBD	Contractor Site Superintendent	TBD	TBD
TBD	Contractor's Environmental Monitor (EM)	TBD	TBD
TBD	Construction Inspector	TBD	TBD
Alex Taheri	PSPC Project Manager	(778) 939.6704	Alex.Taheri@pwgsc-tpsgc.gc.ca
Laurie Crawford	PSPC Environmental Coordinator	(780) 497.3892	Laurie.Crawford@pwgsc-tpsgc.gc.ca
Matt Keleher	Tetra Tech Project Manager	(604) 608.8615	Matt.Keleher@tetrattech.com

6.2 Contractor Responsibilities

The successful contractor will review Tender Specifications for environmental compliance and this EMP with their staff and subcontractors and prepare an EPP prior to undertaking any work. The Contractor is responsible for ensuring that all the activities related to the Project are conducted in such a way that impacts to the environment are either avoided or minimized.

- Contractors will comply with all laws, orders, rules, regulations, and codes of any provincial or federal environmental agency or like authority, which are applicable to the Project.
- Contractors are responsible for implementing the BMPs and mitigation measures outlined in the EMP.
- Contractors will cooperate with the EM appointed for the work. They must comply with written or verbal instructions with respect to execution of the proposed work in compliance with the mitigation measures outlined in the Tender Specifications, this EMP and their EPP, which are at a minimum, consistent with the regulatory agencies having jurisdiction over the area of the Project. Prior to construction the Contractor must retain the EM to evaluate the two mapped watercourses (i.e., KM 568.84 and KM 569.95) for the presence of Bull Trout redds.
- Contractors must complete their work in such a fashion that all watercourses, including any ditches and swales, where works are to occur, are effectively isolated from downstream habitat. The Contractor will coordinate with the EM prior to and during the installation of the isolation measures in order that the EM can arrange for the concurrent salvage of fish and other aquatic wildlife within the isolated work areas. Environmental staging drawings for site isolation and stream diversion can be found in Appendix E of the EOA prepared for this project.
- Contractors will correct deficiencies and any non-compliance upon direction from the EM whether written or verbal. Corrections should be made as soon as reasonably possible, ideally within 24 hours of directions.
- Contractors will arrange provision of appropriate on-site waste containers, if required.

- Contractors are responsible for the restoration of all disturbed areas resulting from any of the works they undertake. The Contractor is responsible for reinstatement of the Project area after construction, to the satisfaction of the Project Manager and the EM.
- If an archaeological site is detected, the Contractor is responsible for following the Chance Find Protocol (Appendix 2).

6.3 Environmental Monitor Responsibilities

On-site monitoring is a key component of ensuring that the mitigation measures recommended in the EMP (and ultimately the EPP) are implemented properly (e.g., appropriate location and correct installation) and function as intended. The Contractor should retain a full-time QEP as the EM to provide guidance on implementing the recommended measures and, if necessary, to develop additional mitigation measures if the need arises.

The key monitoring stages the EM is responsible for include:

- During start-up of the Project and installation of erosion and sediment control measures;
- During work that occurs within 30 m of water or within 30 m of the high-water mark of any watercourse. *For this Project, the EM is expected to be on-site full time during any work conducted within 30 m of the KM 568+840 and KM 569+950 culverts and their associated watercourses. For the ten drainage culverts, close oversight of the EM will only be required if there is flow through the culvert at the time of construction;*
- During worksite isolation from flow, when fish and wildlife salvage operations are required, and during instream works (i.e., work below the high-water mark);
- During any accidents or malfunctions that affect the Project and following any significant rainfall events. It is equally important to take corrective action prior to inclement weather events rather than to react during or after the event; and
- During completion of the Project and decommissioning/removal of mitigation measures.

The primary responsibility of the EM is to confirm that the environmental protection objectives of the Project are met and that the requirements of this EMP and contractor's EPP are enacted. EM responsibilities include:

- Monitor compliance with the EMP, EPP, permits and other legal requirements.
- Securing Fish Collection Permits and General Wildlife Permits prior to conducting salvage work.
- Evaluating the two mapped watercourses (i.e., KM 568.84 and KM 569.95) for the presence of Bull Trout redds prior to construction.
- Communicate the requirements of the EMP and EPP to the contractors and their respective employees during pre-job and tailboard meetings.
- Be on site as per the schedule established between parties prior to Project start and remain on-call (via phone or email) during non-critical work periods to respond to emerging environmental issues or emergencies.
- Review the contractors work procedures to assess functionality and compliance with the EMP, the EPP and applicable regulations, standards and BMPs.
- Have the authority to modify and/or halt any construction activity at any time if deemed necessary for the protection of the environment or if SAR (i.e., Woodland Caribou) are observed in the Project area.

- Advise Project personnel if Project activities have caused or are likely to cause an environmental incident and make recommendations for corrective action.
- Liaise directly with Project personnel and provide technical advice to resolve situations that may impact the environment as they arise.
- Monitor all works conducted within watercourses to ensure downstream habitat is effectively isolated.
- Conduct routine field water quality data collection (turbidity, pH, temperature, conductivity) using portable water quality meters prior to (baseline) and during construction activity within watercourses. Results will be compared to the British Columbia Approved Water Quality Guidelines for Aquatic Life. If a Guideline is exceeded, the EM will direct the contractor to undertake corrective measures or, as necessary, halt works until the EM deems the issue that caused the turbidity or pH non-compliance is effectively resolved.
- Maintain complete records of activities related to the implementation of the EPP. This should include any readings or measurements taken, photographs and incident reports.
- Complete and submit a monitoring report to PSPC and report any unanticipated adverse effects to the environment within 24 hours of occurrence. Such reports should include the nature of the effect, its cause, mitigation and/or remediation implemented, and whether a work stoppage was ordered, as well photographs, analyses, and measurements, if applicable.

6.4 Public Services and Procurement Canada Responsibilities

PSPC will delegate a Departmental Representative / Environmental Coordinator (EC) to oversee the Project to completion and to coordinate project activities between all parties involved. Throughout the duration of the Project, PSPC is committed to undertake the following:

- Require that the successful Contractor has an appropriate EPP, and an EM in place prior to starting work.
- A Project-specific EPP will be prepared by the successful Contractor as part of the Tender requirements for the Project and provided to the PSPC EC for review prior to work commencing. The PSPC EC will review the Contractor's EPP for accuracy against the this EMP, appropriate Project specifications, and contract requirements. Work related to the EPP submittal (as determined by the PSPC EC) shall not proceed until acceptance of the EPP by the PSPC EC.
- Upon PSPC EC acceptance of the Contractor's EPP, the PSPC EC may submit the EPP as part of the environmental notification/permitting process.
- The PSPC EC monitors compliance with the contract specifications.
- The PSPC EC has the responsibility to notify Contractor verbally and in writing of observed non-compliance with environmental Project specifications and/or Federal, Provincial or Municipal environmental laws or regulations, permits, etc.
- The PSPC EC has the authority to issue a stop work order when an existing or potential environmental non-compliance is observed until satisfactory corrective action has been taken.
- The PSPC EC ensures that environmental incidents are reported.
- The PSPC EC liaises with regulatory agencies as required.

6.5 Environmental Auditor (Tetra Tech) Responsibilities

Tetra Tech will provide environmental oversight on behalf of PSPC for the Project. The role of Tetra Tech includes the following tasks:

- Prepare and update the Environmental Overview Assessment, Environmental Management Plan, Caribou Protection Plan and Chance Find Protocol as necessary;
- Confirm that the Contractor understands all requirements of the Chance Find Protocol;
- Apply for environmental permits on behalf of PSPC required for Project activities (with the exception of the Fish Collection and General Wildlife Act permits which are the responsibility of the Contractor's EM);
- Liaise with PSPC's Environmental Coordinator to meet Project objectives; and
- Prepare project design details, drawings, and specifications on PSPC's behalf.

7.0 ENVIRONMENTAL COMMUNICATION / REPORTING REQUIREMENTS

7.1 Environmental Protection Plan

A Project-specific EPP will be prepared by the successful Contractor as part of the Tender requirements for the Project and provided to the PSPC Environmental Coordinator for comment and review prior to work commencing. An appropriately qualified EM will be designated by the Contractor before the commencement of the Project to oversee the execution of the EPP. The EPP will:

- Be available to all staff during Project activities. The Contractor will be required to keep a copy of the EPP on-site during construction.
- Include an access plan including access routes, traffic safety, type of equipment used for various construction phases, and location of lay down areas in order to prevent/minimize disturbance to vegetation and soils. Lay down areas will occur on paved and/or hardened surfaces, where possible.
- Include spill response procedures and hazardous materials plan (e.g., fuels, lubricants, concrete etc.), including appropriate containment, storage, security, handling, and transportation of applicable materials/substances, spill kit requirements, and emergency response contacts. The Material Safety Data Sheets (MSDS) for all chemicals used will be made available on site.
- Include an Emergency Response Plan that outlines procedures to follow in case of emergency (e.g., wildlife encounter, equipment malfunction/failure, fire, avalanche).
- Details of environmental monitoring and rehabilitation.
- Includes an Erosion and Sediment Control Plan.
- Include provisions to reduce human-wildlife interactions.
- Integrate fully with the Traffic Management Plan, Quality Management Plan and Site-Specific Health and Safety Plan.

7.2 Environmental Monitoring Reports

The EM is responsible for completing and submitting environmental monitoring reports at a frequency acceptable to PSPC, detailing the construction activities that occurred during the days the EM was on-site and any observations of environmental non-compliance with the EMP or EPP. EM reports should include the following information:

- The name of the EM and the date, time and duration the EM was on site;
- A description of the weather during the site visit;
- A list of personnel on site;
- A summary and photo documentation of the construction activities that were taking place during the site visit, or that took place since the last site visit;
- Water turbidity measurements and/or fish salvage results if works were being conducted in or around a watercourse (other than if the watercourse was dry at the time of the works); and
- In cases where environmental non-compliance or environmental incidents are observed, the EM report should include:
 - The nature of the effect and its cause,
 - Whether a work stoppage was ordered,
 - Photographs,
 - Analyses, and measurements, if applicable,
 - Mitigation and/or remediation measures that were implemented or recommended, and
 - In subsequent site visits, the EM should document if non-compliances identified during previous EM visits had been resolved and/or addressed.

7.3 Emergency Response and Environmental Incident Reporting

All environmental incidents/emergencies should be reported to the EM, the Contractor Site Superintendent, and PSPC as soon as possible, so that appropriate notifications can be made, and Project management can ensure that incidents are handled appropriately. In the case of any environmental concern and/or incident, Project personnel are responsible for informing their Site Superintendent, who must then report to the EM. Contractors are responsible to ensure that all crew are adequately trained and equipped to deal with potential environmental incidents related to their work. Any concerns about preparedness for environmental incidents should be brought to the attention of the Site Superintendent or the EM.

The Emergency Contacts List (Table 7-1) should be updated as part of the EPP, as necessary.

Table 7-1: Emergency Contact List

Agency	Phone Number
Emergency Services	911 Please note that there is no 911 service in the NRRD.
Fort Nelson – Local Police (Non-emergency)	1.250.774.2700
Police Emergency (NRRD)	1.250.774.2777
Fort Nelson Fire Department (Non-emergency)	1.250.774.3955
Fire Emergency (NRRD)	1.250.774.2222
BC Wildfire Reporting Line	1 800.663.5555 or *5555 on cell
Emergency Management BC	1 800.663.3456
Conservation Officer Service (wildlife issues)	1 877.952.7277
DFO (aquatic habitat/fisheries issues, Record and Report 24-hour Hotline)	1 800.465.4336
FLNRORD – Fort Nelson Office	1.250.774.5511

An Environmental Incident Report (EIR) should be prepared as soon as possible following an incident. The Contractor is responsible for completing the EIR and the EM should follow-up with the Contractor to ensure it is filed. The target for reporting is within one (1) working day from the time of the incident. A sample EIR is included as Appendix 4. All significant emergencies (as determined by the EM) should be reported to Emergency Management BC (EMBC) at 1-800-663-3456.

Any incidents that result in non-compliance with a permit or environmental legislation such as the Fisheries Act must be reported within 12 hours to the BC MOE, DFO, and Emergency Management BC (EMBC) [formerly the Provincial Emergency Program (PEP); if reportable spill quantity].

If the incident results in severe environmental impact or involvement of the public, the media, or government representatives, PSPC must be notified immediately. The target for this type of notification is within one hour of the incident or its escalation to severe status.

An environmental incident is one that has caused, or has the potential to cause, one or more of the following:

- Deleterious effects to the environment including those affecting the air quality, aquatic resources, wildlife, including SAR or other environmental resources;
- Unauthorized discharge of deleterious substances into a watercourse;
- Disturbance or damage of heritage resources or archaeological sites
- Adverse publicity with respect to environment; and
- Legal action with respect to violation of legislation, regulation, policy or environmental damage.


Examples of Environmental Incidents include, but are not limited to:

- Spills of oil, fuel, hydraulic fluids, PCBs or chemicals;
- Discharge of deleterious substances (sediment, spills, concrete) into fish-bearing water;
- Mass wasting, landslides, erosion, or floods as they affect environmental or water quality;
- Activities that affect fish or fish habitat, wildlife or recreation;
- Violation of environmental regulations, permits, or approvals;
- Negative wildlife interactions;
- Forest fires related to activities; and
- Work and/or removal of vegetation in or near water bodies without regulatory approval.

8.0 CLOSURE

We trust this document meets your present requirements. If you have any questions or comments, please contact the undersigned.

Respectfully Submitted,
Tetra Tech Canada Inc.



FILE: 704-TRN.VHWY03172-02
FILE: 704-TRN.VHWY03172-02
FILE: 704-TRN.VHWY03172-02



FILE: 704-TRN.VHWY03172-02
FILE: 704-TRN.VHWY03172-02
FILE: 704-TRN.VHWY03172-02

Prepared by:
Elyse Hofs, B.Sc., Dipl.T.
Junior Environmental Scientist
Environment and Water Practice
Direct Line: 778.945.5724
Elyse.Hofs@tetrattech.com

Reviewed by:
Nigel Cavanagh, M.Sc., R.P.Bio., P.Biol.
Senior Aquatic Biologist
Environment and Water Practice
Direct Line: 250.756.3966 x240
Nigel.Cavanagh@tetrattech.com

/sy

REFERENCES

- BC Ministry of Environment (MOE). 2004. Standards and Best Management Practices for Instream Works. Available at: <http://www.env.gov.bc.ca/wld/documents/bmp/iswstdsbpsmarch2004.pdf>.
- BC Ministry of Environment (MOE). 2005. A User's Guide to Working In and Around Water: Understanding the Regulation under British Columbia's Water Act. Water Management Branch. Available at: https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/natural-resource-use/land-water-use/crown-land/working_around_water.pdf.
- BC Ministry of Environment (MOE). 2014. Develop with Care: Environmental Guidelines for Urban and Rural Land Development in British Columbia. Available at: <https://www2.gov.bc.ca/gov/content/environment/natural-resource-stewardship/laws-policies-standards-guidance/best-management-practices/develop-with-care>.
- BC Ministry of Environment (MOE). 2016. Best Management Practices for Bats in British Columbia. Government of British Columbia. Available at: <http://a100.gov.bc.ca/pub/eirs/viewDocumentDetail.do?fromStatic=true&repository=BDP&documentId=12460>.
- BC Ministry of Environment and Climate Change Strategy (MOE). 2018. British Columbia Approved Water Quality Guidelines: Aquatic Life, Wildlife & Agriculture. Government of British Columbia. Available at: https://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/waterquality/water-quality-guidelines/approved-wqgs/wqg_summary_aquaticlife_wildlife_agri.pdf.
- BC Ministry of Forests, Lands and Natural Resource Operations and Rural Development (FLNRORD). 2014. A Compendium of Wildlife Guidelines for Industrial Development Projects in the North Area, British Columbia. Government of British Columbia. Available at: <http://a100.gov.bc.ca/pub/eirs/finishDownloadDocument.do?subdocumentId=9921>
- BC Ministry of Forests, Lands and Natural Resource Operations and Rural Development (FLNRORD). 2019. Terms and Conditions for Water Sustainability Act Changes in and about a Stream as specified by Ministry of Forests, Lands and Natural Resource Operations (FLNRO) Habitat Officers, Northeast Region. Available: https://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/working-around-water/terms_and_conditions_northeast_region_sept_2016.pdf.
- Decker, Scott, J. Hagan, and J. Baxter. 2005. Feasibility of Juvenile and Adult Bull Trout Abundance Monitoring in Selected Tributaries of the Arrow Lakes Reservoir. Prepared for Columbia Basin Fish and Wildlife Compensation Program and BC Hydro and Power Authority. Available at: http://www.sgrc.selkirk.ca/bioatlas/pdf/Feasibility_of_Juvenile_and_Adult_Bull_Trout_Abundance_Monitoring_in_Selected_Tributaries_of_the_Arrow_Lakes_Reservoir.pdf.
- Environment and Climate Change Canada (ECCC). 2018. General Nesting Periods of Migratory Birds. Available: https://www.canada.ca/en/environment-climate-change/services/avoiding-harm-migratory-birds/general-nesting-periods.html#_03.
- Fisheries and Oceans Canada [DFO]. 1992. Land Development Guidelines for the Protection of Aquatic Habitat. Produced, Compiled and Edited by Habitat Management Division DFO & Integrated Management Branch of the Ministry of Environment, Lands and Parks (MELP).
- Fisheries and Oceans Canada [DFO]. 2018. Measures to Avoid Causing Harm to Fish and Fish Habitat. Government of Canada. Available at: <https://www.dfo-mpo.gc.ca/pnw-ppe/measures-mesures-eng.html>.
- Fisheries and Oceans Canada [DFO]. 2019. Interim Code of Practice: End-of-Pipe Fish Protection Screens for Small Water Intakes in Freshwater. Government of Canada. Available at: <https://www.dfo-mpo.gc.ca/pnw-ppe/codes/screen-ecran-eng.html>

- Fisheries and Oceans Canada [DFO]. 2020a. Interim Code of Practice: Temporary Cofferdams and Diversion Channels. Government of Canada. Available at: <https://www.dfo-mpo.gc.ca/pnw-ppe/codes/cofferdams-batardeaux-eng.html>.
- Fisheries and Oceans Canada [DFO]. 2020b. Interim Code of Practice: Temporary Stream Crossings. Government of Canada. Available at: <https://www.dfo-mpo.gc.ca/pnw-ppe/codes/temporary-crossings-traversees-temporaires-eng.html>.
- Invasive Species Council of BC [ISBC]. 2007. A Legislative Guidebook to Invasive Plant Management in BC. Williams Lake, BC. Available at: <https://bcinvasives.ca/documents/IPC3-Legislative-Guidebook.pdf>.
- Northwest Response Ltd. 2018. BC Fuel Guidelines (8th Edition). Available at: <http://www.northwestresponse.ca/resources/2018%20BC%20Fuel%20Guidelines.pdf>.
- Tetra Tech. 2020a. Environmental Overview Assessment, KM 566 + 900 to KM 570 + 200 Highway Realignment and Reconstruction. Prepared for Public Services and Procurement Canada.
- Tetra Tech. 2020b. Caribou Protection Plan, KM 566 + 900 to KM 570 + 200 Highway Realignment and Reconstruction. Prepared for Public Services and Procurement Canada.

APPENDIX 1

TETRA TECH'S LIMITATIONS ON THE USE OF THIS DOCUMENT

LIMITATIONS ON USE OF THIS DOCUMENT

NATURAL SCIENCES

1.1 USE OF DOCUMENT AND OWNERSHIP

This document pertains to a specific site, a specific development, and a specific scope of work. The document may include plans, drawings, profiles and other supporting documents that collectively constitute the document (the "Professional Document").

The Professional Document is intended for the sole use of TETRA TECH's Client (the "Client") as specifically identified in the TETRA TECH Services Agreement or other Contractual Agreement entered into with the Client (either of which is termed the "Contract" herein). TETRA TECH does not accept any responsibility for the accuracy of any of the data, analyses, recommendations or other contents of the Professional Document when it is used or relied upon by any party other than the Client, unless authorized in writing by TETRA TECH.

Any unauthorized use of the Professional Document is at the sole risk of the user. TETRA TECH accepts no responsibility whatsoever for any loss or damage where such loss or damage is alleged to be or, is in fact, caused by the unauthorized use of the Professional Document.

Where TETRA TECH has expressly authorized the use of the Professional Document by a third party (an "Authorized Party"), consideration for such authorization is the Authorized Party's acceptance of these Limitations on Use of this Document as well as any limitations on liability contained in the Contract with the Client (all of which is collectively termed the "Limitations on Liability"). The Authorized Party should carefully review both these Limitations on Use of this Document and the Contract prior to making any use of the Professional Document. Any use made of the Professional Document by an Authorized Party constitutes the Authorized Party's express acceptance of, and agreement to, the Limitations on Liability.

The Professional Document and any other form or type of data or documents generated by TETRA TECH during the performance of the work are TETRA TECH's professional work product and shall remain the copyright property of TETRA TECH.

The Professional Document is subject to copyright and shall not be reproduced either wholly or in part without the prior, written permission of TETRA TECH. Additional copies of the Document, if required, may be obtained upon request.

1.2 ALTERNATIVE DOCUMENT FORMAT

Where TETRA TECH submits electronic file and/or hard copy versions of the Professional Document or any drawings or other project-related documents and deliverables (collectively termed TETRA TECH's "Instruments of Professional Service"), only the signed and/or sealed versions shall be considered final. The original signed and/or sealed electronic file and/or hard copy version archived by TETRA TECH shall be deemed to be the original. TETRA TECH will archive a protected digital copy of the original signed and/or sealed version for a period of 10 years.

Both electronic file and/or hard copy versions of TETRA TECH's Instruments of Professional Service shall not, under any circumstances, be altered by any party except TETRA TECH. TETRA TECH's Instruments of Professional Service will be used only and exactly as submitted by TETRA TECH.

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.

1.3 STANDARD OF CARE

Services performed by TETRA TECH for the Professional Document have been conducted in accordance with the Contract, in a manner consistent with the level of skill ordinarily exercised by members of the profession currently practicing under similar conditions in the jurisdiction in which the services are provided. Professional judgment has been applied in developing the conclusions and/or recommendations provided in this Professional Document. No warranty or guarantee, express or implied, is made concerning the test results, comments, recommendations, or any other portion of the Professional Document.

If any error or omission is detected by the Client or an Authorized Party, the error or omission must be immediately brought to the attention of TETRA TECH.

1.4 DISCLOSURE OF INFORMATION BY CLIENT

The Client acknowledges that it has fully cooperated with TETRA TECH with respect to the provision of all available information on the past, present, and proposed conditions on the site, including historical information respecting the use of the site. The Client further acknowledges that in order for TETRA TECH to properly provide the services contracted for in the Contract, TETRA TECH has relied upon the Client with respect to both the full disclosure and accuracy of any such information.

1.5 INFORMATION PROVIDED TO TETRA TECH BY OTHERS

During the performance of the work and the preparation of this Professional Document, TETRA TECH may have relied on information provided by 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 ISSUES

The ability to rely upon and generalize from environmental baseline data is dependent on data collection activities occurring within biologically relevant survey windows.

It is incumbent upon the Client and any Authorized Party, to be knowledgeable of the level of risk that has been incorporated into the project design or scope, in consideration of the level of the environmental baseline information that was reasonably acquired to facilitate completion of the scope.

1.8 NOTIFICATION OF AUTHORITIES

TETRA TECH professionals are bound by their ethical commitments to act within the bounds of all pertinent regulations. In certain instances, observations by TETRA TECH of regulatory contravention may require that regulatory agencies and other persons be informed. The client agrees that notification to such bodies or persons as required may be done by TETRA TECH in its reasonably exercised discretion.

APPENDIX 2

ARCHAEOLOGY CHANCE FIND PROTOCOL

To:	Public Services and Procurement Canada	Date:	January 18, 2021
c:		Memo No.:	
From:	Elyse Hofs, Charla Arnott, Matt Keleher	File:	704-TRN.VHWY03172-02
Subject:	Archaeological Site Chance Find Protocol Alaska Highway Realignment & Reconstruction – KM 566.90 to KM 570.2		

1.0 INTRODUCTION

Tetra Tech Canada Inc. (Tetra Tech) has been retained by Public Services and Procurement Canada (PSPC) to provide engineering and environmental for planned highway realignment and reconstruction work located between KM 566.9 and KM 570.2 of the Alaska Highway (herein referred to as the “Project”).

Throughout the Project, there is potential to encounter archaeological sites and artifacts that are protected under the *Heritage Conservation Act*. As such, Tetra Tech has been asked to provide archaeological services for the Project, including the preparation of a site-specific Chance Find Protocol (CFP).

The purpose of this Archaeological Site CFP is to provide guidance to PSPC employees and contractors on what to do if they come across or expose an archaeological site while conducting ground disturbing operations. This document provides a framework for recognizing archaeological artifacts and avoiding unforeseen disturbance to them. The Protocol, consisting of two parts, (1) informs employees and contractors about the legislation that protect archaeological sites from disturbance and what archaeological sites look like, and (2) what procedural steps to follow if a suspected archaeological or heritage resource is encountered during ground disturbing activities.

1.1 Project Contacts

Name	Role	Phone Number	Email
Alex Taheri	PSPC Project Manager / Representative	778.939.6704	Alex.Taheri@pwgsc-tpsgc.gc.ca
Charla Arnott	Archaeologist, Soriak Consulting & Research Ltd.	780.995.4859	Charla@soriakconsulting.com
Matt Keleher	Project Manager, Tetra Tech Inc.	604.608.8615	Matt.Keleher@tetrattech.com

2.0 EDUCATION

This section informs Project personnel that archaeological sites are protected by law, provides examples of what archaeological sites look like and how they can be identified.

2.1 Heritage Conservation Act

The British Columbia (BC) *Heritage Conservation Act* confers automatic protection upon archaeological and historic heritage sites that meet the definitions within Section 13(2) of the Act. These include:

- All sites pre-dating AD1846;
- All sites of unknown age or origin which may pre-date AD1846;
- All burial places and rock art sites of historical or archaeological value; and
- All vessels or aircraft wrecked for two or more years.





All areas within the boundaries of a heritage site are protected under the Act, including areas without archaeological deposits or other kinds of heritage remains (e.g., land without archaeological deposits between several culturally modified trees at one site, or between several storage pits at one site).

There is always a limited possibility for unknown archaeological sites to exist, particularly in proximity to water sources; therefore, it is necessary that a CFP be developed in advance of construction, in the event that cultural artifacts or anthropogenic deposits (e.g., remains of hearths, dwellings, storage pits) are uncovered during Project-related activities.

Archaeological sites (both recorded and unrecorded) in British Columbia are protected under the *Heritage Conservation Act* and must not be altered or damaged without a site alteration permit issued by BC's Archaeology Branch, Ministry of Forests, Lands, Natural Resource Operations and Rural Development. If an archaeological site is encountered during development, activities must be halted, the discovery protocol provided in Section 3.0 should be followed, and the BC Archaeology Branch is to be contacted at 250-953-3334 for direction.

2.2 Artifact Identification

In northeast British Columbia, cultural material can widely range depending on location. Material is generally found in areas that were favorable to the needs of the area's earliest inhabitants. Examples of possible artifacts in the region may include, but are not limited to, the following:

Type:	Description
Stone Tools	<p>These were made for hunting or fishing, can be formed from a variety of materials, and can come in many different colours. Examples include projectile points, hide scrapers, as well as the material cast off when they are manufactured (lithic debitage):</p> 
<p>Culturally Modified Trees (CMTs):</p> <p>Trails:</p>	<p>Trees were modified in different ways and for different purposes, including bark stripping and trail marking.</p> <p>Trees with blazes on either side of them sometimes marked trails. These trails may also warrant protection.</p> 
Historic Structures	<p>Historic objects identified during construction should be inspected/documentated; however, depending on their antiquity, they may or may not be protected under the <i>Heritage Conservation Act</i>.</p> 
Burials:	<p>The BC government's <i>Found Human Remains</i> mandate details procedures to follow in the event human remains are identified.</p> <p>Burials traditionally occurred in elevated areas overlooking water.</p> <p>Unusual rock piles or soil depressions may be indicative that a burial is present.</p> 

3.0 DISCOVERY PROTOCOL

This section describes the necessary steps required when a suspected archaeological site is identified by an employee or contractor in the field. Section 6.3 of the Government of Canada's General Provisions for Construction Services outlines the responsibilities of the Contractor in the event that human remains, archaeological remains or items of historical or scientific interest are discovered (GOC 2018). These provisions have been incorporated into this protocol.

If materials are encountered during development that could be archaeological or heritage resources, the following steps will be taken:

1. Cease all forms of ground disturbance in the immediate vicinity of the find and leave all possible archaeological or heritage materials in place.
2. Establish a protective buffer of at least 30 m around the extent of the find area and demarcate the buffer in a highly visible and clear manner (e.g., with "No Work Zone" flagging).
3. Record the GPS location of the found materials, take photos and fill out the attached form.
4. Inform the Archaeological Monitor and the Project Manager of the possible archaeological site and submit the associated form and photos.
5. The Project Manager will contact PSPC and all personnel will await further instruction.
6. After consulting with PSPC, the Archaeological Monitor is to notify the BC Archaeology Branch at 250.953.3334 for direction.


3.1 Form

General Information		
Date of Discovery:		
Discovery Made By:		
Other Parties Present:		
Location (UTM):		
Site Description		
What is the closest waterbody (or other identifying feature – KM marker etc.)?		
Describe the site characteristics:		
Provide a sketch of the site with appropriate measurements:		
Photograph Summary		
Picture #:	Direction:	Description:
Picture #:	Direction:	Description:
Picture #:	Direction:	Description:
Picture #:	Direction:	Description:
Picture #:	Direction:	Description:
Picture #:	Direction:	Description:
Forward all information, pictures, maps and communications to the Project Manager:		<input type="checkbox"/> Yes <input type="checkbox"/> No Date:
Forward all information, pictures, maps and communications to Archaeological Monitor:		<input type="checkbox"/> Yes <input type="checkbox"/> No Date:
Forward all information, pictures, maps and communications to PSPC:		<input type="checkbox"/> Yes <input type="checkbox"/> No Date:

4.0 CLOSURE

We trust this technical memo meets your present requirements. If you have any questions or comments, please contact the undersigned.

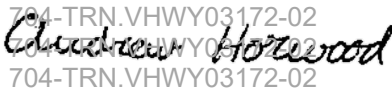
Respectfully submitted,
Tetra Tech Canada Inc.


704-TRN.VHWY03172-02
704-TRN.VHWY03172-02
704-TRN.VHWY03172-02


704-TRN.VHWY03172-02
704-TRN.VHWY03172-02
704-TRN.VHWY03172-02

Prepared by:
Elyse Hofs, B.Sc., Dipl.T.
Environmental Scientist
Environment and Water Practice
Direct Line: 778.945.5724
Elyse.Hofs@tetratech.com

Prepared by:
Charla Arnott, MSc., RPCA, PMP, RPA
Archaeologist
SORIAK Consulting
Direct Line: 780.995.4859
Charla@Soriakconsulting.com


704-TRN.VHWY03172-02
704-TRN.VHWY03172-02
704-TRN.VHWY03172-02

Reviewed by:
Andrew Horwood, B.Tech., ASCT
Project Manager
Transportation Group
Direct Line: 778.945.5879
Andrew.Horwood@tetratech.com

/sy

REFERENCES

Government of Canada [GOC]. 2018. General Conditions (GC) 6 – Delays and Changes in Work – Construction Services. Available at: <https://buyandsell.gc.ca/policy-and-guidelines/standard-acquisition-clauses-and-conditions-manual/5/R/R2860D/6#human-remains-archaeological-remains-and-items-of-interest>.

Heritage Conservation Act, RSBC 1996, c 187. Available at: <http://canlii.ca/t/52qv7>. Retrieved on Feb 11, 2019.

APPENDIX 3

EXAMPLE SPILL RESPONSE PLAN

EXAMPLE SPILL RESPONSE PLAN

The Contractor should ensure that the information provided in this Example Spill Response Plan is included within their prepared EPP.

The Contractor must be familiar with the Spill Response Plan and must ensure that the entire Project personnel understands it. Each member of the Project personnel should know what constitutes a “significant” spill which needs to be reported. In the case of any environmental concern and/or incident, the Project personnel is responsible for informing the Site Superintendent, who must then report to the EM and PSPC. The Site Superintendent is responsible to ensure that all Project personnel are adequately trained and equipped to deal with potential environmental incidents related to their work. Any concerns regarding preparedness for environmental incidents will be brought to the attention of the Site Superintendent or the EM.

1.0 KEY CONTACTS

Key contacts in the event of spill are presented in Table A1, which should be updated when information is available.

Table A1: Key Project Emergency Contacts

Contact	Name	Phone #	Contact Details
PSPC Project Manager	TBD	TBD	Report all incidents to contact
PSPC Site Manager	TBD	TBD	Report all incidents to contact
PSPC Environmental Manager	TBD	TBD	Report all incidents to contact
Contractor Site Superintendent	TBD	TBD	Report all incidents to contact
Environmental Monitor (EM)	TBD	TBD	Report all incidents to contact
Fire, ambulance, police service		911	Emergency Assistance. Please note that there is no 911 service in the NRRD.
Emergency Management BC		1.800.663.3456	Report as required
Conservation Officer Service (wildlife issues)		1.877.952.7277	Wildlife issues
DFO (aquatic habitat/fisheries issues, Record and Report 24-hour Hotline)		1.800.465.4336	Aquatic habitat/ fisheries issues

2.0 BEST PRACTICES

The following measures/best practices should be implemented as part of the **Spill Response Plan**:

- The Contractor’s EPP should provide a list of all materials that may be hazardous or of a deleterious nature and include the Workplace Hazardous Materials Information System (WHMIS) paperwork.
- A pre-construction meeting should be held to identify all materials of a deleterious nature that could be spilled.
- Hazardous materials and wastes should be stored in covered containers and in secondary containment.
- Appropriate spill cleanup materials should be readily available and easily accessible. Project personnel should be aware of the specific materials required to clean up various spills.
- Minimize the potential for spills through proper use, handling, storage, and disposal of products.
- Work should be undertaken and completed in such a manner as to prevent the release of silt, sediment-laden water, fuels or lubricants, uncured concrete or any other deleterious substance.

- All waste fuel, oil, petroleum products, other hydrocarbons and their storage containers must be disposed of off-site at an approved disposal site.
- Contractors should ensure that all construction machinery is to arrive on site in a clean, washed condition, in good operating condition and is to be maintained free of fluid leaks, excess oil, and grease.
- Hydraulic fluids for machinery used within around watercourses should be biodegradable in case of accidental loss of fluid.
- Contractors should ensure vehicles and equipment are not serviced or refuelled within 30 m of any watercourse or catch basins. Tanks, hoses, and connections should be inspected before use. All hose connections should be wrapped and secured with absorbent pads during fuel/oil transfers and remain wrapped, contained, and in an upright orientation during all other times. All hoses, valves, and equipment should be kept in a containment area whenever possible. Minimize hose length and the number of connections - use dripless connections if possible. Drain hoses when finished.
- Hazardous materials must be labelled and disposed of according to the WHMIS criteria and the TDG Regulations.
- Hydrocarbon and coolant storage, if required on site, should be within a secondary impermeable containment facility capable of holding 110% of the storage tank contents. This may be achieved through the use of double-walled storage tanks. These containment basins should be inspected daily for leaks and wear points, kept clean and any measurable rainwater removed and disposed of appropriately. If practical, the containment area should be covered to prevent infilling with rainwater. Where leaks and/or wear points are found, they should be repaired promptly to restore full containment.
- Contractors should ensure that small containers (i.e., jerry cans) will be stored in a secure location, protected from weather. These containers must be designed solely for the purpose of storing and pouring fuel and should not be more than 5 years old. Containers must not leak and must be sealed with a proper fitting cap or lid.
- All work sites must have emergency spill kits (stocked with pads and sorbent booms) available on site. The kits should be suitable for the quantities and types of material in use and stored at the site. All mobile equipment must contain fully stocked, dedicated spill kits. Contractors must be trained in the proper use of the kits in case of a spill.
- If a spill occurs, stop work immediately to respond. Action should be taken to contain the spill and then, if necessary, reported. When cleaning up the spill:
 - Use appropriate absorbent pads or other materials based on the type of substance spilled. The method of disposing of the waste is dependent on the amount and type of deleterious substance that was spilled.
 - Technical assistance is available from the EM on cleanup procedures and residue sampling.
 - All equipment and/or material used in cleanup (e.g., used sorbent, oil containment materials, etc.) must be disposed of properly.
 - Accidental spills may produce hazardous wastes (e.g., material with > 3% oil) and contaminated soil. All waste disposal must comply with the Environmental Management Act and Regulations.
 - Contaminated soil must be treated and dealt with as required on a site-specific basis.

3.0 SPILL RESPONSE PROCEDURES

1. Assess/Ensure Safety

- Ensure personal/public, electrical, and environmental safety.
- Ensure that people with proper training and equipment deal with the spill and unnecessary people are kept clear of the area.
- Wear appropriate Personal Protective Equipment (PPE) and consult Material Safety Data Sheets.
- Never rush in, always determine the product spilled before taking action.
- Warn people in the immediate vicinity.
- Ensure no ignition sources if spill is of a flammable material.

2. Stop the Source (When Possible)

- If required, and when it is safe to do so, stop the spill at its source. This may simply be righting an overturned container or sealing a hole.
- Act quickly to reduce the risk of environmental impacts.
- Close valves, shut off pumps or plug holes/leaks, set containers upright.
- Stop the flow of the spill at its source.

3. Secure the Area

- Limit access to the spill area.
- Prevent unauthorized entry onto the site.

4. Contain and Control the Spill

- The spill should be prevented from infiltrating into the ground or entering a watercourse.
- If the spill occurs to water, booms should be deployed to prevent its spread.
- Block off and protect drains and culverts.
- Prevent spilled material from entering drainage structures (ditches, culverts, drains).
- Use spill sorbent material to contain spill.
- If necessary, use a dyke or any other method to prevent any discharge off-site.
- Make every effort to minimize contamination.
- Contain as close to the source as possible.

5. Notify/Report Incident to Appropriate Authority

4.0 ENVIRONMENTAL INCIDENT REPORTING

All environmental incidents, including spills, must be reported to the EM, the Site Superintendent and PSPC as soon as possible by phone so that appropriate notifications can be made, and the incident is handled appropriately. Spills must be promptly cleaned up and subsequently reported. Make a note of what, how, and where the incident happened. An EIR should be prepared as soon as possible following an incident (Appendix 4). The target for reporting is within one (1) working day from the time of the incident occurs. All personnel on-site have a responsibility to report all environmental concerns or incidents regardless of magnitude. The Contractor will be responsible for completing and filing the EIR.

A. External Reporting:

For all spills in amounts requiring external notification/reporting or of any substance toxic to aquatic life, the person who had possession, charge or control of a substance immediately before its spill, or the person that discovers a spill, will report the spill to EMBC 24-hour phone line at **1800-663-3456**. This same person must also immediately report the spill details to the Site Superintendent and EM who will report the spill internally.

When reporting a spill, the caller should be prepared to provide the dispatcher the following information, if possible:

- Name and phone number of person reporting the spill;
- Name and phone number of person involved with the spill;
- Location, time, and date of spill;
- Type and quantity of material spilled;
- Cause and effect of the spill;
- Details of action taken or proposed to contain the spill and minimize its effect;
- Duration of occurrence;
- Weather conditions;
- Description of the spill location and surrounding area;
- Names of government agencies on scene, if any;
- Names of other persons or agencies advised or to be advised concerning the spill; and
- Planned follow-up.

*****ALL SPILLS TO WATER ARE REPORTABLE TO Emergency Management BC AND DFO*****

*****If in doubt as to whether or not to report a spill, err on the side of caution and report the spill*****

B. Reportable Spill Quantities

Table A2 outlines specific substances and reportable quantities according to the EMA Spill Reporting Regulation (includes amendments up to BC Reg. 376/2008, December 9, 2008):

Table A2: Reportable Spill Quantities

Item	Substance Spilled	Specific Amount
1	Class 1, Explosives as defined in Section 2.9 of the Federal Regulations*	Any quantity that could pose a danger to public safety or 50 kg
2	Class 2.1, Flammable Gases, other than natural gas, as defined in Section 2.14 (a) of the Federal Regulations	10 kg
3	Class 2.2 Non-Flammable and Non-Toxic Gases as defined in Section 2.14 (b) of the Federal Regulations	10 kg
4	Class 2.3, Toxic Gases as defined in Section 2.14 (c) of the Federal Regulations	5 kg
5	Class 3, Flammable Liquids as defined in Section 2.18 of the Federal Regulations	100 L
6	Class 4, Flammable Solids as defined in Section 2.20 of the Federal Regulations	25 kg
7	Class 5.1, Oxidizing Substances as defined in Section 2.24 (a) of the Federal Regulations	50 kg or 50 L
8	Class 5.2, Organic Peroxides as defined in Section 2.24 (b) of the Federal Regulations	1 kg or 1 L
9	Class 6.1, Toxic Substances as defined in Section 2.27 (a) of the Federal Regulations	5 kg or 5 L
10	Class 6.2, Infectious Substances as defined in Section 2.27 (b) of the Federal Regulations	1 kg or 1 L, or less if the waste poses a danger to public safety or the environment
11	Class 7, Radioactive Materials as defined in Section 2.37 of the Federal Regulations	Any quantity that could pose a danger to public safety and an emission level greater than the emission level established in Section 20 of the "Packaging and Transport of Nuclear Substances Regulations"
12	Class 8, Corrosives as defined in Section 2.40 of the Federal Regulations	5 kg or 5 L
13	Class 9, Miscellaneous Products, Substances or Organisms as defined in Section 2.43 of the Federal Regulations	25 kg or 25 L
14	Waste containing dioxin as defined in Section 1 of the Hazardous Waste Regulation	1 kg or 1 L, or less if the waste poses a danger to public safety or the environment
15	Leachable toxic waste as defined in Section 1 of the Hazardous Waste Regulation	25 kg or 25 L
16	Waste containing polycyclic aromatic hydrocarbons as defined in section 1 of the Hazardous Waste Regulation	5 kg or 5 L
17	Waste asbestos as defined in Section 1 of the Hazardous Waste Regulation	50 kg
18	Waste oil as defined in Section 1 of the Hazardous Waste Regulation	100 L
19	Waste containing a pest control product as defined in Section 1 of the Hazardous Waste Regulation	5 kg or 5 L
20	PCB Wastes as defined in Section 1 of the Hazardous Waste Regulation	25 kg or 25 L

Table A2: Reportable Spill Quantities

Item	Substance Spilled	Specific Amount
21	Waste containing tetrachloroethylene as defined in Section 1 of the Hazardous Waste Regulation	50 kg or 50 L
22	Biomedical waste as defined in Section 1 of the Hazardous Waste Regulation	1 kg or 1 L, or less if the waste poses a danger to public safety or the environment
23	A hazardous waste as defined in Section 1 of the Hazardous Waste Regulation and not covered under items 1 – 22	25 kg or 25 L
24	A substance, not covered by items 1 to 23, that can cause pollution	200 kg or 200 L
25	Natural gas	10 kg, if there is a breakage in a pipeline or fitting operated above 100 psi that results in a sudden and uncontrolled release of natural gas

**"Federal Regulations" means the Transportation of Dangerous Goods Regulations made under the Transportation of Dangerous Goods Act (Canada)

APPENDIX 4

ENVIRONMENTAL INCIDENT REPORT FORM

Environmental Incident Reporting (EIR) Form

Project Name _____ Project No. _____

Location _____

Date and Time of Spill _____

SEE guidelines on the reverse page for reporting protocols.

Person	Name	Number
Reporting Spill		
Involved in Spill		
Spill Cleanup		

Type and quantity of material spilled

Cause of spill

Action taken to contain and minimize effects

Notification to:					
PSPC Project Manager <input type="checkbox"/>	Phone/cell:		EM <input type="checkbox"/>	Phone/cell:	
PSPC Environmental Coordinator <input type="checkbox"/>	Phone/cell:		EMBC <input type="checkbox"/>	Phone/cell:	
Site Superintendent <input type="checkbox"/>	Phone/cell:		DFO <input type="checkbox"/>	Phone/cell:	
<input type="checkbox"/>	Phone/cell:			Phone/cell:	

What Incidents are Reportable?

All incidents must be reported to the Project team, in accordance with the EIR Communications Plan Section described in Section 7.0 of the EMP. Any environmental incidents of reportable quantities will be reported immediately to EMBC, according to the guidelines of the Spill Reporting Notification Chart (Below).

ALL SPILLS TO WATER ARE REPORTABLE TO THE EMERGENCY MANAGEMENT BC (EMBC) AND FISHERIES AND OCEANS CANADA (DFO).

If in doubt as to whether or not to report a spill, err on the side of caution and report the spill.

The following information must be reported to the project team and appropriate government agencies:

- Name and phone number of person reporting the spill.
- Name and phone number of person who witnessed or was involved with the spill.
- Location and time of the spill.
- Type and quantity of material spilled.
- Area or habitat effected.
- Cause, nature, and effect of spill.
- Details of action taken or proposed to contain the spill and minimize its effect or limit the activity causing the incident.
- Names of other persons or agencies advised.
- Aquatic, terrestrial and/or cultural resources affected.
- Mitigation measures taken to control.
- Additional recommended remedial or corrective actions.
- Communications held with Project personnel.
- Communications with regulatory agencies.

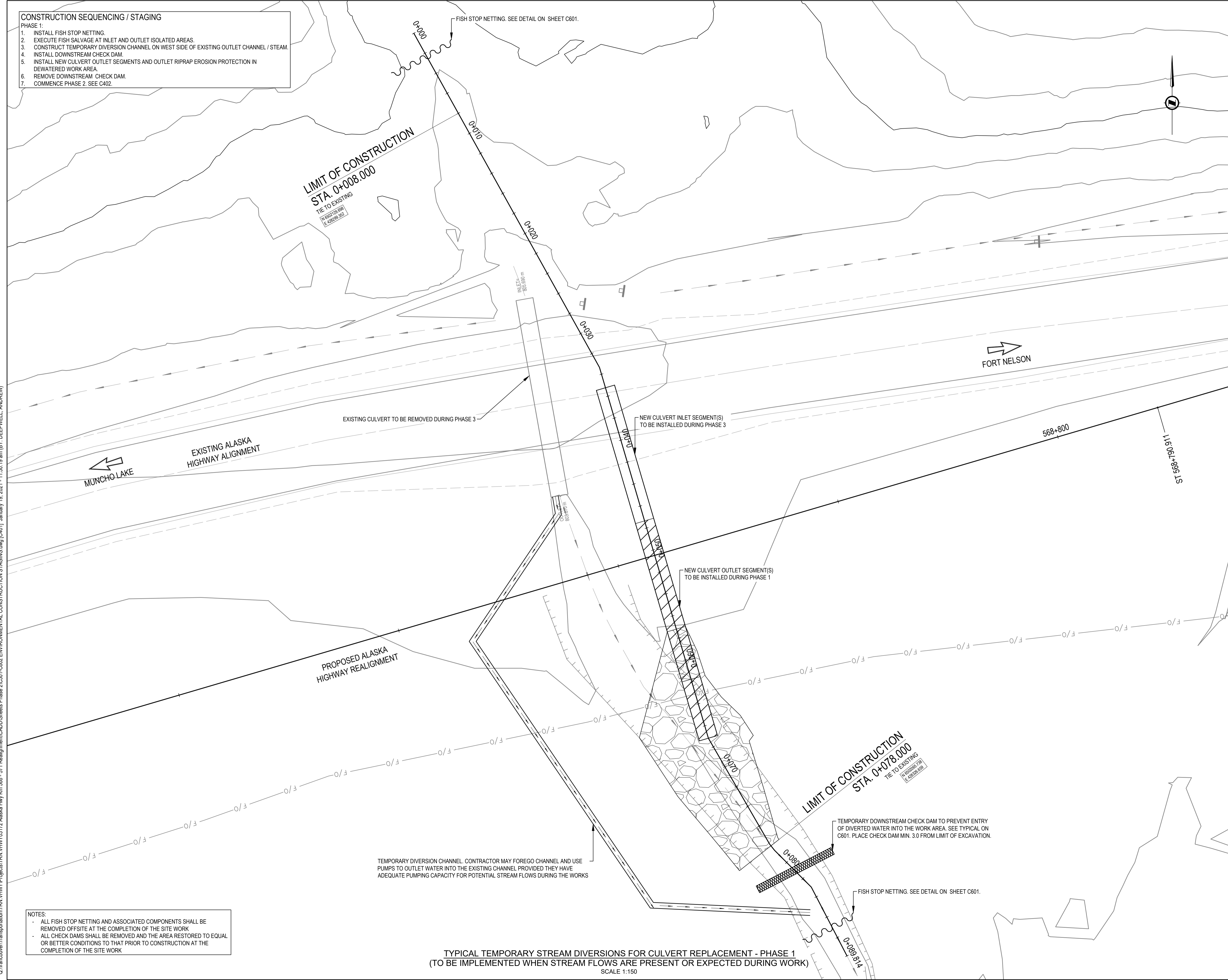
APPENDIX E

ENGINEERING DESIGN DRAWINGS

CONSTRUCTION SEQUENCING / STAGING
PHASE 1:
 1. INSTALL FISH STOP NETTING.
 2. EXECUTE FISH SALVAGE AT INLET AND OUTLET ISOLATED AREAS.
 3. CONSTRUCT TEMPORARY DIVERSION CHANNEL ON WEST SIDE OF EXISTING OUTLET CHANNEL / STEAM.
 4. INSTALL DOWNSTREAM CHECK DAM.
 5. INSTALL NEW CULVERT OUTLET SEGMENTS AND OUTLET RIPRAP EROSION PROTECTION IN DEWATERED WORK AREA.
 6. REMOVE DOWNSTREAM CHECK DAM.
 7. COMMENCE PHASE 2. SEE C402.

ISSUED FOR PERMITTING

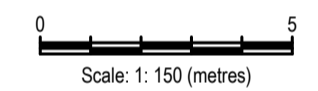
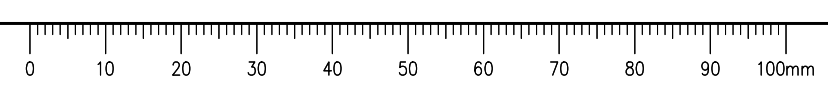
GENERAL NOTES:
 1. DIMENSIONS, COORDINATES, ELEVATIONS ARE SHOWN IN METRES UNLESS NOTED.



Q:\Vancouver\Transportation\TRN\WHY\03172 Alaska Hwy Km 568 - 571 Realignment\CADD\Sheets Phase 2\C501-C602 ENVIRONMENTAL CONSTRUCTION STAGING.dwg [C401] January 19, 2021 - 11:50:19 am (BY: DEEPWELL, ANDREW)

NOTES:
 - ALL FISH STOP NETTING AND ASSOCIATED COMPONENTS SHALL BE REMOVED OFFSITE AT THE COMPLETION OF THE SITE WORK
 - ALL CHECK DAMS SHALL BE REMOVED AND THE AREA RESTORED TO EQUAL OR BETTER CONDITIONS TO THAT PRIOR TO CONSTRUCTION AT THE COMPLETION OF THE SITE WORK

TYPICAL TEMPORARY STREAM DIVERSIONS FOR CULVERT REPLACEMENT - PHASE 1
 (TO BE IMPLEMENTED WHEN STREAM FLOWS ARE PRESENT OR EXPECTED DURING WORK)
 SCALE 1:150



Revision	Description/Description	Date/Date
A	ISSUED FOR PERMITTING	20/12/21

Client/client
Public Services and Procurement Canada



Project title/Titre du projet
KM 568 TO KM 573 (TETSA RIVER) RECONSTRUCTION - PHASE 2 ALASKA HIGHWAY, BC

Approved by/Approve par
S. LI
 Designed by/Concept par
E. YANG / M. KELEHER

Drawn by/Dessine par
A. DEEPWELL
 PWGSC Project Manager/Administrateur de Projets TPSCG
A. TAHERI

PWGSC, Architectural and Engineering Resources Manager/Ressources Architectural et de Directeur d'ingénierie, TPSCG
 Client/client
Public Services and Procurement Canada

Drawing title/Titre du dessin
KM 568.84 CULVERT ENVIRONMENTAL CONSTRUCTION STAGING - PLAN VIEW PHASE 1

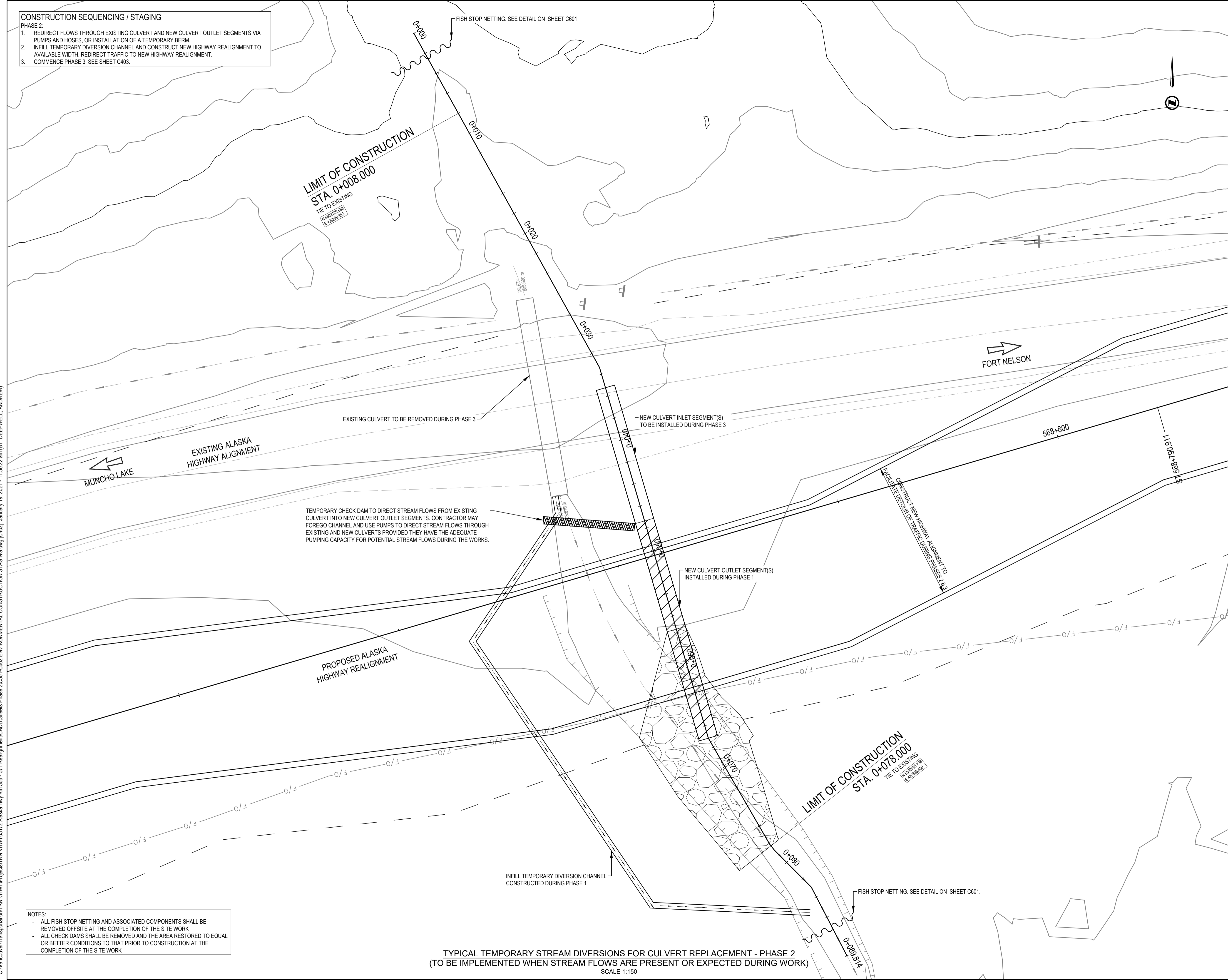
Project No./No. du projet	Sheet/Feuille	Revision no./La Révision no.
R.112220.002	C401	A



CONSTRUCTION SEQUENCING / STAGING
PHASE 2:
 1. REDIRECT FLOWS THROUGH EXISTING CULVERT AND NEW CULVERT OUTLET SEGMENTS VIA PUMPS AND HOSES, OR INSTALLATION OF A TEMPORARY BERM.
 2. INFILL TEMPORARY DIVERSION CHANNEL AND CONSTRUCT NEW HIGHWAY REALIGNMENT TO AVAILABLE WIDTH. REDIRECT TRAFFIC TO NEW HIGHWAY REALIGNMENT.
 3. COMMENCE PHASE 3. SEE SHEET C403.

ISSUED FOR PERMITTING

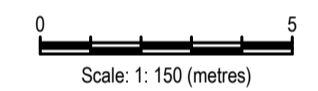
GENERAL NOTES:
 1. DIMENSIONS, COORDINATES, ELEVATIONS ARE SHOWN IN METRES UNLESS NOTED.



Q:\Vancouver\Transportation\TRN\WHY\03172 Alaska Hwy Km 568 - 571 Realignment\CADD\Sheets Phase 2\C501-C602 ENVIRONMENTAL CONSTRUCTION STAGING.dwg [C402] January 19, 2021 - 11:50:22 am (BY: DEEPWELL, ANDREW)

NOTES:
 - ALL FISH STOP NETTING AND ASSOCIATED COMPONENTS SHALL BE REMOVED OFFSITE AT THE COMPLETION OF THE SITE WORK
 - ALL CHECK DAMS SHALL BE REMOVED AND THE AREA RESTORED TO EQUAL OR BETTER CONDITIONS TO THAT PRIOR TO CONSTRUCTION AT THE COMPLETION OF THE SITE WORK

TYPICAL TEMPORARY STREAM DIVERSIONS FOR CULVERT REPLACEMENT - PHASE 2
 (TO BE IMPLEMENTED WHEN STREAM FLOWS ARE PRESENT OR EXPECTED DURING WORK)
 SCALE 1:150



Revision	Description/Description	Date/Date
A	ISSUED FOR PERMITTING	20/12/21

Client/client
Public Services and Procurement Canada

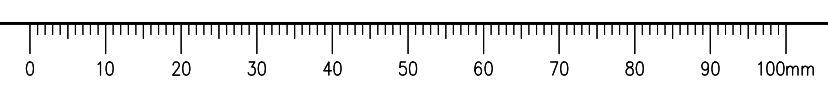


Project title/Titre du projet
KM 568 TO KM 573 (TETSA RIVER) RECONSTRUCTION - PHASE 2 ALASKA HIGHWAY, BC

Approved by/Approuvé par
S. LI
 Designed by/Concepté par
E. YANG / M. KELEHER
 Drawn by/Dessiné par
A. DEEPWELL
 PWGSC Project Manager/Administrateur de Projets TPSC
A. TAHERI
 PWGSC Architectural and Engineering Resources Manager/Ressources Architectural et de Directeur d'ingénierie, TPSC
 Client/client
Public Services and Procurement Canada

Drawing title/Titre du dessin
KM 568.84 CULVERT ENVIRONMENTAL CONSTRUCTION STAGING - PLAN VIEW PHASE 2

Project No./No. du projet	Sheet/Feuille	Revision no./La Révision no.
R.112220.002	C402	A



ISSUED FOR PERMITTING

GENERAL NOTES:
1. DIMENSIONS, COORDINATES, ELEVATIONS ARE SHOWN IN METRES UNLESS NOTED.

- CONSTRUCTION SEQUENCING / STAGING**
PHASE 3:
1. INSTALL FISH STOP NETTING.
 2. INSTALL UPSTREAM CHECK DAM.
 3. INSTALL UPSTREAM PUMP(S), PASS HOSES THROUGH CULVERT AND COMMENCE STREAM FLOW DIVERSION INTO PUMPS THROUGH NEW CULVERT OUTLET SEGMENTS.
 4. INSTALL NEW CULVERT INLET SEGMENTS.
 5. REMOVE AND DISPOSE OF EXISTING CULVERT, COMPLETE INLET CHANNEL REALIGNMENT AND INSTALL INLET RIPRAP EROSION PROTECTION.
 6. REMOVE UPSTREAM CHECK DAMS AND ANY ASSOCIATED MATERIAL.
 7. REMOVE UPSTREAM PUMP(S) AND ANY ASSOCIATED MATERIAL.
 8. REMOVE UPSTREAM AND DOWNSTREAM FISH STOP NET AND ANY ASSOCIATED MATERIAL.

TEMPORARY UPSTREAM CHECK DAM TO PREVENT STREAM FLOWS FROM ENTERING THE DEWATERED INSTREAM WORK AREA. SEE TYPICAL ON C601. PLACE CHECK DAM MIN. 3.0 FROM LIMIT OF EXCAVATION.

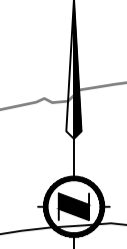
LIMIT OF CONSTRUCTION
STA. 0+008.000
TIE TO EXISTING
E. 6262078.996
E. 476260.362

FISH STOP NETTING. SEE DETAIL ON SHEET C601.

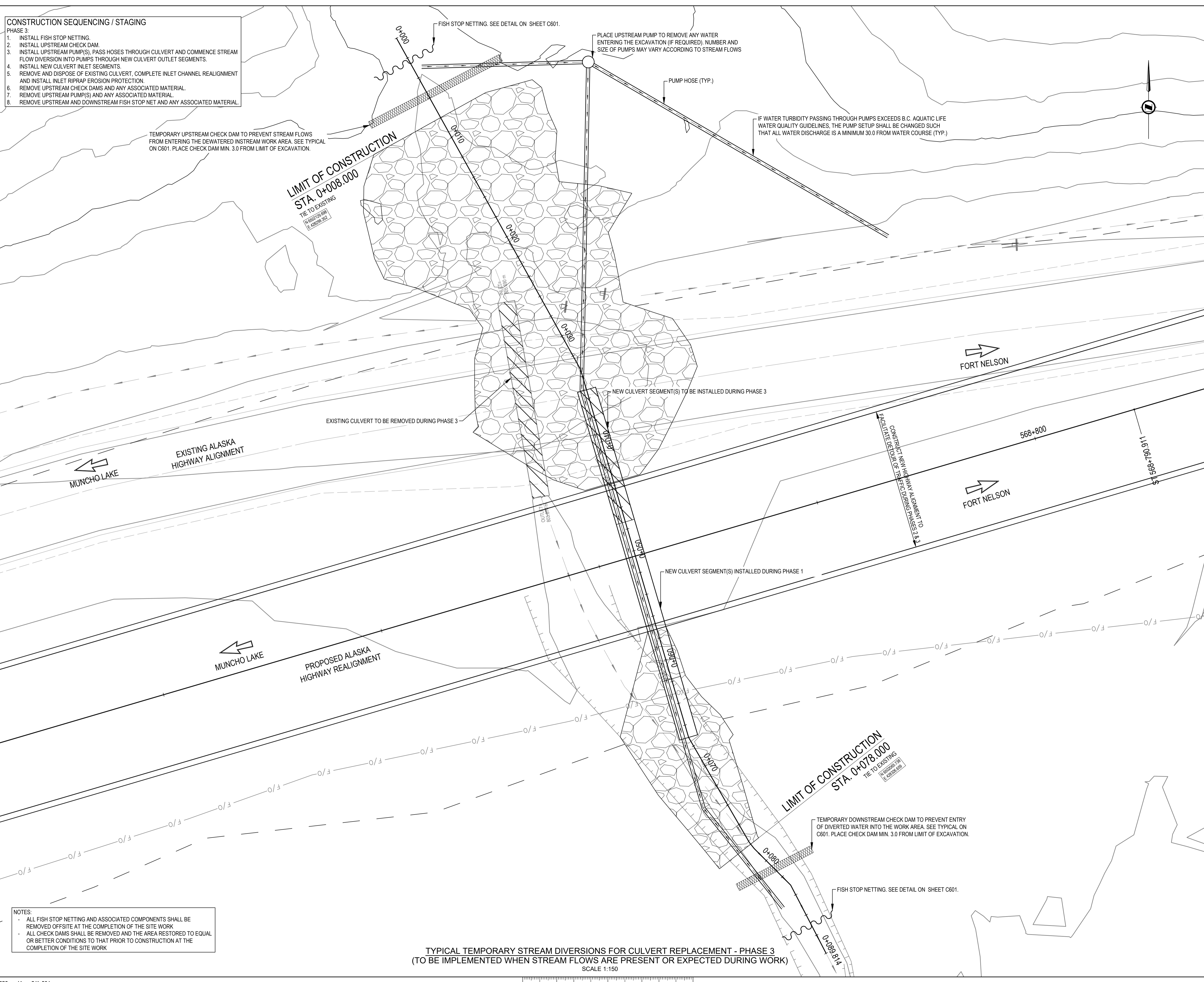
PLACE UPSTREAM PUMP TO REMOVE ANY WATER ENTERING THE EXCAVATION (IF REQUIRED). NUMBER AND SIZE OF PUMPS MAY VARY ACCORDING TO STREAM FLOWS

PUMP HOSE (TYP.)

IF WATER TURBIDITY PASSING THROUGH PUMPS EXCEEDS B.C. AQUATIC LIFE WATER QUALITY GUIDELINES, THE PUMP SETUP SHALL BE CHANGED SUCH THAT ALL WATER DISCHARGE IS A MINIMUM 30.0 FROM WATER COURSE (TYP.)



Q:\Vancouver\Transportation\TRN\VHWY03172 Alaska Hwy Km 568 - 571 Realignment\CADD\Sheets Phase 2\C501-C602 ENVIRONMENTAL CONSTRUCTION STAGING.dwg [C403] January 19, 2021 - 11:50:27 am (BY: DEEPWELL, ANDREW)



FORT NELSON

FORT NELSON

EXISTING ALASKA HIGHWAY ALIGNMENT

MUNCHO LAKE

PROPOSED ALASKA HIGHWAY REALIGNMENT

EXISTING CULVERT TO BE REMOVED DURING PHASE 3

NEW CULVERT SEGMENT(S) TO BE INSTALLED DURING PHASE 3

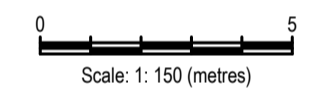
NEW CULVERT SEGMENT(S) INSTALLED DURING PHASE 1

CONSTRUCT NEW HIGHWAY ALIGNMENT TO FACILITATE FLOW OF TRAFFIC DURING PHASES 2 & 3.

LIMIT OF CONSTRUCTION
STA. 0+078.000
TIE TO EXISTING
E. 6262078.996
E. 476260.362

TEMPORARY DOWNSTREAM CHECK DAM TO PREVENT ENTRY OF DIVERTED WATER INTO THE WORK AREA. SEE TYPICAL ON C601. PLACE CHECK DAM MIN. 3.0 FROM LIMIT OF EXCAVATION.

FISH STOP NETTING. SEE DETAIL ON SHEET C601.



Revision	Description/Description	Date/Date
A	ISSUED FOR PERMITTING	20/12/21

Client/client
Public Services and Procurement Canada



Project title/Titre du projet
KM 568 TO KM 573 (TETSA RIVER) RECONSTRUCTION - PHASE 2 ALASKA HIGHWAY, BC

Approved by/Approve par
S. LI
Designed by/Consept par
E. YANG / M. KELEHER
Drawn by/Dessine par
A. DEEPWELL
PWGSC Project Manager/Administrateur de Projets TPSCG
A. TAHERI
PWGSC Architectural and Engineering Resources Manager/Ressources Architectural et de Directeur d'ingénierie, TPSCG

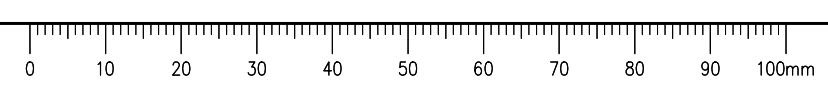
Client/client
Public Services and Procurement Canada

Drawing title/Titre du dessin
KM 568.84 CULVERT ENVIRONMENTAL CONSTRUCTION STAGING - PLAN VIEW PHASE 3

Project No./No. du projet	Sheet/Feuille	Revision no./La Révision no.
R.112220.002	C403	A

- NOTES:**
- ALL FISH STOP NETTING AND ASSOCIATED COMPONENTS SHALL BE REMOVED OFFSITE AT THE COMPLETION OF THE SITE WORK
 - ALL CHECK DAMS SHALL BE REMOVED AND THE AREA RESTORED TO EQUAL OR BETTER CONDITIONS TO THAT PRIOR TO CONSTRUCTION AT THE COMPLETION OF THE SITE WORK

TYPICAL TEMPORARY STREAM DIVERSIONS FOR CULVERT REPLACEMENT - PHASE 3
(TO BE IMPLEMENTED WHEN STREAM FLOWS ARE PRESENT OR EXPECTED DURING WORK)
SCALE 1:150



ISSUED FOR PERMITTING

GENERAL NOTES:
1. DIMENSIONS, COORDINATES, ELEVATIONS ARE SHOWN IN METRES UNLESS NOTED.

- CONSTRUCTION SEQUENCING / STAGING**
PHASE 1:
1. INSTALL FISH STOP NETTING.
 2. EXECUTE FISH SALVAGE AT INLET AND OUTLET ISOLATED AREAS.
 3. INSTALL UPSTREAM CHECK DAM.
 4. INSTALL UPSTREAM PUMP(S), PASS HOSES THROUGH EXISTING CULVERT AND COMMENCE STREAM FLOW DIVERSION INTO PUMPS.
 5. INSTALL DOWNSTREAM CHECK DAM.
 6. INSTALL NEW CULVERT IN THE DEWATERED INSTREAM WORK AREA.
 7. INSTALL RIPRAP EROSION PROTECTION IN THE DEWATERED INSTREAM WORK AREA.
 8. DIRECT STREAM FLOWS THROUGH NEW CULVERT.
 9. REMOVE UPSTREAM AND DOWNSTREAM CHECK DAMS AND ANY ASSOCIATED MATERIAL.
 10. REMOVE UPSTREAM PUMP(S) AND ANY ASSOCIATED MATERIAL.
 11. COMMENCE PHASE 2 - SEE SHEET C502

IF WATER TURBIDITY PASSING THROUGH PUMPS EXCEEDS B.C. AQUATIC LIFE WATER QUALITY GUIDELINES, THE PUMP SETUP SHALL BE CHANGED SUCH THAT ALL WATER DISCHARGE IS A MINIMUM 30.0 FROM WATER COURSE (TYP.)

PLACE UPSTREAM PUMP TO REMOVE ANY WATER ENTERING THE EXCAVATION (IF REQUIRED). NUMBER AND SIZE OF PUMPS MAY VARY ACCORDING TO STREAM FLOWS

FISH STOP NETTING. SEE DETAIL ON SHEET C601.

TEMPORARY UPSTREAM CHECK DAM TO PREVENT ENTRY OF WATER INTO THE WORK AREA. SEE TYPICAL ON C601. PLACE CHECK DAM MIN. 3.0 FROM LIMIT OF EXCAVATION.

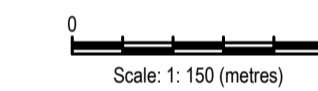
LIMIT OF CONSTRUCTION
STA. 0+012.000
TIE TO EXISTING
N 6502273.537
E 427244.969

EXISTING CULVERT TO BE REMOVED / DECOMMISSIONED DURING PHASE 2

NEW CULVERT INSTALLED DURING PHASE 1

PROPOSED ALASKA HIGHWAY REALIGNMENT

FORT NELSON



Revision	Description/Description	Date/Date
A	ISSUED FOR PERMITTING	20/12/21

Client/client
Public Services and Procurement Canada



Project title/Titre du projet
KM 568 TO KM 573 (TETSA RIVER) RECONSTRUCTION - PHASE 2 ALASKA HIGHWAY, BC

Approved by/Approuvé par
S. LI
Designed by/Concept par
E. YANG / M. KELEHER
Drawn by/Dessiné par
A. DEEPWELL
PWGSC Project Manager/Administrateur de Projets TPSCG
A. TAHERI
PWGSC Architectural and Engineering Resources Manager/Ressources Architectural et de Directeur d'ingénierie, TPSCG

Client/client
Public Services and Procurement Canada

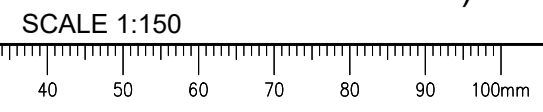
Drawing title/Titre du dessin
KM 569.95 CULVERT ENVIRONMENTAL CONSTRUCTION STAGING - PLAN VIEW PHASE 1

Project No./No. du projet	Sheet/Feuille	Revision no./La Révision no.
R.112220.002	C501	A

C:\Vancouver\Transportation\TRN\VHWY03172 Alaska Hwy Km 568 - 571 Realignment\CADD\Sheets Phase 2\C501-C602 ENVIRONMENTAL CONSTRUCTION STAGING.dwg [C501] January 19, 2021 - 11:50:32 am (BY: DEEPWELL, ANDREW)

- NOTES:**
- ALL FISH STOP NETTING AND ASSOCIATED COMPONENTS SHALL BE REMOVED OFFSITE AT THE COMPLETION OF THE SITE WORK
 - ALL CHECK DAMS SHALL BE REMOVED AND THE AREA RESTORED TO EQUAL OR BETTER CONDITIONS TO THAT PRIOR TO CONSTRUCTION AT THE COMPLETION OF THE SITE WORK

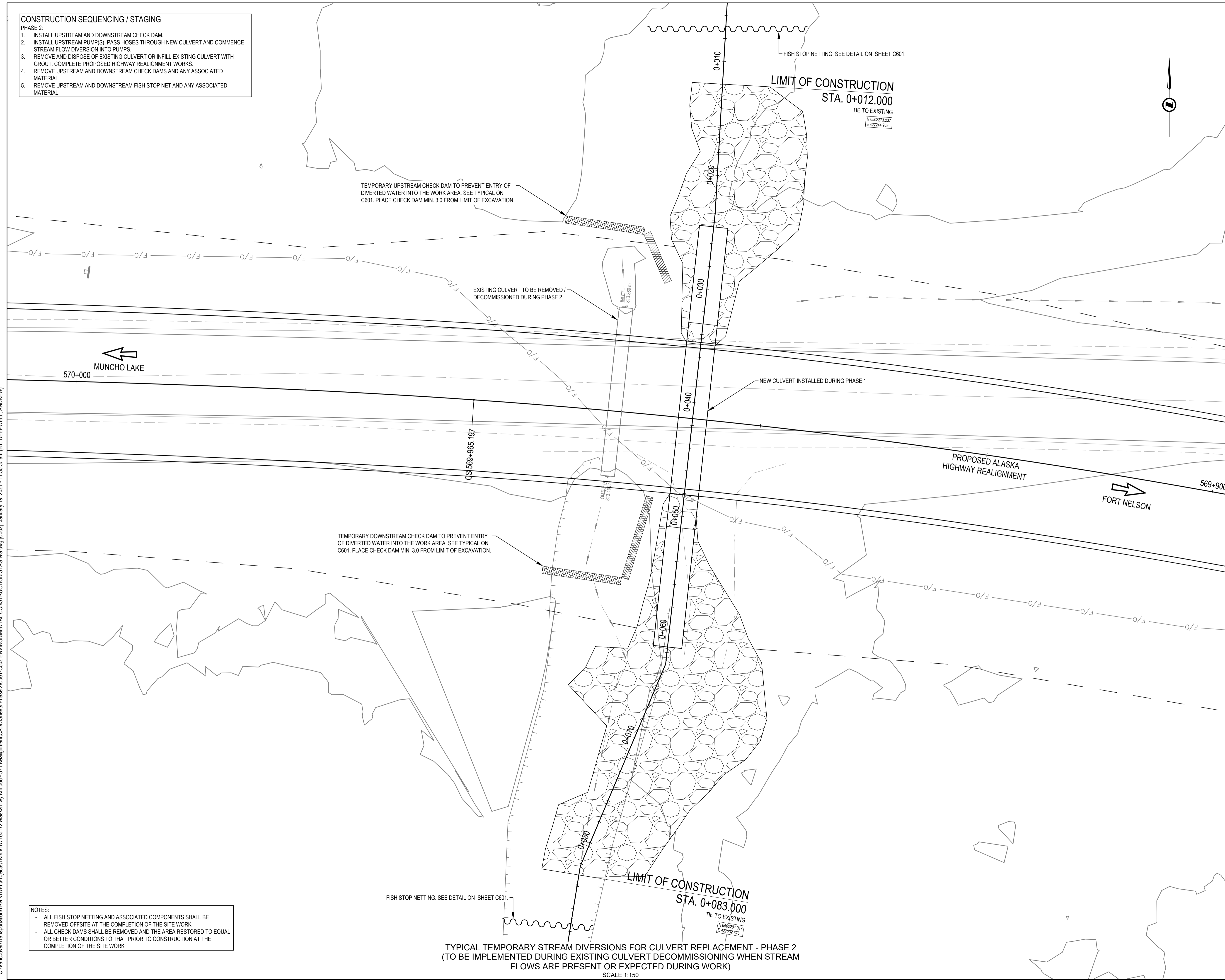
TYPICAL TEMPORARY STREAM DIVERSIONS FOR CULVERT REPLACEMENT - PHASE 1
(TO BE IMPLEMENTED DURING NEW CULVERT INSTALLATION WHEN STREAM FLOWS ARE PRESENT OR EXPECTED DURING WORK)



ISSUED FOR PERMITTING

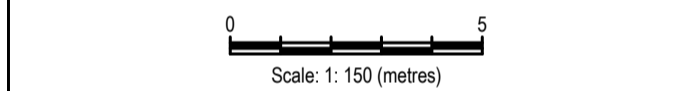
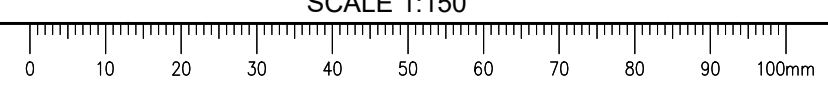
GENERAL NOTES:
 1. DIMENSIONS, COORDINATES, ELEVATIONS ARE SHOWN IN METRES UNLESS NOTED.

CONSTRUCTION SEQUENCING / STAGING
 PHASE 2:
 1. INSTALL UPSTREAM AND DOWNSTREAM CHECK DAM.
 2. INSTALL UPSTREAM PUMP(S), PASS HOSES THROUGH NEW CULVERT AND COMMENCE STREAM FLOW DIVERSION INTO PUMPS.
 3. REMOVE AND DISPOSE OF EXISTING CULVERT OR INFILL EXISTING CULVERT WITH GROUT. COMPLETE PROPOSED HIGHWAY REALIGNMENT WORKS.
 4. REMOVE UPSTREAM AND DOWNSTREAM CHECK DAMS AND ANY ASSOCIATED MATERIAL.
 5. REMOVE UPSTREAM AND DOWNSTREAM FISH STOP NET AND ANY ASSOCIATED MATERIAL.



NOTES:
 - ALL FISH STOP NETTING AND ASSOCIATED COMPONENTS SHALL BE REMOVED OFFSITE AT THE COMPLETION OF THE SITE WORK
 - ALL CHECK DAMS SHALL BE REMOVED AND THE AREA RESTORED TO EQUAL OR BETTER CONDITIONS TO THAT PRIOR TO CONSTRUCTION AT THE COMPLETION OF THE SITE WORK

TYPICAL TEMPORARY STREAM DIVERSIONS FOR CULVERT REPLACEMENT - PHASE 2
 (TO BE IMPLEMENTED DURING EXISTING CULVERT DECOMMISSIONING WHEN STREAM FLOWS ARE PRESENT OR EXPECTED DURING WORK)



Revision	Description/Description	Date/Date
A	ISSUED FOR PERMITTING	20/12/21
Client/client		

Public Services and Procurement Canada



Project title/Titre du projet
KM 568 TO KM 573 (TETSA RIVER) RECONSTRUCTION - PHASE 2 ALASKA HIGHWAY, BC

Approved by/Approve par
S. LI
 Designed by/Consept par
E. YANG / M. KELEHER
 Drawn by/Dessine par
A. DEEPWELL
 PWGSC Project Manager/Administrateur de Projets TPSCG
A. TAHERI
 PWGSC, Architectural and Engineering Resources Manager/Ressources Architectural et de Directeur d'ingénierie, TPSCG

Client/client
Public Services and Procurement Canada

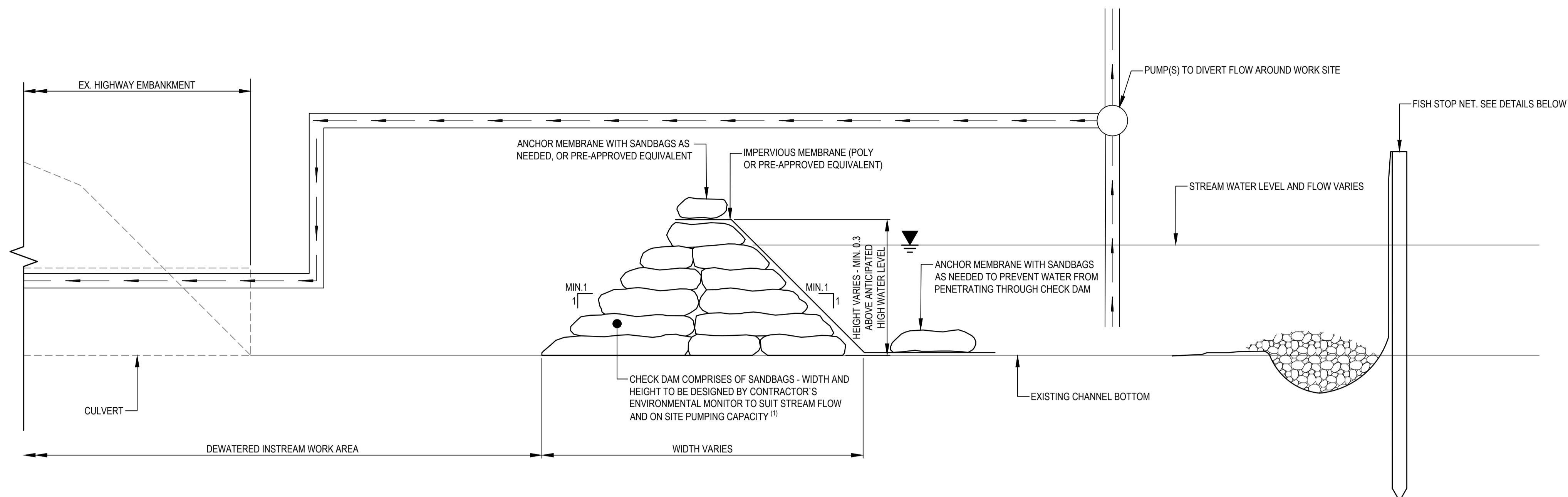
Drawing title/Titre du dessin
KM 569.95 CULVERT ENVIRONMENTAL CONSTRUCTION STAGING - PLAN VIEW PHASE 2

Project No./No. du projet	Sheet/Feuille	Revision no./La Révision no.
R.112220.002	C502	A

Q:\Vancouver\Transportation\TRN\VHWY03172 Alaska Hwy Km 568 - 571 Realignment\CADD\Sheets Phase 2\C501-C602 ENVIRONMENTAL CONSTRUCTION STAGING.dwg [C502] January 19, 2021 - 11:50:37 am (BY: DEEPWELL, ANDREW)

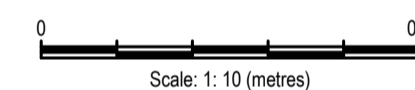
ISSUED FOR PERMITTING

GENERAL NOTES:
1. DIMENSIONS, COORDINATES, ELEVATIONS ARE SHOWN IN METRES UNLESS NOTED.



NOTES:
- IF PRE-APPROVED BY THE DEPARTMENTAL REPRESENTATIVE AND THE CONTRACTOR'S ENVIRONMENTAL MONITOR, THE CONTRACTOR MAY UTILIZE EARTH FILL TO CONSTRUCT CHECK DAM. IF AN EARTH FILL CHECK DAM IS UTILIZED, THE TURBIDITY LEVELS SHALL REMAIN WITHIN B.C. AQUATIC LIFE WATER QUALITY GUIDELINES FOR TURBIDITY FOR THE DURATION OF THE EARTH BERM INSTALLATION. THE EARTH MATERIAL USED AND COMPACTION REQUIREMENTS SHALL BE DESIGNED BY THE ENVIRONMENTAL MONITOR.

TYPICAL SECTION OF TEMPORARY CHECK DAM USING SANDBAGS
(UPSTREAM CHECK DAM ARRANGEMENT SHOWN, MIRROR ARRANGEMENT FOR DOWNSTREAM CHECK DAM)
SCALE 1:10



Revision	Description/Description	Date/Date
A	ISSUED FOR PERMITTING	20/12/21

Client/client
Public Services and Procurement Canada



Project title/Titre du projet
KM 568 TO KM 573 (TETSA RIVER) RECONSTRUCTION - PHASE 2 ALASKA HIGHWAY, BC

Approved by/Approve par
S. LI

Designed by/Concept par
E. YANG / M. KELEHER

Drawn by/Dessine par
A. DEEPWELL

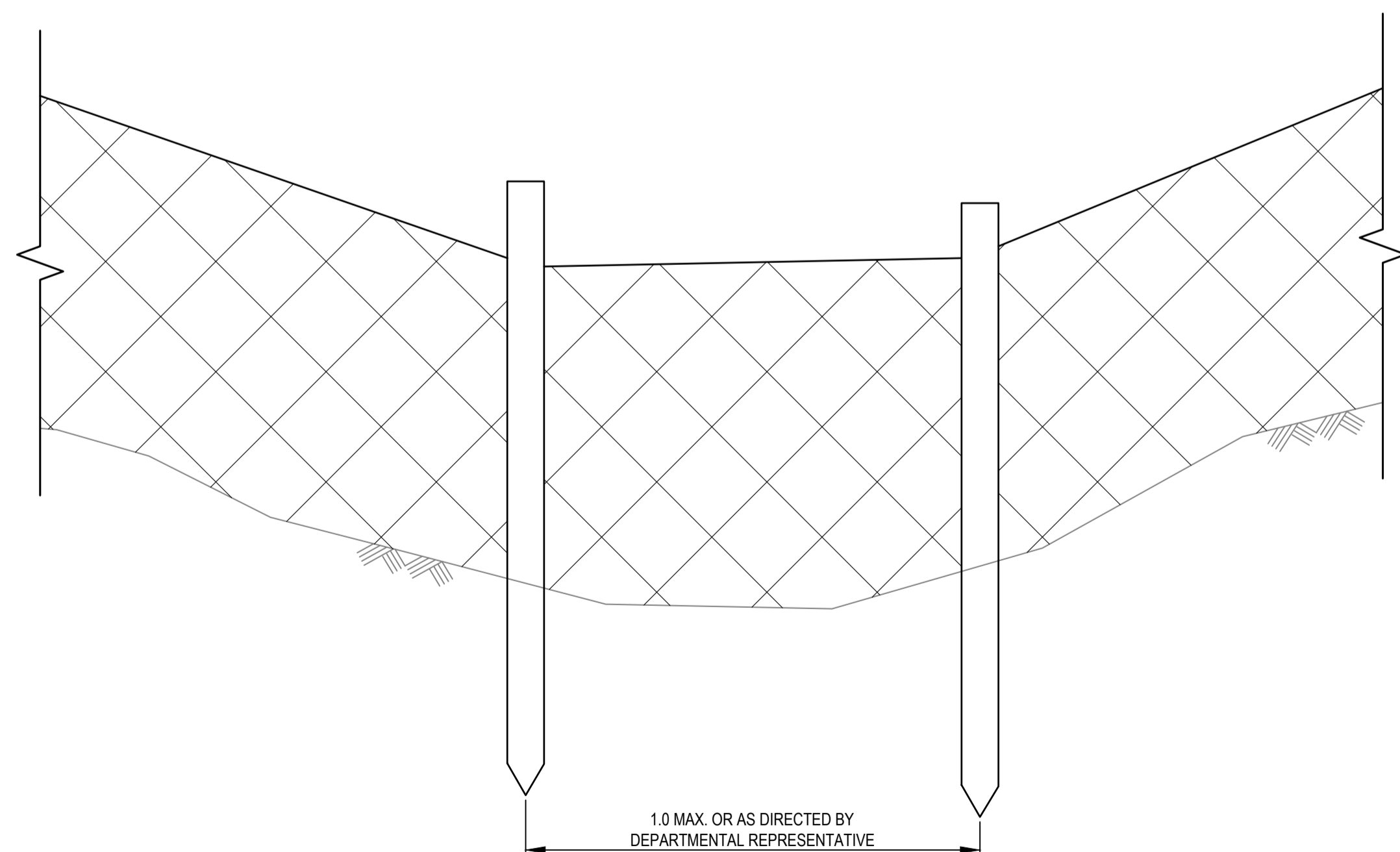
PWSC Project Manager/Administrateur de Projets TPSCG
A. TAHERI

PWSC Architectural and Engineering Resources Manager/Ressources Architectural et de Directeur d'ingénierie, TPSCG

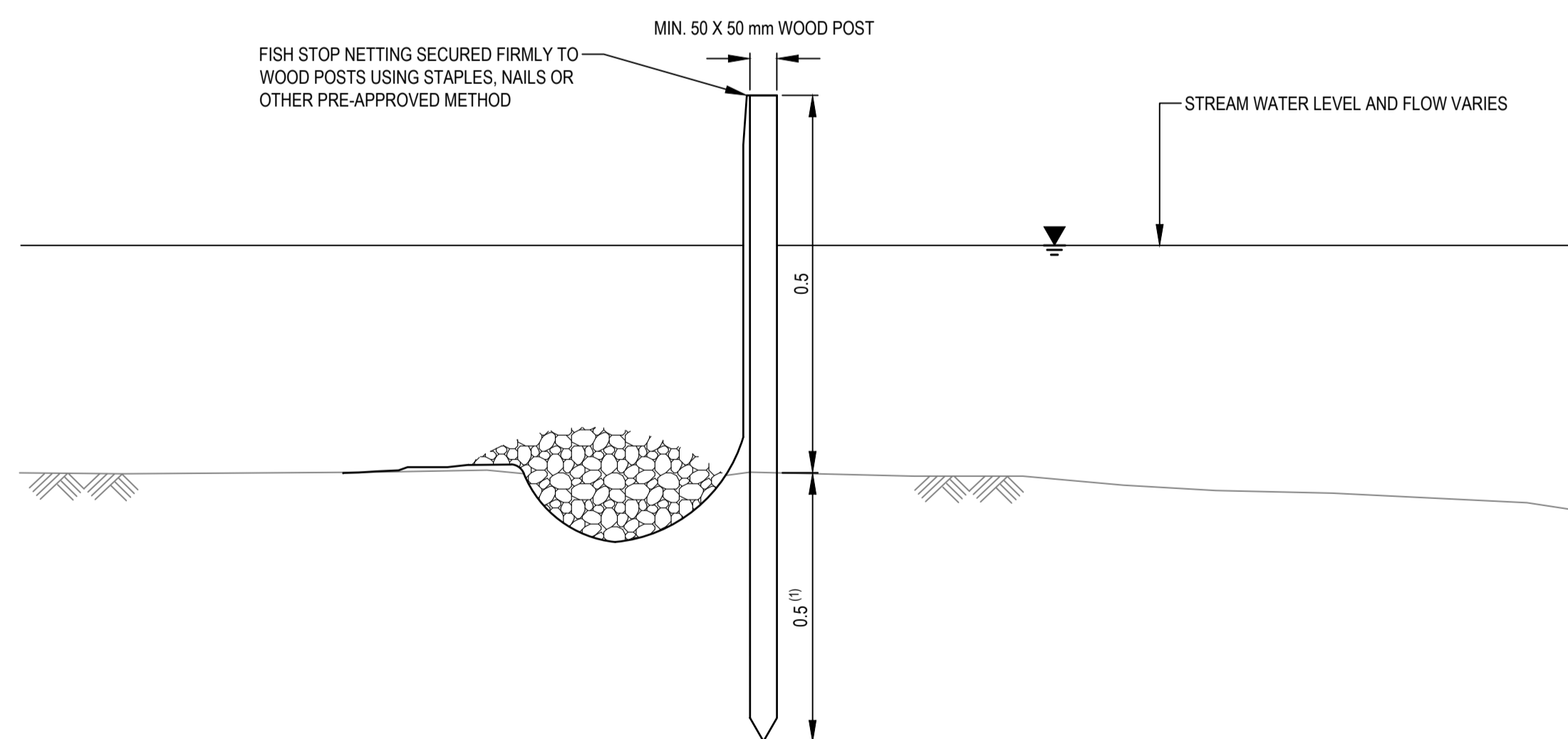
Client/client
Public Services and Procurement Canada

Drawing title/Titre du dessin
ENVIRONMENTAL CONSTRUCTION STAGING - CHECK DAM & FISH STOP NET DETAILS

Project No./No. du projet	Sheet/Feuille	Revision no./La Révision no.
R.112220.002	C601	A



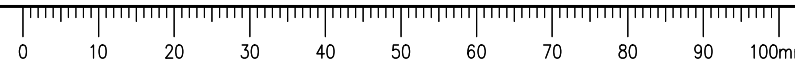
TYPICAL SECTION FISH STOP NET INSTALLATION
SCALE 1:10



NOTES:
(1) OR AS DIRECTED BY DEPARTMENTAL REPRESENTATIVE AND ENVIRONMENTAL MONITOR TO SUIT FIELD CONDITIONS

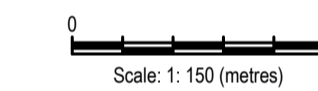
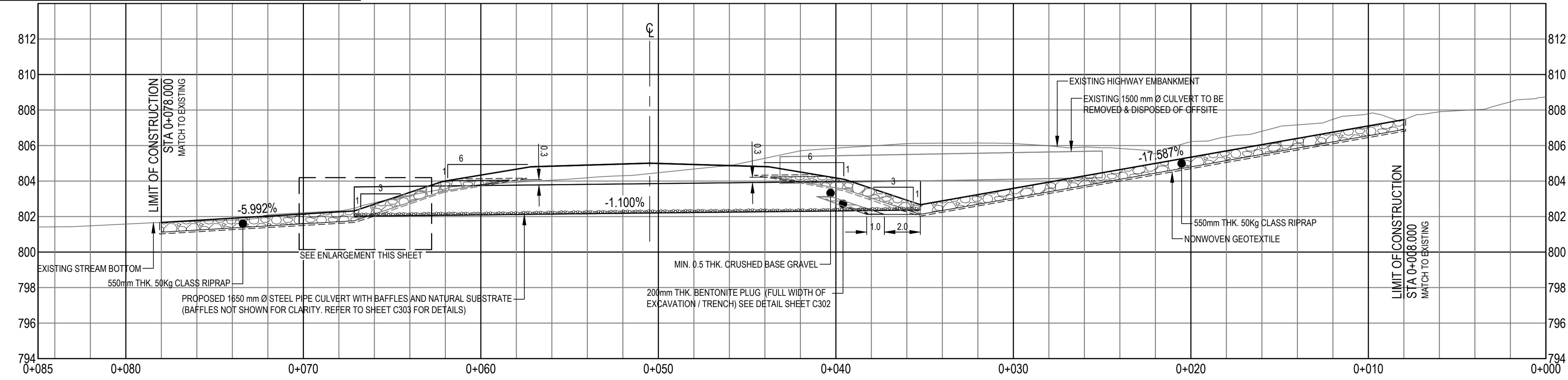
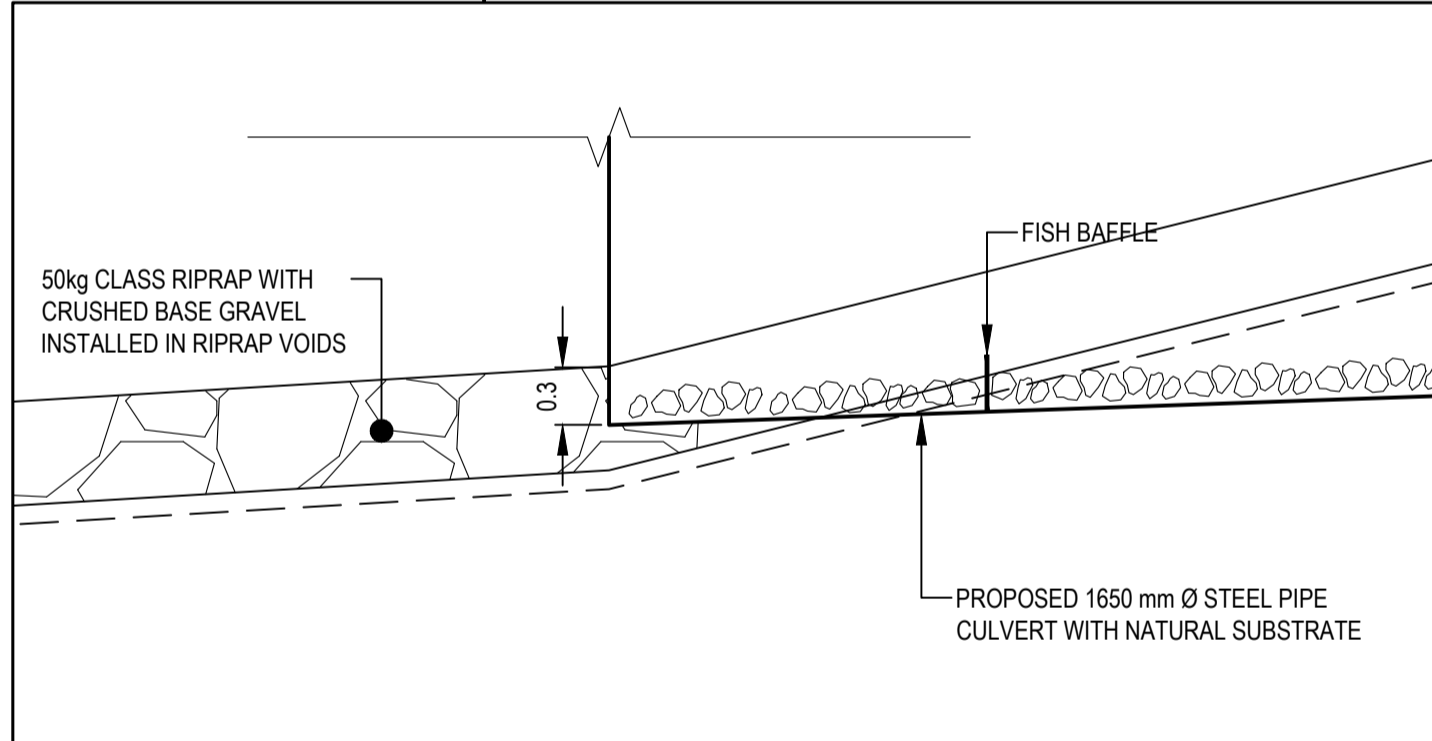
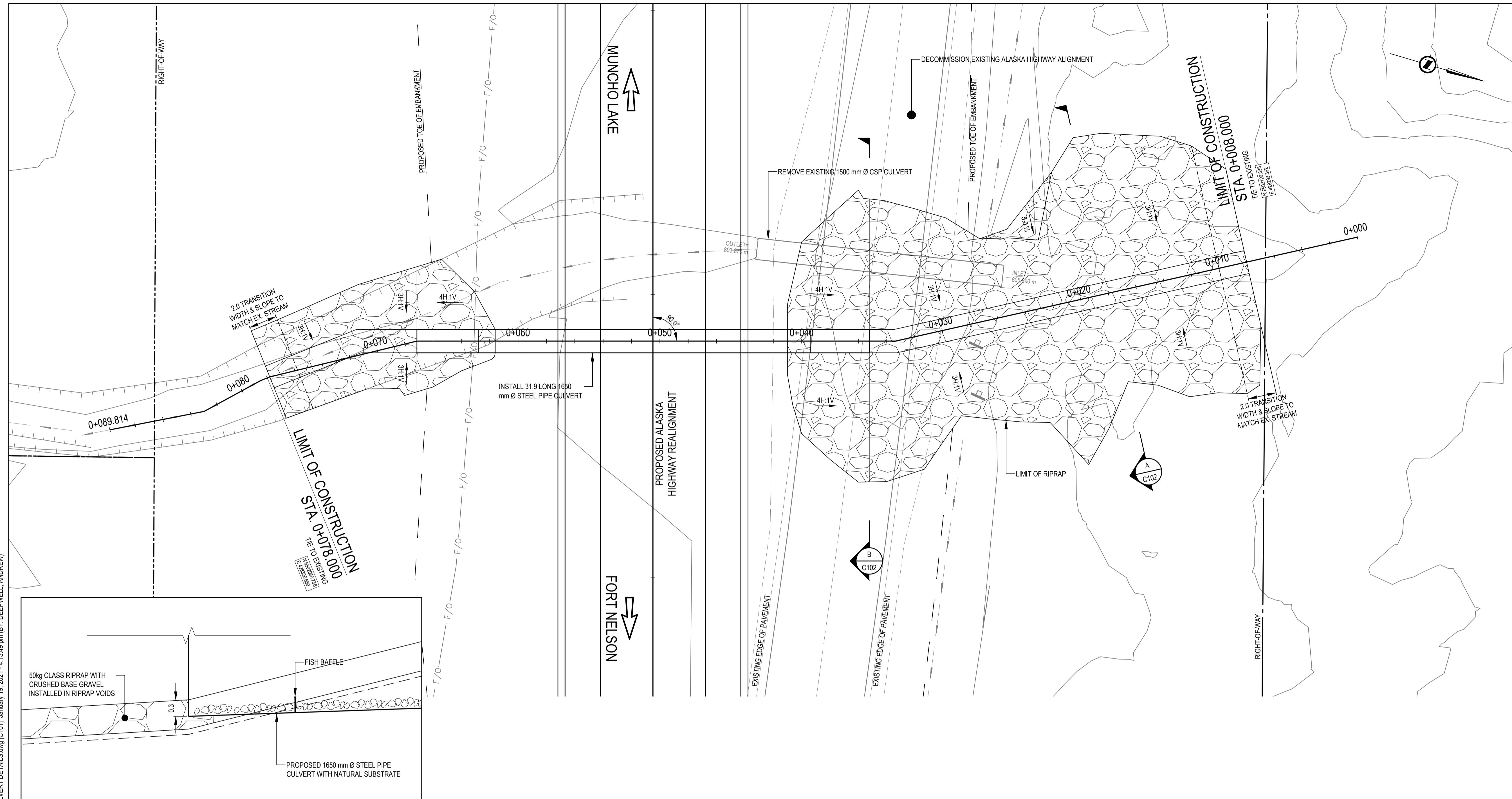
TYPICAL SECTION FISH STOP NET POST AND FABRIC
SCALE 1:10

Q:\Vancouver\Transportation\TRN\VHWY03172 Alaska Hwy Km 568 - 571 Realignment\CADD\Sheets Phase 2\C501-C602 ENVIRONMENTAL CONSTRUCTION STAGING.dwg [C601] January 19, 2021 - 11:50:43 am (BY: DEEPWELL, ANDREW)



ISSUED FOR PERMITTING

GENERAL NOTES:
1. DIMENSIONS, COORDINATES, ELEVATIONS ARE SHOWN IN METRES UNLESS NOTED.



Revision	Description/Description	Date/Date
A	ISSUED FOR PERMITTING	20/12/21

Client/client
Public Services and Procurement Canada



Project title/Titre du projet
KM 568 TO KM 573 (TETSA RIVER) RECONSTRUCTION - PHASE 2 ALASKA HIGHWAY, BC

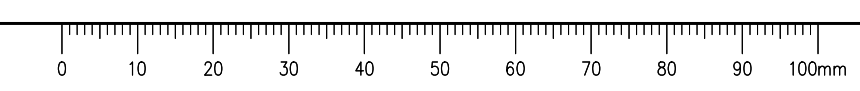
Approved by/Approuvé par
S. LI
Designed by/Concepté par
E. YANG / M. KELEHER
Drawn by/Dessiné par
A. DEEPWELL
PWSC Project Manager/Administrateur de Projets TPSCG
A. TAHERI
PWSC, Architectural and Engineering Resources Manager/Ressources Architectural et de Directeur d'ingénierie, TPSCG

Client/client
Public Services and Procurement Canada
Drawing title/Titre du dessin

CULVERT KM 568.84 PLAN / PROFILE

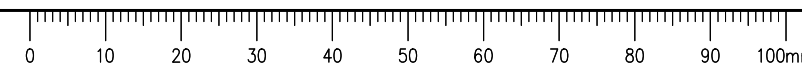
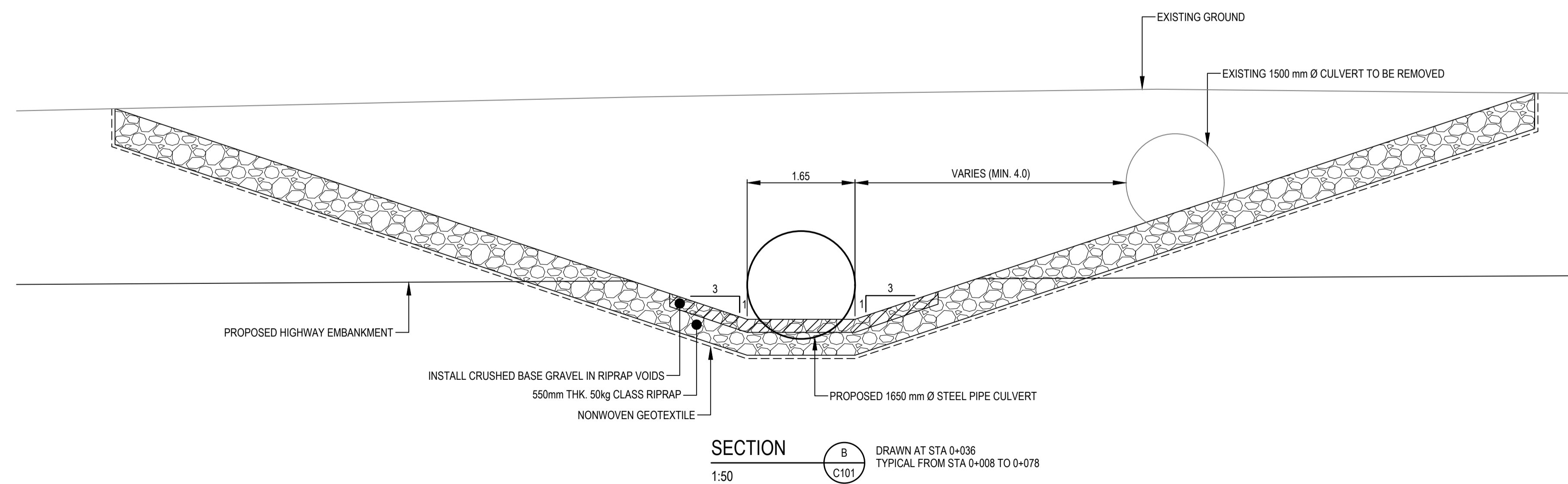
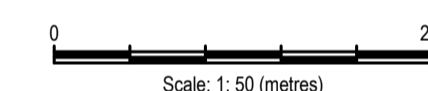
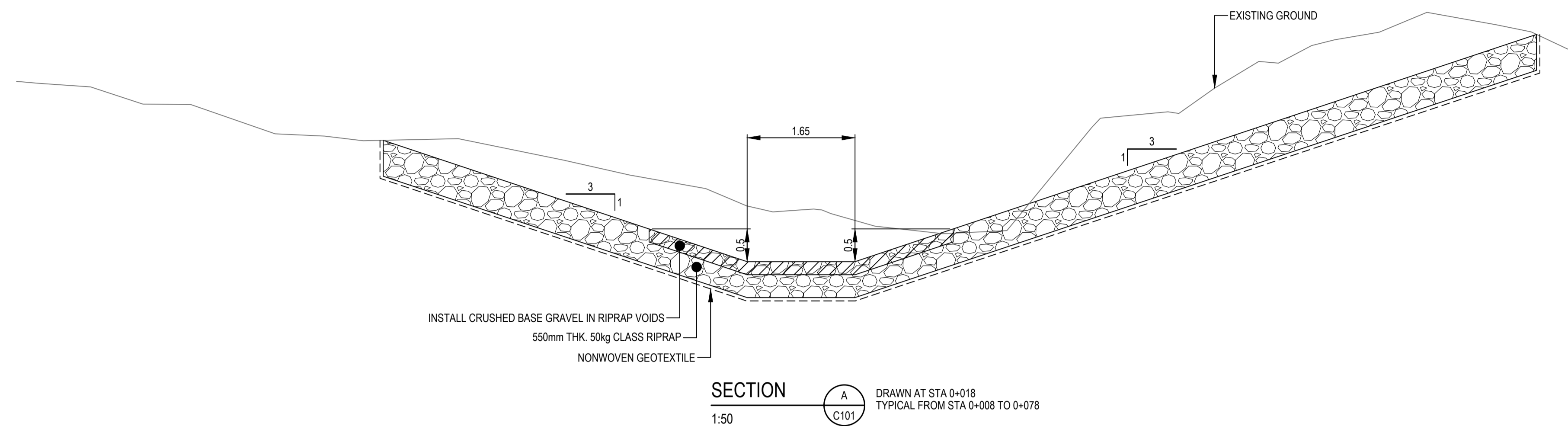
Project No./No. du projet	Sheet/Feuille	Revision no./La Révision no.
R.112220.002	C101	A

Q:\Vancouver\Transportation\TRN\WY03172 Alaska Hwy Km 568 - 571 Realignment\CADD\Sheets Phase 2\C2101-C2205 CULVERT DETAILS.dwg [C101] January 19, 2021 - 4:13:49 pm (BY: DEEPWELL, ANDREW)



ISSUED FOR PERMITTING

GENERAL NOTES:
1. DIMENSIONS, COORDINATES, ELEVATIONS ARE SHOWN IN METRES UNLESS NOTED.



Revision	Description/Description	Date/Date
A	ISSUED FOR PERMITTING	20/12/21

Client/client
Public Services and Procurement Canada



Project title/Titre du projet
KM 568 TO KM 573 (TETSA RIVER) RECONSTRUCTION - PHASE 2 ALASKA HIGHWAY, BC

Approved by/Approve par
S. LI

Designed by/Concept par
E. YANG / M. KELEHER

Drawn by/Dessine par
A. DEEPWELL

PWSC Project Manager/Administrateur de Projets TPSCG
A. TAHERI

PWSC Architectural and Engineering Resources Manager/Ressources Architectural et de Directeur d'ingénierie, TPSCG

Client/client
Public Services and Procurement Canada

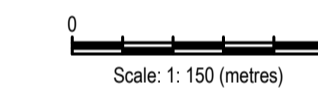
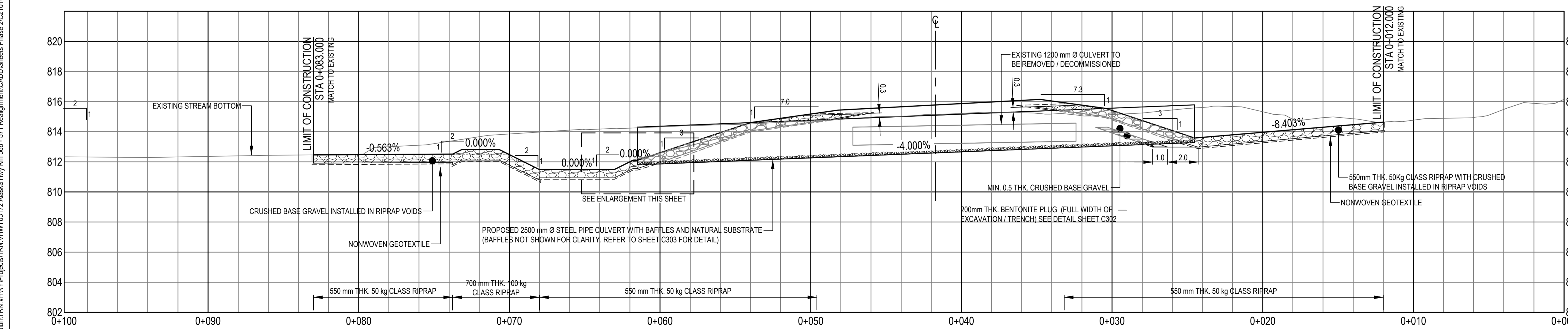
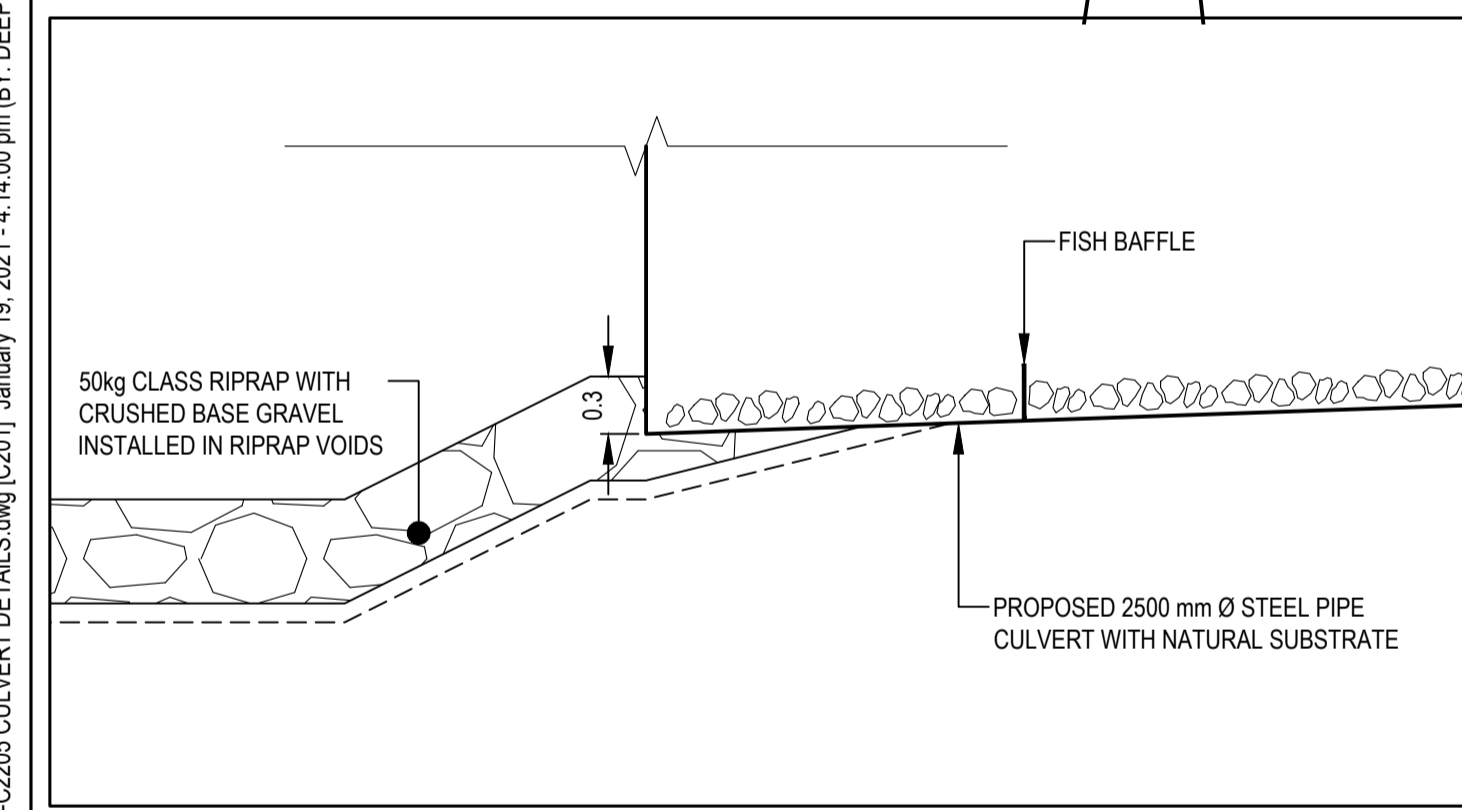
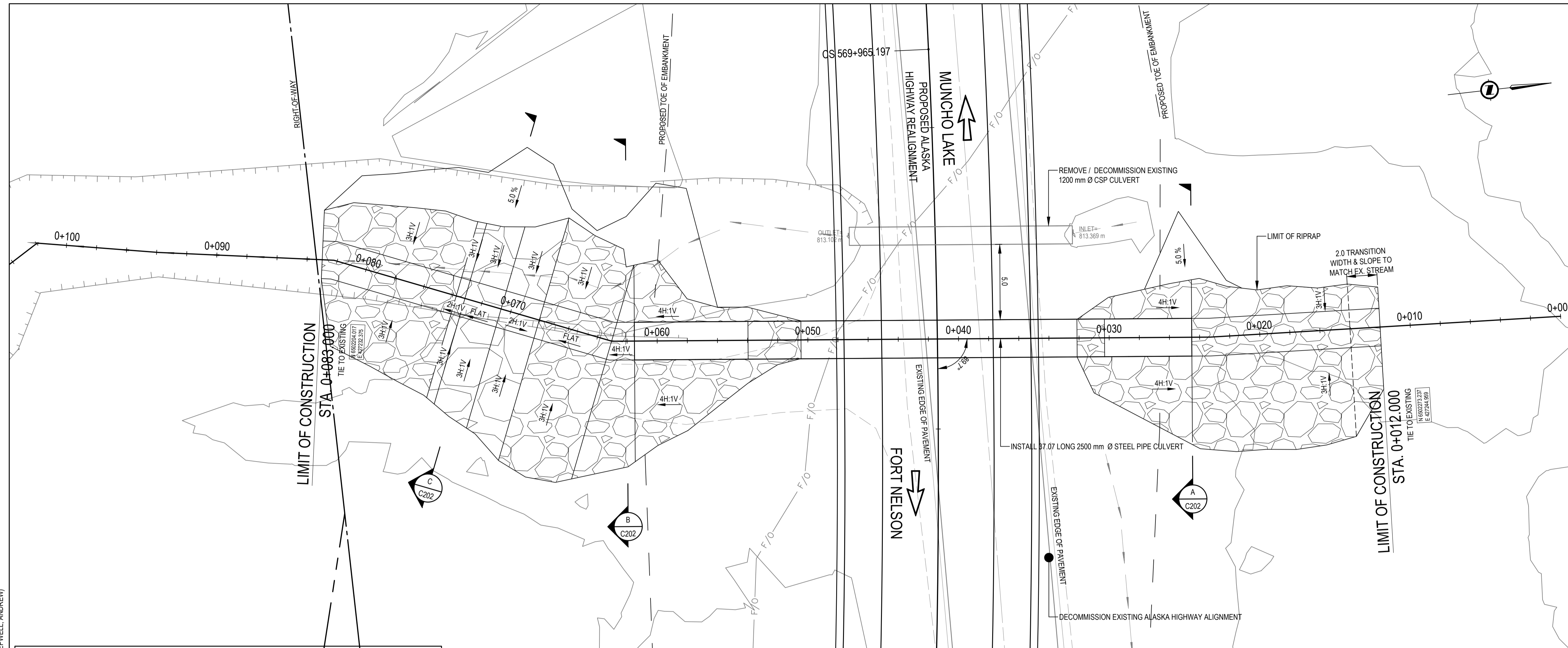
Drawing title/Titre du dessin
CULVERT KM 568.84 TYPICAL SECTIONS

Project No./No. du projet R.112220.002	Sheet/Feuille C102	Revision no./La Révision no. A
--	------------------------------	--



ISSUED FOR PERMITTING

GENERAL NOTES:
1. DIMENSIONS, COORDINATES, ELEVATIONS ARE SHOWN IN METRES UNLESS NOTED.



Revision	Description/Description	Date/Date
A	ISSUED FOR PERMITTING	20/12/21

Client/client
Public Services and Procurement Canada



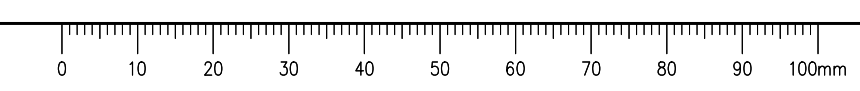
Project title/Titre du projet
KM 568 TO KM 573 (TETSA RIVER) RECONSTRUCTION - PHASE 2 ALASKA HIGHWAY, BC

Approved by/Approve par
S. LI
Designed by/Concept par
E. YANG / M. KELEHER
Drawn by/Dessiné par
A. DEEPWELL
PWGSC Project Manager/Administrateur de Projets TPWGC
A. TAHERI
PWGSC, Architectural and Engineering Resources Manager/Ressources Architectural et de Directeur d'ingénierie, TPWGC

Client/client
Public Services and Procurement Canada
Drawing title/Titre du dessin
CULVERT KM 569.95 PLAN / PROFILE

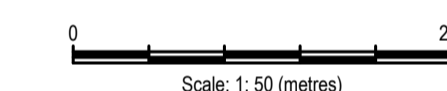
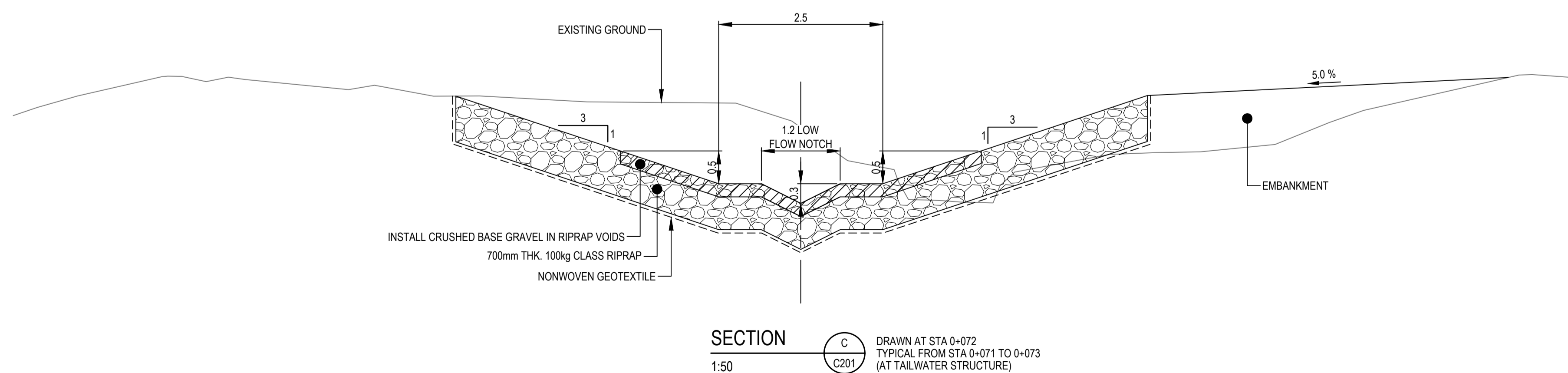
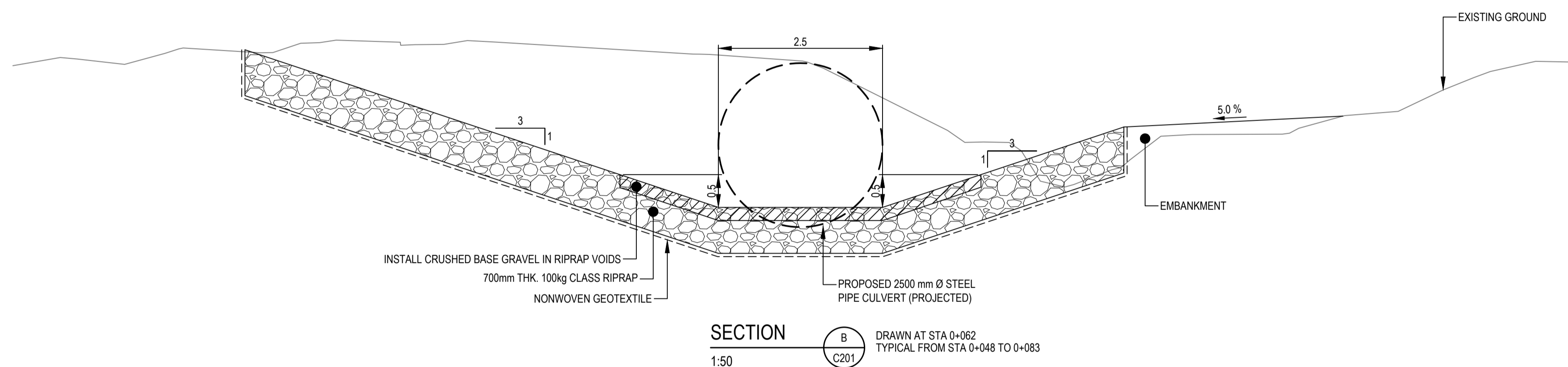
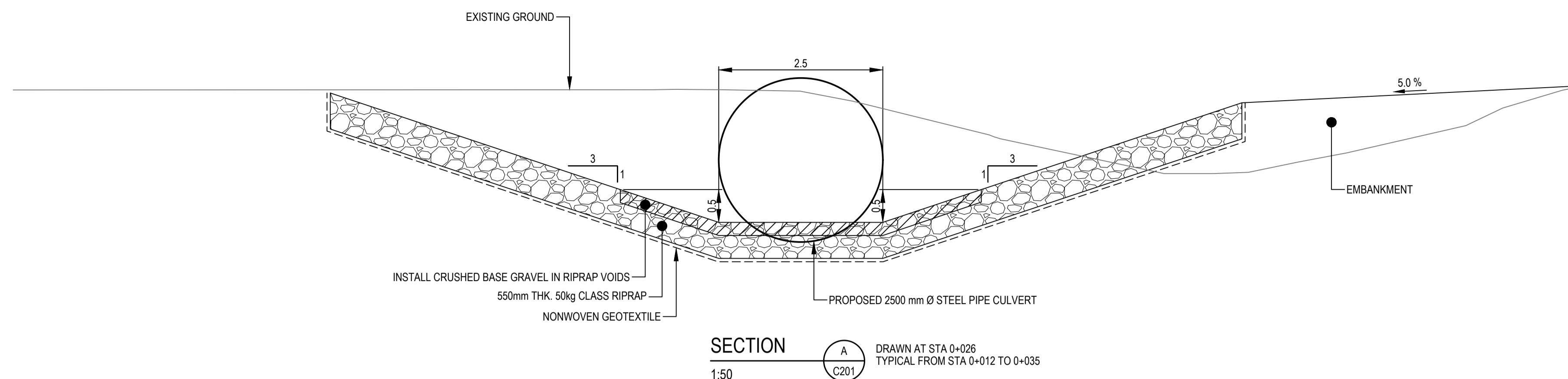
Project No./No. du projet	Sheet/Feuille	Revision no./La Révision no.
R.112220.002	C201	A

Q:\Vancouver\Transportation\TRN\VHWY03172 Alaska Hwy Km 568 - 571 Realignment\CADD\Sheets Phase 2\C201-C2205 CULVERT DETAILS.dwg [C201] January 19, 2021 - 4:14:00 pm (BY: DEEPWELL, ANDREW)



ISSUED FOR PERMITTING

GENERAL NOTES:
1. DIMENSIONS, COORDINATES, ELEVATIONS ARE SHOWN IN METRES UNLESS NOTED.



Revision	Description/Description	Date/Date
A	ISSUED FOR PERMITTING	20/12/21

Client/client
Public Services and Procurement Canada



Project title/Titre du projet
KM 568 TO KM 573 (TETSA RIVER) RECONSTRUCTION - PHASE 2 ALASKA HIGHWAY, BC

Approved by/Approuvé par
S. LI

Designed by/Conçu par
E. YANG / M. KELEHER

Drawn by/Dessiné par
A. DEEPWELL

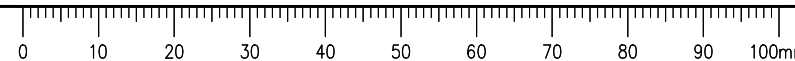
PWGSC Project Manager/Administrateur de Projets TPSCG
A. TAHERI

PWGSC Architectural and Engineering Resources Manager/Ressources Architectural et de Directeur d'ingénierie, TPSCG

Client/client
Public Services and Procurement Canada

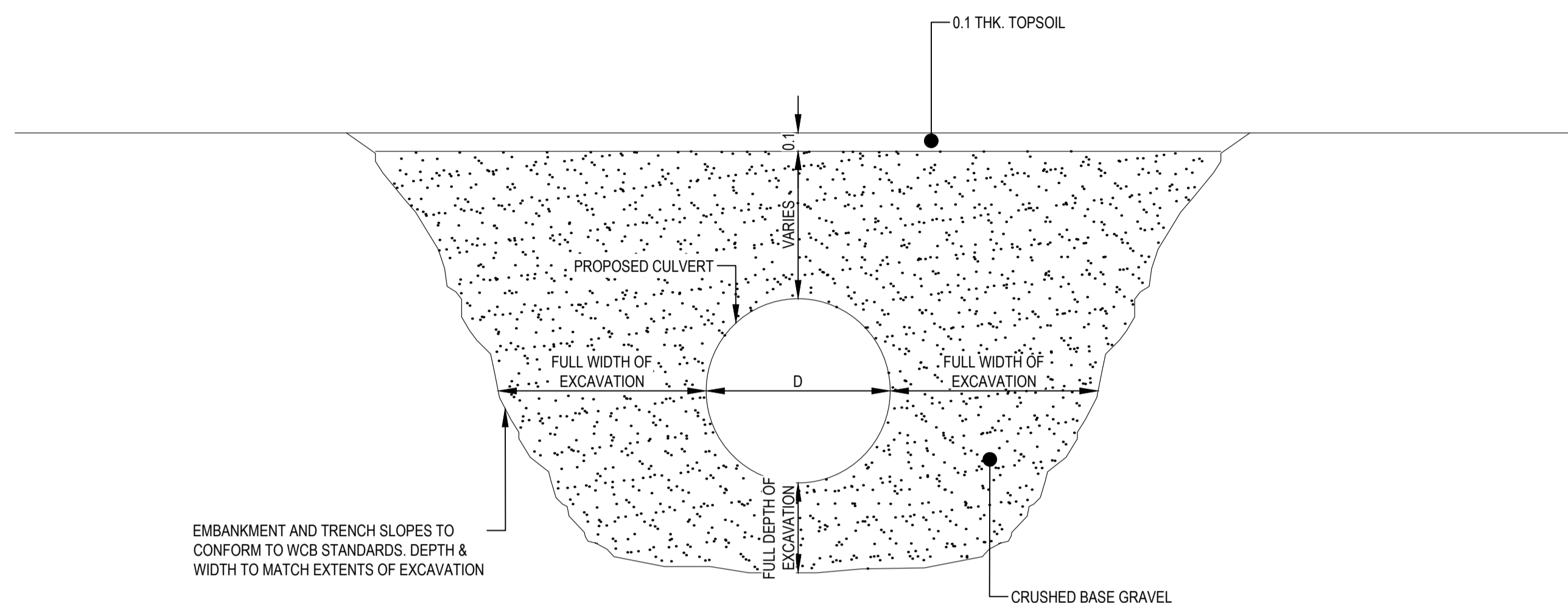
Drawing title/Titre du dessin
CULVERT KM 569.95 TYPICAL SECTIONS

Project No./No. du projet	Sheet/Feuille	Revision no./La Révision no.
R.112220.002	C202	A



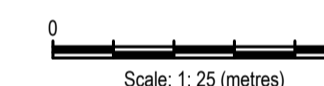
ISSUED FOR PERMITTING

GENERAL NOTES:
1. DIMENSIONS, COORDINATES, ELEVATIONS ARE SHOWN IN METRES UNLESS NOTED.



TYPICAL BACKFILL IN AREAS OF EMBANKMENT / NATIVE MATERIAL EXCAVATED TO FACILITATE CONSTRUCTION OF PROPOSED AND EXISTING CULVERTS

1:25



Revision	Description/Description	Date/Date
A	ISSUED FOR PERMITTING	20/12/21

Client/client
Public Services and Procurement Canada



Project title/Titre du projet
KM 568 TO KM 573 (TETSA RIVER) RECONSTRUCTION - PHASE 2 ALASKA HIGHWAY, BC

Approved by/Approuvé par
S. LI

Designed by/Concepté par
E. YANG / M. KELEHER

Drawn by/Dessiné par
A. DEEPWELL

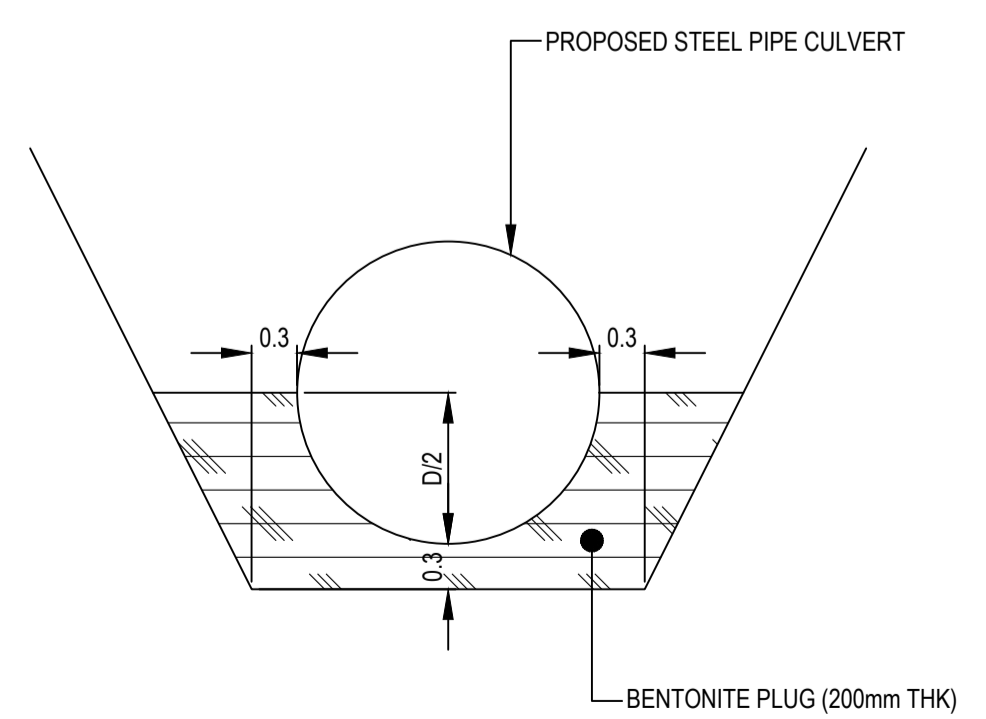
PWGSC Project Manager/Administrateur de Projets TPSCG
A. TAHERI

PWGSC Architectural and Engineering Resources Manager/Ressources Architectural et de Directeur d'ingénierie, TPSCG

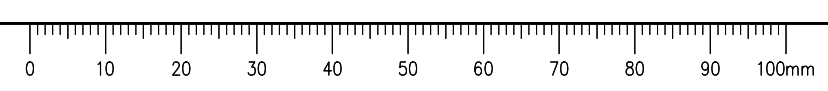
Client/client
Public Services and Procurement Canada

Drawing title/Titre du dessin
CULVERT DETAILS

Project No./No. du projet R.112220.002	Sheet/Feuille C302	Revision no./La Révision no. A
--	------------------------------	--



TYPICAL BENTONITE PLACEMENT

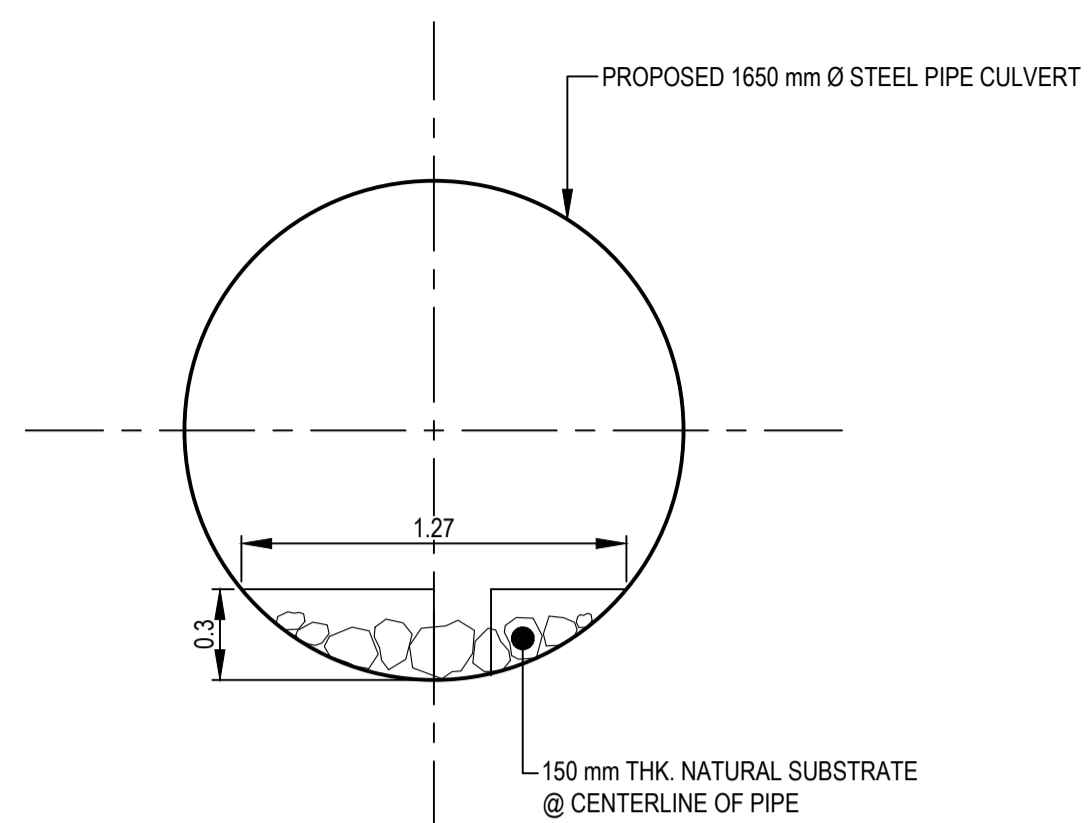


Q:\Vancouver\Transportation\TRN\VHWY\Projects\TRN\VHWY\03172 Alaska Hwy Km 568 - 571 Realignment\CADD\Sheets Phase 2\C2101-C2205 CULVERT DETAILS.dwg [302] January 19, 2021 - 4:14:10 pm (BY: DEEPWELL, ANDREW)

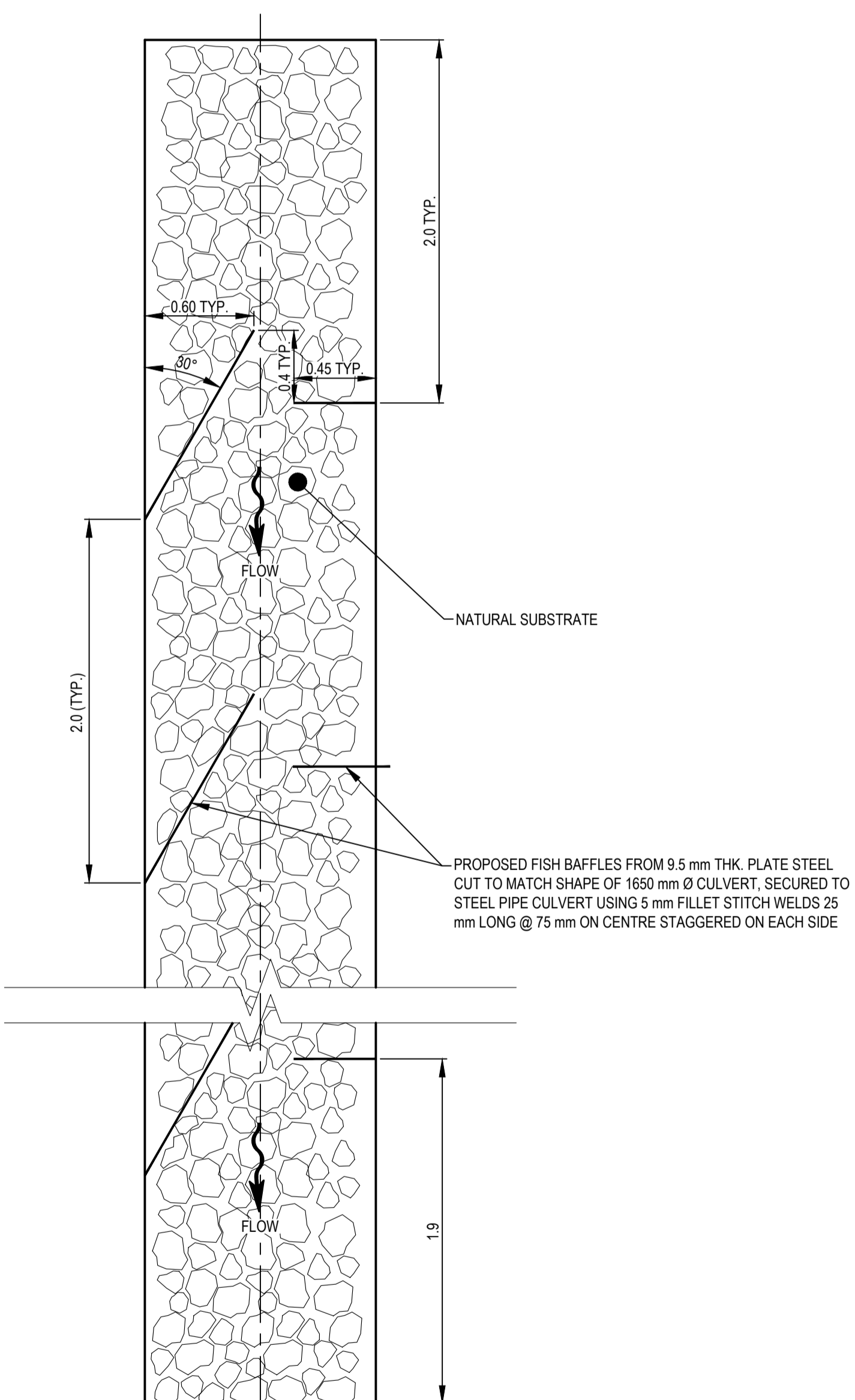


ISSUED FOR PERMITTING

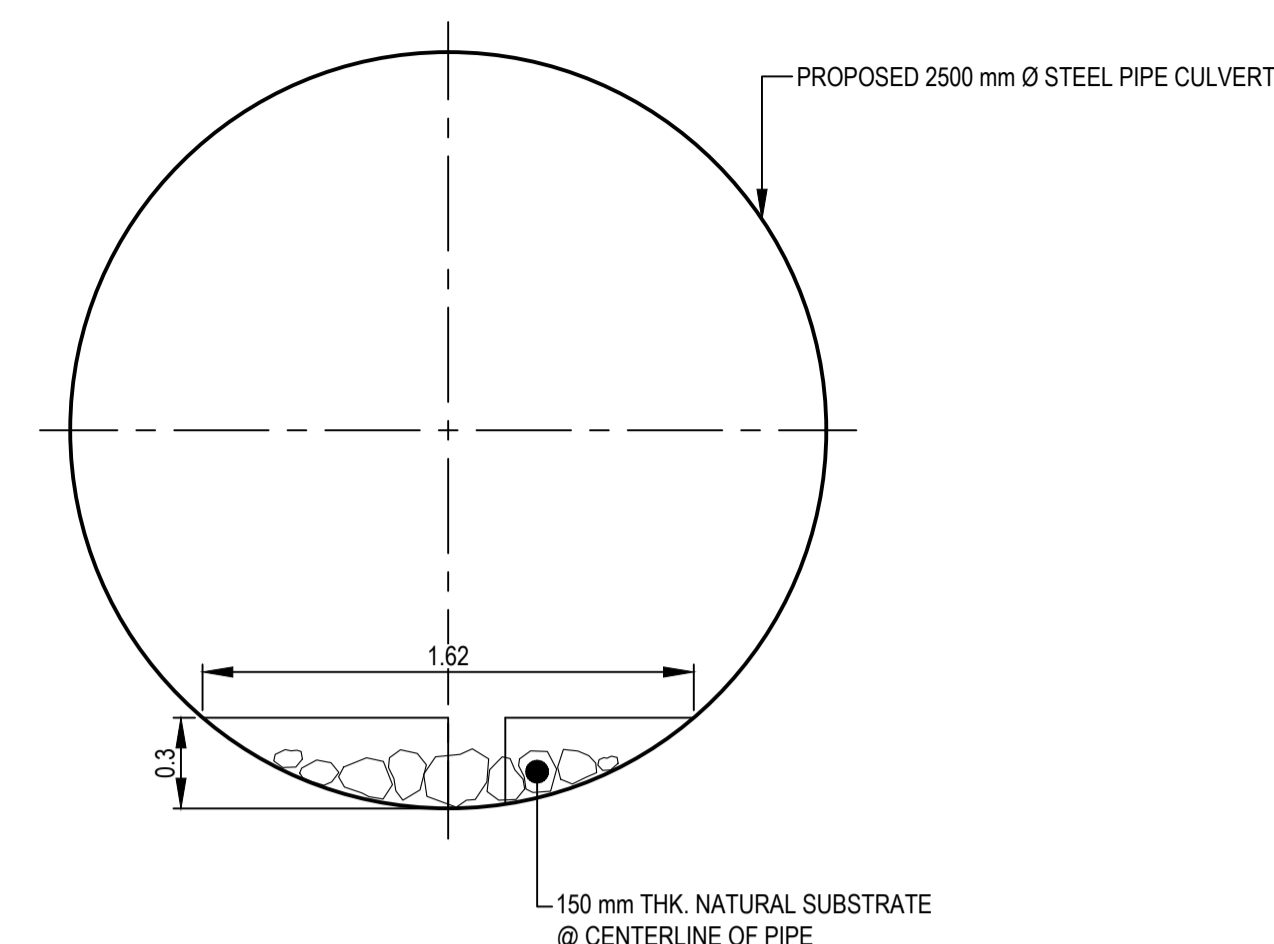
GENERAL NOTES:
1. DIMENSIONS, COORDINATES, ELEVATIONS ARE SHOWN IN METRES UNLESS NOTED.



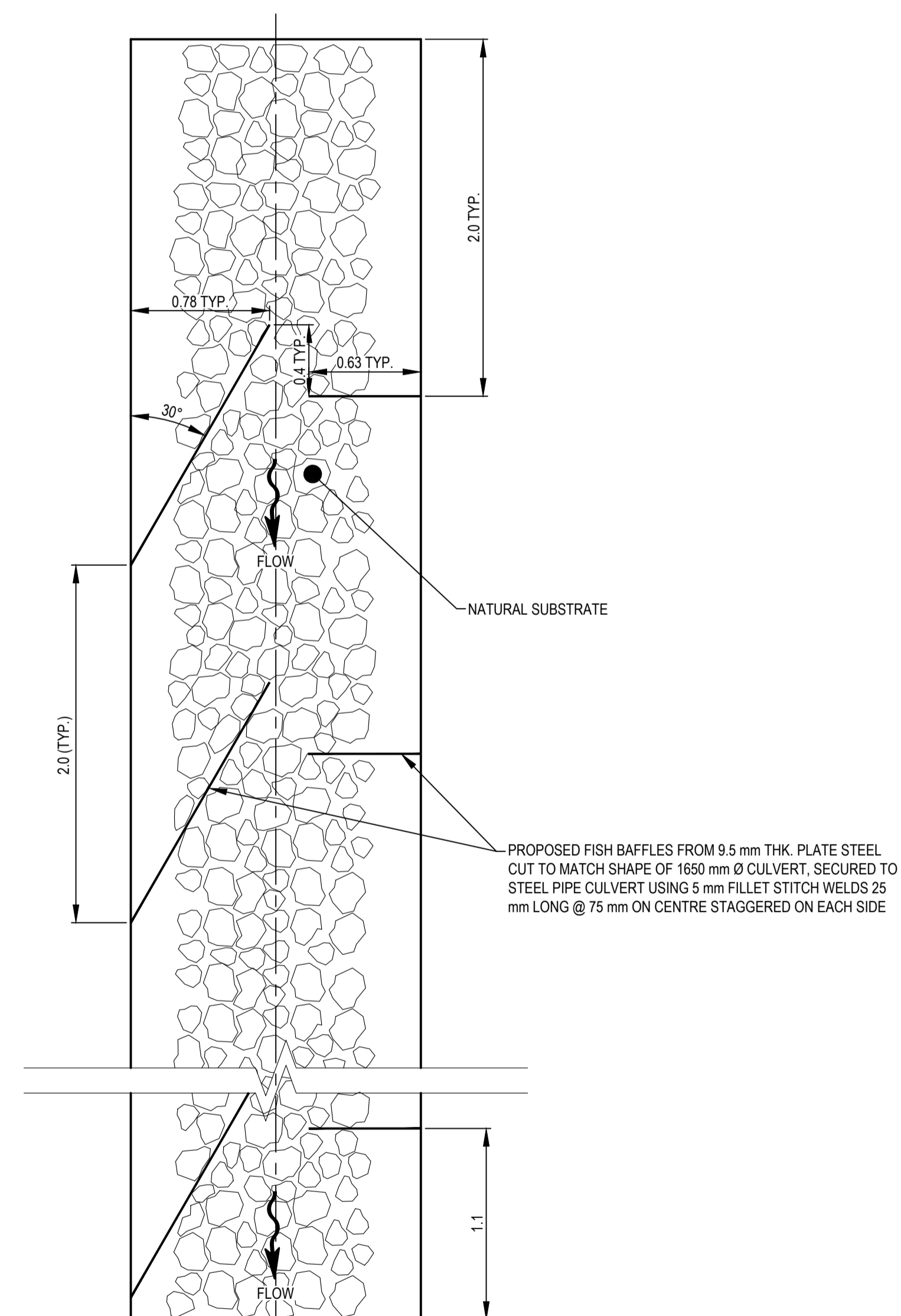
TYPICAL FISH BAFFLE SECTION
SCALE 1:25



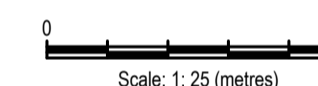
TYPICAL FISH BAFFLE PLAN
DRAWN AT TOP OF BAFFLES
SCALE 1:25



TYPICAL FISH BAFFLE SECTION
SCALE 1:25



TYPICAL FISH BAFFLE PLAN
DRAWN AT TOP OF BAFFLES
SCALE 1:25



Revision	Description/Description	Date/Date
A	ISSUED FOR PERMITTING	20/12/21

Client/client
Public Services and Procurement Canada



Project title/Titre du projet
KM 568 TO KM 573 (TETSA RIVER) RECONSTRUCTION - PHASE 2 ALASKA HIGHWAY, BC

Approved by/Approuvé par
S. LI

Designed by/Concepté par
E. YANG / M. KELEHER

Drawn by/Dessiné par
A. DEEPWELL

PWGSC Project Manager/Administrateur de Projets TPSCG
A. TAHERI

PWGSC Architectural and Engineering Resources Manager/Ressources Architectural et de Directeur d'ingénierie, TPSCG

Client/client
Public Services and Procurement Canada

Drawing title/Titre du dessin
CULVERT FISH BAFFLE DETAILS

Project No./No. du projet	Sheet/Feuille	Revision no./La Révision no.
R.112220.002	C303	A

Q:\Vancouver\Transportation\TRN\VHWY03172 Alaska Hwy Km 568 - 571 Realignment\CADD\Sheets Phase 2\C2101-C2205 CULVERT DETAILS.dwg [C303] January 19, 2021 - 4:14:15 pm (BY: DEEPWELL, ANDREW)

APPENDIX F

ARCHAEOLOGICAL OVERVIEW ASSESSMENT



To:	Alex Taheri, P.Eng., PMP Public Services and Procurement Canada	Date:	January 15, 2021
c:		Memo No.:	01
From:	Charla Arnott, Matt Keleher	File:	704-TRN.VHWY03172-02
Subject:	Archaeological Overview Assessment and Preliminary Field Reconnaissance KM 568 and KM 573 (Tetsa River) Reconstruction, Alaska Highway		

1.0 INTRODUCTION

Tetra Tech Canada Inc. (Tetra Tech) was retained by Public Services and Procurement Canada (PSPC) to support the Alaska Highway KM 568 and KM 573 (Tetsa River) Reconstruction Project (the Project), located in northeast British Columbia. As part of this work, Tetra Tech sub-contracted Soriak Consulting and Research Ltd. (Soriak Consulting) to complete an Archaeological Overview Assessment (AOA) with a Preliminary Field Reconnaissance (PFR) component to identify potential impacts to cultural heritage resources within the proposed Project area.

1.1 Site Description

The Project is situated between KM 568 and KM 573 of the Alaska Highway and includes terrain adjacent to the current highway alignment. The Project footprint will remain within the Alaska Highway Right-of-Way, however PSPC intend to acquire an additional 3.509 Ha of Right-of-Way to facilitate realignment of the highway. Terrain within the Project footprint is level to steeply sloping with a predominant southeast aspect. Multiple drainages cross the Alaska Highway and drain into the Tetsa River, located approximately 450 m downslope. Vegetation reflects the level of past ground disturbance and soil conditions; forest cover consists primarily of black spruce, poplar, alder, willow, rose, clover, and grasses. The proposed Project footprint crosses saturated to moderately well drained terrain that is level to steeply sloping and devoid of distinct topographic features indicative of moderate or higher archaeological potential.

2.0 PROJECT SCOPE

Soriak Consulting completed a preliminary desktop-based AOA prior to completion of an in-field PFR of the Project footprint. Fieldwork was completed in conjunction with environmental assessment work undertaken in Spring 2020. The PFR was completed within the Project footprint and included pedestrian traverse within cleared and forested terrain on either side of the current highway alignment (See Appendix A, Figure 1).

The Project involves realignment and reconstruction of approximately 3 km of the Alaska Highway between KM 568 and KM 573. The objectives of the proposed works includes:

- Improving highway safety by upgrading the highway alignment and geometry to satisfy the relevant design guidelines;
- Replacing existing drainage structures (i.e. culverts) to improve drainage capacity and fish passage;
- Mitigating erosion and rockfall concerns at the existing cut slopes on the north side of the highway; and
- Reducing PSPC's ongoing maintenance costs.

Construction of the Project will be completed in two separate Phases, as follows:

- Phase 1: anticipated to include tree clearing to facilitate the future highway realignment, rock / shale excavation, and stockpiling of excavated materials at PSPC's existing pit at KM 565.9 of the Alaska Highway. Phase 1 works are scheduled to be completed during Winter 2020/21.
- Phase 2 (Summer 2021): anticipated to include highway reconstruction / realignment, replacement of existing drainage structures, installation of erosion protection (i.e. riprap), private access / driveway improvements, and decommissioning of the existing highway alignment (where necessary).

2.1 Archaeological Overview Assessment (AOA)

An AOA's primary objective is to determine whether development of a project will adversely impact cultural heritage resources. It also serves to identify the potential extent of these impacts, if applicable, and outlines mitigative options prior to development. Generally, an AOA is desktop-based, although it may include a PFR component, as was the case for this Project.

Through a review of satellite imagery and other topographic data, an analysis of the Project's geographic location and ground cover was completed. A review of existing archaeological and historic site records in the greater Project area was also undertaken, and both previous and proposed construction activities at the Project site were studied.

Early road construction techniques stemming from when the highway was first pushed through northeast British Columbia were also reviewed and documentation pertaining to former highway alignments were reviewed. The desktop assessment indicated the proposed alignment crosses level to steeply sloping terrain. Multiple areas of modelled archaeological potential were identified; the PFR allowed for in-field observations of these locations to be made.

In summary, the scope of the AOA for this Project included a review of:

- existing databases and archaeological site records, including the BC Archaeology Branch's Remote Access to Archaeological Data (RAAD) website, to determine if previously recorded archaeological sites are located within, or in proximity to, the Project area;
- archaeological and ethnographic sources to gain an understanding of regional archaeological site density and distribution;
- available archival and photographic sources, such as historic photos, satellite imagery and published materials pertaining to the development history of the general area; and,
- regional soil information with a view toward understanding how geomorphic processes or pre-contact environmental conditions may have impacted site distribution within the Project area.

2.2 Preliminary Field Reconnaissance (PFR)

A PFR of the Project footprint was completed by Charla Arnott (Soriak Consulting) on June 18, 2020. The in-field review of the Project footprint included documentation of pre-construction conditions and inspection of soil exposures for cultural heritage resources within the Project footprint.

The scope of the PFR included:

- a pedestrian traverse, done primarily in transects walking parallel and perpendicular to the Project boundaries and the Alaska Highway right-of-way;

- visual surface inspections of ground exposures at various locations, including road cuts and areas of erosion; and
- documentation of pre-construction conditions through development of a photographic record. (A selection of photos is included in this report – see Appendix B).

3.0 RESULTS

3.1 Cultural Heritage Resources and Archaeological Sites

In British Columbia, archaeological materials are protected under the *Heritage Conservation Act* (HCA). Cultural resource material includes a range of culturally and naturally modified materials deposited both above and below ground surfaces. Archaeological sites are found upon a variety of topographic features. Typically, the closer terrain features are to natural hydrological features the higher the archaeological potential. Other factors, such as proximity to trails, fishing, hunting, and gathering areas, sun exposure, and protection from the elements are additional reasons why certain areas were favoured for use, and still may be. Micro-topographic features, such as knolls, eskers, banks, terraces and ridges often contain subsurface cultural materials. Both surface and subsurface inspections of such areas may reveal the presence of culturally modified material.

No previously recorded sites are located within the proposed Project footprint. Previously recorded archaeological site IdSa-1 is located approximately 5.75 km to the east of the Project. This site, consisting of lithic debitage is located on the west bank of a small pond south of the highway right-of-way. This site will not be impacted by construction of the proposed Project.

3.2 Ground Disturbance

Cultural heritage resources can occur at various locations and soil depths. Ground altering activities, both natural and unnatural, have potential to damage or displace artifacts and other cultural heritage resources, particularly those occurring in shallow deposits. Ground disturbance may cause an area bearing cultural heritage resources to be more susceptible to future damage through erosional activities. It is also possible for shallow cultural deposits to be impacted while deeper deposits remain intact. When cultural resource sites are disturbed, the context of artifact distribution may be lost. This can result in incorrect interpretations of archaeological data. For this reason, proposed ground disturbance can be a factor when determining if an area exhibits elevated archaeological potential.

Ground disturbance was noted within the Project area, particularly within the cleared highway right-of-way and along the adjacent tree line. Most observed disturbances within the Project area are the result of highway road construction activities and natural impacts caused by water erosion. Ground visibility ranged from excellent to poor, depending on the depth of water present, ground vegetation and level of erosion.

3.3 Archaeological Potential

3.3.1 Evaluation of Archaeological Potential

Archaeological potential is determined through a review of an area's geography, the nature and distribution of previously recorded cultural heritage sites and Aboriginal Traditional Knowledge (ATK), as well as a determination of disturbance levels and site preservation. If these factors, in combination or individually, are indicative of prehistoric or historic utilization of an area, then a moderate-to-high probability rating for cultural heritage/

archaeological sites is applied. When an area is identified as having moderate-to-high heritage resource potential, this can trigger a recommendation for further archaeological studies.

Archaeological sites are found upon a variety of topographic features. Typically, the closer terrain features are to natural hydrological features (lakes, rivers, streams), the higher the archaeological potential. Other factors, such as proximity to trails, fishing, hunting, and gathering areas, sun exposure, and protection from the elements are additional reasons why certain areas are/were favoured for traditional uses. Micro-topographic features, such as knolls, eskers, banks, terraces and ridges often contain surface and subsurface cultural heritage resource materials and features. Both surface and subsurface inspections of such areas may reveal the presence of cultural materials.

Two Archaeological Impact Assessments (AIA) were previously completed in areas to the west of the Project footprint. The first, completed under archaeological permit 2008-398 involved assessment of KM 555-571 of the Alaska highway right-of-way and discovery of site IdSa-1. The west boundary of the assessed area appears to terminate at the eastern extent of the Project. While shovel testing was completed during the assessment, most of the footprint was assessed to have low archaeological potential due to sloping, poorly drained featureless terrain, and previous ground disturbance. The second, completed under archaeological permit 2009-252, involved assessment of a proposed borrow pit located to the east of the Project. While areas indicative of high archaeological potential were identified, subsurface testing was terminated due to the presence of glacial till.

During the PFR, transects were completed along both sides of the highway right-of-way. The Project is situated on the edge of steeply sloping terrain located upslope of the Tetsa River. From the west extent of the Project, the highway right-of-way is level to gently sloping with an overall southeast aspect towards Tetsa River Lodge. The terrain continues to slope gently to the southeast to an area just east of the Lodge before deflecting upwards to the east and levelling out near the east extent of the Project. It is anticipated that the new cut area required for the highway re-alignment will extend to the north and south of the existing highway right-of-way. Portions of the Project located within areas of modelled archaeological potential were closely reviewed in the field (Figure 1).

Ground disturbance was noted within the bulk of the existing highway right-of-way. The right-of-way remains mostly unforested. The natural slope of the terrain in this area is artificially levelled during highway construction or during the construction of Tetsa River Lodge. Road cuts and highway ditching are significant in areas (Photo 14) with push extending into the treed areas (Photo 8). Such groundwork results in the adjacent terrain appearing to be artificially elevated. The new cut terrain that extends downslope of the highway right-of-way is predominantly level to gently sloping and gently undulating. Vegetation is indicative of poorly to moderately well drained terrain. Vegetation in this area consists primarily of spruce, scattered aspen, alder, willow, grasses, and mosses. Drainages were closely inspected and observed to have sloping, poorly formed bank features. This portion of the Project is indicative of low archaeological potential due to the absence of naturally occurring microtopographic features and presence of significantly disturbed terrain.

Terrain indicative of low archaeological potential was observed adjacent to the north of the Alaska Highway. In this area large portions of the Project are previously disturbed. Areas of new cut to the north of the highway are gently to steeply sloping with rocky outcroppings.

Ground exposures in the Project footprint were intensely examined; however, no cultural material was identified during the PFR.

4.0 RECOMMENDATIONS

Based on the results of the preliminary desktop review completed for the project, the in-field observations of the Project footprint during the PFR, and the results of previous archaeological assessment work in the region, the Project is considered to fall within areas indicative of low archaeological potential.

The existing highway right-of-way exhibits low archaeological potential due to the level of ground disturbance typical of highway construction activities. Subsurface testing completed under archaeological permit 2008-398 within the highway right of way confirmed that archaeological sediments were not present.¹ Field observations made during the PFR included documentation of disturbed terrain within the cleared right-of-way and in areas extending into the tree line. The forested portions of the Project are typified by steep slopes with rocky outcroppings to the north and low lying, saturated to poorly drained terrain dominated by willow, alder, and wet indicator plants to the south.

No distinct, naturally occurring topographic features indicative of moderate or higher archaeological potential were observed within the Project footprint during the PFR. Further, previous archaeological assessment completed in terrain in proximity of the Project indicated that elevated terrain features were dominated by glacial till².

Further study is recommended if any ground altering activities, including tree removal, are proposed outside the proposed Project limits, as assessed in the field. If cultural materials requiring protection are identified during subsequent assessment, mitigation strategies to avoid or mitigate impacts to cultural heritage resource materials will be developed. The processes involved in permitting and conducting an AIA are dependent upon the ownership of the land. Notably, a provincial Heritage Inspection Permit is required for lands held by the Province of British Columbia. For federal lands under the jurisdiction of PSPC, a Provincial Heritage Inspection permit may not be required (permit requirements to be discussed with PSPC if applicable).

It is further recommended that the Construction Contract for the Project include PSPC's standard contract clause requiring work be stopped and further assessments undertaken if cultural heritage resource materials are identified during any ground altering activities.

5.0 LIMITATIONS OF REPORT

This report and its contents are intended for the sole use of Public Services and Procurement Canada (PSPC) and their agents. Tetra Tech Canada Inc. (Tetra Tech) and Soriak Consulting & Research Ltd. (Soriak Consulting) do 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 PSPC 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 report is subject to the terms and conditions stated in Tetra Tech Canada Inc.'s Services Agreement. Tetra Tech's Limitations on the use of this Document (Appendix C) are attached to this memo.

¹ Golder Associates Ltd. 2009 *Archaeological Impact Assessment Report on proposed Alaska Highway 97 Realignment from KM 555 to KM 571*. HCA Permit 2008-0398. Report on file with the Archaeology Branch, Victoria, BC.

² Golder Associates Ltd. 2010 *Archaeological Impact Assessment Report on proposed Alaska Highway Borrow Pit: Km 568+300 to 568+900*. HCA Permit 2009-052. Report on file with the Archaeology Branch, Victoria, BC.

6.0 CLOSURE

We trust this technical memo meets your present requirements. If you have any questions or comments, please contact the undersigned.

Respectfully submitted,


704-TRN.VHWY03172-02
704-TRN.VHWY03172-02
704-TRN.VHWY03172-02


704-TRN.VHWY03172-02
704-TRN.VHWY03172-02
704-TRN.VHWY03172-02

Prepared by:
Charla Arnott, M.Sc., RPCA, PMP, RPA
Archaeologist, Soriak Consulting & Research Ltd.
Direct Line: 780.995.4859
charla@soriakconsulting.com

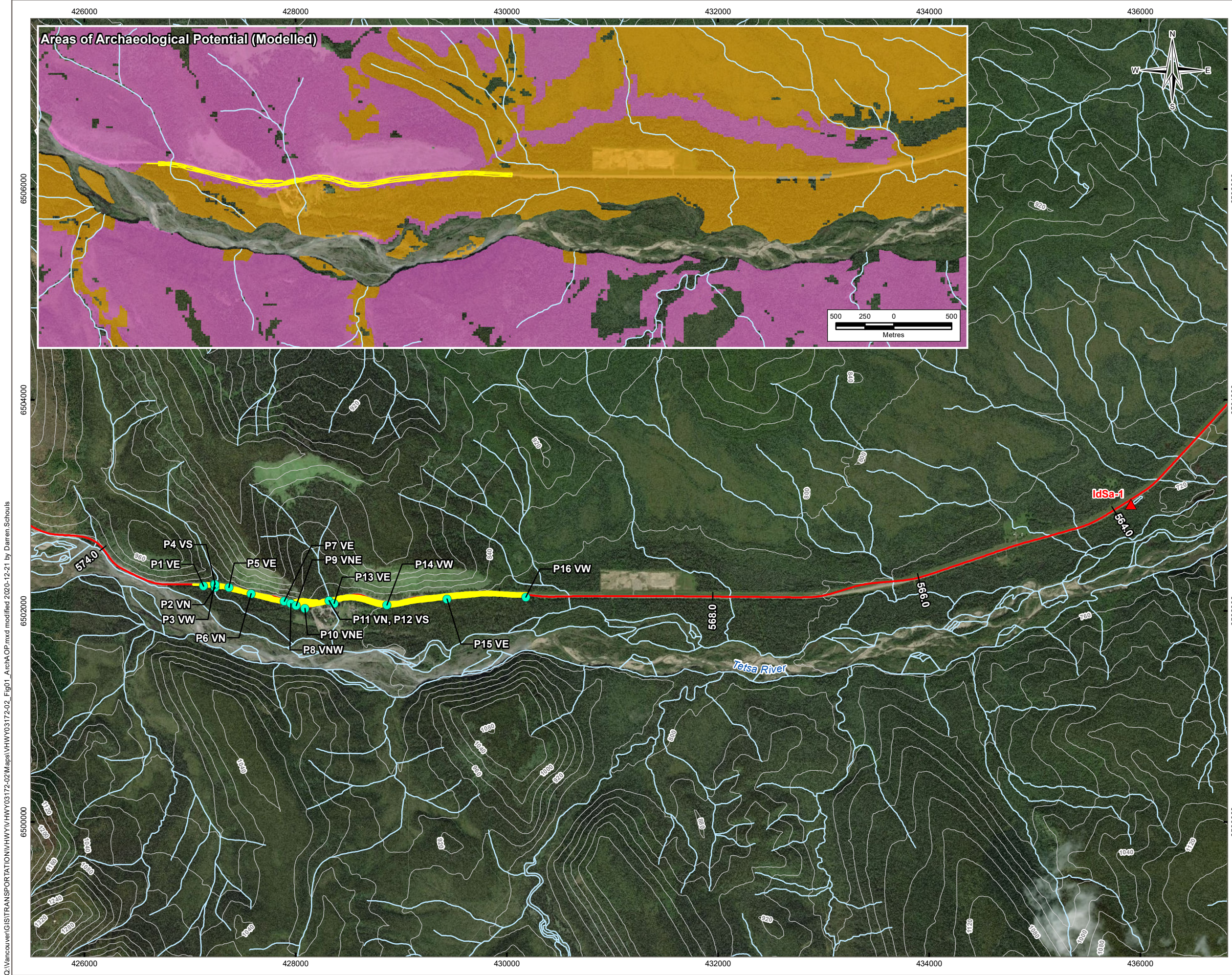
Reviewed by:
Matt Keleher, B.Eng., E.I.T
Transportation Engineer-in-Training
Direct Line: 604.608.8615
matt.keleher@tetrattech.com

/sy

Attachments: Appendix A – Figures (1)
Appendix B – Photos (16)
Appendix C – Tetra Tech’s Limitations on the use of this Document

APPENDIX A

Figure 1 Archaeological Assessment



LEGEND

- Realignment Work
- ▲ Archaeological Site
- Photo Location

Archaeological Potential (Modelled)

- Moderate
- High

- +— Alaska Highway Centerline
- Contour (40 m)
- Watercourse/Waterbody



NOTES
 This document contains sensitive information about cultural resources that are protected under provisions of British Columbia's Heritage Conservation Act. This information is to be used to assist in planning the proposed project only and is not to be disseminated. No copies of this document are to be made without written permission of Public Services and Procurement Canada.

Archaeological data source:
 British Columbia's Remote Access to Archaeological Data (RAAD) (accessed Oct. 7, 2020)

Base data source:
 CanVec 1:50,000
 Imagery provided by ESRI; Maxar (2019)

STATUS
ISSUED FOR USE

**ALASKA HIGHWAY KM 568 - KM 573
(TESTA RIVER) RECONSTRUCTION**

Archaeological Assessment		CLIENT	
PROJECTION UTM Zone 10		DATUM NAD83	
Scale: 1:35,000		Public Services and Procurement Canada	
600 300 0 600 Metres		TETRA TECH	
FILE NO. VHWY03172-02_Fig01_ArchAOP.mxd			
OFFICE TL-VANC	DWN DS	CKD SL	APVD CA
DATE January 15, 2021	PROJECT NO. TRN.VHWY03172-02		
		Figure 1	

Q:\Vancouver\GIS\TRANSPORTATION\HWY03172-02\Maps\HWY03172-02_Fig01_ArchAOP.mxd modified 2020-12-21 by Darren Schouls

APPENDIX B

- Photo 1: View E of vegetation at the W extent of the Project
- Photo 2: View N of the outlet of a drainage near the W extent of the Project
- Photo 3: View W of terrain adjacent to the W bound lane, near the W extent of the Project
- Photo 4: View S of the outlet of a drainage (same drainage as shown in Photo 2)
- Photo 5: View E of varied terrain and vegetation along right-of-way
- Photo 6: View N of topo high, steeply sloping terrain N of the existing highway right-of-way
- Photo 7: View E of terrain adjacent to the E bound lane right-of-way
- Photo 8: View NW showing rock debris and push along the tree line of the existing right-of-way
- Photo 9: View NE towards Tetsa River Lodge
- Photo 10: View NE towards Tetsa River Lodge
- Photo 11: View N of the inlet of a drainage at Tetsa River Lodge
- Photo 12: View S of the outlet of a drainage at Tetsa River Lodge
- Photo 13: View E of the highway right-of-way adjacent to the Tetsa River Lodge
- Photo 14: View W of the ditch line of the current highway right-of-way
- Photo 15: View E of a log fence line in proximity of the highway right-of-way
- Photo 16: View W from the E extent of the highway right-of-way



Photo 1: View E of vegetation at the W extent of the Project



Photo 1: View N of the outlet of a drainage near the W extent of the Project



Photo 3: View W of terrain adjacent to the W bound lane, near the W extent of the Project



Photo 4: View S of the outlet of a drainage (same drainage as shown in Photo 2)



Photo 5: View E of varied terrain and vegetation along right-of-way



Photo 6: View N of topo high, steeply sloping terrain N of the existing highway right-of-way



Photo 7: View E of terrain adjacent to the E bound lane right-of-way



Photo 8: View NW showing rock debris and push along the tree line of the existing right-of-way



Photo 9: View NE towards Tetsa River Lodge



Photo 10: View NE towards Tetsa River Lodge



Photo 11: View N of the inlet of a drainage at Tetsa River Lodge



Photo 12: View S of the outlet of a drainage at Tetsa River Lodge



Photo 13: View E of the highway right-of-way adjacent to the Tetsa River Lodge



Photo 14: View W of the ditch line of the current highway right-of-way



Photo 15: View E of a log fence line in proximity of the highway right-of-way



Photo 16: View W from the E extent of the highway right-of-way

APPENDIX C

TETRA TECH'S LIMITATIONS ON THE USE OF THIS DOCUMENT

LIMITATIONS ON USE OF THIS DOCUMENT

1.1 USE OF DOCUMENT AND OWNERSHIP

This document pertains to a specific site, a specific development, and a specific scope of work. The document may include plans, drawings, profiles and other supporting documents that collectively constitute the document (the "Professional Document").

The Professional Document is intended for the sole use of TETRA TECH's Client (the "Client") as specifically identified in the TETRA TECH Services Agreement or other Contractual Agreement entered into with the Client (either of which is termed the "Contract" herein). TETRA TECH does not accept any responsibility for the accuracy of any of the data, analyses, recommendations or other contents of the Professional Document when it is used or relied upon by any party other than the Client, unless authorized in writing by TETRA TECH.

Any unauthorized use of the Professional Document is at the sole risk of the user. TETRA TECH accepts no responsibility whatsoever for any loss or damage where such loss or damage is alleged to be or, is in fact, caused by the unauthorized use of the Professional Document.

Where TETRA TECH has expressly authorized the use of the Professional Document by a third party (an "Authorized Party"), consideration for such authorization is the Authorized Party's acceptance of these Limitations on Use of this Document as well as any limitations on liability contained in the Contract with the Client (all of which is collectively termed the "Limitations on Liability"). The Authorized Party should carefully review both these Limitations on Use of this Document and the Contract prior to making any use of the Professional Document. Any use made of the Professional Document by an Authorized Party constitutes the Authorized Party's express acceptance of, and agreement to, the Limitations on Liability.

The Professional Document and any other form or type of data or documents generated by TETRA TECH during the performance of the work are TETRA TECH's professional work product and shall remain the copyright property of TETRA TECH.

The Professional Document is subject to copyright and shall not be reproduced either wholly or in part without the prior, written permission of TETRA TECH. Additional copies of the Document, if required, may be obtained upon request.

1.2 ALTERNATIVE DOCUMENT FORMAT

Where TETRA TECH submits electronic file and/or hard copy versions of the Professional Document or any drawings or other project-related documents and deliverables (collectively termed TETRA TECH's "Instruments of Professional Service"), only the signed and/or sealed versions shall be considered final. The original signed and/or sealed electronic file and/or hard copy version archived by TETRA TECH shall be deemed to be the original. TETRA TECH will archive a protected digital copy of the original signed and/or sealed version for a period of 10 years.

Both electronic file and/or hard copy versions of TETRA TECH's Instruments of Professional Service shall not, under any circumstances, be altered by any party except TETRA TECH. TETRA TECH's Instruments of Professional Service will be used only and exactly as submitted by TETRA TECH.

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.

1.3 STANDARD OF CARE

Services performed by TETRA TECH for the Professional Document have been conducted in accordance with the Contract, in a manner consistent with the level of skill ordinarily exercised by members of the profession currently practicing under similar conditions in the jurisdiction in which the services are provided. Professional judgment has been applied in developing the conclusions and/or recommendations provided in this Professional Document. No warranty or guarantee, express or implied, is made concerning the test results, comments, recommendations, or any other portion of the Professional Document.

If any error or omission is detected by the Client or an Authorized Party, the error or omission must be immediately brought to the attention of TETRA TECH.

1.4 DISCLOSURE OF INFORMATION BY CLIENT

The Client acknowledges that it has fully cooperated with TETRA TECH with respect to the provision of all available information on the past, present, and proposed conditions on the site, including historical information respecting the use of the site. The Client further acknowledges that in order for TETRA TECH to properly provide the services contracted for in the Contract, TETRA TECH has relied upon the Client with respect to both the full disclosure and accuracy of any such information.

1.5 INFORMATION PROVIDED TO TETRA TECH BY OTHERS

During the performance of the work and the preparation of this Professional Document, TETRA TECH may have relied on information provided by third parties other than the Client.

While TETRA TECH endeavours to verify the accuracy of such information, TETRA TECH accepts no responsibility for the accuracy or the reliability of such information even where inaccurate or unreliable information impacts any recommendations, design or other deliverables and causes the Client or an Authorized Party loss or damage.

1.6 GENERAL LIMITATIONS OF DOCUMENT

This Professional Document is based solely on the conditions presented and the data available to TETRA TECH at the time the data were collected in the field or gathered from available databases.

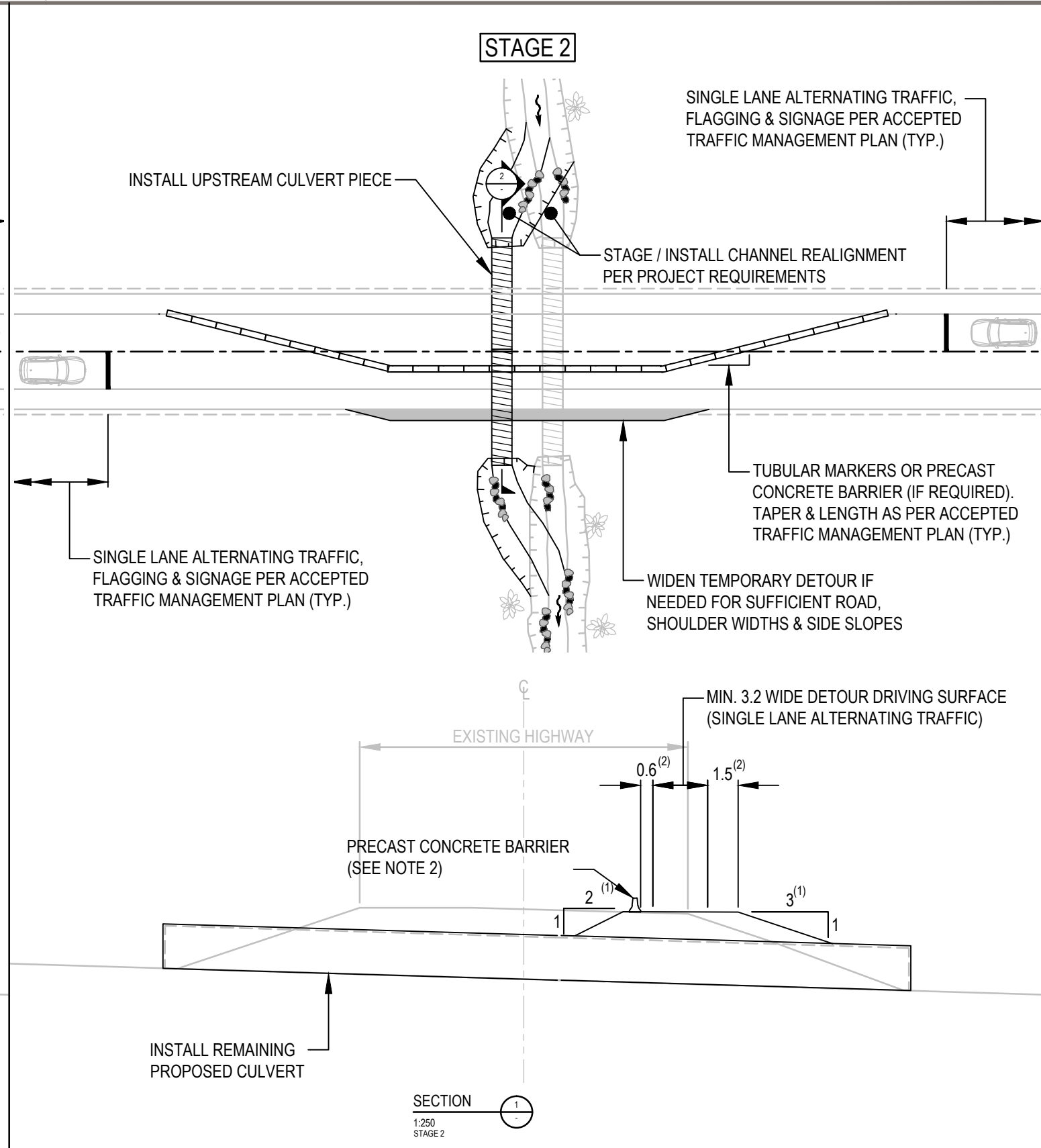
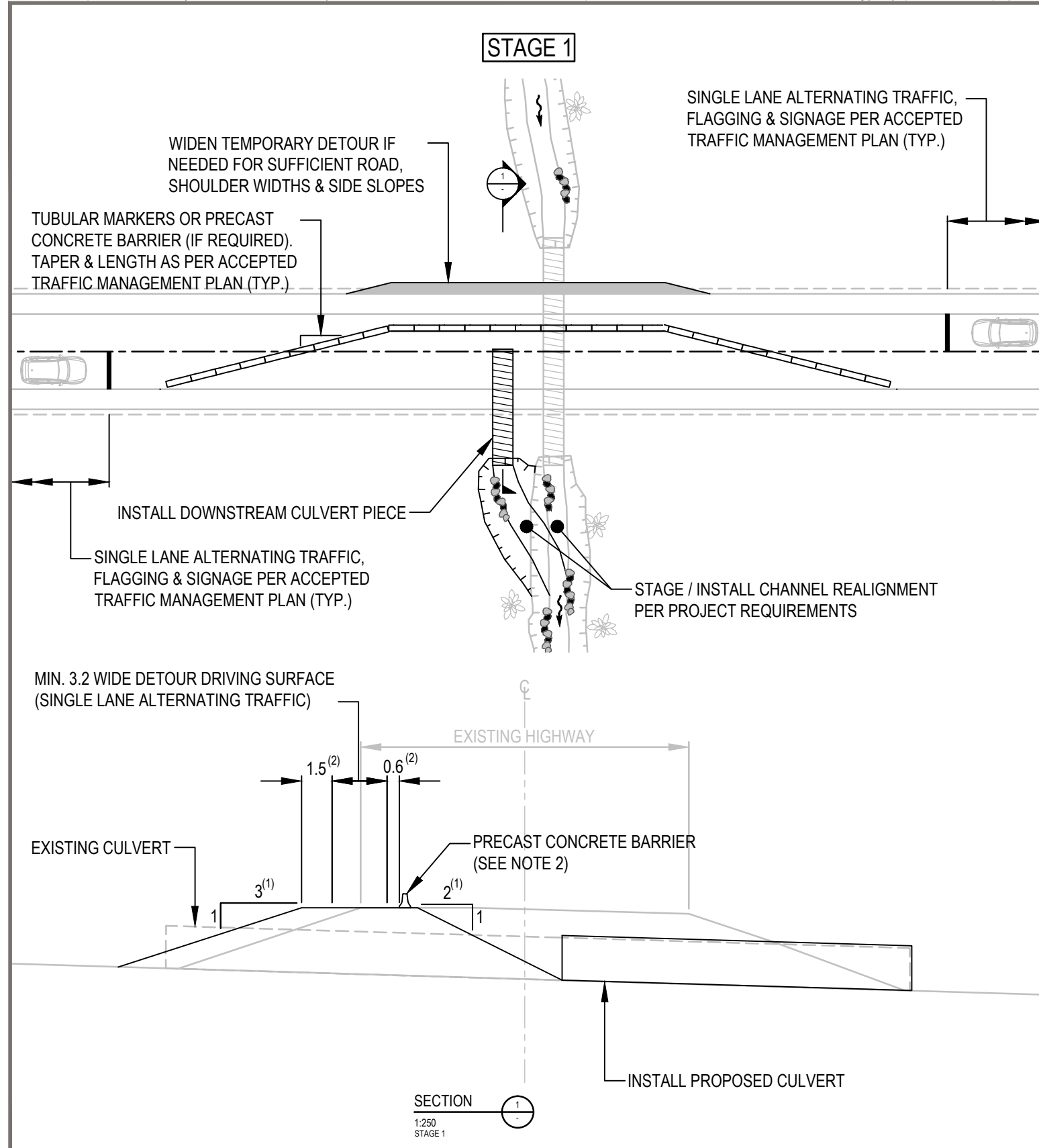
The Client, and any Authorized Party, acknowledges that the Professional Document is based on limited data and that the conclusions, opinions, and recommendations contained in the Professional Document are the result of the application of professional judgment to such limited data.

The Professional Document is not applicable to any other sites, nor should it be relied upon for types of development other than those to which it refers. Any variation from the site conditions present, or variation in assumed conditions which might form the basis of design or recommendations as outlined in this report, at or on the development proposed as of the date of the Professional Document requires a supplementary exploration, investigation, and assessment.

TETRA TECH is neither qualified to, nor is it making, any recommendations with respect to the purchase, sale, investment or development of the property, the decisions on which are the sole responsibility of the Client.

R.112220.002
Appendix L

**Example Culvert Construction Staging and Traffic Detour
Drawings**



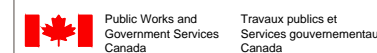
LEGEND

CONCEPTUAL ONLY

NOTES

1. SLOPE TO CONFORM WITH WORKSAFE BC REQUIREMENTS
2. SHOULDER TO BE 1.5m FOR SIDE SLOPES 3:1 OR FLATTER & 0.6m SHOULDERS (EDGE OF TRAVEL LANE TO FRONTSIDE OF BARRIER) WITH BARRIER FOR SIDE SLOPES STEEPER THAN 3:1. FOR SLOPES STEEPER THAN 3:1, THE BACKSIDE OF BARRIER TO BE 0.3m FROM EDGE OF SLOPE
3. CONSTRUCTION STAGING SHOWN CONCEPTUALLY ONLY. THE CONTRACTOR TO CONFIRM EXISTING SITE CONDITIONS PRIOR TO CONSTRUCTION AND ADJUST STAGING REQUIREMENTS AS APPLICABLE TO SUIT SITE CONDITIONS, CULVERT DESIGN, ACCEPTED TRAFFIC MANAGEMENT PLAN, ACCEPTED SITE SPECIFIC SAFETY PLAN, AND ACCEPTED ENVIRONMENTAL PROTECTION PLAN
4. CONTRACTOR IS RESPONSIBLE FOR VERIFYING LOCATION OF ALL UTILITIES PRIOR TO CONSTRUCTION
5. DIMENSIONS, COORDINATE & ELEVATIONS ARE IN METERS UNLESS NOTED OTHERWISE

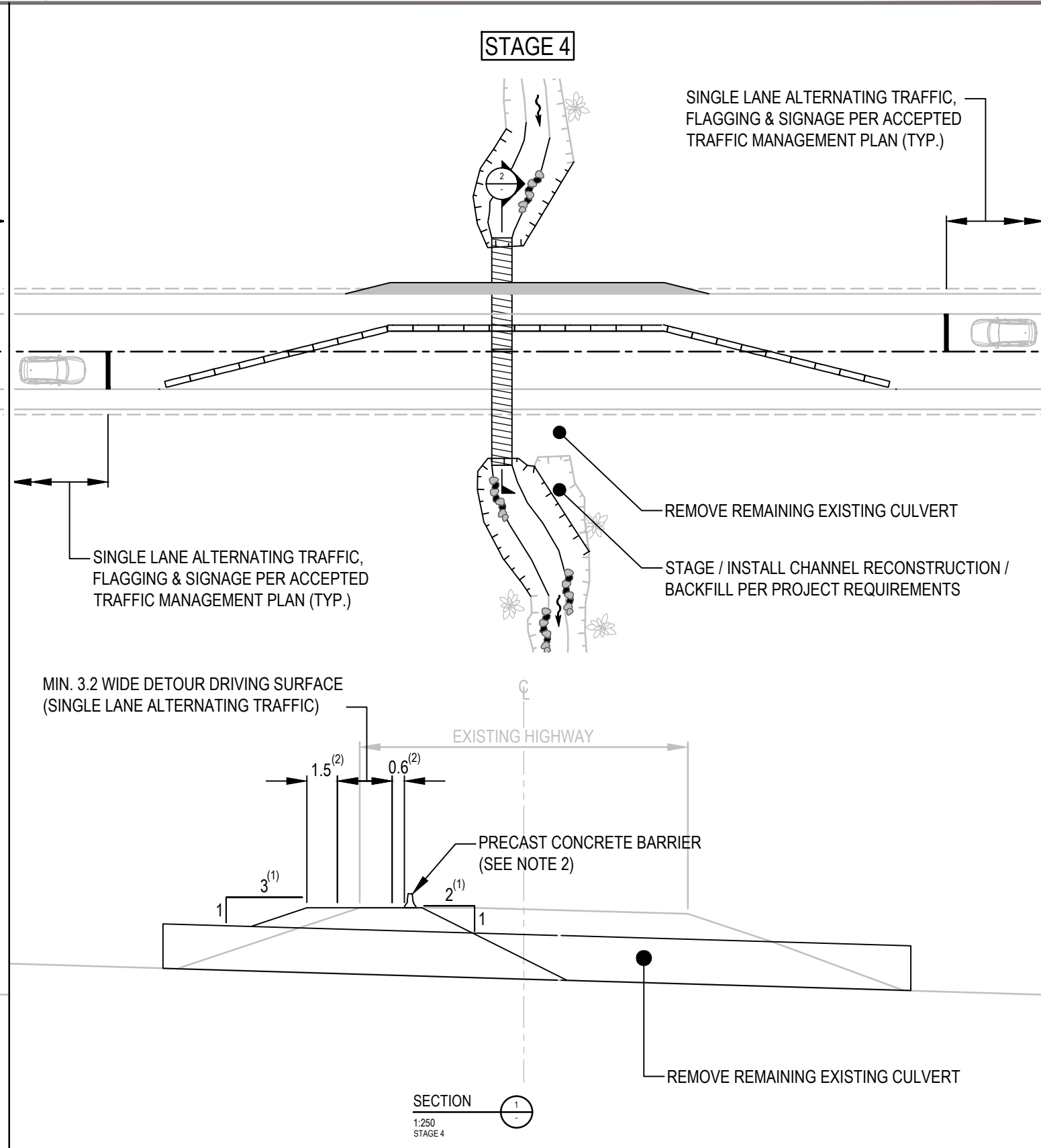
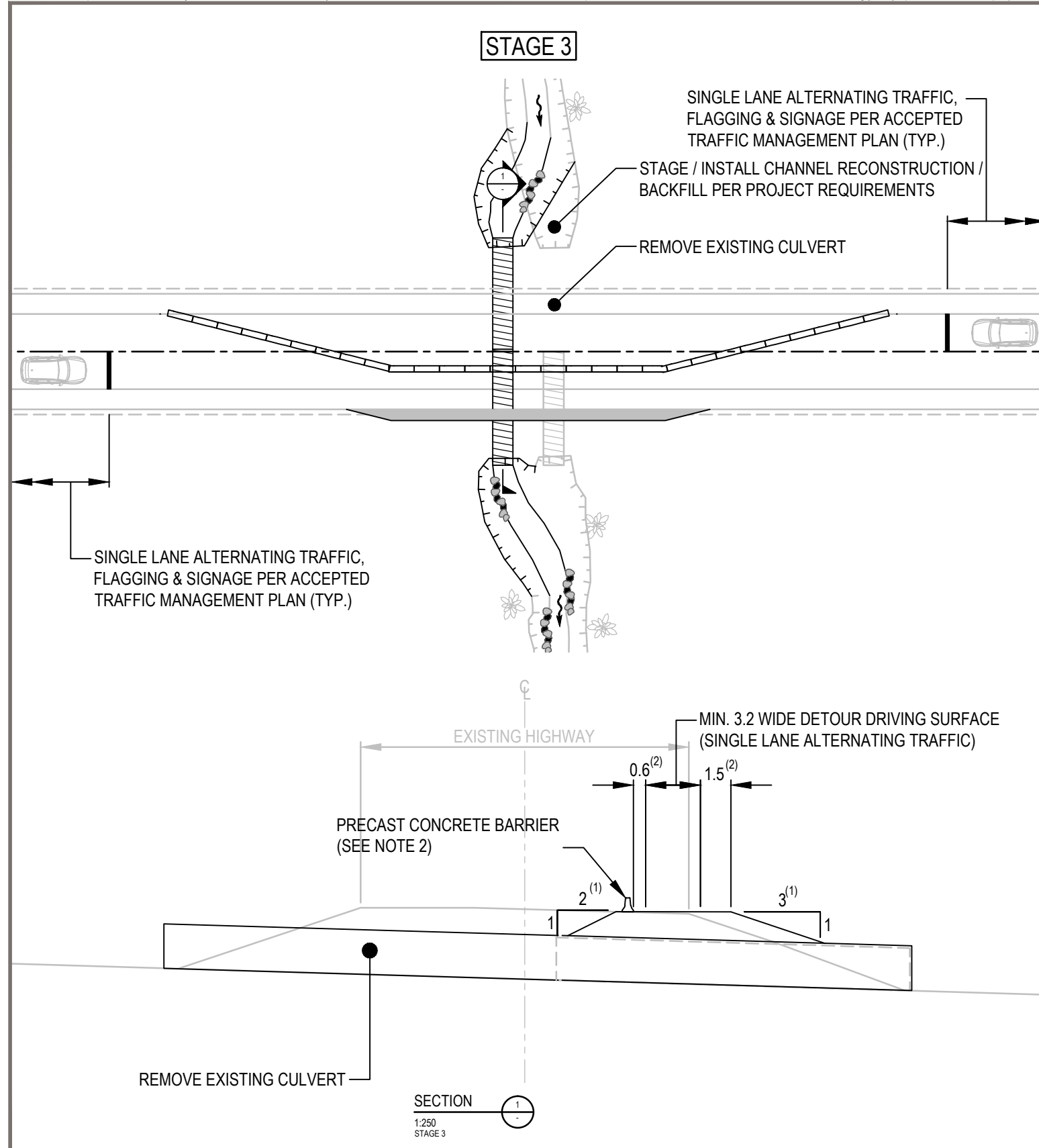
CLIENT



CULVERT CONSTRUCTION STAGING & TRAFFIC DETOUR DRAWINGS

CONCEPTUAL STAGING (OPEN CUT METHOD) STAGE 1 & 2

PROJECT NO. TRN.VHWY03172-02	DWN AD	CKD AH	REV 0	APPENDIX L
OFFICE VANC	DATE April 17, 2018			



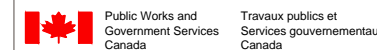
LEGEND

CONCEPTUAL ONLY

NOTES

1. SLOPE TO CONFORM WITH WORKSAFE BC REQUIREMENTS
2. SHOULDER TO BE 1.5m FOR SIDE SLOPES 3:1 OR FLATTER & 0.6m SHOULDERS (EDGE OF TRAVEL LANE TO FRONTSIDE OF BARRIER) WITH BARRIER FOR SIDE SLOPES STEEPER THAN 3:1. FOR SLOPES STEEPER THAN 3:1, THE BACKSIDE OF BARRIER TO BE 0.3m FROM EDGE OF SLOPE
3. CONSTRUCTION STAGING SHOWN CONCEPTUALLY ONLY. THE CONTRACTOR TO CONFIRM EXISTING SITE CONDITIONS PRIOR TO CONSTRUCTION AND ADJUST STAGING REQUIREMENTS AS APPLICABLE TO SUIT SITE CONDITIONS, CULVERT DESIGN, ACCEPTED TRAFFIC MANAGEMENT PLAN, ACCEPTED SITE SPECIFIC SAFETY PLAN, AND ACCEPTED ENVIRONMENTAL PROTECTION PLAN
4. CONTRACTOR IS RESPONSIBLE FOR VERIFYING LOCATION OF ALL UTILITIES PRIOR TO CONSTRUCTION
5. DIMENSIONS, COORDINATE & ELEVATIONS ARE IN METERS UNLESS NOTED OTHERWISE

CLIENT



CULVERT CONSTRUCTION STAGING & TRAFFIC DETOUR DRAWINGS

CONCEPTUAL STAGING (OPEN CUT METHOD) STAGE 3 & 4

PROJECT NO. TRN.VHWY03172-02	DWN AD	CKD AH	REV 0	APPENDIX L
OFFICE VANC	DATE April 17, 2018			

R.112220.002

Appendix M

Pit Location Plan

KM 568-573 (TETSA RIVER) RECONSTRUCTION - PHASE 2, ALASKA HIGHWAY, BC

PIT PLAN



R.112220.002

Appendix N

**Geotechnical Exploration Data Report – Alaska Highway
Km 568-573 (Tetsa River) Reconstruction Phase 2,
Tetra Tech – May 2021**

Geotechnical Exploration Data Report Alaska Highway Km 568 – 573 (Tetsa River) Reconstruction Phase 2



PRESENTED TO
Public Services and Procurement Canada

MAY 6, 2021
ISSUED FOR USE
FILE: 704-TRN.VHWY03172-02

This page intentionally left blank.

TABLE OF CONTENTS

1.0	INTRODUCTION	1
2.0	PROJECT AND SITE DESCRIPTION	1
2.1	Project Description	1
2.2	Site Description	1
2.2.1	Surficial Geology	2
2.2.2	Bedrock Geology	2
3.0	GEOTECHNICAL EXPLORATION	2
3.1	Utility Locates	2
3.2	Borehole Exploration	2
3.3	Testpit Exploration	3
3.4	Laboratory Testing	4
3.5	Vibrating Wire Piezometer Installations	5
4.0	SUBSURFACE CONDITIONS	5
4.1	Proposed Alignment	5
4.1.1	Topsoil	5
4.1.2	Sand (Fill)	6
4.1.3	Coarse-Grained Soils	6
4.1.4	Fine-Grained Soils	6
4.1.5	Peat	6
4.1.6	Bedrock	6
4.1.7	Groundwater	6
4.2	Gravel Pit	7
4.2.1	Coarse Granular Soil	7
4.2.2	Clay	7
4.2.3	Groundwater	7
5.0	CLOSURE	8
	REFERENCES	9

LIST OF TABLES IN TEXT

Table 1: Borehole Summary	3
Table 2: Testpit Summary	4
Table 3: Geotechnical Laboratory Testing Summary	4
Table 4: Vibrating Wire Piezometer Installation Summary	5

APPENDIX SECTIONS

FIGURES

- Figure 1 Site Plan
- Figure 2 Gravel Pit

APPENDICES

- Appendix A Tetra Tech's Limitations on the Use of this Document
- Appendix B Testhole Logs
- Appendix C Laboratory Test Results
- Appendix D Vibrating Wire Piezometer Installation Records

LIMITATIONS OF REPORT

This report and its contents are intended for the sole use of Public Services and Procurement 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 Services and Procurement 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 Services and Procurement Canada (PSPC) for project No. R112220.002 to provide engineering services for highway realignment and reconstruction between Km 568 and Km 573 of the Alaska Highway at Tetsa River, BC (the Project).

Tetra Tech completed a geotechnical subsurface exploration program to characterize the soil and groundwater conditions at the Project. This data report details the findings of the of the geotechnical exploration program, including:

- The results of a desktop review.
- Description of the equipment and methods used during the geotechnical exploration.
- Summary of observed soil and groundwater conditions encountered during exploration.
- Summary description of piezometer installations.
- A testhole location plan and testhole logs with descriptions of conditions encountered and incorporating the results of laboratory test results.

The limitations on the use of this document, attached in Appendix A, forms an integral part of this document.

2.0 PROJECT AND SITE DESCRIPTION

2.1 Project Description

In the area of the Project, PSPC identified that the highway does not currently meet the requirements for a Rural Arterial Undivided (RAU) highway with a design speed of less than 80 km/h. Proposed upgrades to the highway include realignment and reconstruction to achieve requirements of an 80 km/h to 100 km/h design speed. The upgrades included in the overall scope of the Project include:

- Blasting of rock material.
- Clearing, grubbing and stripping of materials to facilitate placement of an embankment.
- Road realignment construction, including new embankment fills up to approximately 4 m to 5 m high.
- Installation of replacement drainage structures and other miscellaneous works.

2.2 Site Description

The Project site is located on the east side of British Columbia's northern Rocky Mountains, approximately 90 km west of Fort Nelson. In the area of the Project, the Alaska Highway travels generally east-west and is at an elevation between 795 m above sea level (asl) and 820 m asl. South of the Project area, the Tetsa River generally parallels the Alaska Highway and flows from west to east. In the area of the Project, the Tetsa River is a braided stream type channel varying between 500 m and 800 m from the highway right of way. North of the Project area terrain consists of vegetated hills. Vegetation along the site ranges from conifer forests to shrubs and grasses. The maximum height of the hills north of the Project area is approximately 1050 m asl and slope angle ranges from approximately 10° to 75° north of the highway alignment. A small unnamed stream crosses the highway at approximate station 571+700. The unnamed stream drains from the hills north of the Project to the Tetsa River.

2.2.1 Surficial Geology

No detailed surficial geology mapping was found for the area of the Project in Tetra Tech's review; however, the Surficial Geology Map of Canada (Fulton, 1995) provides general geological information for the area. Review of the map indicates that soils in the Project area may consist of colluvial rubble, rubble and silt, derived from carbonate and consolidated fine clastic sedimentary rocks, and / or glacial till.

2.2.2 Bedrock Geology

Review of the map 'Bedrock Geology, Fort Nelson, British Columbia' (Okulitch et. al., 2002) indicates that bedrock in the area of the Project consists of the Buckingham and Liard Formations. The Buckingham Formation is described as dark grey marine shale, siltstone and minor sandstone. The Liard Formation is described as dolomitic and calcareous sandstone and siltstone.

3.0 GEOTECHNICAL EXPLORATION

3.1 Utility Locates

Tetra Tech completed a BC One Call request for the Project area prior to commencing the geotechnical exploration program, and reviewed all responses to inform for potential underground utility conflicts. A Northwestel Inc. representative visited the site prior to the exploration to mark the location of the fibre optic line in the area. No other utilities were present based on the BC One Call.

3.2 Borehole Exploration

A total of five boreholes were completed using air rotary drilling techniques. Borehole locations were selected to target areas of relatively greater fill heights in the Project area. Locations of the completed boreholes are shown in Figure 1 and Figure 2. The target depth for drilling was approximately 15 m, or upon encountering bedrock. Where bedrock was encountered before the 15 m termination depth, holes were advanced a minimum of 3.0 m into bedrock prior to borehole termination. Drilling was completed using a Fraste Multidrill PL owned and operated by Westech Drilling Corp. of Prince George, BC.

Air rotary drilling uses compressed air to drive a down-hole impact hammer and clear cuttings as the borehole is advanced. The drilling method has the potential to impact in-situ testing values; however, it was selected for the exploration to advance borehole efficiently through varying materials types, such as coarse granular material such as cobbles and boulders.

Drilling was supervised by Eli Riedl, EIT, of Tetra Tech. Observations of drilling conditions, including drill advancement, in-situ tests, instrument installations and backfill procedures were logged as each borehole was advanced, and representative samples were collected.

Standard Penetration (SPT) and Large Penetration (LPT) tests were undertaken at select intervals during drilling. LPTs were completed where SPTs encountered refusal due to large particles and/or exhibited poor sample recovery. SPT and LPT tests were conducted using a Marl Brand automatic trip SPT hammer attached to the drill rig. The SPT hammer drops a 63.5 kg weight from a height of 760 mm for each blow. The SPT sample tube had an inside diameter of 35 mm and an outside diameter of 50.8 mm. The LPT sample tube had an inside diameter of 60 mm and an outside diameter of 76 mm. SPT and LPT samplers were attached to NWJ drill rods for sampling and did not use sample tube liners.

Vibrating wire piezometers were installed in each borehole upon completion, with the exception of BH21-02. Boreholes with piezometers were backfilled with grout to surface using the tremie method. BH21-02 was backfilled with drill cuttings and bentonite. Borehole locations were measured in the field using a handheld GPS device and are estimated to have a horizontal accuracy of +/- 5 m. Borehole completion data is summarized in Table 1, below. Borehole closure details are included on the borehole logs presented in Appendix B.

Table 1: Borehole Summary

Borehole ID	Easting ¹ (m)	Northing ¹ (m)	Ground Surface Elevation ² (m asl)	Final Depth Below Ground Surface (m)	Piezometer Installed
BH21-01	429478	6502130	788	12.2	Yes
BH21-02	429327	6502109	789	13.2	No
BH21-03	429085	6502095	792	11.6	Yes
BH21-04	428660	6502107	798	14.8	Yes
BH21-05	427832	6502101	807	14.0	Yes

- 1: Borehole locations were measured in the field using a handheld GPS device and are estimated to be accurate to +/- 5 m. UTM coordinates are for UTM zone 10 N.
- 2: Borehole elevations have been estimated using elevation data provided by McElhanney, dated June 2017 and are estimated to be accurate to +/- 1 m.

3.3 Testpit Exploration

A total of 13 testpits were completed for the geotechnical exploration. Testpit locations were selected to provide coverage along the proposed realignment (TP21-01 to TP21-13) and to provide information for the existing material in the gravel pit at approximately Km 565 (TP21-14 to TP21-19). Locations of the completed testpits are shown in Figure 1.

Testpits were excavated using a Caterpillar 322C excavator owner and operated by Garcia and Sons Transfer Ltd. of Fort Nelson, BC. Testpit excavation was supervised by Eli Riedl of Tetra Tech. Target depth for testpits was the limit of excavator reach, which varied due to site topography and ground features. Four testpits were terminated before reaching target depths due to excessive sloughing of the testpit walls while seven testpits were terminated due to refusal of the excavator bucket on oversize, frozen and / or very dense material.

Soil and stratigraphy, groundwater conditions and testpit wall conditions were logged as each testpit was advanced and representative samples were photographed and collected. Testpits were backfilled with excavated material and bucket tamped upon completion. Testpit locations were measured in the field using a handheld GPS device and are estimated to have a horizontal accuracy of +/- 5 m. Testpit completion data is summarized in Table 2, below.

Table 2: Testpit Summary

Testpit ID	Easting ¹ (m)	Northing ¹ (m)	Ground Surface Elevation ² (m asl)	Final Depth Below Ground Surface (m)
TP21-01	429751	6502152	785	4.9
TP21-02	429618	6502142	786	5.5
TP21-03	429018	6502083	792	4.7
TP21-04	428776	6502073	796	4.3
TP21-05	428515	6502129	800	4.9
TP21-06	428324	6502084	804	4.9
TP21-07	428188	6502054	803	4.3
TP21-08	428020	6502038	803	3.7
TP21-09	427885	6502080	805	4.7
TP21-10	427738	6502122	806	2.8
TP21-11	427632	6502145	807	3.0
TP21-12	427393	6502218	810	4.7
TP21-13	429191	6502105	790	4.8
TP21-14	431416	6502258	Not reported.	0.3
TP21-15	431442	6502279	Not reported.	0.3
TP21-16	431525	6502284	Not reported.	0.3
TP21-17	431212	6502329	Not reported.	0.45
TP21-18	431025	6502329	Not reported.	4.7
TP21-19	430998	6502274	Not reported.	4.0

1: Testpit locations were measured in the field using a handheld GPS device and are estimated to be accurate to +/- 5 m. UTM coordinates are for UTM zone 10 N.

2: Testpit elevations for testpits TP21-01 to TP21-13 have been estimated using elevation data provided by McElhanney, dated June 2017 and are estimated to be accurate to +/- 1 m. Elevation data was not available for the locations of TP21-14 to TP21-19, and has therefore not been reported.

3.4 Laboratory Testing

Soil samples obtained during the subsurface exploration were shipped to Tetra Tech’s laboratory in Nanaimo, BC, for geotechnical index classification. The following tests were conducted on selected samples in general accordance with the associated ASTM test number, as shown in Table 3, below. Laboratory index test results are presented in Appendix C and included in the testhole logs.

Table 3: Geotechnical Laboratory Testing Summary

Test Type	Number of Tests	ASTM Reference
Water Content	49	D2216
Atterberg Limits	7	D4318
Sieve Analysis	14	D6913
Fines Content Analysis	10	D1140-00

3.5 Vibrating Wire Piezometer Installations

Four vibrating wire piezometers (VWP) were installed, one in each of BH21-01, BH21-03, BH21-04 and BH21-05. Eli Riedl observed the installation on the VWPs and completed the following tasks:

- Collected pre- and post-installation readings from the instruments for quality control purposes.
- Documented the installation of the instruments.
- Connected the installed VWPs to data logging devices and programmed the devices to collect two readings per day (once every 12 hours).

Prior to installation, each VWP was soaked in a bucket of water heated by a propane torch. The water was transferred to the bucket at least 8 hours prior to installation from a bladder that had been filled on site more than 36 hours prior to the first installation. To install each VWP, the device was inverted and taped to the outside of a PVC tremie pipe. The tremie pipe was then lowered to the bottom of the completed borehole and the hole was grouted to surface. VWP installations are summarized in 4, below. VWP installation records and calibration sheets are provided in Appendix D.

Table 4: Vibrating Wire Piezometer Installation Summary

Borehole	VWP Serial Number	VWP Installation Depth (m)
BH21-01	VW129875	6.1
BH21-03	VW130617	6.1
BH21-04	VW130618	4.6
BH21-05	VW126872	6.1

4.0 SUBSURFACE CONDITIONS

In general soil conditions encountered in the geotechnical exploration were consistent with conditions expected based on site topography and the results of the background review. Conditions have been summarized for two general areas: Section 4.1 summarizes conditions encountered in testholes completed along the proposed alignment, and Section 4.2 summarizes conditions encountered in testholes in the gravel pit located at approximately Km 569. Detailed descriptions of conditions encountered are included on the testhole logs, attached in Appendix B.

4.1 Proposed Alignment

The following sections summarize conditions encountered in testholes completed along the proposed alignment (BH21-01 to BH21-05 and TP21-01 to TP21-13).

4.1.1 Topsoil

Grass and topsoil were encountered in all testholes initiated along the proposed alignment. Grass and topsoil thickness was measured up to 0.2 m, but was typically less than 0.1 m. Topsoil thickness could not be measured in boreholes due to the nature of air rotary drilling but based on field observations was present at all locations.

4.1.2 Sand (Fill)

Soils inferred to be fills were encountered in TP21-03, TP21-05 and BH21-05 underlying the topsoil. Sand and gravel fill with some silt some cobbles and occasional wood pieces was encountered in TP21-03 and TP21-05 extending to 0.9 m and 1.5 m below ground surface (bgs), respectively. Silty sand fill with some wood debris was encountered in BH21-05 and extended to 2.0 m bgs.

4.1.3 Coarse-Grained Soils

Variable coarse-grained soils were the typical soil type encountered along the proposed alignment. The composition of the coarse-grained soils was generally observed to range between cobbles and gravel, with some sand to sand, and some silt and trace gravel. One exception to the general soil description was encountered in BH21-04 where a layer of silty Sand was encountered from 0.5 m to 0.9 m in depth. Consistency of the coarse-grained soils ranged from compact to very dense. Where encountered, gravel, cobbles and boulders were generally observed to be rounded to subrounded with exception to TP21-09 and TP21-12, where occasional angular boulders were encountered as well.

4.1.4 Fine-Grained Soils

Fine-grained soils were encountered in the following testholes at the specified depths:

- BH21-02: from 2.4 m to 4.3 m.
- TP21-02: from 3.7 m to 4.9 m.
- TP21-06: from 0.1 m to 3.7 m.
- TP21-08: 50 mm thick layer encountered near the base of the testpit at 3.7 m.

Composition of the fine-grained soils ranged from silty clay with trace sand, to silt and sand with trace gravel and trace clay. Consistency of the fine-grained soils ranged between firm and very stiff.

4.1.5 Peat

Soils classified as Peat were encountered from 1.5 m to 3.2 m in depth in TP21-05. The peat was moderately decomposed, fibrous, and contained some granular material.

4.1.6 Bedrock

Bedrock was encountered in every borehole at depths between 7.9 m and 10.0 m. Bedrock appeared to be a shale and was inferred to be highly fractured. Large amounts of water was continuously cleared from the hole during drilling in bedrock. Due to the method of advancement of air rotary drilling, many details of the bedrock rock mass such as fracture spacing, and alteration of fractures could not be determined.

4.1.7 Groundwater

Groundwater was observed in all testpits except TP21-04, TP21-05, TP21-06 and TP21-07. Where groundwater was encountered in testpits it was observed to range in depth from 2.2 m and 4.6 m bgs. Due to the coarse granular nature of many soils in the Project area, holes excavated below the water table generally experienced rapid infiltration. Seepage above the water table was generally not observed.

Due to the casing advanced while drilling, the exact depth to groundwater was difficult to determine in boreholes. Depth to groundwater was inferred between a minimum depth of 3.3 m and a maximum depth of 5.0 m in boreholes. Groundwater conditions are anticipated to vary seasonally and based on weather and freshet events.

4.2 Gravel Pit

The following sections summarize conditions encountered in testpits completed in the gravel pit (TP21-14 to TP21-19). It is noted that TP21-14, TP21-15, TP21-16, and TP21-17 experienced shallow refusal of the excavator bucket due to compact, frozen soils.

4.2.1 Coarse Granular Soil

All testpits in the gravel pit area were initiated in coarse granular soil.

In the case of TP21-14 to TP21-17, the ground surface profile was indicative of stockpiled materials. The composition of these soils ranged from cobbles with some gravel, some sand and some silt, to gravelly Cobbles with trace sand and trace silt. Refusal of the excavator bucket was encountered in all testpits initiated in these soils due to the compact / frozen nature of the soils and the significant portion of oversize material.

In the case of TP21-18 and TP21-19, it is not clear from the ground surface profile if the testpits were initiated in stockpiled soil or native soil. The composition of the soils in these testpits ranged from cobbly Gravel and Sand with trace silt, to sandy Cobbles and Gravel. Soil consistency was inferred to range from loose to compact.

4.2.2 Clay

A layer of high plastic Clay was encountered in TP21-18 and TP21-19 at depths of 4.4 m and 3.5 m respectively. The Clay was inferred to be stiff in consistency and contained some gravel.

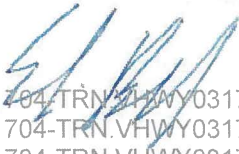
4.2.3 Groundwater

Light seepage was observed at the base of TP21-18 at 4.3 m. All other holes were dry on completion. It is considered likely that groundwater would be encountered at similar depths to TP21-18 in other holes; however, most holes experienced shallow refusal. Groundwater conditions are anticipated to vary seasonally and based on weather and freshet events.

5.0 CLOSURE

We trust this document meets your present requirements. If you have any questions or comments, please contact the undersigned.

Respectfully submitted,
Tetra Tech Canada Inc.



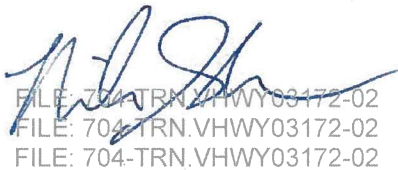
FILE: 704-TRN.VHWY03172-02
FILE: 704-TRN.VHWY03172-02
FILE: 704-TRN.VHWY03172-02



FILE: 704-TRN.VHWY03172-02
FILE: 704-TRN.VHWY03172-02
FILE: 704-TRN.VHWY03172-02

Prepared by:
Eli Riedl, EIT
Junior Geotechnical Engineer
Direct Line: 250.668.0426
Eli.Riedl@tetrattech.com

Prepared by:
Tim Morton, M.A.Sc., P.Eng.
Geotechnical Engineer
Direct Line: 778.945.5709
Tim.Morton@tetrattech.com



FILE: 704-TRN.VHWY03172-02
FILE: 704-TRN.VHWY03172-02
FILE: 704-TRN.VHWY03172-02

Reviewed by:
Nick Ekman, M.Eng., P.Eng.
Senior Geotechnical Engineer
Direct Line: 778.744.5936
Nick.Ekman@tetrattech.com

/sy

REFERENCES

- Fulton, R.J. 1995, Surficial Materials of Canada. Map 1880A. Scale 1:5,000,000. Geological Survey of Canada.
- Okulitch, A.V., MacIntyre, D.G, Taylor, G.C., Gabrielse, H., Cullen, B., Massey, N., Bellafontaine, K. 2002. Geology, Fort Nelson, British Columbia, Central Foreland, Map NO-10-G, Scale 1:500,000. Geological Survey of Canada. Open File 3604 (revised).

FIGURES

- Figure 1 Site Plan
- Figure 2 Gravel Pit



Q:\Edmonton\GIS\TRANSPORTATION\HWY\HWY03172-02\Maps\HWY03172-02_Figure01_SitePlan.mxd modified 2021-04-13 by stephanie.leusink

LEGEND

- Borehole
- Grab Sample
- Testpit
- Alaska Highway
- Watercourse

NOTES
 Borehole and testpit locations measured in the field using a handheld GPS device and are estimated to be accurate to +/- 5 m.

 Base data source: Imagery provided by ESRI; Maxar (2013)

**ALASKA HIGHWAY
 KM 568 – 573 (TETSA RIVER)
 RECONSTRUCTION, PHASE 2**

Site Plan




PROJECTION UTM Zone 10		DATUM NAD83		CLIENT Public Services and Procurement Canada	
Scale: 1:6,500					
FILE NO. VHWY03172-02_Figure01_SitePlan.mxd					
OFFICE Tt-EDM	DWN MRV	CKD SL	APVD ER	REV 0	Figure 1
DATE April 13, 2021		PROJECT NO. TRN.VHWY03172-02			

STATUS
ISSUED FOR USE



Q:\Edmonton\GIS\TRANSPORTATION\HWY\HWY03172-02\Maps\HWY03172-02_Figure02_GravelPit.mxd modified 2021-04-13 by stephanie.levaink

LEGEND


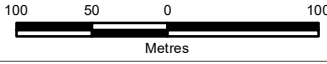

-  Testpit
-  Alaska Highway
-  Watercourse

NOTES
 Borehole and testpit locations measured in the field using a handheld GPS device and are estimated to be accurate to +/- 5 m.

 Base data source: Imagery provided by ESRI; Maxar (2019)

**ALASKA HIGHWAY
 KM 568 – 573 (TETSA RIVER)
 RECONSTRUCTION, PHASE 2**

Gravel Pit

PROJECTION UTM Zone 10		DATUM NAD83		CLIENT  Public Services and Procurement Canada	
Scale: 1:5,000					
 100 50 0 100 Metres					
FILE NO. VHWY03172-02_Figure02_GravelPit.mxd					
OFFICE Tt-EDM	DWN MRV	CKD SL	APVD ER	REV 0	 TETRA TECH
DATE April 13, 2021	PROJECT NO. TRN.VHWY03172-02				
Figure 2					

STATUS
ISSUED FOR USE

APPENDIX A

TETRA TECH'S LIMITATIONS ON THE USE OF THIS DOCUMENT

LIMITATIONS ON USE OF THIS DOCUMENT

GEOTECHNICAL

1.1 USE OF DOCUMENT AND OWNERSHIP

This document pertains to a specific site, a specific development, and a specific scope of work. The document may include plans, drawings, profiles and other supporting documents that collectively constitute the document (the "Professional Document").

The Professional Document is intended for the sole use of TETRA TECH's Client (the "Client") as specifically identified in the TETRA TECH Services Agreement or other Contractual Agreement entered into with the Client (either of which is termed the "Contract" herein). TETRA TECH does not accept any responsibility for the accuracy of any of the data, analyses, recommendations or other contents of the Professional Document when it is used or relied upon by any party other than the Client, unless authorized in writing by TETRA TECH.

Any unauthorized use of the Professional Document is at the sole risk of the user. TETRA TECH accepts no responsibility whatsoever for any loss or damage where such loss or damage is alleged to be or, in fact, caused by the unauthorized use of the Professional Document.

Where TETRA TECH has expressly authorized the use of the Professional Document by a third party (an "Authorized Party"), consideration for such authorization is the Authorized Party's acceptance of these Limitations on Use of this Document as well as any limitations on liability contained in the Contract with the Client (all of which is collectively termed the "Limitations on Liability"). The Authorized Party should carefully review both these Limitations on Use of this Document and the Contract prior to making any use of the Professional Document. Any use made of the Professional Document by an Authorized Party constitutes the Authorized Party's express acceptance of, and agreement to, the Limitations on Liability.

The Professional Document and any other form or type of data or documents generated by TETRA TECH during the performance of the work are TETRA TECH's professional work product and shall remain the copyright property of TETRA TECH.

The Professional Document is subject to copyright and shall not be reproduced either wholly or in part without the prior, written permission of TETRA TECH. Additional copies of the Document, if required, may be obtained upon request.

1.2 ALTERNATIVE DOCUMENT FORMAT

Where TETRA TECH submits electronic file and/or hard copy versions of the Professional Document or any drawings or other project-related documents and deliverables (collectively termed TETRA TECH's "Instruments of Professional Service"), only the signed and/or sealed versions shall be considered final. The original signed and/or sealed electronic file and/or hard copy version archived by TETRA TECH shall be deemed to be the original. TETRA TECH will archive a protected digital copy of the original signed and/or sealed version for a period of 10 years.

Both electronic file and/or hard copy versions of TETRA TECH's Instruments of Professional Service shall not, under any circumstances, be altered by any party except TETRA TECH. TETRA TECH's Instruments of Professional Service will be used only and exactly as submitted by TETRA TECH.

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.

1.3 STANDARD OF CARE

Services performed by TETRA TECH for the Professional Document have been conducted in accordance with the Contract, in a manner consistent with the level of skill ordinarily exercised by members of the profession currently practicing under similar conditions in the jurisdiction in which the services are provided. Professional judgment has been applied in developing the conclusions and/or recommendations provided in this Professional Document. No warranty or guarantee, express or implied, is made concerning the test results, comments, recommendations, or any other portion of the Professional Document.

If any error or omission is detected by the Client or an Authorized Party, the error or omission must be immediately brought to the attention of TETRA TECH.

1.4 DISCLOSURE OF INFORMATION BY CLIENT

The Client acknowledges that it has fully cooperated with TETRA TECH with respect to the provision of all available information on the past, present, and proposed conditions on the site, including historical information respecting the use of the site. The Client further acknowledges that in order for TETRA TECH to properly provide the services contracted for in the Contract, TETRA TECH has relied upon the Client with respect to both the full disclosure and accuracy of any such information.

1.5 INFORMATION PROVIDED TO TETRA TECH BY OTHERS

During the performance of the work and the preparation of this Professional Document, TETRA TECH may have relied on information provided by third parties other than the Client.

While TETRA TECH endeavours to verify the accuracy of such information, TETRA TECH accepts no responsibility for the accuracy or the reliability of such information even where inaccurate or unreliable information impacts any recommendations, design or other deliverables and causes the Client or an Authorized Party loss or damage.

1.6 GENERAL LIMITATIONS OF DOCUMENT

This Professional Document is based solely on the conditions presented and the data available to TETRA TECH at the time the data were collected in the field or gathered from available databases.

The Client, and any Authorized Party, acknowledges that the Professional Document is based on limited data and that the conclusions, opinions, and recommendations contained in the Professional Document are the result of the application of professional judgment to such limited data.

The Professional Document is not applicable to any other sites, nor should it be relied upon for types of development other than those to which it refers. Any variation from the site conditions present, or variation in assumed conditions which might form the basis of design or recommendations as outlined in this document, at or on the development proposed as of the date of the Professional Document requires a supplementary exploration, investigation, and assessment.

TETRA TECH is neither qualified to, nor is it making, any recommendations with respect to the purchase, sale, investment or development of the property, the decisions on which are the sole responsibility of the Client.

1.7 ENVIRONMENTAL AND REGULATORY ISSUES

Unless stipulated in the report, TETRA TECH has not been retained to explore, address or consider and has not explored, addressed or considered any environmental or regulatory issues associated with development on the subject site.

1.8 NATURE AND EXACTNESS OF SOIL AND ROCK DESCRIPTIONS

Classification and identification of soils and rocks are based upon commonly accepted systems, methods and standards employed in professional geotechnical practice. This report contains descriptions of the systems and methods used. Where deviations from the system or method prevail, they are specifically mentioned.

Classification and identification of geological units are judgmental in nature as to both type and condition. TETRA TECH does not warrant conditions represented herein as exact, but infers accuracy only to the extent that is common in practice.

Where subsurface conditions encountered during development are different from those described in this report, qualified geotechnical personnel should revisit the site and review recommendations in light of the actual conditions encountered.

1.9 LOGS OF TESTHOLES

The testhole logs are a compilation of conditions and classification of soils and rocks as obtained from field observations and laboratory testing of selected samples. Soil and rock zones have been interpreted. Change from one geological zone to the other, indicated on the logs as a distinct line, can be, in fact, transitional. The extent of transition is interpretive. Any circumstance which requires precise definition of soil or rock zone transition elevations may require further investigation and review.

1.10 STRATIGRAPHIC AND GEOLOGICAL INFORMATION

The stratigraphic and geological information indicated on drawings contained in this report are inferred from logs of test holes and/or soil/rock exposures. Stratigraphy is known only at the locations of the test hole or exposure. Actual geology and stratigraphy between test holes and/or exposures may vary from that shown on these drawings. Natural variations in geological conditions are inherent and are a function of the historical environment. TETRA TECH does not represent the conditions illustrated as exact but recognizes that variations will exist. Where knowledge of more precise locations of geological units is necessary, additional exploration and review may be necessary.

1.11 PROTECTION OF EXPOSED GROUND

Excavation and construction operations expose geological materials to climatic elements (freeze/thaw, wet/dry) and/or mechanical disturbance which can cause severe deterioration. Unless otherwise specifically indicated in this report, the walls and floors of excavations must be protected from the elements, particularly moisture, desiccation, frost action and construction traffic.

1.12 SUPPORT OF ADJACENT GROUND AND STRUCTURES

Unless otherwise specifically advised, support of ground and structures adjacent to the anticipated construction and preservation of adjacent ground and structures from the adverse impact of construction activity is required.

1.13 INFLUENCE OF CONSTRUCTION ACTIVITY

Construction activity can impact structural performance of adjacent buildings and other installations. The influence of all anticipated construction activities should be considered by the contractor, owner, architect and prime engineer in consultation with a geotechnical engineer when the final design and construction techniques, and construction sequence are known.

1.14 OBSERVATIONS DURING CONSTRUCTION

Because of the nature of geological deposits, the judgmental nature of geotechnical engineering, and the potential of adverse circumstances arising from construction activity, observations during site preparation, excavation and construction should be carried out by a geotechnical engineer. These observations may then serve as the basis for confirmation and/or alteration of geotechnical recommendations or design guidelines presented herein.

1.15 DRAINAGE SYSTEMS

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. Where temporary or permanent drainage systems are installed within or around a structure, these systems must protect the structure from loss of ground due to mechanisms such as internal erosion and must be designed so as to assure continued satisfactory performance of the drains. Specific design details regarding the geotechnical aspects of such systems (e.g. bedding material, surrounding soil, soil cover, geotextile type) should be reviewed by the geotechnical engineer to confirm the performance of the system is consistent with the conditions used in the geotechnical design.

1.16 DESIGN PARAMETERS

Bearing capacities for Limit States or Allowable Stress Design, strength/stiffness properties and similar geotechnical design parameters quoted in this report relate to a specific soil or rock type and condition. Construction activity and environmental circumstances can materially change the condition of soil or rock. The elevation at which a soil or rock type occurs is variable. It is a requirement of this report that structural elements be founded in and/or upon geological materials of the type and in the condition used in this report. Sufficient observations should be made by qualified geotechnical personnel during construction to assure that the soil and/or rock conditions considered in this report in fact exist at the site.

1.17 SAMPLES

TETRA TECH will retain all soil and rock samples for 30 days after this report is issued. Further storage or transfer of samples can be made at the Client's expense upon written request, otherwise samples will be discarded.

1.18 APPLICABLE CODES, STANDARDS, GUIDELINES & BEST PRACTICE

This document has been prepared based on the applicable codes, standards, guidelines or best practice as identified in the report. Some mandated codes, standards and guidelines (such as ASTM, AASHTO Bridge Design/Construction Codes, Canadian Highway Bridge Design Code, National/Provincial Building Codes) are routinely updated and corrections made. TETRA TECH cannot predict nor be held liable for any such future changes, amendments, errors or omissions in these documents that may have a bearing on the assessment, design or analyses included in this report.

APPENDIX B

TESTHOLE LOGS

BOREHOLE KEYSHEET

Water Level Measurement



Measured in standpipe, piezometer or well



Inferred

Sample Types



A-Casing



Core



Disturbed, Bag, Grab



HQ Core



Jar



Jar and Bag



NQ Core



No Recovery



Split Spoon/SPT



Tube



CRREL Core

Backfill Materials



Asphalt



Bentonite



Cement/Grout



Drill Cuttings



Grout



Gravel



Sand



Slough



Topsoil Backfill

Lithology - Graphical Legend¹



Asphalt



Bedrock



Cobbles/Boulders



Clay



Coal



Concrete



Fill



Gravel



Limestone



Mudstone



Organics



Peat



Sand



Sandstone



Shale



Silt



Siltstone



Till



Topsoil

1. The graphical legend is an approximation and for visual representation only. Soil strata may comprise a combination of the basic symbols shown above. Particle sizes are not drawn to scale

TERMS USED ON BOREHOLE LOGS

TERMS DESCRIBING CONSISTENCY OR CONDITION

COARSE GRAINED SOILS (major portion retained on 0.075 mm sieve): Includes (1) clean gravels and sands, and (2) silty or clayey gravels and sands. Condition is rated according to relative density, as inferred from laboratory or in situ tests.

descriptive term	relative density	n (blows per 0.3 m)
Very Loose	0 to 20%	0 to 4
Loose	20 to 40%	4 to 10
Compact	40 to 75%	10 to 30
Dense	75 to 90%	30 to 50
Very Dense	90 to 100%	greater than 50

The number of blows, N, on a 51 mm O.D. split spoon sampler of a 63.5 kg weight falling 0.76 m, required to drive the sampler a distance of 0.3 m from 0.15 m to 0.45 m.

FINE GRAINED SOILS (major portion passing 0.075 mm sieve): Includes (1) inorganic and organic silts and clays, (2) gravelly, sandy, or silty clays, and (3) clayey silts. Consistency is rated according to shearing strength, as estimated from laboratory or in situ tests.

descriptive term	unconfined compressive strength (kPa)
Very Soft	Less than 25
Soft	25 to 50
Firm	50 to 100
Stiff	100 to 200
Very Stiff	200 to 400
Hard	Greater than 400

NOTE: Slickensided and fissured clays may have lower unconfined compressive strengths than shown above, because of planes of weakness or cracks in the soil.

GENERAL DESCRIPTIVE TERMS

Slickensided - having inclined planes of weakness that are slick and glossy in appearance.

Fissured - containing shrinkage cracks, frequently filled with fine sand or silt; usually more or less vertical.

Laminated - composed of thin layers of varying colour and texture.

Interbedded - composed of alternate layers of different soil types.

Calcareous - containing appreciable quantities of calcium carbonate.;

Well graded - having wide range in grain sizes and substantial amounts of intermediate particle sizes.

Poorly graded - predominantly of one grain size, or having a range of sizes with some intermediate size missing.

MODIFIED UNIFIED SOIL CLASSIFICATION

MAJOR DIVISION		GROUP SYMBOL	TYPICAL DESCRIPTION	LABORATORY CLASSIFICATION CRITERIA				
COARSE-GRAINED SOILS More than 50% retained on 75 µm sieve*	GRAVELS 50% or more of coarse fraction retained on 4.75 mm sieve	CLEAN GRAVELS	GW	Well-graded gravels and gravel-sand mixtures, little or no fines	$C_u = D_{60} / D_{10}$ Greater than 4 $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ Between 1 and 3 Not meeting both criteria for GW			
		GRAVELS WITH FINES	GP	Poorly graded gravels and gravel-sand mixtures, little or no fines				
		CLEAN SANDS	GM	Silty gravels, gravel-sand-silt mixtures		Atterberg limits plot below "A" line or plasticity index less than 4		
		SANDS WITH FINES	GC	Clayey gravels, gravel-sand-clay mixtures			Atterberg limits plot above "A" line or plasticity index greater than 7	
	SANDS More than 50% of coarse fraction passes 4.75 mm sieve	CLEAN SANDS	SW	Well-graded sands and gravelly sands, little or no fines	Classification on basis of percentage of fines GW, GP, SW, SP GM, GC, SM, SC Borderline Classification requiring use of dual symbols			
		SANDS WITH FINES	SP	Poorly graded sands and gravelly sands, little or no fines		$C_u = D_{60} / D_{10}$ Greater than 6 $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ Between 1 and 3 Not meeting both criteria for SW		
		SANDS WITH FINES	SM	Silty sands, sand-silt mixtures			Atterberg limits plot below "A" line or plasticity index less than 4	
		SANDS WITH FINES	SC	Clayey sands, sand-clay mixtures		Atterberg limits plot above "A" line or plasticity index greater than 7		
		FINE-GRAINED SOILS (by behavior) 50% or more passes 75 µm sieve*	SILTS Liquid limit	<50			ML	Inorganic silts, very fine sands, rock flour, silty or clayey fine sands of slight plasticity
				>50		MH	Inorganic silts, micaceous or diatomaceous fine sands or silts, elastic silts	
CLAYS Above "A" line on plasticity chart negligible organic content Liquid limit	<30		CL	Inorganic clays of low plasticity, gravelly clays, sandy clays, silty clays, lean clays				
	30-50		CI	Inorganic clays of medium plasticity, silty clays				
	>50		CH	Inorganic clays of high plasticity, fat clays				
ORGANIC SILTS AND CLAYS Liquid limit	<50		OL	Organic silts and organic silty clays of low plasticity				
	>50		OH	Organic clays of medium to high plasticity				
HIGHLY ORGANIC SOILS			PT	Peat and other highly organic soils				

*Based on the material passing the 75 mm sieve
 Reference: ASTM Designation D2487, for identification procedure see D2488. USC as modified by PFRA

SOIL COMPONENTS				OVERSIZE MATERIAL	
FRACTION	SIEVE SIZE		DEFINING RANGES OF PERCENTAGE BY MASS OF MINOR COMPONENTS		Rounded or subrounded COBBLES 75 mm to 300 mm BOULDERS > 300 mm
	PASSING	RETAINED	PERCENTAGE	DESCRIPTOR	
GRAVEL coarse fine	75 mm	19 mm	>35 %	"and"	Not rounded ROCK FRAGMENTS >75 mm ROCKS > 0.76 cubic metre in volume
	19 mm	4.75 mm	21 to 35 %	"y-adjective"	
SAND coarse medium fine	4.75 mm	2.00 mm	10 to 20 %	"some"	
	2.00 mm	425 µm	>0 to 10 %	"trace"	
	425 µm	75 µm			
SILT (non plastic) or CLAY (plastic)	75 µm		as above but by behavior		

TT_Modified Unified Soil Classification.cdr



**PUBLIC SERVICES AND
PROCUREMENT
CANADA**

Borehole No: BH21-01

Project: KM 568 - 573 (TESTA RIVER) RECONSTRUCTION

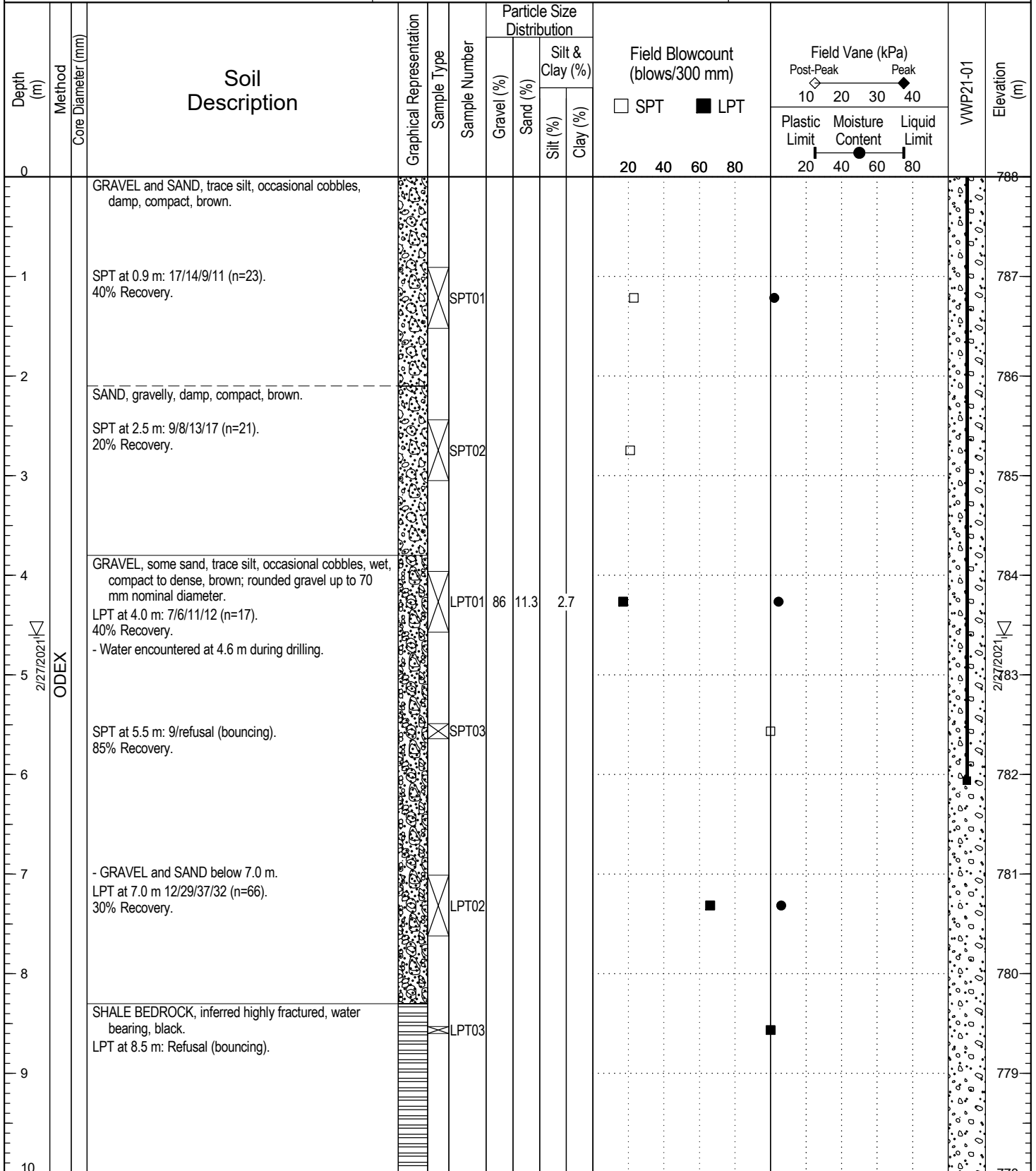
Project No: 704-TRN.VHWY03172-02

Location: ALASKA HIGHWAY

Ground Elev: 788 m

FORT NELSON, BC

UTM: 429478 E; 6502130 N; Z 10



Contractor: WESTECH

Completion Depth: 12.2 m

Drilling Rig Type: FRASTE MULTIDRILL PL

Start Date: 2021 February 27

Logged By: ER

Completion Date: 2021 February 27

Reviewed By: TM

Page 1 of 2

**PUBLIC SERVICES AND
PROCUREMENT
CANADA**

Borehole No: BH21-01

Project: KM 568 - 573 (TESTA RIVER) RECONSTRUCTION Project No: 704-TRN.VHWY03172-02
 Location: ALASKA HIGHWAY Ground Elev: 788 m
 FORT NELSON, BC UTM: 429478 E; 6502130 N; Z 10

Depth (m)	Method Core Diameter (mm)	Soil Description	Graphical Representation	Sample Type	Sample Number	Particle Size Distribution				Field Blowcount (blows/300 mm) □ SPT ■ LPT	Field Vane (kPa)			VWP21-01	Elevation (m)		
						Gravel (%)	Sand (%)	Silt & Clay (%)			Post-Peak	Peak	Plastic Limit			Moisture Content	Liquid Limit
								Silt (%)	Clay (%)		10	20					
10																	
11	ODEX	SHALE BEDROCK, inferred highly fractured, water bearing, black.															
12																	
13		End of borehole at 12.2 m, bedrock encountered at 8.3 m. - UTM coordinates were measured on site using a handheld GPS device. - Ground surface elevations estimated using a digital elevation model provided by McElhanney, dated June 2017. - Soil descriptions are based on visual classification and field observation, in combination with in-situ and laboratory testing. Some variation throughout the interpreted soil layers is expected. - Estimates of soil consistency were determined from drill reaction, in-situ testing, and visual classification of recovered samples. - Groundwater was inferred at 4.6 m during drilling. - Piezometer installed at 6.1 m and borehole was grouted to surface on completion.															
14																	
15																	
16																	
17																	
18																	
19																	
20																	



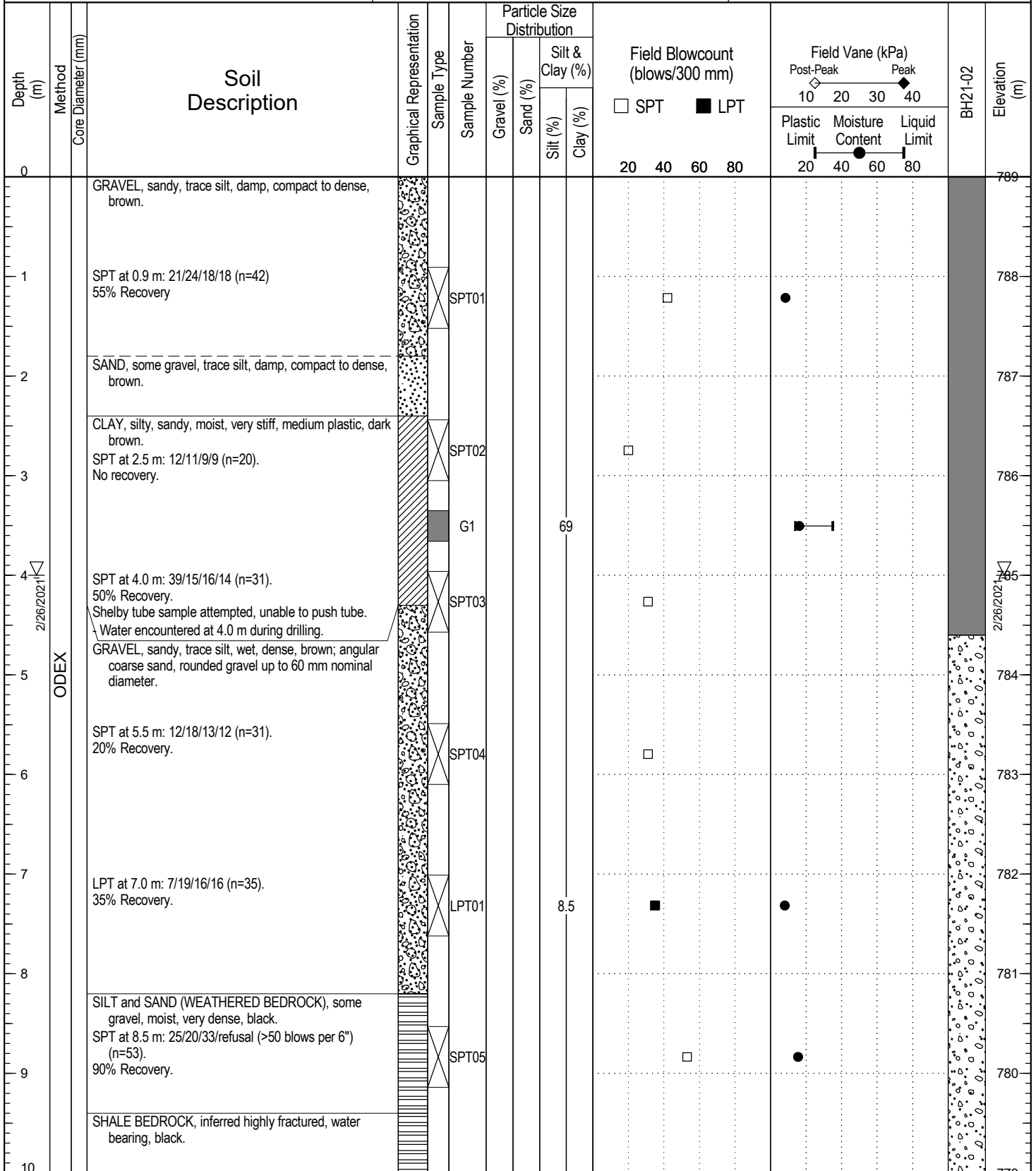
Contractor: WESTECH	Completion Depth: 12.2 m
Drilling Rig Type: FRASTE MULTIDRILL PL	Start Date: 2021 February 27
Logged By: ER	Completion Date: 2021 February 27
Reviewed By: TM	Page 2 of 2

**PUBLIC SERVICES AND
PROCUREMENT
CANADA**

Borehole No: BH21-02

Project: KM 568 - 573 (TESTA RIVER) RECONSTRUCTION
Location: ALASKA HIGHWAY
FORT NELSON, BC

Project No: 704-TRN.VHWY03172-02
Ground Elev: 789 m
UTM: 429327 E; 6502109 N; Z 10



Contractor: WESTECH

Drilling Rig Type: FRASTE MULTIDRILL PL

Logged By: ER

Reviewed By: TM

Completion Depth: 13.2 m

Start Date: 2021 February 26

Completion Date: 2021 February 27

Page 1 of 2

**PUBLIC SERVICES AND
PROCUREMENT
CANADA**

Borehole No: BH21-02

Project: KM 568 - 573 (TESTA RIVER) RECONSTRUCTION Project No: 704-TRN.VHWY03172-02
 Location: ALASKA HIGHWAY Ground Elev: 789 m
 FORT NELSON, BC UTM: 429327 E; 6502109 N; Z 10

Depth (m)	Method Core Diameter (mm)	Soil Description	Graphical Representation	Sample Type	Sample Number	Particle Size Distribution			Field Blowcount (blows/300 mm) □ SPT ■ LPT	Field Vane (kPa)			BH21-02	Elevation (m)		
						Gravel (%)	Sand (%)	Silt & Clay (%)		Post-Peak	Peak	Plastic Limit			Moisture Content	Liquid Limit
10		SHALE BEDROCK, inferred highly fractured, water bearing, black. SPT at 10 m: Refusal (bouncing).			SPT06									779		
11	ODEX													778		
12														777		
13														776		
14		End of borehole at 13.2 m, bedrock encountered at 9.4 m. - UTM coordinates were measured on site using a handheld GPS device. - Ground surface elevations estimated using a digital elevation model provided by McElhanney, dated June 2017. - Soil descriptions are based on visual classification and field observation, in combination with in-situ and laboratory testing. Some variation throughout the interpreted soil layers is expected. - Estimates of soil consistency were determined from drill reaction, in-situ testing, and visual classification of recovered samples. - Groundwater was inferred at 4.0 m during drilling. - Upon completion borehole was backfilled with grout and bentonite as shown on the borehole log.												775		
15														774		
16														773		
17														772		
18														771		
19														770		
20														769		



Contractor: WESTECH Completion Depth: 13.2 m
 Drilling Rig Type: FRASTE MULTIDRILL PL Start Date: 2021 February 26
 Logged By: ER Completion Date: 2021 February 27
 Reviewed By: TM Page 2 of 2

**PUBLIC SERVICES AND
PROCUREMENT
CANADA**

Borehole No: BH21-03

Project: KM 568 - 573 (TESTA RIVER) RECONSTRUCTION

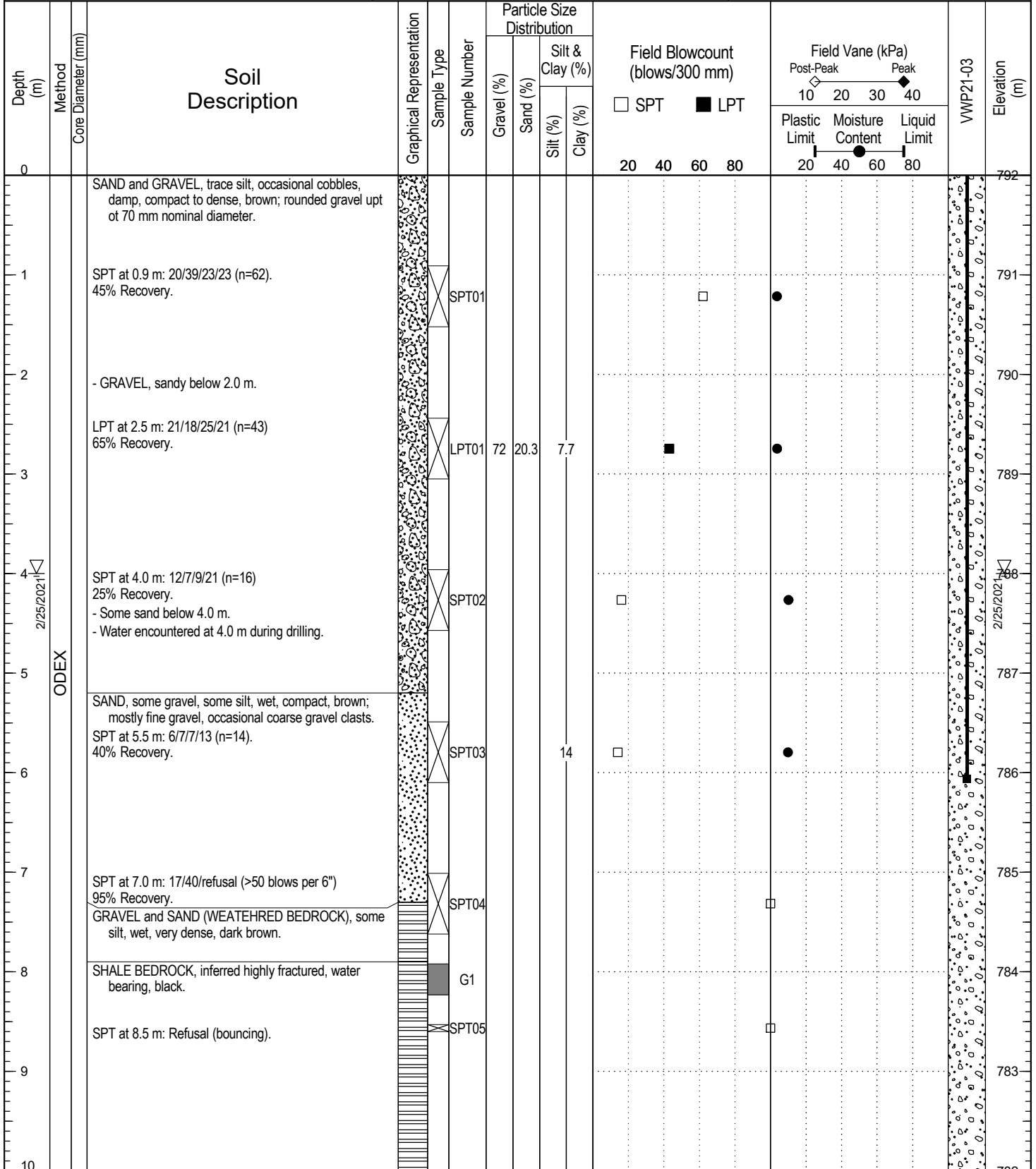
Project No: 704-TRN.VHWY03172-02

Location: ALASKA HIGHWAY

Ground Elev: 792 m

FORT NELSON, BC

UTM: 429085 E; 6502095 N; Z 10



Contractor: WESTECH

Completion Depth: 11.6 m

Drilling Rig Type: FRASTE MULTIDRILL PL

Start Date: 2021 February 25

Logged By: ER

Completion Date: 2021 February 26

Reviewed By: TM

Page 1 of 2

**PUBLIC SERVICES AND
PROCUREMENT
CANADA**

Borehole No: BH21-03

Project: KM 568 - 573 (TESTA RIVER) RECONSTRUCTION Project No: 704-TRN.VHWY03172-02
 Location: ALASKA HIGHWAY Ground Elev: 792 m
 FORT NELSON, BC UTM: 429085 E; 6502095 N; Z 10

Depth (m)	Method Core Diameter (mm)	Soil Description	Graphical Representation	Sample Type	Sample Number	Particle Size Distribution				Field Blowcount (blows/300 mm) □ SPT ■ LPT	Field Vane (kPa)			VWP21-03	Elevation (m)		
						Gravel (%)	Sand (%)	Silt & Clay (%)			Post-Peak	Peak	Plastic Limit			Moisture Content	Liquid Limit
								Silt (%)	Clay (%)								
10																	
11	ODEX	SHALE BEDROCK, inferred highly fractured, water bearing, black.			G2										782		
12		End of borehole at 11.6 m, bedrock encountered at 7.9 m. - UTM coordinates were measured on site using a handheld GPS device. - Ground surface elevations estimated using a digital elevation model provided by McElhanney, dated June 2017.													781		
13		- Soil descriptions are based on visual classification and field observation, in combination with in-situ and laboratory testing. Some variation throughout the interpreted soil layers is expected.													780		
14		- Estimates of soil consistency were determined from drill reaction, in-situ testing, and visual classification of recovered samples. - Groundwater was inferred at 4.0 m during drilling. - Piezometer installed at 6.1 m and borehole was grouted to surface on completion.													779		
15															778		
16															777		
17															776		
18															775		
19															774		
20															773		

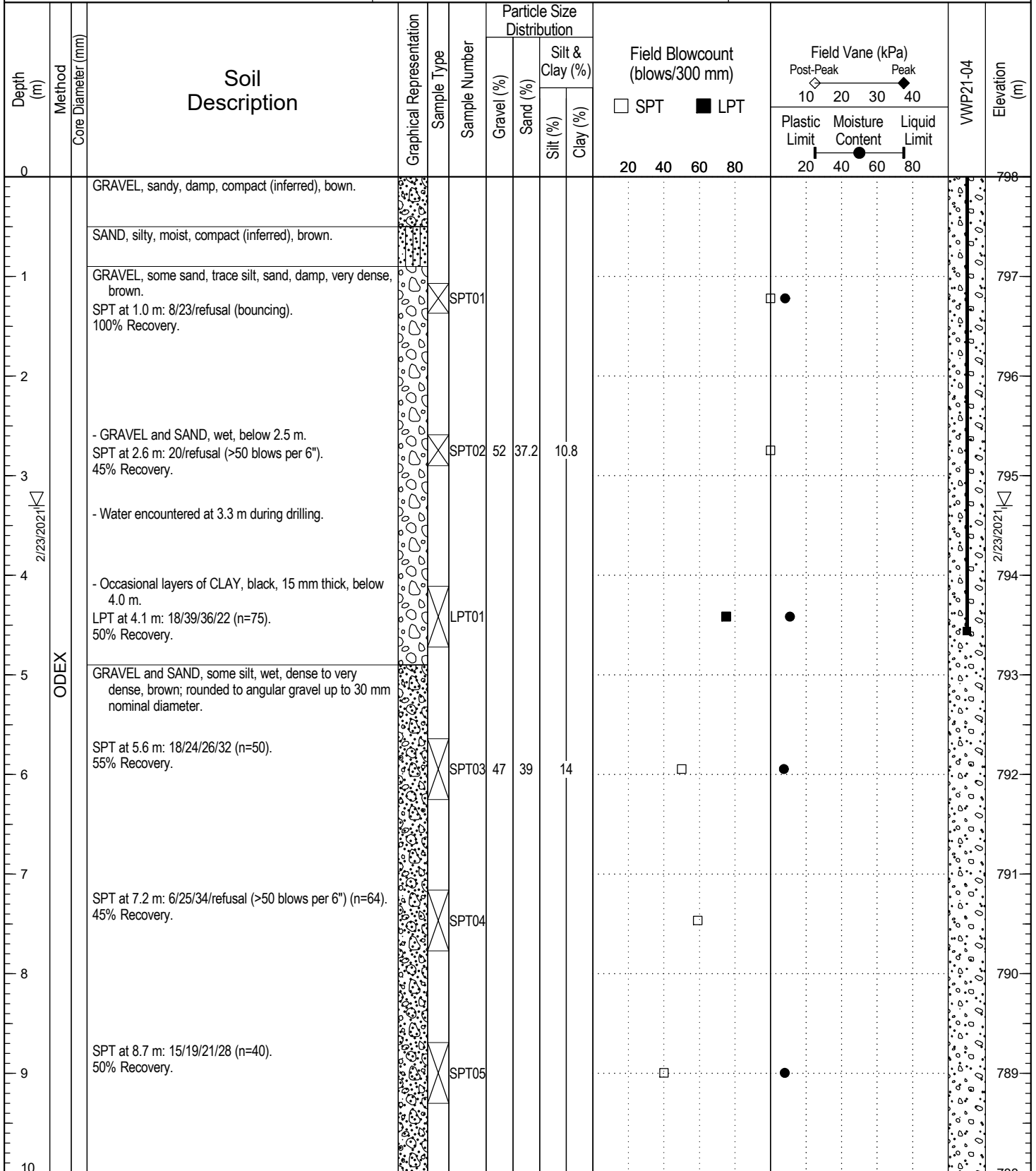


Contractor: WESTECH	Completion Depth: 11.6 m
Drilling Rig Type: FRASTE MULTIDRILL PL	Start Date: 2021 February 25
Logged By: ER	Completion Date: 2021 February 26
Reviewed By: TM	Page 2 of 2

**PUBLIC SERVICES AND
PROCUREMENT
CANADA**

Borehole No: BH21-04

Project: KM 568 - 573 (TESTA RIVER) RECONSTRUCTION Project No: 704-TRN.VHWY03172-02
 Location: ALASKA HIGHWAY Ground Elev: 798 m
 FORT NELSON, BC UTM: 428660 E; 6502107 N; Z 10

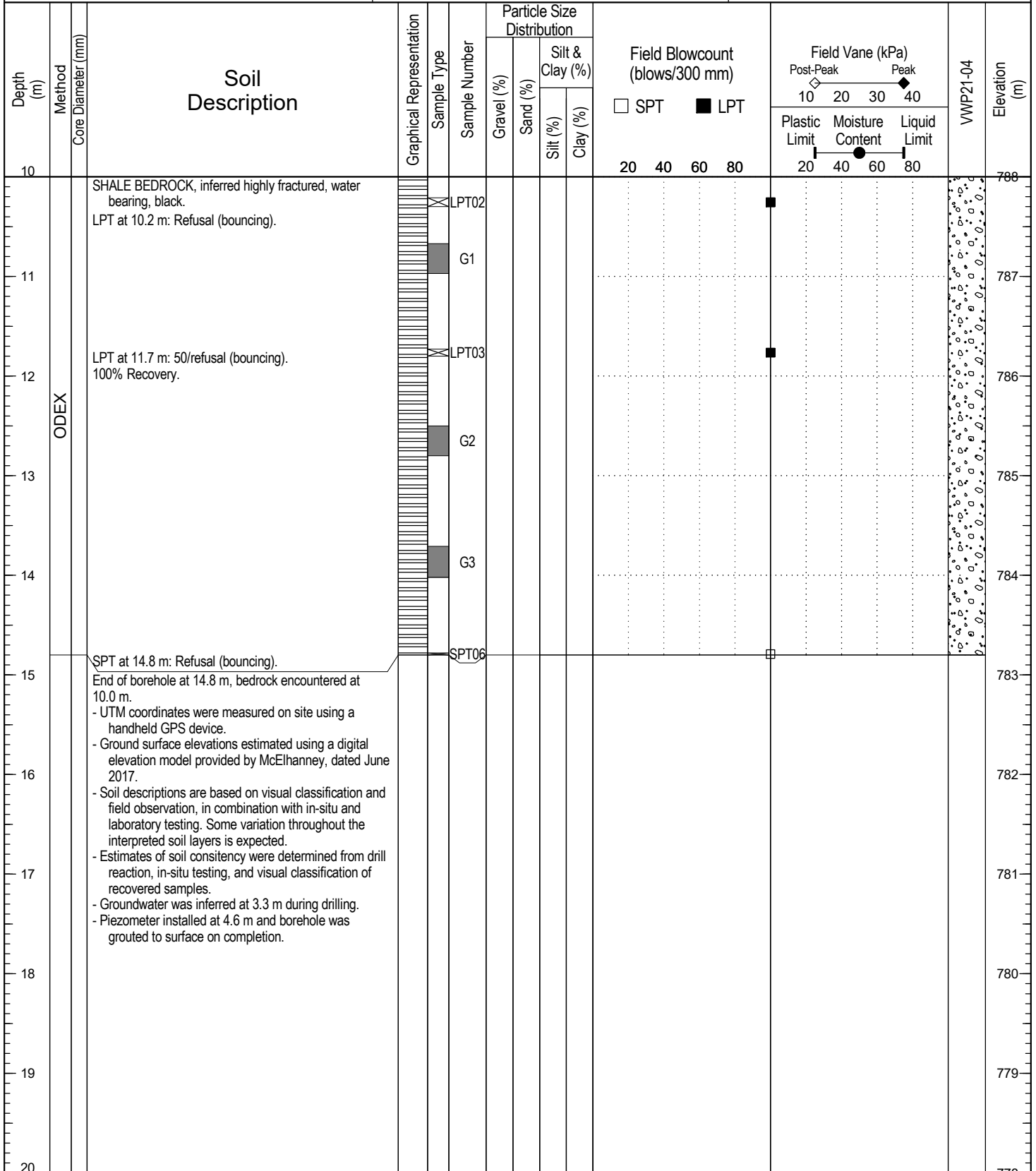


Contractor: WESTECH Completion Depth: 14.8 m
 Drilling Rig Type: FRASTE MULTIDRILL PL Start Date: 2021 February 23
 Logged By: ER Completion Date: 2021 February 24
 Reviewed By: TM Page 1 of 2

**PUBLIC SERVICES AND
PROCUREMENT
CANADA**

Borehole No: BH21-04

Project: KM 568 - 573 (TESTA RIVER) RECONSTRUCTION Project No: 704-TRN.VHWY03172-02
 Location: ALASKA HIGHWAY Ground Elev: 798 m
 FORT NELSON, BC UTM: 428660 E; 6502107 N; Z 10



Contractor: WESTECH Completion Depth: 14.8 m
 Drilling Rig Type: FRASTE MULTIDRILL PL Start Date: 2021 February 23
 Logged By: ER Completion Date: 2021 February 24
 Reviewed By: TM Page 2 of 2

**PUBLIC SERVICES AND
PROCUREMENT
CANADA**

Borehole No: BH21-05

Project: KM 568 - 573 (TESTA RIVER) RECONSTRUCTION

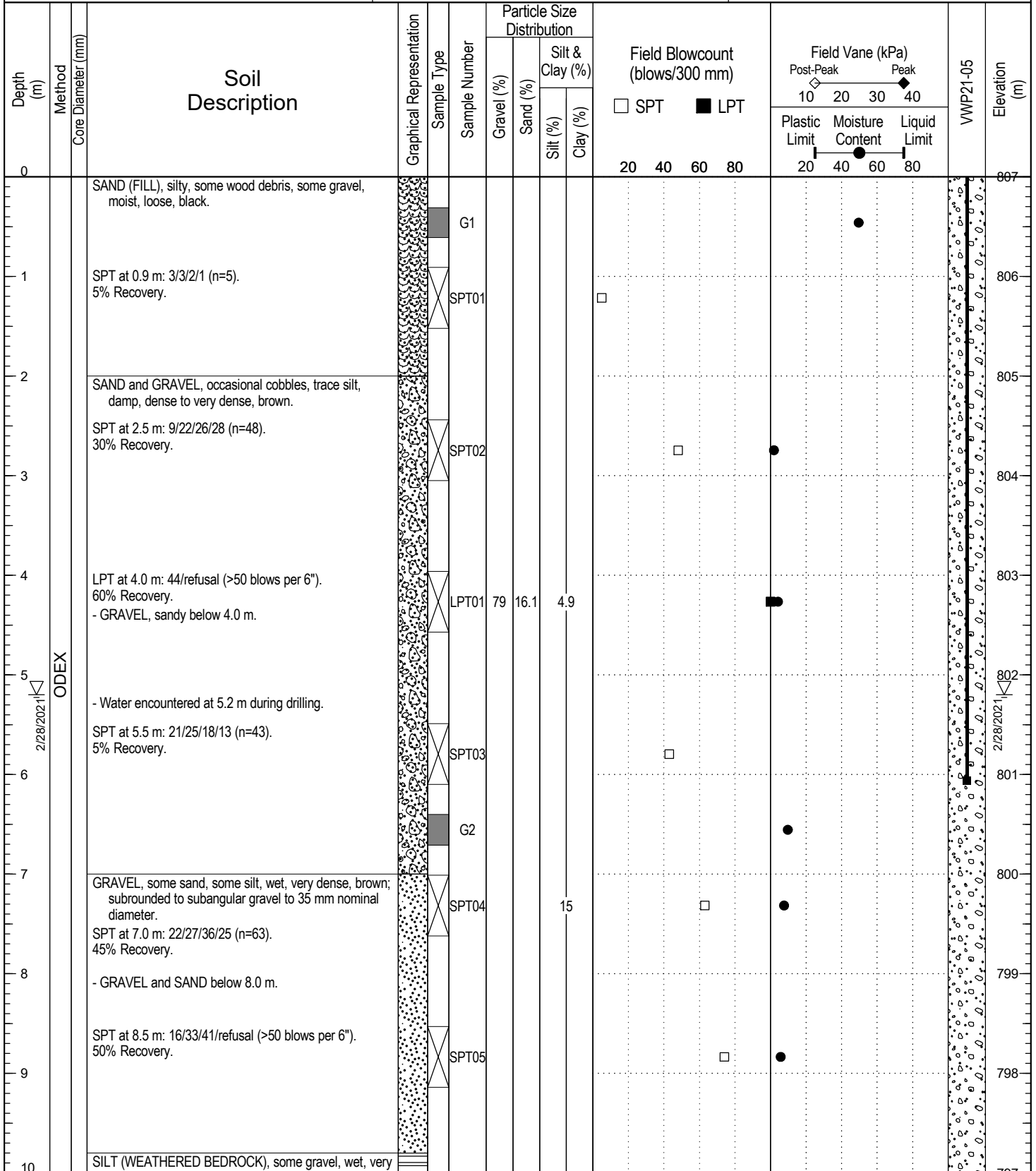
Project No: 704-TRN.VHWY03172-02

Location: ALASKA HIGHWAY

Ground Elev: 807 m

FORT NELSON, BC

UTM: 427832 E; 6502101 N; Z 10



Contractor: WESTECH

Completion Depth: 14 m

Drilling Rig Type: FRASTE MULTIDRILL PL

Start Date: 2021 February 28

Logged By: ER

Completion Date: 2021 February 28

Reviewed By: TM

Page 1 of 2

**PUBLIC SERVICES AND
PROCUREMENT
CANADA**

Borehole No: BH21-05

Project: KM 568 - 573 (TESTA RIVER) RECONSTRUCTION Project No: 704-TRN.VHWY03172-02
 Location: ALASKA HIGHWAY Ground Elev: 807 m
 FORT NELSON, BC UTM: 427832 E; 6502101 N; Z 10

Depth (m)	Method Core Diameter (mm)	Soil Description	Graphical Representation	Sample Type	Sample Number	Particle Size Distribution				Field Blowcount (blows/300 mm) □ SPT ■ LPT	Field Vane (kPa)			VWP21-05	Elevation (m)		
						Gravel (%)	Sand (%)	Silt & Clay (%)			Post-Peak	Peak	Liquid Limit			Moisture Content	Liquid Limit
								Silt (%)	Clay (%)								
10		dense, black. SPT at 10.0 m: 14/30/46/40 (n=76). 70% Recovery.			SPT06										797		
11	ODEX	SHALE BEDROCK, inferred highly fractured, water bearing, black.													796		
12		SPT at 11.6 m: Refusal (bouncing).			SPT07										795		
13															794		
14		End of borehole at 14.0 m, bedrock encountered at 10.7 m.													793		
15		- UTM coordinates were measured on site using a handheld GPS device. - Ground surface elevations estimated using a digital elevation model provided by McElhanney, dated June 2017.													792		
16		- Soil descriptions are based on visual classification and field observation, in combination with in-situ and laboratory testing. Some variation throughout the interpreted soil layers is expected. - Estimates of soil consistency were determined from drill reaction, in-situ testing, and visual classification of recovered samples.													791		
17		- Groundwater was inferred at 5.2 m during drilling. - Piezometer installed at 6.1 m and borehole was grouted to surface on completion.													790		
18															789		
19															788		
20															787		



Contractor: WESTECH Completion Depth: 14 m
 Drilling Rig Type: FRASTE MULTIDRILL PL Start Date: 2021 February 28
 Logged By: ER Completion Date: 2021 February 28
 Reviewed By: TM Page 2 of 2

**PUBLIC SERVICES AND
PROCUREMENT
CANADA**

Testpit No: TP21-01

Project: KM 568 - 573 (TESTA RIVER) RECONSTRUCTION

Project No: 704-TRN.VHWY03172-02

Location: ALASKA HIGHWAY

Ground Elev: 785 m

FORT NELSON, BC

UTM: 429751 E; 6502152 N; Z 10

Depth (m)	Method Core Diameter (mm)	Soil Description	Graphical Representation	Sample Type	Sample Number	Field Vane (kPa)			Elevation (m)
						Post-Peak	Moisture Content	Peak	
0		GRASS and TOPSOIL							785
0.5		GRAVEL and SAND, cobbley, occasional boulders, damp, loose to compact (inferred), brown; rounded to subrounded cobbles and boulders up to 700 mm nominal diameter.			G1				784
1.0		SAND, some gravel, trace silt, damp, loose (inferred), brown; fine rounded gravel.			G2				784
1.5		SAND and GRAVEL, cobbley, occasional boulders, damp, loose to compact (inferred), brown; rounded to subrounded cobbles and boulders up to 700 mm nominal diameter.			G3				783
2.0									783
2.5									783
3.0					G4				782
3.5									782
3.7		- Water observed at 3.7 m in open hole on completion.							781
4.0									781
4.5		GRAVEL and SAND, some cobbles, occasional boulders, wet, compact (inferred), brown; rounded to subrounded cobbles and boulders up to 500 mm nominal diameter.			G5				781
5.0		End of testpit at 4.9 m due to sloping of testpit walls.							780
5.5		- UTM coordinates were measured on site using a handheld GPS device.							780
6.0		- Ground surface elevation estimated using a digital elevation model provided by McElhanney, dated June 2017.							779
6.5		- Soil descriptions are based on visual classification and field observation, in combination with laboratory testing. Some variation throughout the interpreted soil layers is expected.							779
7.0		- Estimates of soil consistency were determined from excavator performance and visual classification of recovered samples.							779
7.5		- Water observed at 3.7 m in open hole on completion.							778
7.5		- Backfilled with excavated material on completion.							778



Contractor: GARCIA AND SONS

Completion Depth: 4.9 m

Drilling Rig Type: CAT 322C

Start Date: 2021 February 16

Logged By: ER

Completion Date: 2021 February 16

Reviewed By: TM

Page 1 of 1

**PUBLIC SERVICES AND
PROCUREMENT
CANADA**

Testpit No: TP21-02

Project: KM 568 - 573 (TESTA RIVER) RECONSTRUCTION

Project No: 704-TRN.VHWY03172-02

Location: ALASKA HIGHWAY

Ground Elev: 786 m

FORT NELSON, BC

UTM: 429618 E; 6502142 N; Z 10

Depth (m)	Method Core Diameter (mm)	Soil Description	Graphical Representation	Sample Type	Sample Number	Particle Size Distribution			Field Vane (kPa)			Elevation (m)		
						Gravel (%)	Sand (%)	Silt & Clay (%)	Post-Peak	Peak	Plastic Limit		Moisture Content	Liquid Limit
0		GRASS and TOPSOIL										786		
0.5		GRAVEL, cobbley, some sand, trace silt, occasional boulders, damp, loose to compact (inferred), brown; rounded to subrounded cobbles and boulders up to 500 mm; angular to subangular cobbles and boulders.		G1									785	
1				G2	51	17.1	1.9						784	
2													783	
3		- Frequent boulders up to 850 mm below 3.0 m.											782	
4		CLAY, some silt, some gravel, trace sand, damp, stiff (inferred), medium plastic, dark brown.		G3			71						781	
4.3		CLAY, silty, damp, stiff (inferred), low plastic, dark brown; 5 mm bedded; occasional fine sand partings. Light seepage observed at 4.3 m on completion.		G4									780	
5		GRAVEL, some silt, some sand, wet, loose to compact (inferred), dark brown. - Water observed at 5.2 m in open hole on completion.		G5									779	
5.5		End of testpit at 5.5 m, limit of excavator reach. - UTM coordinates were measured on site using a handheld GPS device. - Ground surface elevation estimated using a digital elevation model provided by McElhanney, dated June 2017. - Soil descriptions are based on visual classification and field observation, in combination with laboratory testing. Some variation throughout the interpreted soil layers is expected. - Estimates of soil consistency were determined from excavator performance and visual classification of recovered samples. - Light seepage starting at 4.3 m, water observed at 5.2 m in open hole on completion. - Backfilled with excavated material on completion.											779	



Contractor: GARCIA AND SONS

Completion Depth: 5.5 m

Drilling Rig Type: CAT 322C

Start Date: 2021 February 16

Logged By: ER

Completion Date: 2021 February 16

Reviewed By: TM

Page 1 of 1

**PUBLIC SERVICES AND
PROCUREMENT
CANADA**

Testpit No: TP21-03

Project: KM 568 - 573 (TESTA RIVER) RECONSTRUCTION Project No: 704-TRN.VHWY03172-02
 Location: ALASKA HIGHWAY Ground Elev: 792 m
 FORT NELSON, BC UTM: 429018 E; 6502083 N; Z 10

Depth (m)	Method Core Diameter (mm)	Soil Description	Graphical Representation	Sample Type	Sample Number	Particle Size Distribution			Field Vane (kPa)			Elevation (m)		
						Gravel (%)	Sand (%)	Silt & Clay (%)	Post-Peak	Peak	Plastic Limit		Moisture Content	Liquid Limit
0		GRASS and TOPSOIL.										792		
0.5		SAND and GRAVEL (FILL), some silt, occasional cobbles, trace organics, loose to compact (inferred), brown; rounded to subrounded cobbles.		G1		18							791	
1.5		GRAVEL and SAND, sandy, some cobbles, trace silt, occasional boulder, damp, loose to compact (inferred), brown; rounded to subrounded cobbles and boulders up to 500 mm nominal diameter.		G2									790	
3.0		- Some silt below 3.0 m.		G3									789	
4.3		- Water observed at 4.3 m in open hole on completion.		G4									788	
4.7		End of testpit at 4.7 m due to sloping of testpit walls. - UTM coordinates were measured on site using a handheld GPS device. - Ground surface elevation estimated using a digital elevation model provided by McElhanney, dated June 2017. - Soil descriptions are based on visual classification and field observation, in combination with laboratory testing. Some variation throughout the interpreted soil layers is expected. - Estimates of soil consistency were determined from excavator performance and visual classification of recovered samples. - Water observed at 4.3 m in open hole on completion. - Backfilled with excavated material on completion.										787		
6.0													786	
7.0													785	
7.5													785	



Contractor: GARCIA AND SONS

Drilling Rig Type: CAT 322C

Logged By: ER

Reviewed By: TM

Completion Depth: 4.7 m

Start Date: 2021 February 16

Completion Date: 2021 February 16

Page 1 of 1

**PUBLIC SERVICES AND
PROCUREMENT
CANADA**

Testpit No: TP21-04

Project: KM 568 - 573 (TESTA RIVER) RECONSTRUCTION Project No: 704-TRN.VHWY03172-02
 Location: ALASKA HIGHWAY Ground Elev: 796 m
 FORT NELSON, BC UTM: 428776 E; 6502073 N; Z 10

Depth (m)	Method Core Diameter (mm)	Soil Description	Graphical Representation	Sample Type	Sample Number	Particle Size Distribution			Field Vane (kPa)			Elevation (m)		
						Gravel (%)	Sand (%)	Silt & Clay (%)	Post-Peak	Peak	Plastic Limit		Moisture Content	Liquid Limit
0		GRASS and TOPSOIL.										796		
0.5		GRAVEL and SAND, some silt, damp, loose to compact (inferred), brown; rounded to subrounded.		G1										
0.5		SAND, some silt, trace gravel, damp, loose to compact (inferred), brown.		G2										
1		GRAVEL, sandy, occasional cobbles, occasional boulders, damp, loose to compact (inferred), brown, rounded to subrounded cobbles and boulders up to 450 mm nominal diameter.											795	
2	TESTPIT	- Some sand, trace silt below 2.0 m.											794	
3				G3	74	20	6						793	
4		- Frequent cobbles and boulders up to 1200 mm nominal diameter below 3.9 m.											792	
5		End of testpit at 4.3 m, refusal on oversize material. - UTM coordinates were measured on site using a handheld GPS device. - Ground surface elevation estimated using a digital elevation model provided by McElhanney, dated June 2017. - Soil descriptions are based on visual classification and field observation, in combination with laboratory testing. Some variation throughout the interpreted soil layers is expected. - Estimates of soil consistency were determined from excavator performance and visual classification of recovered samples. - Dry on completion. - Backfilled with excavated material on completion.											791	
6													790	
7													789	
7.5														



Contractor: GARCIA AND SONS

Completion Depth: 4.3 m

Drilling Rig Type: CAT 322C

Start Date: 2021 February 17

Logged By: ER

Completion Date: 2021 February 17

Reviewed By: TM

Page 1 of 1

**PUBLIC SERVICES AND
PROCUREMENT
CANADA**

Testpit No: TP21-05

Project: KM 568 - 573 (TESTA RIVER) RECONSTRUCTION Project No: 704-TRN.VHWY03172-02
 Location: ALASKA HIGHWAY Ground Elev: 800 m
 FORT NELSON, BC UTM: 428515 E; 6502129 N; Z 10

Depth (m)	Method Core Diameter (mm)	Soil Description	Graphical Representation	Sample Type	Sample Number	Particle Size Distribution			Field Vane (kPa)			Elevation (m)		
						Gravel (%)	Sand (%)	Silt & Clay (%)	Post-Peak	Peak	Plastic Limit		Moisture Content	Liquid Limit
0		GRASS and TOPSOIL.			G1							800		
1		SAND and GRAVEL (FILL), some silt, some cobbles, occasional wood pieces, occasional boulder, damp, loose to compact (inferred), brown; rounded to subrounded cobbles and boulders up to 500 mm nominal diameter.										799		
2		PEAT, moderately decomposed, mainly woody fibrous, some amorphous granular matter, slight smell, moderate tensile strength.			G2		21.8					798		
3		SAND, moist, compact (inferred), brown.										797		
4		SAND and GRAVEL, some silt, occasional cobbles, occasional boulders, wet, loose to compact (inferred), brown; rounded to subrounded cobbles and boulders up to 600 mm.			G3							796		
5		- Occasional rounded to subrounded boulders up to 800 mm nominal diameter, occasional subangular boulder below 4.3 m.			G4							795		
6		End of testpit at 4.9 m, limit of excavator reach. - UTM coordinates were measured on site using a handheld GPS device. - Ground surface elevation estimated using a digital elevation model provided by McElhanney, dated June 2017. - Soil descriptions are based on visual classification and field observation, in combination with laboratory testing. Some variation throughout the interpreted soil layers is expected. - Estimates of soil consistency were determined from excavator performance and visual classification of recovered samples. - Dry on completion. - Backfilled with excavated material on completion.										794		
7												793		
7.5														



Contractor: GARCIA AND SONS

Drilling Rig Type: CAT 322C

Logged By: ER

Reviewed By: TM

Completion Depth: 4.9 m

Start Date: 2021 February 17

Completion Date: 2021 February 17

Page 1 of 1

**PUBLIC SERVICES AND
PROCUREMENT
CANADA**

Testpit No: TP21-06

Project: KM 568 - 573 (TESTA RIVER) RECONSTRUCTION Project No: 704-TRN.VHWY03172-02
 Location: ALASKA HIGHWAY Ground Elev: 804 m
 FORT NELSON, BC UTM: 428324 E; 6502084 N; Z 10

Depth (m)	Method Core Diameter (mm)	Soil Description	Graphical Representation	Sample Type	Sample Number	Particle Size Distribution			Field Vane (kPa)			Elevation (m)		
						Gravel (%)	Sand (%)	Silt & Clay (%)	Post-Peak	Peak	Plastic Limit		Moisture Content	Liquid Limit
0		GRASS and TOPSOIL.										804		
0.5		SILT and SAND, trace gravel, trace clay, trace organics, occasional wood piece, occasional cobbles, moist, firm (inferred), dark brown, low plastic; rounded cobbles.		G1		34						803		
1.5		CLAY, some silt, some gravel, some sand, trace organics, occasional cobbles, moist, firm (inferred), low plastic, dark brown; rounded cobbles.		G2								802		
4.0		SAND and GRAVEL, trace silt, occasional cobbles, occasional boulders, damp, loose to compact (inferred), brown; rounded cobbles and boulders up to 400 mm nominal diameter.		G3		9.3						800		
4.9		End of testpit at 4.9 m, limit of excavator reach. - UTM coordinates were measured on site using a handheld GPS device. - Ground surface elevation estimated using a digital elevation model provided by McElhanney, dated June 2017. - Soil descriptions are based on visual classification and field observation, in combination with laboratory testing. Some variation throughout the interpreted soil layers is expected. - Estimates of soil consistency were determined from excavator performance and visual classification of recovered samples. - Dry on completion. - Backfilled with excavated material on completion.		G4								799		
6.0												798		
7.0												797		
7.5												797		



Contractor: GARCIA AND SONS	Completion Depth: 4.9 m
Drilling Rig Type: CAT 322C	Start Date: 2021 February 17
Logged By: ER	Completion Date: 2021 February 17
Reviewed By: TM	Page 1 of 1

**PUBLIC SERVICES AND
PROCUREMENT
CANADA**

Testpit No: TP21-07

Project: KM 568 - 573 (TESTA RIVER) RECONSTRUCTION

Project No: 704-TRN.VHWY03172-02

Location: ALASKA HIGHWAY

Ground Elev: 803 m

FORT NELSON, BC

UTM: 428188 E; 6502054 N; Z 10

Depth (m)	Method Core Diameter (mm)	Soil Description	Graphical Representation	Sample Type	Sample Number	Field Vane (kPa)			Elevation (m)	
						Post-Peak	Moisture Content	Peak		
0						10	20	30	40	803
0		GRASS and TOPSOIL. GRAVEL, cobbly, some sand, trace silt, trace rootlets, damp, loose to compact (inferred), brown; rounded cobbles.			G1					
1		- Rootlets end at 1.2 m.								802
2		- Occasional rounded boulders up to 800 mm nominal diameter, difficult to excavate due to oversize material.								801
3					G2					800
4		- GRAVEL and SAND below 3.5 m. - Angular boulder 800 mm nominal diameter at 4.0 m.			G3					799
5		End of testpit at 4.3 m, refusal on oversize material. - UTM coordinates were measured on site using a handheld GPS device. - Ground surface elevation estimated using a digital elevation model provided by McElhanney, dated June 2017. - Soil descriptions are based on visual classification and field observation, in combination with laboratory testing. Some variation throughout the interpreted soil layers is expected. - Estimates of soil consistency were determined from excavator performance and visual classification of recovered samples. - Dry on completion. - Backfilled with excavated material on completion.								798
6										797
7										796
7.5										



Contractor: GARCIA AND SONS

Completion Depth: 4.3 m

Drilling Rig Type: CAT 322C

Start Date: 2021 February 17

Logged By: ER

Completion Date: 2021 February 17

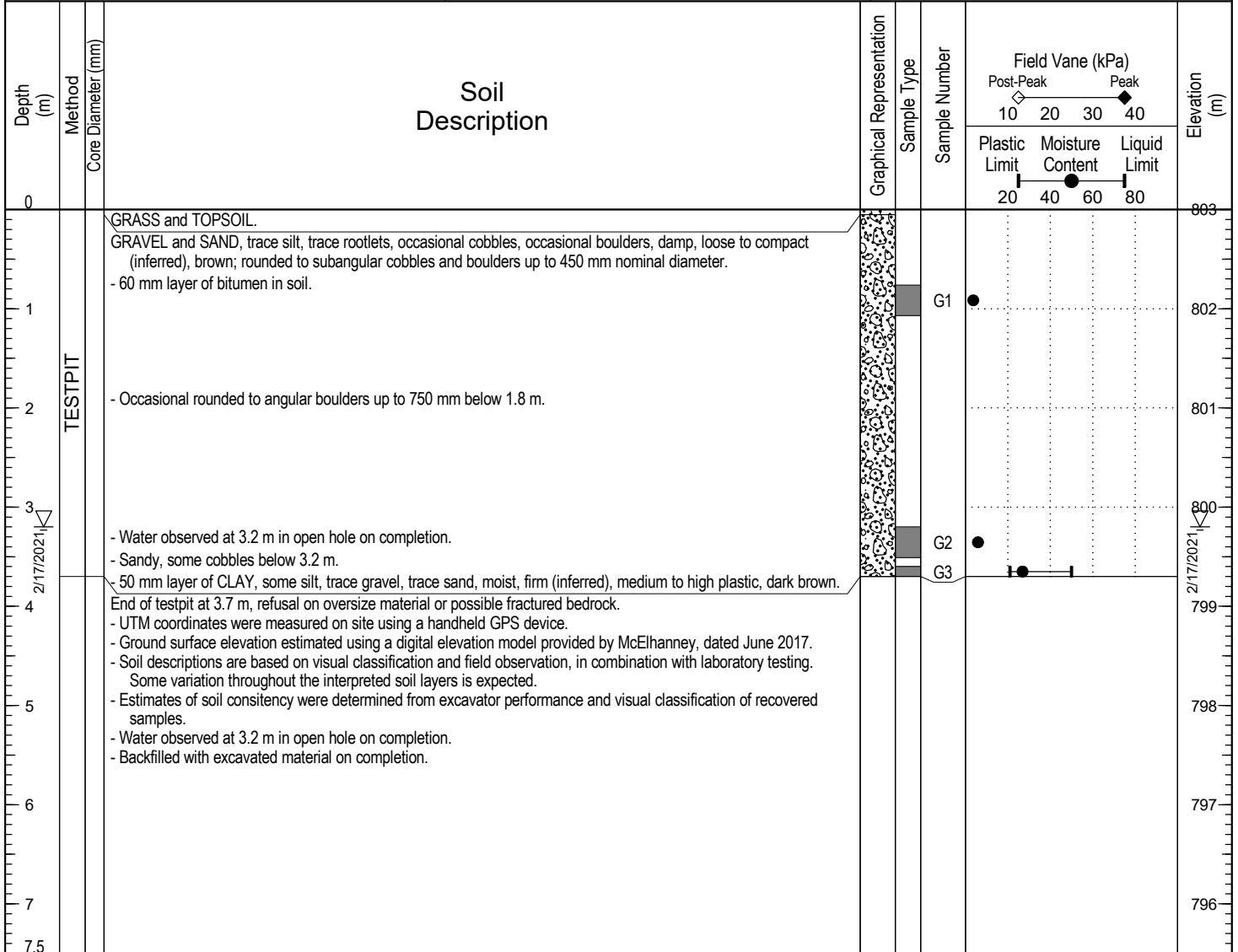
Reviewed By: TM

Page 1 of 1

**PUBLIC SERVICES AND
PROCUREMENT
CANADA**

Testpit No: TP21-08

Project: KM 568 - 573 (TESTA RIVER) RECONSTRUCTION Project No: 704-TRN.VHWY03172-02
 Location: ALASKA HIGHWAY Ground Elev: 803 m
 FORT NELSON, BC UTM: 428020 E; 6502038 N; Z 10



Contractor: GARCIA AND SONS
 Drilling Rig Type: CAT 322C
 Logged By: ER
 Reviewed By: TM

Completion Depth: 3.7 m
 Start Date: 2021 February 17
 Completion Date: 2021 February 17
 Page 1 of 1

**PUBLIC SERVICES AND
PROCUREMENT
CANADA**

Testpit No: TP21-09

Project: KM 568 - 573 (TESTA RIVER) RECONSTRUCTION Project No: 704-TRN.VHWY03172-02
 Location: ALASKA HIGHWAY Ground Elev: 805 m
 FORT NELSON, BC UTM: 427885 E; 6502080 N; Z 10

Depth (m)	Method Core Diameter (mm)	Soil Description	Graphical Representation	Sample Type	Sample Number	Particle Size Distribution			Field Vane (kPa)			Elevation (m)		
						Gravel (%)	Sand (%)	Silt & Clay (%)	Post-Peak	Peak	Liquid Limit		Moisture Content	Plastic Limit
0		GRASS and TOPSOIL. GRAVEL and SAND, occasional cobbles, trace silt, trace rootlets, damp, loose to compact (inferred), brown; rounded to subrounded cobbles.										805		
1		- No rootlets below 0.9 m.			G1							804		
2		- Frequent boulders up to 900 mm nominal diameter; usually rounded to subrounded, occasionally flat and subangular.			G2	44	26	4				803		
3												802		
4		- Water observed at 4.0 m in open hole on completion.			G3							801		
5		End of testpit at 4.7 m, limit of excavator reach. - UTM coordinates were measured on site using a handheld GPS device. - Ground surface elevation estimated using a digital elevation model provided by McElhanney, dated June 2017. - Soil descriptions are based on visual classification and field observation, in combination with laboratory testing. Some variation throughout the interpreted soil layers is expected. - Estimates of soil consistency were determined from excavator performance and visual classification of recovered samples. - Water observed at 4.0 m in open hole on completion. - Backfilled with excavated material on completion.										800		
6												799		
7												798		
7.5												798		



Contractor: GARCIA AND SONS

Completion Depth: 4.7 m

Drilling Rig Type: CAT 322C

Start Date: 2021 February 17

Logged By: ER

Completion Date: 2021 February 17

Reviewed By: TM

Page 1 of 1

**PUBLIC SERVICES AND
PROCUREMENT
CANADA**

Testpit No: TP21-10

Project: KM 568 - 573 (TESTA RIVER) RECONSTRUCTION Project No: 704-TRN.VHWY03172-02
 Location: ALASKA HIGHWAY Ground Elev: 806 m
 FORT NELSON, BC UTM: 427738 E; 6502122 N; Z 10

Depth (m)	Method Core Diameter (mm)	Soil Description	Graphical Representation	Sample Type	Sample Number	Field Vane (kPa)			Elevation (m)	
						Post-Peak	Peak			
						Plastic Limit	Moisture Content	Liquid Limit		
0		GRASS and TOPSOIL.				10	20	30	40	806
1	TESTPIT	GRAVEL and SAND, trace silt, occasional cobbles, occasional boulders, damp, loose to compact (inferred), brown; rounded to subrounded cobbles boulders up to 700 mm nominal diameter.			G1					805
2		- Cobblely below 2.1 m. - Water at 2.2 m in open hole on completion.			G2					804
3		End of testpit at 2.8 m due to sloughing of testpit walls. - UTM coordinates were measured on site using a handheld GPS device. - Ground surface elevation estimated using a digital elevation model provided by McElhanney, dated June 2017. - Soil descriptions are based on visual classification and field observation, in combination with laboratory testing. Some variation throughout the interpreted soil layers is expected. - Estimates of soil consistency were determined from excavator performance and visual classification of recovered samples. - Water observed at 2.2 m in open hole on completion. - Backfilled with excavated material on completion.						803		
4									802	
5									801	
6									800	
7									799	
7.5										



Contractor: GARCIA AND SONS

Completion Depth: 2.8 m

Drilling Rig Type: CAT 322C

Start Date: 2021 February 18

Logged By: ER

Completion Date: 2021 February 18

Reviewed By: TM

Page 1 of 1

**PUBLIC SERVICES AND
PROCUREMENT
CANADA**

Testpit No: TP21-11

Project: KM 568 - 573 (TESTA RIVER) RECONSTRUCTION Project No: 704-TRN.VHWY03172-02
 Location: ALASKA HIGHWAY Ground Elev: 807 m
 FORT NELSON, BC UTM: 427632 E; 6502145 N; Z 10

Depth (m)	Method Core Diameter (mm)	Soil Description	Graphical Representation	Sample Type	Sample Number	Field Vane (kPa)			Elevation (m)	
						Post-Peak	Moisture Content	Peak		
0						10	20	30	40	807
0.5		GRASS and TOPSOIL. SAND, damp, loose (inferred), dark brown; fine to medium sand.			G1					806
1.0		GRAVEL and SAND, trace silt, occasional cobble, damp, loose to compact (inferred), brown; rounded cobbles.			G2					805
2.7		- Water at 2.7 m in open hole on completion.			G3					804
3.0		End of testpit at 3.0 m due to sloughing of testpit walls. - UTM coordinates were measured on site using a handheld GPS device. - Ground surface elevation estimated using a digital elevation model provided by McElhanney, dated June 2017. - Soil descriptions are based on visual classification and field observation, in combination with laboratory testing. Some variation throughout the interpreted soil layers is expected. - Estimates of soil consistency were determined from excavator performance and visual classification of recovered samples. - Water observed at 2.7 m in open hole on completion. - Backfilled with excavated material on completion.								803
4.0										802
5.0										801
6.0										800
7.0										800
7.5										800



Contractor: GARCIA AND SONS

Drilling Rig Type: CAT 322C

Logged By: ER

Reviewed By: TM

Completion Depth: 3 m

Start Date: 2021 February 18

Completion Date: 2021 February 18

Page 1 of 1

**PUBLIC SERVICES AND
PROCUREMENT
CANADA**

Testpit No: TP21-12

Project: KM 568 - 573 (TESTA RIVER) RECONSTRUCTION

Project No: 704-TRN.VHWY03172-02

Location: ALASKA HIGHWAY

Ground Elev: 810 m

FORT NELSON, BC

UTM: 427393 E; 6502218 N; Z 10

Depth (m)	Method Core Diameter (mm)	Soil Description	Graphical Representation	Sample Type	Sample Number	Field Vane (kPa)			Elevation (m)		
						Post-Peak	Moisture Content	Peak			
0						10	20	30	40	810	
0		GRASS and TOPSOIL. COBBLES and GRAVEL, some sand, trace silt, occasional boulders, trace rootlets, damp, loose to compact (inferred), brown; rounded cobbles; angular boulders up to 700 mm nominal diameter.			G1					809	
1		- No rootlets below 1.4 m.									808
2											807
3										806	
4					G2					805	
4.6		- Water at 4.6 m in open hole on completion.			G3					804	
4.7		End of testpit at 4.7 m, limit of excavator reach.								803	
5		- UTM coordinates were measured on site using a handheld GPS device.									
6		- Ground surface elevation estimated using a digital elevation model provided by McElhanney, dated June 2017.									
7		- Soil descriptions are based on visual classification and field observation, in combination with laboratory testing. Some variation throughout the interpreted soil layers is expected.									
7.5		- Estimates of soil consistency were determined from excavator performance and visual classification of recovered samples.									
		- Water observed at 4.6 m in open hole on completion.									
		- Backfilled with excavated material on completion.									



Contractor: GARCIA AND SONS

Completion Depth: 4.7 m

Drilling Rig Type: CAT 322C

Start Date: 2021 February 18

Logged By: ER

Completion Date: 2021 February 18

Reviewed By: TM

Page 1 of 1

**PUBLIC SERVICES AND
PROCUREMENT
CANADA**

Testpit No: TP21-13

Project: KM 568 - 573 (TESTA RIVER) RECONSTRUCTION

Project No: 704-TRN.VHWY03172-02

Location: ALASKA HIGHWAY

Ground Elev: 790 m

FORT NELSON, BC

UTM: 429191 E; 6502105 N; Z 10

Depth (m)	Method Core Diameter (mm)	Soil Description	Graphical Representation	Sample Type	Sample Number	Particle Size Distribution			▲ Pocket Pen. (kPa) ▲			Elevation (m)		
						Gravel (%)	Sand (%)	Silt & Clay (%)	Field Vane (kPa)		Plastic Limit		Moisture Content	Liquid Limit
									Post-Peak	Peak				
0		GRASS and TOPSOIL. GRAVEL and SAND, cobblely, trace silt, trace rootlets, damp, compact (inferred), brown.										790		
1	TESTPIT	- Boulder 750 mm nominal diameter at 1.5 m.			G1							789		
2												788		
3						G2						787		
4		2/18/2021	Seepage observed at 3.6 m on completion. CLAY, silty, moist, firm (inferred), low plastic, black; occasional fine sand partings, slight horizontal layering evident.			G3		98					786	
5		End of testpit at 4.8 m, limit of excavator reach. - UTM coordinates were measured on site using a handheld GPS device. - Ground surface elevation estimated using a digital elevation model provided by McElhanney, dated June 2017. - Soil descriptions are based on visual classification and field observation, in combination with laboratory testing. Some variation throughout the interpreted soil layers is expected. - Estimates of soil consistency were determined from excavator performance and visual classification of recovered samples. - Light seepage observed at 3.6 m in open hole on completion. - Backfilled with excavated material on completion.										785		
6												784		
7												783		
7.5														



Contractor: GARCIA AND SONS

Completion Depth: 4.8 m

Drilling Rig Type: CAT 322C

Start Date: 2021 February 18

Logged By: ER

Completion Date: 2021 February 18

Reviewed By: TM

Page 1 of 1

**PUBLIC SERVICES AND
PROCUREMENT
CANADA**

Testpit No: TP21-14

Project: KM 568 - 573 (TESTA RIVER) RECONSTRUCTION Project No: 704-TRN.VHWY03172-02
 Location: ALASKA HIGHWAY
 FORT NELSON, BC UTM: 431416 E; 6502258 N; Z 10

Depth (m)	Method	Core Diameter (mm)	Soil Description	Graphical Representation	Sample Type	Sample Number	Field Vane (kPa)			Depth (ft)	
							Post-Peak	Peak			
0							10	20	30	40	0
0	TESTPIT		COBBLES, gravelly, some sand, trace silt, frozen, compact (inferred), brown; rounded cobbles up to 300 mm nominal diameter. End of testpit at 0.3 m, refusal on frozen, compact soils. - UTM coordinates were measured on site using a handheld GPS device. - Soil descriptions are based on visual classification and field observation, in combination with laboratory testing. Some variation throughout the interpreted soil layers is expected. - Estimates of soil consistency were determined from excavator performance and visual classification of recovered samples. - Backfilled with excavated material on completion.			G1	20	40	60	80	0
1											1
2											2
3											3
4											4
5											5
6											6
7											7
7.5											7.5



Contractor: GARCIA AND SONS	Completion Depth: 0.3 m
Drilling Rig Type: CAT 322C	Start Date: 2021 February 19
Logged By: ER	Completion Date: 2021 February 19
Reviewed By: TM	Page 1 of 1

**PUBLIC SERVICES AND
PROCUREMENT
CANADA**

Testpit No: TP21-15

Project: KM 568 - 573 (TESTA RIVER) RECONSTRUCTION Project No: 704-TRN.VHWY03172-02
 Location: ALASKA HIGHWAY
 FORT NELSON, BC UTM: 431442 E; 6502279 N; Z 10

Depth (m)	Method	Core Diameter (mm)	Soil Description	Graphical Representation	Sample Type	Sample Number	Particle Size Distribution			Field Vane (kPa)			Depth (ft)
							Gravel (%)	Sand (%)	Silt & Clay (%)	Post-Peak	Peak	Plastic Limit	
0	TESTPIT		COBBLES, some sand, some gravel, some silt, frozen, compact (inferred), brown; rounded cobbles up to 250 mm nominal diameter. End of testpit at 0.3 m, refusal on frozen, compact soils. - UTM coordinates were measured on site using a handheld GPS device. - Soil descriptions are based on visual classification and field observation, in combination with laboratory testing. Some variation throughout the interpreted soil layers is expected. - Estimates of soil consistency were determined from excavator performance and visual classification of recovered samples. - Backfilled with excavated material on completion.		G1	14	20	19					0
1													1
2													2
3													3
4													4
5													5
6													6
7													7
7.5													7.5



Contractor: GARCIA AND SONS
 Drilling Rig Type: CAT 322C
 Logged By: ER
 Reviewed By: TM

Completion Depth: 0.3 m
 Start Date: 2021 February 19
 Completion Date: 2021 February 19
 Page 1 of 1

**PUBLIC SERVICES AND
PROCUREMENT
CANADA**

Testpit No: TP21-16

Project: KM 568 - 573 (TESTA RIVER) RECONSTRUCTION Project No: 704-TRN.VHWY03172-02
 Location: ALASKA HIGHWAY
 FORT NELSON, BC UTM: 431525 E; 6502284 N; Z 10

Depth (m)	Method Core Diameter (mm)	Soil Description	Graphical Representation	Sample Type	Sample Number	Field Vane (kPa)			Depth (ft)	
						Post-Peak	Peak			
0						10	20	30	40	0
0	TESTPIT	COBBLES, gravelly, sandy, trace silt, occasional boulders, frozen, compact (inferred), brown; rounded cobbles and boulders up to 400 mm nominal diameter. End of testpit at 0.3 m, refusal on frozen, compact soils. - UTM coordinates were measured on site using a handheld GPS device. - Soil descriptions are based on visual classification and field observation, in combination with laboratory testing. Some variation throughout the interpreted soil layers is expected. - Estimates of soil consistency were determined from excavator performance and visual classification of recovered samples. - Backfilled with excavated material on completion.			G1	20	40	60	80	0
1										1
2										2
3										3
4										4
5										5
6										6
7										7
7.5										7.5



Contractor: GARCIA AND SONS
 Drilling Rig Type: CAT 322C
 Logged By: ER
 Reviewed By: TM

Completion Depth: 0.3 m
 Start Date: 2021 February 19
 Completion Date: 2021 February 19
 Page 1 of 1

**PUBLIC SERVICES AND
PROCUREMENT
CANADA**

Testpit No: TP21-17

Project: KM 568 - 573 (TESTA RIVER) RECONSTRUCTION Project No: 704-TRN.VHWY03172-02
 Location: ALASKA HIGHWAY
 FORT NELSON, BC UTM: 431212 E; 6502329 N; Z 10

Depth (m)	Method Core Diameter (mm)	Soil Description	Graphical Representation	Sample Type	Sample Number	Field Vane (kPa)			Depth (ft)
						Post-Peak	Peak		
						Plastic Limit	Moisture Content	Liquid Limit	
0						20	40	80	0
0	TESTPIT	COBBLES, gravelly, trace sand, trace silt, frozen, compact (inferred), brown; rounded cobbles up to 200 mm nominal diameter. End of testpit at 0.45 m, refusal on frozen, compact soils. - UTM coordinates were measured on site using a handheld GPS device. - Soil descriptions are based on visual classification and field observation, in combination with laboratory testing. Some variation throughout the interpreted soil layers is expected. - Estimates of soil consistency were determined from excavator performance and visual classification of recovered samples. - Backfilled with excavated material on completion.			G1	•	•	•	1
1									2
2									3
3									4
4									5
5									6
6									7
7									8
7.5									9
									10
									11
									12
									13
									14
									15
									16
									17
									18
									19
									20
									21
									22
									23
									24
									25



Contractor: GARCIA AND SONS

Completion Depth: 0.45 m

Drilling Rig Type: CAT 322C

Start Date: 2021 February 19

Logged By: ER

Completion Date: 2021 February 19

Reviewed By: TM

Page 1 of 1

**PUBLIC SERVICES AND
PROCUREMENT
CANADA**

Testpit No: TP21-18

Project: KM 568 - 573 (TESTA RIVER) RECONSTRUCTION Project No: 704-TRN.VHWY03172-02
 Location: ALASKA HIGHWAY
 FORT NELSON, BC UTM: 431025 E; 6502329 N; Z 10

Depth (m)	Method Core Diameter (mm)	Soil Description	Graphical Representation	Sample Type	Sample Number	Particle Size Distribution			Field Vane (kPa)			Depth (ft)		
						Gravel (%)	Sand (%)	Silt & Clay (%)	Post-Peak	Peak	Liquid Limit		Moisture Content	Plastic Limit
0												0		
0-4.3		COBBLES and GRAVEL, sandy, damp, loose to compact (inferred), brown; rounded cobbles up to 250 mm nominal diameter.										0-13.4		
4.3-4.7		- GRAVEL, cobbley, sandy, trace silt below 3.5 m. Seepage observed at 4.3 m on completion.			G1	41	15.7	1.3				13.4-14.6		
4.7-4.75		CLAY, some gravel, moist, stiff (inferred), high plastic, black. End of testpit at 4.7 m, limit of excavator reach.			G2	39	28.9	3.1				14.6-15.1		
4.75-7.5		- UTM coordinates were measured on site using a handheld GPS device. - Ground surface elevation estimated using a digital elevation model provided by McElhanney, dated June 2017. - Soil descriptions are based on visual classification and field observation, in combination with laboratory testing. Some variation throughout the interpreted soil layers is expected. - Estimates of soil consistency were determined from excavator performance and visual classification of recovered samples. - Moderate seepage observed at 4.3 m in open hole on completion. - Backfilled with excavated material on completion.			G3							15.1-24.6		



Contractor: GARCIA AND SONS

Completion Depth: 4.7 m

Drilling Rig Type: CAT 322C

Start Date: 2021 February 19

Logged By: ER

Completion Date: 2021 February 19

Reviewed By: TM

Page 1 of 1

**PUBLIC SERVICES AND
PROCUREMENT
CANADA**

Testpit No: TP21-19

Project: KM 568 - 573 (TESTA RIVER) RECONSTRUCTION Project No: 704-TRN.VHWY03172-02
 Location: ALASKA HIGHWAY
 FORT NELSON, BC UTM: 430998 E; 6502274 N; Z 10

Depth (m)	Method Core Diameter (mm)	Soil Description	Graphical Representation	Sample Type	Sample Number	Particle Size Distribution			▲ Pocket Pen. (kPa) ▲ 100 200 300 400			Depth (ft)								
						Gravel (%)	Sand (%)	Silt & Clay (%)	Field Vane (kPa)											
									Post-Peak	Peak										
0												0								
0-4	TESTPIT	GRAVEL, sandy, cobbley, trace silt, trace rootlets, occasional boulder, damp, compact (inferred), brown; rounded cobbles and boulders up to 550 mm nominal diameter. - Boulder 1,000 mm nominal diameter at 2.4 m.		G1	46	30.9	2.1	●	●	▲		0								
4-10		GRAVEL and SAND, cobbley, trace silt, moist, compact (inferred), brown; rounded cobbles up to 250 mm nominal diameter.										G2								10
10-13		CLAY, some gravel, moist, stiff (inferred), high plastic, black.										G3								
13-7.5		End of testpit at 4.0 m, limit of excavator reach. - UTM coordinates were measured on site using a handheld GPS device. - Ground surface elevation estimated using a digital elevation model provided by McElhanney, dated June 2017. - Soil descriptions are based on visual classification and field observation, in combination with laboratory testing. Some variation throughout the interpreted soil layers is expected. - Estimates of soil consistency were determined from excavator performance and visual classification of recovered samples. - Dry on completion. - Backfilled with excavated material on completion.										14-25								



Contractor: GARCIA AND SONS	Completion Depth: 4 m
Drilling Rig Type: CAT 322C	Start Date: 2021 February 19
Logged By: ER	Completion Date: 2021 February 19
Reviewed By: TM	Page 1 of 1

APPENDIX C

LABORATORY TEST RESULTS

MOISTURE CONTENT and 75 MICRON FINES CONTENT TEST RESULTS

ASTM D2216, ASTM D1140

Project: Alaska Highway Km 568 - 571 Design	Borehole No.: 70
Project No.: 704-TRN.HWY03172-02	Date Tested: March 9, 2021
Client: Public Services and Procurement Canada	Tested By: EE
Project Engineer: Nick Ekman	Page: 1 of 3

Sample Number	Depth m	Moisture Content (%)	Fines Content (%)	Visual Description of Soil
BH21-01	SPT01 @ 0.9 - 1.5	2.1		GRAVEL and SAND, trace silt, moist, brown
BH21-01	LPT01 @ 4.0 - 4.6	4.5		GRAVEL, some sand, trace silt, moist, brown
BH21-01	LPT02 @ 7.0 - 7.6	6.0		GRAVEL and SAND, some silt, trace organics, moist, brown
BH21-02	SPT01 @ 0.9 - 1.5	8.4		GRAVEL, sandy, trace silt, moist, brown
BH21-02	LPT01 @ 7.0 - 7.6	8.0	8.5	GRAVEL, sandy, trace silt, moist, brown
BH21-02	SPT05 @ 8.5 - 9.1	15.5		SILT and SAND, some gravel, trace organics, moist, brown
BH21-03	SPT01 @ 0.9 - 1.5	3.6		SAND and GRAVEL, trace silt, moist, brown
BH21-03	SPT02 @ 4.0 - 4.6	10.1		GRAVEL, some sand, trace silt, moist, brown
BH21-03	SPT03 @ 5.5 - 6.1	9.8	14	SAND, some gravel, some silt, moist, brown
BH21-04	SPT01 @ 1.1 - 1.7	8.2		GRAVEL, some sand, trace silt, moist, brown
BH21-04	LPT01 @ 4.1 - 4.7	10.9		GRAVEL, some sand, some silt, moist, brown
BH21-04	SPT05 @ 8.7 - 9.3	8.0		GRAVEL and SAND, some silt, moist, brown
BH21-05	G1 @ 0.3 - 0.6	49.6		SAND, silty, wood debris, moist, brown
BH21-05	SPT02 @ 2.4 - 3.0	1.9		SAND and GRAVEL, trace silt, dry, brown
BH21-05	G2 @ 6.4 - 6.7	9.7		SAND and GRAVEL, trace silt, moist, brown
BH21-05	SPT04 @ 7.0 - 7.6	7.6	15	GRAVEL, some sand, some silt, moist, brown
BH21-05	SPT05 @ 8.5 - 9.1	5.7		GRAVEL and SAND, some silt, moist, brown
TP21-01	G1 @ 0.6 - 0.9	2.3		GRAVEL and SAND, trace silt, moist, brown
TP21-01	G2 @ 0.9 - 1.2	5.0		SAND, some gravel, trace silt, moist, brown
TP21-01	G4 @ 2.7 - 3.0	6.3		SAND and GRAVEL, trace silt, moist, brown
TP21-01	G5 @ 4.3 - 4.6	3.2		GRAVEL and SAND, trace silt, moist, brown
TP21-02	G3 @ 13.7 - 14.3	15.0	71	CLAY, silty, some gravel, trace sand, moist, brown
TP21-02	G4 @ 4.4 - 4.7	21.4		CLAY, silty, trace sand, moist, black
TP21-02	G5 @ 5.2 - 5.5	5.4		GRAVEL, some silt, some sand, moist, dark brown
TP21-03	G1 @ 0.3 - 0.6	14.3	18	SAND and GRAVEL, some silt, trace organics, moist, brown

* Non-standard sample size

Reviewed By: ASc.T.

Data presented hereon is for the sole use of the stipulated client. Tetra Tech is not responsible, nor can be held liable, for use made of this report by any other party, with or without the knowledge of Tetra Tech. The testing services reported herein have been performed to recognized industry standards, unless noted. No other warranty is made. These data do not include or represent any interpretation or opinion of specification compliance or material suitability. Should engineering interpretation be required, Tetra Tech will provide it upon written request.



MOISTURE CONTENT and 75 MICRON FINES CONTENT TEST RESULTS

ASTM D2216, ASTM D1140

Project: Alaska Highway Km 568 - 571 Design Borehole No.: 70
 Project No.: 704-TRN.HWY03172-02 Date Tested: March 9, 2021
 Client: Public Services and Procurement Canada Tested By: EE
 Project Engineer: Nick Ekman Page: 2 of 3

Sample Number	Depth m	Moisture Content (%)	Fines Content (%)	Visual Description of Soil
TP21-03	G2 @ 1.2 - 1.5	2.3		GRAVEL and SAND, trace silt, moist, brown
TP21-03	G3 @ 3.0 - 3.7	4.1		GRAVEL and SAND, trace silt, trace organics, moist, black
TP21-04	G3 @ 2.4 - 2.7	5.1		GRAVEL and SAND, some silt, moist, brown
TP21-05	G1 @ 0.1 - 0.2	5.9		SAND and GRAVEL, some silt, wood debris, moist, grey
TP21-05	G3 @ 3.7 - 4.0	17.3		SAND and GRAVEL, some silt, very moist, brown
TP21-06	G1 @ 0.6 - 0.9	29.0	34	SAND, silty, trace gravel, trace clay, wet, black
TP21-06	G3 @ 4.0 - 4.3	10.2	9.3	SAND and GRAVEL, trace silt, trace organics, moist, brown
TP21-07	G1 @ 0.2 - 0.5	2.8		GRAVEL, some sand, trace silt, moist, brown
TP21-07	G3 @ 4.0 - 4.3	3.9		GRAVEL and SAND, trace silt, moist, brown
TP21-08	G1 @ 0.8 - 1.1	3.7		GRAVEL and SAND, trace silt, moist, dark brown
TP21-08	G2 @ 3.2 - 3.5	5.9		GRAVEL and SAND, trace silt, moist, brown
TP21-09	G1 @ 0.6 - 0.9	2.4		GRAVEL and SAND, trace silt, moist, brown
TP21-10	G1 @ 0.8 - 1.1	5.1		GRAVEL and SAND, trace silt, moist, brown
TP21-10	G2 @ 2.4 - 2.7	4.9		GRAVEL and SAND, trace silt, moist, brown
TP21-11	G2 @ 0.9 - 1.2	2.0		GRAVEL and SAND, trace silt, moist, brown
TP21-12	G2 @ 3.7 - 4.0	3.0		COBBLES and GRAVEL, some sand, trace silt, moist, brown
TP21-13	G1 @ 0.6 - 0.9	3.7		GRAVEL and SAND, trace silt, trace organics, moist, brown
TP21-14	G1 @ 0.0 - 0.3	5.1		GRAVEL and SAND, trace silt, moist, brown
TP21-16	G1 @ 0.0 - 0.3	7.5		GRAVEL and SAND, trace silt, moist, grey-brown
TP21-17	G1 @ 0.0 - 0.5	6.7		GRAVEL and SAND, trace silt, moist, brown
TP21-19	G2 @ 3.0 - 3.4	1.4		GRAVEL and SAND, trace silt, moist, brown
BH21-02	G1 @ 3.4 - 3.7	16.2	69	CLAY, silty, sandy, moist, grey
TP21-13	G3 @ 3.8 - 4.1	24.1	98	CLAY, silty, trace sand, moist, brown

Reviewed By: *Brin Gunnerson* ASc.T.

Data presented hereon is for the sole use of the stipulated client. Tetra Tech is not responsible, nor can be held liable, for use made of this report by any other party, with or without the knowledge of Tetra Tech. The testing services reported herein have been performed to recognized industry standards, unless noted. No other warranty is made. These data do not include or represent any interpretation or opinion of specification compliance or material suitability. Should engineering interpretation be required, Tetra Tech will provide it upon written request.



ATTERBERG LIMITS - LABORATORY RESULTS SUMMARY

ASTM D4318

Project: Alaska Highway Km 568 - 571

Test Hole No.: BH 21 -02, TP 21 - 02 to TP 21 - 13

Project No.: 704-TRN.VHWY03172-02

Submitted By: ER

Sampled By: ER

Client: Public Services and Procurement Canada

Date Sampled: February 28, 2021

Tested By: EE

Attention:

Date Tested: March 17, 2021

Laboratory: Nanaimo

Test Hole Number	Sample ID	Depth (m)	Moisture Content (%)	Atterberg Limits			Mod. USCS	Soil Description <small>Type, constituents/composition, structure, moisture, consistency, plasticity, colour, odour, inclusions.</small>
				LL	PL	PI		
BH 21 - 02	G1	3.4 - 3.7	16.2	35	14	21	CI	CLAY, some silt, trace sand, moist, grey
TP 21 - 02	G3	13.7 - 14.3	14.7	36	19	17	CI	CLAY, some silt, some gravel, trace sand, moist, brown
TP 21 - 02	G4	4.4 - 4.7	21.4	25	17	8	CL - ML	CLAY, silty, trace sand, moist, brown
TP 21 - 05	G2	1.8 - 2.1	88.3	N/A	N/A	N/A	OL	PEAT - dark brown, moderately decomposed, somewhat dry, mainly woody fibrous PEAT, some amorphous granular matter, slight smell, moderate tensile strength. Plastic limit not possible.
TP 21 - 06	G2	1.2 - 1.5	20.0	48	27	21	CI - CH	CLAY, some silt, some gravel, some sand, moist, brown
TP 21 - 08	G3	3.5 - 3.5	26.9	50	21	29	CI - CH	CLAY, some silt, trace gravel, trace sand, moist, brown
TP 21 - 13	G3	3.8 - 4.1	24.1	27	18	9	CL	CLAY, silty, trace sand, moist, brown

Remarks:

Reviewed By:  _____ **ASc.T.**

Data presented hereon is for the sole use of the stipulated client. Tetra Tech is not responsible, nor can be held liable, for use made of this report by any other party, with or without the knowledge of Tetra Tech. The testing services reported herein have been performed to recognized industry standards, unless noted. No other warranty is made. These data do not include or represent any interpretation or opinion of specification compliance or material suitability. Should engineering interpretation be required, Tetra Tech will provide it upon written request.



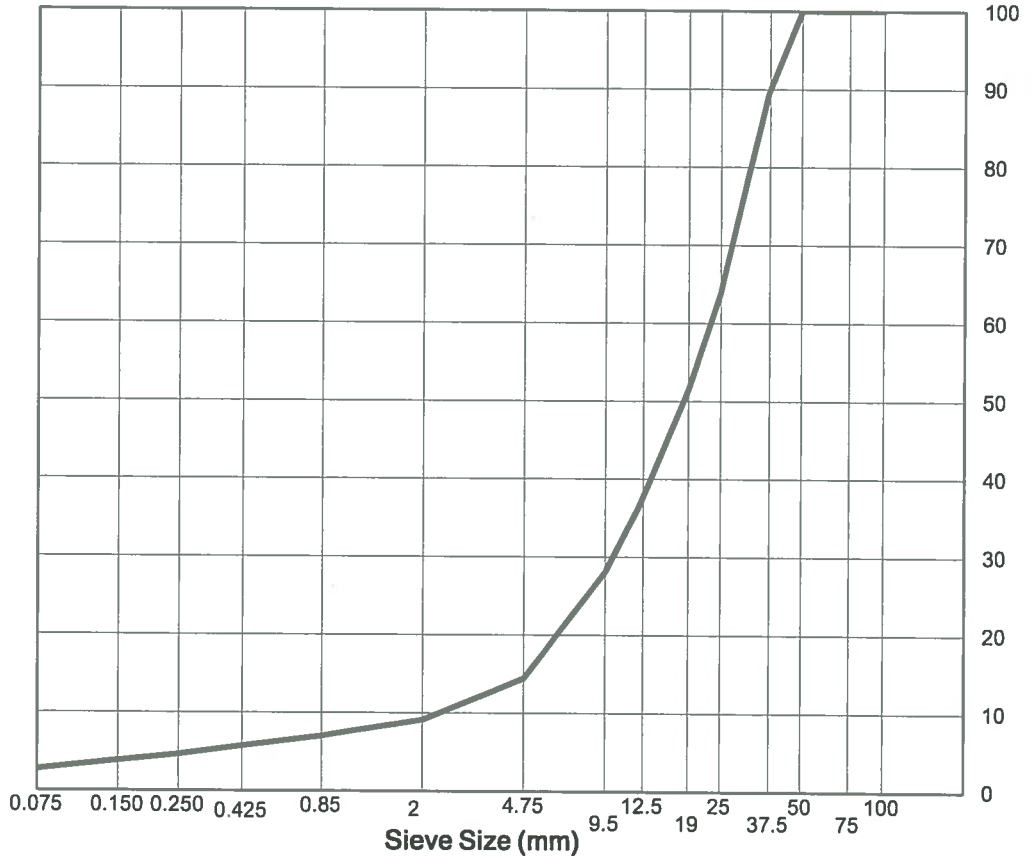
SIEVE ANALYSIS REPORT

Washed Sieve: ASTM C136 and C117

Project No.: 704-TRN.VHWY03172-01
 Project: Alaska Highway Km 568-571 Design
 Client: Public Services and Procurement Canada
 Attention: _____
 Email: _____
 Description: GRAVEL, some sand, trace silt, moist, brown
 Source: BH 21 - 01
 Supplier: _____
 Sample Location: LPT01 @ 4.0 - 4.6 m
 Specification: _____

Sample No.: 71
 Date Sampled: March 9, 2021
 Sampled by: ER
 Date Tested: March 16, 2021
 Tested by: EE Office: Nanaimo
 Moisture Content (as received): 4.5%
 No. Crushed Faces: Two (2) or Three (3)
 By particle mass: _____

Sieve Size	Percent Passing
125	100
100	100
75	100
50	100
37.5	89
25	64
19	51
12.5	36
9.5	28
4.75	14
2.00	9
0.85	7
0.425	6
0.250	5
0.150	4
0.075	2.7



Remarks: _____

Reviewed By: *Quinn Gunnerson* ASc.T.

Data presented hereon is for the sole use of the stipulated client. Tetra Tech is not responsible, nor can be held liable, for use made of this report by any other party, with or without the knowledge of Tetra Tech. The testing services reported herein have been performed to recognized industry standards, unless noted. No other warranty is made. These data do not include or represent any interpretation or opinion of specification compliance or material suitability. Should engineering interpretation be required, Tetra Tech will provide it upon written request.



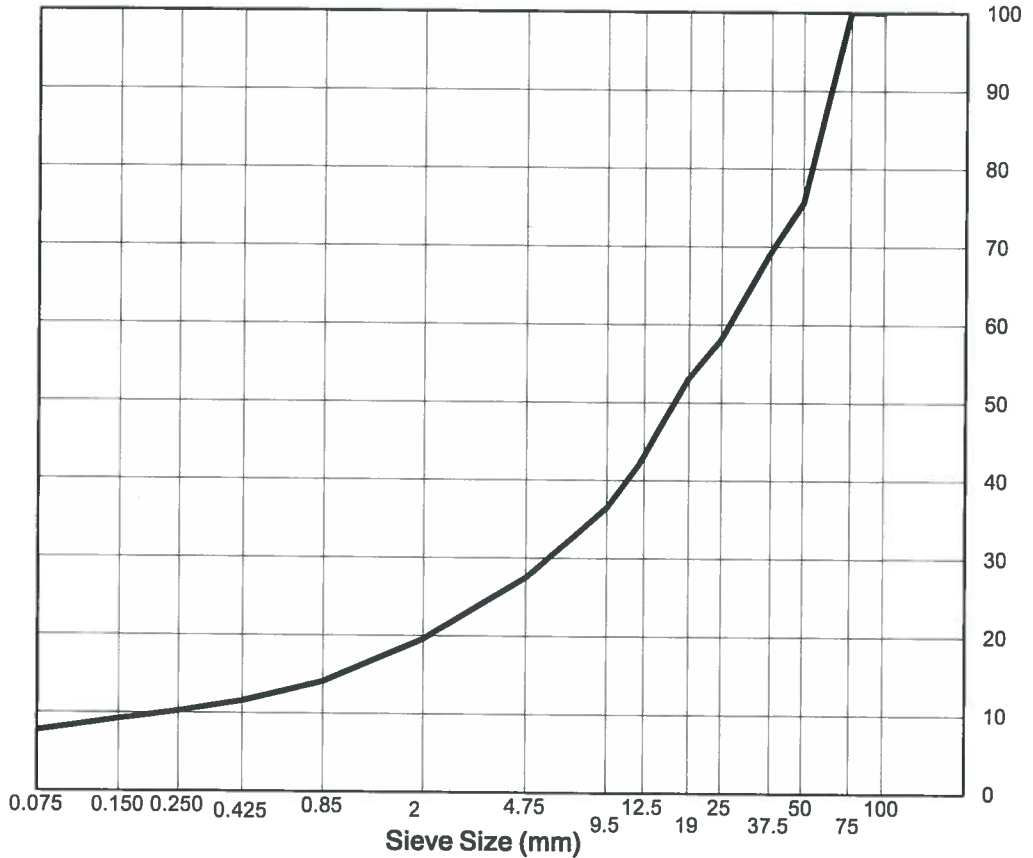
SIEVE ANALYSIS REPORT

Washed Sieve: ASTM C136 and C117

Project No.: 704-TRN.VHWY03172-01
 Project: Alaska Highway Km 568-571 Design
 Client: Public Services and Procurement Canada
 Attention: _____
 Email: _____
 Description: GRAVEL, sandy, trace silt, moist, brown
 Source: BH 21 - 03
 Supplier: _____
 Sample Location: LPT01 @ 2.4 - 3.0 m
 Specification: _____

Sample No.: 72
 Date Sampled: March 9, 2021
 Sampled by: ER
 Date Tested: March 16, 2021
 Tested by: EE Office: Nanaimo
 Moisture Content (as received): 3.7%
 No. Crushed Faces: Two (2) or Three (3)
 By particle mass: _____

Sieve Size	Percent Passing
125	100
100	100
75	100
50	76
37.5	69
25	58
19	53
12.5	42
9.5	37
4.75	28
2.00	20
0.85	14
0.425	12
0.250	10
0.150	9
0.075	7.7



Remarks: _____

Reviewed By: *Kevin Sumner* ASCT.

Data presented hereon is for the sole use of the stipulated client. Tetra Tech is not responsible, nor can be held liable, for use made of this report by any other party, with or without the knowledge of Tetra Tech. The testing services reported herein have been performed to recognized industry standards, unless noted. No other warranty is made. These data do not include or represent any interpretation or opinion of specification compliance or material suitability. Should engineering interpretation be required, Tetra Tech will provide it upon written request.



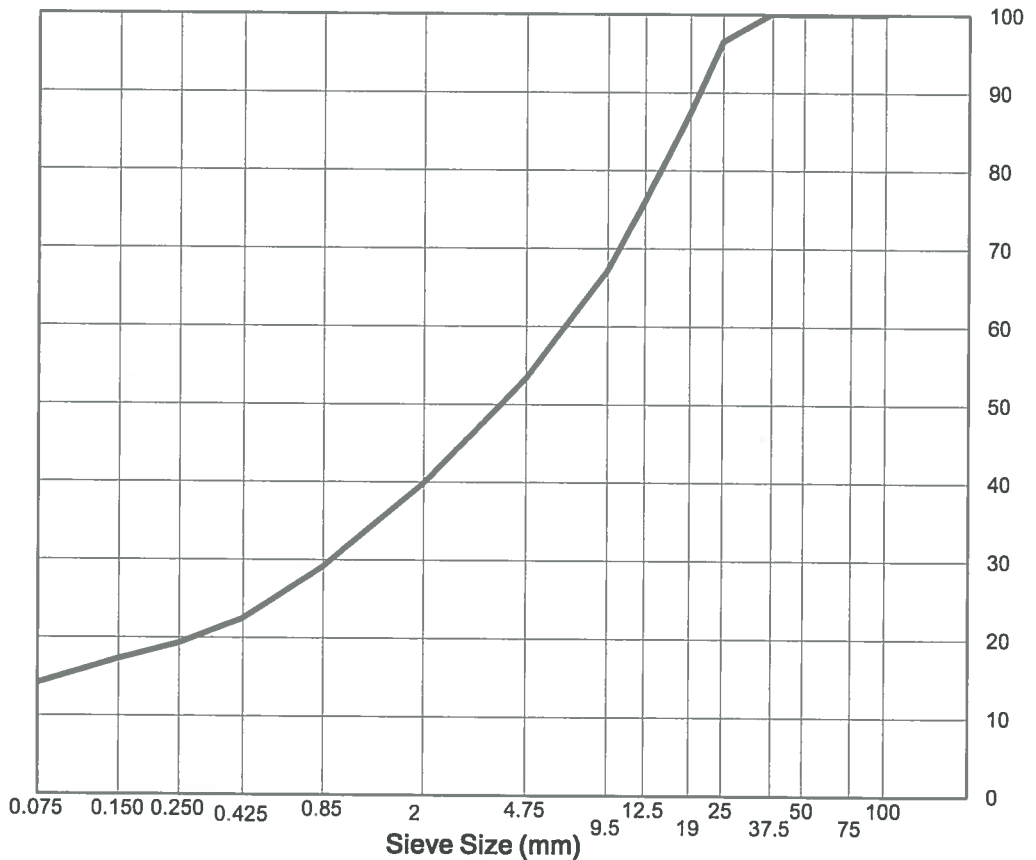
SIEVE ANALYSIS REPORT

Washed Sieve: ASTM C136 and C117

Project No.: 704-TRN.VHWY03172-01
 Project: Alaska Highway Km 568-571 Design
 Client: Public Services and Procurement Canada
 Attention: _____
 Email: _____
 Description: GRAVEL and SAND, some silt, moist, brown
 Source: BH 21 - 04
 Supplier: _____
 Sample Location: SPT03 and SPT04 @ 5.6 - 7.8 m
 Specification: _____

Sample No.: 74
 Date Sampled: March 9, 2021
 Sampled by: ER
 Date Tested: March 16, 2021
 Tested by: EE Office: Nanaimo
 Moisture Content (as received): 7.5%
 No. Crushed Faces: Two (2) or Three (3)
 By particle mass: _____

Sieve Size	Percent Passing
150	100
100	100
75	100
50	100
37.5	100
25	97
19	87
12.5	75
9.5	67
4.75	53
2.00	40
0.85	29
0.425	22
0.250	19
0.150	17
0.075	14



Remarks: _____

Reviewed By: *Brian Summers* ASce.T.

Data presented hereon is for the sole use of the stipulated client. Tetra Tech is not responsible, nor can be held liable, for use made of this report by any other party, with or without the knowledge of Tetra Tech. The testing services reported herein have been performed to recognized industry standards, unless noted. No other warranty is made. These data do not include or represent any interpretation or opinion of specification compliance or material suitability. Should engineering interpretation be required, Tetra Tech will provide it upon written request.



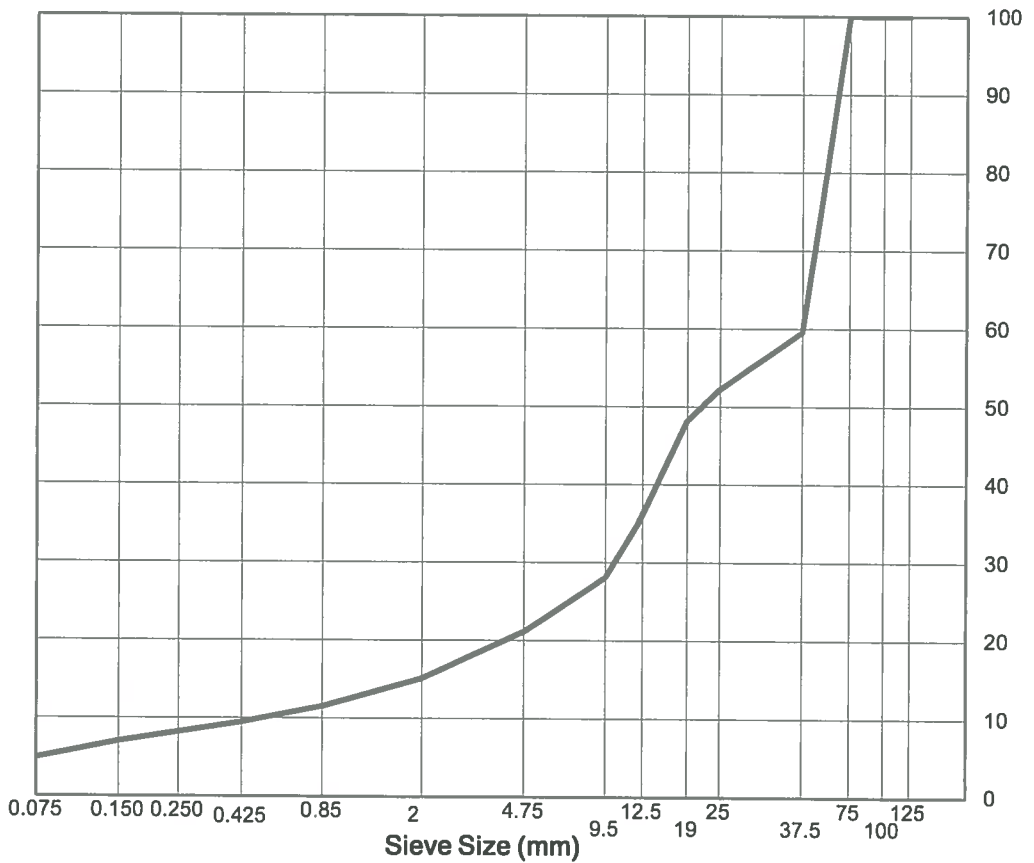
SIEVE ANALYSIS REPORT

Washed Sieve: ASTM C136 and C117

Project No.: 704-TRN.VHWY03172-01
 Project: Alaska Highway Km 568-571 Design
 Client: Public Services and Procurement Canada
 Attention: _____
 Email: _____
 Description: GRAVEL, sandy, trace silt, moist, brown
 Source: BH 21 - 05
 Supplier: _____
 Sample Location: LPT01 @ 4.0 - 4.6 m
 Specification: _____

Sample No.: 75
 Date Sampled: March 9, 2021
 Sampled by: ER
 Date Tested: March 16, 2021
 Tested by: EE Office: Nanaimo
 Moisture Content (as received): 4.2%
 No. Crushed Faces: Two (2) or Three (3)
 By particle mass: _____

Sieve Size	Percent Passing
150	100
125	100
100	100
75	100
50	60
25	52
19	48
12.5	35
9.5	28
4.75	21
2.00	15
0.85	12
0.425	9
0.250	8
0.150	7
0.075	4.9



Remarks: _____

Reviewed By: *Quinn Gunnerson* ASsc.T.

Data presented hereon is for the sole use of the stipulated client. Tetra Tech is not responsible, nor can be held liable, for use made of this report by any other party, with or without the knowledge of Tetra Tech. The testing services reported herein have been performed to recognized industry standards, unless noted. No other warranty is made. These data do not include or represent any interpretation or opinion of specification compliance or material suitability. Should engineering interpretation be required, Tetra Tech will provide it upon written request.



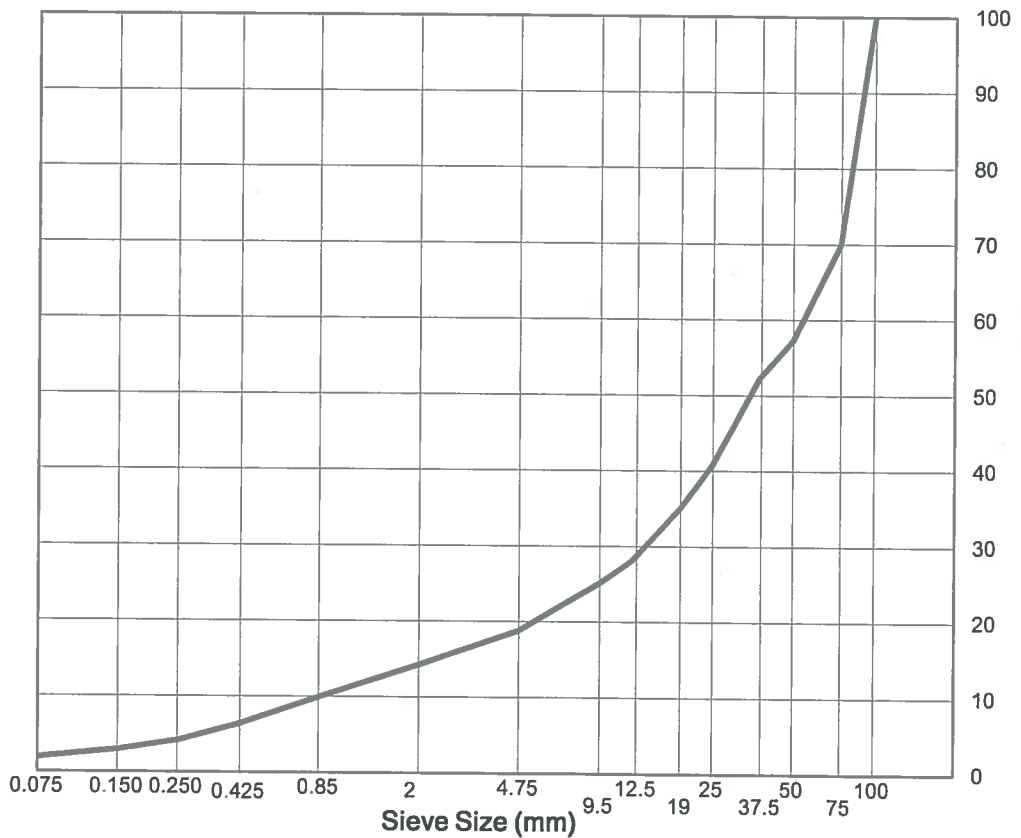
SIEVE ANALYSIS REPORT

Washed Sieve: ASTM C136 and C117

Project No.: 704-TRN.VHWY03172-01
 Project: Alaska Highway Km 568-571 Design
 Client: Public Services and Procurement Canada
 Attention: _____
 Email: _____
 Description: GRAVEL, cobbly, some sand, trace silt, moist, grey-brown
 Source: TP 21 - 02
 Supplier: _____
 Sample Location: G2 @ 0.9 - 1.2 m
 Specification: _____

Sample No.: 76
 Date Sampled: March 9, 2021
 Sampled by: ER
 Date Tested: March 9, 2021
 Tested by: EE Office: Nanaimo
 Moisture Content (as received): 6.6%
 No. Crushed Faces: Two (2) or Three (3)
 By particle mass: _____

Sieve Size	Percent Passing
125	100
100	100
75	70
50	57
37.5	52
25	41
19	35
12.5	28
9.5	25
4.75	19
2.00	14
0.85	10
0.425	6
0.250	4
0.150	3
0.075	1.9



Remarks: _____

Reviewed By: *Brian Gunnerson* ASc.T.

Data presented hereon is for the sole use of the stipulated client. Tetra Tech is not responsible, nor can be held liable, for use made of this report by any other party, with or without the knowledge of Tetra Tech. The testing services reported herein have been performed to recognized industry standards, unless noted. No other warranty is made. These data do not include or represent any interpretation or opinion of specification compliance or material suitability. Should engineering interpretation be required, Tetra Tech will provide it upon written request.



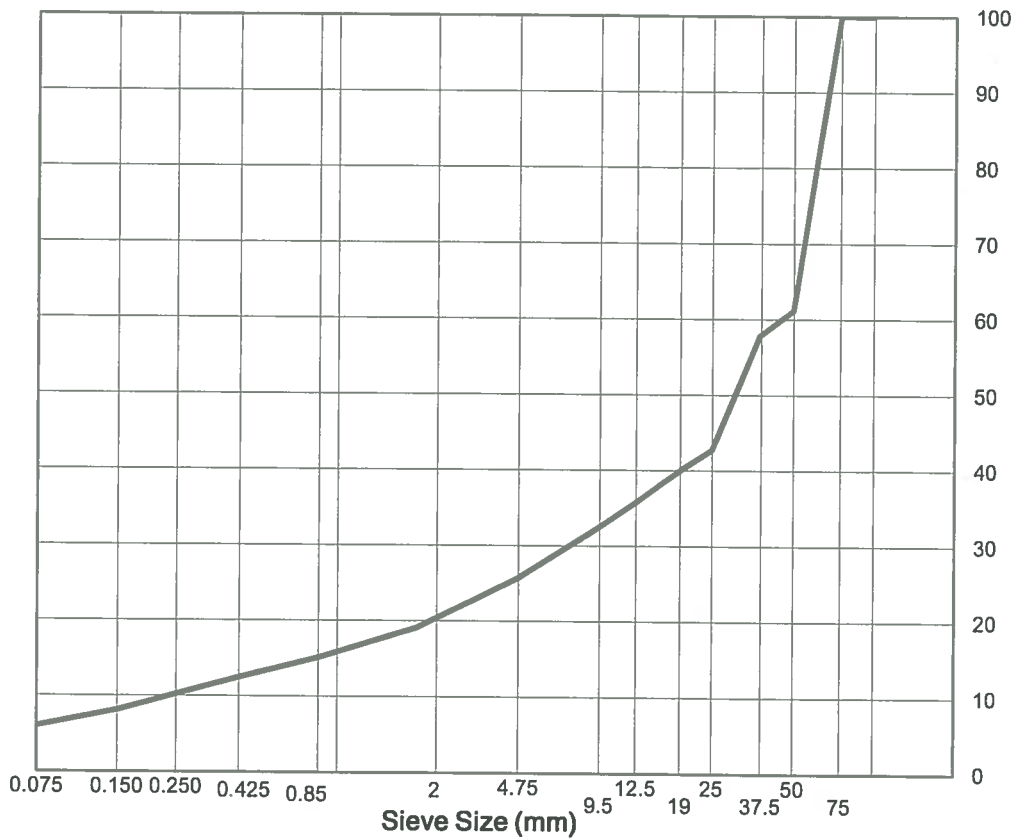
SIEVE ANALYSIS REPORT

Washed Sieve: ASTM C136 and C117

Project No.: 704-TRN.VHWY03172-01
 Project: Alaska Highway Km 568-571 Design
 Client: Public Services and Procurement Canada
 Attention: _____
 Email: _____
 Description: GRAVEL, some sand, trace silt, moist, brown
 Source: TP 21 - 04
 Supplier: _____
 Sample Location: G3 @ 2.4 - 2.7 m
 Specification: _____

Sample No.: 77
 Date Sampled: March 9, 2021
 Sampled by: ER
 Date Tested: March 9, 2021
 Tested by: EE Office: Nanaimo
 Moisture Content (as received): 5.1%
 No. Crushed Faces: Two (2) or Three (3)
 By particle mass: _____

Sieve Size	Percent Passing
100	100
75	100
50	61
37.5	58
25	43
19	40
12.5	35
9.5	33
4.75	26
2.00	19
0.85	15
0.425	12
0.250	10
0.150	8
0.075	6.0



Remarks: _____

Reviewed By: *Brian Gunnerson* ASsc.T.

Data presented hereon is for the sole use of the stipulated client. Tetra Tech is not responsible, nor can be held liable, for use made of this report by any other party, with or without the knowledge of Tetra Tech. The testing services reported herein have been performed to recognized industry standards, unless noted. No other warranty is made. These data do not include or represent any interpretation or opinion of specification compliance or material suitability. Should engineering interpretation be required, Tetra Tech will provide it upon written request.



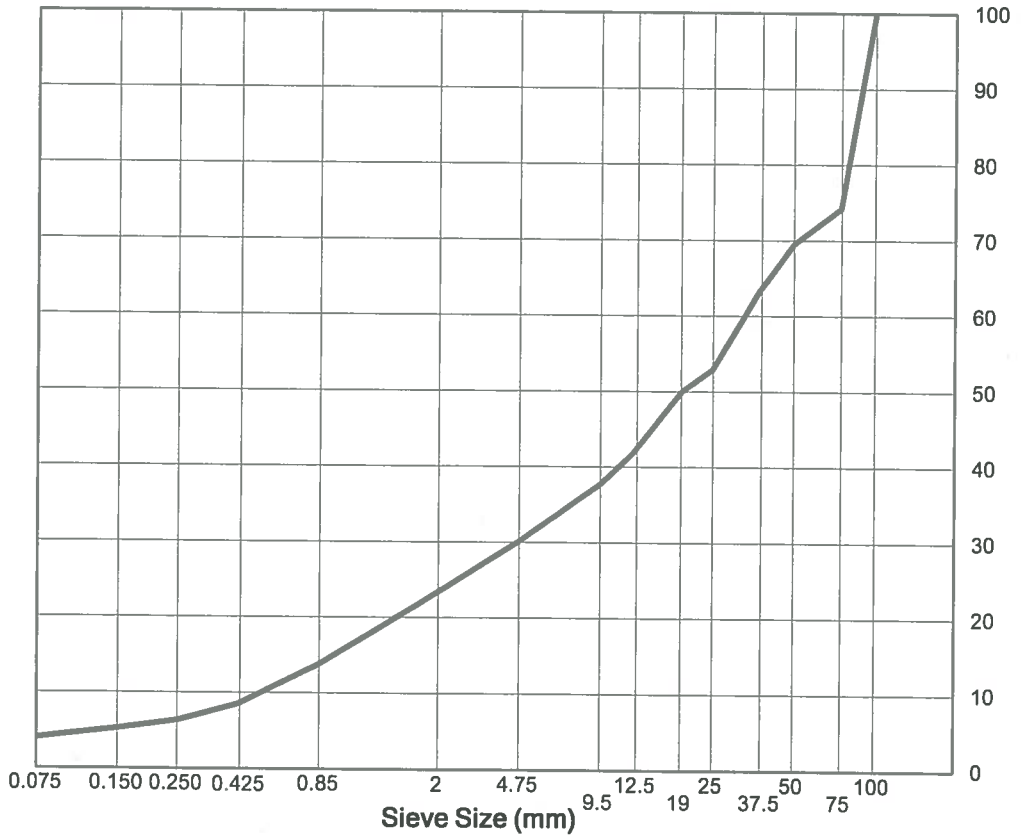
SIEVE ANALYSIS REPORT

Washed Sieve: ASTM C136 and C117

Project No.: 704-TRN.VHWY03172-01
 Project: Alaska Highway Km 568-571 Design
 Client: Public Services and Procurement Canada
 Attention: _____
 Email: _____
 Description: GRAVEL, cobbly, sandy, trace silt, moist, brown
 Source: TP 21 - 09
 Supplier: _____
 Sample Location: G2 @ 1.8 - 2.1 m
 Specification: _____

Sample No.: 78
 Date Sampled: March 9, 2021
 Sampled by: ER
 Date Tested: March 9, 2021
 Tested by: EE Office: Nanaimo
 Moisture Content (as received): 4.5%
 No. Crushed Faces: Two (2) or Three (3)
 By particle mass: _____

Sieve Size	Percent Passing
100	100
75	74
50	70
37.5	63
25	53
19	50
12.5	42
9.5	38
4.75	30
2.00	22
0.85	14
0.425	9
0.250	6
0.150	5
0.075	4.0



Remarks: _____

Reviewed By: *Oliver Summers* ASc.T.

Data presented hereon is for the sole use of the stipulated client. Tetra Tech is not responsible, nor can be held liable, for use made of this report by any other party, with or without the knowledge of Tetra Tech. The testing services reported herein have been performed to recognized industry standards, unless noted. No other warranty is made. These data do not include or represent any interpretation or opinion of specification compliance or material suitability. Should engineering interpretation be required, Tetra Tech will provide it upon written request.



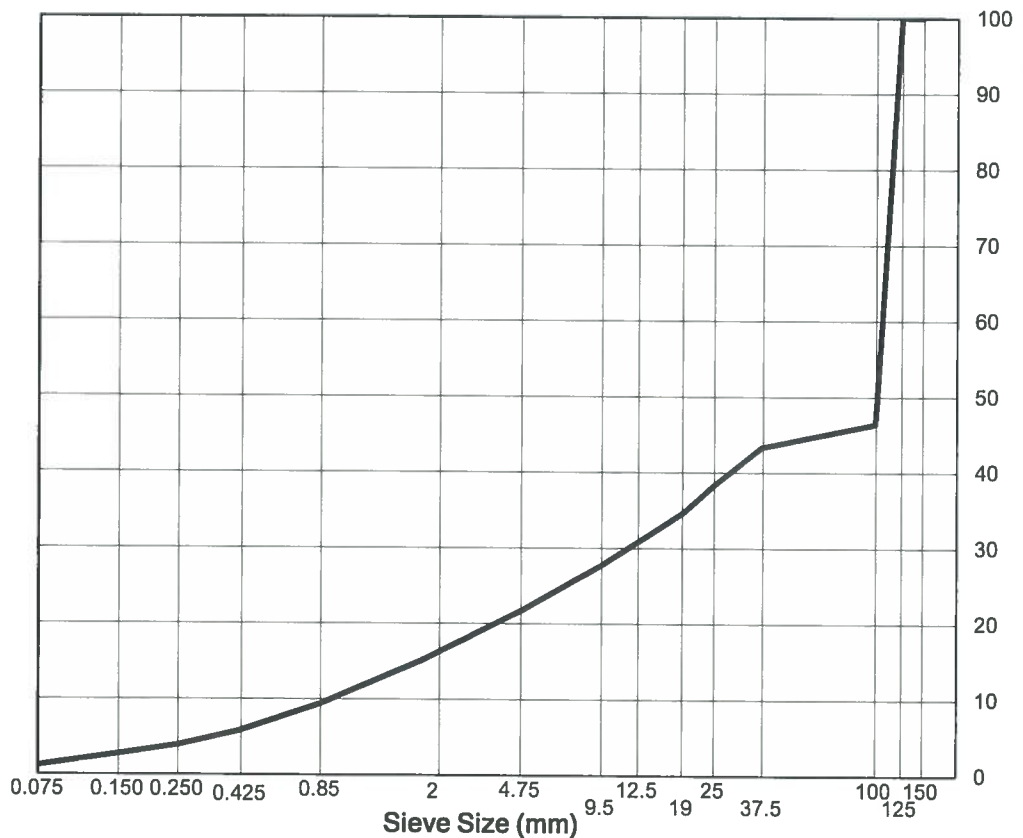
SIEVE ANALYSIS REPORT

Washed Sieve: ASTM C136 and C117

Project No.: 704-TRN.VHWHY03172-01
 Project: Alaska Highway Km 568-571 Design
 Client: Public Services and Procurement Canada
 Attention: _____
 Email: _____
 Description: Cobbles, gravelly, some sand, trace silt, moist, brown
 Source: TP 21 - 14
 Supplier: Jobsite
 Sample Location: G1 @ 0.0 - 0.3 m
 Specification: _____

Sample No.: 79
 Date Sampled: March 9, 2021
 Sampled by: ER
 Date Tested: March 9, 2021
 Tested by: EE Office: Nanaimo
 Moisture Content (as received): 5.1%
 No. Crushed Faces: Two (2) or Three (3)
 By particle mass: _____

Sieve Size	Percent Passing
150	100
125	100
100	46
37.5	43
25	38
19	35
12.5	30
9.5	28
4.75	22
2.00	15
0.85	9
0.425	6
0.250	4
0.150	3
0.075	1.2



Remarks: _____

Reviewed By: *Kevin Gorman* ASsc.T.

Data presented hereon is for the sole use of the stipulated client. Tetra Tech is not responsible, nor can be held liable, for use made of this report by any other party, with or without the knowledge of Tetra Tech. The testing services reported herein have been performed to recognized industry standards, unless noted. No other warranty is made. These data do not include or represent any interpretation or opinion of specification compliance or material suitability. Should engineering interpretation be required, Tetra Tech will provide it upon written request.



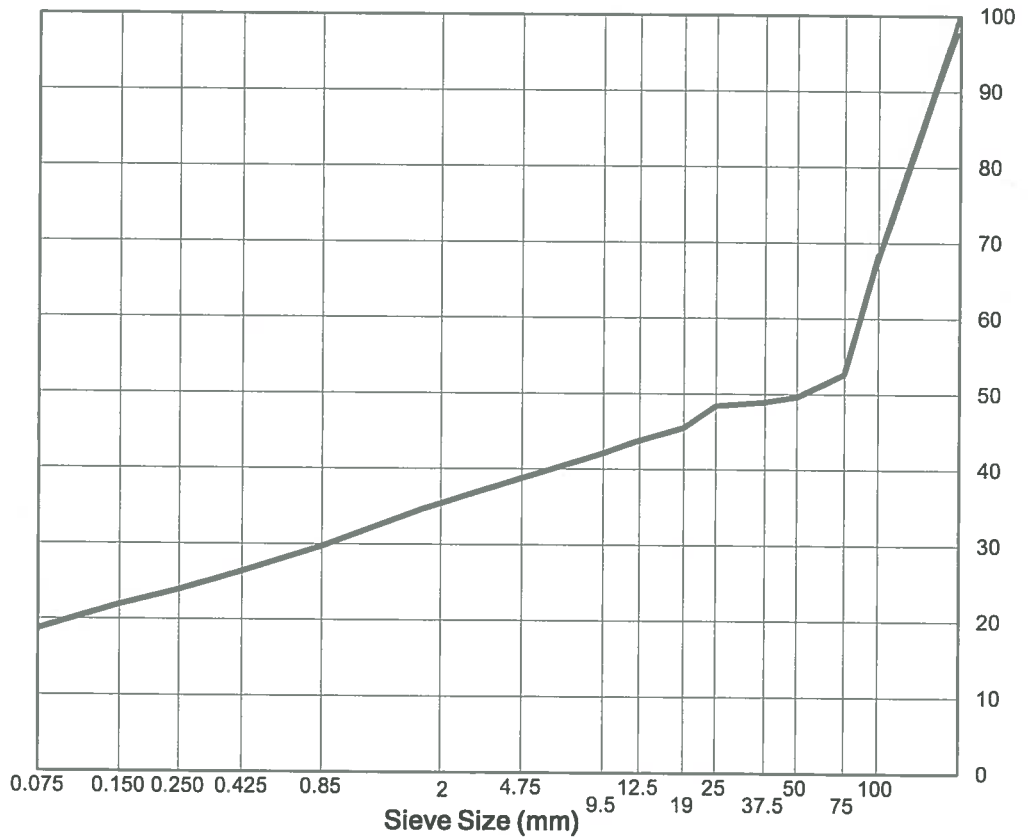
SIEVE ANALYSIS REPORT

Washed Sieve: ASTM C136 and C117

Project No.: 704-TRN.VHWY03172-01
 Project: Alaska Highway Km 568-571 Design
 Client: Public Services and Procurement Canada
 Attention: _____
 Email: _____
 Description: Cobbles, some sand, some gravel, some silt, moist, grey
 Source: TP 21 - 15
 Supplier: _____
 Sample Location: G1 @ 0.0 - 0.3 m
 Specification: _____

Sample No.: 80
 Date Sampled: March 9, 2021
 Sampled by: ER
 Date Tested: March 9, 2021
 Tested by: EE Office: Nanaimo
 Moisture Content (as received): 8.6%
 No. Crushed Faces: Two (2) or Three (3)
 By particle mass: _____

Sieve Size	Percent Passing
125	100
100	68
75	53
50	50
37.5	49
25	48
19	46
12.5	44
9.5	42
4.75	39
2.00	35
0.85	30
0.425	26
0.250	24
0.150	22
0.075	19



Remarks: _____

Reviewed By: *Brian Summers* ASc.T.

Data presented hereon is for the sole use of the stipulated client. Tetra Tech is not responsible, nor can be held liable, for use made of this report by any other party, with or without the knowledge of Tetra Tech. The testing services reported herein have been performed to recognized industry standards, unless noted. No other warranty is made. These data do not include or represent any interpretation or opinion of specification compliance or material suitability. Should engineering interpretation be required, Tetra Tech will provide it upon written request.



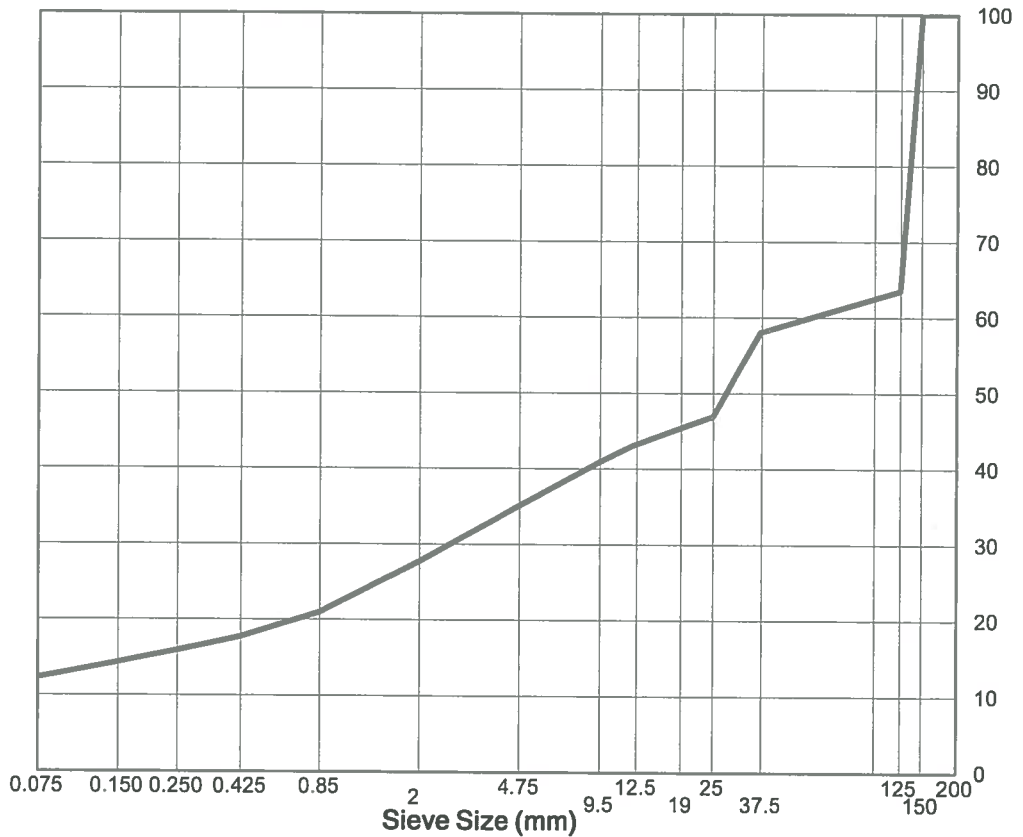
SIEVE ANALYSIS REPORT

Washed Sieve: ASTM C136 and C117

Project No.: 704-TRN.VHWY03172-01
 Project: Alaska Highway Km 568-571 Design
 Client: Public Services and Procurement Canada
 Attention: _____
 Email: _____
 Description: Cobbles, gravelly, sandy, some silt, very most, grey brown
 Source: TP 21 - 16
 Supplier: _____
 Sample Location: G1 @ 0.0 - 0.3 m
 Specification: _____

Sample No.: 81
 Date Sampled: March 9, 2021
 Sampled by: ER
 Date Tested: March 9, 2021
 Tested by: EE Office: Nanaimo
 Moisture Content (as received): 7.5%
 No. Crushed Faces: Two (2) or Three (3)
 By particle mass: _____

Sieve Size	Percent Passing
200	100
150	100
125	64
37.5	58
25	47
19	45
12.5	43
9.5	41
4.75	35
2.00	28
0.85	21
0.425	18
0.250	16
0.150	14
0.075	12



Remarks: _____

Reviewed By: *Brian Gunnerson* ASsc.T.

Data presented hereon is for the sole use of the stipulated client. Tetra Tech is not responsible, nor can be held liable, for use made of this report by any other party, with or without the knowledge of Tetra Tech. The testing services reported herein have been performed to recognized industry standards, unless noted. No other warranty is made. These data do not include or represent any interpretation or opinion of specification compliance or material suitability. Should engineering interpretation be required, Tetra Tech will provide it upon written request.



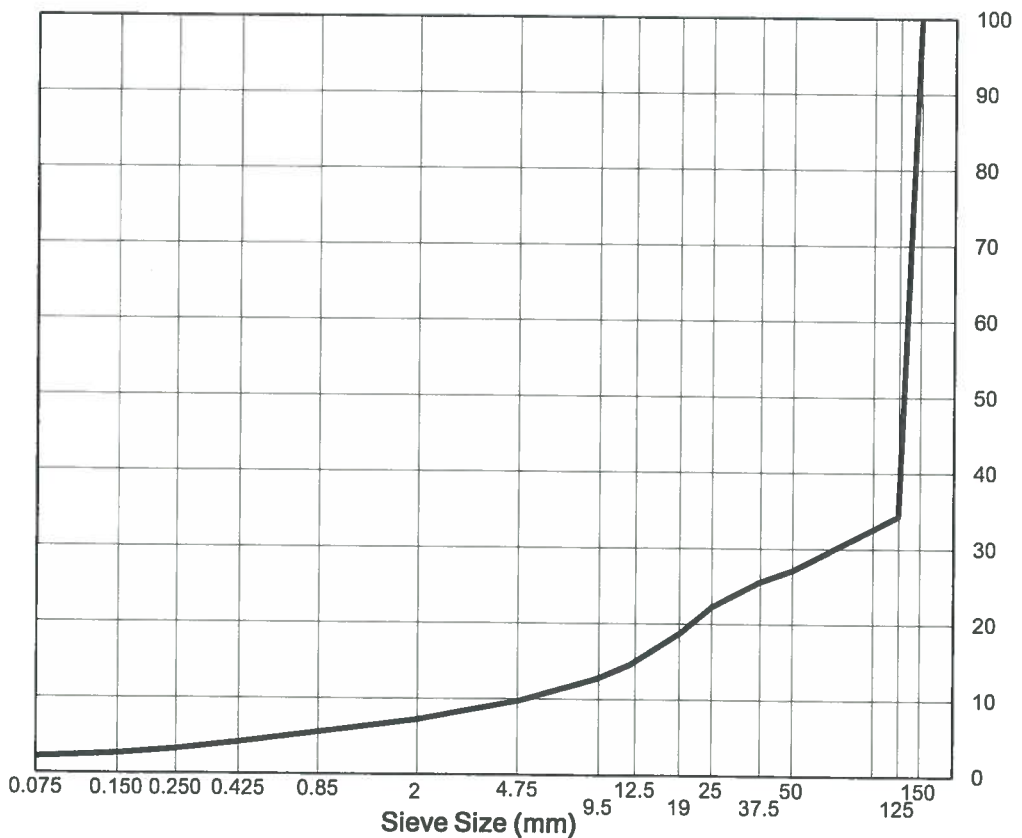
SIEVE ANALYSIS REPORT

Washed Sieve: ASTM C136 and C117

Project No.: 704-TRN.VHWY03172-01
 Project: Alaska Highway Km 568-571 Design
 Client: Public Services and Procurement Canada
 Attention: _____
 Email: _____
 Description: COBBLES, gravelly, trace sand, trace silt, moist, brown
 Source: TP 21 - 17
 Supplier: _____
 Sample Location: G1 @ 0.0 - 0.5 m
 Specification: _____

Sample No.: 82
 Date Sampled: March 9, 2021
 Sampled by: ER
 Date Tested: March 9, 2021
 Tested by: EE Office: Nanaimo
 Moisture Content (as received): 6.7%
 No. Crushed Faces: Two (2) or Three (3)
 By particle mass: _____

Sieve Size	Percent Passing
175	100
150	100
125	34
50	27
37.5	26
25	22
19	19
12.5	15
9.5	13
4.75	10
2.00	7
0.85	6
0.425	4
0.250	3
0.150	3
0.075	2.1



Remarks: _____

Reviewed By: *Oliver J. Gorman* ASsc.T.

Data presented hereon is for the sole use of the stipulated client. Tetra Tech is not responsible, nor can be held liable, for use made of this report by any other party, with or without the knowledge of Tetra Tech. The testing services reported herein have been performed to recognized industry standards, unless noted. No other warranty is made. These data do not include or represent any interpretation or opinion of specification compliance or material suitability. Should engineering interpretation be required, Tetra Tech will provide it upon written request.



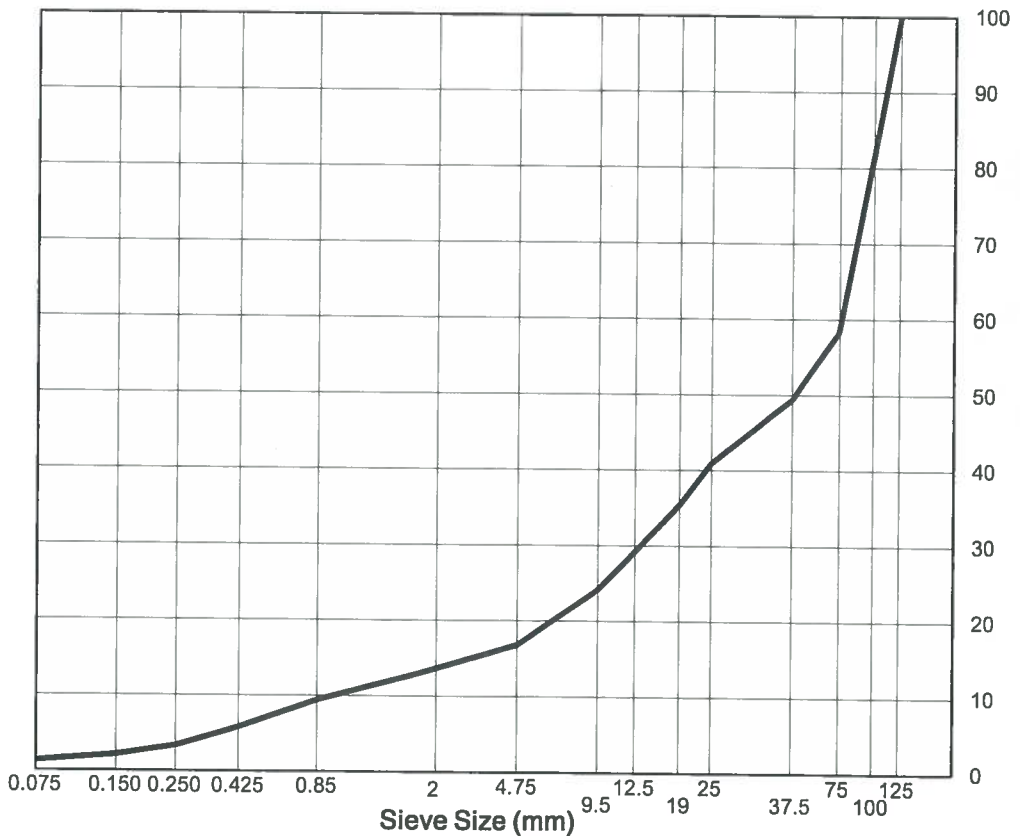
SIEVE ANALYSIS REPORT

Washed Sieve: ASTM C136 and C117

Project No.: 704-TRN.VHWY03172-01
 Project: Alaska Highway Km 568-571 Design
 Client: Public Services and Procurement Canada
 Attention: _____
 Email: _____
 Description: COBBLES and GRAVEL, some sand, trace silt, trace organics, moist, brown
 Source: TP 21 - 18
 Supplier: _____
 Sample Location: G1 @ 1.1 - 1.4 m
 Specification: _____

Sample No.: 92
 Date Sampled: March 9, 2021
 Sampled by: ER
 Date Tested: March 9, 2021
 Tested by: EE Office: Nanaimo
 Moisture Content (as received): 5.3%
 No. Crushed Faces: Two (2) or Three (3)
 By particle mass: _____

Sieve Size	Percent Passing
150	100
125	100
100	81
75	58
50	49
25	41
19	35
12.5	29
9.5	24
4.75	17
2.00	13
0.85	9
0.425	6
0.250	3
0.150	2
0.075	1.3



Remarks: _____

Reviewed By: *Alan Janner* ASCT.

Data presented hereon is for the sole use of the stipulated client. Tetra Tech is not responsible, nor can be held liable, for use made of this report by any other party, with or without the knowledge of Tetra Tech. The testing services reported herein have been performed to recognized industry standards, unless noted. No other warranty is made. These data do not include or represent any interpretation or opinion of specification compliance or material suitability. Should engineering interpretation be required, Tetra Tech will provide it upon written request.



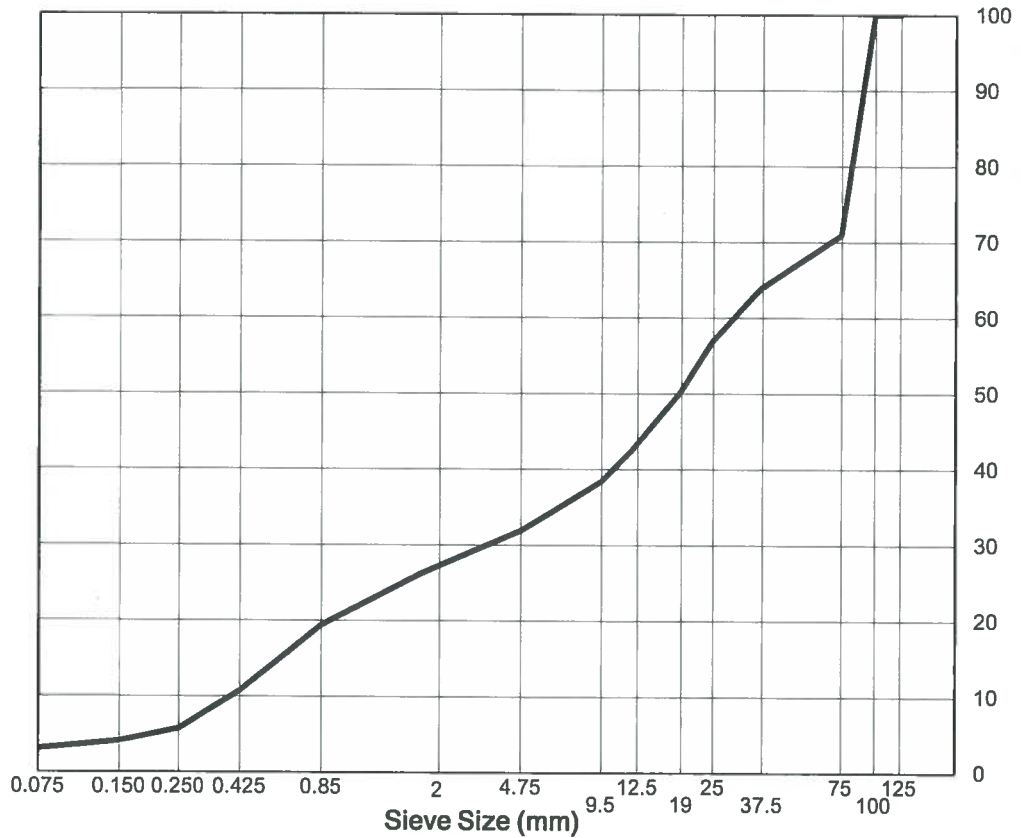
SIEVE ANALYSIS REPORT

Washed Sieve: ASTM C136 and C117

Project No.: 704-TRN.VHWY03172-01
 Project: Alaska Highway Km 568-571 Design
 Client: Public Services and Procurement Canada
 Attention: _____
 Email: _____
 Description: GRAVEL, cobbly, sandy, trace silt, moist, brown
 Source: TP 21 - 18
 Supplier: _____
 Sample Location: G2 @ 3.7 - 4.0 m
 Specification: _____

Sample No.: 83
 Date Sampled: March 9, 2021
 Sampled by: ER
 Date Tested: March 9, 2021
 Tested by: EE Office: Nanaimo
 Moisture Content (as received): 4.9%
 No. Crushed Faces: Two (2) or Three (3)
 By particle mass: _____

Sieve Size	Percent Passing
150	100
125	100
100	100
75	71
37.5	64
25	57
19	50
12.5	43
9.5	38
4.75	32
2.00	26
0.85	19
0.425	11
0.250	6
0.150	4
0.075	3.1



Remarks: _____

Reviewed By: *Brian Hammer* ASc.T.

Data presented hereon is for the sole use of the stipulated client. Tetra Tech is not responsible, nor can be held liable, for use made of this report by any other party, with or without the knowledge of Tetra Tech. The testing services reported herein have been performed to recognized industry standards, unless noted. No other warranty is made. These data do not include or represent any interpretation or opinion of specification compliance or material suitability. Should engineering interpretation be required, Tetra Tech will provide it upon written request.



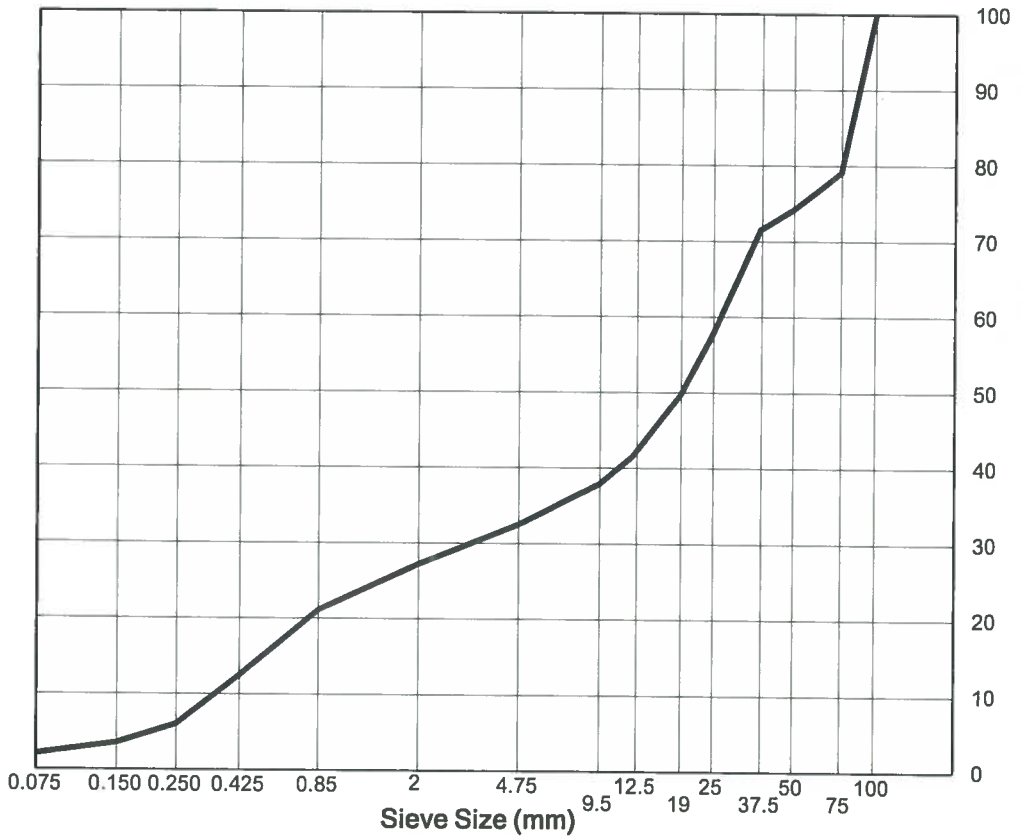
SIEVE ANALYSIS REPORT

Washed Sieve: ASTM C136 and C117

Project No.: 704-TRN.VHWY03172-01
 Project: Alaska Highway Km 568-571 Design
 Client: Public Services and Procurement Canada
 Attention: _____
 Email: _____
 Description: GRAVEL, sandy, cobbly, trace silt, trace organics, moist, brown
 Source: TP 21 - 19
 Supplier: _____
 Sample Location: G1 @ 1.5 - 1.8 m
 Specification: _____

Sample No.: 84
 Date Sampled: March 9, 2021
 Sampled by: ER
 Date Tested: March 9, 2021
 Tested by: EE Office: Nanaimo
 Moisture Content (as received): 3.1%
 No. Crushed Faces: Two (2) or Three (3)
 By particle mass: _____

Sieve Size	Percent Passing
125	100
100	100
75	79
50	74
37.5	72
25	58
19	50
12.5	42
9.5	38
4.75	33
2.00	27
0.85	21
0.425	12
0.250	6
0.150	4
0.075	2.1



Remarks: _____

Reviewed By: *Brian J. [Signature]* ASsc.T.

Data presented hereon is for the sole use of the stipulated client. Tetra Tech is not responsible, nor can be held liable, for use made of this report by any other party, with or without the knowledge of Tetra Tech. The testing services reported herein have been performed to recognized industry standards, unless noted. No other warranty is made. These data do not include or represent any interpretation or opinion of specification compliance or material suitability. Should engineering interpretation be required, Tetra Tech will provide it upon written request.



Moisture, Ash, and Organic Matter of Peat and Other Organic Soils

ASTM D2974 Test Method C

Project No: 704-TRN.VHWY-3172-02	Sample No.: 110
Project: Alaska Highway Km 568-571 Design	Date Sampled: February 28, 2021
Client: Public Services Procurement Canada	Sampled By: Eli Riedl
Attention: _____ Ph: _____	Date Tested: March 17, 2021
Email: _____	Tested By: Brian Gummesson
	Office: Nanaimo

Description: Brown, moderately decomposed, somewhat dry PEAT, high content wood fibers, considerable amorphous granular matter, slight smell, no tensile strength. Plastic limit not possible. Plant types not identified.

Sample Location: TP21-05 G2 @ 1.8-2.1 m

Moisture Content	Trial 1	Trial 2
Moisture Content, %	49.6	49.6
Average	49.6	

Ash Content	Trial 1	Trial 2
Ash Content, %	67.5	68.5
Average	68.0	

Organic Matter Content	Trial 1	Trial 2
Organic Matter Content, %	32.5	31.5
Average	32.0	

* Furnace Temperature: 440 °C

Remarks: Sample oven dried prior to sieving through 2.0 mm sieve
 Fraction of Aggregate Sample Tested: 84% passing 2.0 mm sieve
 Organic Content, Total Sample: 26.8% by dry mass of sample

Reviewed By:  P. Eng.

Data presented hereon is for the sole use of the stipulated client. Tetra Tech is not responsible, nor can be held liable, for use made of this report by any other party, with or without the knowledge of Tetra Tech. The testing services reported herein have been performed to recognized industry standards, unless noted. No other warranty is made. These data do not include or represent any interpretation or opinion of specification compliance or material suitability. Should engineering interpretation be required, Tetra Tech will provide it upon written request.



Moisture, Ash, and Organic Matter of Peat and Other Organic Soils

ASTM D2974 Test Method C

Project No: 704-TRN.VHWY-3172-02	Sample No.: 109
Project: Alaska Highway Km 568-571 Design	Date Sampled: _____
Client: Public Services Procurement Canada	Sampled By: Eli Riedl
Attention: _____	Date Tested: March 17, 2021
Ph: _____	Tested By: Brian Gummeson
Email: _____	Office: Nanaimo

Description: PEAT- dark brown somewhat dry PEAT, moderately decomposed, mainly fibrous, some amorphous granular matter, slight smell, moderate tensile strength. Plastic limit not possible. Plant types not identified.

Sample Location: TP21-05 G2 @ 1.8-2.1 m

Moisture Content		Trial 1	Trial 2
Moisture Content, %		88.3	88.3
Average		88.3	

Ash Content		Trial 1	Trial 2
Ash Content, %		68.7	69.2
Average		68.9	

Organic Matter Content		Trial 1	Trial 2
Organic Matter Content, %		31.3	30.8
Average		31.1	

* Furnace Temperature: **440 °C**

Remarks: Sample oven dried prior to sieving through 2.0 mm sieve
 Fraction of Aggregate Sample Tested: **100%** passing 2.0 mm sieve
 Organic Content, Total Sample: **31.1%** by dry mass of sample

Reviewed By: P. Eng.

Data presented hereon is for the sole use of the stipulated client. Tetra Tech is not responsible, nor can be held liable, for use made of this report by any other party, with or without the knowledge of Tetra Tech. The testing services reported herein have been performed to recognized industry standards, unless noted. No other warranty is made. These data do not include or represent any interpretation or opinion of specification compliance or material suitability. Should engineering interpretation be required, Tetra Tech will provide it upon written request.



APPENDIX D

VIBRATING WIRE PIEZOMETER INSTALLATION RECORDS



Monitor
with
Confidence

Calibration Record

RST Instruments Ltd., 11545 Kingston St., Maple Ridge, British Columbia, Canada V2X 0Z5
Tel: 604 540 1100 • Fax: 604 540 1005 • Toll Free: 1 800 665 5599 (North America only)
e-mail: info@rstinstruments.com • Website: www.rstinstruments.com

Vibrating Wire Piezometer

Customer: TETRA TECH CANADA INC.
Sales Order: 227096
Customer ID:
Model: VW2100-0.35
Serial Number: VW129875
Mfg Number: P129875
Range: 350 kPa
Cable Length: 20 meters
Cable Marking: 745149 m to 745169 m
Cable Type: EL380004
Cable Colour Code: Red/Black (Coil) Green/White (Thermistor)
Thermistor Type: 3K

Applied Pressure (kPa)	First Reading (B units)	Second Reading (B units)	Average Reading (B units)	Calculated Linear (kPa)	Linearity Error (%FS)	Calculated Polynomial (kPa)	Polynomial Error (%FS)
0.0	8622	8623	8622	-0.5	-0.14	0.0	0.01
70.0	7982	7982	7982	70.1	0.03	70.0	-0.00
140.0	7345	7345	7345	140.3	0.09	139.9	-0.02
210.0	6709	6709	6709	210.4	0.12	210.0	0.01
280.0	6076	6076	6076	280.2	0.05	280.1	0.03
350.0	5448	5448	5448	349.4	-0.16	349.9	-0.02
Max Error (%)					0.16		0.03

Linear Calibration Factor: CF = 1.1022e-01 kPa/B unit
Temperature Correction Factor: Tk = -9.5890e-02 kPa/°C rise

Polynomial Gauge Factor:
A = 3.7644e-07 kPa/(B unit)² B = -1.1552e-01 kPa/B unit C = calculate (see below) kPa

Users must establish site zero readings for calculation purposes

$$\text{Polynomial C} = -[A(L_0^2) + B(L_0)]$$

Pressure is calculated with the following equations:

$$\text{Linear: } P = CF(L_0 - L) - Tk(T_0 - T) + (S_0 - S)$$

$$\text{Polynomial: } P = A(L^2) + B(L) + C - Tk(T_0 - T) + (S_0 - S)$$

L_0 , L = initial (installation) and current readings, in B units

T_0 , T = initial (installation) and current temperature, in °C

S_0 , S = initial (installation) and current barometric pressure readings, in kPa

B units = Hz²/1000 ie: 1700 Hz = 2890 B units

Shipped Zero Readings:	Date	VW Reading (B Units)	Temperature (°C)	Baro (mbar)
	04 Feb 2021	8600	20.7	1026.4

This instrument has been calibrated using standards traceable to the NIST in compliance with ANSI Z540-1

Technician: Kailah Toews Date: 04/02/2021

Approved: Samantha Shaw Date: 04/02/2021

Vibrating Wire Piezometer Installation - Installation Record

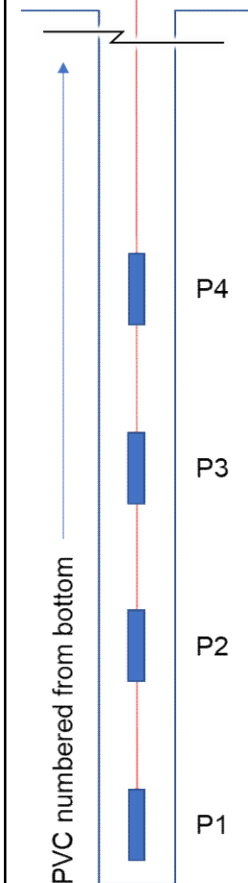
Form Completed By: Eli Riedl

Project: AK HWY KM 568 - 571
 Project Number: TRN03172-02
 Client: PSPC
 Site:
 Installation Date: 27-Feb-21

Borehole ID: BH21-01
 Collar Elevation: 800 m-asl
 Inclination: °
 Total Depth*: 12.2 m-ah
 Barometric Pressure: 900 mbar

Data Logger Serial Number:
 Length per PVC Section: m
 Total Number of PVC Required:
 *confirm with geophysics and/or drill rods before finalizing position of VWPs
 Piezometric Surface (open hole): m-ah

<u>VWP Info</u>	<u>P1</u>	<u>P2</u>	<u>P3</u>	<u>P4</u>
Serial Number:	<u>VW129875</u>			
Pressure Range:	<u>350</u> kPa	<u></u> Mpa	<u></u> Mpa	<u></u> Mpa
Target Depth:	<u>6.1</u> m-ah	<u></u> m-ah	<u></u> m-ah	<u></u> m-ah
Elevation:	<u>800.00</u> m-asl	<u></u> m-asl	<u></u> m-asl	<u></u> m-asl
PVC Number:	<u>#DIV/0!</u>			
Distance from bottom of PVC:	<u>#DIV/0!</u> m	<u></u> m	<u></u> m	<u></u> m
Site Zero Readings (at drill pad, dry)	B Units: <u>8711.8</u>			
Temperature:	<u>-3.9</u> °C	<u></u> °C	<u></u> °C	<u></u> °C
<u>Calibration Information</u>				
Polynomial Gage Factors	A: <u>3.7644E-07</u> kPa/Bunit^2	<u></u> Mpa/Bunit^2	<u></u> Mpa/Bunit^2	<u></u> Mpa/Bunit^2
	B: <u>-1.1552E-01</u> kPa/Bunit	<u></u> Mpa/Bunit	<u></u> Mpa/Bunit	<u></u> Mpa/Bunit
	C: <u>977.8170</u> kPa	<u></u> Mpa	<u></u> Mpa	<u></u> Mpa
Temperature Correction (Tk):	<u>-9.5890E-02</u> kPa/°C Rise	<u></u> Mpa/°C Rise	<u></u> Mpa/°C Rise	<u></u> Mpa/°C Rise
Linear Calibration Factor:	<u>1.1022E-01</u> kPa/Bunit	<u></u> Mpa/Bunit	<u></u> Mpa/Bunit	<u></u> Mpa/Bunit
Shipped Zero Readings	B Units: <u>8600</u>			
	Temperature: <u>20.7</u> °C	<u></u> °C	<u></u> °C	<u></u> °C
	Baro: <u>1026.4</u> mbar	<u></u> mbar	<u></u> mbar	<u></u> mbar
<u>Error Checking (Linear)</u>				
Site Zero %Error:	<u>0.76%</u>			
In Bucket at Surface	Depth: <u>0.2</u> m	<u></u> m	<u></u> m	<u></u> m
	B Units: <u>8691.5</u>			
	Temperature: <u>5.2</u> °C	<u></u> °C	<u></u> °C	<u></u> °C
	Linear %Error: <u>0.59%</u>			
In Borehole, Grouted to Surface	Depth: <u>6.1</u> m-ah	<u></u> m-ah	<u></u> m-ah	<u></u> m-ah
	B Units: <u>8458.7</u>			
	Temperature: <u>9.6</u> °C	<u></u> °C	<u></u> °C	<u></u> °C
	Linear %Error: <u></u>			





Monitor
with
Confidence

Calibration Record

RST Instruments Ltd., 11545 Kingston St., Maple Ridge, British Columbia, Canada V2X 0Z5
Tel: 604 540 1100 • Fax: 604 540 1005 • Toll Free: 1 800 665 5599 (North America only)
e-mail: info@rstinstruments.com • Website: www.rstinstruments.com

Vibrating Wire Piezometer

Customer: TETRA TECH CANADA INC.
Sales Order: 227096
Customer ID:
Model: VW2100-0.35
Serial Number: VW130617
Mfg Number: P130617
Range: 350 kPa
Cable Length: 20 meters
Cable Marking: 745192 m to 745212 m
Cable Type: EL380004
Cable Colour Code: Red/Black (Coil) Green/White (Thermistor)
Thermistor Type: 3K

Applied Pressure (kPa)	First Reading (B units)	Second Reading (B units)	Average Reading (B units)	Calculated Linear (kPa)	Linearity Error (%FS)	Calculated Polynomial (kPa)	Polynomial Error (%FS)
0.0	8372	8373	8372	0.0	0.00	0.1	0.01
70.0	7688	7689	7688	69.9	-0.01	69.9	-0.02
140.0	7004	7004	7004	140.0	-0.00	139.9	-0.02
210.0	6319	6319	6319	210.1	0.02	210.0	0.01
280.0	5634	5634	5634	280.1	0.03	280.1	0.03
350.0	4952	4952	4952	349.9	-0.03	349.9	-0.02
Max Error (%)					0.03		0.03

Linear Calibration Factor: CF = 1.0229e-01 kPa/B unit
Temperature Correction Factor: Tk = -7.0582e-02 kPa/°C rise

Polynomial Gauge Factor:
A = 3.2174e-08 kPa/(B unit)² B = -1.0272e-01 kPa/B unit C = calculate (see below) kPa

Users must establish site zero readings for calculation purposes

$$\text{Polynomial C} = -[A(L_0^2) + B(L_0)]$$

Pressure is calculated with the following equations:

$$\text{Linear: } P = CF(L_0 - L) - Tk(T_0 - T) + (S_0 - S)$$

$$\text{Polynomial: } P = A(L^2) + B(L) + C - Tk(T_0 - T) + (S_0 - S)$$

L_0 , L = initial (installation) and current readings, in B units

T_0 , T = initial (installation) and current temperature, in °C

S_0 , S = initial (installation) and current barometric pressure readings, in kPa

B units = Hz²/1000 ie: 1700 Hz = 2890 B units

Shipped Zero Readings:	Date	VW Reading (B Units)	Temperature (°C)	Baro (mbar)
	04 Feb 2021	8352	20.7	1026.4

This instrument has been calibrated using standards traceable to the NIST in compliance with ANSI Z540-1

Technician: Kailah Toews Date: 04/02/2021

Approved: Samantha Shaw Date: 04/02/2021

Vibrating Wire Piezometer Installation - Installation Record

Form Completed By: Eli Riedl

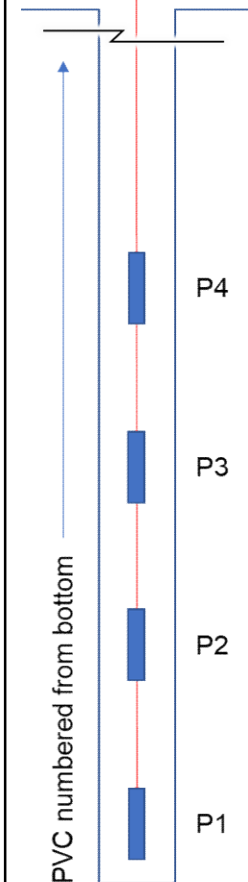
Project: AK HWY KM 568 - 571
 Project Number: TRN03172-02
 Client: PSPC
 Site:
 Installation Date: 25-Feb-21

Borehole ID: BH21-03
 Collar Elevation: 800 m-asl
 Inclination: °
 Total Depth*: 11.6 m-ah
 Barometric Pressure: 900 mbar

Data Logger Serial Number:
 Length per PVC Section: m
 Total Number of PVC Required:
 Piezometric Surface (open hole): m-ah

*confirm with geophysics and/or drill rods before finalizing position of VWPs

<u>VWP Info</u>	P1	P2	P3	P4
Serial Number:	<u>VW130617</u>			
Pressure Range:	<u>350</u> kPa	<u></u> Mpa	<u></u> Mpa	<u></u> Mpa
Target Depth:	<u>6.1</u> m-ah	<u></u> m-ah	<u></u> m-ah	<u></u> m-ah
Elevation:	<u>800.00</u> m-asl	<u></u> m-asl	<u></u> m-asl	<u></u> m-asl
PVC Number:	<u>#DIV/0!</u>			
Distance from bottom of PVC:	<u>#DIV/0!</u> m	<u></u> m	<u></u> m	<u></u> m
Site Zero Readings (at drill pad, dry)	B Units: <u>8462.1</u>			
Temperature:	<u>-7.2</u> °C	<u></u> °C	<u></u> °C	<u></u> °C
<u>Calibration Information</u>				
Polynomial Gage Factors	A:	<u>3.2174E-08</u> kPa/Bunit^2	<u></u> Mpa/Bunit^2	<u></u> Mpa/Bunit^2
	B:	<u>-1.0272E-01</u> kPa/Bunit	<u></u> Mpa/Bunit	<u></u> Mpa/Bunit
	C:	<u>866.9230</u> kPa	<u></u> Mpa	<u></u> Mpa
Temperature Correction (Tk):	<u>-7.0582E-02</u> kPa/°C Rise	<u></u> Mpa/°C Rise	<u></u> Mpa/°C Rise	<u></u> Mpa/°C Rise
Linear Calibration Factor:	<u>1.0229E-01</u> kPa/Bunit	<u></u> Mpa/Bunit	<u></u> Mpa/Bunit	<u></u> Mpa/Bunit
Shipped Zero Readings	B Units:	<u>8352</u>		
	Temperature:	<u>20.7</u> °C	<u></u> °C	<u></u> °C
	Baro:	<u>1026.4</u> mbar	<u></u> mbar	<u></u> mbar
<u>Error Checking (Linear)</u>				
Site Zero %Error:	<u>0.96%</u>			
In Bucket at Surface	Depth:	<u>0.2</u> m	<u></u> m	<u></u> m
	B Units:	<u>8456</u>		
	Temperature:	<u>23</u> °C	<u></u> °C	<u></u> °C
	Linear %Error:	<u>-0.03%</u>		
In Borehole, Grouted to Surface	Depth:	<u>6.1</u> m-ah	<u></u> m-ah	<u></u> m-ah
	B Units:	<u>7906.3</u>		
	Temperature:	<u>11.1</u> °C	<u></u> °C	<u></u> °C
	Linear %Error:			





Monitor
with
Confidence

Calibration Record

RST Instruments Ltd., 11545 Kingston St., Maple Ridge, British Columbia, Canada V2X 0Z5
Tel: 604 540 1100 • Fax: 604 540 1005 • Toll Free: 1 800 665 5599 (North America only)
e-mail: info@rstinstruments.com • Website: www.rstinstruments.com

Vibrating Wire Piezometer

Customer: TETRA TECH CANADA INC.
Sales Order: 227096
Customer ID:
Model: VW2100-0.35
Serial Number: VW130618
Mfg Number: P130618
Range: 350 kPa
Cable Length: 20 meters
Cable Marking: 655895 m to 655915 m
Cable Type: EL380004
Cable Colour Code: Red/Black (Coil) Green/White (Thermistor)
Thermistor Type: 3K

Applied Pressure (kPa)	First Reading (B units)	Second Reading (B units)	Average Reading (B units)	Calculated Linear (kPa)	Linearity Error (%FS)	Calculated Polynomial (kPa)	Polynomial Error (%FS)
0.0	8888	8888	8888	-0.1	-0.02	0.1	0.03
70.0	8233	8233	8233	69.9	-0.02	69.9	-0.03
140.0	7576	7576	7576	140.0	0.01	139.9	-0.03
210.0	6919	6919	6919	210.2	0.06	210.1	0.02
280.0	6264	6264	6264	280.2	0.05	280.1	0.04
350.0	5612	5612	5612	349.8	-0.07	349.9	-0.03
Max Error (%)					0.07		0.04

Linear Calibration Factor: CF = 1.0678e-01 kPa/B unit
Temperature Correction Factor: Tk = -4.8720e-02 kPa/°C rise

Polynomial Gauge Factor:
A = 1.0248e-07 kPa/(B unit)² B = -1.0827e-01 kPa/B unit C = calculate (see below) kPa

Users must establish site zero readings for calculation purposes
Polynomial C = $-[A(L_0^2) + B(L_0)]$

Pressure is calculated with the following equations:
Linear: $P = CF(L_0 - L) - Tk(T_0 - T) + (S_0 - S)$
Polynomial: $P = A(L^2) + B(L) + C - Tk(T_0 - T) + (S_0 - S)$

L_0 , L = initial (installation) and current readings, in B units
 T_0 , T = initial (installation) and current temperature, in °C
 S_0 , S = initial (installation) and current barometric pressure readings, in kPa
B units = Hz²/1000 ie: 1700 Hz = 2890 B units

Shipped Zero Readings:	Date	VW Reading (B Units)	Temperature (°C)	Baro (mbar)
	04 Feb 2021	8869	20.7	1026.4

This instrument has been calibrated using standards traceable to the NIST in compliance with ANSI Z540-1

Technician: Kailah Toews Date: 04/02/2021
Approved: Samantha Shaw Date: 04/02/2021

Vibrating Wire Piezometer Installation - Installation Record

Form Completed By: Eli Riedl

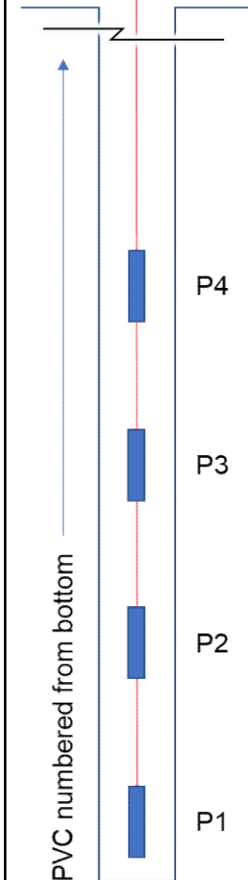
Project: AK HWY KM 568 - 571
 Project Number: TRN03172-02
 Client: PSPC
 Site:
 Installation Date: 24-Feb-21

Borehole ID: BH21-04
 Collar Elevation: 800 m-asl
 Inclination: °
 Total Depth*: m-ah
 Barometric Pressure: 900 mbar

Data Logger Serial Number:
 Length per PVC Section: m
 Total Number of PVC Required:
 Piezometric Surface (open hole): m-ah

*confirm with geophysics and/or drill rods before finalizing position of VWPs

<u>VWP Info</u>	P1	P2	P3	P4
Serial Number:	<u>VW130618</u>			
Pressure Range:	<u>350</u> kPa	<u></u> Mpa	<u></u> Mpa	<u></u> Mpa
Target Depth:	<u>4.57</u> m-ah	<u></u> m-ah	<u></u> m-ah	<u></u> m-ah
Elevation:	<u>800.00</u> m-asl	<u></u> m-asl	<u></u> m-asl	<u></u> m-asl
PVC Number:	<u>#DIV/0!</u>			
Distance from bottom of PVC:	<u>#DIV/0!</u> m	<u></u> m	<u></u> m	<u></u> m
Site Zero Readings (at drill pad, dry)	B Units: <u>8973</u>			
Temperature:	<u>-11.5</u> °C	<u></u> °C	<u></u> °C	<u></u> °C
<u>Calibration Information</u>				
Polynomial Gage Factors	A:	<u>1.0248E-07</u> kPa/Bunit^2	<u></u> Mpa/Bunit^2	<u></u> Mpa/Bunit^2
	B:	<u>-1.0827E-01</u> kPa/Bunit	<u></u> Mpa/Bunit	<u></u> Mpa/Bunit
	C:	<u>963.2556</u> kPa	<u></u> Mpa	<u></u> Mpa
Temperature Correction (Tk):	<u>-4.8720E-02</u> kPa/°C Rise	<u></u> Mpa/°C Rise	<u></u> Mpa/°C Rise	<u></u> Mpa/°C Rise
Linear Calibration Factor:	<u>1.0678E-01</u> kPa/Bunit	<u></u> Mpa/Bunit	<u></u> Mpa/Bunit	<u></u> Mpa/Bunit
Shipped Zero Readings	B Units:	<u>8869</u>		
	Temperature:	<u>20.7</u> °C	<u></u> °C	<u></u> °C
	Baro:	<u>1026.4</u> mbar	<u></u> mbar	<u></u> mbar
<u>Error Checking (Linear)</u>				
Site Zero %Error:	<u>0.89%</u>			
In Bucket at Surface	Depth:	<u>0.2</u> m	<u></u> m	<u></u> m
	B Units:	<u>8937.2</u>		
	Temperature:	<u>29.1</u> °C	<u></u> °C	<u></u> °C
	Linear %Error:	<u>0.85%</u>		
In Borehole, Grouted to Surface	Depth:	<u>4.6</u> m-ah	<u></u> m-ah	<u></u> m-ah
	B Units:	<u>8534.9</u>		
	Temperature:	<u>9.7</u> °C	<u></u> °C	<u></u> °C
	Linear %Error:			





Monitor
with
Confidence

Calibration Record

RST Instruments Ltd., 11545 Kingston St., Maple Ridge, British Columbia, Canada V2X 0Z5
Tel: 604 540 1100 • Fax: 604 540 1005 • Toll Free: 1 800 665 5599 (North America only)
e-mail: info@rstinstruments.com • Website: www.rstinstruments.com

Vibrating Wire Piezometer

Customer: TETRA TECH CANADA INC.
Sales Order: 227096
Customer ID:
Model: VW2100-0.35
Serial Number: VW126872
Mfg Number: P126872
Range: 350 kPa
Cable Length: 20 meters
Cable Marking: 745171 m to 745191 m
Cable Type: EL380004
Cable Colour Code: Red/Black (Coil) Green/White (Thermistor)
Thermistor Type: 3K

Applied Pressure (kPa)	First Reading (B units)	Second Reading (B units)	Average Reading (B units)	Calculated Linear (kPa)	Linearity Error (%FS)	Calculated Polynomial (kPa)	Polynomial Error (%FS)
0.0	8805	8805	8805	-0.4	-0.11	0.2	0.05
70.0	8065	8065	8065	69.8	-0.06	69.7	-0.09
140.0	7321	7321	7321	140.4	0.12	140.0	-0.01
210.0	6582	6582	6582	210.6	0.16	210.1	0.03
280.0	5846	5847	5846	280.3	0.10	280.2	0.07
350.0	5120	5121	5120	349.2	-0.22	349.8	-0.05
Max Error (%)					0.22		0.09

Linear Calibration Factor: CF = 9.4896e-02 kPa/B unit
Temperature Correction Factor: Tk = -8.1729e-02 kPa/°C rise

Polynomial Gauge Factor:
A = 3.2558e-07 kPa/(B unit)² B = -9.9430e-02 kPa/B unit C = calculate (see below) kPa

Users must establish site zero readings for calculation purposes
Polynomial C = $-[A(L_0^2) + B(L_0)]$

Pressure is calculated with the following equations:

Linear: $P = CF(L_0 - L) - Tk(T_0 - T) + (S_0 - S)$

Polynomial: $P = A(L^2) + B(L) + C - Tk(T_0 - T) + (S_0 - S)$

L_0 , L = initial (installation) and current readings, in B units

T_0 , T = initial (installation) and current temperature, in °C

S_0 , S = initial (installation) and current barometric pressure readings, in kPa

B units = Hz/1000 ie: 1700 Hz = 2890 B units

Shipped Zero Readings:	Date	VW Reading (B Units)	Temperature (°C)	Baro (mbar)
	04 Feb 2021	8786	20.7	1026.4

This instrument has been calibrated using standards traceable to the NIST in compliance with ANSI Z540-1

Technician: Kailah Toews Date: 04/02/2021

Approved: Samantha Shaw Date: 04/02/2021

Vibrating Wire Piezometer Installation - Installation Record

Form Completed By: Eli Riedl

Project: AK HWY KM 568 - 571
 Project Number: TRN03172-02
 Client: PSPC
 Site:
 Installation Date: 24-Feb-21

Borehole ID: BH21-04
 Collar Elevation: 800 m-asl
 Inclination: 90 °
 Total Depth*: m-ah
 Barometric Pressure: 900 mbar

Data Logger Serial Number:
 Length per PVC Section: m
 Total Number of PVC Required:
 Piezometric Surface (open hole): m-ah

*confirm with geophysics and/or drill rods before finalizing position of VWPs

<u>VWP Info</u>	P1	P2	P3	P4
Serial Number:	<u>VW126872</u>			
Pressure Range:	<u>350</u> kPa	<u></u> Mpa	<u></u> Mpa	<u></u> Mpa
Target Depth:	<u>6.1</u> m-ah	<u></u> m-ah	<u></u> m-ah	<u></u> m-ah
Elevation:	<u>793.90</u> m-asl	<u></u> m-asl	<u></u> m-asl	<u></u> m-asl
PVC Number:	<u>#DIV/0!</u>			
Distance from bottom of PVC:	<u>#DIV/0!</u> m	<u></u> m	<u></u> m	<u></u> m
Site Zero Readings (at drill pad, dry)	B Units: <u>8921.2</u>			
Temperature:	<u>-13.2</u> °C	<u></u> °C	<u></u> °C	<u></u> °C
<u>Calibration Information</u>				
Polynomial Gage Factors	A:	<u>3.2558E-07</u> kPa/Bunit^2	<u></u> Mpa/Bunit^2	<u></u> Mpa/Bunit^2
	B:	<u>-9.9430E-02</u> kPa/Bunit	<u></u> Mpa/Bunit	<u></u> Mpa/Bunit
	C:	<u>861.1227</u> kPa	<u></u> Mpa	<u></u> Mpa
Temperature Correction (Tk):	<u>-8.1729E-02</u> kPa/°C Rise	<u></u> Mpa/°C Rise	<u></u> Mpa/°C Rise	<u></u> Mpa/°C Rise
Linear Calibration Factor:	<u>9.4896E-02</u> kPa/Bunit	<u></u> Mpa/Bunit	<u></u> Mpa/Bunit	<u></u> Mpa/Bunit
Shipped Zero Readings	B Units:	<u>8786</u>		
	Temperature:	<u>20.7</u> °C	<u></u> °C	<u></u> °C
	Baro:	<u>1026.4</u> mbar	<u></u> mbar	<u></u> mbar
<u>Error Checking (Linear)</u>				
Site Zero %Error:	<u>0.74%</u>			
In Bucket at Surface	Depth:	<u>0.2</u> m	<u></u> m	<u></u> m
	B Units:	<u>8905.8</u>		
	Temperature:	<u>27.2</u> °C	<u></u> °C	<u></u> °C
	Linear %Error:	<u>-0.35%</u>		
In Borehole, Grouted to Surface	Depth:	<u>6.1</u> m-ah	<u></u> m-ah	<u></u> m-ah
	B Units:	<u>8142.3</u>		
	Temperature:	<u>8.6</u> °C	<u></u> °C	<u></u> °C
	Linear %Error:			

