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C	Category 2 Traffic Management Plan Template <i>Note: The Category 2 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>
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- P Deactivation of Former Alignments Km 501.05 to Km 508.80 – Environmental Overview Assessment (EOA), Environmental Management Plan (EMP), Caribou Protection Plan (CPP)
- Q Deactivation of Former Alignments Km 501.05 to Km 508.80 – Site Photos
Note: The selective site photos are provided for the Contractor’s general information only. Photos have not been provided for all required work. PSPC takes no responsibility for the completeness or any misinterpretation by the Contractor of the site conditions based on the photos provided. Site conditions may have changed since the photos were taken. It is the Contractor’s responsibility to visit the site and confirm all existing site conditions.
- R Deactivation of Former Alignments Km 501.05 to Km 508.80 – British Columbia Ministry of Forests, Lands, Natural Resource Operations, and Rural Development (FLNRORD) Section 11 Approval for Instream Work – Date: July 23, 2021 – Notice of Authorized Changes – Changes In and About a Stream (File 9000667)

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
Edition – 2020 Edition and applicable Amendments available.

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

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4	Km 501 – Km 509 Geometric and Drainage Improvements Project Location Plan, Key Plan, Legend & Control Monuments	C1001	0
5	Plan / Profile STA. 501+020 to STA. 501+300	C1101	0
6	Plan / Profile STA. 501+300 to STA. 501+960	C1102	0
7	Plan / Profile STA. 501+960 to STA. 502+620	C1103	0
8	Plan / Profile STA. 502+620 to STA. 503+280	C1104	0
9	Plan / Profile STA. 503+280 to STA. 503+940	C1105	0
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25	Plan / Profile Culvert KM 504.36 Sheet 3 of 4 Optional Work	C1206.3	0
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39	Culvert Details	C1304	0
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PART 1 – GENERAL

- 1.1 Order of Precedence .1 In the event of any discrepancy or conflict, order of precedence shall be in accordance with GC1.2.2 – Order of Precedence and as follows:
- .1 The Division 1 Sections of these Specifications take precedence over the other sections of the Specifications.
 - .2 If conflict arises between an item in the main body of these Specifications (Division 1 – Division 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 geometric improvements (i.e. widening), drainage improvements (i.e. culvert installations and interceptor ditch relocation) and deactivation of a former Alaska Highway alignment. The site is located from Km 501 to Km 509 of the Alaska Highway between Fort Nelson and Toad River, BC.
- For reference, Dawson Creek is at Km 0, Fort St. John is at approximately Km 75, Fort Nelson is at approximately Km 455, and Watson Lake is at approximately Km 986 on the Alaska Highway.
- .2 The work under this contract generally comprises of the following but is not limited to:
- .1 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 Item 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 Traffic Management Plan and construction staging plans with the details of all required temporary lanes, traffic control, signage, and detours (if required) for the duration of the works, including "typical" winter maintenance (snow clearing, sanding, ice removal) for all open lanes for duration of construction
- .4 Quality Management and Quality Control.
 - .5 Environmental protection, onsite environmental monitoring and reporting.
 - .6 The work under this contract is split into two parts and payment will be made for each part separately as set out in the unit price tables. The two parts are:
 - .1 Km 501-509 Geometric and Drainage Improvements (Project No. R.115628.001).
 - .2 Deactivation of Former Alignments Km 501.05 to Km 508.80 (Project No. R.106984.001).
 - .3 Km 501-509 Geometric and Drainage Improvements (Project No. R.115628.001) includes but not limited to the following:
 - .1 Clearing and grubbing, removal and offsite disposal of cleared vegetation by chipping / mulching, brush and other riparian vegetation within the construction footprint necessary to facilitate construction of the works.
 - .2 Development of construction access and temporary berms to facilitate construction. Restoration of the disturbed areas following the construction.
 - .3 Stripping of organics within the designated construction footprint, including loading, hauling and stockpiling offsite.
 - .4 Excavation, loading, hauling and placement of Embankment.
 - .5 Supply, manufacture, hauling, placement and compaction of aggregate materials (Crushed Base Gravel and Sub-Base Course) for highway widening.
 - .6 Supply and install of new steel pipe culverts via trenchless methodologies (i.e. pipe jacking).

- .7 Extension of existing steel pipe culvert at Km 504.36.
 - .8 Culvert end protection including supply and installation of riprap, nonwoven geotextile and bentonite.
 - .9 Culvert ditching including excavation, transport, and disposal of excess material (waste) offsite.
 - .10 Supply and installation of Common Fill and Riprap Erosion Protection for construction of check dams / ditch blocks.
 - .11 Decommissioning of existing culverts via the supply and installation of Culvert Infill Material.
 - .12 Relocation of existing interceptor ditch including excavation of new interceptor ditch alignment and infilling of existing interceptor ditch.
 - .13 Restoration to pre-construction conditions of all disturbed areas.
 - .14 Surveys (construction layout, payment quantities, as-built survey, and others as required).
 - .15 Work completed by Change Order (if required and approved by Departmental Representative).
- Optional Work for Km 501-509 Geometric and Drainage Improvements, if required and approved by the Departmental Representative, including:
- .16 Supply and install of new steel pipe culverts via trenchless methodologies (i.e. pipe jacking) at Km 501.40, Km 502.24, Km 504.36, Km 505.22 and Km 507.12.
 - .17 Replacement of previously stripped materials as Topsoil (Optional Work, if removed or disturbed during the work), and Hydraulic Seeding of all disturbed areas.
- .4 Deactivation of Former Alignments Km 501.05 to Km 508.80 (Project No. R.106984.001) includes but not limited to the following:
- .1 Project Management including all requirements of Section 01 31 00 – Project Management and Coordination.

- .2 Mobilization and demobilization, including preparation of 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 Traffic Management Plan and construction staging plans with the details of all required temporary lanes, traffic control, signage, and detours (if required) for the duration of the works, including “typical” winter maintenance (snow clearing, sanding, ice removal) for all open lanes for duration of construction.
- .4 Coordination of all construction with adjacent construction projects, including but not limited to Alaska Highway Km 501-509 Geometric and Drainage Improvements project and management of flows to prevent any adverse downstream effects.
- .5 Development of construction access to facilitate construction. Restoration and seeding of the disturbed areas following construction.
- .6 Scarification and non-hydraulic seeding of former roadway surfaces and any temporary equipment accesses
- .7 Environmental monitoring and water management, including stream diversion and temporary check dams as shown on the contract drawings, should there be stream flows present or expected at the time of construction, or as directed by the Departmental Representative.
- .8 Excavation, transport, stockpile/waste, clearing and grubbing (if required) and placement of excavated material for slope restoration, removal of culvert and construction of cross ditches and streams.
- .9 Debris removal, including the transport and offsite disposal of existing culverts and various other man-made debris (ex. Abandoned vehicle, metallic stakes, timber products, garbage, etc.). If the debris consists of creosote treated wood or other contaminants deemed as hazardous by the Contractor’s Environmental Monitor, the surrounding soil may require disposal. Potential contamination may be present in soil around the abandoned vehicle and require suitable disposal.

- .10 Construction of ditches with and without coco fiber geotextile and riprap channels.
- .11 Sorting, transport, supply, and placement of riprap.
- .12 Restoration to pre-construction conditions and non-hydraulic seeding of all disturbed areas except for areas of riprap placement.
- .13 Surveys (construction layout, payment quantities, as-built survey, and others as required).

Optional Work for Deactivation of Former Alignments Km 501.05 to Km 508.80, if required and approved by the Departmental Representative, including:

- .14 Installation of waterbars (diagonal channel across road to divert surface water).
- .15 Supply and installation of coco fiber geotextile for slopes above riprap for constructed cross ditches at various locations and slope restoration at Km 21.83.
- .16 Excavation and offsite disposal of creosote contaminated soil.
- .17 Excavation and offsite disposal of hydrocarbon contaminated soil (from abandoned vehicle).
- .18 Any additional work issued by Change Order.

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), Section 01 35 43 – Environmental Protection, the Environmental Management Plan (EMP) (Appendix K and P), the Caribou Protection Plan (Appendix K and P), and the Contract requirements.

PART 2 – PRODUCTS

- 2.1 Owner Supplied Materials (Outside Limits of Work)
- .1 PSPC is providing the Contractor with access to the former Alaska Highway alignment road prism between Km 501.05 and Km 508.80 of the Alaska Highway for the excavation, screening/ manufacture of Embankment. Should the Contractor choose to use the former Alaska Highway alignment road prism or roadside cuts, the Contractor shall be responsible for developing and maintaining access to the former Alaska Highway alignment during construction, tree clearing, removal of vegetation, excavation sorting / screening, hauling and stockpiling of material suitable for use as Embankment. See Appendix M and Section 31 24 14 – Excavation, Embankment, and Compaction for further details.
 - .2 PSPC is providing access to the “as-is” Steel Pipe Culverts and Nonwoven Geotextile located at PSPC’s Fort Nelson Maintenance Yard (Airport Drive, Fort Nelson) for use by the Contractor on this project. See Section 31 37 00 – Riprap, and Section 33 42 13 – Pipe Culverts for further details. The Contractor shall provide a minimum of three (3) days’ notice prior to requiring access to PSPC’s maintenance yard(s) to collect the materials. Access to PSPC’s maintenance yards will only be available to the Contractor Monday – Friday during the hours of 7:00 am to 3:30 pm, or as agreed to by the Departmental Representative. The following materials are available for use by the Contractor:
 - .1 Steel Pipe Culvert: 1,524 mm (60”) diameter, approximately 115.8 m total length.
 - .2 Nonwoven Geotextile, 40 rolls. (Contractor to confirm quantity of Nonwoven Geotextile available).

PART 3 – EXECUTION

- 3.1 Site Visit
- .1 There is no scheduled site visit. 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. Bidders are permitted to sample and test borrow source materials (i.e. from the former Alaska Highway alignment roadbed between Km 501.05 and Km 508.80 of the Alaska Highway) prior to submitting their bid.
 - .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 March 24, 2022.
 - .3 Achieve Completion by March 31, 2022.
 - .4 The works will be carried out during the winter season and the Contractor should ensure work methods and products are suitable to the conditions anticipated during this season. The Contractor shall account for completing work in winter / frozen conditions in the construction schedule and in the unit prices.
 - .5 The project Change Approval permitting under the Provincial Water Sustainability Act (WSA) for instream work has been submitted to the applicable regulatory authorities and is in process as two separate applications for culvert ditching and erosion end protection, and for interceptor ditch relocation. The timeline for receipt of the Change Approvals is not known. The very earliest PSPC expects to receive the Change Approvals is mid-September 2021.
 - .6 The Km 501-509 Geometric and Drainage Improvements Notification permitting under the Provincial WSA for culvert installations has been received (see Appendix L).
 - .7 The project Notification permitting under the Provincial WSA for in stream works associated with the Deactivation of Former Alignments Km 501.05 to Km 508.80 has been received (see Appendix R)
 - .8 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.

- .9 The instream construction on this project shall be completed within the dates indicated on the British Columbia Ministry of Forests, Lands, Natural Resource Operations and Rural Development (FLNRORD) Section 11 Approval and “DFO Authorization for Instream Work” (to be provided to the Contractor prior to the start of construction), Section 01 35 43 – Environmental Protection, and the Environmental Management Plan (EMP) (Appendix K and P). Approval to complete instream works outside of these dates can only be provided by FLNRORD and Department of Fisheries and Oceans (DFO). It will be the Contractor’s responsibility to apply for and receive these additional approvals should it be required.
- .10 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 stream 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 stream 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 stream flows or adverse weather conditions.
- .11 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.
- .12 The Contractor shall account for the possibility of not being able to complete work due to high stream flows or adverse weather conditions in the construction schedule and in the unit prices. No payment for temporary work stoppages due to high stream flows or adverse weather conditions will be made.

- .13 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.
- .14 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 the utility owner (e.g. NorthwesTel) before or during the project work if it is determined by the utility owner that the fibre optic line interferes with the permanent work or if it may be damaged by the works. See Section 01 14 00 – Work Restrictions, Access Development, Construction Staging, and

Restoration, Item 1.3 Utilities and the following for further details:

- .1 The Contractor shall allow the utility company (NorthwesTel) the opportunity to locate and assess the potential fibre optic line conflicts within the limits of the proposed work. A representative of the utility company will be onsite during works with the potential to impact the fibre optic line. The Contractor shall provide a minimum of seven (7) calendar days' notice to the Departmental Representative and the utility company prior to commencing work that has the potential to impact the existing fibre optic line.
- .2 Where the fibre optic line interferes with the proposed work, the utility company may temporarily relocate the existing fibre optic line beyond the limits of work and reinstall the existing fibre optic line during the work. The Contractor shall coordinate the works with NorthwesTel to allow the fibre optic line relocation as required, and in accordance with these specifications.
- .3 Existing structures, signs, utilities, Bituminous Surface Treatment (BST), culverts, cut & fill slopes, ditches, bridges, street furniture and all other structures, services, piping or equipment within the limits of work shall be properly protected from any injury or damage, direct or indirect. Any damage which 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 Sequence of Work

- .1 The project shall be completed per the dates provided in Item 3.2 – Work Completion.
- .2 Onsite project work within 30 m of streams may not start until the application for 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.
- .3 Unless preapproved by the Departmental Representative, the sequencing of the work shall be in accordance with Item 1.9 Construction Staging in Section 01 14 00 – Work Restrictions, Access Development, Construction Staging, and Restoration, and the Environmental Construction Staging Contract Drawings.

- .4 Optional Work (Unit Price Table – Optional Work) may be awarded to the Contractor at any time during the work at the sole discretion of the Departmental Representative. Optional Work shall be undertaken by the Contractor upon receipt of a signed Change Order. The Contractor shall update the sequencing of work accordingly and any incidental items such as but not necessarily limited to Traffic Management, Environmental Monitoring and Quality Control.
- 3.6 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 shall not be used). Report to the Departmental Representative when a working control point is lost or destroyed because of necessary work. Replace working control points from the project survey control monuments.
- .7 Establish / layout the proposed alignment(s) and grades using paint lines and survey stakes based on working control points and survey control monuments provided.
- .8 The Departmental Representative may elect to verify surveys. Verification of the survey by the Departmental Representative does not abdicate the Contractor's responsibility for the correctness and accuracy of the survey.
- .9 Maintain a complete, accurate log of control and survey work as it progresses. On request of the Departmental Representative, submit documentation to verify the accuracy of the field engineering work.
- .10 The Contractor shall regularly monitor the condition of the Work Site and of property on and adjoining the Work Site throughout the construction period, and shall immediately notify the Owner if any deterioration in condition is detected. Such monitoring shall cover all pertinent features and property including, but not limited to, buildings, structures, roads, walls, fences, slopes, sewers, culverts and landscaped areas.
- .11 The Departmental Representative may, but shall not be obligated to, survey and record the condition of the Work Site and of property on or adjoining the Work Site prior to the commencement of construction by the Contractor. If a survey is undertaken and if requested by the Contractor, the

- Departmental Representative will provide a copy of the survey records to the Contractor for reference.
- .12 Whenever supplied with survey records, the Contractor shall satisfy itself as to the accuracy and completeness of the survey records provided by the Departmental Representative for any area before commencing construction in that area. Commencement of construction in any area shall be interpreted to signify that the Contractor has accepted such survey records as being a true record of the existing conditions prior to construction.
- 13 The provision of the records of a survey of existing conditions by the Departmental Representative shall in no way limit or restrict the Contractor's responsibility to exercise proper care to prevent damage to all property within or adjacent to the Work Site, whether all such property is covered by the survey or not.
- 3.7 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 hard copy drawing sets may take up to 14 days to prepare (excluding shipping).
- .2 Upon award of the project, PSPC will provide the successful Contractor with a digital PDF version of the "Issued for Construction" or "Issued for Tender" Contract Drawings. Preparation of the PDF drawing file may take up to 14 days to prepare.
- 3.8 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.

3.9 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. Allow for submittal review periods as required for each submittal and as detailed in Section 01 33 00 – Submittal Procedures. Required submittals include, but are not limited to the following:
 - .1 Project Schedule (see Section 01 32 16 – Construction Progress Schedules – Bar (Gantt) Chart).
 - .2 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) including:
 - .1 Preliminary Hazard Assessment Form (Appendix 1 of Project Specific Health and Safety Plan template, see Appendix B).
 - .2 Confirmation of Prime Contractor's Main Responsibilities Under the WorkSafeBC Occupational Health and Safety Regulations and Worker's Compensation Act form (Appendix 2 of Project Specific Health and Safety Plan template, see Appendix B).
 - .3 Contractor's COVID-19 Safe Work Plan (Appendix 3 of Project Specific Health and Safety Plan template, see Appendix B).
 - .5 Environmental Protection Plan (see Section 01 35 43 – Environmental Protection).

- .6 Quality Management Plan and related Quality Management documentation (see Section 01 45 00 – Quality Management).
- .7 Hazardous Materials Management Plan (see Section 02 61 33 – Hazardous Materials).
- .8 Tunneling Methodology Report (see Section 33 42 13 – Pipe Culverts).
- .9 Ground Movement Monitoring Plan (see Section 33 42 13 – Pipe Culverts).
- .10 Canadian Welding Bureau (CWB) Form 160 Welding Procedure Data Sheet (see Section 33 42 13 – Pipe Culverts).
- .11 Pre-Construction Survey (see Section 01 29 00 – Payment Procedures).
- .12 As-built Survey, As-built Drawing mark-ups, and Shop Drawing mark-ups (see Section 01 78 00 – Closeout Submittals).
- .13 Shop Drawings (if applicable, including professional seal for design work required), Product Data, Samples, and Mix designs (see Section 03 40 00 – Culvert Infill Material, Section 32 93 21-A – Hydraulic Seeding, Section 32 93 21-B Non-Hydraulic Seeding and Section 33 42 13 – Pipe Culverts).
- .14 Construction Staging Drawings (see Section 01 14 00 – Work Restrictions, Access Development, Construction Staging, and Restoration).
- .15 Progress Payment Request Form (see Appendix E).
- .16 Measurement for Payment Survey Details Form (see Appendix F).
- .17 General Contractor & Sub-Contractor Construction Equipment List (See Section 01 52 00 – Construction Facilities and Equipment and Appendix G).
- .18 Fish Salvage Permit (see Section 01 35 43 – Environmental Protection).

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- 3.10 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 full time and shall be present on the Work Site each and every workday that Work is being performed, from the commencement of work to Substantial Performance and Completion of the Work.
 - .2 Deputy Project Superintendent: shall have the authority of the Project Superintendent during the latter's absence for short periods of time.
 - .3 Health and Safety Coordinator: shall possess safety experience in general construction. Duties shall encompass all matters of safety activities from commencement of work until Substantial Performance and Completion of the Work (see Section 01 35 33 – Health and Safety for further requirements).
 - .4 Quality Control Manager: shall be 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 Monitor(s): shall be a P.Biol, RPBio or Qualified Environmental Professional (QEP) (see Section 01 35 43 – Environmental Protection for further requirements).

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- 3.11 Special Requirements .1 The following special requirements for this project are emphasized for the Contractor's attention:
- .1 The former Alaska Highway alignment roadbed between Km 501.05 and Km 508.80 can be utilized by the Contractor as a source of Embankment materials for the project. Materials can be excavated / removed from the areas noted in the Environmental Management Plan (EMP, see Appendix K and P). The Contractor shall not disturb areas of the Former Alaska Highway alignment within 30 m of streams noted in the EMP shall not be disturbed.
 - .2 Utility relocations by others may be undertaken prior to or during the project work. See Subsection 3.12 Work by Others in this Specifications section and Section 01 14 00 – Work Restrictions, Access Development, Construction Staging, and Restoration for further details.
- 3.12 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 Contractor(s), including site access and traffic management. See Section 31 24 14 – Excavation, Embankment, and Compaction for further details.
- .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. See Item 1.3 Utilities in Section 01 14 00 – Work Restrictions, Access Development, Construction Staging, and Restoration for further details.
- 3.13 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.
- 3.14 Use of Owner Borrow Sources, Gravel Pits, Quarries, and Maintenance Yards .1 The Contractor's use of PSPC's borrow sources, gravel pits, quarries and maintenance yards as listed elsewhere within these specifications for the purposes of extraction / manufacture of Embankment, granular materials and rock and loading and transporting Steel Pipe Culverts and Nonwoven Geotextile, shall be subject to the following:
- .1 Other Contractors may be working in the borrow sources, 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 quarries, gravel pits and maintenance yards.
 - .3 The Contractor is responsible for providing all equipment required to excavate, manufacture (as necessary), load, and haul the material from PSPC's borrow sources, gravel pits, quarries, and maintenance yards.
 - .4 The security of equipment parked, and material manufactured and stockpiled in the borrow sources, gravel pits, quarries, and maintenance yards, along with the safety of the Contractor's personnel, remains the Contractor's responsibility.
 - .5 If PSPC's borrow sources, gravel pits, quarries, and maintenance yards are equipped with vehicle gates, the Departmental Representative will provide the Contractor with the gate key(s) upon commencement of the onsite work. The Contractor shall be responsible for locking the vehicle gate anytime the Contractor's personnel have vacated the borrow sources, gravel pits, quarries, and maintenance yards (regardless of duration). The Contractor shall return the gate key(s) to the Departmental Representative upon completion of the work.
 - .6 The Contractor shall be responsible for maintaining access roads into the borrow sources, gravel pits, quarries, and maintenance yards and for haul roads required to access the material sources for the duration of the project. At a minimum, maintaining and developing access may include grading and snow removal. At the conclusion of the works all access roads and haul roads shall be left in an equal to or better condition than when work started.
- 3.15 Contractor's Personnel .1 Upon request of the Departmental Representative, the Contractor shall remove any personnel from the project work site who, in the opinion of the Departmental Representative, is incompetent or has been guilty of improper conduct.

END OF SECTION

SECTION INCLUDES

PART 1 – GENERAL:

- 1.1 Use of 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 Right-of-Way 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. The Contractor shall be responsible to undertake "typical" winter maintenance (including but not limited to ice removal, snow clearing, and sanding to PSPC's typical winter maintenance

level of service) through the length of the project worksite for the duration of the project. See Section 01 35 00 – Traffic Management for further details.

- .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 complete onsite highway work, 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 is completed during all times of work. The Departmental Representative may withdraw approval for the extended work hours at any time should the Contractor fail to achieve all necessary QC requirements or any other contractual requirement as a result of the extended work hours.

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

- .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 on the Contract Drawings are not necessarily exact nor is there any guarantee that all utilities in existence within the limits of the Work Site have been shown on the Contract Drawings.
- .3 NorthwesTel utilities (i.e. existing fibre optic line) are located within the limits of work. NorthwesTel (Utility Owner) will

provide an onsite representative during times the work has the potential to impact the existing fibre optic cable. The Utility Owner will carry out any works associated with relocation of the existing fibre optic line. The Contractor shall coordinate their works with NorthwesTel to allow relocation of the fibre optic line as required, and in accordance with these specifications. The Contractor shall allow for relocation of the existing fibre optic lines in the construction schedule and in the unit prices.

- .4 At sites where the existing fibre optic cable interferes with the proposed work, as determined by the onsite Utility Owner and the Departmental Representative, the affected utilities will be exposed and lowered / relocated at the time of construction by the Utility Owner.
 - .5 The Departmental Representative will provide the Contractor with Utility Owner's (NorthwesTel) contact information prior to commencement of construction. The Contractor shall coordinate directly with the Utility Owner as required to ensure successful completion of the work in accordance with these specifications.
 - .6 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.
 - .7 Whenever working in the vicinity of utilities, the Contractor shall locate such utilities and shall advise the Departmental Representative and Utility Owner. If required the Contractor shall expose those utilities that may be affected by the Work, using hand labour as required.
 - .8 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.
 - .9 The Contractor shall immediately report any damage to utilities to the Departmental Representative and to the utility company or authority affected, and shall promptly undertake such remedial measures as are necessary at no additional cost to the Owner.
- 1.4 Protection of Persons and Property
- .1 The Contractor shall comply with all applicable safety regulations of WorkSafeBC including, but not limited to, the Workers Compensation Act, Occupational Health and Safety Regulations, Industrial First Aid Regulations, and Workplace Hazardous Materials Information System Regulations (see

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- Section 01 35 33 – Health and Safety for additional requirements).
- .2 The Contractor shall take all necessary precautions and measures to prevent injury or damage to persons and property on or near the Work Site.
- .3 The Contractor shall promptly take such measures as are required to repair, replace or compensate for any loss or damage caused by the Contractor to any property.
- 1.5 Use of Public Areas
- .1 Off-road construction equipment (equipment which exceeds legal highway load limits or dimensions) will not be allowed on the Alaska Highway outside the limits of the work shown on the Contract Drawings except as designated in the Contractor's Construction Staging / Traffic Management Plans accepted by the Departmental Representative. Steel tracked equipment with cleats will not be allowed on Bituminous Surface Treatment (BST) unless measures are taken to protect the existing BST road surface against any damage. Off-road construction equipment will be permitted to travel within the Alaska Highway Right-of-Way within the project limits for the purposes of hauling excavated materials from the former Alaska Highway alignment roadbed (Km 501.05 to Km 508.80 of the Alaska Highway).
- .2 The Contractor shall ensure that its vehicles and equipment do not cause nuisance in public areas. All vehicles and equipment leaving the Work Site and entering public roadways shall be cleaned of mud, 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, the Environmental Management Plan (EMP, see Appendix K and P), and the Environmental Protection Plan prepared by the Contractor for the project.
- .3 The traveled lanes of the Alaska Highway shall remain a Public Highway subject to the rules and laws of Public Highways in the Province of British Columbia. The Contractor is responsible for ensuring all equipment accessing the Highway meets all requirements for vehicles traveling on Public Highways in the Province.

- 1.6 Construction Signage
- .1 No signs or advertisements, other than regulatory or warning signs, PSPC supplied signage, and portable electrically illuminated message signs are permitted 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 Management Plan (EMP, see Appendix K and P) and the Contractor’s accepted Environmental Protection Plan.
- 1.8 Construction Start-up
- .1 The Contractor or their Sub-Contractor(s) shall not perform any onsite work until all necessary contract submittals have been provided, reviewed, and accepted by the Departmental Representative, and the Contractor has received from the Departmental Representative a completed version of the “On-Site Construction Start-up Form” (see Appendix D) which has been completed and signed by PSPC’s 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 streams or works that affect the existing interceptor ditch (including but not limited to excavation of new interceptor ditch, or infilling of existing interceptor ditch with Embankment or Common Fill) may not commence until the application for 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 Change Approval

is not known. 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 (if required), and Contract Specifications are achieved.
 - .2 All requirements of Section 01 35 00 – Traffic Management are achieved.
 - .3 All requirements of the Section 01 35 43 – Environmental Protection, the Environmental Management Plan (EMP, see Appendix K and P), and the Contractor’s Environmental Protection Plan are achieved accepted by the Departmental Representative.
 - .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.
 - .7 Both Hydraulic Seeding and Non-hydraulic Seeding are to be completed during the spring or summer season. Assume one (1) mobilization each to complete Hydraulic Seeding (Optional Work) and Non-hydraulic Seeding will be required.

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

- 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.
- .5 If requested by the Departmental Represented via an approved Change Order, Hydraulically Seed areas designated for Hydraulic Seeding in accordance with the requirements of Section 32 93 21-A – Hydraulic Seeding
- .6 Seed all disturbed areas designated for Non-hydraulic Seeding, per Section 32 93 21-B – Non-hydraulic Seeding.

END OF SECTION

SECTION INCLUDES

PART 1 – GENERAL:

- 1.1 Definitions.
- 1.2 Measurement and Payment Procedures.

PART 1 – GENERAL

- 1.1 Definitions
 - .1 Mobilization and Demobilization: Consists of preparatory work and operations, including but not limited to:
 - .1 Preparation and acceptance of submittals (Project Schedule, Cash Flow Forecasting, Traffic Management Plan, Project Specific Health and Safety Plan, Environmental Protection Plan, Quality Management Plan, Hazardous Materials Management Plan, Construction Staging Plans, 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 within the limits of the work. All signs identifying “Riparian Zone” and underground fibre optic utility shall remain in place.
 - .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 Km 501-509 Geometric and Drainage Improvements Mobilization and Demobilization will be made on the basis of the Price per Unit Bid for Km 501-509 Geometric and Drainage Improvements 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 relating to the Km 501-509 Geometric and Drainage Improvements part of the works.
 - .2 Measurement for Payment for completion of Km 501-509 Geometric and Drainage Improvements 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, Cash Flow Forecasting, Traffic Management Plan, Project Specific Health and Safety Plan, Environmental Protection Plan, Quality Management Plan, Hazardous Materials Management Plan, Construction Staging Drawings, and any other submittals noted in the Contract Specifications as being required prior to starting work) have been submitted for review, accepted for the work in its entirety, and work onsite has commenced to the satisfaction of the Departmental Representative. Should the Departmental Representative allow the work to start prior to submission or acceptance by the Departmental Representative of any of submittals listed above, the Departmental Representative may choose to hold back a minimum of 5% of the 50% Mobilization and Demobilization payment for each outstanding submittal until an acceptable submission is provided.
- .2 50% once the project has achieved "Completion" and all equipment has been demobilized from the site, the site has been cleaned to the satisfaction of the Departmental Representative, remaining deficiencies identified during final inspection (Section 01 77 00 – Closeout Procedures) are corrected, and all closeout submittals are provided and accepted by the Departmental Representative.
- .3 Payment for Deactivation of Former Alignments Km 501.05 To Km 508.80 Mobilization and Demobilization will be made on the basis of the Price per Unit Bid for Deactivation of Former Alignments Km 501.05 To Km 508.80 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 relating to the Deactivation of Former Alignments Km 501.05 To Km 508.80 part of the works.
- .4 Measurement for Payment for completion of Deactivation of Former Alignments Km 501.05 To Km 508.80 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, Cash Flow Forecasting, Traffic Management Plan, Project Specific Health and Safety Plan, Environmental Protection Plan, Quality Management Plan, Hazardous Materials Management Plan, Construction Staging Drawings, and any other submittals noted in the Contract Specifications as being required prior to starting work) have been submitted for review, accepted for the work in its entirety, and work onsite has commenced to the satisfaction of the Departmental Representative. Should the Departmental Representative allow the work to start prior to submission or acceptance by the Departmental Representative of any of submittals listed above, the Departmental Representative may choose to hold back a minimum of 5% of the 50% Mobilization and Demobilization payment for each outstanding submittal until an acceptable submission is provided.

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

END OF SECTION

SECTION INCLUDES:

PART 1 – GENERAL:

- 1.1 Terms of Payment.
- 1.2 Basis of Payment.
- 1.3 Survey.

PART 1 – GENERAL

1.1 Terms of Payment

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

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

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

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- .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 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 Item 1.2 – Measurement and Payment Procedures of Section 01 25 20 – Measurement and Payment Procedures). 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.

- .11 The Contractor should account for all impact costs (including but not necessarily limited to mobilization, demobilization, traffic management, quality management, site access, environmental monitoring and water management) associated in the unit rates for Optional Work items.
- 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 (cu.m, sq.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 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 Clearing and Grubbing after the Clearing and Grubbing has been completed to the satisfaction of the Departmental Representative. The survey shall be provided to the Departmental Representative for review and acceptance. 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 (ex. multiple progress payments), compile individual survey point files into one complete survey file free of overlapping points and other inconsistencies resulting from the completion of individual surveys.
- .9 The Contractor shall complete detailed volume calculations using average end area determination or electronic surface to surface comparisons. Details of volume calculations shall be provided to the Departmental Representative for review upon request.
- .10 Surveys may be subject to verification by the Departmental Representative. In case of discrepancy, the Departmental Representative's survey will govern.

END OF SECTION

SECTION INCLUDES

PART 1 – GENERAL:

- 1.1 Pre-Construction Meeting.
- 1.2 On-Site Documents.
- 1.3 Schedules.
- 1.4 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 Sub-Contractors shall attend in person or via teleconference.
 - .3 The Departmental Representative shall establish a time, location, and teleconference number for the meeting and notify the Contractor a minimum of three days prior to the meeting. The Contractor shall notify all concerned parties of the meeting.
 - .4 The agenda is to include but is not limited to the following:
 - .1 Appointment of the official representative of participants in the work and lines of communication.
 - .2 Project schedule, hours of work per day and number of days per week.
 - .3 Contractor submissions (requirements and submissions schedule).

- .4 Requirements for site access, temporary facilities, site signage, offices, storage sheds, utilities, and fences.
 - .5 Permitting and Environmental requirements.
 - .6 Site security in accordance with Section 01 52 00 – Construction Facilities and Equipment.
 - .7 Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime, and administrative requirements.
 - .8 As-built drawings in accordance with Section 01 78 00 – Closeout Submittals.
 - .9 Take-over procedures, acceptance, and warranties in accordance with Section 01 77 00 – Closeout Procedures.
 - .10 Monthly progress claims, administrative procedures, photographs, and holdbacks.
 - .11 Contractor’s Quality Management and Quality Assurance undertaken by the Departmental Representative.
 - .12 Insurances and transcript of policies.
 - .13 Contractor’s Project Specific Health and Safety Plan.
 - .14 Maintenance in accordance with Section 01 78 00 – Closeout Submittals.
 - .15 Other business as required by the Departmental Representative or Contractor.
- .5 Within fourteen (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 Specifications.

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- .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 set of "Issued for Construction" Contract Drawings (or "Issued for Tender" if being used for construction), contract specifications, and Shop Drawings (if required) 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, Item 1.4).
- 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 fifteen days after award of Contract but in all cases prior to starting onsite work.
- .2 Update project cash flow forecasting on a monthly basis or for each submission of a progress payment reflecting changes to the schedule until project completion. Submit updated forecast to the Departmental Representative.
- 1.5 Construction Progress Meetings .1 During the course of work the Departmental Representative may schedule construction progress meetings approximately every 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 (3) days prior to the meeting. The Contractor shall notify all concerned parties of the meeting.
- .4 The meetings may be held onsite provided teleconference capabilities are available, or at PSPC's office in Fort Nelson. If held onsite, the Contractor shall provide physical space and make arrangements for the meetings.
- .5 Agenda to include 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).

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- .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.
 - .4 Construction Staging Plan / Site Access.
 - .5 Quality Management Plan.
 - .6 Project Specific Health and Safety Plan, including Material Safety Data Sheets (MSDS).
 - .7 Hazardous Materials Management Plan.
 - .8 Shop Drawings and Product Samples (if applicable).
 - .9 As-built Survey and As-Built Drawing Mark-ups.

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- .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 using Microsoft Project software.
 - .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 work day 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.
 - .7 For submission during the work, split horizontally for projected and actual performance.
- 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 (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 review copy. Once accepted by the Departmental Representative, the accepted schedule shall form a baseline which all schedule updates shall be compared against.
 - .6 Distribute copies of revised schedule to:
 - .1 The Contractor’s team including Project Superintendent, Deputy Project Superintendent, and others as required.
 - .2 Sub-Contractors.
 - .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) for further details.

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- .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 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.

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- 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 hard copies as requested by the Departmental Representative.
- .9 Submit electronic copies of product data sheets or brochures for requirements requested in specification sections and as requested by the Departmental Representative where Shop

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- 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 completion of Km 501-509 Geometric and Drainage Improvements Traffic Management will be made on the basis of the Price per Unit Bid for Km 501-509 Geometric and Drainage Improvements Traffic Management in the Bid and Acceptance Form. The Price per Unit Bid shall include the completion of the Traffic Management Plan, construction signage, traffic flaggers, automated traffic control devices, pilot vehicles, temporary concrete barriers and privacy fence (if required), shadow and escort vehicles, temporary gravel surfacing (if required), detours (if required), winter maintenance (snow clearing, sanding, ice removal), and all other items necessary for the successful completion of the task relating to the Km 501-509 Geometric and Drainage Improvements part of the works.
- .2 Measurement for Payment for completion of the Km 501-509 Geometric and Drainage Improvements Traffic Management will be made by Lump Sum based on the percentage of the work completed and accepted by the Departmental Representative.
- .3 Payment for the completion of Deactivation of Former Alignments Km 501.05 To Km 508.80 Traffic Management

will be made on the basis of the Price per Unit Bid for Deactivation of Former Alignments Km 501.05 To Km 508.80 Traffic Management in the Bid and Acceptance Form. The Price per Unit Bid shall include the completion of the Traffic Management Plan, construction signage, traffic flaggers, automated traffic control devices, pilot vehicles, temporary concrete barriers and privacy fence (if required), shadow and escort vehicles, temporary gravel surfacing (if required), detours (if required), winter maintenance (snow clearing, sanding, ice removal), and all other items necessary for the successful completion of the task relating to the Deactivation of Former Alignments Km 501.05 To Km 508.80 part of the works.

- .4 Measurement for Payment for completion of the Deactivation of Former Alignments Km 501.05 To Km 508.80 Traffic Management will be made by Lump Sum based on the percentage of the work completed and accepted by the Departmental Representative.

1.2 References

- .1 British Columbia Ministry of Transportation and Infrastructure.
 - .1 Traffic Management Manual for Work on Roadways – 2020 Edition.
 - .2 British Columbia Supplement to Transport Associate of Canada (TAC) Geometric Design Guide for Canadian Roads (latest edition).
- .2 Transportation Association Canada (TAC).
 - .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.
- .2 The Traffic Management Plan will include all works and requirements of both the Km 501-509 Geometric and

Drainage Improvements and the Deactivation of Former Alignments Km 501.05 To Km 508.80 parts of the project.

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 Subsection 3.2.1.10 – Traffic Management (15 minutes).
- .2 Limits of Work: The limits of work for this project are defined as Km 501+000 to Km 509+000 as shown on the Contract drawings.
- .3 Drop-off: An abrupt change in elevation created by construction activity such as milling, paving, or excavation that is steeper than 3H:1V.
- .4 Long-Duration Work: For Traffic Management purposes and applicable signage requirements, all work on the project shall be considered Long Duration as defined by the BC Ministry of Transportation Traffic Management Manual for Work on Roadways – 2020 Edition.

1.5 Submittals

- .1 Traffic Management Plan:
 - .1 Submit to the Departmental Representative for review and acceptance a Traffic Management Plan. The Traffic Management Plan shall function as a standalone document incorporating both the Km 501-509 Geometric and Drainage Improvements and Deactivation of Former Alignments Km 501.05 to Km 508.80 works, 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

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- 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 Edition, excluding Section 3.4.1 and 3.4.3.
- .4 Developed and conform to the standards for Category 2 Traffic Management Plans as defined in Section 3: Traffic Management Plans of the BC Ministry of Transportation Traffic Management Manual for Work on Roadways – 2020 Edition. As defined by Section 3.4.2, the Category 2 Traffic Management Plan shall be signed and sealed by a Professional Engineer who is licensed in British Columbia and qualified and experienced in traffic management. The customized drawings shall further include the sign size used for each individual sign (see Item 2.1 – Temporary Traffic Control Devices, subsection .2 of this specification), the sign support used (see Item 2.1 – Temporary Traffic Control Devices, subsection .1.4 of this specification), and the use of flags (if applicable, see Item 2.1 – Temporary Traffic Control Devices, subsection .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 Edition.

- .7 Shall include traffic signage to be used on side access roads within the limits of the work.
- .8 If dynamic message signs (DMS) 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 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 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, paving, line painting, rumble strip installation, excavation on highway, excavation off highway, culvert installation, etc. The table or list of each element of work on the project shall also include the applicable traffic accommodation strategies and layout drawing(s) to be used during non-work hours.

- .11 If using Traffic Control Persons (TCP) during non-daylight hours (before sunrise after sunset), 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 (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

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- 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 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 Edition and the following requirements.
 - .1 The use of portable dynamic message signs (DMS) for the duration of the work shall be at the Contractor’s discretion.
 - .2 Unless preapproved by the Departmental Representative, where 45 cm, 70 cm, or 90 cm cones are called for by the BC Ministry of Transportation Traffic Management Manual for Work on Roadways – 2020 Edition, 100 cm tubular markers shall be used.
 - .3 Automated Flagger Assistance Devices (AFADs) shall not be used on the project.
 - .4 All sign supports shall either be a post mounted support per the requirements of Figure 01 35 00 – 01 or Wind Resistance Sign Stand per the requirements of Figure 01 35 00 – 02.

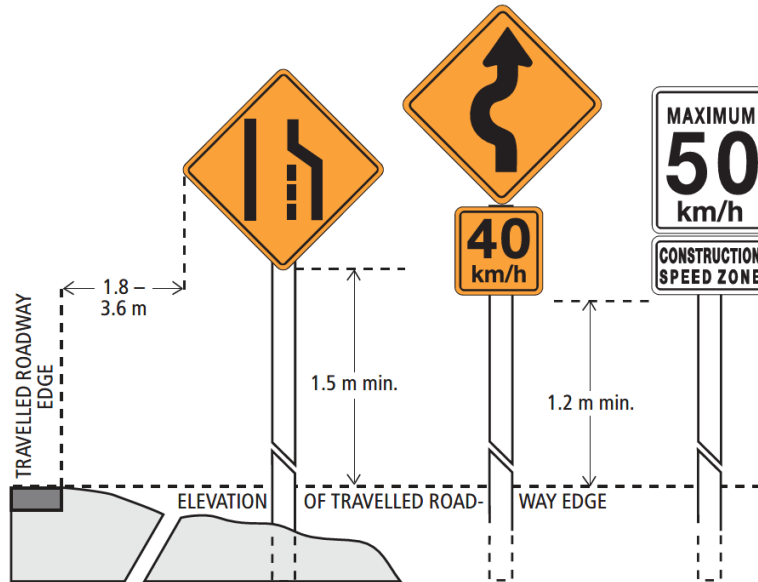


Figure 01 35 00 - 01: Post Mounted Supports



Figure 01 35 00 - 02: Wind 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 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 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 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.

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- .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 Edition) shall be included in the Traffic Management Plan and by undertaken / implemented by the Contractor prior to commencing work.
- .4 The Contractor shall maintain winter maintenance (snow clearing, sanding, ice removal) operations through the length of the project worksite for the duration of the project. Winter maintenance shall be completed to the level and standard that PSPC would have undertaken in this area should there not be an active ongoing construction project and provide for safe movement of public traffic on all open traffic lanes through the work zone. 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 Section 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 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 Edition.
- .4 Section 6: Traffic Control Layouts – General Instructions of the BC Ministry of Transportation Traffic Management Manual for Work on Roadways – 2020 Edition and as follows:

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- .1 Per section 6.3 of the BC Ministry of Transportation Traffic Management Manual for Work on Roadways – 2020 Edition, traffic management shall be managed as one continuous work zone where the work is one kilometer apart or less.
 - .2 Drop-off's shall be treated in accordance with Section 6.5 of the BC Ministry of Transportation Traffic Management Manual for Work on Roadways – 2020 Edition whenever the drop-off is within 1.5 m of the edge of the travel lane. Additionally, the following requirements shall be achieved.
 - .1 Drop-offs \geq 150 mm between 1.5 m and 3.0 m of the travel lane shall be signed with Low Shoulder (C-013) signs at least once every 1 kilometer for as long as the condition persists.
 - .2 A lane width of 3.7 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 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 Item 3.2 – Traffic Management, subsection .1.6 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 The use of portable dynamic message signs (DMS) is at the Contractor's discretion. If used by the Contractor, the portable DMS shall be positioned in the location identified in 7.2 Typical Construction Speed Zone Signing – Two-Lane, Two-way Roadway (see Item 3.2 – Traffic Management, subsection .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 The use of DMS is at the Contractor's discretion. If used by the Contractor, a DMS shall be positioned approximately 300 m prior to the sign C-018-2A.
 - .2 The sign C-035 shall be replaced with signs C-035-C and C-035-CT with the Contractor's name and phone number. Signs C-035-C and C-035-CT shall be in accordance with Figure 01 35 00 – 3.

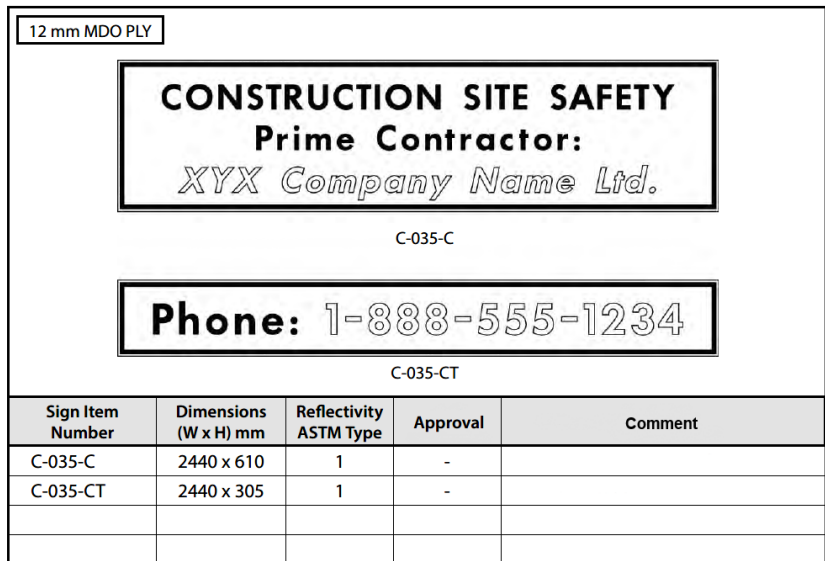


Figure 01 35 00 – 03: Sign C-035-C and C-035-CT Details

.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:

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

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

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

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

.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 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 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, or where the Contractor utilizes a Pilot Car in accordance with Item 3.2.1.5.8 of this specification section.

.2 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 Edition with the details included in the submitted and accepted Traffic Management Plan.

.3 A sign shall be installed on or near the temporary traffic signal indicating the maximum wait time (as determined by the signal timing 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 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 Edition) for the applicable speed (adjust all other sign spacing as required).

- .5 The temporary traffic signal stations are checked regularly, at a minimum interval of every two (2) hours.

- .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 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 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. A custom sign stating, “wait for pilot vehicle, maximum wait 15 minutes” (or

- similar) must be displayed at the temporary signals.
- .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 Edition) for the applicable speed (adjust all other sign spacing as required).
- .9 No Road Lines (C-046), Temporary Road Lines (C-047-1), and Low Shoulder (C-013) shall be included in the Contractor's Traffic Management 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 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 borrow source and 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. Existing conditions for traffic may be restricted to single lane (min. 3.2 m lane width with min. shoulder width on each side per Table 01 35 00 – 01) alternating traffic during completion of on-highway work including, full depth reclamation, regrading, paving, shouldering, line painting, rumble strip installation, or others works as preapproved by the Departmental Representative. Speed limit reduced during these times to 30 km/h (or 50 km/h, at the Contractor’s discretion).

- .9 Existing conditions for traffic may be restricted for the following work:
 - .1 Highway widening work may be restricted to single lane alternating traffic (3.2 m wide lane with min. shoulder width on each side per Table 01 35 00 – 01) with a speed limit reduced to during these times to 30 km/h (or 50 km/h, at the Contractor’s discretion).

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

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- .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 traffic control person (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.
 - .13 For sites with access roads / intersections, the following shall be used:
 - .1 At a minimum, a C-004 (or C-018-1A) sign shall be placed in front of a C-029 sign, followed by a C-001-1 sign (if traffic flaggers are used) or a C-027 sign (if traffic flaggers are not used). If traffic flaggers are not used, a custom sign stating "wait for pilot vehicle" (or similar) must be displayed before the C-027 sign. Depending on the traffic volumes, flaggers may be necessary at all access road intersections. The need for flaggers shall be determined on site following discussion and acceptance by the Departmental Representative.
 - .2 Signs should be positioned so that they do not block the sight lines of drivers entering a roadway from side roads or other access points.
 - .3 The maximum allowable delay to any individual motorist travelling through the

project limits from an access road / intersection as a result of the Contractor's operations will be 15 minutes.

- 3.3 Protection of Public Traffic .1
- Ensure traffic control and other measures as necessary are in place for the duration of the works to protect and accommodate public traffic as follows:
- .1 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 Edition. Complete checks a minimum of three (3) times per 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 Fire Safety Requirements.
- 1.22 Unforeseen Hazards.
- 1.23 Posted Documents.
- 1.24 Correction of Non-Compliance.

- 1.25 Medical.
- 1.26 Accidents and Accident Reports.
- 1.27 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:

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- .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.

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- .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 will include all works and requirements of both the Km 501-509 Geometric and Drainage Improvements and the Deactivation of Former Alignments Km 501.05 To Km 508.80 parts of the project and 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

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- 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 the Project Specific Health and Safety Plan. The preparation and

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

- .2 The Project Specific Health and Safety Plan shall, at a minimum include all headings, 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 Policies / 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 (ie. 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.

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| 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, Territorial 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. |

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- .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 night time, or provide security guard as deemed necessary to protect site against entry.
 - .3 Conduct daily safety meetings and task specific meetings (toolbox) as required by special work. At a minimum, meetings shall include refresher training for existing equipment and protocols, review ongoing safety issues and protocols, and examine new site conditions as encountered. Keep records of meetings and post to 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.
 - .6 Use powder-actuated devices in accordance with ANSI A10.3 (as amended) only after receipt of written permission from the Departmental Representative.
- 1.11 Project / Site Conditions
- .1 Work at the site may, 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.

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- .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.

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- .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

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- 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

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- 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 Fire Safety Requirements .1 Store oily/paint-soaked rags, waste products, empty containers and materials subject to spontaneous combustion in ULC approved, sealed containers and remove from site on a daily basis.
- .2 Handle, store, use and dispose of flammable and combustible materials in accordance with the National Fire Code of Canada.
- 1.22 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.
- 1.23 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.
- 1.24 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

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- General Contractor/subcontractors will be responsible for any costs arising from such a "stop work order".
- 1.25 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 hand held 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.
- 1.26 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.
- 1.27 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 Km 501-509 Geometric and Drainage Improvements 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 relating to the Km 501-509 Geometric and Drainage Improvements part of the works.
- .2 Measurement for Payment for completion of the Km 501-509 Geometric and Drainage Improvements 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.
- .3 Payment for the cost of Environmental Monitoring and Water Management will be made on the basis of the Price per Unit Bid for Deactivation of Former Alignments Km 501.05 To Km 508.80 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 relating to the Deactivation of Former Alignments Km 501.05 To Km 508.80 part of the works.
- .4 Measurement for Payment for completion of the Deactivation of Former Alignments Km 501.05 To Km 508.80 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, and:
 - .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, and
 - .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://www2.gov.bc.ca/gov/content/environment/plants-animals-ecosystems/invasive->

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).

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- .6 Environmental Overview Assessment (Appendix K and P).
 - .7 British Columbia Ministry of Forests, Lands, Natural Resource Operations, and Rural Development (FLNRORD) Section 11 Approval for Culvert Installation (Appendix L and R).
- 1.4 Regulatory Overview
- .1 The Departmental Representative will complete the environmental Change Approval and Notification permitting required under the 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 permit 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 and 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 or works that impact the existing interceptor ditch (including but not necessarily limited to excavation of new interceptor ditch, or infilling existing interceptor ditch with Embankment or Common Fill).
 - .2 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 following is a summary of the environmental permitting required for the works:
 - .1 Km 501-509 Geometric and Drainage Improvements Culvert Replacements / Installations and – Riprap erosion protection (ref: 100338776): Notification received for new culvert installations (see Appendix L). The Change Approval for culvert ditching and erosion end protection is in process and the timeline for approval is not known. The earliest PSPC anticipates receiving the Change Approval is mid-September 2021.
 - .2 Km 501-509 Geometric and Drainage Improvements Interceptor ditch relocation (ref: 100338840): The Change Approval is in process and the timeline for approval is not known. The earliest PSPC anticipates receiving the Change Approval is mid-September 2021.

- .3 Works affected by the Interceptor ditch relocation Change Approval include the excavation and placement of Embankment Material within the existing ditch area and associated highway widening. These works cannot start until the Change Approval is received.
- .4 Deactivation of Former Alignments Km 501.05 To Km 508.80 (ref: 100351139). The project Notification permitting under the Provincial Water Sustainability Act for instream work has been submitted to and approved by the applicable regulatory authorities (Refer to Appendix R).
- .3 The Contractor shall review the conditions of the Notification and Change Approval permits issued by FLNRORD to plan the works. This includes timing of instream works that shall only occur during the least risk fish window or when the channel is naturally dry (no flow) or completely frozen to the bottom at the time of construction.
- .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), and Environmental Site Inspection Memos, shall include both the Km 501-509 Geometric and Drainage Improvements and Deactivation of Former Alignments Km 501.05 to Km 508.80 works and be submitted to the Departmental Representative. Each report / 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 Memos, (first submission and if required all subsequent re-submissions) within 14 days of submission and the Breeding Bird and Bird Nest Survey (first submission and if required all subsequent re-submissions) within three (3) weekdays of submission. Upon review of the plan / report / memo the Departmental Representative will do one of the following:
- .1 Accept the plan / report / memo.
- .2 Accept portions of the plan / report / memo and provide comments outlining required changes or additional information in other sections. Following completion of edits by the Contractor, the Contractor shall re-submit the complete plan / report / memo for review.
- .3 Reject the plan / report / memo and provide comments outlining required changes or additional information needed before the plan / report / memo will be reviewed in detail. Following completion of edits by the Contractor, the Contractor shall re-submit the complete plan / report / memo for review.
- .2 The Contractor shall allow time in the schedule for the reviews, and subsequent edits / re-submission.
- .3 Work affected by the submittal (as determined by the Departmental Representative) shall not proceed until acceptance of the EPP and Breeding Bird and Bird Nest Survey by the Departmental Representative.
- .4 Upon Departmental Representative acceptance of the Contractor's EPP, the Departmental Representative may

- submit the EPP as part of the environmental notification / permitting process to FLNRORD.
- .5 The review of the EPP, Breeding Bird and Bird Nest Survey memo, Environmental Site Inspection Memos, by the Departmental Representative shall not relieve the Contractor of responsibility for errors or omissions in the accepted submittals or of responsibility for meeting all requirements of the Contract Documents.
- .6 Should deficiencies in the Contractor's EPP or Breeding Bird and Bird Nest Survey be noted following acceptance of the submittal by the Departmental Representative but during the project work, the Departmental Representative reserves the right to provide additional comments to the Contractor and require re-submission of the EPP or Breeding Bird and Bird Nest Survey to ensure the correction of any deficiencies.
- .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 to include all works and requirements of both the Km 501-509 Geometric and Drainage Improvements and the Deactivation of Former Alignments Km 501.05 To Km 508.80 parts of the project. The EPP should include and address all relevant environmental impacts / issues at the site as indicated by the EPP Checklist (Appendix H), environmental permitting approvals as provided by FLNRORD and provided in Appendix L and R, and as identified in this Section of the specifications. The EPP will require the Contractor to carefully think through the entire project, including identifying what activities and works will be occurring, both generally and at specific sites, and by what methods. The Environmental Protection Plan shall be 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 Item 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 onsite (including grout or other products from entering waterway). 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 mitigate measures which the Contractor will undertake and implement to ensure compliance with the environmental regulations applicable to the project (which may include requirements provided in FLNRORD Approval or Notifications for Instream Work, NWPA Approval for Instream Work, DFO Fisheries Act requirements, etc.) and these contract specifications.
- .10 The procedures for stopping the work and implementing changes to the construction methods should the Contractor not be achieving the environmental requirements as outlined in these 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 30 and August 20). 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 at least 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.

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- .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 Interceptor Ditch works.
 - .9 Camp management.
 - .10 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 are required to take place outside the Reduced Risk Timing Window (July 15 – August 15), the Contractor must work with a Qualified Environmental Professional (QEP) to develop proper mitigation to avoid harm to fish.
- .1 If the Contractor’s QEP confirms flows are not present within the watercourse (i.e. the watercourses are dry or frozen to bottom), work can proceed as planned.
- 3.2 Site Access and Parking .1 The Contractor shall review both short and long term access requirements with the Departmental Representative, both at the start-up and on an on-going basis. In consultation with the Departmental Representative, the Contractor shall formulate an agreement for worker transportation to and from the work site and where workers shall park their private vehicles. Generally, personal vehicles shall be parked at least 10 meters from any water course.
- .2 The Contractor shall ensure that the environment beyond the work limits is not negatively impacted or damaged by workers’ vehicles or construction machinery and shall instruct workers so that the “footprint” of the project is kept within defined boundaries.
- 3.3 Protection of Work Limits .1 The Contractor shall include in the EPP details on the work limits, how these shall be marked and what procedures will be employed to ensure trespass outside these limits does not occur, to the satisfaction of the Departmental Representative.
- 3.4 Erosion Control .1 Erosion control measures that prevent sediment from entering any waterway, water body or wetland in the vicinity of the construction site are a critical element of the project and shall be implemented by the Contractor.
- .2 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.

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- .3 The regular monitoring and maintenance of all erosion control measures shall be the responsibility of the Contractor. If the design of the control measures is not functioning effectively they are to be repaired. The Departmental Representative will monitor the Contractor's erosion control performance.
- .4 Erosion control measures must be in compliance with both Federal and Provincial legislation where required. Contractors should be referencing the provincial MoE Standards and Best Practices for Instream Works (2004).
- 3.5 Pollution Control
- .1 The Contractor shall prevent any deleterious and objectionable materials from entering streams, rivers, wetlands, water bodies or watercourses that would result in damage to aquatic and riparian habitat. Hazardous or toxic products shall be stored no closer than 100 metres to any surface water.
- .2 A Spill Response Plan will be prepared as part of the EPP and shall detail the containment and storage, security, handling, use and disposal of empty containers, surplus product or waste generated in the application of these products, to the satisfaction of the Departmental Representative, and in accordance with all applicable federal and provincial legislation. The EPP shall include a list of products and materials to be used or brought to the construction site that are considered or defined as hazardous or toxic to the environment. Such products include, but are not limited to, waterproofing agents, grout, cement, concrete finishing agents, hot poured rubber membrane materials, asphalt cement and sand blasting agents.
- .3 The containment, storage, security, handling, use, unique spill response requirements and disposal of empty containers, surplus product or waste generated in the use of any hazardous or toxic products shall be in accordance with all applicable federal and provincial legislation. Hazardous products shall be stored no closer than 100 metres from any surface water.
- .4 An impervious berm shall be constructed around fuel tanks and any other potential spill area. The berms shall be capable of holding 110% of tank storage volumes and shall be to the satisfaction of the Departmental Representative. Measures such as collection/drip trays and berms lined with occlusive material such as plastic and a layer of sand, and double lined fuel tanks can prevent spills into the environment.

- .5 The Contractor shall prevent blowing dust and debris by covering and/or providing dust control for temporary roads and on-site work such as rock drilling and blasting by methods that are approved by the Departmental Representative.
- .6 The Contractor shall provide spill kits, to the satisfaction of the Departmental Representative, at refueling, lubrication and repair locations that will be capable of dealing with 110% of the largest potential spill and shall be maintained in good working order on the construction site. The Contractor and site staff shall be informed of the location of the spill response kit(s) and be trained in its use.
- .7 Timely and effective actions shall be taken to stop, contain and clean-up all spills as long as the site is safe to enter. The Departmental Representative shall be notified immediately of any spill as well as the provincial authorities. Basic instructions and phone numbers shall be part of the Contractor's EPP.
- .8 In the event of a major spill, the Contractor shall prioritize the cleanup and all other work shall be stopped, where appropriate, and personnel devoted to spill containment and cleanup.
- .9 The costs involved in a major spill incident (control, clean up, disposal of contaminants, and site remediation to pre-spill conditions), shall be the responsibility of the Contractor. The site will be inspected to ensure completion to the pre-spill condition to the satisfaction of the Departmental Representative.
- .10 The Contractor's Environmental Monitor must inspect the abandoned vehicle and surrounding soil located at approximately Km 22.26 of the Former Alignment to confirm whether any hazardous materials are present prior to removal (refer to Section 02 22 50 – Selective Site Demolition).
 - .1 The Contractor's Environmental Monitor must submit in writing confirmation of no hazardous materials within the vehicle and the surrounding soil to the Departmental Representative for approval prior to removal of the vehicle.
 - .2 If hazardous materials are deemed to be present by the Contractor's Environmental Monitor, a suitable

mitigation plan for removal of the hazardous liquids/materials in line with the EMP Mitigation (Appendix K and P) must be prepared and submitted to the Departmental Representative for approval prior to removal of the vehicle and surrounding soil.

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 metres to any surface water (streams, wetlands, water bodies or watercourses) shall require discussion with the Departmental Representative. Regardless of fueling location, personnel shall maintain a presence during refueling with immediate attention to the fueling operations.
- .3 Diesel and gasoline delivery vehicles, including bulk tankers shall not be parked within 100 metres from any surface water unless actively being used for refueling. Immediately following refueling, bulk tankers shall be moved to a location 100 m or greater from any surface water. Gravity fed fuel systems are not allowed. Manual or electric pump delivery systems shall be used.
- .4 Mobile fuel containers (e.g. slip tanks, small fuel carboys) shall remain in the service vehicle at all times. Protection and containment of approved fuel storage sites is addressed in Item 3.5 – Pollution Control, Subsection .4 of this specification.
- .5 Equipment 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.

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- .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 onsite 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 or in the water, the Contractor is required to stage the work and employ the mitigation measures shown on the Environmental Staging Drawings 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 topsoils) in the trees bordering the right-of-way or into surface water.
- .3 When, in the opinion of PSPC, negligence on the part of the Contractor results in damage or destruction of vegetation, or other environmental or aesthetic features beyond the designated work area, the Contractor shall be responsible, at his or her expense, for complete restoration including the replacement of trees, shrubs, topsoil, grass, etc. to the satisfaction of the Departmental Representative.
- .4 Restrict vehicle movements to the work limits.
- .5 Workers vehicles are to remain within the construction footprint.

- 3.8 Managing Invasive Plant Vegetation
- .1 Keep equipment clean and avoid parking, turning around or staging equipment in known invasive species infested areas, or mow prior to use.
 - .2 Wash equipment prior to mobilization to site.
 - .3 Minimize unnecessary disturbance of roadside aggregates or soil and retain desirable roadside vegetation whenever possible.
 - .4 Where possible, begin mowing or brushing in “invasive plant free” areas and end in infested areas.
 - .5 Where possible, use only clean fill material from an “invasive plant free” source.
 - .6 Whenever possible, re-seed with grass mixtures that are free of weeds, locally adapted, non-invasive, and quick to establish. Spread seed in the early spring or late fall to ensure successful establishment. Refer to Section 32 93 21-A – Hydraulic Seeding or Section 32 93 21-B – Non-Hydraulic Seeding for additional requirements.
- 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.

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- .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 (CPP). See Environmental Overview Assessment (EOA) in Appendix K and P.
- 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.

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- .3 Construction, trade, hazardous waste and domestic waste materials shall not be burned, buried, or discarded at the construction site. These wastes shall be contained and removed in a timely and approved manner by the Contractor and workers, and disposed of at an appropriate waste landfill site located outside the work area.
- .4 A concerted effort shall be made by the Contractor and workers to reduce, reuse and recycle materials where possible.
- .5 Sanitary facilities, such as portable container toilets, shall be provided by the Contractor and maintained in a clean condition.
- 3.13 Wastewater Discharge Criteria
- .1 Wash water, meltwater collection, rinse water resulting from the cleaning of fuel tanks and pipelines, contaminated groundwater, and/or any other liquid effluent stream will be released onto the ground at a location that is a minimum of 30 metres from natural drainage courses and 100 metres from fish bearing waters, and will conform to the discharge requirements set out in 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 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 metres from natural drainage courses and 100 metres from fish bearing waters.
- .7 Have on hand sufficient pumping equipment, machinery, and tankage in good working condition for ordinary emergencies, including power outage, and competent workers for operation of pumping equipment.
- 8 Ensure no downstream adverse effects are caused by the removal of beaver dams (if necessary).
- .1 3.15 Site Clearing, Plant Protection, and Nesting Bird Protection
Prior to any clearing performed during the breeding bird nesting period (April 30 to August 20), the Contractor shall have a Breeding Bird and Bird Nest survey completed first per the requirements of Subsection 1.5 Submittals. No surveys are required if clearing is performed outside of the nesting period.

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- .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.
 - .7 Ensure removal of beaver dams occur only after trapping of beavers have been completed by PSPC. The Environmental Monitor shall be onsite during beaver dam removal.
- 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 manufacture'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.
- .3 Payment for Quality Management for Deactivation of Km 501.05 to Km 508.80 will not be made and shall be considered incidental to the applicable payment item of work.

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- 1.2 References
- .1 British Columbia MoTI – 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 D2419, Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate.
 - .5 ASTM C566, Standard Test Methods for Total Evaporable Moisture Content of Aggregate by Drying.
 - .6 ASTM D2216, Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass.
 - .7 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.

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- .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 contractors 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 to include all works and requirements of both the Km 501-509 Geometric and Drainage Improvements and the Deactivation of Former Alignments Km 501.05 To Km 508.80 parts of the project. 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, grout, 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 Approval for Instream Work (see Appendix K and P and Section 01 35 43 – Environmental Protection), and all other applicable regulations including the requirements of these specifications.
 - .5 All forms to be filled in by the Quality Control Personnel (ex. check sheets, test forms, daily reports, NCR's, etc.).
 - .6 Procedures for the review of the project submissions by the QC Manager and Contractor to ensure accuracy and completeness of each submission

- against the project / specification requirements by the Contractor prior to submission to the Departmental Representative for review approval.
- .7 Resumes of Quality Control Manager and designated replacement (if applicable) detailing the Quality Control Manager(s) past experience performing similar roles on similar projects.
 - .8 Details of the anticipated work schedule (onsite and breaks) for the Quality Control Manager and designate replacement Quality Control Manager.
 - .9 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

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- provide the specific services required for the Project.
- .3 A listing of Quality Control Staff (including names, qualifications and relevant experience) and their assigned roles and work scheduling in performing Quality Control duties.
 - .4 A list of testing and survey equipment to be used for the work.
 - .4 The Contractor shall ensure that all workers are familiar with the Quality Management Plan, its goals, and their role under it, as well as the Contract Specifications associated with the work they are to undertake.
 - .5 The Quality Management Plan shall be reviewed and signed by QC Manager prior to submission to the Departmental Representative for review. The QC Manager's signature shall also include a note indicating the that the Quality Management Plan is complete and conforms with the project requirements for QC as noted in the Contract Specifications and any additional QC requirements that the Contractor may have for the project prior to submission to the Departmental Representative for review.
- 1.8 Quality Control Personnel
- .1 The Contractor shall appoint 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 Contractor's Quality Control Personnel and require the Contractor to find alternative Quality Control Personnel prior to or during the work should the Quality Control Personnel not have the necessary qualifications as listed in this Contract Specification or in the opinion of the

Departmental Representative is not adequately fulfilling the quality control requirements or independently reporting on the Contractor'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.

- .6 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 Contractor 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 (ex. "as approved by the Departmental Representative"), the check sheets shall assume that the requirement listed governs and the QC process shall check these requirements unless directed otherwise during the project by the Departmental Representative.
- .2 The frequency of check sheets completed by the Quality Control Staff to verify and document conformance of the work to the quality requirements of the contract shall be established by the Quality Control Manager to ensure the quality of the work is

thoroughly documented. At a minimum, the frequency of check sheets shall 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 Be completed using suitable testing devices, operational, and staffed onsite field laboratory (except for tests noted otherwise in Table 01 45 00 – 01) during times of construction activity and gravel manufacturing.
 - .2 Include all testing and survey inspection specified in the Contract Documents.
 - .3 Any other testing or survey inspection required as a condition for deviation from the specified Contract procedures.
- .2 The frequency of testing / survey 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	ASTM C136, Sieve Analysis of Fine and Coarse Aggregates	The more stringent of: one (1) test per 3,000 m ³ or one (1) test for every two (2) hours of manufacturing
Gradation –Embankment, Common Fill	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	Survey Inspection	One (1) point every 3 m ² of placed material
Placement / Site Tolerance – Crushed Base Gravel	Survey Inspection	Final lift, four (4) points along each cross section at 20 m stations (two (2) points LHS, two (2) points RHS)
Placement / Site Tolerance – Sub-Base Course, Embankment	Survey Inspection	Final lift, four (4) points along each cross section at 20 m stations (two (2) points LHS, two (2) points RHS)
Placement / Site Tolerance – Common Fill	Survey Inspection	Final lift, three (3) points along each cross section at 20 m stations
Site Tolerance – Interceptor Ditch	Survey Inspection	Two (2) survey shots at Interceptor Ditch invert and two (2) survey shots at excavation limits every 10 m stations
Compaction – Crushed Base Gravel, Sub-Base Course, Embankment (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 / material source.
Compaction – Crushed Base Gravel, Sub-Base Course (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 – Embankment (unfrozen condition)	In-Place Density (ASTM D6938, Proof Rolling)	One (1) test per 200 m ² per lift of placed material or Proof Roll over full width of each lift of material placed if 30% or more of the Embankment is oversized (> 19 mm)
Compaction – Culvert Bedding Material / Crushed Base Gravel	In-Place Density (ASTM D6938)	One (1) test per 20 m ² per lift of placed material
Moisture Content – Crushed Base Gravel, Sub-Base Course, (frozen condition)	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, 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
Compaction – Common Fill (frozen and unfrozen condition)	Method Specification	Compact each lift with a minimum of six (6) passes of the entire lift area using a Plate Compactor with a nominal operating weight of 1000 LB (454 kg) or larger, or an alternate control strip method proposed by the Contractor and accepted by the Departmental Representative
Placement / Site Tolerance – Culverts (Trenchless Method, Culvert Extension)	Survey Inspection	One (1) survey shot (invert of culvert) at inlet and outlet ends, and along the length of the culvert as necessary to confirm the culvert is not reverse graded and within +/- 300 mm of the true line and level along the culvert
Manufacture – Grout	Compressive Strength (ASTM C1019)	One (1) set of four (4) cubes (one 7-day and three 28-day) cubes for every culvert filled with Grout
Manufacture – Cellular Plastic Void Filler	Restrained Core Density (ASTM D1622)	One (1) sample test per delivery of product prior to works
Manufacture – Cellular Plastic Void Filler	Compressive Strength (ASTM D1621)	One (1) sample test per delivery of product prior to works
Placement / Site Tolerance – Riprap	Survey Inspection	One (1) survey point every 5 m ² or design change in grade

.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 1.10 – QC Testing 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 Item 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.

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- .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 hrs. of the occurrence, with a copy to the Departmental Representative in accordance with Item 1.6 – Submittals of this specification. Included as part of the NCR will be a required response time.
- The Contractor shall then respond to the NCR (within the specified response time) by notifying the Quality Control Manager and the Departmental Representative of the proposed resolutions and corrective actions. The Contractor and/or the Quality Control Manager may consult with the Departmental Representative on the resolutions but is not required to do so.
- Payment for the work for which the NCR has been issued may be withheld until the NCR issue is resolved.

- .3 Should the Contractor's Quality Control reporting indicate that an aspect of the Contractor's work is continually deficient (starting with the second similar occurrence) and not in conformance with the contract requirements (including the Contractor's submitted plans (Project Specific Health and Safety Plan, Traffic Management Plan, Environmental Protection Plan, Quality Control Plan, etc.)), the Quality Control Manager shall issue an internal procedural Non-Conformance Report (NCR) to the Contractor within 24 hrs. of the occurrence, with a copy to the Departmental Representative in accordance with Item 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 Installation and Removal.
- 1.3 Scaffolding.
- 1.4 Hoisting.
- 1.5 Site Storage / Loading.
- 1.6 Security.
- 1.7 Equipment, Tool, and Materials Storage.
- 1.8 Sanitary Facilities.
- 1.9 Construction Signage.
- 1.10 Construction Laydown Area, Construction Parking, and Site Office.
- 1.11 Departmental Representative’s Office Trailer.
- 1.12 Power.
- 1.13 Communications.
- 1.14 Temporary Heating, Ventilation, and Lighting.
- 1.15 Fire Protection.
- 1.16 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 Installation and Removal .1 Provide construction facilities in order to execute work expeditiously.
.2 Remove from site all such work after use.
- 1.3 Scaffolding .1 Provide and maintain scaffolding, ramps, ladders, swing staging, platforms, and temporary stairs as necessary to carry out work.

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| 1.4 Hoisting | .1 | Provide, operate, and maintain hoists and cranes as necessary for moving of workers, materials, and equipment. |
| | .2 | Hoists and cranes shall be operated by qualified operators. |
| 1.5 Site Storage / Loading | .1 | Confine work and operations of employees by Contract Documents. Do not unreasonably encumber premises with products. |
| | .2 | Do not load or permit to load any part of work with a weight or force that will endanger the work or existing infrastructure. |
| 1.6 Security | .1 | Provide and pay for responsible security personnel as required. |
| 1.7 Equipment, Tool, and Materials Storage | .1 | If required by the Contractor provide and maintain, in a clean and orderly condition, lockable weatherproof sheds for storage of tools, equipment and materials. |
| | .2 | Locate materials not required to be stored in weatherproof sheds on site in a manner to cause least interference with public. |
| 1.8 Sanitary Facilities | .1 | Provide sanitary facilities for work force in accordance with governing regulations and ordinances. |
| | .2 | Post notices and take such precautions as required by local health authorities. Keep area and premises in sanitary condition. |
| 1.9 Construction Signage | .1 | No other signs or advertisements, other than those required by Section 01 35 00 – Traffic Management, are permitted on site. |
| 1.10 Construction Laydown Area, Construction Parking, and Site Office | .1 | Confine construction laydown areas, site office locations, and construction parking to the locations identified below in compliance with Section 01 35 43 – Environmental Protection and as preapproved by the Departmental Representative. |
| | .1 | Within Alaska Highway right-of-way, former Alaska 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 | Other areas as preapproved by the Departmental Representative. |
| 1.11 Departmental Representative's Office Trailer | .1 | Provide Departmental Representative with office space within the Contractor's trailer or standalone office trailer set up at a location preapproved by the Departmental Representative. |

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- .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.
 - .6 If the Departmental Representative's office space will be within the Contractor's Trailer, the office shall have a separate lockable entrance door and space fully partitioned from Contractor's area.
 - .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 Alaska Highway right-of-way between Km 501 and Km 509.
 - 1.12 Power
 - .1 Provide and pay for power as required for the completion of the works and operations of construction offices.
 - 1.13 Communications
 - .1 Ensure Contractor's onsite representatives have suitable onsite phone communications allowing the Departmental Representative reliable communication to the Contractors onsite representative when onsite.
 - 1.14 Temporary Heating, Ventilation, and Lighting
 - .1 Provide temporary heating, ventilation, and lighting as required during construction period to facilitate construction of the works.

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| 1.15 Fire Protection | .1 | Provide and maintain temporary fire protection equipment during performance of work. |
| 1.16 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 be brought to site should the work appear to be delayed due to lack of equipment. |

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 of 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.

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| 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. Obtain approval from landowner should Contractor choose to setup construction camp. The construction camp shall not be located within PSPC's right-of-way, PSPC's maintenance yards, PSPC's gravel pits / quarries, or on any other land owned or leased by PSPC.
.2 The Contractor shall be responsible for all utility services to the construction camp. The construction camp to be established and operated in accordance with local regulations.
- 1.3 Requirements of Regulatory Agencies .1 Obtain necessary licenses and approvals required by Authority having Jurisdiction for authorized use of water and disposal of domestic sewage and other waste.
.2 Comply with Environmental regulations.

PART 2 – PRODUCTS

- 2.1 Products .1 Not used.

PART 3 – EXECUTION

- 3.1 Mobilization .1 Mobilize equipment, personnel, and materials as necessary to establish temporary construction camp and offices. Obtain necessary licenses and approvals from authorities having jurisdiction prior to mobilization. Camp and service area location and layout plan to be submitted to Departmental Representative for review and acceptance.
- .2 Temporary construction camps to be established and operated in accordance with local regulations.
- 3.2 Maintenance .1 Maintain construction camp and offices in a neat and tidy condition.
- 3.3 Demobilization .1 Upon vacating the construction camp, offices and temporary services, clean-up and leave site in a condition satisfactory to the Departmental Representative and the authorities having jurisdiction.

END OF SECTION

SECTION INCLUDES

PART 1 – GENERAL:

- 1.1 Measurement and Payment Procedures.
- 1.2 Project Cleanliness.
- 1.3 Final Cleaning.

PART 1 – GENERAL

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| 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. Reinstatement of 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 provide 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 (1) 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 relocated interceptor ditch, embankment and gravels placed).
 - .2 Culverts (inverts at inlet and outlet), size and type.
 - .3 Signage (new or modified).
 - .4 BST cut line.
 - .5 Edge of Gravel Shoulder.
 - .6 Riprap.
 - .7 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 – PRODCUTS:

2.1 Not used.

PART 3 – EXECUTION:

3.1 Debris Removal.

3.2 Creosote Treated Wood and Surrounding Soil.

3.3 Abandoned Vehicle and Surrounding Soil.

3.4 Culverts.

PART 1 – GENERAL

1.1 Measurement and Payment
Procedures

.1 Payment for the removal and offsite disposal of the debris identified at various locations will be made on the basis of the Price per Unit Bid for Debris Removal – Various Locations in the Bid and Acceptance Form. The Price per Unit Bid shall include all costs for:

.1 Debris: removal, loading, transport, and offside disposal of debris (including vehicle) identified in the contract drawings and specifications.

.2 Creosote treated wood: removal, loading, transport, and offsite disposal. All timber debris shall be considered to be creosote treated unless noted otherwise by the Contractor's Environmental Monitor, and removed as per Item 3.2 – Creosote Treated Wood and Surrounding Soil of Section 02 22 50 – Selective Site Demolition.

.3 Abandoned Vehicle: Inspection by the Contractor's Environmental Monitor to verify any hazardous materials present and preparation of a suitable mitigation plan if required, for approval by the Departmental Representative. Removal as per Item 3.3 – Abandoned Vehicle and Surrounding Soil.

.4 All other items necessary for successful completion of the work.

- .2 Measurement for Payment for Debris Removal – Various Locations shall be made by Lump Sum based on the percentage of the work completed and accepted by the Departmental Representative.
- .3 Payment for Optional Work – Excavation and Offsite Disposal of Abandoned Vehicle Contaminated Soil at Km 22.26 shall be made on the basis of Price per Unit Bid for Optional Work – Excavation and Offsite Disposal of Abandoned Car Contaminated Soil in the Bid and Acceptance Form. The Price per Unit Bid shall include:
 - .1 All costs for excavating the contaminated soil agreed upon by the Contractor’s Environmental Monitor and the Departmental Representative as per Item 3.3 – Abandoned Vehicle and Surrounding Soil, including temporary placement and storage of the excavated materials on site prior to disposal offsite.
 - .2 All costs loading, transport, and offsite disposal of the contaminated soil at an appropriate facility as per Item 3. 3 – Abandoned Vehicle and Surrounding Soil.
 - .3 All other items necessary for successful completion of the work.

This optional work item will be directed by the Departmental Representative via change order.
- .4 Measurement for Payment for Optional Work – Excavation and Offsite Disposal of Abandoned Vehicle Contaminated Soil at Km 22.26 shall be made on the volume of material excavated and disposed, surveyed in cubic metres and accepted by the Departmental Representative.
- .5 Measurement and payment for removal and offsite disposal of existing culverts shall not be made under this specification section. Refer to Section 31 24 14 – Excavation, Embankment, and Compaction.
- .6 Measurement and payment for Optional Work – Excavation and Offsite Disposal of Creosote Contaminated Soil shall not be made under this specification section. Refer to Section 31 24 14 – Excavation, Embankment, and Compaction.

PART 2 – PRODUCTS

- .1 Not Used

PART 3 – EXECUTION

- 3.1 Debris Removal .1 Debris indicated on contract drawings and by the Departmental Representative shall be removed by the Contractor and disposed offsite at a disposal facility acceptable to the Departmental Representative.
- 3.2 Creosote Treated Wood and Surrounding Soil .1 Dispose of creosote treated wood and surrounding soil as per the EMP (Appendix P) such that:
- .1 All removed Creosote Treated Wood should be placed on poly sheeting while temporarily stockpiled in order to prevent the possibility of leached creosote from any newly exposed wood surfaces from gaining to the surface and substance soils which would potentially contaminate the soil with Polycyclic Aromatic Hydrocarbons (PAHs).
 - .2 The Contractor's Environmental Monitor shall inspect the exposed soils adjacent to the removed Creosote Treated Wood. If the soil does not present visual or olfactory evidence of residual creosote, the soil may be left in place. The Contractor's Environmental Monitor shall provide documentation of the soil being free of visual or olfactory evidence of residual creosote and submit to the Departmental Representative.
 - .3 If any exposed soils adjacent to the treated wood presents visual or olfactory evidence of residual creosote, the soil shall be excavated and stockpiled on poly sheeting. 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 PAHs and the analytes required to meet the receiving facility's disposal criteria (one sample for each: flashpoint, pH, total BTEX) to determine disposal options. PAHs 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. 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.
- .4 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 PAHs from the stockpile.
 - .5 Prevent contact of creosote-treated wood with water within the watercourse.
 - .6 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 it to PSPC.
- 3.3 Abandoned Vehicle and Surrounding Soil
- .1 Dispose of Abandoned Vehicle and surrounding soil at Km 22.26 as per the EMP (Appendix P) such that:
 - .1 The Contractor's Environmental Monitor shall inspect the Abandoned Vehicle and surrounding soils adjacent to the vehicle for the presence of hazardous materials such as but not limited to hydrocarbons.
 2. If hazardous materials are not present the Contractor's Environmental Monitor shall submit confirmation in writing to the Departmental Representative for approval. Removal of the vehicle shall not proceed without the Departmental Representative's approval.
 - .1 Once the vehicle is removed the soil previously inaccessible under the car shall be inspected by the Contractor's Environmental Monitor.
 - .2 If the surrounding soil does not present visual or olfactory evidence of hazardous materials, the soil may be left in place. The Contractor's Environmental Monitor shall provide documentation of the soil being free of visual or

- olfactory evidence of hazardous materials and submit to the Departmental Representative.
- .3 If the surrounding soil contains hazardous materials the Contractor is to proceed based on Item 3.3.4 of this section.
- .3 If hazardous materials are present the Contractor's Environmental Monitor shall prepare a suitable mitigation plan including the mitigation measures outlined in the EMP (Appendix P) and any further measures to ensure the safe removal of hazardous materials from the vehicle or surrounding area. The mitigation plan is to be submitted to the Departmental Representative for approval. Removal of the car shall not proceed without the Departmental Representative's approval.
- .4 If any exposed soils adjacent to or under the Abandoned Vehicle presents visual or olfactory evidence of residual Hazardous materials, the soil shall be excavated and stockpiled on poly sheeting. 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 polycyclic aromatic hydrocarbons (PAHs) and the analytes required to meet the receiving facility's disposal criteria (one sample for each: flashpoint, pH, total BTEX) to determine disposal options. PAHs 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. All analysis results shall be submitted to PSPC prior to disposal of the 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.
- .5 Until such time that any stockpiled soil is removed from the site, the stockpile(s) should be covered with

poly sheeting to prevent precipitation from leaching from the stockpile.

.6 Prevent contact of soil with water within the watercourse.

.7 Any hazardous materials 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. 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 it to PSPC.

3.4 Culverts

.1 Perform culvert excavation as per Item 3.8 – Excavation and Culvert Removal of Section 31 24 14 – Excavation, Embankment, and Compaction.

END OF SECTION

SECTION INCLUDES

PART 1 – GENERAL:

- 1.1 Definitions.
- 1.2 Submittals.
- 1.3 Storage and Handling.
- 1.4 Transportation.

PART 2 – PRODUCTS:

- 2.1 Materials.

PART 3 – EXECUTION:

- 3.1 Disposal.

PART 1 – GENERAL

1.1 Definitions

- .1 Dangerous Goods: Product, substance, or organism that is specifically listed or meets the hazard criteria established in Transportation of Dangerous Goods Regulations.
- .2 Hazardous Material: Product, substance, or organism that is used for its original purpose and that is either dangerous goods or a material that may cause adverse impact to the environment or adversely affect health of persons, animals, or plant life when released into the environment.
- .3 Hazardous Waste: Any hazardous material that is no longer used for its original purpose and that is intended for recycling, treatment, or disposal.
- .4 Workplace Hazardous Materials Information System (WHMIS): A Canada-wide system designed to give employers and workers information about hazardous materials used in the workplace. Under WHMIS, information on hazardous materials is to be provided on container labels, material safety data sheets (MSDS), and worker education programs. WHMIS is put into effect by a combination of federal and provincial laws.

1.2 Submittals

- .1 Submit product data in accordance with Section 01 33 00 – Submittal Procedures.
- .2 If requested by the Departmental Representative, submit to the Departmental Representative a current Material Safety Data

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- Sheet (MSDS) for each hazardous material required prior to bringing hazardous material on site.
- 1.3 Storage and Handling
- .3 If requested by the Departmental Representative, submit Hazardous Materials Management Plan to the Departmental Representative that identifies all hazardous materials, their use, their location, personal protective equipment requirements, and disposal arrangements.
 - .1 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.
- 1.3 Definitions.
- 1.4 Submittals.
- 1.5 Quality Management.

PART 2 – PRODUCTS:

- 2.1 Grout.
- 2.2 Grout Mix.
- 2.3 Cellular Plastic Void Filler.
- 2.4 Crushed Base Gravel.

PART 3 – EXECUTION:

- 3.1 General.
- 3.2 Environmental Requirements.
- 3.3 Site Preparation.
- 3.4 Delivery, Storage, and Handling.
- 3.5 Placement.
- 3.6 Curing and Finishing.

PART 1 – GENERAL

- 1.1 Measurement and Payment Procedures .1 Payment for the installation of Culvert Infill Material shall not be made and shall be considered incidental to Section 33 42 13 – Pipe Culverts.
- 1.2 References .1 American Society for Testing and Materials (ASTM), latest edition.
 - .1 ASTM C1019, Standard Test Methods for Sampling and Testing Grout.

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- .2 ASTM C940, Standard Test Method for Expansion and Bleeding of Freshly Mixed Grouts for Preplaced-Aggregate Concrete in the Laboratory.
 - .3 ASTM D1621, Standard Test Method for Compressive Properties of Rigid Cellular Plastics
 - .4 ASTM D1622, Standard Test Method for Apparent Density of Rigid Cellular Plastics
 - .5 ASTM D2842, Standard Test Method for Water Absorption of Rigid Cellular Plastics
 - .6 ASTM D2126, Standard Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging
 - .7 ASTM C260 / C260M, Standard Specification for Air-Entraining Admixtures for Concrete
- .2 Canadian Standards Association (CSA International), latest edition.
 - .1 CSA A23.1/A23.2, Concrete Materials and Methods of Concrete Construction / Test Methods and Standard Practices for Concrete.
 - .3 BC Ministry of Water, Land and Air Protection – Standards and Best Practices for Instream Work.
- 1.3 Definitions
- .1 Culvert Infill Material: Ready mix controlled low strength material either grout, Cellular Plastic Void Filler or other suitable product proposed by the Contractor and acceptable to the Departmental Representative.
 - .2 Grout: Ready-mix controlled low strength material used as an alternative to compacted soil, and is also known as controlled density fill, flowable fill, and several other names, some of which are trademark names of material suppliers. Grout differs from Portland cement concrete as it contains a low cementitious content to reduce strength development for possible future removal.
 - .3 Cellular Plastic Void Filler: 2-part component mix controlled system used in the filling of culvert voids.
- 1.4 Submittals
- .1 Undertake the relevant Mix Design or provide product data as applicable to the Culvert Infill Material proposed, and pay for all costs associated with the development, testing, and

submissions of the product. Additional details required for the Culvert Infill Material shall include but are not necessarily limited to:

- .1 Expected method of batching, transporting, and placing Material.
- .2 Distance and expected travel time from batch plant location to project site.
- .2 Prepare a written Culvert Infill Material Installation Memo that will include the proposed methodology / procedures that will ensure the entire void space within each culvert is filled with Grout, Cellular Plastic Void Filler or alternative product and no void space is remaining at the conclusion of the work. The submittal shall include sufficient details of all aspects of the proposed plan, including installation in winter conditions / freezing temperatures, such that the Departmental Representative can ascertain the effectiveness of the proposed plan.
- .3 Prepare a written submittal with drawings (as necessary) of any Formwork / Falsework Containment which will be used during the installation to prevent any Grout, Cellular Plastic Void Filler or alternative product from entering the adjacent water course. The submittal shall include sufficient details of all aspects of the proposed plan for the various culvert locations and sizes such that the Departmental Representative can ascertain the effectiveness of the proposed plan upon completion of the work (i.e. prove that all void spaces are filled).
- .4 The Contractor's Culvert Infill Material Product Design, Installation Memo, and Formwork / Falsework Containment submittals 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 Culvert Infill Material Product Design, Installation Memo, and Formwork / Falsework Containment submittals (first submission and if required all subsequent re-submissions) within seven (7) days of submission. Upon review of the submittals the Departmental Representative will do one of the following:
 - .1 Accept the Culvert Infill Material Product Design, Installation Memo, and Formwork / Falsework Containment submittals.

- .2 Accept portions of the Culvert Infill Material Product Design, Installation Memo, and Formwork / Falsework Containment submittals and provide comments outlining required changes or additional information in other sections. Following completion of edits by the Contractor, re-submit for review.
 - .3 Reject the Culvert Infill Material Product Design, Installation Memo, and Formwork / Falsework Containment submittals 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 for review.
 - .5 The Contractor shall allow time in the schedule for the reviews, and subsequent edits / re-submission.
 - .6 No Culvert Infill Material shall be placed prior to receiving Departmental Representative's acceptance of the Culvert Infill Material Product Design, Installation Memo, and Formwork / Falsework Containment submittals.
 - .7 Acceptance of the Culvert Infill Material Product Design by the Departmental Representative does not constitute acceptance of the Culvert Infill Material. Acceptance of the Culvert Infill Material will be based upon the test results and the performance and quality of the Culvert Infill Material placed on the project.
- 1.5 Quality Management
- .1 Quality Control and Quality Assurance in accordance with Section 01 45 00 – Quality Management.
 - .2 Quality Control testing frequency: Minimum test frequency as described in Table 01 45 00 – 01 unless advised otherwise by the Departmental Representative following a review of the Grout Mix Design but in advance of the work.

PART 2 – PRODUCTS

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

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- .2 Portland cement: to CSA-A23.1
 - .3 Water: to CSA-A23.1
 - .4 Aggregates: to CSA-A23.1
 - .5 Air entraining Admixtures: to ASTM C260 / C260M
 - .6 In no case will batch adjustment relieve the Contractor of the responsibility for the durability, strength, or acceptability of Grout concerned. The Departmental Representative reserves the right to reject any batch in case of confirmed unacceptability and to require immediate removal of any Grout from this batch from the work.
- 2.2 Grout Mix
- .1 Proportion Grout to yield the following properties.
 - .1 Maximum cementitious content of 90 kg/m³.
 - .2 Minimum compressive strength at 28 days: 2.1 MPa.
 - .3 Maximum compressive strength at 28 days: 5 MPa.
 - .4 Consistency that will result in a flowable product at the time of placement which does not require manual means to move it into place.
 - .5 Maximum evaporation of bleed water shall not result in shrinkage of more than 10.4 mm/m of Grout depth. Measurement of a final bleeding shall be as measured in Section 10 of ASTM C940.
 - .2 Do not change Grout Mix without prior approval of the Departmental Representative. Should change in material source be proposed, a new Grout mix design to be submitted to the Departmental Representative for compliance acceptance.
- 2.3 Cellular Plastic Void Filler
- .1 Cellular Plastic Void Filler to yield to the following properties.
 - .1 2 Part Component System
 - .2 Restrained Core Density: 32.0 kg/m³ (2.0 pcf).
 - .3 Compressive Strength: 0.19 MPa (27 psi).
 - .4 Closed Cell Content: 95%.

- .5 Water Absorption 0.4 L/m² (0.08 lbs./sq.ft.).
- .6 28 Day Dimensional Stability – Vol. Change:
 - .1 -28.9°C (-20°F): -0.1%.
 - .2 93.3°C (200°F): -0.2%.
 - .3 70°C (158°F), 95% RH: -1.2%.
- 2.4 Crushed Base Gravel .1 Crushed Base Gravel shall be in accordance with Section 31 05 16 – Aggregates: General.

PART 3 – EXECUTION

- 3.1 General
 - .1 Provide 24 hours' notice and Obtain the Departmental Representative's approval before placing the Culvert Infill Material.
 - .2 Prior to placing the Culvert Infill Material obtain approval from the Departmental Representative of proposed method of protection of Culvert Infill Material during placing and curing in adverse weather or when air temperatures are less than 5 degrees Celsius or greater than 30 degrees Celsius.
- 3.2 Environmental Requirements
 - .1 Take all necessary precautions as outlined in Section 01 35 43 – Environmental Protection and the Contractor's EPP to mitigate against environmental pollution or damage during installation.
 - .2 Concrete and grouting will follow Section 14.6 Concrete Materials Use under the BC Ministry of Water, Land and Air Protection – Standards and Best Practices for Instream Work.
 - .3 Grout fines, wash, or any other substance shall not be deposited or contact, either directly or indirectly, any water or watercourse. Grout materials shall remain inside Formwork/ Falsework (see Item 3.3 – Site Preparation, Subsection .1 of this specification).
 - .4 A carbon dioxide (CO₂) tank with regulator, hose and gas diffuser shall be readily available during Grout work. Should a spill occur, carbon dioxide gas will be released into the affected area to neutralize pH levels.
 - .5 The Contractor shall provide containment facilities for the wash-down water from concrete delivery trucks, concrete pumping equipment and other tools and equipment.

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- .6 All spills must be reported to the Provincial Emergency Program 24-hour phone line at 1-800-663-3456 and where possible, immediate removal of materials from the water and implementation of emergency mitigation and clean-up measures will be initiated.
 - .7 Monitoring the pH in the watercourse immediately downstream of the works shall be conducted should the stream not be frozen. Isolate and hold any water that contacts uncured or partly cured concrete or grout until the pH is between 6.5 and 8.0.
- 3.3 Site Preparation
- .1 Prepare formwork / falsework containment on ends of the existing culvert as per Culvert Infill Material Installation Memo, Formwork / Falsework Containment written and accepted submissions (see 1.4 – Submittals, subsection .2 and .3 of this specification) to ensure Culvert Infill Material does not escape the existing culvert.
 - .2 Use pumps and other means to ensure the existing culverts are clear of standing water and other debris until the Culvert Infill Material is placed.
- 3.4 Delivery, Storage, and Handling
- .1 Grout shall be fully discharged and placed within 3 hours after water and cement have been combined. Any proposed deviation from this requirement must be pre-approved by the Departmental Representative. To obtain pre-approval, the Contractor shall submit in writing the proposed methodology to ensure all concrete / grout strength and other requirements are achieved. Regardless of the proposed methodology submitted, the Departmental Representative is under no obligation to deviate from this requirement.
 - .2 Grout delivery: ensure that continuous Grout delivery from plant meets CSA A23.1/A23.2.
 - .3 Cellular Plastic Void Filler or an alternative approved product shall be delivered, stored and handled in accordance with manufacturer requirements.
 - .4 Waste Management and Disposal:
 - .1 Divert unused Grout, Cellular Plastic Void Filler or alternative product materials to a local landfill facility approved by the Departmental Representative.
 - .2 Provide an appropriate area on the job site where Grout concrete trucks can be safely washed.

- .3 Unused admixtures and additive materials must not be disposed of into sewer systems, into lakes, streams, onto ground, or in other locations where it could pose a health or environmental hazard.
 - .4 Prevent admixtures and additive materials from entering drinking water supplies or streams. Using appropriate safety precautions, collect liquid or solidify liquid with inert, non-combustible material and remove for disposal. Dispose of waste in accordance with applicable local, Provincial, and Federal regulations.
- 3.5 Placement
- .1 Comply with hot / cold weather Grout fabrication, placement, and curing requirements as per CSA-23.1-09.
 - .2 Convey the Grout, Cellular Plastic Void Filler or alternative product at the site in accordance with manufacturer requirements utilizing equipment of the design, size, and condition to deposit a continuous and adequate supply of Grout, Cellular Plastic Void Filler or alternative product of the specified mix and consistency without segregation at the required locations.
 - .3 Ensure Culvert Infill Material has filled all areas of the existing culverts. If required, use manual means to move Culvert Infill Material into areas of the culverts void.
- 3.6 Curing and Finishing
- .1 Protect exposed surfaces of Culvert Infill Material from premature drying, wash by rain or running water, wind, mechanical injury, and excessively hot or cold temperatures. Curing method shall be subject to approval by the Departmental Representative.
 - .2 Ensure ends of existing culverts are encased with minimum 0.3 m of Crushed Base Gravel or as shown on the Contract Drawings through the import and placement of Crushed Base Gravel over each culvert end or the shortening of the culvert into the existing highway embankment and then placement of Crushed Base Gravel.
 - .3 Complete ditching and excavation in accordance with the Contract Drawings and Section 33 42 13 – Pipe Culverts.
 - .4 If directed by the Departmental Representative via Change Order, undertake Hydraulic Seeding (Optional Work) in accordance with Section 32 93 21-A – Hydraulic Seeding.

END OF SECTION

SECTION INCLUDES

PART 1 – GENERAL:

- 1.1 Measurement and Payment Procedures.
- 1.2 References.

PART 2 – PRODUCTS:

- 2.1 Wood Posts and Hardware.

PART 3 – EXECUTION:

- 3.1 Existing Sign and Post Removal.
- 3.2 Wood Post Installation.
- 3.3 Sign Mounting.

PART 1 – GENERAL

1.1 Measurement and Payment
Procedures

- .1 Payment for Traffic Signs will be made on the basis of the Price per Unit Bid for Traffic Signs in the Bid and Acceptance Form. The Price per Unit Bid shall include all costs for the removal and reinstallation of existing signs as noted on the Contract Drawings, removal and offsite disposal of existing sign posts, supply and installation of timber posts, field cut of posts to size, hardware, post hole drilling, and all other items necessary for successful completion of the work. Should existing signs be damaged during removal, or are deemed unsuitable for reinstallation by the Departmental Representative, the Price per Unit Bid shall also include all costs for the supply and installation of new signs.
- .2 Measurement for Payment for Traffic Signs will be made the count of each Traffic Sign installed and accepted by the Departmental Representative.

1.2 References

- .1 British Columbia Ministry of Transportation and Infrastructure (BC MoTI):
 - .1 Manual of Standard Traffic Signs & Pavement Markings (September 2000, or latest edition).
 - .2 British Columbia MoT – 2020 Standard Specifications for Highway Construction.
- .2 Transportation Association of Canada (TAC):

- .1 Manual of Uniform Traffic Control Devices for Canada (January 2020, or latest edition).

PART 2 – PRODUCTS

- 2.1 Wood Posts and Hardware .1 The sign posts and hardware shall be in accordance with the BC MoTI 2016 Standard Specification for Highway Construction, Section 635, Subsection 635.27 and the following requirements.
- .1 The sign posts 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.

PART 3 – EXECUTION

- 3.1 Existing Sign and Post Removal .1 Remove existing signs from posts and set aside for later reinstallation. Ensure existing signs are protected from damage during removal. The Contractor shall take necessary precautions to prevent damage to the signs during the removal, transport and temporary 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.
- .2 Remove and dispose of existing sign posts at an offsite facility permitted to accept the materials, and acceptable to the Departmental Representative.
- 3.2 Wood Post Installation .1 Wood post sign structures 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 100 mm or smaller 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 Sign Mounting

- .1 Reinstall existing signs in accordance with BC MoTI
Standard Drawings SP635-3.5.6 through SP635-3.5.9 and SS
635.32.

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 Riprap.
- 2.6 Natural Substrate.
- 2.7 Embankment.
- 2.8 Specialty Embankment.
- 2.9 Common Fill

PART 3 – EXECUTION:

- 3.1 Preparation.
- 3.2 Processing.
- 3.3 Handling and Transportation.
- 3.4 Stockpiling.
- 3.5 Cleaning.

PART 1 – GENERAL

1.1 Measurement and
Payment Procedures

- .1 Measurement and Payment for Aggregate Materials shall be per the applicable work included in Section 31 24 14 – Excavation, Embankment, and Compaction, Section 31 37 00 – Riprap, Section 32 11 19 – Sub-Base Course, Section 32 11 24 –

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- 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 C131, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
 - .2 ASTM C136, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 - .3 ASTM D2216, Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass.
 - .4 ASTM D4318, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
 - .5 ASTM D4791, Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.
- 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 The Contractor shall provide his own source(s) for all aggregate materials for this project. The Contractor will be solely responsible for ensuring that the aggregate source(s) selected by the Contractor continuously achieve all aggregate material properties, quality and gradation requirements as outlined in this contract specification for the material intended use.
- .2 The Contractor will be responsible for the manufacture, screening, blending, aeration or drying, or any other required processing to achieve all material requirements.
- .3 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(s) and test results confirming source(s) meet this Contract's required aggregate material properties and quality.

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.

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- .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 / supplied 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 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 the curve plotted from the sieve analysis shall flow in a smooth 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/ supplied 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 – 02, and the curve plotted from the sieve analysis shall flow in a smooth 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 Riprap

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

2.6 Natural Substrate

- .1 The Natural Substrate shall be imported from an offsite source and achieve the following requirements.
- .1 Natural Substrate shall be a maximum of 150 mm 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 – 03: 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.

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

2.8 Specialty Embankment .1 Specialty Embankment Material shall conform with the following requirements:

.1 The material shall have a gradation conforming to the following gradation limits:

Table 31 05 16 – 04: Gradation Limits: Specialty Embankment	
Sieve Designation (mm)	Percent Passing by Weight
75.0	100
19.0	15-100
0.3	0-15

.2 Stone consisting of hard durable particles free from clay lumps and other deleterious materials, and free from splits, seams or defects likely to impair its soundness during handling.

.3 Where Specialty 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%.

2.9 Common Fill .1 Common Fill shall be in conformance with Section 31 24 14 – Excavation, Embankment, and Compaction.

PART 3 – EXECUTION

- 3.1 Preparation
- .1 Prior to excavating materials for aggregate production, strip off and stockpile unsuitable surface material.
 - .2 Strip area ahead of quarrying or excavating operation sufficient to prevent contamination of aggregate by deleterious material.
- 3.2 Processing
- .1 Process aggregate uniformly using methods that prevent contamination, segregation, and degradation.
 - .2 Blend aggregates, if required, to obtain gradation requirements, percentage of crushed particles, or particle shapes, as specified in these Specifications. Use methods and equipment approved by Departmental Representative.
 - .3 Wash aggregates, if required, to achieve requirements of these specifications. Use only equipment and water approved by Departmental Representative.
 - .4 When operating in stratified deposits, use excavation equipment and methods that produce a uniform, homogeneous aggregate.
- 3.3 Handling and Transportation
- .1 Avoid segregation, contamination, and degradation of aggregate during handling and transporting.
 - .2 Load limit restrictions will be in accordance with British Columbia Highway 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.
- 3.4 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 asphalt pavement or BST 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.

3.5 Cleaning

- .1 Any stockpiles temporarily placed on the highway right-of-way or on PSPC property shall 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.

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 Grubbing.
- 3.4 Removal and Disposal.
- 3.5 Finished Surfaces.

PART 1 – GENERAL

1.1 Measurement and Payment Procedures

- .1 Payment for Clearing and Grubbing will not be made and shall be considered incidental to the applicable payment items found in Section 31 24 14 – Excavation, Embankment, and Compaction and Section 31 37 00 – Riprap.

1.2 Definitions

- .1 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.
- .2 Grubbing: excavating and disposing stumps and roots to 150 mm below existing ground surface.
- .3 License to Cut: License required under Province of British Columbia's Forest Act that authorizes a Contractor to salvage and remove timber from Crown Land.

1.3 Protection

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

- .2 Repair any damage caused by Clearing and Grubbing 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 Clearing and Grubbing 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 Clearing and Grubbing 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 Grubbing
 - .1 Grub out stumps and wood debris including roots and embedded logs not less than 150 mm below ground surface.
 - .2 In areas with highway embankment fill, grubbing requirements on the downslope side of embankment fill slope shall be altered be as follows:
 - .1 No grubbing of stumps flush cut with ground elevation (< 0.1 m in height of surrounding ground).
 - .2 Clearing of all rocks > 0.3 m in diameter required.
- 3.4 Removal and Disposal
 - .1 Dispose of cleared and grubbed 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.
- 3.5 Finished Surfaces
 - .1 Leave ground surface in a condition suitable for excavation of existing ground.

END OF SECTION

SECTION INCLUDES

PART 1 – GENERAL:

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

PART 2 – PRODUCTS:

- 2.1 Embankment Material.
- 2.2 Surplus Excavation Material.
- 2.3 Specialty Embankment.
- 2.4 Nonwoven Geotextile.
- 2.5 Topsoil.
- 2.6 Common Fill.
- 2.7 Coco Fiber Geotextile.

PART 3 – EXECUTION:

- 3.1 Stripping of Topsoil.
- 3.2 Excavation.
- 3.3 Excavation of Embankment from Former Alaska Highway Alignment.
- 3.4 Embankment and Specialty Embankment Material.
- 3.5 Surplus excavation material.
- 3.6 Topsoil.
- 3.7 Interceptor Ditch Relocation.
- 3.8 Excavation and Culvert Removal.
- 3.9 Creosote Treated Wood and Surrounding Soil.
- 3.10 Ditch and Channel Construction (Following Culvert Removal).
- 3.11 Placement of Coco Fiber Geotextile.

- 3.12 Scarification of Road Surface.
- 3.13 Non-hydraulic Seeding.
- 3.14 Waterbars (Optional Work).
- 3.15 Excavation and Offsite Disposal of Creosote Contaminated Soil (Optional Work).
- 3.16 Beaver Dam Removal.

PART 1 – GENERAL

1.1 Measurement and Payment Procedures

- .1 Payment for stripping of topsoil will be made on the basis of the Price per Unit Bid for Stripping in the Bid and Acceptance Form. The Price per Unit Bid shall include all costs for the stripping of organic materials, loading, hauling, and stockpiling at PSPC's Kledo Pit (Km 509.3 of the Alaska Highway, BC), and all other items necessary for successful completion of the work.
- .2 Measurement for Payment for completion of Stripping will be made on the volume of material surveyed in cubic metres, excavated from the limits of the work, and accepted by the Departmental Representative. No separate measurement or payment for hauling or stockpiling of Stripping will be made.
- .3 Payment for the excavation, transport, and placement of 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, loading, hauling, placement as Embankment, and compaction, and all other items necessary for successful completion of the work. The Price per Unit Bid shall further include all costs associated with excavation of Embankment from the former Alaska Highway alignment roadbed (Km 501.05 to Km 508.80 of the Alaska Highway), including but not limited to developing and maintaining access to the former Alaska Highway alignment during the works, clearing and offsite disposal of trees / vegetation, screening organics, and all other items necessary for the 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 hauling or excavation of the material will be made.

- .5 Payment for the excavation, transport, manufacture, and placement of Specialty Embankment will be made on the basis of the Price per Unit Bid for Specialty Embankment in the Bid and Acceptance Form. The Price per Unit Bid shall include all costs for excavation, manufacture, transport, placement, compaction, and all other items necessary for successful completion of the work.
- .6 Measurement for Payment for completion of Specialty Embankment will be made on the volume of material surveyed in cubic metres incorporated into the finished highway embankment (at the completion of compaction) as measured by neat lines, and accepted by the Departmental Representative. No separate measurement or payment for hauling of Specialty Embankment will be made.
- .7 Payment for the supply, transport and placement of Non-woven Geotextile in areas of Specialty Embankment will be made on the basis of the Price per Unit Bid for Nonwoven Geotextile in the Bid and Acceptance Form. The Price per Unit Bid shall include all costs for supply, transport, placement, and all other items necessary for successful completion of the work.
- .8 Measurement for Payment for completion of Nonwoven Geotextile will be made on the area of geotextile placed surveyed in square metres and accepted by the Departmental Representative.
- .9 Payment for Interceptor Ditch Excavation will be made on the basis of the Price per Unit Bid for Interceptor Ditch Excavation in the Bid and Acceptance Form. The Price per Unit Bid Shall include all costs for excavation of new / relocated Interceptor Ditch, temporary stockpiling of excavated material if being re-used as Common Fill, and all other items necessary for the successful completion of the work.
- .10 Measurement for Payment for Interceptor Ditch Excavation will be made on the volume of material excavated, surveyed in cubic metres, and accepted by the Departmental Representative.
- .11 Payment for infill of the existing ditch with Common Fill will be made on the basis of the Price per Unit Bid for Common Fill – Interceptor Ditch in the Bid and Acceptance Form. The Price per Unit Bid Shall include all costs for loading, placement and compaction of Common Fill including

- removal and offsite disposal of timber weirs and all other items necessary for the successful completion of the work.
- .12 Measurement for Payment for Common Fill – Interceptor Ditch will be made on the volume of material surveyed in cubic metres incorporated into the work at completion of compaction and accepted by the Departmental Representative. No separate measurement or payment for hauling of Common Fill – Interceptor Ditch will be made.
- .13 Payment for Interceptor Ditch Excavation – Haul to Waste from the Interceptor Ditch Excavation will be made on the basis of the Price per Unit Bid for Excavation to Waste in the Bid and Acceptance Form. The Price per Unit Bid Shall include all costs for loading of Interceptor Ditch Excavation, hauling and spreading of material to the Former Alaska Highway alignment site (Km 501.05 to Km 508.80), and all other items necessary for the successful completion of the work.
- .14 Measurement for Payment for Interceptor Ditch Excavation – Haul to Waste will be made on the volume of material surveyed in cubic metres incorporated into the work and accepted by the Departmental Representative. The volume for Interceptor Ditch Excavation – Haul to Waste shall be calculated by the difference in volume (in cubic metres) between Interceptor Ditch Excavation (Item 1.1.8) and Common Fill – Interceptor Ditch (Item 1.1.10) and accepted by the Departmental Representative.
- .15 Payment for placement of Topsoil (Optional Work) will be made on the basis of the Price per Unit Bid for Topsoil (Optional Work) in the Bid and Acceptance Form. The Price per Unit Bid shall include all costs included with the loading, transport, spreading, racking, and grooming of the previously stripped material being reused as topsoil, and all other items necessary for successful completion of the work.
- .16 Measurement for Payment for completion of Topsoil (Optional Work) will be made on the area of material surveyed in square metres, incorporated in the works and accepted by the Departmental Representative. Areas of spread wasted excess stripping will not be measured for payment. No separate measurement or payment for hauling of Topsoil will be made.
- .17 Payment for scarification of road surface shall be made on the basis of Price per Unit Bid for Scarification in the Bid and Acceptance Form. The Price per Unit Bid shall include

all costs for labour, equipment, and equipment access associated with scarifying the areas of the decommissioned highway as indicated in the Contract Drawings or as directed by the Departmental Representative, and all other items necessary for the successful completion of the work.

- .18 Measurement for payment for scarification of road surface will be made by the length of decommissioned highway scarified, surveyed in lineal metres, measured parallel to the decommissioned highway alignment and accepted by the Departmental Representative.

The width of the scarification will not be measured or considered during the survey of the length of scarification. However, the width and depth of scarification shall be performed as per Sub-section 3.6 of this Specification.

- .19 Payment for completion of the Permanent Access Removal by Ditch Construction for Boulder Placement at Km 10.31 and Km 25.19 – shall be made on the basis of Price per Unit Bid for Permanent Access Removal by Ditch Construction for Boulder Placement (Km 10.31 and 25.19) in the Bid and Acceptance Form. The Price per Unit Bid shall include all costs for excavation and forming of the ditch, loading, transport and placement of the excavated material stockpiled onsite, and all other items necessary for successful completion of the work.

- .20 Measurement for Payment for Permanent Access Removal by Ditch Construction for Boulder Placement (Km 10.31 and 25.19) shall be made on the count of each Permanent Access Removal Location completed and accepted by the Departmental Representative.

- .21 Payment for completion of the Permanent Access Removal by Ditch Construction at Km 14.52, 20.05, 24.25 and 24.37 shall be made on the basis of Price per Unit Bid for Permanent Access Removal by Ditch Construction (Km 14.52, 20.05, 24.25 and 24.37) in the Bid and Acceptance Form. The Price per Unit Bid shall include all costs for excavation and forming of the ditch, loading, transport and placement of the excavated material stockpiled onsite, and all other items necessary for successful completion of the work.

- .22 Measurement for Payment for Permanent Access Removal by Ditch Construction (Km 14.52, 20.05, 24.25 and 24.37) shall be made on the count of each Permanent Access

- Removal Location completed and accepted by the Departmental Representative.
- .23 Payment for completion of Slope Restoration at Km 21.83 shall be made on the basis of Price per Unit Bid for Excavation and Shaping for Slope Restoration (Km 21.83) in the Bid and Acceptance Form. The Price per Unit Bid shall include all costs for excavating and shaping of the slope, clearing and grubbing (if necessary), removal and offsite disposal of existing culvert pieces, supply and installation of Nonwoven Geotextile, supply and installing of temporary coir logs, onsite disposal of the excavated material and all other items necessary for the successful completion of the work.
- .24 Measurement for payment for Excavation and Shaping for Slope Restoration (Km 21.83) will be made by the volume of material excavated, surveyed in cubic metres and accepted by the Departmental Representative.
- .25 Payment for completion of Remove Existing Culvert and Construct Cross Ditch with Coco Fiber Geotextile – Ditch Depth Less than 3 m (Km 22.68, 23.94, 24.81, 25.02 & 25.04) shall be made on the basis of Price per Unit Bid for Remove Existing Culvert and Construct Cross Ditch with Coco Fiber Geotextile – Ditch Depth Less than 3 m (Km 22.68, 23.94, 24.81, 25.02 & 25.04) in the Bid and Acceptance Form. The Price per Unit Bid shall include:
- .1 All costs for excavating and offsite disposal of existing culverts and associated components (steam pipes, screens, debris catchments etc., if present).
 - .2 All costs for excavating and shaping of the ditch, disposal of the native materials on site, and if necessary, refilling of the space created by the removal of the existing culvert with common fill material acceptable to the Departmental Representative.
 - .3 All costs for selecting, loading, transport, and the supply and install of coco fiber geotextile.
 - .4 All other items necessary for successful completion of the work.
- .26 Measurement for Payment for completion of Remove Existing Culvert and Construct Cross Ditch with Coco Fiber Geotextile – Ditch Depth Less than 3 m (Km 22.68,

23.94, 24.81, 25.02 & 25.04) shall be made on the count of each culvert removal and cross ditch construction completed and accepted by the Departmental Representative.

- .27 Payment for completion of Remove Existing Culvert and Construct Cross Ditch for Riprap Placement – Ditch Depth Less Than 3 m (Km 11.35, 11.61, 13.23, 13.68, 13.92, 14.28, 20.47, 20.97, 21.47, 22.07, 22.54 & 24.29) shall be made on the basis of Price per Unit Bid for Remove Existing Culvert and Construct Cross Ditch for Riprap Placement – Ditch Depth Less Than 3 m (Km 11.35, 11.61, 13.23, 13.68, 13.92, 14.28, 20.47, 20.97, 21.47, 22.07, 22.54 & 24.29) in the Bid and Acceptance Form. The Price per Unit Bid shall include:
- .1 All costs for the removal of existing beaver dams upon trapping and removal of beavers by PSPC, and the removal and offsite disposal of beaver dams / woody debris to facilitate the completion of the work, including coordination with any downstream works including but not limited to the Km 501-509 Geometric and Drainage Improvements project.
 - .2 All costs for excavating and offsite disposal of existing culverts and associated components (steam pipe, gabion baskets, screens, debris catchments etc., if present).
 - .3 All costs for excavating and shaping of the ditch, disposal of the native materials on site, and if necessary, refilling of the space created by the removal of the existing culvert with common fill material acceptable to the Departmental Representative.
 - .4 All costs for the supply and installation of Nonwoven Geotextile.
 - .5 All other items necessary for successful completion of the work.
- .28 Measurement for Payment for completion of Remove Existing Culvert and Construct Cross Ditch for Riprap Placement – Ditch Depth Less Than 3 m (Km 11.35, 11.61, 13.23, 13.68, 13.92, 14.28, 20.47, 20.97, 21.47, 22.07, 22.54 & 24.29) shall be made on the count of each culvert

removal and cross ditch construction completed and accepted by the Departmental Representative.

- .29 Payment for completion of Remove Existing Culvert and Construct Cross Ditch for Riprap Placement – Ditch Depth Greater Than or Equal to 3 m and Less than 8 m shall be made on the basis of Price per Unit Bid for Remove Existing Culvert and Construct Cross Ditch for Riprap Placement – Ditch Depth Greater Than or Equal to 3 m and Less than 6 m (Km 11.16), Remove Existing Culvert and Construct Cross Ditch for Riprap Placement – Ditch Depth Greater Than or Equal to 3 m and Less than 6 m (Km 12.15), Remove Existing Culvert and Construct Cross Ditch for Riprap Placement – Ditch Depth Greater Than or Equal to 3 m and Less than 8 m (Km 21.48), Remove Existing Culvert and Construct Cross Ditch for Riprap Placement – Ditch Depth Greater Than or Equal to 3 m and Less than 6 m (Km 23.02), Remove Existing Culvert and Construct Cross Ditch for Riprap Placement – Ditch Depth Greater Than or Equal to 3 m and Less than 6 m (Km 23.26), Remove Existing Culvert and Construct Cross Ditch for Riprap Placement – Ditch Depth Greater Than or Equal to 3 m and Less than 6 m (Km 24.55) in the Bid and Acceptance Form. The Price per Unit Bid shall include:
- .1 All costs for excavating and offsite disposal of existing culverts and associated components (steam pipe, gabion baskets, screens, debris catchments etc., if present).
 - .2 All costs for excavating and shaping of the ditch, disposal of the native materials on site, and if necessary, refilling of the space created by the removal of the existing culvert with common fill material acceptable to the Departmental Representative.
 - .3 All costs for the supply and installation of Nonwoven Geotextile.
 - .4 All other items necessary for successful completion of the work.
- .30 Measurement for Payment for Remove Existing Culvert and Construct Cross Ditch for Riprap Placement – Ditch Depth Greater Than or Equal to 3 m and Less than 8 m shall be made by Lump Sum based on the percentage of the work completed and accepted by the Departmental Representative for each site.

- .31 Payment for completion of installation of Optional Work – Waterbars shall be made on the basis of Price per Unit Bid for Optional Work – Waterbars in the Bid and Acceptance Form. The Price per Unit Bid shall include all costs for excavating and shaping of the waterbar, disposal of the native materials on site and all other items necessary for the successful completion of the work. This optional work item will be directed by the Departmental Representative via change order.
- .32 Measurement for payment for installation of Optional Work – Waterbars for various locations will be made by the count of each waterbar installed and accepted by the Departmental Representative.
- .33 Payment for completion of Optional Work – Supply and Install Coco Fiber Geotextile for Riprap Cross Ditches for cross ditches at various locations and the slope restoration at Km 21.83 shall be made on the basis of Price per Unit Bid for Optional Work – Supply and Install Coco Fiber Geotextile for Riprap Cross Ditches at Various Locations and for Slope Restoration at Km 21.83 in the Bid and Acceptance Form. The Price per Unit Bid shall include all costs for selecting, loading, transport, and the supply and install of coco fiber geotextile and all other items necessary for the successful completion of the work. This optional work item will be directed by the Departmental Representative via change order.
- .34 Measurement for payment for completion of Optional Work – Supply and Install Coco Fiber Geotextile for Riprap Cross Ditches at Various Locations and for Slope Restoration at Km 21.83 will be made by the area of coco fiber geotextile installed and surveyed in square metres accepted by the Departmental Representative.
- .35 Payment for Optional Work – Excavation and Offsite Disposal of Creosote Contaminated Soil for various stations shall be made on the basis of Price per Unit Bid for Optional Work – Excavation and Offsite Disposal of Creosote Contaminated Soil in the Bid and Acceptance Form. The Price per Unit Bid shall include:
- .1 All costs for excavating of the creosote contaminated soil agreed upon by the Contractor’s Environmental Monitor and the Departmental Representative as per Item 3.2 – Creosote Treated Wood and Surrounding Soil of Section 02 22 50 – Selective Site Demolition, including temporary

placement and storage of the excavated materials on site prior to disposal offsite.

.2 All costs loading, transport, and offsite disposal of the creosote contaminated soil at an appropriate facility as per Item 3.2 – Creosote Treated Wood and Surrounding Soil of Section 02 22 50 – Selective Site Demolition.

.3 All other items necessary for successful completion of the work.

This optional work item will be directed by the Departmental Representative via change order.

.36 Measurement for Payment for Optional Work – Excavation and Offsite Disposal of Creosote Contaminated Soil shall be made on the volume of material excavated and disposed, surveyed in cubic metres and accepted by the Departmental Representative.

.37 Payment for Optional Work – Ditch construction to connect existing flow path shall be made on the basis of Price per Unit Bid Optional Work – Ditch Construction to Connect Existing Flow Path (Max. Depth 2.0 m) in the Bid and Acceptance Form. The Price per Unit Bid shall include:

.1 All costs for excavating and shaping of the ditch, disposal of the native materials on site.

.2 All costs for selecting, loading, transport, and the supply and install of coco fiber geotextile.

.3 All other items necessary for successful completion of the work.

.38 Measurement for Payment for Optional Work – Ditch Construction to Connect Existing Flow Path (Max. Depth 2.0 m) shall be made on the count of each ditch construction completed and accepted by the Departmental Representative.

1.2 Definitions

.1 Stripping: excavation of organic material covering the original ground.

.2 Excavation: excavation of materials that are not rock excavation or stripping.

- .3 Embankment: material derived from usable excavation and placed above stripped surface.
- .4 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 metres or more.
- .5 Common Fill: native materials generated from interceptor ditch excavation that are not rock excavation or stripping.
- .6 Topsoil: organic material free of rocks greater than 150 mm diameter and other debris hindering good vegetative growth.

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 D698-12, 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 D6938-10 Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods.
 - .6 ASTM D2216 Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass.

- .2 Alberta Transportation Testing (ATT):
 - .1 ATT-58/96 Density Test, Control Strip Method.

PART 2 – PRODUCTS

- 2.1 Embankment Material
 - .1 Material containing no more than 3% organic matter by mass, weeds, sod, roots, logs, stumps or any other unsuitable material unless otherwise directed by Departmental Representative, excavated from 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 and gravels excavated to facilitate widening of the existing Alaska Highway.
 - .2 Former Alaska Highway alignment roadbed, between Km 501.05 and Km 508.80 of the Alaska Highway.
 - .3 Suitable imported material from an off-site source.
- 2.2 Surplus Excavation Material
 - .1 Excavated material meeting the requirements of Embankment Material. Material shall not contain rock materials > 200 mm in diameter.
- 2.3 Specialty Embankment
 - .1 Specialty Embankment shall be Specialty Embankment material in accordance with Section 31 05 16 – Aggregates: General.
- 2.4 Nonwoven Geotextile
 - .1 Nonwoven Geotextile shall be in accordance with Section 31 37 00 – Riprap.
- 2.5 Topsoil
 - .1 Material meeting the definition of Topsoil derived from Stripping on the project. Should insufficient quantities of Topsoil be available from Stripping, Topsoil may comprise of other materials from excavation as accepted by the Departmental Representative.

- 2.6 Common Fill .1 Material meeting the definition of Common Fill and acceptable to the Departmental Representative.
- 2.7 Coco Fiber Geotextile .1 Coco Fiber Geotextile shall achieve or exceed the minimum requirements outlined in Table 31 00 99 - 01.

Table 31 00 99 – 01: Coco Fiber Geotextile		
Property	Test	Value
Mass Per Unit Area	ASTM D6566	≥ 390 g/m ²
Thickness	ASTM D6525	≥ 5.8
Ground Cover	ASTM D6567	≥ 99%
Water Holding Capacity	ASTM D7367	≥ 1,500%

- .2 Prior to purchase of materials submit manufacturer’s product data and installation instructions to the Departmental Representative for review and acceptance. Include required substrate preparation, list of materials and application rate.

PART 3 – EXECUTION

- 3.1 Stripping of Topsoil
 - .1 Stripping in areas of the existing interceptor ditch may only commence after receipt of the Provincial Change Approval for interceptor relocation work. See Subsection 1.4 Regulatory Overview in Section 01 35 43 – Environmental Protection for further details.
 - .2 In areas requiring Clearing and Grubbing, commence Stripping after completion of the Clearing and Grubbing.
 - .3 Complete Stripping of organic materials to the design lines, grades and depths indicated on the Contract Drawings, and where directed by the Departmental Representative. Stripping shall be completed to the extents as shown on the Typical Section in the Contract Drawings rather than the Cross Sections which show approximate representative stripping.
 - .4 Limit extent 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.

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- .5 Load, haul and stockpile stripped material at PSPC's Kledo Pit (Km 509.3 of the Alaska Highway) for re-use later as Topsoil (Optional Work). Stockpile Stripped material in uniform layers not greater than 1 m in thickness. During stockpiling operations, prevent ice and snow from becoming intermixed with Stripped materials.
 - .6 Ensure Stripped material is not stockpiled in ditches or interferes with the established drainage patterns. Provide drainage ditches around the perimeter of each stockpile as required to prevent ponding of water. Ensure ready runoff of surface water following stockpiling of Stripped materials, to the satisfaction of the Departmental Representative.
 - .7 The Contractor shall ensure that plank or protected runways shall be provided for operating trucks on stockpiles when the Departmental Representative deems them necessary to prevent dirt from being tracked onto the stockpiled material.
- 3.2 Excavation
- .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 Material.
 - .2 During excavation maintain profiles, crowns and cross slopes to provide good surface drainage. Provide ditches as work progresses to provide drainage and construct interceptor ditches as shown on plans or as directed before excavating or placing embankment in adjacent area.
 - .3 If, during excavation, material appearing to conform to classification for rock excavation is encountered, notify Departmental Representative and provide sufficient time to enable measurements to be made to determine volume of rock. Payment for rock excavation (if required) will be completed via change order.
- 3.3 Excavation of Embankment from Former Alaska Highway Alignment
- .1 Obtain Embankment materials from former Alaska Highway alignment roadbed (Km 501.05 to Km 508.80 of the Alaska Highway) or alternative suitable source off site.
 - .2 The Contractor shall be responsible for the implementation, maintenance, removal, and restoration for all haul roads, temporary drainage structures, and access points / ramps required for the successful completion of the work, in accordance with the requirements of Section 01 14 00 – Work Restrictions, Construction Staging, Access Development, and Restoration.

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- .3 Upon completion of extraction of embankment materials the Contractor is to ensure the following is achieved:
- .1 When complete the former Alaska highway alignment site shall be neat and regular in shape, with a maximum surface grade of 10% in any direction.
 - .2 Ensure excavation does not interfere with ditches or the established drainage patterns. Ensure ready run-off of surface water following excavation of material.
 - .3 Depth of excavations shall not be lower than the surrounding natural ground elevation beyond the toes / footprint of the former Alaska Highway roadbed, such that ponding of water will not occur following completion of the work.
- 3.4 Embankment and Specialty Embankment Material
- .1 Areas of Embankment and Specialty Embankment placement within the existing interceptor ditch may only commence after receipt of the Provincial Change Approval for interceptor relocation work. See Subsection 1.4 Regulatory Overview in Section 01 35 43 – Environmental Protection for further details.
 - .2 Place excavated material as Embankment following Stripping to the design lines and grades, cross sections and dimensions as shown on the Contract Drawings. Wrap specialty embankment materials (underlay and overlay) with Nonwoven Geotextile. Install Nonwoven Geotextile in accordance with Section 31 37 00 – Riprap.
 - .3 When Embankment is placed on hillsides or existing embankments steeper than 2.5H:1V, the slopes of the embankment shall be terraced in a continuous series of steps a minimum of 1.0 m wide. Excavate benches from bottom of the slope one level at a time with the compacted Embankment placed to the height of the cut before the next bench is excavated.
 - .4 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.
 - .5 Do not place material which is frozen nor place material on frozen surfaces except where accepted by the Departmental Representative.

- .6 Maintain crowned surface during construction to ensure ready run-off of surface water.
- .7 Drain low areas before placing materials.
- .8 Place and compact to full width in layers not exceeding 200 mm loose thickness. The 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.
- .9 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.
- .10 Break material down to sizes that enable required compaction and mix for uniform moisture to full depth of layer. Embankment materials which cannot be compacted to the required density due to high moisture content, or embankment materials with a natural moisture content greater than optimum, shall not be used without prior aeration and drying.
- .11 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.
- .2 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.
 - .3 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.
 - .4 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.
- .12 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.
 - .13 Remove rocks over 150 mm in any dimension from slopes and ditch bottoms.
 - .14 Hand finish slopes that cannot be finished satisfactorily by machine.

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- .15 Run dozer tracks over slopes exceeding 3 m in height to leave grouser tracks parallel to centerline of highway.
 - .16 Trim between constructed slopes to provide drainage free of humps, sags, ruts, and protruding stones.
 - .17 Maintain finished surfaces in condition conforming to this Section until acceptance by Departmental Representative.
- 3.5 Surplus Excavation Material
- .1 Place Surplus Excavated material (if any) on the slopes of the finished embankment in locations indicated on the Contract Drawings, or where directed by the Departmental Representative.
 - .2 Place surplus excavation to a maximum thickness of 200 mm. Shape surplus excavation to remove high a 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 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 and leave grouser tracks parallel to centerline of highway.
 - .8 Trim between constructed slopes 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.
- 3.6 Topsoil
- .1 Commence placement of Topsoil (Optional Work) upon receipt of a signed Change Order from the Departmental Representative, and following completion and survey of preceding materials which have been accepted by the Departmental Representative.

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- .2 Load, haul, transport and spread previously stockpiled Stripped materials designated for reuse as Topsoil in locations shown on the Contract Drawings, and as approved by the Departmental Representative.
 - .3 Place Topsoil to the thicknesses shown on the Contract Drawings +/- 50 mm, but not uniformly high or low. Neatly shape outside limits of Topsoil to eliminate sharp changes in lines and grades. Ensure ready run-off of surface water.
 - .4 Remove rocks > 150 mm in diameter and other debris hindering good vegetative growth from the placed topsoil.
 - .5 Finish surface even, free of large openings and neat in appearance.
 - .6 Maintain finished surfaces in condition conforming to this Section until acceptance by Departmental Representative.
 - .7 Previously stripped material not used as Topsoil placement shall be stockpiled in conformance with Subsection 3.1 Stripping of Topsoil in this Specification section, and to the satisfaction of the Departmental Representative.
- 3.7 Interceptor Ditch Relocation
- .1 Commence excavation of new interceptor ditch and infilling of existing interceptor ditch only after the following:
 - .1 Provincial Change Approval for interceptor relocation work has been received. See Subsection 1.4 Regulatory Overview in Section 01 35 43 – Environmental Protection for further details.
 - .2 Embankment material has been placed and compacted in the locations shown on the Contract Drawings, surveyed and accepted by the Departmental Representative.
 - .2 Complete excavation of new interceptor ditch in compliance with Subsection 3.2 Excavation of this specification section and in compliance with the WorkSafeBC Workers' Compensation Act and/or the BC Occupational Health and Safety Regulations, as applicable. The costs for flattening of the interceptor ditch sideslopes from what is shown on the Contract Drawings shall not be measured for payment.
 - .3 Excavate interceptor ditch to within +/- 50 mm of the lines and grades as indicated on the Contract Drawings, but not uniformly high or low. Excavation is not to exceed the excavation limits shown on the Contract Drawings. Excavations (and backfill if applicable) completed beyond

- the limits shown on the Contract Drawings shall be at the Contractor's cost.
- .4 Transition Interceptor Ditch Excavation at the tie in locations shown on the Contract Drawings to match the existing ditch profile, widths, sideslopes and elevations and to the satisfaction of the Departmental Representative. Ensure positive drainage upon completion of Interceptor Ditch Excavation.
 - .5 Place excavated material as Common Fill material into existing ditch location following stripping to the design lines and grades, cross sections and dimensions as shown on the contract drawings.
 - .6 Do not place material which is frozen nor place material on frozen surfaces except where accepted by the Departmental Representative.
 - .7 Maintain crowned surface during construction to ensure ready run-off of surface water.
 - .8 Drain low areas before placing materials.
 - .9 Place and compact to full width in lifts not exceeding 200 mm loose thickness.
 - .10 Compact each lift of Common Fill with a minimum of six (6) passes of the entire lift area using a plate compactor with a nominal operating weight of 1,000 lb. (454 kg) or larger.
 - .11 Hand finish slopes that cannot be finished satisfactorily by machine.
 - .12 Trim between constructed slopes to provide drainage free of humps, sags, ruts, and protruding stones.
 - .13 Maintain finished surfaces in condition conforming to this Section until acceptance by Departmental Representative.
 - .14 Any excess excavated material not used as Common Fill acceptable to the Departmental Representative shall be measured and paid as Excavation Waste and excavated material shall be loaded, hauled and spread to the former Alaska Highway alignment site (Km 501.05 to Km 508.80) off site.
 - .15 Upon completion of spreading of Excavation Waste, Contractor to ensure finish surface is in compliance in Item

- 3.3.3 above and to the satisfaction of the Departmental Representative.
- 3.8 Excavation and Culvert Removal
- .1 Take all necessary precautions as outline in Section 01 35 43 – Environmental Protection and the Contractor’s EPP to mitigate against sediment transport and other environmental pollution or damage during construction. Complete the work as per the Environmental Management Plan (EMP) (Appendix P) and incorporate the sediment and erosion control features as outlined on the Contract Drawings.
 - .2 Excavate and remove all existing culverts and associated components (steam pipes, culvert markers, 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.
 - .3 Unless noted otherwise in Section 31 24 14 – Excavation, Embankment, and Compaction, re-use excavated material as embankment (if deemed suitable by the Departmental Representative) or spread material onsite as indicated in the Contract Drawings, in areas which do not cause changes in drainage patterns or create unsafe loading of a slope, and in a condition acceptable to the Departmental Representative.
- 3.9 Creosote Treated Wood and Surrounding Soil
- .1 Perform disposal of creosote treated wood and surrounding soil as per Item 3.2 – Creosote Treated Wood of Section 02 22 50 – Selective Site Demolition.
- 3.10 Ditch and Channel Construction (Following Culvert Removal)
- .1 Complete the ditch or channel construction to the inverts and to the lines and grades shown on the contract drawings. Ensure excavation will allow for positive drainage upon placement of riprap or coco fiber geotextile.
 - .2 Install 50 Kg Class Riprap or Coco Fiber Geotextile to the lines and grades shown on the contract drawings and to the requirements of Section 31 37 00 Riprap for Placement of Riprap and Nonwoven Geotextile and sub-Section 3.11 – Placement of Coco Fiber Geotextile. Ensure positive drainage following riprap or coco fiber geotextile placement.
 - .3 Dispose of excavated waste material onsite in a condition acceptable to the Departmental Representative in locations shown on the Contract Drawings.

- 3.11 Placement of Coco Fiber Geotextile
- .1 Deliver materials and products in UV and weather resistant factory labeled packages. Store and handle in strict compliance with manufacturer's instructions and recommendations. Protect form damage, weather, excessive temperatures and construction operations.
 - .2 Follow the manufacturer's installation specifications. If manufacturer's installation specifications are not available, the following installation method may be used.
 - .1 Excavate anchor trench 300 mm deep by 200 mm wide, approximately 1 m back from the crest of slope along the length of slope to be protected.
 - .2 Insert the leading edge of the coco fiber geotextile roll into the trench and back fill and compact soil. Insert anchors at 3000 mm intervals along the edge of the anchor trench.
 - .3 Roll out coco fiber geotextile downslope making sure the Coco Fiber Geotextile is not stretched or under tension.
 - .4 The entire coco fiber geotextile must be loose and be in intimate contact with the underlying soil.
 - .5 The edges of adjacent parallel rolls must be overlapped 50 to 75 mm and be stapled every 1 m.
 - .6 When coco fiber geotextile must be spliced down the slope, place coco fiber geotextile end over end (shingle style with the upslope coco fiber geotextile on the top) with 200 mm overlap. Staple through overlapped area at 300 mm intervals.
 - .7 Blankets shall be stapled sufficiently to anchor coco fiber geotextile and maintain contact with the soil.
 - .8 Staple the central portion of the coco fiber geotextile at 4 staples/m² minimum (0.5 m spacing) for slopes steeper than 2H:1V and 1 staple/m² minimum (1.0 m spacing) on slopes shallower than 2H:1V.
 - .9 Wire staple anchors shall be a minimum of 11 gauge and 150 to 200 mm long and shall be driven flush to the soil surface.

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| | .3 | Protect installed coco fiber geotextile material from displacement, damage or deterioration before, during and after placement of material layers. |
| | .4 | Replace damaged or deteriorated coco fiber geotextile to the approval of Departmental Representative. |
| | .5 | Upon acceptance by the Departmental Representative, place succeeding material as shown on the contract drawings. |
| 3.12 Scarification of Road Surface | .1 | Scarify the un-treed road surfaces and all areas of BST as shown in the Contract Drawings to a minimum depth of 100 mm, with the furrows no more than 300 mm apart, unless otherwise directed by the Departmental Representative. |
| | .2 | Do not level or grade the road surface after scarification. Construction equipment is not permitted on the scarified road surface. |
| | .3 | Some areas of the road section will have been reduced in level and material for the KM 501 – KM 509 Widening works. The contractor will need to continue the scarification and seeding of these areas. |
| | .4 | Maintain finished scarified surface in condition conforming to this specification until acceptance. |
| 3.13 Non-hydraulic Seeding | .1 | Seed all disturbed areas as per Section 32 93 21-B – Non-hydraulic Seeding, including excavated waste material, coco fiber geotextile and areas disturbed by equipment access but excluding finished riprap surfaces. |
| | .2 | Seed all areas of the Slope Restoration as detailed on the Contract Drawings and as per Section 32 93 21-B – Non-hydraulic Seeding. |
| 3.14 Waterbars (Optional Work) | .1 | Construct waterbars as per the Contract Drawings in location(s) specified by the Departmental Representative. |
| | .2 | Protect installed waterbars from damage or deterioration. Construction equipment is not permitted on water bars. |
| | .3 | Compact the berm portion of the waterbar to minimum 95% maximum dry density in accordance with ASTM D698-12. |
| 3.15 Excavation and Offsite Disposal of Creosote Contaminated Soil (Optional Work) | 1. | Excavate and remove creosote contaminated soil as per Item 3.2 – Creosote Treated Wood and Surrounding Soil of Section 02 22 50 – Selective Site Demolition. |

- 3.16 Beaver Dam Removal
- .1 Upon trapping and removal of beavers by PSPC, remove and dispose offsite beaver dams and associated woody debris to facilitate the completion of the work.
 - .2 Ensure there are no adverse downstream effects from the removal of beaver dams. Coordinate with downstream works including but not limited to the Km 501-509 Geometric and Drainage Improvements Project.

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 Riprap Boulders.
- 2.3 Nonwoven Geotextile.
- 2.4 Crushed Base Gravel.
- 2.5 Common Fill.
- 2.6 Bentonite.

PART 3 – EXECUTION:

- 3.1 General.
- 3.2 Placement of Nonwoven Geotextile.
- 3.3 Placement of Riprap.

PART 1 – GENERAL

1.1 Measurement and Payment
Procedures

- .1 Payment for Culvert Ditching and Erosion End Protection of new culverts will be made on the basis of the Price per Unit Bid for Km 501.18 – Culvert Ditching and Erosion End Protection, Km 503.47 – Culvert Ditching and Erosion End Protection, Km 504.01 – Culvert Ditching and Erosion End Protection, Km 504.36 – Culvert Ditching and Erosion End Protection, Km 505.68 – Culvert Ditching and Erosion End Protection, Km 505.93 – Culvert Ditching and Erosion End Protection, Km 506.35 – Culvert Ditching and Erosion End Protection, Km 506.54 – Culvert Ditching and Erosion End Protection, Km 506.63 – Culvert Ditching and Erosion End Protection, Km 507.64 – Culvert Ditching and Erosion End Protection, Km 507.90 – Culvert Ditching and Erosion End Protection 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, supply and placement of bentonite, the supply and installation of Nonwoven Geotextile, construction of ditch blocks, selection, loading, transport and placement of 50 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 Ditching and Erosion End Protection will be made by Lump Sum based on the percentage of the work 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 Ditching and Erosion End Protection (Optional Work) will be made on the basis of the Price per Unit Bid for Km 501.40 – Culvert Ditching and Erosion End Protection (Optional Work), Km 502.24 – Culvert Ditching and Erosion End Protection (Optional Work), Km 505.22 – Culvert Ditching and Erosion End Protection (Optional Work), and Km 507.12 – Culvert Ditching and Erosion End Protection (Optional Work) 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, construction of ditch blocks, selection, loading, transport and placement of 50 kg Class Riprap, supply, loading, transport and installation of Crushed Base Gravel, alterations to adjacent interceptor ditch and all other items necessary for the successful completion of the work.
- .4 Measurement for Payment for Ditching and Erosion End Protection (Optional Work) will be made by Lump Sum based on the percentage of the work completed and accepted by the Departmental Representative. Each culvert shall receive both inlet and outlet protection which will be counted as one installation.
- .5 Payment for Ditching and Erosion End Protection (Optional Work) will be made on the basis of the Price per Unit Bid for Km 504.36 – Culvert Ditching and Erosion End Protection (Optional Work) in the Bid and Acceptance Form. The Price per Unit Bid shall include all costs for alterations to the adjacent existing culvert ditching and erosion end protection, dewatering (as required), excavating, loading, hauling and disposal of the excavated materials in preparation for the Riprap, the supply and installation of Nonwoven Geotextile,

- construction of ditch blocks, selection, loading, transport and placement of 50 kg Class Riprap, supply, loading, transport and installation of Crushed Base Gravel, alterations to adjacent interceptor ditch and all other items necessary for the successful completion of the work.
- .6 Measurement for Payment for Ditching and Erosion End Protection (Optional Work) will be made by Lump Sum based on the percentage of the work completed and accepted by the Departmental Representative. Each culvert shall receive both inlet and outlet protection which will be counted as one installation.
- .7 Payment for Riprap Placement Following CSP Culvert / Wood Stave Culvert Removal will be made on the basis of the Price per Unit Bid for Riprap Placement Following CSP Culvert / Wood Stave Culvert Removal in the Bid and Acceptance Form. The Price per Unit Bid shall include all costs for selecting, loading, transport, and placement of 50 kg Class Riprap, and all other items necessary for the successful completion of the work.
- .8 Measurement for Payment for Riprap Placement Following CSP Culvert / Wood Stave Culvert Removal shall be made by the volume of material placed, surveyed in cubic metres and accepted by the Departmental Representative.
- .9 Payment for Slope Restoration Riprap Placement Following CSP Culvert Removal Km 21.83 will be made on the basis of the Price per Unit Bid for Slope Restoration Riprap Placement Following CSP Culvert Removal Km 21.83 in the Bid and Acceptance Form. The Price per Unit Bid shall include all costs for selecting, loading, transport, and placement of 50 kg Class Riprap, and all other items necessary for the successful completion of the work.
- .10 Measurement for Payment for Slope Restoration Riprap Placement Following CSP Culvert Removal Km 21.83 shall be made on the volume of material placed, surveyed in cubic metres and accepted by the Departmental Representative.
- .11 Payment for Supply and Place Riprap Boulders for Permanent Access Removal (Km 10.31 and 25.19) will be made on the basis of Price per Unit for Supply and Place Riprap Boulders for Permanent Access Removal (Km 10.31 and 25.19) in the Bid and Acceptance Form. The Price per Unit Bid shall include supply (if PSPC quarry supply not used), sorting, screening, manufacture, loading, transport,

and placement of riprap boulders, and all other items necessary for successful completion of the work.

- .12 Measurement and payment for Supply and Place Riprap Boulders for Permanent Access Removal (Km 10.32 and 25.18) will be made on the count of each riprap boulder placement completed and accepted by the Departmental Representative.

1.2 References

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

.1 2020 Standard Specifications for Highway Construction.

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

.1 ASTM 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, 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, Item 3.2 – Work Completion, Subsections .10 through .12 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 Existing rock material within the limits of construction that achieves the requirements for Riprap may be set aside by the Contractor and for re-use as Riprap
 - .3 Alternative sources outside the Alaska 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:

Table 31 37 00 – 01: 50 Kg Class Riprap		
Mass (kg) *	Nominal Diameter @ 2650 kg/m ³ (mm)	Percent Larger Than
300	600	0
150	510	15
50	350	50
5	160	85
1	95	100

*Mass governs the gradation of Riprap. Nominal diameter is provided for informational purposes only. Nominal size is defined according to the following expression: Nominal Size (mm) = 1150 times the cube root of the mass (kg) divided by the density of the rock (kg/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 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, Item 1.5 – Owner Supplied Materials (Outside Limits of Work) for further details.
- .4 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 Riprap Boulders
- .1 Riprap boulders shall be hard, durable stones free from splits, seems, or defects likely to impair its soundness during transport or after install and have an average dimension of 1.0 metres in three dimensions, with no one dimension being less than 0.30 metres in length. They shall be sourced from the following sources:

- .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 Existing rock material within the limits of construction that achieves the requirements for Riprap may be set aside by the Contractor and for re-use as Riprap
- .3 Alternative sources outside the Alaska Highway Right-of-Way.
- .2 The material shall conform with the requirements of:
 - .1 The requirements for the Riprap listed above in Sub-Section 2.1.2
 - .2 Have a relative density: to ASTM C127, not less than 2.65.

2.3 Nonwoven Geotextile

- .1 The Nonwoven Geotextile shall achieve or exceed the following minimum requirements:

Table 31 37 00 – 02: 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 ² (gpm/ft ²)	3056 (75)
UV Resistance	ASTM-D4355	% retained at 500 hrs.	70

2.4 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.

2.5 Common Fill .1 Common Fill shall be native materials designated for excavation and achieving the material properties of Embankment in accordance with Section 31 24 14 – Excavation, Embankment and Compaction.

2.6 Bentonite .1 Bentonite shall be in conformance with Section 33 42 13 – Pipe Culverts.

PART 3 – EXECUTION

3.1 General .1 Riprap extraction, processing, handling, transportation, stockpiling, and cleaning shall be in accordance with 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 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 – Excavation, Embankment, and Compaction. Where required, place and compact Common Fill and Crushed Base Gravel to the lines and grades shown on the Contract Drawings and in accordance with Section 31 24 14 – 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.

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- .7 Overlap each successive strip of Nonwoven Geotextile 1000 mm over previously laid strip. When Nonwoven Geotextile are placed on a slope, ensure overlap is as follows:
 - .1 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 Install temporary drainage and pumping and construct berms as outlined in the Contract Drawings and 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 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.
 - .3 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.
 - .4 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.
 - .5 Place Riprap material using methods that do not lead to segregation or degradation of aggregate. Do not place by end dumping from haul units.
 - .6 Do not drop Riprap from a height greater than 0.5 m vertically from its final position.

- .7 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. Ensure placement of the riprap materials allows for positive drainage.
- .8 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.
- .9 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.
- .10 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 where a rock having a mass equal or greater than 25% of the maximum stone mass can be placed.
 - .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.
- .11 Construction equipment is not permitted on the Riprap at any stage of construction.
- .12 Maintain finished material surfaces in a condition conforming to these specifications until acceptance by the Departmental Representative.

END OF SECTION

SECTION INCLUDES

PART 1 – GENERAL:

- 1.1 Measurement and Payment Procedures.
- 1.2 References.

PART 2 – PRODUCTS:

- 2.1 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 is surveyed by the Contractor and is inspected 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, 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:
 - .2 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.
 - .3 Shape and roll alternately to obtain smooth, even and uniformly compacted structure.
 - .4 Apply water as necessary during compacting to obtain specified density. If Sub-base Course material is excessively moist, take remedial action as directed by Departmental Representative.
 - .5 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers approved by Departmental Representative.
 - .6 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.
- 3.4 Tolerances
- .1 Finished Sub-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 Sub-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.
- 2.2 Nonwoven Geotextile.

PART 3 – EXECUTION:

- 3.1 Inspection and Survey of Underlying Surface.
- 3.2 Placing.
- 3.3 Compaction.
- 3.4 Tolerances.
- 3.5 Protection.

PART 1 – GENERAL

1.1 Measurement and Payment
Procedures

- .1 Payment for Crushed Base Gravel will be made on the basis of the Price per Unit Bid for Crushed Base Gravel in the Bid and Acceptance Form. The Price per Unit Bid shall include all costs included with the supply, manufacture, stockpiling, loading, transport, placing, shaping, watering and/or drying and compaction of 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 Culvert Ditching and Erosion End Protection, Crushed Base Gravel used to infill voids in the surface of placed Riprap, and Crushed Base Gravel required for Trenchless Culvert Installation, 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.
- 2.2 Nonwoven Geotextile .1 Nonwoven Geotextile shall be in accordance with Section 31 37 00 – Riprap.

PART 3 – EXECUTION

- 3.1 Inspection and Survey of Underlying Surface .1 Place Crushed Base Gravel after underlying surface is surveyed by the Contractor and is inspected and approved by Departmental Representative.
- 3.2 Placing .1 Place Crushed Base Gravel material in the locations and to lines and grades shown on the contract drawings.
- .2 Ensure placed material is free of ice and snow, or as acceptable to the Departmental Representative, and has a maximum moisture content of 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 Crushed Base Gravel material on crown line or on high side of one-way slope.

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- .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 for Trenchless Culvert Installation:
 - .1 Compact Crushed Base Gravel to a minimum 98% of the standard maximum dry density in accordance with ASTM D698. Take special care to obtain required density under haunches of Steel Pipe Culvert. Hand tamp where necessary to obtain compaction.
 - .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.
 - .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 Crushed Base Gravel 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 Compact material with mechanical tampers approved by Departmental Representative.
 - .4 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers approved by the Departmental Representative.
 - .5 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.
- 3.4 Tolerances
- .1 Finished base surface to be within +/- 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 (if applicable) or until substantial performance. 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 Measurement and Payment Procedures
- 1.2 References.
- 1.3 Product Data.
- 1.4 Scheduling.
- 1.5 Product Handling and Storage.

PART 2 – PRODUCTS:

- 2.1 Materials.
- 2.2 Equipment.

PART 3 – EXECUTION:

- 3.1 Application.
- 3.2 Workmanship.
- 3.3 Protection of Surfaces.
- 3.4 Preparation of Slurry.
- 3.5 Slurry Application.
- 3.6 Warranty and Maintenance.

PART 1 – GENERAL

1.1 Measurement and Payment
Procedures

- .1 Payment for the completion of Hydraulic Seeding (Optional Work) will be made on the basis of the Price per Unit Bid for Hydraulic Seeding (Optional Work) in the Bid and Acceptance Form. The Price per Unit Bid shall include all costs for supply, placement, and maintenance of the Hydraulic Seeding in all areas of topsoil, cut slopes, excavation, and other disturbed areas as detailed in these specifications or as directed by the Departmental Representative. The Price per Unit Bid shall further include all costs associated up to one (1) mobilization to complete Hydraulic Seeding (Optional Work) during the spring or summer season, at the direction of the Departmental Representative.

- .2 Measurement for Payment for completion of Hydraulic Seeding (Optional work) will be made by Lump Sum based on the percentage of the work completed and accepted by the Departmental Representative.

- 1.2 References
 - .1 American Society for Testing and Materials (ASTM), latest edition:
 - .1 ASTM D5338, Standard Test Method for Determining Aerobic Biodegradation of Plastic Materials Under Controlled Composting Conditions, Incorporating Thermophilic Temperatures.
 - .2 ASTM D6525, Standard Test Method for Measuring Nominal Thickness of Rolled Erosion Control Products.
 - .3 ASTM D6566, Standard Test Method for Measuring Mass Per Unit Area of Turf Reinforcement Mats.
 - .4 ASTM D6567, Standard Test Method for Measuring the Light Penetration of a Rolled Erosion Control Product (RECP).
 - .5 ASTM D7322, Standard Test Method for Determination of Rolled Erosion Control Product (RECP) Ability to Encourage Seed Germination and Plant Growth Under Bench-Scale Conditions.
 - .6 ASTM D7367, Standard Test Method for Determining Water Holding Capacity of Fiber Mulches for Hydraulic Planting.
 - .2 Environmental Protection Agency (EPA), latest edition:
 - .1 EPA 2021.0, Methods for Measuring Acute Toxicity to Freshwater and Marine Organisms, *Daphnia pulex* and *Daphnia magna* acute.

- 1.3 Product Data
 - .1 Provide product data, prior to seeding for:
 - .1 Seed:
 - .1 Shipping Bill: issued by supplier of material, identifying manufacturer and supplier, material, and net mass or volume in each container.

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- .2 Biotic Soil Media.
 - .1 Shipping Bill: issued by supplier of material, identifying manufacturer and supplier, material, and net dry-air mass in each container.
 - .3 Hydraulic Erosion Control Product (HECP).
 - .1 Shipping Bill: issued by supplier of material, identifying manufacturer and supplier, material, and net dry-air mass in each container.
 - .4 Fertilizer
 - .1 Shipping Bill: issued by supplier of material, identifying manufacturer and supplier, material, and net dry-air mass in each container.
 - .2 Guarantees.
 - .3 Chemical Analysis.
 - .2 Unless advised otherwise in advance of the work by the Departmental Representative, submit in writing to the Departmental Representative 14 days prior to commencing work:
 - .1 Volume capacity of hydraulic seeder in litres.
 - .2 Amount of material to be used per tank based on volume.
 - .3 Number of tank loads required per hectare to apply specified slurry mixture per hectare.
 - 1.4 Scheduling
 - .1 Schedule Hydraulic Seeding as directed by the Departmental Representative to coincide with the completion of surface on which the Hydraulic Seeding shall be applied and Construction Staging requirements as outlined in Section 01 14 00 – Work Restrictions, Access Development, Construction Staging, and Restoration.
 - 1.5 Product Handling and Storage
 - .1 Deliver and store seed in original containers individually labeled in accordance with “Seeds Regulations” and indicating name of supplier.

- .2 Deliver and store seed and fertilizer out of adverse weather.
- .3 Protect all product as required during transportation and storage.
- .4 Remove from project area, product that has become wet or otherwise damaged during transportation or storage, or does not meet requirements specified.

PART 2 – PRODUCTS

2.1 Materials

- .1 Seed: “Canada pedigreed grade” in accordance with Government of Canada Seeds Act and Regulations.
 - .1 Grass Mixture: “Certified”, Canada No. 1 seed for common cultivars in accordance with Government of Canada Seeds Act and Regulations and shall conform to the following seed mixes for the applicable project locations:

Table 32 93 21 – 01: Grass Seed Mix	
% By Weight	Species
30%	Creeping Red Fescue
20%	Slender Wheatgrass
10%	Alsike Clover
10%	Timothy
10%	Canada Bluegrass
15%	Smooth Brome Grass
5%	Sheep Fescue

- .2 Fall rye.
- .2 Biotic Soil Media shall be a Wood Fibre Based Product certified for use in Canada containing the following ingredients:
 - .1 Renewable Thermally Refined Bark and Wood Fibers
 - .2 Biochar
 - .3 Cross-Linked Polysaccharide Biopolymers
 - .4 Soil Building Components Containing Seaweed Extract, Humic Acid, and Endomycorrhizae.

- .3 Hydraulic Erosion Control Product (HECP) shall be a Wood Fibre Product certified for use in Canada with the following properties as detailed in Table 32 93 21 – 02:

Table 32 93 21 – 02: HECP		
Physical Properties ⁽¹⁾	Test Method	Test Value
Thickness	ASTM D6525 ⁽²⁾	≥ 4 mm
Ground Cover	ASTM D6567 ⁽²⁾	≥ 98%
Mass/Unit Area	ASTM D6566 ⁽²⁾	≥ 390 g/m ²
Water Holding Capacity	ASTM D7367	≥ 1,400%
Material Color	Observed	Green
Physical Properties ⁽¹⁾	Test Method	Test Value
Cover Factor ⁽³⁾	Large Scale ⁽⁵⁾	≤ 0.05
Percent Effectiveness ⁽⁴⁾	Large Scale ⁽⁵⁾	≥ 95%
Cure Time	Observed	4 – 24 Hours
Vegetation Establishment	ASTM D7322 ⁽²⁾	≥ 600%
Functional Longevity	ASTM D5338	≤ 12 Months
Environmental Properties ⁽¹⁾	Test Method	Test Value
Ecotoxicity	EPA 2021.0	48-hr LC ₅₀ > 100%
Biodegradability	ASTM D5338	Yes
Product Composition		Typical Value
Thermally Processed ⁽⁷⁾ (within a pressurized vessel) Virgin Wood Fiber		77%
Wetting Agents - including high-viscosity, colloidal polysaccharides, crossed-linked biopolymers and water absorbents (>10% of total formulation)		18%
Crimped, Biodegradable Interlocking Fibers		2.5%
Micro-Pore Granules		2.5%

Notes:

- (1) When uniformly applied at a rate of 3,500 pounds per acre (3,900 kilograms/hectare) under laboratory conditions.
- (2) ASTM test methods developed for Rolled Erosion Control Products that have been modified to accommodate Hydraulic Erosion Control Products.
- (3) Cover Factor is calculated as soil loss ratio of treated surface versus an untreated control surface.
- (4) % Effectiveness = One minus Cover Factor multiplied by 100%.
- (5) Large scale testing conducted at Utah Water Research Laboratory and Texas Transportation Institute. For specific testing information please contact a Profile technical service representative at 800-508-8681.

- (6) Functional Longevity is the estimated time period, based upon ASTM D5338 testing and field observations, that a material can be anticipated to provide erosion control and agronomic benefits as influenced by composition, as well as site-specific conditions, including; but not limited to — temperature, moisture, light conditions, soils, biological activity, vegetative establishment and other environmental factors.
- (7) Heated to a temperature greater than 380 degrees Fahrenheit (193 degrees Celsius) for 5 minutes at a pressure greater than 50 psi (345 kPa) in order to be Thermally Refined®/Processed and to achieve phytosanitization.

.4 Water: free of impurities that would inhibit germination and growth.

.5 Fertilizer:

.1 To Canada Fertilizers Act and Regulations.

.2 Complete synthetic, ratio: 18:18:18.

2.2 Equipment

.1 Capable of mixing and evenly distributing seed, fertilizer, Biotic Soil Media, and HECF mixtures for efficient treatment of areas to be seeded.

.2 Agitation system:

.1 To be built in.

.2 To have sufficient capacity to agitate, suspend and homogeneously mix slurry of materials in amounts specified using slurry recirculation or mechanical agitation method.

.3 To be capable of operating during seeding and charging of the tank.

.3 Slurry tank to have working capacity of at least 4,500 litres with pump capable of maintaining continuous, nonfluctuating stream of slurry. Distribution lines to be equipped with appropriate nozzles and of sufficient diameter to prevent blockage. Tank volume to be certified by certifying authority and identified by authorities with the Volume Certification Plate.

.4 Capable of seeding by 50 m hand operated hose or tower with appropriate nozzles.

PART 3 – EXECUTION

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|----------------------------|----|---|
| 3.1 Application | .1 | Apply Hydraulic Seeding as per the direction provided by the Departmental Representative during spring or summer season to avoid winter weather conditions. Assume one (1) mobilization will be required to complete Hydraulic Seeding (Optional Work). |
| 3.2 Workmanship | .1 | Apply Hydraulic Seeding in all areas of topsoil, cut / fill slopes, disturbed areas, or other areas as detailed in these specifications or as directed by the Departmental Representative. |
| | .2 | Do not spray onto structures, signs, guardrails, plant material, and other surfaces than intended. |
| | .3 | Clean-up immediately any material sprayed where not intended, to satisfaction of Departmental Representative. |
| | .4 | Do not perform work under adverse field conditions such as wind speeds that will carry product beyond area designed for hydraulic seeding or not uniformly applied, frozen ground or ground covered with snow, ice or standing water, or other adverse conditions unless otherwise pre-approved by the Departmental Representative. |
| | .5 | Protect seeded areas from trespass until plants are established. |
| 3.3 Protection of Surfaces | .1 | Fine grade areas to be seeded free of humps and hollows. Ensure areas are free of deleterious and refuse materials. |
| | .2 | Obtain Departmental Representative's review of grade, finished surface, and topsoil depth before starting to seed. |
| 3.4 Preparation of Slurry | .1 | Measure quantities of materials by weight or weight-calibrated volume measurement. Supply equipment required for this work. |
| | .2 | Calculate amount of material to be used and area to be covered for each tank load utilizing size of slurry tank and carrying capacities of water. |
| | .3 | Charge required water into seeder. Add material into hydraulic seeder under agitation. Pulverize Biotic Soil Media and HECF and charge slowly into seeder. Use optimum carrying capacity of water relative to Biotic Soil Media, and HECF as follows: |
| | .1 | Biotic Soil Media: 55kg/1000 L. |

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- .2 HECP: 43kg/1000 L.
 - .4 Mix thoroughly to complete the slurry once all other material is in the seeder.
- 3.5 Slurry Application
- .1 Hydraulic seeding equipment:
 - .1 Slurry tank.
 - .2 Agitation system for slurry to be capable of operating during charging of tank and during seeding, consisting of recirculation of slurry and /or mechanical agitation method.
 - .3 Capable of seeding by 50 m hand operated hoses or tower with appropriate nozzles.
 - .2 The hydraulic seeding slurry mixture shall be applied in (2) two separate applications. The second application shall be applied within 24 hours of the first application. The slurry mixture per hectare of each application shall be as follows:
 - .1 Application 1 (Biotic Soil Media and Seed):
 - .1 Biotic Soil Media: 3500 kg
 - .2 Fall rye: 110 kg.
 - .3 Fertilizer: 360 kg.
 - .2 Application 2 (HECP):
 - .1 HECP: 3900 kg.
 - .2 Grass Seed Mixture: 125 kg.
 - .3 Thoroughly mix and uniformly apply slurry, at optimum angle of application for adherence to surfaces and germination of seed over area to be seeded.
 - .1 Using correct nozzle for application.
 - .2 Using hoses for surfaces difficult to reach and to control application.
 - .4 Blend application 300 mm into adjacent grass areas previous applications to form uniform surfaces.

- .5 Re-apply where application is not uniform.
 - .6 Immediately remove slurry from items and areas not designated to be sprayed.
 - .7 Protect seeded areas from trespass and damage.
 - .8 Remove protection devices.
- 3.6 Warranty and Maintenance
- .1 The Contractor shall warranty the Hydraulic Seeding free of defects in accordance with General Conditions (GC3.13), for one full growing season or 12 months from the date of Substantial Performance whichever is greater.
 - .2 It is the responsibility of the Contractor to complete maintenance as the Contractor deems necessary on the Hydraulic Seeding such that a 90% survival rate is achieved at the end of the warranty period.
 - .3 If at the end or prior to the end of the warranty period a 90% survival rate is not achieved the Contractor shall at his own expense replace Hydraulic Seeding not surviving or in poor condition except when the loss or damage can be proven to be due to abnormal weather, or any causes beyond the control of the Contractor.
 - .4 An end-of-warranty inspection will be conducted by the Departmental Representative.

END OF SECTION

SECTION INCLUDES:

PART 1 – GENERAL:

- 1.1 Measurement and Payment Procedures.
- 1.2 Product Data.
- 1.3 Scheduling.
- 1.4 Product Handling and Storage.

PART 2 – PRODUCTS:

- 2.1 Materials.
- 2.2 Equipment.

PART 3 – EXECUTION:

- 3.1 Preparation.
- 3.2 Application.
- 3.3 Workmanship.
- 3.4 Warranty and Maintenance.

PART 1 – GENERAL

1.1 Measurement and Payment
Procedures

- .1 Payment for Non-hydraulic Seeding will be made on the basis of the Price per Unit Bid for Non-hydraulic Seeding in the Bid and Acceptance Form. The Price per Unit Bid shall include all costs for the supply, placement, warranty, maintenance, and all other items necessary for successful completion of seeding in all areas of the decommissioned highway alignment, cut slopes, access development, any disturbed areas, and all other areas requiring seeding as shown on the Contract Drawings and as detailed in these specifications. The Mobilization and Demobilization – Section 01 25 20 shall include all costs associated up to one (1) mobilization to complete Non-hydraulic Seeding during the spring or summer season, at the direction of the Departmental Representative.
- .2 Measurement for Payment for Non-hydraulic Seeding will be made by the length of decommissioned highway seeded, surveyed in lineal metres, measured parallel to the decommissioned highway alignment and accepted by the Departmental Representative.

- The width of the seeding will not be measured or considered during the survey of the length of seeded decommissioned highway.
- .3 Payment for Non-hydraulic Seeding for the Slope Restoration at Km 21.83 will be made on the basis of the Price per Unit Bid for Non-hydraulic Seeding for Slope Restoration at Km 21.83 in the Bid and Acceptance Form. The Price per Unit Bid shall include all costs for the supply, placement, warranty, maintenance, and all other items necessary for successful completion of seeding in all areas of the Slope Restoration, any disturbed areas, and all other areas requiring seeding as shown on the Contract Drawings and as detailed in these specifications. The Mobilization and Demobilization – Section 01 25 20 shall include all costs associated up to one (1) mobilization to complete Non-hydraulic Seeding during the spring or summer season, at the direction of the Departmental Representative.
- .4 Measurement for Payment for Non-hydraulic Seeding for Slope Restoration at Km 21.83 will be made on the area of seeding placed, surveyed in square metres and accepted by the Departmental Representative.
- 1.2 Product Data
- .1 Provide product data, prior to Non-hydraulic seeding for:
- .1 Seed:
- .1 Shipping Bill: issued by supplier of material, identifying manufacturer and supplier, material, and net mass or volume in each container.
- 1.3 Scheduling
- .1 Schedule Non-hydraulic seeding to coincide with completion of any scarification, furrowing, excavations, and restoration of access development areas.
- 1.4 Product Handling and Storage
- .1 Deliver and store seed in original containers individually labeled in accordance with “Seeds Regulations” and indicating name of supplier.
- .2 Protect all product as required during transportation and storage.
- .3 Remove from project area, product that has become wet or otherwise damaged during transportation or storage, or does not meet requirements specified.

PART 2 – PRODUCTS

- 2.1 Materials .1 Seed: “Canada pedigreed grade” in accordance with Government of Canada Seeds Act and Regulations.
- .1 Grass Mixture: “Certified”, Canada No. 1 seed for common cultivars in accordance with Government of Canada Seeds Act and Regulations and shall conform to the following:

Table 32 93 21 – 01: Grass Seed Mix	
% By Weight	Species
30%	Creeping Red Fescue
20%	Slender Wheatgrass
10%	Alsike Clover
10%	Timothy
10%	Canada Bluegrass
15%	Smooth Brome Grass
5%	Sheep Fescue

- 2.2 Equipment .1 Use electric cyclone seeders mountable on ATV capable of broadcasting seed at the required application rate.
- .2 All equipment shall be cleaned prior to delivery to site.

PART 3 – EXECUTION

- 3.1 Preparation .1 Obtain Departmental Representative’s review and acceptance of scarification or furrowing of areas to be seeded prior to beginning Non-hydraulic seeding.
- 3.2 Application .1 Apply seeding as per the direction provided by the Departmental Representative during spring or summer season to avoid winter weather conditions. Assume one (1) mobilization will be required to complete.
- .2 Apply seeding in all areas of decommissioned highway scarification, cut slopes, access development, areas disturbed by construction, and other areas requiring seeding as detailed in these Contract Specifications, Contract Drawings, or as directed by the Departmental Representative.
- .3 Application rate shall be between fifteen and twenty kilograms per hectare.

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- .4 Do not perform work under adverse field conditions, such as wind speeds over 10 km/h, frozen ground or ground covered with snow, ice or standing water, or other adverse conditions unless otherwise preapproved by the Departmental Representative.
- 3.3 Workmanship
- .1 Do not seed onto structures, signs, guardrails, and other surfaces identified by the Departmental Representative as not requiring seeding.
- .2 Clean-up immediately, any material or area seeded where not intended, to the satisfaction of Departmental Representative.
- 3.4 Warranty and Maintenance
- .1 The Contractor shall warranty the seeding free of defects in accordance with General Conditions (GC3.13), for one full growing season or 12 months from the date of Substantial Performance, whichever is greater.
- .2 It is the responsibility of the Contractor to complete maintenance as the Contractor deems necessary on the seeding such that a 90% survival rate is achieved at the end of the warranty period.
- .3 If at the end or prior to the end of the warranty period a 90% survival rate is not achieved the Contractor shall, at his or her own expense, replace seeding not surviving or in poor condition except when the loss or damage can be proven to be due to abnormal weather, or causes beyond the control of the Contractor.
- .4 An end-of-warranty inspection will be conducted by the Departmental Representative.

END OF SECTION

SECTION INCLUDES

PART 1 – GENERAL:

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

PART 2 – PRODUCTS:

- 2.1 Steel Pipe Culverts.
- 2.2 Welding Materials.
- 2.3 Crushed Base Gravel.
- 2.4 Bentonite.
- 2.5 Culvert Infill Material.
- 2.6 Fish Baffles.
- 2.7 Natural Substrate.

PART 3 – EXECUTION:

- 3.1 Equipment.
- 3.2 Installation.
- 3.3 Existing Steel Pipe Extension
- 3.4 Fish Baffle and Natural Substrate Installation.
- 3.5 Channel Realignment and Erosion Protection.
- 3.6 Abandon Existing Culvert.
- 3.7 Clean-up.

PART 1 – GENERAL

- 1.1 General .1 Complete 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 and the Contractor's accepted EPP.
- 1.2 Measurement and Payment Procedures .1 Payment for extending existing Steel Pipe Culverts will be made on the basis of the Price per Unit Bid for Km 504.36 – 1050 mm Diameter Steel Pipe Culvert Extension in the Bid and Acceptance Form. The Price per Unit Bid shall include all costs included with the work including:
- .1 Confirmation of the existing pipe diameter and modification to existing culvert ends (as required) to ensure sound connection of culvert extension
 - .2 Excavation and dewatering (as required) to facilitate culvert extension.
 - .3 Supply, transport, and installation of the specified diameter Steel Pipe Culvert (i.e. 1050 mm), welding.
 - .4 Supply, placement and compaction of Crushed Base Gravel and Embankment and all other items necessary for the successful completion of the work.
- .2 Measurement for Payment for Km 504.36 – 1050 mm Diameter Steel Pipe Culvert Extension will be made on the length of culvert surveyed in lineal metres, measured parallel to the direction of the culvert along the invert of the culvert, and accepted by the Departmental Representative.
- .3 Payment for the install of new Steel Pipe Culverts will be made on the basis of the Price per Unit Bid for Km 501.18 – 600 mm Diameter Steel Pipe Culvert Installation, Km 503.47 – 2400 mm Diameter Steel Pipe Culvert Installation, Km 504.01 – 900 mm Diameter Steel Pipe Culvert Installation, Km 505.68 – 1500 mm Diameter Steel Pipe Culvert Installation, Km 505.93 – 1500 mm Diameter Steel Pipe Culvert Installation, Km 506.35 -1200 mm Diameter Steel Pipe Culvert Installation, Km 506.54 – 900 mm Diameter Steel Pipe Culvert Installation, Km 506.63 – 900 mm Diameter Steel Pipe Culvert Installation, Km 507.64 – 2200 mm Diameter Steel Pipe Culvert Installation, and Km 507.90 – 1500 mm Diameter Steel Pipe Culvert Installation in the Bid and Acceptance

Form. The Price per Unit Bid shall include all costs included with the work including:

- .1 Excavation and dewatering (as required) to facilitate trenchless culvert installation.
 - .2 Supply, transportation to site, and installation of the specified diameter Steel Pipe Culvert (i.e. 600 mm, 900 mm, 1200 mm, 1500 mm, 2200 mm and 2400 mm) by trenchless technologies (i.e. pipe jacking) and required welding. Culvert installation by open cut methods will not be accepted.
 - .3 Preparation of working gravel pad to accommodate pipe jacking equipment and length of Steel Pipe Culvert.
 - .4 Fabrication and installation of fish baffles in the locations shown on the Contract Drawings (i.e. Km 507.64 and Km 507.90 culverts only) via welding to the steel pipe culvert once the steel pipe culvert has been installed.
 - .5 Removal and offsite disposal of earth material inside the new Steel Pipe Culvert.
 - .6 Supply, placement and compaction of Crushed Base Gravel in any areas around the outside of the culvert where native materials were removed to facilitate the work.
 - .7 Restoration of the disturbed areas
 - .8 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 Payment for Abandon / Infill Existing Culverts will be made on the basis of the Price per Unit Bid for Km 501.17 – Abandon / Infill Existing 600 mm Diameter Culvert, Km 503.46 – Abandon / Infill Existing 1200 mm Diameter Culvert, Km 504.01 – Abandon / Infill Existing 900 mm Diameter Culvert, Km 505.67 – Abandon / Infill Existing 1200 mm Diameter Culvert, Km 505.92 – Abandon / Infill

Existing 900 mm Diameter Culvert, Km 506.34 – Abandon / Infill Existing 900 mm Diameter Culvert, Km 506.55 – Abandon / Infill Existing 900 mm Diameter Culvert, Km 506.64 – Abandon / Infill Existing 900 mm Diameter Culvert, Km 507.63 – Abandon / Infill Existing 1200 mm Diameter Culvert, and Km 507.90 – Abandon / Infill Existing 900 mm Diameter Culvert in the Bid and Acceptance Form. The Price per Unit Bid shall include all costs for dewatering (if required), excavation, disposal of excavated material, removal and offsite disposal of existing culvert inlet and outlet segments, installation of Culvert Infill Material and any associated Formwork / Falsework, supply, transport and placement of Culvert Infill Material, backfill and compaction of Crushed Base Gravel at the abandoned culvert inlet and outlet, restoration and all other items necessary for the successful completion of the work. At the existing culvert at Km 503.46, the Price per Unit Bid shall further include removal of the existing beaver guard and modified/re-used on site as instructed by the Departmental Representative.

- .6 Measurement for Payment for Abandon / Infill Existing Culverts will be made by Lump Sum based on the percentage of work completed and accepted by the Departmental Representative.
- .7 Payment for the install of new Steel Pipe Culverts (Optional Work) will be made on the basis of the Price per Unit Bid for Km 501.40 – 2100 mm Diameter Steel Pipe Culvert Installation (Optional Work), Km 502.24 – 2100 mm Diameter Steel Pipe Culvert Installation (Optional Work), Km 504.36 – 2900 mm Diameter Steel Pipe Culvert Installation (Optional Work), Km 505.22 – 1600 mm Diameter Steel Pipe Culvert Installation (Optional Work), and Km 507.12 – 1500 mm Diameter Steel Pipe Culvert Installation (Optional Work) in the Bid and Acceptance Form. The Price per Unit Bid shall include all costs included with the work including:
 - .1 Excavation and dewatering (as required) to facilitate trenchless culvert installation.
 - .2 Supply, transport to site, and installation of the specified diameter Steel Pipe Culvert (i.e. 1500 mm, 1600 mm, 2100 mm, and 2900 mm) by trenchless technologies (i.e. pipe jacking) and required welding. Culvert installation by open cut methods will not be accepted.

- .3 Preparation of a working gravel pad to accommodate pipe jacking equipment and length of Steel Pipe Culvert.
 - .4 Fabrication and installation of fish baffles in the locations shown on the Contract Drawings (i.e. Km 502.24, Km 504.36, Km 505.22, and Km 507.12 culverts only) via welding to the steel pipe culvert once the steel pipe culvert has been installed.
 - .5 Removal and offsite disposal of earth material inside the new Steel Pipe Culvert.
 - .6 Supply, placement and compaction of Crushed Base Gravel in any areas around the outside of the culvert where native materials were removed to facilitate the work.
 - .7 Restoration of the disturbed areas.
 - .8 All other items necessary for the successful completion of the work.
- .8 Measurement for Payment for the install of new Steel Pipe Culverts (Optional Work) 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.

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 The Pipe Jacking Association – Guide to Best Practices for the Installation of Pipe Jacks and Microtunnels.
- .3 American Society for Testing and Materials (ASTM), latest edition:
 - .1 ASTM A252, Standard Specification for Welded and Seamless Steel Pipe Products.

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- .2 ASTM D698, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ [600 kN-m/m³]).
 - .4 Canadian Welding Bureau Group (CWB):
 - .1 CWB Form 160 Welding Procedure Data Sheet.
 - 1.4 Definitions
 - .1 Obstruction: Rock or other material which must be removed prior to the continuation of the Pipe Jacking work.
 - .2 Trenchless: Culvert installation through the existing ground within strict alignment and grade tolerances using hydraulic equipment, without the need for the excavation of the existing ground above the culvert.
 - 1.5 Submittals
 - .1 Submittals in accordance with Section 01 33 00 – Submittal Procedures.
 - .2 The following submittals are required prior to undertaking the work:
 - .1 Unless advised otherwise in advance of the work by the Departmental Representative, submit a Tunneling Methodology report for review and acceptance by the Departmental Representative. The report shall be sufficient to convey the following:
 - .1 Proposed method of tunnel construction and type of face support.
 - .2 Manufacturer and type of tunneling equipment proposed.
 - .3 Sequence of operations.
 - .4 Method of spoil transportation from the face and surface storage.
 - .5 Capacity of jacking equipment and cushioning.
 - .6 Identify critical utility crossings and special precautions proposed.
 - .7 Slurry injection system details (if required).
 - .2 Submit to the Departmental Representative for review and acceptable the steel producer's

certificates for the steel pipe culverts in accordance with ASTM A252.

.3 Submit to the Departmental Representative the following welding submittals:

.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.

.4 Submit to the Departmental Representative the Shop Drawings for Fish Baffles design.

1.6 Environmental

.1 Complete culvert installation and related works in conformance with the requirements of Section 01 35 43 – Environmental Protection, 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, Item 3.2 – Work Completion, Sub-Section .10 through .12 for further information.

.3 If pipe culverts are not installed prior to the removal of Beaver Dams, suitable erosion protection may be required due to the potential high flows following removal of Beaver Dams (Refer to Section 31 24 14 – Excavation, Embankment and Compaction).

1.7 Delivery, Storage, and Handling

.1 Handle and store the Steel Pipe Culverts products 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 Steel Pipe Culverts

- .1 PSPC is providing access to approximately 115.8 m of “as-is” 1,524 mm (60”) diameter Steel Pipe Culverts located at PSPC’s Fort Nelson Maintenance Yard (Airport Drive, Fort Nelson) for use by the Contractor on this project.

Should the Contractor choose to use the “as-is” Steel Pipe Culverts, the Contractor shall be responsible to inspect the Steel Pipe Culvert sections prior to pick-up and report any damage or concerns to the Departmental Representative. The Contractor shall be responsible for loading and transportation of the culvert sections to the project site. PSPC will provide the Contractor with the Steel Pipe Culvert producer’s mill certificates for the steel pipe culverts.

- .2 Supply Steel Pipe Culverts of required diameter and length as shown on the Contract Drawings and the following wall thicknesses:

- .1 Steel pipe diameter less than or equal to 900 mm: 12.5 mm (0.5”).
- .2 Steel pipe diameter greater than 900 mm but less than 1500 mm: 15.9 mm (5/8”).
- .3 Steel pipe diameter greater than 1500 mm: 25 mm (1.0”).

Substitution of pipe with larger diameter or thicker wall thickness to suit equipment availability or ground conditions (trenchless culvert installation) shall be pre-approved by the Departmental Representative. The substitution of pipe with smaller diameter or thinner wall thickness will not be permitted.

- .3 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.
- .4 Steel pipe culverts shall be delivered to the site in uniform lengths.
- .5 The Contractor shall be responsible for selection of appropriate pipe, pipe joints, and pipe wall thickness to carry the thrust of any trenchless installation forces or any other

- construction loads in combination with overburden, earth and hydrostatic loads. The trenchless installation equipment shall not unduly damage or distort the ends of the steel pipe culverts during the installation process.
- 2.2 Welding Materials .1 Welding materials to CSA W59.
- .2 Welding electrodes to CSA W48 Series.
- 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 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.
- 2.5 Culvert Infill Material .1 Where noted on the Contract Drawings or in these specifications, existing culverts shall be infilled with Culvert Infill Material in accordance with Section 03 40 00 – Culvert infill Material.
- 2.6 Fish Baffles .1 Fish Baffles shall be 9.5 mm thick plate steel cut to match shape of 1500 mm, 1600 mm, 2100 mm, 2200 mm, and 2900 mm diameter Steel Pipe Culverts at the locations, angles, and spacing shown on the Contract Drawings.
- .2 Shop drawings of the proposed Fish Baffle installation shall be provided by the Contractor to the Departmental Representative for approval prior to the works.
- 2.7 Natural Substrate .1 Natural Substrate shall be in accordance with Section 31 05 16 – Aggregates: General.
- PART 3 – EXECUTION**
- 3.1 Equipment .1 The Contractor shall be solely responsible for selection of trenchless installation equipment capable of handling the culvert size, ground conditions and existing soils. Additionally, the equipment shall provide satisfactory support of the excavated face.
- 3.2 Installation .1 Complete all work in accordance with the Environmental Requirements as outlined in Section 01 35 43 – Environmental Protection and the Contractor’s accepted EPP.

Setup berms and/or pumps as required to ensure flows are contained within the existing culvert and the new steel pipe culvert installation is completed in the dry.

- .2 Use trenchless installation methods that will minimize movement of the ground in front of and surrounding the Steel Pipe Culvert.
- .3 Perform trenchless installation so as to avoid interference with the operation of the vehicles travelling the highway.
- .4 Excavation diameter should be a minimum size to permit trenchless culvert installation with an allowance for bentonite injection into the annular space (if necessary for installation, see Item .12 below).
- .5 Install gravel pad and/or thrust reaction blocks as required for trenchless installation equipment. Complete excavation as necessary for installation of the pipe lengths while keeping the construction footprint to the minimum extent possible.
- .6 Divert stream water, drainage, and discharge from dewatering away from the trenchless installation operations to a location in compliance with the Contractor's accepted EPP.
- .7 Install steel pipe culvert to +/- 1.0 m horizontal and +/- 0.5 m vertical of the alignment and vertical gradient shown on the Contract Drawings. Adjustments to the line and level should be gradual to ensure that the Steel Pipe Culvert or joints are not damaged. Monitor line and level of the culvert with appropriate instruments. Steel pipe culvert installation outside of these tolerances may be considered defective work by the Departmental Representative and subject to the conditions of GC3.11.3
- .8 Monitor ground movement (settlement and heave) throughout the trenchless installation operation using survey points installed prior to the work and sampled at regular intervals throughout the work. Halt all operations and take immediate remedial action (including notification to the Departmental Representative) if ground movements greater than +/- 50 mm are detected.
 - .1 If ground movements in excess of +/- 50 mm are detected, the Departmental Representative will consult with the Contractor (and others if required) to determine the most appropriate course of action. The installation of the steel pipe culverts can only

commence again following approval from the Departmental Representative.

- .9 Cushion pipe joints as necessary to transmit the trenchless installation forces without damage to the Steel Pipe Culvert or steel pipe joints.
- .10 Prior to welding steel pipe culvert section and install via pipe jacking, rotate the next steel pipe culvert section to find the best match / alignment between adjacent culvert sections. Install "Alignment Dogs" on the Steel Pipe Culvert to align adjacent sections of the steel pipe culverts as necessary.
- .11 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 Item 1.4.3 of this specification section. The Departmental Representative will conduct random visual inspections and/or nondestructive testing of completed welds during trenchless culvert installation. Should any cracks in the welds develop either immediately following the welding or upon further installation of the pipe via pipe jacking, the weld will be considered rejected and require replacement.
- .12 If necessary, maintain an envelope of bentonite slurry around the exterior of the pipe during the trenchless installation to reduce the exterior friction and reduce the possibility of pipe seizing in place.
- .13 If the steel pipe culvert seizes in place and Contractor elects to construct a recovery access shaft, pre-approval must first be obtained from the Departmental Representative.
- .14 In the event a section of Steel Pipe Culvert is damaged during the trenchless installation operation, or joint failure occurs, as evident by inspection, visible ground water inflow or other observations, the Contractor shall submit for approval their methods for repair or replacement of the steel pipe culvert. Any steel pipe culvert damage or misalignment of the steel pipe culvert shall be removed and replaced by the Contractor at no additional costs to PSPC.
- .15 Ensure no voids between the outside of the Steel Pipe Culvert and ground result from the trenchless installation process. Any voids which form shall be filled with pressure grouting. If pressure grouting is necessary, submit pressure grouting materials and procedures to the Departmental Representative for review and acceptance prior to undertaking the work.

-
- .16 In the event an obstruction is encountered during the trenchless installation process, notify the Departmental Representative immediately. Await further instruction from the Departmental Representative before proceeding.
 - .17 Install Crushed Base Gravel (see Section 32 11 24 – Crushed Base Gravel) around any length of pipe installed using Trenchless Method that upon installation is not completely encircled with native, undisturbed embankment material (e.g. end of Steel Pipe Culvert at jacking pit or Steel Pipe Culvert which has been exposed to remove obstruction).
 - .18 Remove soil materials from within the steel pipe using appropriate equipment. Dispose of excavation material in an offsite location outside PSPC's ROW acceptable to the Departmental Representative and in accordance with Section 31 24 14 – Excavation, Embankment and Compaction.
 - .19 Trim ends of steel pipe culverts to the lines shown on the Contract Drawings.
 - .20 Submit to the Departmental Representative an As-Built Survey of the trenchless culvert installation in accordance with Section 01 33 00 – Submittal Procedures and Section 01 78 00 – Closeout Submittals. The Departmental Representative will review the As-Built Survey to compare the trenchless culvert installation against the requirements of the Contract Drawings and these specifications, specifically the tolerances outlined in Item 3.2.7.
- 3.3 Existing Steel Pipe Extension
- .1 Install steel pipe culvert extension at Km 504.36 to the length, alignment, vertical gradient and elevations shown on the Contract Drawings. Extend steel pipe culvert to +/- 0.1 m horizontal and +/- 0.05 m vertical of the alignment shown on the Contract Drawings. Adjustments to the line and level should be gradual to ensure that the Steel Pipe Culvert extension or joints are not damaged. Monitor line and level of the culvert with appropriate instruments. Steel pipe culvert installation outside of these tolerances may be considered defective work by the Departmental Representative and subject to the conditions of GC3.11.3
 - .2 Fuse Steel Pipe Culvert sections to the existing culvert 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 Item 1.4.3 of this specification section. The Departmental Representative will conduct random visual inspections and/or nondestructive testing of completed welds during trenchless

- culvert installation. Should any cracks in the welds develop either immediately following the welding or upon further installation, the weld will be considered rejected and require replacement.
- .3 Trim / modify existing culvert end to provide suitable section surface to connect extension to. Prior to welding steel pipe culvert section and install, rotate the steel pipe culvert section to find the best match / alignment between adjacent culvert sections. Install "Alignment Dogs" on the Steel Pipe Culvert to align adjacent sections of the steel pipe culverts as necessary.
- .4 Install Crushed Base Gravel (see Section 32 11 24 – Crushed Base Gravel) around any length of pipe installed using Trenchless Method that upon installation is not completely encircled with native, undisturbed embankment material (e.g. end of Steel Pipe Culvert at jacking pit or Steel Pipe Culvert which has been exposed to remove obstruction).
- .5 If required, trim ends of extended steel pipe culvert to the lines shown on the Contract Drawings.
- 3.4 Fish Baffle and Natural Substrate Installation
- .1 Install Fish Baffles at locations Km 502.24, Km 504.36, Km 505.22, Km 507.12, Km 507.64 and Km 507.90 and spacings as shown on the Contract Drawings. Fuse fish baffles to the Steel Pipe Culvert using fillet stitch welds as indicated on the Contract Drawings. Complete welding in accordance with CSA W48 and W59.
- .2 Install Natural Substrate in the bottom of the steel pipe culvert to the depths and locations shown on the Contract Drawings. See Section 31 05 16 – Aggregates: General for further details.
- 3.5 Channel Realignment and Erosion 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 – Excavation, Embankment and Compaction.
- .2 Excavate ground to the lines and grades shown on the Contract Drawings to facilitate the proposed ditch realignment and the installation of riprap end protection at both the inlet and outlet. Ensure excavation will allow for positive drainage upon placement of Riprap. If shown on the Contract Drawings, complete Clearing and Grubbing prior to excavation in accordance with Section 31 11 00 – Clearing and Grubbing. Dispose of removed trees offsite at a location pre-approved by the Departmental Representative.

-
- .3 Dispose of excess excavated material offsite at a location pre-approved by the Departmental Representative in accordance with the requirements of Section 31 24 14 – Excavation, Embankment and Compaction.
 - .4 Place and compact Crushed Base Gravel to the design lines and grades shown on the Contract Drawings in accordance with Section 32 11 24 – Crushed Base Gravel.
 - .5 Place Bentonite and Crushed Base Gravel on the inlet end of each culvert to the thicknesses and locations shown on the Contract Drawings.
 - .6 Install Nonwoven Geotextile, 50 kg Class Riprap to the lines, grades and locations shown on the Contract Drawings and in accordance with Section 31 37 00 – Riprap. Regrade inlet and outlet areas and channelize stream through new culverts.
 - .7 Install ditch blocks in the locations and elevations shown on the Contract Drawings to suit the channel profile and culvert elevations and where acceptable to the Departmental Representative.
- 3.6 Abandon Existing Culvert
- .1 Following the completion of the steel pipe culvert installation using Trenchless Method, abandon the existing pipe culvert(s). At the existing culvert at Km 503.46, remove the existing beaver guard from the culvert inlet. The beaver guard shall be modified and re-used on site for the new culvert as instructed by the Departmental Representative.
 - .2 Excavate existing materials to expose culvert inlet and outlet segments to the limits shown on the Contract Drawings. Detach / cut and remove culvert inlet and outlet segments to the extent shown on the Contract Drawings or to the satisfaction of the Departmental Representative.
 - .3 Infill the existing culvert(s) with Culvert Infill Material in accordance with Section 03 40 00 – Culvert Infill Material.
 - .4 Backfill excavation with Crushed Base Gravel to the lines and grades shown on the Contract Drawings and in accordance with Section 32 11 24 – Crushed Base Gravel. Ensure existing culvert and Grout is encased with a minimum of 0.3 m of Crushed Base Gravel.
 - .5 Install Riprap and Nonwoven Geotextile to the lines, grades and limits shown on the Contract Drawings, in accordance with Section 31 37 00 – Riprap and to the satisfaction of the Departmental Representative.

3.7 Clean-up

- .1 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).
- .2 Complete Hydraulic Seeding of all disturbed areas (refer to Section 32 93 21-A – Hydraulic Seeding for further details).

END OF SECTION

PSPC

Appendices

Km 501-509 Geometric and Drainage Improvements and Deactivation
of Former Alignments Km 501.05 To Km 508.80, Alaska Highway, BC
Project No. R.115628.001, R.106984.001

R.115628.001, R.106984.001
Appendix A

Written Communication / Document Management Protocol

Alaska Highway Km 501-509 Geometric and Drainage Improvements and Deactivation of Former Alignments Km 501.05 To Km 508.80, Alaska Highway, BC –Project: Written Communication / Document Management Protocol

Communication for the Alaska Highway Km 501-509 Geometric and Drainage Improvements Project (R.115628.001) and Deactivation of Former Alignments Km 501.05 To Km 508.80 Project (R.106984.001) 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 projects. 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.

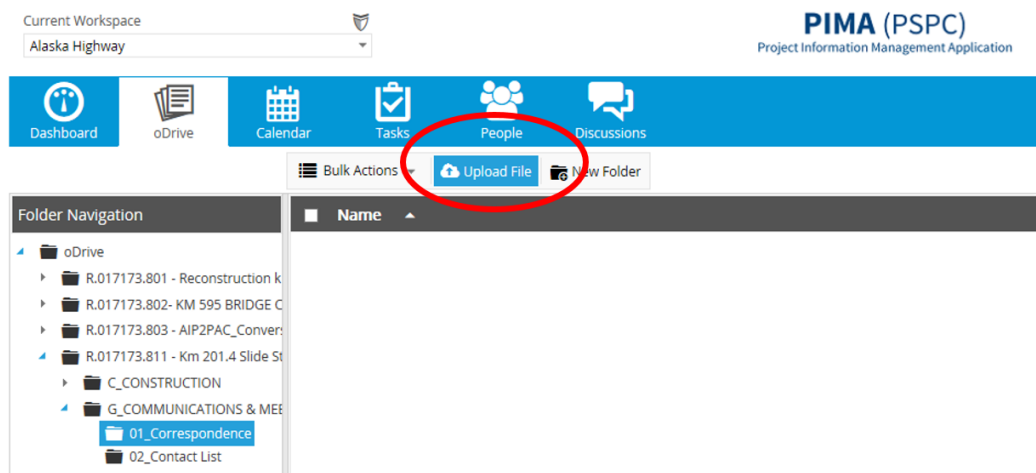
CentralCollab can be accessed at the following address: <https://app.centralcollab.com/>

The contractor is encouraged to have CentralCollab accounts for project team members who are involved with accessing or posting project documentation for both projects. 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.

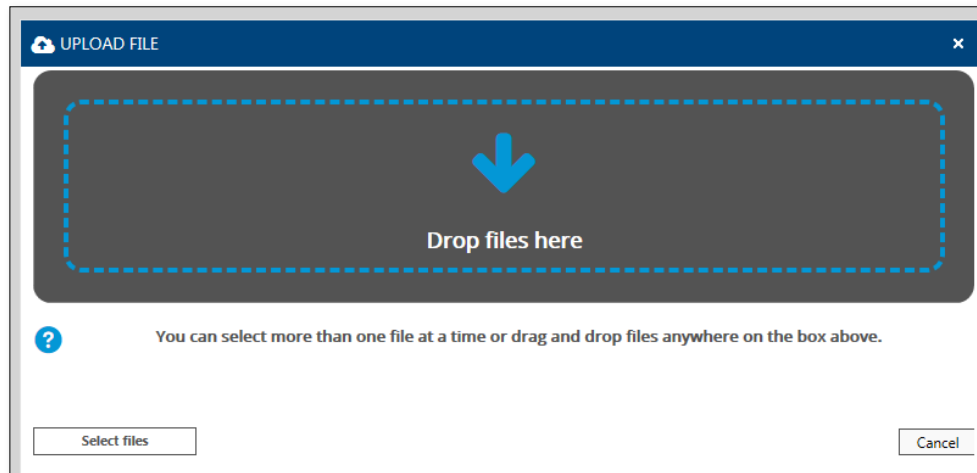
1 Uploading to CentralCollab

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**:

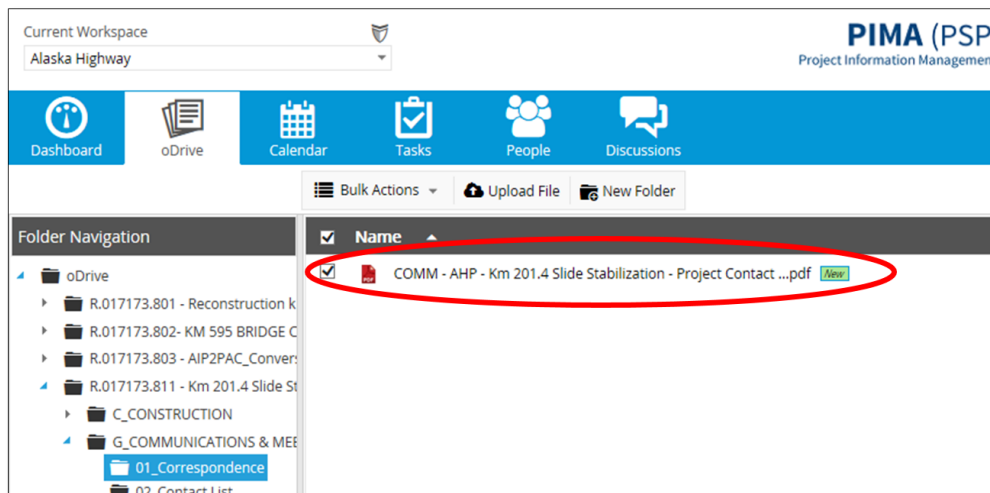


Drag and drop your document(s), then press Save.

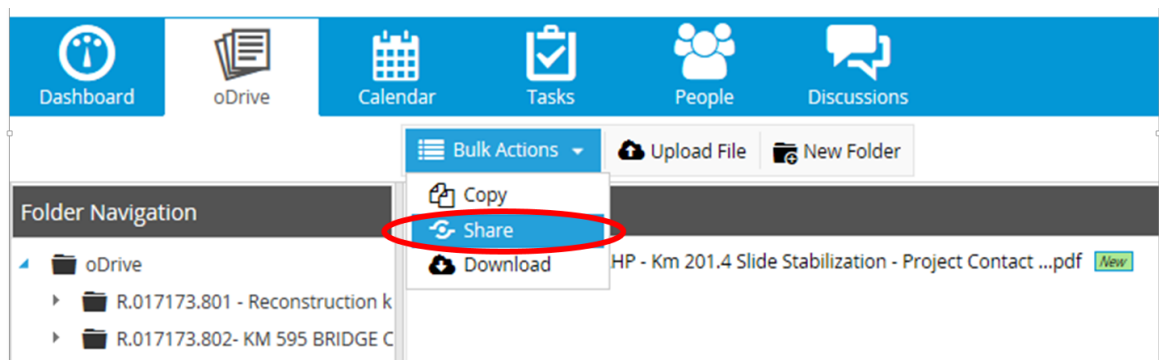
NOTE: Make sure you have named your document correctly, as explained in Section 2.2 CentralCollab File Naming Convention.



Once saved, you will see your new document (circled below), but no one else will be notified until you share it.

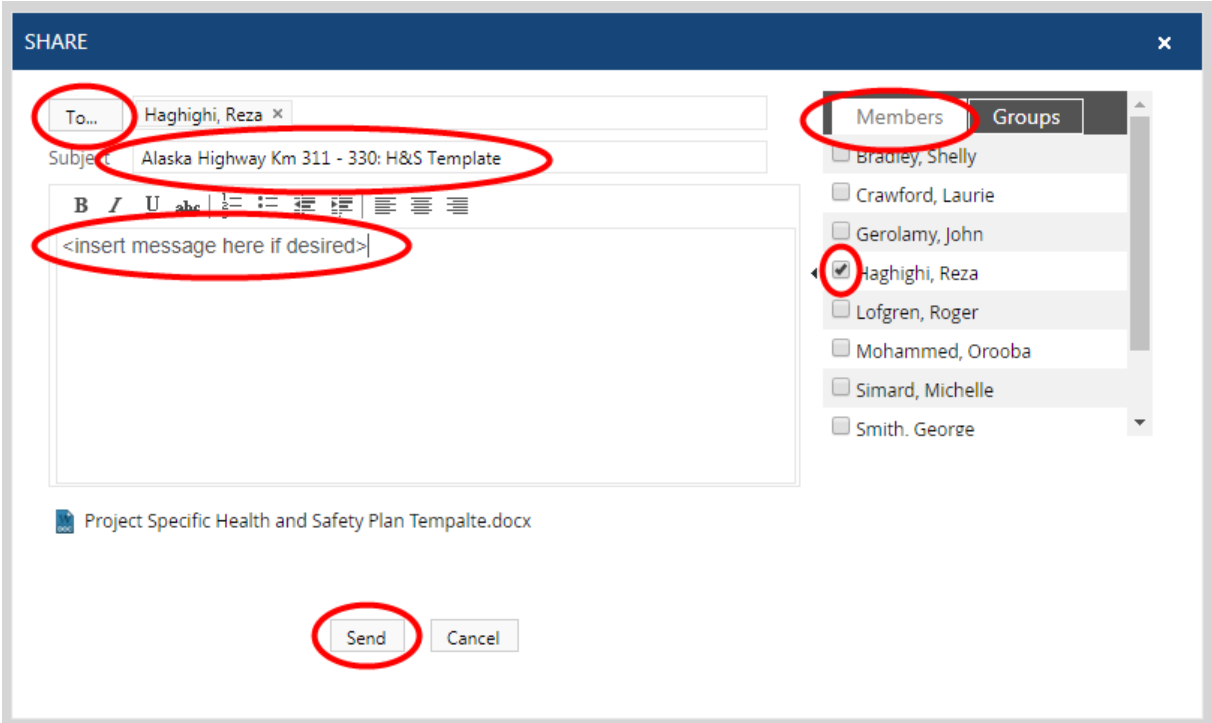


To notify members of the new document, check the box next to the document ✓ then click **Bulk Actions** > **Share** :

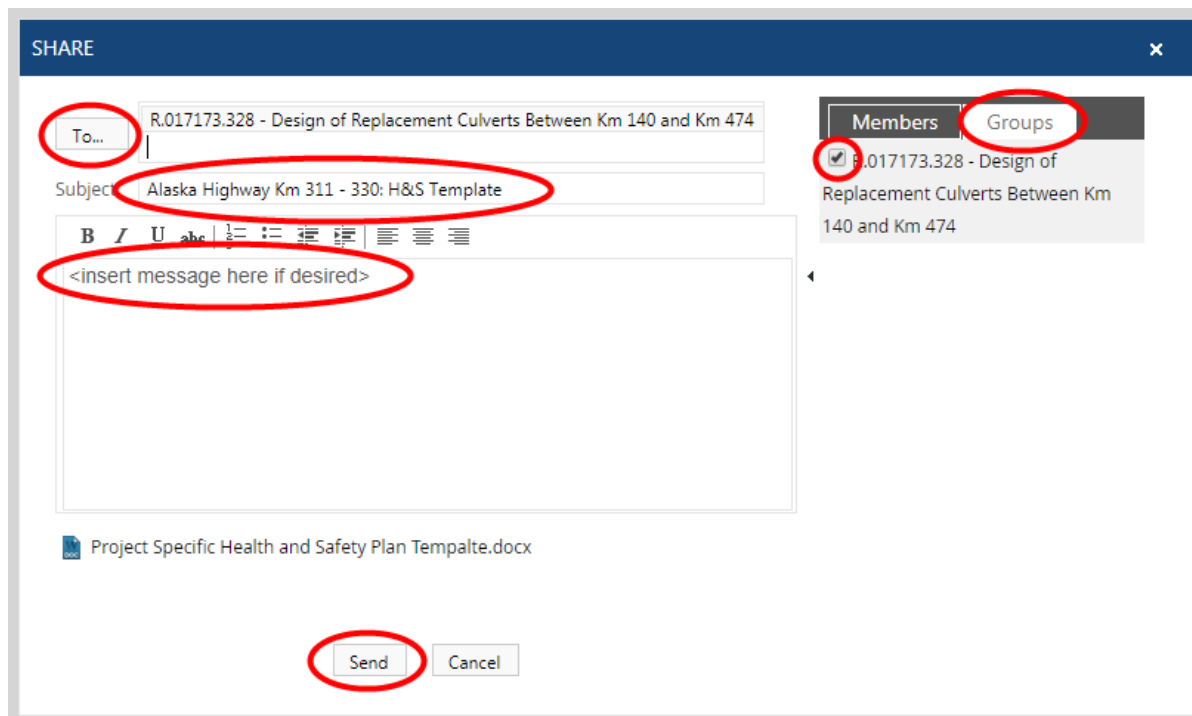


Once the new window opens, select **To**, and then select the **Members** tab and all Members from whom you wish to notify (as directed during the pre-construction meeting or otherwise by PSPC) or select the **Groups** tab and select the pre-set group:

Example – Notification Members:



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 501-509 Project (or Deactivation Km 501.05-508.80) – File Description or Document Name – YYYY MM DD

Example file names:

- Plan – AHP – Km 501-509 Project – Quality Management Plan – 2022 02 15
- Schedule – AHP – Km 501-509 Project – Project Schedule – 2022 02 20
- Finance – AHP – Deactivation Km 501.05-508.80 Project – Progress Payment 01 – 2022 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.115628.001 – Km 501-509 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
06_Change Orders	Change Orders (typically generated by PSPC)

Table 2: Common Document Filing / Folder Locations	
Folder Names	Description of Typical Documents
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
CentralCollab folder: R.115628.001 – Km 501-509 Project > G_COMMUNICATIONS & MEETINGS >	

Table 2: Common Document Filing / Folder Locations	
Folder Names	Description of Typical Documents
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.115628.001 – Km 501-509 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.

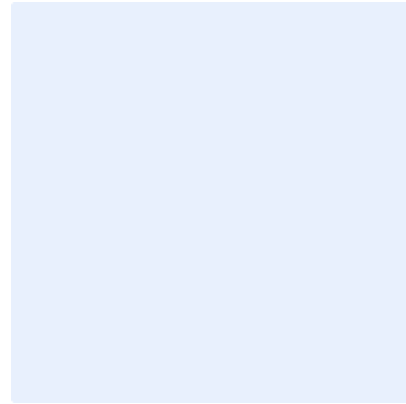
Example sub-folders:

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

R.115628.001, R.106984.001
Appendix B

Project Specific Health and Safety Plan Template

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.



<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.>

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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.>

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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

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<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

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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.>

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<Contractor>
<Date>

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12. Contractor's Team Review and Acceptance

This document has been prepared through discussions with the Contractor's entire project team <including sub-contractors (if applicable)>, and will be enforced by the contractor for the duration of the project. By signing this document, the signee confirms that they have reviewed the document and agree with its contents.

Project Manager

_____	_____	_____
Name	Signature	Date

Site Superintendent

_____	_____	_____
Name	Signature	Date

Health and Safety Manager

_____	_____	_____
Name	Signature	Date

Quality Control Manager

_____	_____	_____
Name	Signature	Date

<Major Sub-Contractor Representatives>

_____	_____	_____
Name	Signature	Date

<Major Sub-Contractor Representatives>

_____	_____	_____
Name	Signature	Date

Appendix 1: Preliminary Hazard Assessment Form



PRELIMINARY HAZARD ASSESSMENT FORM

Project Number:	R.115628.001		
Location:	Km 501-509 of the Alaska Highway, BC		
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>

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**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: Km 501-509 Geometric and Drainage Improvements, Alaska Highway, BC _____

Owner: Public Services and Procurement Canada

Contractor: _____

Consulting Engineer: Tetra Tech Canada Inc.

	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>

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

<Project Name>
<Contractor>
<Date>

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

<Project Name>
<Contractor>
<Date>

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

<Project Name>
<Contractor>
<Date>

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

<Project Name>
<Contractor>
<Date>

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

<Project Name>
<Contractor>
<Date>

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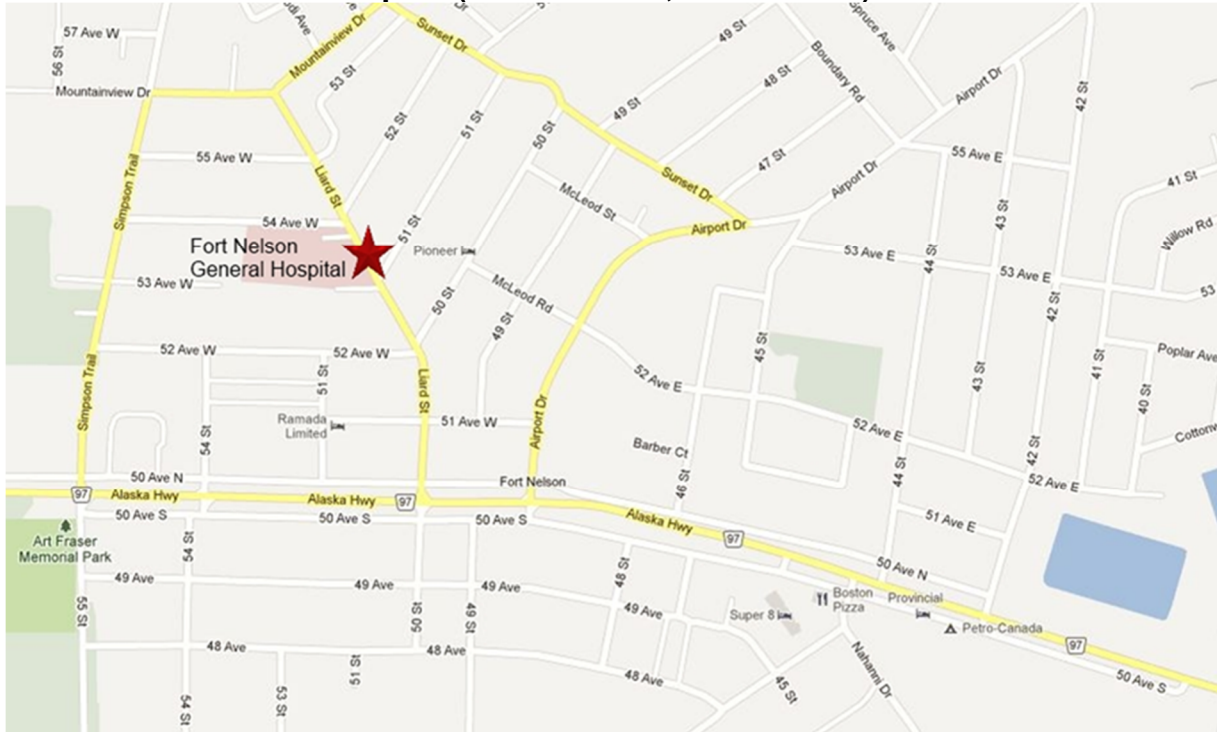
Appendix 8: Local Hospital Maps

<Project Name>
<Contractor>
<Date>

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<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>

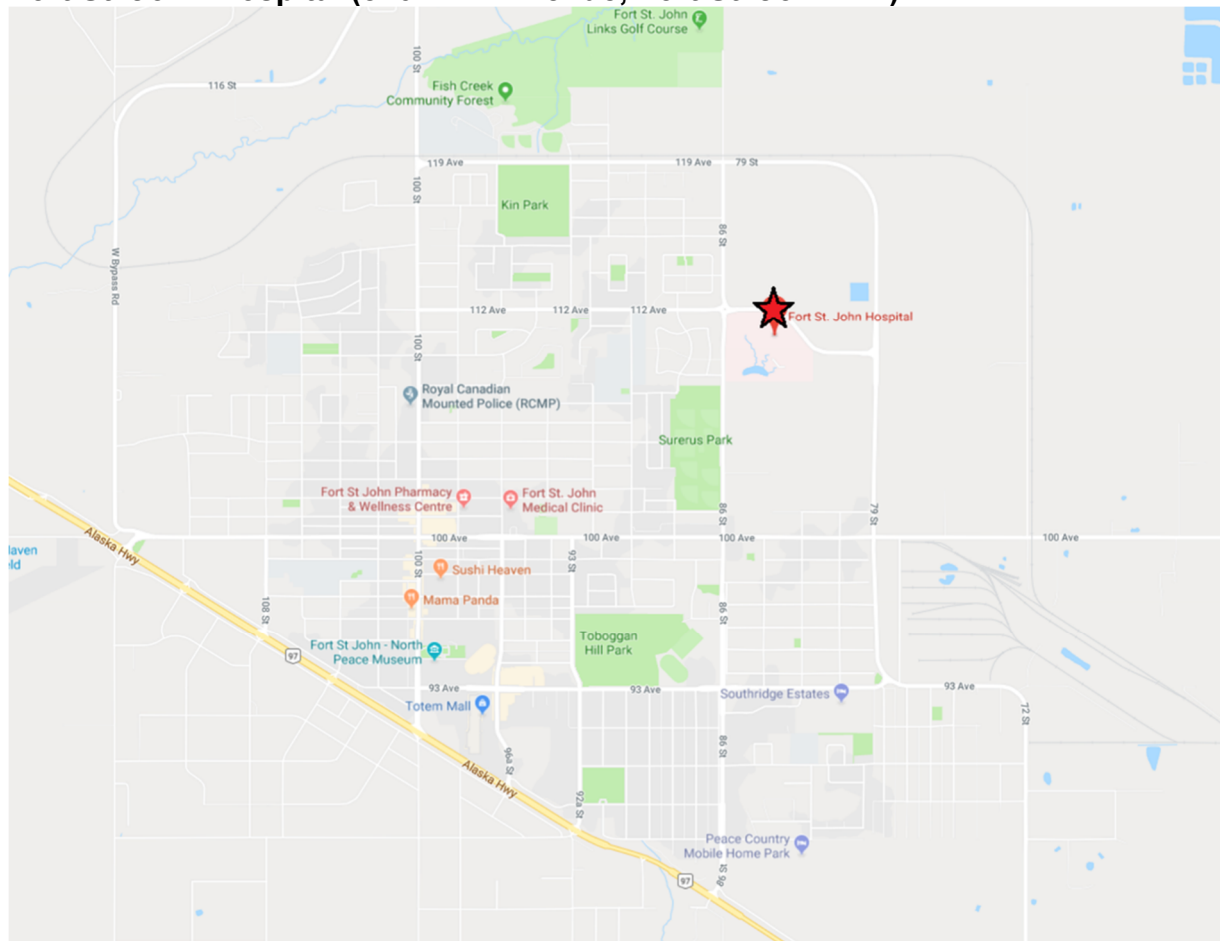
<Head Southbound on the Alaska Highway

Turn Left onto Liard St.>

<Project Name>
<Contractor>
<Date>

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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

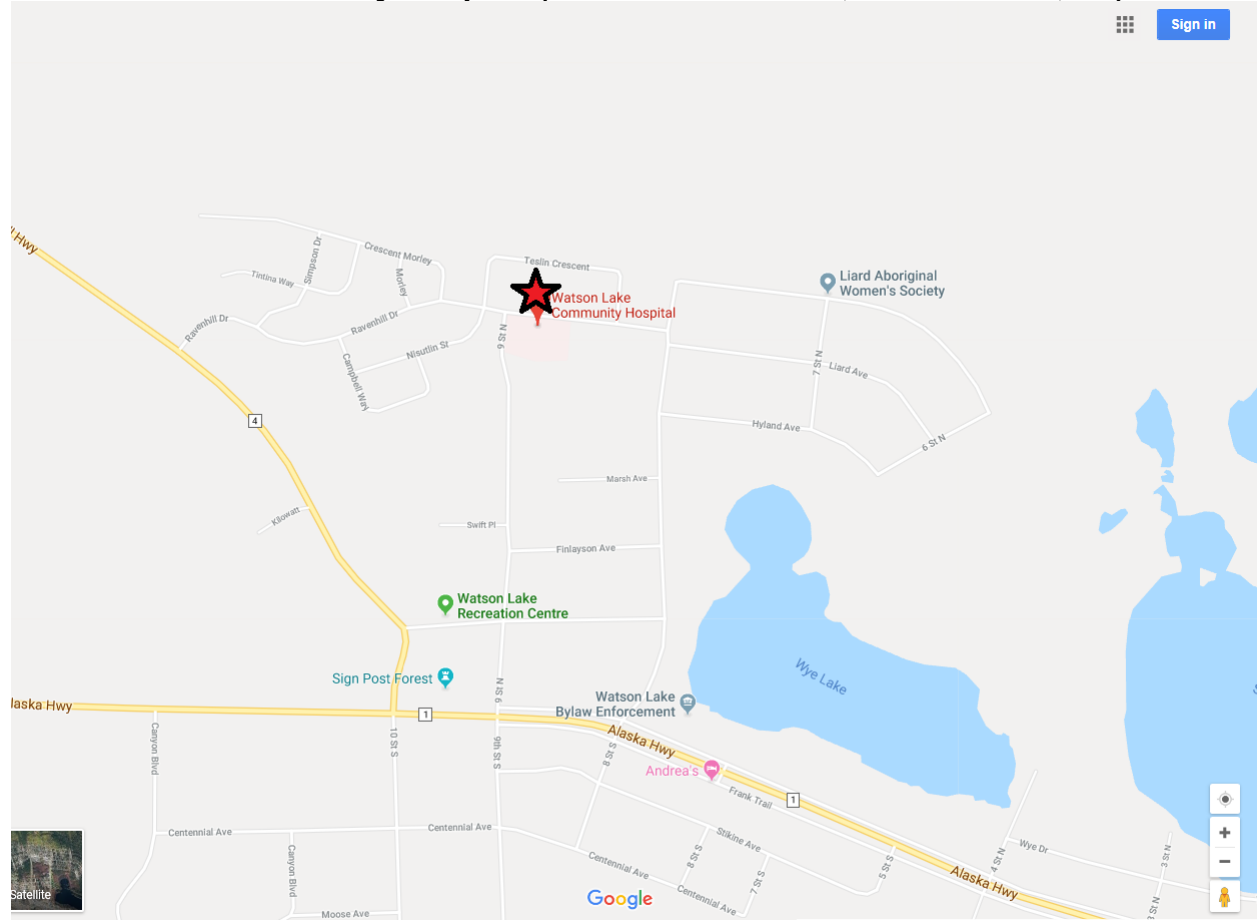
Turn Right toward Drop-off Loop

Continue straight onto Drop-off Loop

<Project Name>
<Contractor>
<Date>

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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>

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

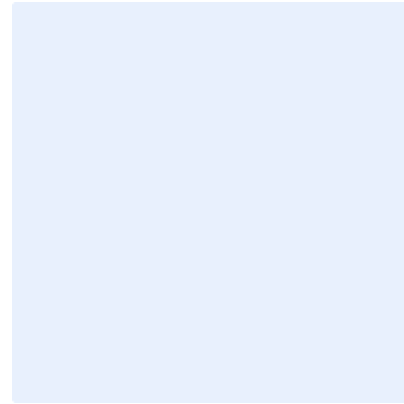
R.115628.001, R.106987.001

Appendix C

Category 2

Traffic Management Plan Template

Note: The Category 2 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.



<insert company logo/information>

Category 2 Traffic Management Plan

Km 501-509 Geometric and Drainage Improvements
and Deactivation of Former Alignments Km 501.05 To
Km 508.80, Alaska Highway, BC
R.115628.001, R106984.001

<Date>

Rev. <Number>

Prepared for:



Public Services and
Procurement Canada

Services publics et
Approvisionnement Canada

The Contractor shall ensure that this document is available on site to all workers for the project duration.

<This template is provided to aid the Contractor in preparing their traffic management plan according to the contract requirements. It is the responsibility of the Contractor to ensure that all required information is presented in their traffic management plan to meet the requirements of the project specifications and British Columbia Ministry of Transportation and Infrastructure's Traffic Management Manual for Work on Roadways – 2020 Edition. The Contractor shall review all aspects of this template and make changes and additions as needed to suit the project requirements.>

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- Appendix A Traffic Control Plan Drawings
- Appendix B Detour Traffic Control Plan Drawings
- Appendix C Daily Sign Check Form
- Appendix D DMS Message Library

<Project Name>
<Contractor>
<Date>

Traffic Management Plan
<Revision Number>

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 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	<p><Are signs installed for short-duration or long-duration work?></p> <p><Are the signs spaced in accordance with posted speed?></p> <p><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 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.></p> <p><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)?></p> <p>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.</p>

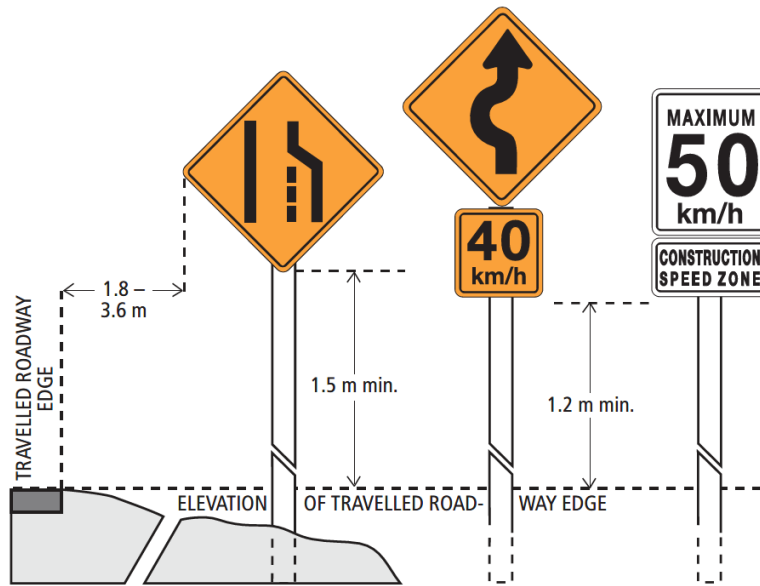


Figure 01: Post Mounted Supports



Figure 02: Wind Resistant Sign Stand

Flags will be used on the following signs:

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

	<p>.2 Survey Crew Ahead (C-003). .3 Crew Working Ahead (C-004). .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 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 (Item 3.2 – Traffic Management, subsection .1.5.3 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 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 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 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>
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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 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 Edition) for the applicable speed (adjust all other sign spacing as required).</p>

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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 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>

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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?>

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2.3 Drawing List

Below is a table summarizing the of drawing(s) showing the applicable traffic accommodation strategies which will be used during specific elements of the work.

<Include a table or list of each element of work on the project and the applicable traffic accommodation strategies and layout drawing(s) which will be used during that element of work throughout all project locations. The table or list of each element of work on the project shall also include the applicable traffic accommodation strategies and layout drawing(s) to be used during non-work hours.>

Traffic Control Drawing(s)	Corresponding Tender Drawing(s)	Project Location(s)	Construction Element(s)
<Drawing No.>	<Drawing No.>	<Station Range, ex.283+360 to 308+905>	<ex. ACP Placement, Rest Stop, Culvert Installation, etc.>

3. Incident Management Plan

The Incident Management Plan defines processes for responding to unplanned events or traffic incidents in the work zone so that incident response operations within the work site are managed effectively.

The Incident Management Plan requirements are partially determined by the project category (see Section 3.2: Traffic Management Plan Sub-Plans and Section 3.4: Traffic Management Plan Requirements by Category in the **Traffic Management Manual for Work on Roadways**).

Traffic Control Supervisor and Qualifications	<Name and qualifications.>
Traffic Control Manager and Qualifications	<Name and qualifications.>
Emergency Response Agencies and Contact Information	<Name and contact information (may be listed in Section 6: Contact List).>
Types of traffic incident that could occur within work zone	<Motor vehicle incident, motor vehicle incident with injuries, vehicle stalls, emergency vehicle transit of work zone, dangerous goods incident, wide load passing, etc.>
Procedures for responding to traffic incident that occurs within work zone	<Will there be a radio announcement?> <Who will evaluate the incident?> <Who will call 911?> <Will traffic be stopped, or will there be single lane alternating traffic?> <Who will assist the emergency responders through the site, and how?> <Who will assist if it is necessary to clear vehicles, and how?>
Procedures to restore traffic flow around incident site as quickly as possible	<How will traffic movement be restored?> <Will traffic control devices be used?> <If so, how?>
Procedures to clear incident and restore normal project traffic	<How will the incident be cleared to restore traffic movement?> <How many TCPs are required?>

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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>

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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 Edition) shall be included in the Traffic Management Plan and by undertaken / implemented by the Contractor prior to commencing work.

Process for routinely notifying PSPC of changes to scheduled work plans	<Who will be responsible for the changes?> <What is the person's title?>
Process for notifying travelling public of scheduled traffic delays and project duration	<Identify the forms of communication to be used [radio, project signs, Permanent Dynamic Message Signs), Portable Dynamic Message Signs, public meetings, etc.]>
Process for notifying travelling public of unscheduled traffic delays	<Identify the forms of communication to be used [project signs, Permanent Dynamic Message Signs, Portable Dynamic Message Signs, public meetings, etc.]>
Major user groups for alternating lane closures or road closures	<Identify the major user groups (BC Trucking Association, BC Transit, emergency response agencies, school districts, etc.).>

5. Implementation Plan

The Implementation Plan identifies responsibilities and procedures for ensuring that traffic management sub-plans are developed and implemented in a coordinated manner.

It identifies the qualifications, responsibilities, and duties of supervisory and management personnel responsible for implementing the Traffic Management Plan and includes the designation of a Traffic Control Manager and a Traffic Control Supervisor.

See also Section 3.2: Traffic Management Plan Sub-Plans and Section 3.4: Traffic Management Plan Requirements by Category in the Traffic Management Manual for Work on Roadways.

Traffic Control Manager and Responsibilities	<Name, qualifications, responsibilities, and duties.>
Traffic Control Supervisor and Responsibilities	<Name, qualifications, responsibilities, and duties.>
Person who will manage emergency traffic control operations	<Name and title.>
Person who will maintain daily traffic control logs	<Name and title.>
Person who will manage Incident Management Plan	<Name and title.>
Person who will manage Public Information Plan	<Name and title.>
Person who will monitor inactive work site	<Name, title, and responsibilities.>

6. Contact List

6.1 Emergency Response Agencies/Assistance

Agency/Assistance	Contact 1	Contact 2
RCMP	911	
Local Police – Fort Nelson (emergency)	250.774.2777	
Local Police – Fort Nelson (non-emergency)	250.774.2700	
Local Police – Fort St. John (emergency)	250.787.8100	
Local Police – Fort St. John (non-emergency)	250.787.8140	
Local Police – Watson Lake (emergency)	867.536.5555	
Local Police – Watson Lake (non-emergency)	867.536.2677	
BC Ambulance		
Ambulance – Fort Nelson	250.774.2344	
Ambulance – Fort St. John	250.785.5559	
Ambulance – Watson Lake	867.536.4444	
S.T.A.R.S Ambulance	1.888.888.4567	
Fire and Rescue		
Fire and Rescue – Fort St. John	250.785.4333	
Fire and Rescue – Fort Nelson (emergency)	250.774.2222	
Fire and Rescue – Fort Nelson (non-emergency)	250.774.3955	
Fire and Rescue – Watson Lake (emergency)	867.536.2222	
Fire and Rescue – Watson Lake (non-emergency)	867.536.8008	
BC Forest Fire Reporting	1.800.663.5555	*5555 (Cell)
Yukon Forest Fire Reporting	1.888.798.3473	
WorkSafeBC Work Site Emergency 24 hr.	1.888.621.7233	1.800.663.4630 250.785.1283 (Non-emergency)
HazMat 24 hr.	1.800.663.3456	
BC Environmental Provincial Emergency Program 24 hr.	1.800.663.3456	
BC Environmental Regional Office	250.787.3411	
BC Hydro – Power (Emergency) 24 hr.	911	1.800.224.9376 (Non-emergency)
Fortis BC – Natural Gas Emergencies 24 hr.	1.800.663.9911	
BC One Call	1.800.474.6886	*6868 (Cell)
Northwestel (Corporate Office Whitehorse)	1.867.668.5300	
Poison Control	1.800.567.8911	*311 (Cell)
Reporting Safety Violations 24 hr.	1.888.775.8785	
Peace River Regional Office	250.784.2363	

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Provincial Emergency Program (Ground Search & Rescue)	24 hr. 1.800.663.3456	
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	

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6.2 Prime Contactor's Contact Numbers

Name and Position	Office Number	Cell Phone Number
<Name>, Project Superintendent	<Contact #>	<Contact #>
<Name>, Health and Safety Coordinator	<Contact #>	<Contact #>
<Name>, First Aid Attendant(s)	<Contact #>	<Contact #>
<Name>, Traffic Control Supervisor	<Contact #>	<Contact #>
<Name>, Traffic Control Company	<Contact #>	<Contact #>
<Name>, Key Subcontractor Representatives	<Contact #>	<Contact #>

6.3 PSPC Contact Numbers

Name and Position	Office Number	Cell Phone Number
George Smith – Operations Manager, Alaska Highway	250.774.6956	250.321.0174 600.700.0131 (Satellite Phone)
<Name> – Onsite Inspection and QA Representative	<Contact #>	<Contact #>

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Appendix A: Traffic Control Plan Drawings

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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 Edition, traffic management shall be managed as one continuous work zone where the work is one kilometer apart or less.>

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Appendix B: Detour Traffic Control Plan Drawings

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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 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 Edition plus other messages anticipated to be required on the project.>

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Appendices

Km 501-509 Geometric and Drainage Improvements and Deactivation
of Former Alignments Km 501.05 To Km 508.80, Alaska Highway, BC
Project No. R.115628.001, R.106984.001

R.115628.001, R.106984.001
Appendix D

On-Site Construction Start-up Form



On-site Construction Start-up Form

Project Name:	Km 501-509 Geometric and Drainage Improvements and Deactivation of Former Alignments Km 501.05 To Km 508.80, Alaska Highway, BC
Project Number:	R.115628.001, R.106984.001
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: _____

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Appendices

Km 501-509 Geometric and Drainage Improvements and Deactivation
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Appendix E

Progress Payment Submittal Form



Progress Payment Submittal Form

Project Name:	
Progress Payment Number:	
Departmental Representative:	Ph:
Contractor:	
Contractor Representative:	Ph:

This form, completed and signed by the Contractor's Representative, shall be submitted with all documentation listed below for each progress payment request.

Upon receipt of this form and all documents, PSPC will commence review of the progress payment request in accordance with General Conditions 5 – Terms of Payment.

The list below is meant to be a guide and is not intended to be a comprehensive list of required submittal items for each progress payment. PSPC may request additional documentation not listed below.

Submission Item	Submitted	Comments
Progress Payment	<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"/>	
Measurement for Payment 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 501-509 Geometric and Drainage Improvements and Deactivation
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Appendix F

Measurement for Payment Survey Details Form



Measurement for Payment Survey Details Form

Project Name:	
Progress Payment Number:	

This form shall be submitted with the progress payment request form to identify how the surveyed quantities for specific line items were obtained.

<Note: remove the examples below and add lines as needed to provide details for every item included in the progress payment measured by survey. Provide individual entries for each task (ex: a line for gravel placed at rest stop A and a separate line for gravel placed at rest stop B). A progress payment line item may have more than one entry – the total entries for a particular line item shall equal the quantity shown on the progress payment)>

Progress Payment Line Item	Specification Defining Payment Requirements	Work Description	Claimed Quantity for Payment	File Name(s) (include point files and break line files names to be compared to compute quantity)	Additional Details
13	31 24 14	Excavation at Km 282 Rest Stop Sta. 282+020 to Sta. 282+070	1400 m ³	<ul style="list-style-type: none"> Km 282 Rest Stop – OG.csv Km 282 Rest Stop – OG Breaklines.dxf Km 282 Rest Stop – Bottom Excavation.csv Km 282 Rest Stop – Bottom Excavation Breaklines.dxf 	In the provided csv files the difference between the 2 surfaces “OG” and “As-built” is equal to 1400 m ³
14	32 11 19	Crushed Base Gravel at Km 282 Rest Stop Sta. 282+020 to Sta. 282+070	800 m ³	<ul style="list-style-type: none"> Km 282 Rest Stop – Bottom Excavation.csv” Km 282 Rest Stop – Bottom Excavation Breaklines.dxf Km 282 Rest Stop – As-Built Survey Data.csv Km 282 Rest Stop – As-Built Survey Breaklines.dxf 	In the provided csv files the difference between the 2 surfaces “OG” and “As-built” is equal to 800 m ³

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Appendices

Km 501-509 Geometric and Drainage Improvements and Deactivation
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Appendix G

General Contractor & Sub-Contractor
Construction Equipment List

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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.			

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Appendix I

**Responsibility Checklist for Authorizations / Approvals /
Notifications / Permitting**

Responsibility Checklist For Authorizations / Approvals / Notifications / Permitting

Project Title	Km 501-509 Geometric and Drainage Improvements and Deactivation of Former Alignments Km 501.05 To Km 508.80, 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 (ie. Contact Creek). http://www.tc.gc.ca/eng/marinesafety/oep-nwpp-minorworks-menu-1743.htm			
Indian and Northern Affairs Canada – Indian Act	Approval for activities on lands under their jurisdiction. This is addressed under the EA review process in most cases. If the project is exempt from an EA it must be addressed by the PM or ES personnel.			
Migratory Birds Convention Act (MBCA)	Environment Canada is responsible for implementing the Migratory Birds Convention Act , which provides for the protection of migratory birds through the Migratory Birds Regulations . This is addressed under the EA review process in most cases. If the project is exempt from and EA it must be addressed by the PM or ES personnel.			
ECMP	<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://wapwww.gov.bc.ca/habitat/fishprotectionact/	This Act was passed in 1997 and is reviewed as part of the Water Act under Section 11 when applying for approval.			
Ministry of Forests, Lands, Natural Resource Operations, and Rural Development	When completing projects such as quarry pits and new highway alignments, a request is put into the archaeological branch of MFLNSO via the			

<p>Archaeological http://www.for.gov.bc.ca/archaeology/requesting_archaeological_site_information/process_steps.htm Contact: Hayley Bond (250) 953-3343</p>	<p>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 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”.

http://www.env.gov.bc.ca/pasb/applications/process/scientific_fish_collect.html#a5

Contractor Responsibility

Federal

DFO – End of Pipe Guidelines

End-of- pipe guidelines for freshwater intake to avoid fish entrainment.

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Provincial

Water Act - MoE

Schedule A – Water License Applications – use of water from waterbody for road maintenance.

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R.115628.001, R.106984.001
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.115628.001
Appendix K

Km 501-509 Geometric and Drainage Improvements

Environmental Overview Assessment (EOA)

Environmental Management Plan (EMP)

Caribou Protection Plan (CPP)

Environmental Overview Assessment Geometric and Drainage Improvements KM 501+000 to KM 509+000, Alaska Highway, BC



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APPENDICES

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- Appendix B Environmental Management Plan
- Appendix C Species at Risk Search Results
- Appendix D Caribou Protection PPlan
- Appendix E Engineering Design Drawings
- Appendix F Preliminary Archaeological Assessment

ACRONYMS & ABBREVIATIONS

Acronyms/Abbreviations	Definition
AQHI	Air Quality Health Index
BC CDC	British Columbia Conservation Data Centre
BC MOE	Ministry of Environment and Climate Change Strategy
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
ECCC	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	Fresh Water Atlas
HADD	Harmful Alteration, Disruption or Destruction of Fish Habitat
MBCA	<i>Migratory Birds Convention Act</i>
NRRM	Northern Rockies Regional Municipality
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>
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 (PSPC) 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 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 are provided in Appendix A of this report.

1.0 INTRODUCTION

Tetra Tech Canada Inc. (Tetra Tech) was retained by Public Services and Procurement Canada (PSPC) to conduct and Environmental Overview Assessment (EOA) for planned geometric and drainage upgrades along an 8.0 km section of the existing Alaska Highway between KM 501.0 and KM 509.0 (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

2.1 Project Location

The Project is located east of Kledo Creek, approximately 40 km west of Fort Nelson, in northeast British Columbia. The Project area spans from KM 501+000 to KM 509+000 of the current Alaska Highway alignment (Figure 1). Sections of two former Alaska Highway alignments, that parallel the current alignment between Km 501-509, have been identified as a potential borrow source of gravel materials for use on the Project (Figure 1).

The majority of the Project will be occurring within PSPC’s current and deactivated transportation rights-of-way. At thirteen of the culvert replacement locations (Table 2-2) and at four locations along the interceptor ditch, Project works will be occurring beyond the current PSPC transportation right-of-way (ROW). PSPC is currently in the process of acquiring these lands from the Province to include within their ROW. Drawings showing the proposed ROW acquisition areas for the thirteen culverts are provided in Appendix E. The proposed acquisition areas for the interceptor ditch works beyond the current ROW are detailed below in Table 2-1.

Table 2-1. Station Ranges, Widths and Areas of the Interceptor Ditch Works Beyond the ROW

Station Range	Max Width (m)	Min Width (m)	Area (m2)
STA 500+950 to STA 500+970	2.61	0.86	28.83
STA 501+340 to STA 504+320	29.73	6.64	65,519.95
STA 504+440 to STA 507+890	21.22	3.18	47,676.32
STA 507+940 to STA 508+580	23.75	2.01	8,059.57

2.2 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.

The Alaska Highway between KM 501+000 and KM 509+000 will receive geometric and drainage improvements in preparation for future asphalt paving of the highway at this location. The geometric and drainage improvements will address existing safety concerns (i.e., traveled lane width and clear zone), increase drainage capacity, mitigate existing and future erosion issues, provide a more reliable highway infrastructure, improve safety for the travelling public, and reduce ongoing maintenance costs to PSPC. Engineering design options were developed in the “Preliminary Engineering Design Report, KM 501 to KM 509 of the Alaska Highway, BC” (Tetra Tech Canada 2018).

Tetra Tech presented the design options to PSPC in an Options Presentation with PSPC on November 4, 2019, and during several subsequent meetings. PSPC selected their preferred design options on November 5, 2020.

The anticipated construction activities are likely to include:

- Stripping of vegetation and organic soils, stockpiling of stripped materials for reuse as topsoil, and isolated tree clearing around the culvert inlets and outlets to facilitate construction;
- Shoulder widening to achieve a finished road top width of 10.7 m (currently < 10 m), including supply, placement and compaction of embankment, sub-base course and crushed base gravel. The former Alaska Highway roadbed adjacent to the site will be used as a source of embankment materials;
- Flattening the embankment side slopes to 3V:1H (currently steeper than 2-2.5H:1V);
- Completing drainage improvements (as detailed in Table 2-2), including:
 - Installation of five steel pipe culverts at existing drainages not serviced by an existing culvert sized to convey flows anticipated from a 100-year rainfall event;
 - Replacement of 10 existing Corrugated Steel Pipe (CSP) culverts with new, larger steel pipe culverts sized to convey flows anticipated from a 100-year rainfall event;
 - Extending one existing steel pipe liner;
 - Infilling old CSP culverts with grout; and
 - Installation of ditch blocks and erosion protection to mitigate erosion issues within the existing interceptor ditch;
- Relocating the existing interceptor ditch in locations it conflicts with the proposed highway embankment. The existing interceptor ditch will be infilled with Common Fill and a new ditch excavated further from the highway to the same invert elevation. See Figure 2 and Table 2-3 for specific locations;
- Signage installations and utility relocations; and
- Placing topsoil and hydroseeding all disturbed areas, riparian zones within the limits of construction.

Standard heavy equipment will be used throughout construction for various activities listed above. These may include excavators, dozers, trucks, graders, rollers, etc. The location and size of staging and laydown areas and construction material and debris stockpiles will be determined through detailed design phase of the Project. During construction, the Alaska Highway will remain fully operational with at least single-lane traffic maintained at all times.

Table 2-2: Proposed Culvert Installations / Replacements Between KM 501+00 and KM 509+00

Culvert ID	Highway Kilometer Mark	UTM Coordinates		Length (m)	Existing Diameter (mm)	Proposed Diameter (mm)	Construction Footprint ¹ (m ²)	ROW Acquisition
		Easting	Northing					
Proposed locations for installation of additional culverts								
Prop-1	501+401	475947	6525999	45.16	-	2000	1900	Y
Prop-2	502+244	475362	6525396	34.99	-	2000	1800	Y
Prop-3	504+344	474008	6523792	87.73	-	2900	3800	Y
Prop-4	505+226	473550	6523038	39.25	-	1600	2100	Y
Prop-5	507+118	472000	6522227	33.93	-	1400	1400	Y
Existing culverts requiring replacement (Install new and abandon existing)								
Ex-1	501+172	476144	6526116	33.18	600	600	1000	N
Ex-2	503+480	474564	6524452	39.94	1200	2400	1900	Y
Ex-3	504+025	474212	6524035	42.68	900	900	2400	Y
Ex-5	505+690	473309	6522641	46.16	1200	1400	1600	Y
Ex-6	505+937	473126	6522476	42.49	900	1400	1200	Y
Ex-7	506+360	472738	6522310	48.17	900	1200	2000	Y
Ex-8	506+538	472570	6522251	41.82	900	900	1800	Y
Ex-9	506+629	472485	6522219	36.22	900	900	1700	Y
Ex-10	507+645	471478	6522245	60.34	1200	2200	3000	Y
Ex-11	507+908	471245	6522129	47.28	900	1400	1600	N
Culverts requiring extension								
Ex-4	504+358	474000	6523780	83.95	900	900	1000	N

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.

Table 2-3: Proposed Ditch Infill and Reconstruction Locations

North Side of Highway				
Infill Start UTM Coordinate		Infill End UTM Coordinate		Approx. Length (m)
Easting	Northing	Easting	Northing	
476271.4	6526211.8	476140.2	6526130.5	154
475991.5	6526050.9	475712.8	6525832.0	354
475043.0	6525050.3	474815.1	6524782.6	352
474754.4	6524707.8	474661.0	6524597.7	144
474628.8	6524560.2	474546.2	6524463.9	127
474510.9	6524418.6	474169.7	6524015.5	528
474119.5	6523955.8	473930.0	6523709.4	312
473836.4	6523562.4	473153.3	6522518.6	1255
473046.0	6522449.8	472767.3	6522339.1	300
472713.9	6522321.2	472594.9	6522277.5	127
472551.5	6522261.6	472496.2	6522241.9	59
472447.3	6522227.8	471999.9	6522243.2	451

North Side of Highway				
Infill Start UTM Coordinate		Infill End UTM Coordinate		Approx. Length (m)
Easting	Northing	Easting	Northing	
South Side of Highway				
Infill Start UTM Coordinate		Infill End UTM Coordinate		Approx. Length (m)
Easting	Northing	Easting	Northing	
476041.6	6526037.4	476008.7	6526015.6	39
475908.6	6525942.7	475676.8	6525739.4	309
474940.7	6524865.8	474874.9	6524787.8	101
474596.5	6524458.7	474564.9	6524421.9	49
474263.0	6524062.3	474207.4	6523997.7	85
473829.8	6523486.0	473738.6	6523328.1	182
473617.9	6523120.6	473578.0	6523051.6	80
473244.2	6522548.6	472742.4	6522283.0	574

2.3 Project Schedule

PSPC anticipates the construction tender to be awarded to the successful Contractor in the September of 2021. Construction is expected to be completed over several months. The culvert works will be conducted in the Winter of 2021/22 and the highway widening and interceptor ditch work will be done during the summer of 2022.

3.0 RELEVANT ENVIRONMENTAL LEGISLATION

3.1 Provincial

3.1.1 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.

3.1.2 BC Water Sustainability Act

The BC *Water Sustainability Act* (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, wetland, 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 Project activities and recent experience with similar projects, Tetra Tech anticipates that 12 of the watercourses undergoing culvert replacement or installation works will require a *Notification*. Replacement of the three drainage culverts that are not associated with a mapped watercourse, will not require a Notification. Until the 45-day Notification period has passed without comment from FLNRORD, no Project works should be conducted on these watercourses.

The highway widening works, require that the interceptor ditch is relocated further into the highway ROW. As such, this Project will result in minor impacts to the wetland habitats directly adjacent to the road prism (Figure 3). Since wetlands meet the definition of a “stream” under the WSA, the infilling and relocation of the ditches further into the adjacent wetlands likely triggers a Change Approval.

3.1.3 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 3-1) 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 3-1: 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 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>)	Scentsless 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>)	

3.1.4 BC Environmental Management Act

The BC *Environmental Management Act* (EMA) was enacted in July 2004 and combined the *Waste Management Act* and *Environment Management Act*. The 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.

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.

3.1.5 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).

Known Heritage Resources have been investigated along the current highway alignment and at the adjacent decommissioning sites (Soriak – Tetra Tech Canada 2018). No archaeological sites have been identified near the Project; however, 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 (Appendix B).

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.

3.2 Federal

3.2.1 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* (Government of Canada 2019) came into force on August 28, 2019 and included 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 typical best management practices and mitigation (such as those detailed in the appended EMP [Appendix B]) are implemented. Therefore, no DFO Project Review or Authorization has been submitted.

3.2.2 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 SOMC 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 C). Should a SARA-listed species or any other rare species be identified on site prior to or during works, the Canadian Wildlife Service (CWS) 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.

Part of the current highway alignment passes through Boreal Caribou Critical Habitat (established in 2012). Special care should be taken in these areas and the Caribou Protection Plan implemented. Due to the already disturbed nature of the sites (i.e. mowed highway corridor), there will be no change to caribou habitat availability from direct impacts. The highway widening works will involve minor impacts to the wetland habitat directly adjacent to the highway prism; however, a change in caribou habitat availability is not expected. The PSPC right-of-way corridor is provincial crown land maintained and operated by the federal government. If a change in caribou habitat availability may occur, the Habitat Branch of FLNRORD should be notified to advise on the next steps and provide input on mitigating the potential impacts to caribou.

3.2.3 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 (ECCC).

3.2.4 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 Act 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.

4.0 METHODOLOGY

4.1 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 2020a);
- BC CDC Species and Ecosystems Explorer (BC CDC 2020b);
- BC Ministry of Environment and Climate Change Strategy (MOE) Fisheries Information Summary System (FISS) databases (BC MOE 2020a);
- BC MOE Habitat Wizard (BC MOE 2020b);
- 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 10 km search area was applied around each culvert to identify nearby watercourses and known occurrences of Species of Management Concern (SOMC), vegetation elements of management concern (VEMCs), and fish occurrences near to the Project area (Figure 2).

For the purposes of this EOA, sensitive fish species, VEMCs, and SOMCs were any species or ecosystems that met one or more of the following criteria:

- Present on the Red or Blue List in the provincial Species Ranking system (BC CDC 2020b);
- 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.

4.2 Field Assessment

Detailed biophysical field assessments were conducted by Tetra Tech field staff in June 2018 and July 2019. The surrounding wetland and vegetation communities present within the current highway ROW were characterized, and a list of identified vegetation species was compiled. All incidental wildlife observed during the biophysical field assessments were recorded.

Aquatic assessments were conducted at the 11 culvert replacement / extension locations following the methods outlined in the *Reconnaissance (1:20,000) Fish and Fish Habitat Inventory* (RIC 2001), modified for the scale of the project. Fish habitat data was not collected for Ex-1 because this watercourse was a dry, ephemeral drainage with no fish potential. The remaining ten culverted watercourses were assessed for a minimum length of 50 m upstream and 50 m downstream of the crossing location. 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. In addition, water quality measurements were taken at each site using a YSI water quality multimeter. When feasible, fish capture was conducted using a backpack electrofisher upstream and downstream of the culvert. At sites where water levels were too low, or there was no defined watercourse, fish capture was not conducted.

Field assessments were not conducted for the proposed culvert locations, with the exception of Prop-3 which is located on the same watercourse as Ex-4. A desktop study which included a review of government databases, photos, orthophotos and topography of the remaining four culvert locations were reviewed in the context of assessing if these proposed culverts would be solely conveying road run-off and seepage from the upland slopes or if they conveyed streams as defined by the *Water Sustainability Act*.

5.0 EXISTING CONDITIONS

The existing environment at the Project was characterized through a desktop study and field assessment. Photos from the field assessment are provided on Figure 2.

5.1 Air Quality and Noise

Air quality is typically determined by the concentrations of pollutants in the atmosphere which are 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 and Landforms

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 Regosolic soils (70%) developed on clay loam-textured parent material. The mode of deposition is alluvial and the main surface form is terraced with slopes of 1-3%. These mineral soils are well to moderately well drained.

5.3 Fish and Aquatic Habitat

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

5.3.1 Watercourse Information

The Project area is located just north of the confluence of Kledo Creek with the Muskwa River. While the Project does not directly cross either of these watercourses, 14 unnamed tributaries to Kledo Creek and the Muskwa River cross the KM 501 to KM 509 section of the highway (Figure 2). These are small headwater tributaries that provide water, food and nutrients to known fish-bearing waters downstream.

Eleven culvert replacements and five culvert installations are going to be conducted as part of the highway upgrade works. Three of the culvert locations (Ex-1, Ex-8 and Ex-9) are not located on mapped watercourses and are culverts that convey road run-off during rainy periods (Table 5-1). Of the 13 remaining culverts (existing or proposed) located on mapped watercourses, eight (8) are located on 1st or 2nd order watercourses with no 50K watershed code; and five (5) are located on 1st to 4th order watercourses that do have 50K watershed codes (Table 5-1). Note that Prop-3 and Ex-4 are located next to each other on the same watercourse. In total 12 mapped watercourses will be impacted by the Project.

Table 5-1: Watercourse Information Summary for the Culvert Installation and Replacement Works

Culvert ID	Stream Name/ Watershed Code 50K	Stream Info	Documented Fish Presence ¹
Prop-1	Unnamed Watercourse No 50K Watershed Code FWA ² Watershed Code: 200-692231-350733-577347-199676	1 st order watercourse that drains the land north of the highway. This watercourse joins with other small tributaries before flowing into the Muskwa River (4.7 km downstream).	No
Prop-2	Unnamed Watercourse No 50K Watershed Code FWA ² Watershed Code: 200-692231-350733-577347-202295	2 nd order watercourse that drains the land northwest of the highway. This watercourse joins with other small tributaries before flowing into the Muskwa River (3.8 km downstream).	No
Prop-3	Unnamed Watercourse 50K Watershed Code: 212-580800-20200-02800 (Same watercourse as Ex-4)	3 rd order watercourse that drains the land north of the highway. The confluence with Kledo Creek is 1.4 km downstream of the culvert.	No
Prop-4	Unnamed Watercourse No 50K Watershed Code FWA ² Watershed Code: 200-692231-350733-577347-208764-015315	1 st order watercourse that drains the land north of the highway. The confluence with Kledo Creek is 700 m downstream of the culvert.	No

Table 5-1: Watercourse Information Summary for the Culvert Installation and Replacement Works

Culvert ID	Stream Name/ Watershed Code 50K	Stream Info	Documented Fish Presence ¹
Prop-5	Unnamed Watercourse No 50K Watershed Code FWA ² Watershed Code: 200-692231-350733-577347-208764-034301	1 st order watercourse that drains the land north of the highway. The confluence with Kledo Creek is 600 m downstream of the culvert.	No
Ex-1	Not mapped in Provincial Databases	Drainage culvert that conveys seepage and road run-off during rainy periods.	No
Ex-2	Unnamed Watercourse 50K Watershed Code: 212-580800-20200-01300	2 nd order watercourse that drains the land northwest of the highway. This watercourse joins with other small tributaries before flowing into the Muskwa River (2.4 km downstream).	No
Ex-3	Unnamed Watercourse 50K Watershed Code: 212-580800-20200-02800-10800	1 st order watercourse that drains the land northwest of the highway. This watercourse joins with other small tributaries before flowing into the Kledo Creek (1.7 km downstream)	No
Ex-4	Unnamed Watercourse 50K Watershed Code: 212-580800-20200-02800 (Same watercourse as Prop-3)	3 rd order watercourse that drains the land north of the highway. The confluence with Kledo Creek is 1.4 km downstream of the culvert.	No
Ex-5	Unnamed Watercourse No 50K Watershed Code FWA ² Watershed Code: 200-692231-350733-577347-208764-015683	2 nd order watercourse that drains the land north of the highway. The confluence with Kledo Creek is 450 m downstream of the culvert.	No
Ex-6	Unnamed Watercourse No 50K Watershed Code FWA ² Watershed Code: 200-692231-350733-577347-208764-020994	1 st order watercourse that drains the land north of the highway. The confluence with Kledo Creek is 400 m downstream of the culvert.	No
Ex-7	Unnamed Watercourse No 50K Watershed Code FWA ² Watershed Code: 200-692231-350733-577347-208764-023742	1 st order watercourse that drains the land north of the highway. The confluence with Kledo Creek is 800 m downstream of the culvert.	No
Ex-8	Not mapped in Provincial Databases	Drainage culvert that conveys seepage and road run-off during rainy periods.	No
Ex-9	Not mapped in Provincial Databases	Drainage culvert that conveys seepage and road run-off during rainy periods.	No
Ex-10	Unnamed Watercourse 50K Watershed Code 212-580800-20200-05900	4 th order watercourse that drains the land north of the highway. The confluence with Kledo Creek is 1 km downstream of the culvert.	No
Ex-11	Unnamed Watercourse No 50K Watershed Code FWA ² Watershed Code: 200-692231-350733-577347-208764-044164-116045	2 nd order watercourse that drains the land north of the highway. The confluence with Kledo Creek is 1 km downstream of the culvert.	No

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

Each culvert identified in Table 5-1 conveys an unnamed watercourse from upstream peatlands (north) of the Highway towards Kledo Creek and the Muskwa River to the south. Kledo Creek (Watershed Code: 212-580800-20200) is a long (101.59 km), 6th order watercourse that flows into the Muskwa River, and is primarily fed from surrounding peatlands. The Muskwa River (Watershed Code: 212-580800) is a 396.38 km, 8th order watercourse that originates in the Northern Rocky Mountains and flows north-east into the Fort Nelson River. The confluence of each tributary with Kledo Creek or Muskwa River was not assessed and therefore it is unknown if fish obstacles are present between the Alaska Highway and the known fish-bearing watercourses. For those tributaries field assessed, each was assessed only at the highway crossing. No obstacles to fish passage are recorded in the provincial databases therefore fish species present downstream in Kledo Creek and/or Muskwa River have the potential to occur in the Project area. And, since each tributary is connected to fish-bearing waters and provide a source of water, food and nutrients to downstream fish habitat they are protected under the *Fisheries Act*.

5.3.2 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 Kledo Creek and the Muskwa River which are known fish-bearing streams. 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 5-2 and Figure 4 shows the location of each culvert and the surrounding watercourse network and documented fish occurrences within 5 km of the culvert locations.

Table 5-2: Fish Species Present in the Muskwa River and Kledo Creek

Common Name	Scientific Name	Muskwa River	Kledo Creek
Arctic Grayling	<i>Thymallus arcticus</i>	X	X
Bull Trout	<i>Salvelinus confluentus</i>	X	X
Burbot	<i>Lota lota</i>	X	X
Chum Salmon	<i>Oncorhynchus keta</i>	X	
Dolly Varden	<i>Salvelinus malma</i>	X	
Finescale Dace	<i>Chrosomus neogaeus</i>		X
Flathead Chub	<i>Platygobio gracilis</i>	X	X
Lake Chub	<i>Couesius plumbeus</i>	X	X
Inconnu	<i>Stenodus leucichthys</i>	X	
Longnose Dace	<i>Rhinichthys cataractae</i>	X	X
Longnose Sucker	<i>Catostomus catostomus</i>	X	X
Largescale Sucker	<i>Catostomus macrocheilus</i>	X	
Mountain Whitefish	<i>Prosopium williamsoni</i>	X	X
Northern Pike	<i>Esox lucius</i>	X	
Pearl Dace	<i>Margariscus nachtriebi</i>	X	X
Prickly Sculpin	<i>Cottus asper</i>	X	
Spoonhead Sculpin	<i>Cottus ricei</i>	X	
Torrent Sculpin	<i>Cottus rhotheus</i>	X	
Slimy Sculpin	<i>Cottus cognatus</i>	X	X
Walleye	<i>Sander vitreus</i>	X	
Trout-perch	<i>Percopsis omiscomaycus</i>	X	X
Finescale Dace	<i>Chrosomus neogaeus</i>	X	

Three of the species documented in Kledo Creek and the Muskwa River are either federally or provincially listed (Table 5-3). The habitat requirements for these species are described below.

Table 5-3: Federally and Provincially Listed Fish Species in Kledo Creek and the Muskwa River

Common Name	Scientific Name	COSEWIC Status	SARA Schedule	BC List
Bull Trout (Western Arctic populations)	<i>Salvelinus confluentus</i>	Special Concern	-	Blue
Pearl Dace	<i>Margariscus nachtriebi</i>	-	-	Blue
Inconnu	<i>Stenodus leucichthys</i>	-	-	Blue

5.3.2.1 Fish Capture Results

Electrofishing was conducted at 5 of the culverted watercourses (Ex-2, Ex-4, Ex-7, Ex-10, and Ex-11). No fish were captured during the electrofishing surveys. At sites where water levels were too low, or there was no defined watercourse, fish capture was not conducted.

5.3.3 Water Quality

Water quality measurements (Table 5-4) were collected at 10 of the culvert replacement locations; water quality was not assessed at EX-1 because it was a dry, ephemeral drainage.

Table 5-4: Water Quality at the Culvert Replacement Sites

Culvert ID	Temperature (°C)	Turbidity (NTU)	pH	Actual Conductivity (µS/cm)	Specific Conductivity (µS/cm)	Dissolved Oxygen (mg/L)
Ex-1	-	-	-	-	-	-
Ex-2	3	6.18	7.2	186.2	240.2	6.9
Ex-3	10.5	2.35	6.8	1172	1561	10.12
Ex-4 / Prop-3	14.1	48.4	7.21	256.6	342.1	7.84
Ex-5	9.7	6.59	6.29	89.4	126.1	7.16
Ex-6	9.3	2.16	6.47	117	167	6.83
Ex-7	9.1	7.01	6.49	97.3	139.6	6.88
Ex-8	10.5	11.19	6.17	92.3	128	5.25
Ex-9	14.7	7.06	6.4	102.4	127.4	2.66
Ex-10	6.9	12.26	6.47	106.5	162.7	9.61
Ex-11	8.3	9.6	6.22	79.8	117.2	8.86

All temperature measurements were within the acceptable range as per BC Approved Water Quality Guidelines (BC AWQG) for Water Quality (BC MOE 2019). The BC AWQG recommends mean weekly maximum temperatures (MWMT) for freshwater aquatic life based on species and life stages. No fish were caught in the fish capture program (Section 5.3.3) but all watercourses connect to known fish-bearing waters. In streams with unknown fish presence, the recommended MWMT is 18 °C and the maximum daily temperature is 19 °C.

BC AWQG guidelines for turbidity, an optical determination of water clarity, are based on acceptable changes from background levels. However, turbidity was generally very low at all of the culvert locations. Turbidity and water flow are informally related – high flows keep particles suspended, thus increasing turbidity. Because water quality measurements were collected in July, a low flow period, it is not unexpected that turbidity is low.

Natural freshwater in BC can range from a pH of 4.0 to a pH of 10.0 though the acceptable range, and the Canadian Council of Ministers of the Environment (CCME) (2018) guideline range, for pH for aquatic life are generally 6.5-9.0 (BC MELP 1998). pH values in EX-5 through EX-11 were slightly below the acceptable range.

Both specific and actual conductivity were measured in the field. Specific conductivity is measured at or corrected to 25°C whereas actual conductivity is the measurement recorded at the ambient temperature. Because temperature can affect conductivity readings, specific conductivity is the standardized reporting unit. Specific conductivity measurements were generally within the normal range: Natural waters can range from 50 µS/cm to 1,500 µS/cm; streams in British Columbia's interior have specific conductivity up to 500 µS/cm (BC MELP 1998). EX-3 had a specific conductivity reading slightly above the normal range at 1561 µS/cm.

The BC AWQG guideline for instantaneous minimum level dissolved oxygen (DO) is 5 mg/L for all stages of life other than buried embryo or alevin. DO levels of approximately 5 mg/L and above are considered adequate for fish although the tolerance range varies with species and temperature (Oram 2013). Levels below 3 mg/L are considered lethal for most aquatic organisms (Simon Research Group 2013). Persistently low DO concentrations could be limiting to aquatic life, especially at the sediment-water interface where benthic invertebrates would be found. Measured DO concentrations generally met the BC AWQG guideline at all culvert locations and were within a range that supports aquatic life. DO at Ex-9 was only 2.66 mg/L which is insufficient to support aquatic life. DO can fluctuate with temperature, salinity and pressure, can vary by season and depth and are affected by diffusion, aeration and biological activity such as photosynthesis, respiration and decomposition. It is not uncommon for DO to vary widely even within the same 24-hour period because of these factors.

5.3.4 Fish Habitat Assessment

Fish habitat was assessed at 10 of the culvert replacement locations along the highway alignment (Table 5-5). All assessed watercourses were small permanent or intermittent streams. Culvert EX-1 was not assessed for fish habitat because it was a dry, ephemeral drainage.

The *Fish Stream Crossing Guidebook* (BC MFLNRO, BC MOE and DFO 2012) notes that “marginal” habitat lacks spawning gravels, deep pools, undercut banks and stable debris and therefore contributes to low productive capacity. Alternatively, “important” habitat provides some suitable spawning gravels and rearing cover but is not considered critical because large amounts are available.

Based on field observations, habitat quality at most culvert locations was rated none to poor and is considered to be marginal (Table 5-5). Low flows, lack of instream cover and lack of suitable spawning substrates limits fish use of these watercourses. Channels are generally poorly defined with fine-dominated substrates. These watercourses may provide some rearing habitat for small bodies fish species, if water is present during summer months. Given the shallow depths, they do not likely provide over-wintering habitat as they would freeze to bottom. A number of the watercourses experienced poor connectivity with downstream fish-bearing watercourses due to poorly defined channels, steep gradients, high water velocities, or barriers to fish passage such as perched culverts. Comments on the specific conditions at each assessed watercourse are provided at the end of Table 5.5. At locations EX-4, EX-10 and EX-11, habitat was rated as moderate and could be considered important.

Table 5-5: Results of the Fish Habitat Assessments Conducted at 10 of the Culvert Replacement Locations

Culvert ID	EX-2	EX-3	EX-4 / Prop-3	EX-5	EX-6	EX-7	EX-8	EX-9	EX-10	EX-11
Channel Characteristics										
Gradient (%)	2	1	5-10	5	10	2	10	10	8	2-3
Avg Channel Width (m)	1.94	1.33	2.31	1.36	1.38	1.3	0.93	0.97	2.04	1.5
Avg Wetted Width (m)	2.26	1	2.61	1.36	1.38	1.3	0.93	0.93	2.45	1.4
Avg Water Depth (m)	0.31	0.32	0.44	0.21	0.24	0.21	0.14	0.2	0.34	0.24
Max Pool Depth (m)	-	-	-	-	-	-	-	-	0.63	0.5
Bankful (m)	1.14	-	1.34	1.05	0.95	1.69	2.1	0.95	0.95	0.63
Pattern	IR/SI	-	IR	-	IR/SI	IR	IR	IR/SI	IR	ME
IR= irregular; SI= sinuous; ME= meandering										
Morphology	Run, Flat, Riffle	-	Run, Flat, Riffle, Rapid, Cascade	Run, Flat, Riffle	Run, Flat, Riffle, Cascade	Run, Flat, Ruffle, Cascade	Run, Riffle, Cascade	Run, Flat, Pool, Riffle, Cascade	Run, Flat, Riffle, Cascade	Run, Flat, Pool
Crown Closure (%)	51-75	25-50	1-25	1-25	1-25	1-25	25-50	1-25	25-50	25-50
Substrates										
% Boulder	-	-	30	-	-	-	-	-	-	-
% Cobble	10	-	30	10	5	5	-	-	25	-
% Lg Gravel	30	-	20	20	10	10	25	40	50	10
% Sm Gravel	-	-	-	20	-	-	-	40	-	-
% Fines	60	100	10	50	85	85	75	20	25	90
Riparian Vegetation										
Rip. Veg	G,S	-	M	S,D,M	C,M	D,M	M	C,M	M	D,M
C= conifer; D= deciduous; G= grass; M= mixed; S=shrub										
Vegetation Stage	SHR,PS, YF	MF	MF	PS,MP	YF,MF	PS,YF, MF	MF	MF	MF	MF
INT= initial; MF = mature forest; PS= pole/sapling; SHR= shrub; YF= young forest										
Stream Cover										
SWD	M	N	M	M	M	T	M	M	A	M
LWD	M	N	M	M	M	T	T	M	M	M
Boulders	N	N	T	N	N	N	N	N	H,T	N
Undercuts	M	N	M	T	T	T	T	T	T	M
Deep Pool	T	M	M	N	N	N	N	N	T	T
Over Veg	M	M	M	M	M	M	M	M	M	M,A
In Veg	T	M	T	T	M,A	T	T	T	-	M
N= none; T= trace; M= moderate; A= abundant										
LWD Dist.	-	-	-	-	Even	Clumped	-	-	Even	-
Instream Veg	-	-	-	-	Emergent	Emergent	-	-	Emergent	None
Fund. LWD	-	-	-	-	Abundant	Few	Few	Few	Few	Few

Table 5-5: Results of the Fish Habitat Assessments Conducted at 10 of the Culvert Replacement Locations

Culvert ID	EX-2	EX-3	EX-4 / Prop-3	EX-5	EX-6	EX-7	EX-8	EX-9	EX-10	EX-11
Habitat Quality										
Spawning	P	P	M	P	P	P	P	P	M	P
Rearing	M	P	M	M	P	P	P	P	M	M
Over-wintering	P	P	M	P	P	P	P	P	M	P,M
Open water	L	N	L	N	N	N	N	N	-	L
Winter	N	N	N	N	N	N	N	N	-	N,L
Overall	<i>P</i>	<i>P</i>	<i>P,M</i>	<i>P</i>	<i>P</i>	<i>P</i>	<i>P</i>	<i>P</i>	<i>M</i>	<i>P,M</i>
N=none; P= poor; L= low; M= moderate;										
Overall Comments on Habitat Quality										
<p>EX-1 – Dry ephemeral drainage that was not assessed.</p> <p>EX-2 – Culvert is perched ~40 cm. The culvert drains a wetland area upstream with no defined channel. The channel downstream of the culvert has defined banks. The only fish that may occupy this watercourse are forage fish.</p> <p>EX-3 – This stream likely used to flow north-south, but now water flow is only possible south-north under wet conditions. Water on the north side of the highway is coming out of the drainage and then flowing west down the ditch. Culvert on north side has high elevation, so water pools at the inlet but can not pass through the culvert itself. The channel is now intermittent on south side of the highway. Ex-3 is draining into Ex-4 along ditch instead of flowing across the highway.</p> <p>EX-4 – Potential fish habitat is adequate at this location, but there is poor connectivity downstream to Kledo Creek due to high water velocity and steep gradient downstream of culvert.</p> <p>EX-5 – Downstream habitat is good but fish passage from Kledo creek upstream to site is impassible due to high velocity water and steep gradients. Upstream there is a poorly defined channel with no fish potential.</p> <p>EX-6 – This watercourse has poor connectivity to downstream watercourses because it has poor channel development, is very steep, and there are barriers from the old highway alignment. Fish passage unlikely. Upstream is muskeg with intermittent channel.</p> <p>EX-7 – No fish potential due to barriers downstream (i.e. perched culvert along former alignment), steep gradient and poor channel development. Culvert drains a wetland area upstream.</p> <p>EX-8 – Drains a wetland area upstream of the culvert, then becomes steep defined channel downstream. Likely very little flow usually. Unlikely to have fish due to limited channel development outside of the ROW.</p> <p>EX-9 – Most of the flow is coming from the ditch draining the upstream side of highway. Very low flow normally. There is no potential for fish habitat upstream of the culvert, and downstream is a steep ravine with poor channel development.</p> <p>EX-10 – The existing culvert is perched ~30 cm with deep scour pool at the outlet (barrier to fish passage upstream of culvert). Steep gradient/ravine downstream of culvert. Could have forage fish.</p> <p>EX-11 – Small stream that could have minnows, though none were captured. Water levels were high at the time of assessment due to recent rainfall, but this watercourse likely has low water levels with poor-quality habitat otherwise.</p>										

5.3.5 Wetlands

The Boreal White and Black Spruce Zone (BWBS) is largely dominated by wetlands, including peatlands (fens and bogs). Peatlands are expansive wetlands that have slow-moving water and develop deep layers of peat. Peatlands provide habitat for wildlife such as moose, beavers, and amphibians.

Wetlands within the Project were identified, classified, and delineated. The wetlands identified were classified according to the *Canadian Wetland Classification System* (Warner and Rubec 1997). Wetland classification is based on the developmental characteristics, surrounding landscape, vegetation communities, and amount of surface water present. The wetlands were assessed in their current state. The wetlands were delineated from recent aerial photos and the wetland sizes were calculated based on the delineation. There are seventeen wetlands that were delineated in the Project area (Figure 3 and Table 5-6).

Table 5-6: Wetlands within Project Area

Wetland ID	Wetland Location	Wetland Classification	Natural or Man-made	Wetland Size (ha) (within 500 m buffer around Project Area)
WL01	501+000 - 501+190 (northwest)	Fen	Natural	4.45
WL02	501+460 - 501+750 (northwest)	Fen	Natural	5.15
WL03	501+500 - 501+805 (southeast)	Fen	Natural	5.84
WL04	501+800 - 501+240 (northwest)	Fen	Natural	8.30
WL05	501+995 - 501+250 (southeast)	Fen	Natural	7.67
WL06	502+445 - 502+180 (northwest)	Fen	Natural	70.50
WL07	502+460 - 502+645 (southeast)	Fen	Natural	47.98
WL08	503+680 - 503+660 (southeast)	Fen	Natural	18.53
WL09	504+115 - 504+895 (northwest)	Fen	Natural	189.68
WL10	504+620 - 504+390 (southeast)	Fen	Natural	23.22
WL11	505+295 - 505+655 (southeast)	Fen	Natural	3.47
WL12	506+900 - 506+565 (southeast)	Fen	Natural	17.85
WL13	507+750 - 507+430 (southeast)	Fen	Natural	2.98
WL14	508+360 - 508+910 (southeast)	Fen	Natural	2.61
WL15	506+900 - 507+565 (southeast)	-	Natural	17.85
WL16	507+750 - 508+430 (southeast)	-	Natural	2.98
WL17	508+105 - 508+910 (southeast)	-	Natural	8.07

Several wetlands were also found on the former Alaska Highway alignment that was investigated for source construction material (Figure 3). The wetlands on the former alignment are highly influenced by beaver activity; beaver ponds have been created by holding back water along channels within forested areas and peatlands.

Through the widening of the highway and the relocation of the interceptor ditch, the Project will result in development within some wetland footprints; therefore, there will be direct effects to some of the wetlands. These impacts are expected to be minor given that these impacts will be maintained within the current maintained transportation ROW adjacent to the road prism, the drainage improvements will result in no net change to the hydrological conditions of the wetlands, and the only impacts to the wetland will be from the Project footprint itself. The activities that will impact the wetlands (i.e., the interceptor ditch works), will be reviewed by FLNRORD under a Change Approval.

Should any further effects be incurred to natural wetlands, approval per the Federal Policy on Wetland Conservation may be required from Environment and Climate Change Canada (ECCC). Canada's priority is to reduce loss of wetlands by first, avoiding; second, minimizing; and third, replacing for effects. If the wetlands cannot be avoided and effects to the wetlands are incurred during development of the Project, compensation/mitigation may be required.

5.4 Flora

The Biogeoclimatic Ecosystem Classification 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.

According to iMap BC, the Project site falls within the boreal white and black spruce (BWBS) biogeoclimatic zone. The BWBS zone is characterized by cold winters with little precipitation and short, warm summers. Ecosystems found in the BWBS zone are dominantly uplands forests and peatlands (Ministry of Forests 2018). In the northeast area of the BWBS, upland forest types are typically comprised of trembling aspen (*Populus tremuloides*) and white spruce (*Picea glauca*) mixed stands. The poorly-drained peatlands are dominated by black spruce (*Picea mariana*) and tamarack (*Larix laricina*), accompanied by sedges and brown mosses. Other common trees found in the BWBS zone include lodgepole pine (*Pinus contorta*) and balsam poplar (*Populus balsamifera*). Characteristic understory plants include soopolallie (*Shepherdia canadensis*), prickly rose (*Rosa acicularis*), highbush-cranberry (*Viburnum edule*), fireweed (*Epilobium angustifolium*), tall bluebells (*Mertensia paniculata*), bunchberry (*Cornus canadensis*), step moss (*Hylocomium splendens*), and red-stemmed feathermoss (*Pleurozium schreberi*) (DeLong et al. 2011).

5.4.1 Vegetation Species of Management Concern

The BC CDC Internet Mapping Tool indicated no known locations of VEMCs within 10 kilometers of the Project. The BC CDC Species and Ecosystem Explorer indicated 47 VEMCs (32 plant species and 15 ecological communities) with potential to occur in the vicinity of the Project (Tables 5-8 and 5-9). None of the VEMCs with potential to occur are listed under the SARA or COSEWIC.

Table 5-7: Provincially Listed Plant Species Potentially Present at or Near the Project Location

Common Name	Scientific Name	BC List
Not Given	<i>Amblyodon dealbatus</i>	Blue
Not Given	<i>Aulacomnium acuminatum</i>	Blue
smooth northern-rockcress	<i>Braya glabella</i> ssp. <i>glabella</i>	Red
Not Given	<i>Bryobrittonia longipes</i>	Blue
two-coloured sedge	<i>Carex bicolor</i>	Blue
Lapland sedge	<i>Carex lapponica</i>	Red
sand-dune wheatgrass	<i>Elymus lanceolatus</i> ssp. <i>psammophilus</i>	Blue
Not Given	<i>Encalypta mutica</i>	Blue
whitish rush	<i>Juncus triglumis</i> ssp. <i>albescens</i>	Blue
Yukon lupine	<i>Lupinus kuschei</i>	Blue
rusty wood-rush	<i>Luzula rufescens</i>	Red
Not Given	<i>Meesia longiseta</i>	Blue
Not Given	<i>Orthotrichum speciosum</i> var. <i>elegans</i>	Blue
Davis' locoweed	<i>Oxytropis campestris</i> var. <i>davisii</i>	Blue
Jordal's locoweed	<i>Oxytropis campestris</i> var. <i>jordalii</i>	Blue
Maydell's locoweed	<i>Oxytropis maydelliana</i>	Blue
Scamman's locoweed	<i>Oxytropis scammaniana</i>	Blue
Gorman's penstemon	<i>Penstemon gormanii</i>	Blue
arctic bladderpod	<i>Physaria arctica</i>	Blue
northern Jacob's-ladder	<i>Polemonium boreale</i>	Blue
meadow willow	<i>Salix petiolaris</i>	Blue
Raup's willow	<i>Salix raupii</i>	Red
common pitcher-plant	<i>Sarracenia purpurea</i> ssp. <i>purpurea</i>	Red
Not Given	<i>Schistidium pulchrum</i>	Blue
Not Given	<i>Schistidium trichodon</i>	Blue
Taimyr campion	<i>Silene ostenfeldii</i>	Blue
pink campion	<i>Silene repens</i>	Red
Not Given	<i>Splachnum vasculosum</i>	Blue
marsh fleabane	<i>Tephrosieris palustris</i>	Blue
Not Given	<i>Timmia norvegica</i>	Blue
ochroleucous bladderwort	<i>Utricularia ochroleuca</i>	Blue
Not Given	<i>Warnstorfia tundrae</i>	Red

Table 5-8: Provincially Listed Ecological Communities Potentially Present at or Near the Project Location

Common Name	Scientific Name	BC Listing
mountain alder / common horsetail	<i>Alnus incana</i> / <i>Equisetum arvense</i>	Blue
scrub birch / water sedge	<i>Betula nana</i> / <i>Carex aquatilis</i>	Blue
slender sedge / common hook-moss	<i>Carex lasiocarpa</i> / <i>Drepanocladus aduncus</i>	Blue
shore sedge - buckbean / hook-mosses	<i>Carex limosa</i> - <i>Menyanthes trifoliata</i> / <i>Drepanocladus</i> spp.	Blue
swamp horsetail - beaked sedge	<i>Equisetum fluviatile</i> - <i>Carex utriculata</i>	Blue
tamarack / scrub birch / buckbean	<i>Larix laricina</i> / <i>Betula nana</i> / <i>Menyanthes trifoliata</i>	Blue
tamarack / water sedge / golden fuzzy fen moss	<i>Larix laricina</i> / <i>Carex aquatilis</i> / <i>Tomentypnum nitens</i>	Blue
white spruce - subalpine fir / black huckleberry / red-stemmed feathermoss	<i>Picea glauca</i> - <i>Abies lasiocarpa</i> / <i>Vaccinium membranaceum</i> / <i>Pleurozium schreberi</i>	Blue
white spruce - black spruce / Labrador-tea / glow moss	<i>Picea glauca</i> - <i>Picea mariana</i> / <i>Rhododendron groenlandicum</i> / <i>Aulacomnium palustre</i>	Blue
white spruce / red swamp currant / horsetails	<i>Picea glauca</i> / <i>Ribes triste</i> / <i>Equisetum</i> spp.	Blue
black spruce / lingonberry / peat-mosses	<i>Picea mariana</i> / <i>Vaccinium vitis-idaea</i> / <i>Sphagnum</i> spp.	Blue
balsam poplar - white spruce / mountain alder - red-osier dogwood	<i>Populus balsamifera</i> - <i>Picea glauca</i> / <i>Alnus incana</i> - <i>Cornus stolonifera</i>	Blue
narrow-leaf willow Shrubland	<i>Salix exigua</i> Shrubland	Red
Pacific willow / red-osier dogwood / horsetails	<i>Salix lasiandra</i> var. <i>lasiandra</i> / <i>Cornus stolonifera</i> / <i>Equisetum</i> spp.	Red
tufted clubrush / golden star-moss	<i>Trichophorum cespitosum</i> / <i>Campylium stellatum</i>	Blue

During the 2019 field reconnaissance, plants typical of mixedwood forests, wetlands, disturbed areas and riparian zones were observed. Natural vegetation communities observed at the Project consisted primarily of mature mixedwood forest, wetlands, and disturbed sites. All vegetation communities were categorized into three vegetation management units (Figure 3; Table 5-9). One provincially regulated noxious species, perennial sow-thistle (*Sonchus arvensis*), was observed. A complete list of plant species observed during the field reconnaissance is included in Table 5-9, and photos of representative vegetation communities are shown on Figure 2.

Proposed Project activities will occur primarily within the existing cleared ROW of the Alaska Highway. However, some clearing of regenerated vegetation within the former highway alignment will be required for the gravel extraction activities. Regenerated vegetation within the former highway alignment mostly includes trembling aspen, balsam poplar, and low-lying native plants. The clearing of the regenerated vegetation within the former highway alignment is expected to be minimal. Vegetation communities within the current Alaska Highway ROW have largely regenerated with low-lying native plants. The current ROW is occasionally cleared of woody and/or tall vegetation.

Table 5-9: Field Observations of Flora Within the Project Area

Scientific Name	Common Name	Native/ Non-Native	Mixedwood	Wetland	Disturbed
<i>Achillea alpina</i>	Siberian yarrow	Native			X
<i>Achillea millefolium</i>	yarrow	Non-Native	X		
<i>Actaea rubra</i>	baneberry	Native	X		
<i>Alnus viridis ssp. crispa</i>	green alder	Native	X		X
<i>Amelanchier alnifolia</i>	saskatoon	Native	X		
<i>Andromeda polifolia</i>	bog-rosemary	Native		X	
<i>Aquilegia brevistyla</i>	blue columbine	Native	X		
<i>Aralia nudicaulis</i>	wild sarsaparilla	Native	X		
<i>Arctostaphylos uva-ursi</i>	kinnikinnick	Native	X		
<i>Astragalus alpinus</i> var. <i>alpinus</i>	alpine milk-vetch	Native		X	
<i>Astragalus canadensis</i> var. <i>canadensis</i>	Canadian milk-vetch	Native	X		
<i>Betula papyrifera</i>	paper birch	Native	X		
<i>Betula pumila</i> var. <i>glandulifera</i>	low birch	Native		X	
<i>Carex aenea</i>	bronze sedge	Native	X		
<i>Carex bebbii</i>	Bebb's sedge	Native		X	
<i>Carex canescens</i>	grey sedge	Native			X
<i>Carex capillaris</i>	hair-like sedge	Native	X		
<i>Carex disperma</i>	soft-leaved sedge	Native	X	X	
<i>Carex gynocrates</i>	yellow bog sedge	Native			X
<i>Carex hirta</i>	hairy sedge	Non-Native			
<i>Carex lasiocarpa</i>	slender sedge	Native			X
<i>Carex media</i>	Scandinavian sedge	Native	X		
<i>Chamerion angustifolium</i>	fireweed	Native	X		
<i>Cicuta maculata</i> var. <i>angustifolia</i>	spotted cowbane	Native			
<i>Cladonia chlorophaea</i>	granulating pixie-cup	Native	X		
<i>Comarum palustre</i>	marsh cinquefoil	Native	X		
<i>Cornus canadensis</i>	bunchberry	Native	X		
<i>Drepanocladus uncinatus</i>	sickle moss	Native		X	
<i>Eleocharis palustris</i>	common spike-rush	Native	X		
<i>Equisetum arvense</i>	common horsetail	Native	X	X	
<i>Equisetum hyemale</i> ssp. <i>affine</i>	scouring-rush	Native		X	
<i>Equisetum scirpoides</i>	dwarf scouring-rush	Native		X	
<i>Equisetum sylvaticum</i>	wood horsetail	Native		X	
<i>Eriophorum</i> spp.	Cotton-grass spp.	Native			
<i>Eriophorum vaginatum</i>	sheathed cotton-grass	Native		X	
<i>Fragaria virginiana</i> ssp. <i>glauca</i>	wild strawberry	Native	X		
<i>Galium boreale</i>	northern bedstraw	Native	X		

Table 5-9: Field Observations of Flora Within the Project Area

Scientific Name	Common Name	Native/ Non-Native	Mixedwood	Wetland	Disturbed
<i>Hedysarum alpinum</i>	alpine hedysarum	Native	X		
<i>Larix laricina</i>	tamarack	Native		X	
<i>Lathyrus ochroleucus</i>	creamy peavine	Native	X		
<i>Linnaea borealis</i> ssp. <i>longiflora</i>	twinflower	Native	X		
<i>Luzula parviflora</i> ssp. <i>parviflora</i>	small-flowered wood-rush	Native		X	
<i>Medicago sativa</i>	alfalfa	Non-Native	X		
<i>Mellilotus officinalis</i>	yellow sweet-clover	Non-Native	X		
<i>Mertensia paniculata</i> var. <i>paniculata</i>	tall bluebells	Native	X		
<i>Mitella nuda</i>	common mitrewort	Native	X		
<i>Moehringia lateriflora</i>	blunt-leaved sandwort	Native	X		
<i>Myrrhis odorata</i>	sweet cicely	Non-Native	X		
<i>Nymphaea tetragona</i>	pygmy waterlily	Native		X	
<i>Orthilia secunda</i>	one-sided wintergreen	Native	X		
<i>Pedicularis labradorica</i>	Labrador lousewort	Native		X	
<i>Petasites frigidus</i> var. <i>palmatus</i>	sweet coltsfoot	Native		X	
<i>Picea glauca</i>	white spruce	Native	X		
<i>Picea mariana</i>	black spruce	Native		X	
<i>Poa palustris</i>	fowl bluegrass	Native	X		
<i>Populus tremuloides</i>	trembling aspen	Native	X		
<i>Pyrola asarifolia</i>	pink wintergreen	Native	X		
<i>Ranunculus gmelinii</i>	small yellow water-buttercup	Native		X	
<i>Rhododendron groenlandicum</i>	Labrador tea	Native		X	
<i>Ribes glandulosum</i>	skunk currant	Native		X	
<i>Ribes hudsonianum</i> var. <i>hudsonianum</i>	northern blackcurrant	Native	X		
<i>Ribes oxycanthoides</i> ssp. <i>oxycanthoides</i>	northern gooseberry	Native	X		
<i>Rosa acicularis</i> ssp. <i>sayi</i>	prickly rose	Native	X		
<i>Rubus chamaemorus</i>	cloudberry	Native		X	
<i>Rubus idaeus</i> ssp. <i>strigosus</i>	red raspberry	Native	X		
<i>Rubus pubescens</i>	dwarf red raspberry	Native	X		
<i>Salix</i> species	willow species	Native	X		
<i>Scirpus microcarpus</i>	small-flowered bulrush	Native			X
<i>Shagnum</i> species	sphagnum	Native		X	
<i>Shepherdia canadensis</i>	soopolallie	Native	X		
<i>Sonchus arvensis</i>	perennial sow-thistle	Non-Native	X		
<i>Sphagnum riparium</i>	shore-growing peat moss	Native		X	
<i>Stellaria longifolia</i>	long-leaved starwort	Native		X	

Table 5-9: Field Observations of Flora Within the Project Area

Scientific Name	Common Name	Native/ Non-Native	Mixedwood	Wetland	Disturbed
<i>Symphotrichum puniceum</i> var. <i>puniceum</i>	purple-stemmed aster	Native	X		
<i>Taraxacum officinale</i>	common dandelion	Non-Native	X		
<i>Trifolium hybridum</i>	alsike clover	Non-Native			
<i>Trifolium pratense</i>	red clover	Non-Native	X		
<i>Vaccinium oxycoccos</i>	bog cranberry	Native		X	
<i>Vaccinium uliginosum</i>	bog blueberry	Native		X	
<i>Viburnum edule</i>	highbush-cranberry	Native	X		
<i>Vicia americana</i>	American vetch	Native	X		
<i>Viola canadensis</i> var. <i>rugulosa</i>	Canada violet	Native	X		

5.5 Fauna

Common wildlife found within the Project area include American Black Bear (*Ursus americana*), Grey Wolf (*Canis lupus*), Coyote (*Canis latrans*), Canada Lynx (*Lynx canadensis*), Northwestern Moose (*Alces americanus*), Rocky Mountain Elk (*Cervus elaphus*), caribou (*Rangifer tarandus*), and American beaver (*Castor canadensis*). 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 (*Lithobates sylvaticus*), Boreal Chorus Frog (*Pseudacris maculata*), and Western Toad (*Anaxyrus boreas*) are commonly found in wetlands and moist upland habitats. The forested areas provide habitat for several songbirds 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 2019 field reconnaissance, several wildlife species and wildlife sign were observed within the Project area; however, no nests were observed at the Project. A list of wildlife species and sign observed at the Project during the field reconnaissance is included in Table 5-10 below.

Table 5-10: Field Observations of Fauna within the Project Area

Common Name	Latin Name	Type of Observation	Notes
Wood Frog	<i>Lithobates sylvaticus</i>	Visual	
Pileated Woodpecker	<i>Dryocopus pileatus</i>	Audio	
White-throated Sparrow	<i>Zonotrichia albicollis</i>	Audio	
American Robin	<i>Turdus migratorius</i>	Audio	
Common Raven	<i>Corvus corax</i>	Visual	
Black-capped Chickadee	<i>Poecile atricapillus</i>	Audio	
Canada Jay	<i>Perisoreus canadensis</i>	Audio	
Ovenbird	<i>Seiurus aurocapilla</i>	Audio	
Yellow-rumped Warbler	<i>Setophaga coronata</i>	Visual	
Tennessee Warbler	<i>Oreothlypis peregrina</i>	Audio	
Blue Jay	<i>Cyanocitta cristata</i>	Audio	
Ruffed Grouse	<i>Bonasa umbellus</i>	Visual	Hen and chicks
Grouse sp.	Grouse sp.	Scat	
Snowshoe Hare	<i>Lepus americanus</i>	Visual	
Vole sp.	Vole sp.	Visual	
Rocky Mountain Elk	<i>Cervus elaphus ssp. nelsoni</i>	Tracks, Elk Kill	
Northwestern Moose	<i>Alces americanus ssp. andersoni</i>	Visual, tracks, and scat	Young bull moose
Bear spp.	<i>Ursus spp.</i>	Tracks and scat	
Mule Deer or White-tailed Deer	<i>Odocoileus spp.</i>	Scat	
Common Muskrat	<i>Ondatra zibethicus</i>	Tracks	
Grey Wolf	<i>Canis lupus</i>	Scat and tracks	
American Beaver	<i>Castor canadensis</i>	Active beaver lodge and beaver dam	
Coyote or Red Fox	<i>Canis latrans</i> or <i>Vulpes vulpes</i>	Scat	

5.5.1 Wildlife Species of Management Concern

The Species and Ecosystems Explorer search revealed 35 potential wildlife SOMC (1 amphibian, 14 birds, 8 mammals, and 12 invertebrates) that could be found in the BWBS zone of the NRRM (Appendix C). Of these species, 1 amphibian, 13 birds, all 8 mammals and 6 invertebrates have the potential to be present in or near to the Project (Table 5-11).

The CDC Internet Mapping tool search revealed that 5 wildlife SOMC (3 birds and 2 mammals [Figure 4]) have been observed within 10 km of the Project. These wildlife species were ranked as having a high potential for presence at the Project area because they have been previously observed near or at the Project.

Table 5-11: Wildlife Species of Management Concern with Potential to Occur at or Near the Project

Common Name	Scientific Name	COSEWIC	SARA	BC List	Potential for Presence in Project Area
Amphibians					
Western Toad	<i>Anaxyrus boreas</i>	Special Concern	Special Concern	Yellow	Moderate – wetlands, streams, and mixedwood forests are present.
Mammals					
Wood Bison	<i>Bos bison athabascaae</i>	Special Concern	Threatened	Red	None – herds only occur north and west of the Project.
Caribou (boreal population)	<i>Rangifer tarandus</i> pop. 14	Threatened	Threatened	Red	High – known occurrences within a 10 km radius of the Project (BC CDC 2018b). Wetlands and riparian habitats nearby.
Caribou (northern mountain population)	<i>Rangifer tarandus</i> pop. 15	Special Concern	Special Concern	Blue	High – known occurrences within a 10 km radius of the Project (BC CDC 2018b). Wetlands and riparian habitats nearby.
Wolverine	<i>Gulo gulo luscus</i>	Special Concern	Special Concern	Blue	Low – mixedwood forest, wetlands and riparian habitats nearby (occasional use).
Fisher	<i>Pekania pennanti</i>	-	-	Blue	Moderate – mixedwood forest, wetlands and riparian habitats nearby.
Grizzly Bear	<i>Ursus arctos</i>	Special Concern	Special Concern	Blue	Moderate – mixedwood forest, streams, wetlands and riparian habitats nearby.
Little Brown Myotis	<i>Myotis lucifugus</i>	Endangered	Endangered	Yellow	Moderate – mixedwood forest and riparian habitats nearby.
Northern Myotis	<i>Myotis septentrionalis</i>	Endangered	Endangered	Blue	High – known occurrences within a 10 km radius of the Project (BC CDC 2018b). Streams and riparian habitats nearby.
Canada Warbler	<i>Cardellina canadensis</i>	Threatened	Threatened	Blue	High – known occurrences within a 10 km radius of the Project (BC CDC 2018b). Mixedwood forest and riparian habitats nearby.
Birds					
Common Nighthawk	<i>Chordeiles minor</i>	Special Concern	Threatened	Yellow	Moderate – mixedwood forest, wetlands, and streams nearby.
Olive-sided Flycatcher	<i>Contopus cooperi</i>	Special Concern	Threatened	Blue	Low – mixedwood forest, wetland and riparian habitats nearby.
Evening Grosbeak	<i>Coccothraustes vespertinus</i>	Special Concern	-	Yellow	Moderate – mixedwood forest and riparian habitats nearby.
Rusty Blackbird	<i>Euphagus carolinus</i>	Special Concern	Special Concern	Blue	Moderate – wetlands and mixedwood forest nearby.
Barn Swallow	<i>Hirundo rustica</i>	Threatened	Threatened	Blue	Moderate – wetlands, streams, mixedwood forest and riparian habitats nearby.

Table 5-11: Wildlife Species of Management Concern with Potential to Occur at or Near the Project

Common Name	Scientific Name	COSEWIC	SARA	BC List	Potential for Presence in Project Area
Upland Sandpiper	<i>Bartramia longicauda</i>	-	-	Red	None – no suitable habitats nearby.
Broad-winged Hawk	<i>Buteo platypterus</i>	-	-	Blue	Moderate – mixed wood forests with aspen nearby.
Gyr Falcon	<i>Falco rusticolus</i>	Not At Risk	-	Blue	Moderate – wetland and streams nearby.
Connecticut Warbler	<i>Oporornis agilis</i>	-	-	Blue	Moderate – mixedwood, spruce and tamarack bogs, and riparian habitats nearby
Surf Scoter	<i>Melanitta perspicillata</i>	-	-	Blue	Moderate – migratory route, riparian habitats nearby
Bay-breasted Warbler	<i>Setophaga castanea</i>	-	-	Red	High – known occurrences within a 10 km radius of the Project (BC CDC 2018b). Mixedwood forest and riparian habitats nearby.
Cape May Warbler	<i>Setophaga tigrina</i>	-	-	Blue	High – known occurrences within a 10 km radius of the Project (BC CDC 2018b). Mixedwood forest and riparian habitats nearby.
Black-throated Green Warbler	<i>Setophaga virens</i>	-	-	Blue	Moderate – mixedwood forest and riparian habitats nearby.
Invertebrates					
Mt. McKinley Alpine	<i>Erebia mackinleyensis</i>	-	-	Red	None – no suitable habitats nearby.
Yellow-dotted Alpine	<i>Erebia pawloskii</i>	-	-	Red	None – no suitable habitats nearby.
Philip's Arctic	<i>Oeneis philipi</i>	-	-	Red	Low – wetland habitats nearby; disjunct occurrence in BC.
Plains Forktail	<i>Ischnura damula</i>	-	-	Red	None – no suitable habitat nearby. Only found in BC at the Liard Hotsprings.
Bronze Copper	<i>Lycaena hyllus</i>	-	-	Blue	Moderate – wetland and riparian habitats nearby
Tawny Crescent	<i>Phyciodes batesii</i>	-	-	Blue	None – no suitable habitats nearby.
Thicklip Rams-horn	<i>Planorbula armigera</i>	-	-	Red	Moderate – Found in slow flowing water, streams nearby.
Cranberry Blue	<i>Plebejus optilete</i>	-	-	Blue	Moderate – Wetland habitats nearby.
Hotwater Physa	<i>Physella wrighti</i>	Endangered	Endangered	Red	None – no suitable habitats nearby.
Eastern Pine Elfin	<i>Callophrys niphon</i>	-	-	Red	None – No suitable habitats nearby.
River Jewelwing	<i>Calopteryx aequabilis</i>	-	-	Blue	Low – known occurrences in southern part of BC
Kennedy's Emerald	<i>Somatochlora kennedyi</i>	-	-	Blue	Moderate – wetland and riparian habitats nearby

Grizzly Bear

Grizzly Bears (*Ursus arctos*) are present across most of northern British Columbia and are known to occur near Fort Nelson. Suitable foraging habitat exists along the vegetated portion of the cleared highway ROW. Although no records are available on Grizzly Bear in the Project area, they likely occur infrequently due to overall low density of grizzly bears.

Woodland Caribou

The Project is within the range of Woodland Caribou (*Rangifer tarandus*), and there is high potential for both the blue-listed northern mountain ecotype (pop. 15) and red-listed boreal ecotype (pop. 14) to be present within the Project area (Figure 4). The Muskwa Herd (northern mountain ecotype) occupies the west side of the Project area and the Parker Herd (boreal ecotype) is found to the east and south of the Project area. Caribou from both herds likely occur infrequently along the highway, especially in winter when lower elevation habitats are used more for foraging (COSEWIC 2014).

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). Boreal caribou are non-migratory and can be found at low-elevations in muskegs, peatlands and black spruce forests. Female boreal caribou calve in undisturbed swamps and wetlands and disturbance to these calving habitats can be highly detrimental to population numbers due to the site fidelity shown by reproducing females. Regardless of ecotype, 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 15th to July 15th) as a critical timing window for caribou and the fall rut (September 15th to January 14th) has been identified as a cautionary timing window (FLNRORD 2014).

Part of the current highway alignment passes through Boreal Caribou Critical Habitat (established in 2012). Special care should be taken in these areas and the Caribou Protection Plan implemented. Due to the already disturbed nature of the sites (i.e. mowed highway corridor), there will be no change to caribou habitat availability from direct impacts. The highway widening works will involve minor impacts to the wetland habitat directly adjacent to the highway prism; however, a change in caribou habitat availability is not expected. The PSPC right-of-way corridor is provincial crown land maintained and operated by the federal government. If a change in caribou habitat availability may occur, the Habitat Branch of FLNRORD should be notified to advise on the next steps and provide input on mitigating the potential impacts to caribou.

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 D).

Northern Myotis

The CDC Internet Mapping tool search showed one occurrence of Northern Myotis (*Myotis septentrionalis*) within 10 km of the Project area (Figure 4). The Northern Myotis is provincially blue-listed and designated as endangered under SARA. This bat species is an obligate user of caves as both night roosts and as hibernacula from early fall to spring. Northern Myotis are often associated with old-growth forests, where they rely on the intact interior forest habitat for summer day roosting and foraging habitat and as nursery sites to rear their young. They are opportunistic insectivores and are known to forage on a wide variety of insects (BC CDC 2014).

Canada Warbler

Two occurrences of Canada Warbler (*Cardellina canadensis*) were found within 10 km of the Project area (Figure 4). The Canada Warbler is provincially blue-listed and designated as threatened under SARA. This warbler is a neotropical migrant, breeding in Canada's boreal forests and over-wintering in the foothills and mountains of northern South America. Breeding habitat in northeastern BC consists of deciduous and mixed wood forests with a good shrub layer and abundant woody debris. This complex understory provides cover for their nests which they build on or near the ground under shrubs, logs or in cavities. Three to five eggs are laid between May and June (BC CDC 2009).

Cape May Warbler

One occurrence of the provincially blue-listed Cape May Warbler (*Setophaga tigrine*) was found within 10 km of the Project area (Figure 4). This warbler over-winters primarily in mature tropical forests of the Bahamas and Greater Antilles, migrating north to breed in conifer forests located between northeastern BC and Nova Scotia. They construct their nests at the top of mature conifers, usually spruce or fir with a clutch of 4-9 eggs laid in June. During the breeding season, they forage primarily on invertebrates and show large population increases during infestations of spruce-budworm (BC CDC 1990).

Bay-breasted Warbler

One occurrence of the provincially red-listed Bay-breasted Warbler (*Setophaga castanea*) was detected within 10 km of the Project area (Figure 4). This warbler over-winters in Panama and northern Columbia, migrating north to breed in boreal coniferous forests (and occasionally second growth or deciduous forests) located between northeastern BC and Nova Scotia. They construct their nests on horizontal tree branches, usually up to 6 m from the ground. A clutch of 3-7 eggs is laid in June and reproduction increases during years of spruce-budworm infestations. Throughout the breeding season they forage primarily on insects found on trees or captured midair (BC CDC 1994).

5.6 Cultural Resources

Cultural resources are summarized in the Preliminary Archaeological Assessment memo (Appendix F) prepared by Soriak Consulting and Research Ltd. and Tetra Tech for PSPC (Soriak – Tetra Tech Canada 2018).

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 B) has been prepared for the Project and includes a summary of Project-specific environmental considerations. 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, 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 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, excavations, pipe jacking, minor channel realignment immediately at the culvert inlets and outlets, gravel extractions at borrow locations along former alignment).</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 (ESC) measures specific to each Project site. General ESC 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 at the gravel borrow locations along the former alignment and within the Alaska Highway ROW around culvert inlets and outlets.

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

Potential Effect	Interaction	Suggested Mitigation	Residual Effect	Comment
Soil contamination.	Accidental spill or release of deleterious substances: <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). 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. 	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).
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 ESC 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.

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

Potential Effect	Interaction	Suggested Mitigation	Residual Effect	Comment
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.
Disturbance or destruction of vegetation.	Project activities (e.g. 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. 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 current or former transportation ROW with minimal vegetation clearing anticipated. Disturbed areas will be seeded at an appropriate time (e.g., spring) with an approved mix to discourage weed growth and facilitate natural revegetation. 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. Western Toad may breed in aquatic habitats at the Project site and may be affected if suitable habitats are disturbed during the toad breeding season (April to July).	<ul style="list-style-type: none"> If Western Toad are observed in the construction area, the area must be isolated and a wildlife salvage must take place to relocate the toads to appropriate habitat upstream of the construction site. This Project occurs entirely within Caribou range, some of which is in Boreal Caribou Critical Habitat. The contractor must implement the Caribou Protection Plan throughout the Project to avoid impacts to caribou or their habitats (Appendix D). 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. Measures to reduce the potential for an accidental spill of a harmful substance should be implemented (see <i>Soils</i>, above). 	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.		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.		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.

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

Potential Effect	Interaction	Suggested Mitigation	Residual Effect	Comment
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.
Fish and Fish Habitat				
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"> Project works are expected to be conducted during frozen, low flow periods or dry conditions which reduces potential for sediment contributions to the watercourse. If there is flow in the watercourse, 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"> Conduct works in the dry. If flows are present, then work site isolation would be required. (see Appendix E for environmental staging drawings). Isolation activities 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 in downstream watercourses, the least risk window is July 15 to August 15. Since construction is planned for Winter 2021/2022 and Summer 2022, Tetra Tech understands that the culvert replacements/installations and potentially, some of the interceptor ditch relocation activities are planned 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 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"> The majority of Project works are not anticipated to result in permanent changes to habitat quality or quantity. Disturbances will be temporary and will likely occur during frozen, low flow or dry conditions. Existing failing or perched culverts (Ex-2 and Ex-10) will be replaced with new culverts that will facilitate fish passage. Regulatory requirements associated with the infilling of the interceptor ditch will be determined by FLNRORD. Installation of new culverts to improve and emulate the natural hydrology between wetlands intersected by the Alaska highway will likely improve the condition of the wetlands.
Cultural Resources				
Disturbance of Archaeological resources	Unknown Archaeological resources or sites may be damaged or disturbed by construction activities that require ground disturbance.	<ul style="list-style-type: none"> 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. 	Archaeological sites may be disturbed.	<ul style="list-style-type: none"> No known archaeological sites have been documented within the Project Area.

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 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.VHWY03116-01
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Prepared by:
Elyse Hofs, B.Sc., Dipl.T.
Environmental Technologist
Environment and Water Practice
Direct Line: 778.945.5724
Elyse.Hofs@tetrattech.com


FILE: 704-TRN.VHWY03116-01
FILE: 704-TRN.VHWY03116-01
FILE: 704-TRN.VHWY03116-01


Prepared by:
Cameron Kulak, B.Sc., R.P.Bio.
Biologist
Environment and Water Practice
Direct Line: 778.945.5760
Cameron.Kulak@tetrattech.com


FILE: 704-TRN.VHWY03116-01
FILE: 704-TRN.VHWY03116-01
FILE: 704-TRN.VHWY03116-01

Prepared by:
Tara Bodeux, B.Sc., R.T.Ag., BIT
Biologist
Environment and Water Practice
Direct Line: 778.945.5815
Tara.Bodeux@tetrattech.com


FILE: 704-TRN.VHWY03116-01
FILE: 704-TRN.VHWY03116-01
FILE: 704-TRN.VHWY03116-01

Reviewed by:
Jeff Matheson, M.Sc., R.P.Bio.
Senior Biologist
Environment and Water Practice
Direct Line: 604.608.8908
Jeff.Matheson@tetrattech.com


FILE: 704-TRN.VHWY03116-01
FILE: 704-TRN.VHWY03116-01
FILE: 704-TRN.VHWY03116-01

Reviewed by:
Nigel Cavanagh, M.Sc., R.P.Bio.
Senior Aquatic Biologist
Environment and Water Practice
Direct Line: 250.756.2256
Nigel.Cavanagh@tetrattech.com

/sy

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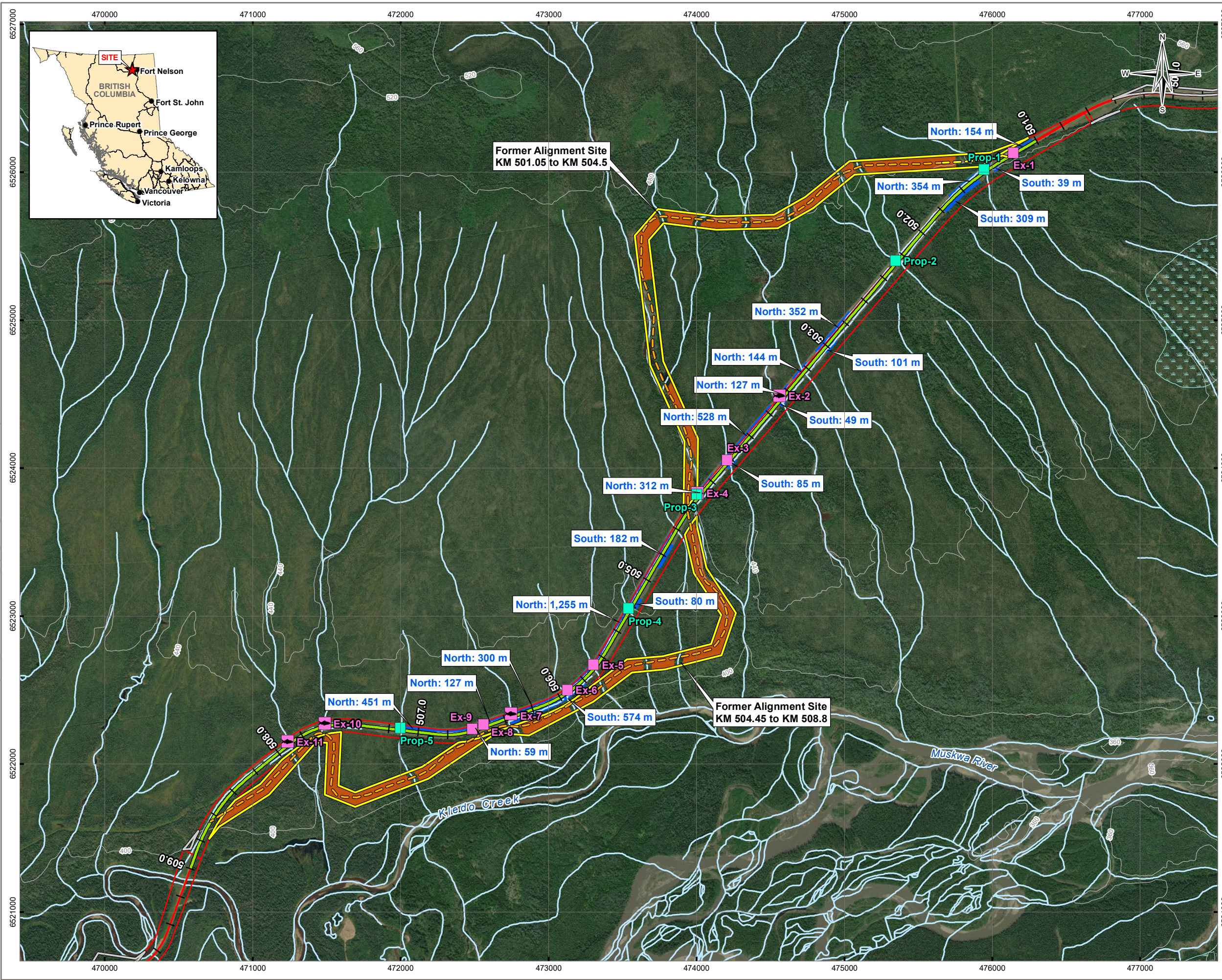
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FIGURES

- Figure 1 Site Location
- Figure 2 Field Results
- Figure 3 Ecosites
- Figure 4 Conservation Data Centre Occurrences and Known Fish Observations

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LEGEND

- Existing Culvert and Fish Capture Location
- Existing Culvert
- Proposed Culvert
- Ditch Infill Location
- Proposed Borrow Area for Gravel
- Current Alaska Highway Alignment**
- Current Alignment - KM 501-509
- Current Alaska Highway
- Current Alaska Highway ROW
- Former Alaska Highway Alignment**
- 2-Wheel Drive Access
- Limited Vehicle Access
- Former Alaska Highway ROW - KM 501-509
- Former Alaska Highway ROW - Other Site
- Base Features**
- Contour (40 m)
- Watercourse
- Waterbody
- Wetland

NOTES
 Base data source:
 CanVec 1:50,000.
 Imagery from ESRI; Maxar (2018/2019).

STATUS
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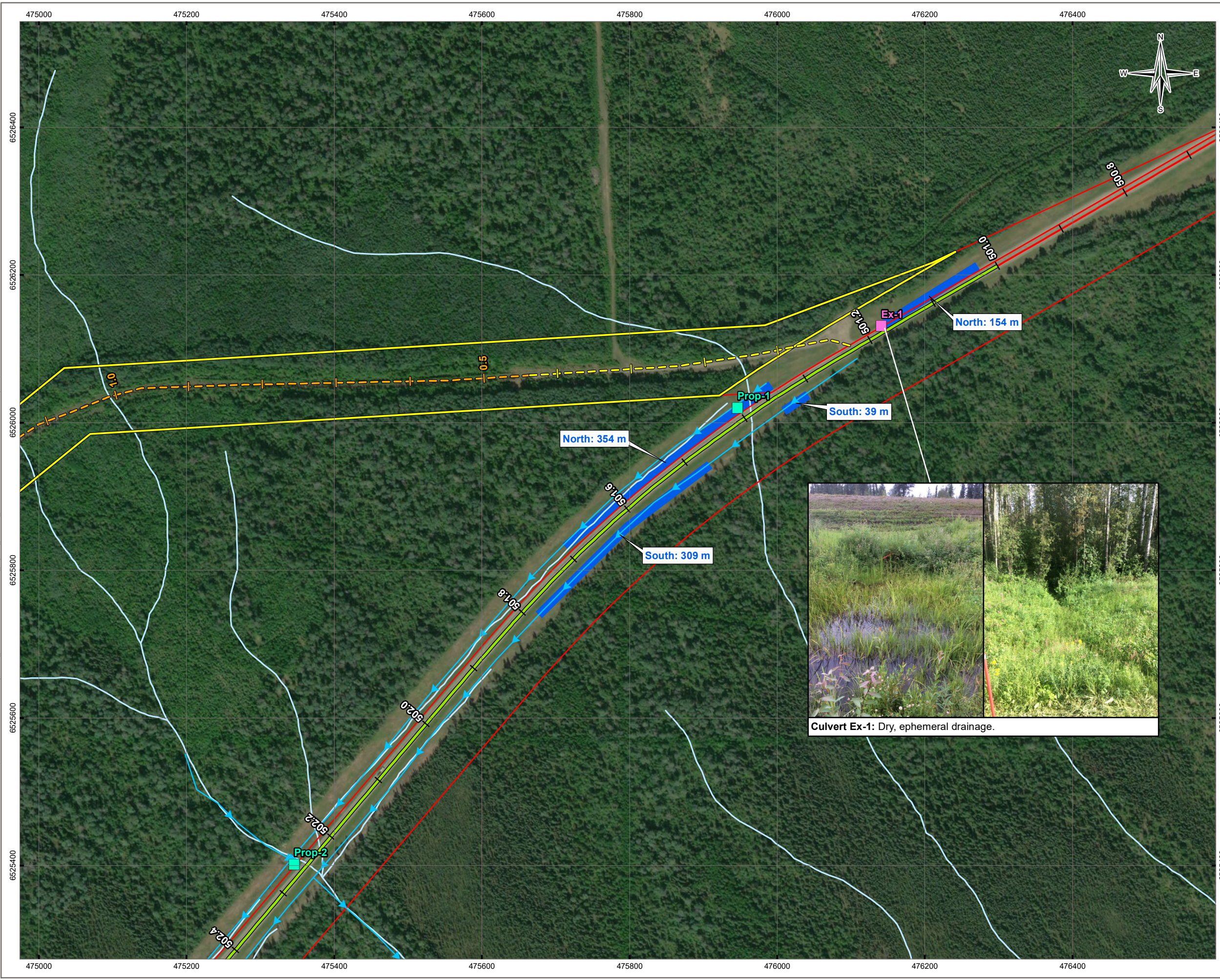
KM 501 TO KM 509 GEOMETRIC AND DRAINAGE IMPROVEMENTS ALASKA HIGHWAY, BC

Site Location

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SL	BB	EH	0							
DATE March 4, 2021	PROJECT NO. TRN.VHWY03116-01									

Figure 1

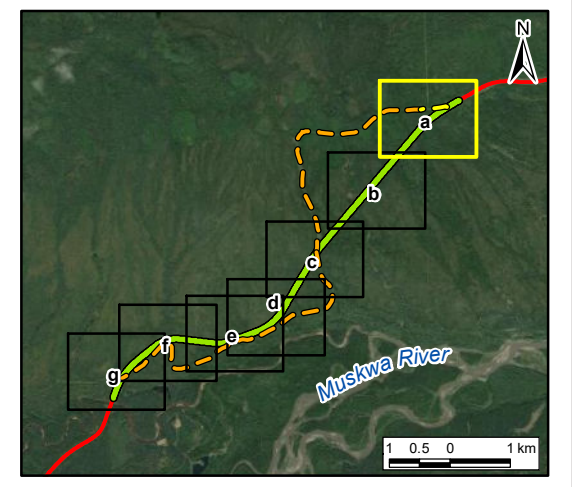
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Culvert Ex-1: Dry, ephemeral drainage.

LEGEND

- Existing Culvert
- Proposed Culvert
- Ditch Infill Location
- Drainage Flow
- Watercourse
- Current Alaska Highway Alignment**
- Current Alignment - KM 501-509
- Current Alaska Highway
- Current Alaska Highway ROW
- Former Alaska Highway Alignment**
- 2-Wheel Drive Access
- Limited Vehicle Access
- Former Alaska Highway ROW - KM 501-509



NOTES
 Base data source:
 CanVec 1:50,000.
 Imagery from ESRI; Maxar (2019).

STATUS
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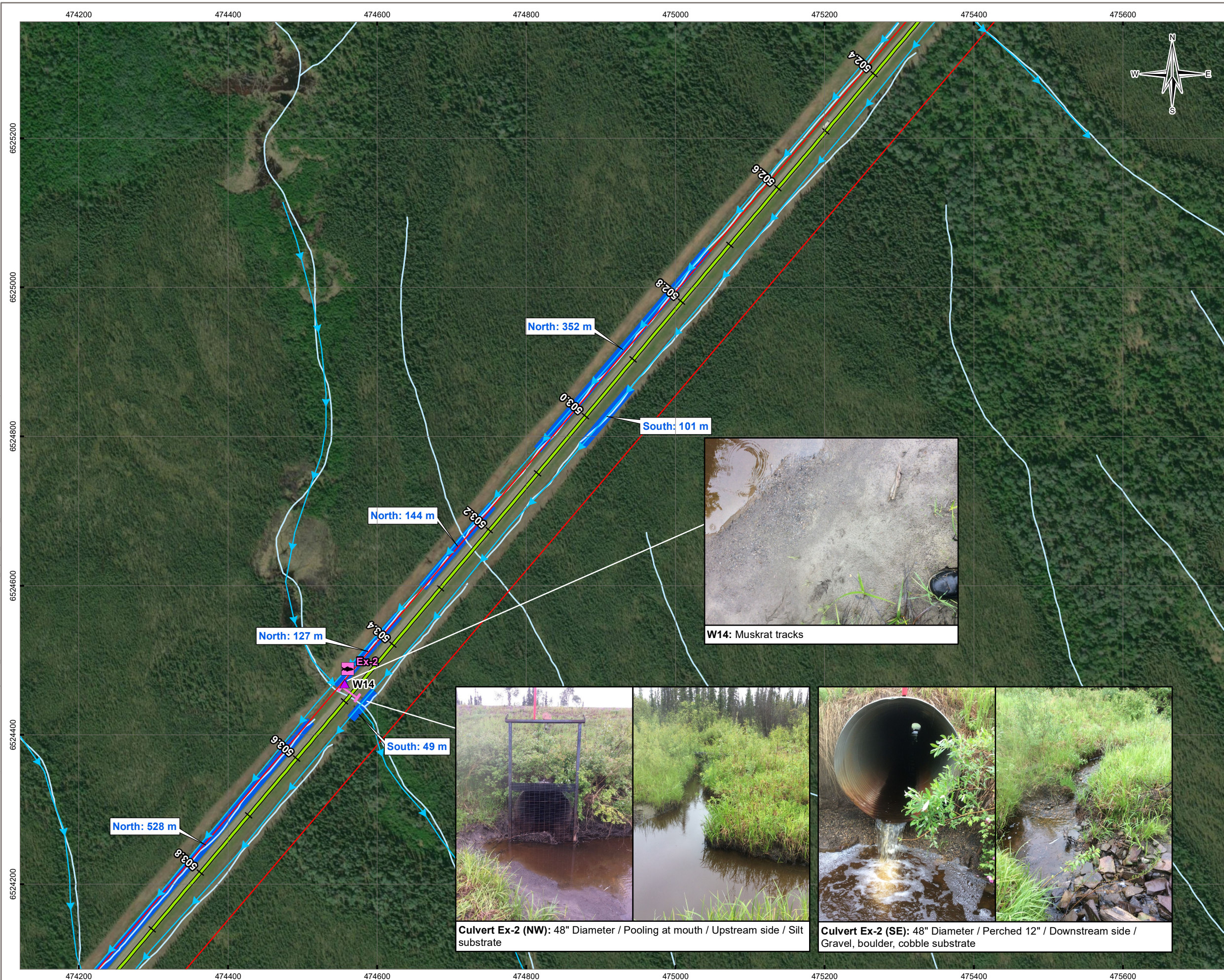
Field Results

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APVD EH	REV 0	
DATE March 4, 2021	PROJECT NO. TRN.VHWY03116-01	



Figure 2a

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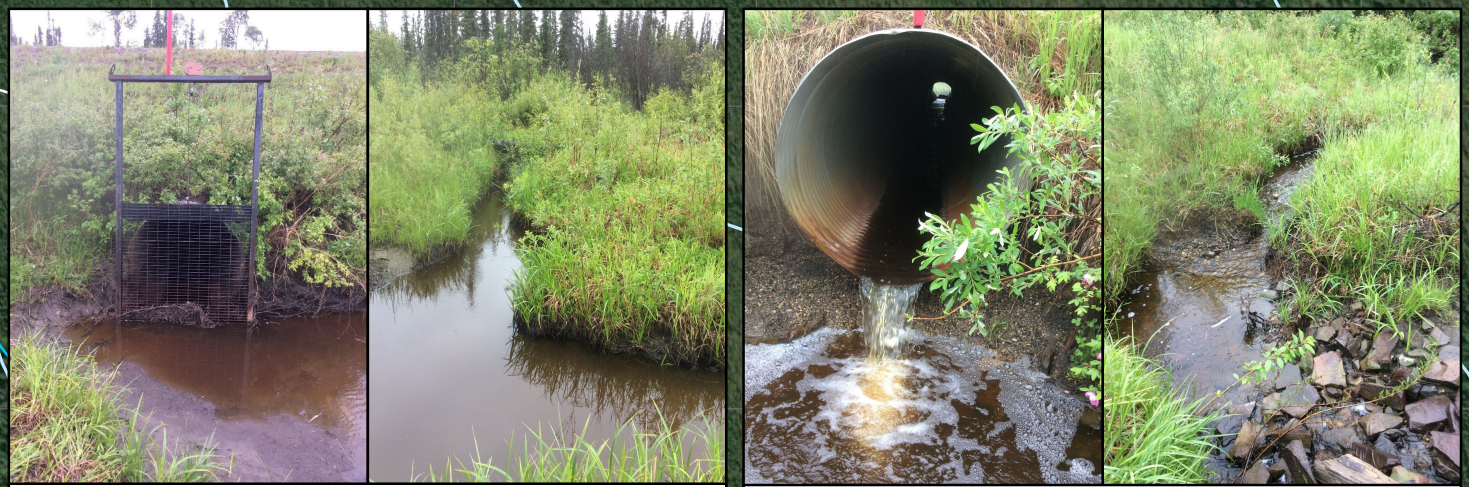
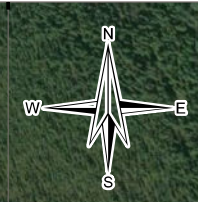


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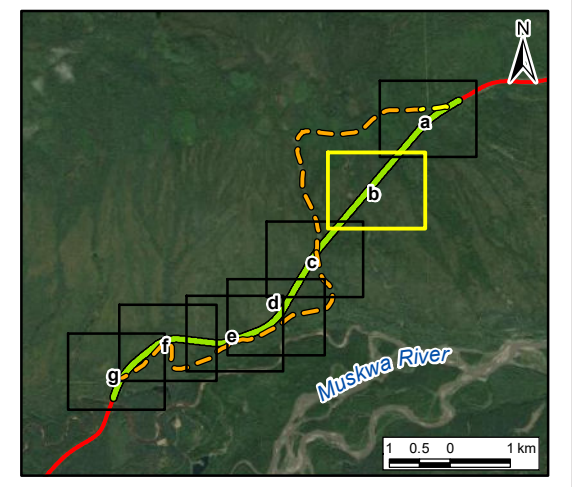
- Wildlife Field Note
- Existing Culvert and Fish Capture Location
- Ditch Infill Location
- Drainage Flow
- Watercourse

Current Alaska Highway Alignment

- Current Alignment - KM 501-509
- Current Alaska Highway
- Current Alaska Highway ROW



Culvert Ex-2 (NW): 48" Diameter / Pooling at mouth / Upstream side / Silt substrate
Culvert Ex-2 (SE): 48" Diameter / Perched 12" / Downstream side / Gravel, boulder, cobble substrate



NOTES
 Base data source:
 CanVec 1:50,000.
 Imagery from ESRI; Maxar (2019).

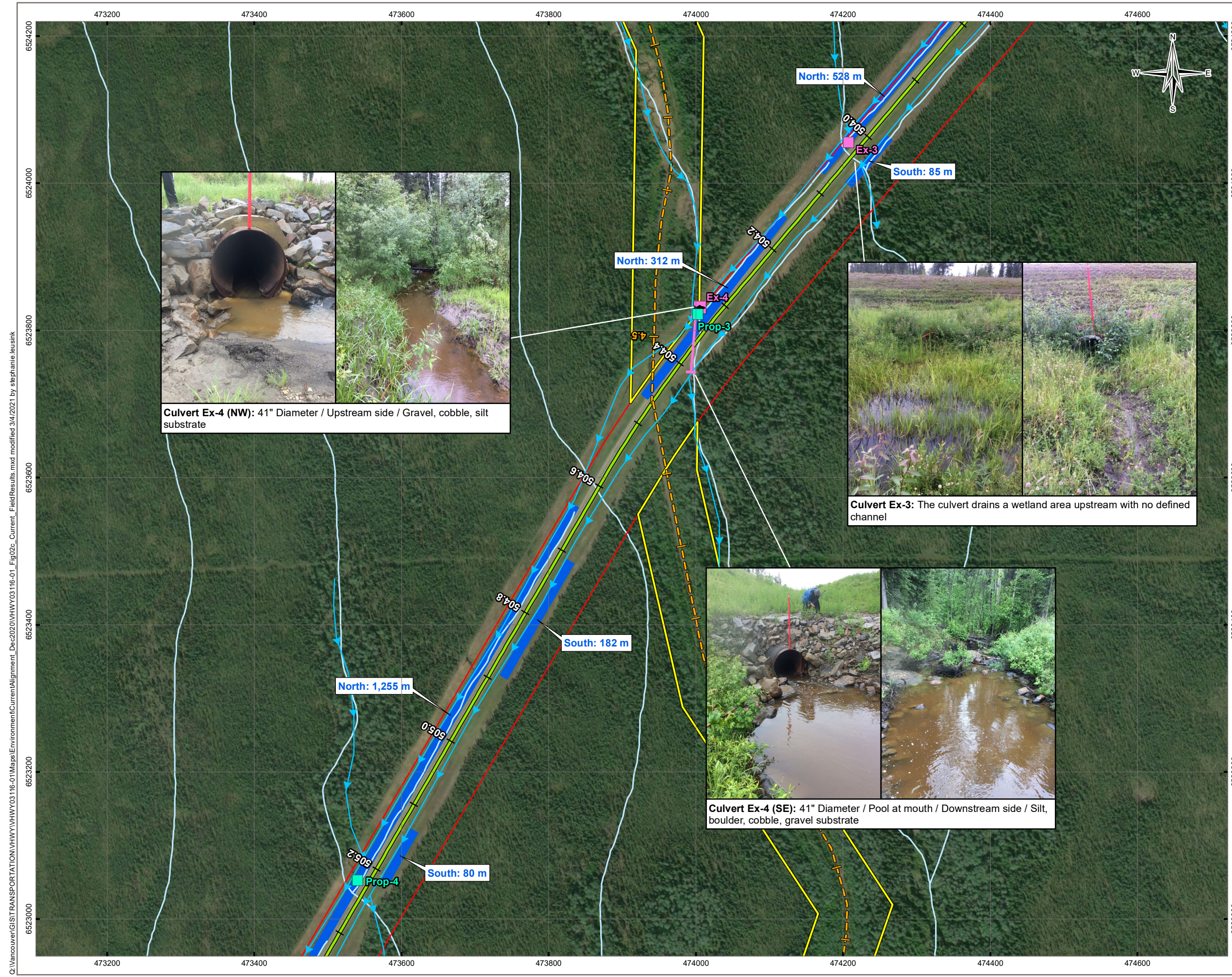
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KM 501 TO KM 509 GEOMETRIC AND DRAINAGE IMPROVEMENTS ALASKA HIGHWAY, BC

Field Results

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DWN SL	CKD BB	APVD EH
REV 0	PROJECT NO. TRN.VHWY03116-01	

Figure 2b



Culvert Ex-4 (NW): 41" Diameter / Upstream side / Gravel, cobble, silt substrate



Culvert Ex-3: The culvert drains a wetland area upstream with no defined channel



Culvert Ex-4 (SE): 41" Diameter / Pool at mouth / Downstream side / Silt, boulder, cobble, gravel substrate

LEGEND

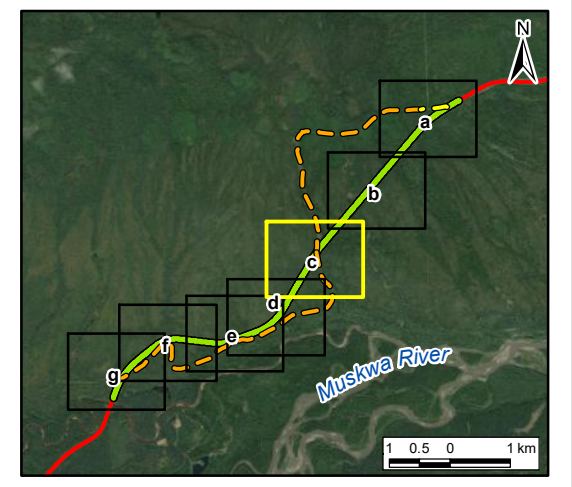
- Existing Culvert and Fish Capture Location
- Existing Culvert
- Proposed Culvert
- Ditch Infill Location
- Drainage Flow
- Watercourse

Current Alaska Highway Alignment

- Current Alignment - KM 501-509
- Current Alaska Highway
- Current Alaska Highway ROW

Former Alaska Highway Alignment

- Limited Vehicle Access
- Former Alaska Highway ROW - KM 501-509



NOTES
 Base data source:
 CanVec 1:50,000.
 Imagery from ESRI; Maxar (2019).

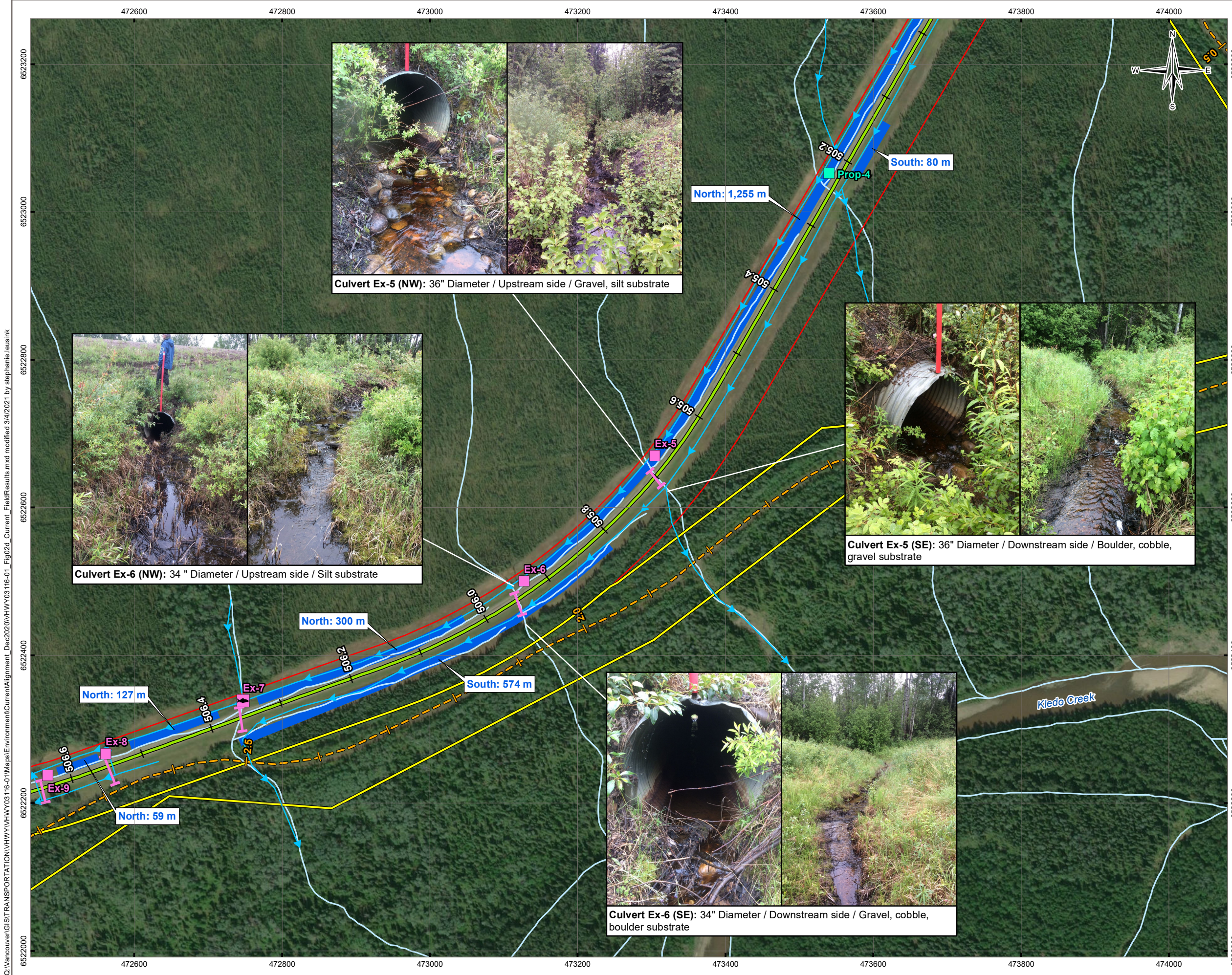
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Field Results

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DATE March 4, 2021	APVD EH	REV 0
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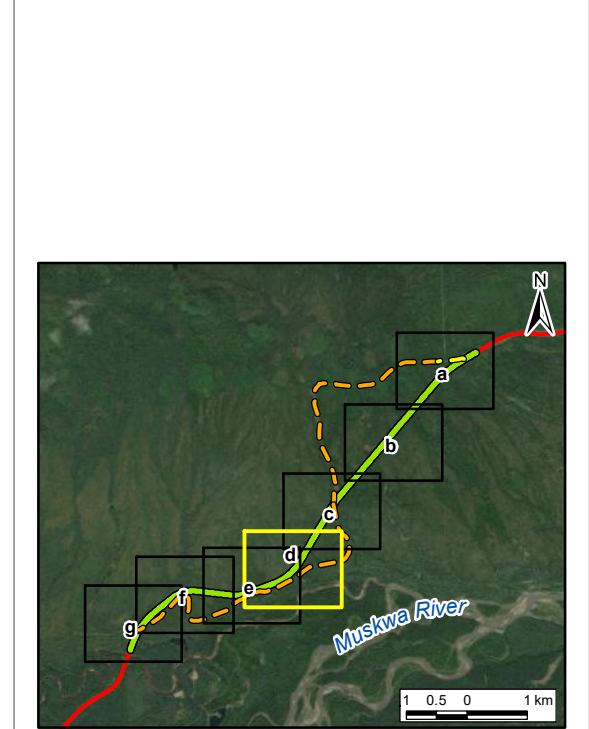
- Existing Culvert and Fish Capture Location
- Existing Culvert
- Proposed Culvert
- Ditch Infill Location
- Drainage Flow
- Watercourse
- Waterbody

Current Alaska Highway Alignment

- Current Alignment - KM 501-509
- Current Alaska Highway
- Current Alaska Highway ROW

Former Alaska Highway Alignment

- Limited Vehicle Access
- Former Alaska Highway ROW - KM 501-509



NOTES
 Base data source:
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 Imagery from ESRI; Maxar (2019).

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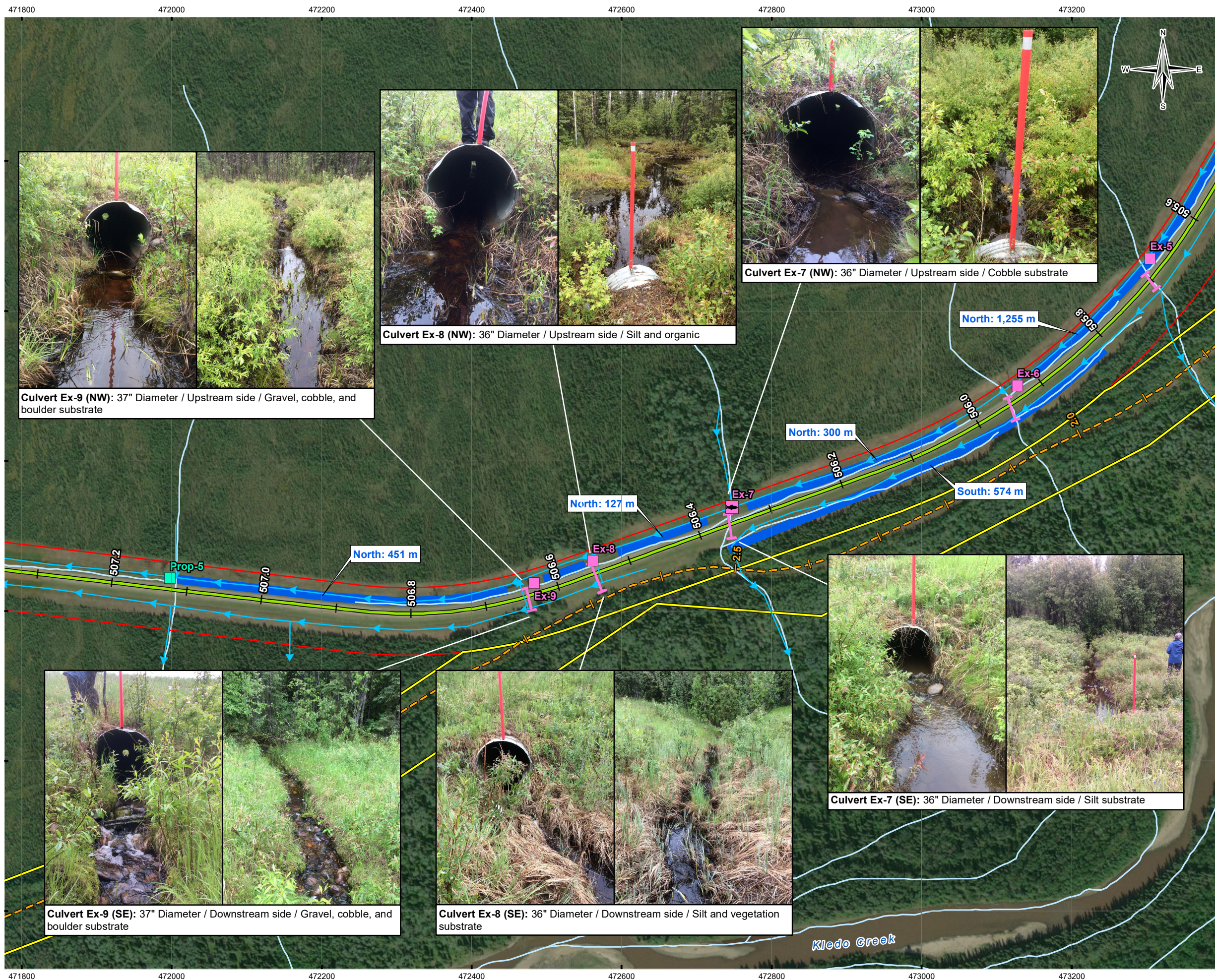
KM 501 TO KM 509 GEOMETRIC AND DRAINAGE IMPROVEMENTS ALASKA HIGHWAY, BC

Field Results

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PROJECT NO. TRN.VHWY03116-01		Figure 2d

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LEGEND

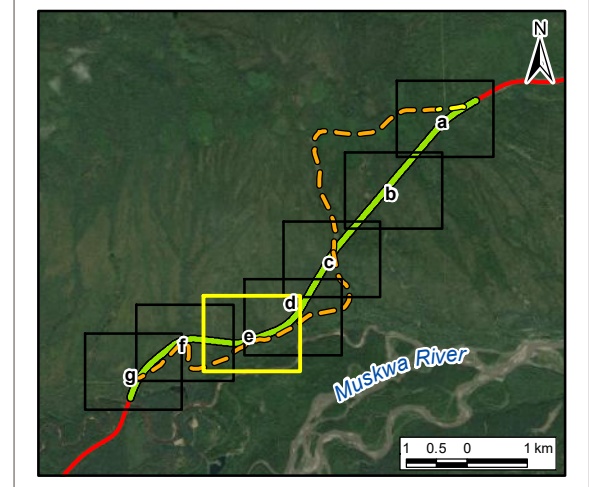
- Existing Culvert and Fish Capture Location
- Existing Culvert
- Proposed Culvert
- Ditch Infill Location
- Drainage Flow
- Watercourse
- Waterbody

Current Alaska Highway

- Current Alignment - KM 501-
- Current Alaska
- Current Alaska Highway ROW

Former Alaska Highway

- Limited Vehicle Access
- Former Alaska Highway ROW - KM 501-509



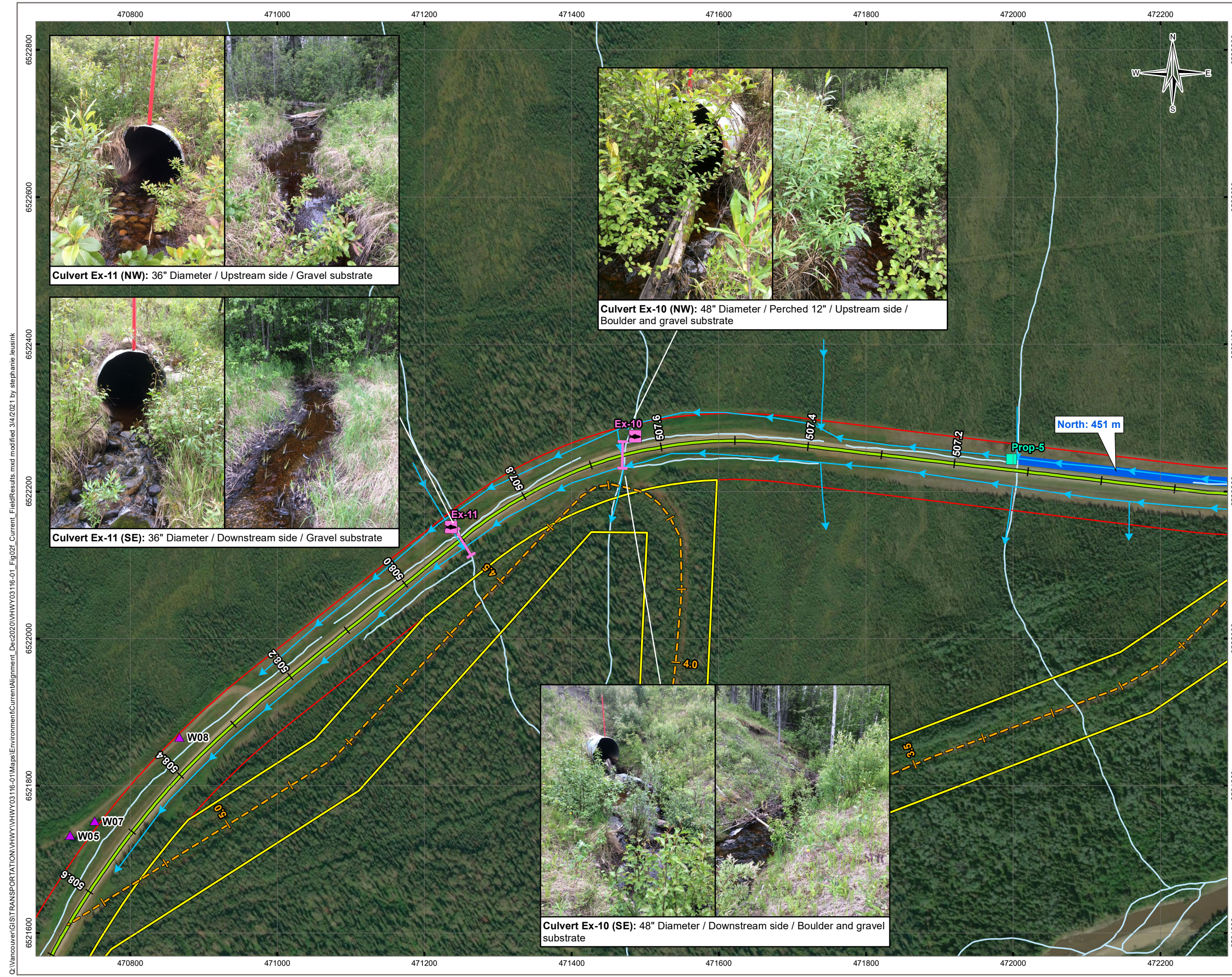
NOTES
 Base data source: CanVec 1:50,000.
 Imagery from ESRI; Maxar (2019).

STATUS
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KM 501 TO KM 509 GEOMETRIC AND DRAINAGE IMPROVEMENTS ALASKA HIGHWAY, BC

Field Results

PROJECTION UTM Zone 10	DATUM NAD83	CLIENT Public Services and Procurement Canada
Scale: 1:5,000		
100 50 0 100 Metres		
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OFFICE TL-VANC	DWN SL	CKD BB
DATE March 4, 2021	APVD EH	REV 0
PROJECT NO. TRN.VHWY03116-01		Figure 2e



Culvert Ex-11 (NW): 36" Diameter / Upstream side / Gravel substrate



Culvert Ex-11 (SE): 36" Diameter / Downstream side / Gravel substrate



Culvert Ex-10 (NW): 48" Diameter / Perched 12" / Upstream side / Boulder and gravel substrate



Culvert Ex-10 (SE): 48" Diameter / Downstream side / Boulder and gravel substrate

LEGEND

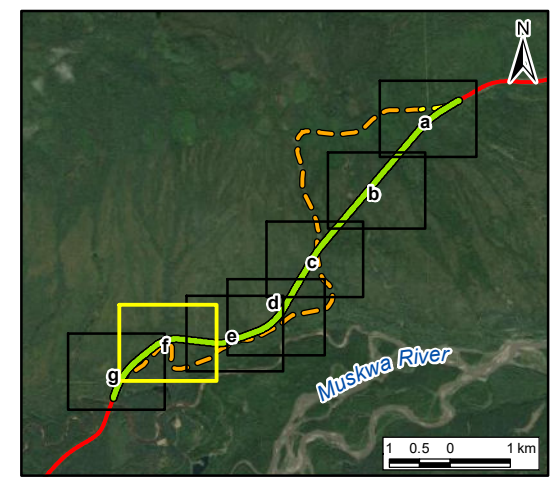
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- Existing Culvert and Fish Capture Location
- Proposed Culvert
- Ditch Infill Location
- ← Drainage Flow
- Watercourse
- Waterbody

Current Alaska Highway Alignment

- Current Alignment - KM 501-509
- Current Alaska Highway
- Current Alaska Highway ROW

Former Alaska Highway Alignment

- - - Limited Vehicle Access
- Former Alaska Highway ROW - KM 501-509



NOTES
 Base data source:
 CanVec 1:50,000.
 Imagery from ESRI; Maxar (2019).

STATUS
 ISSUED FOR USE

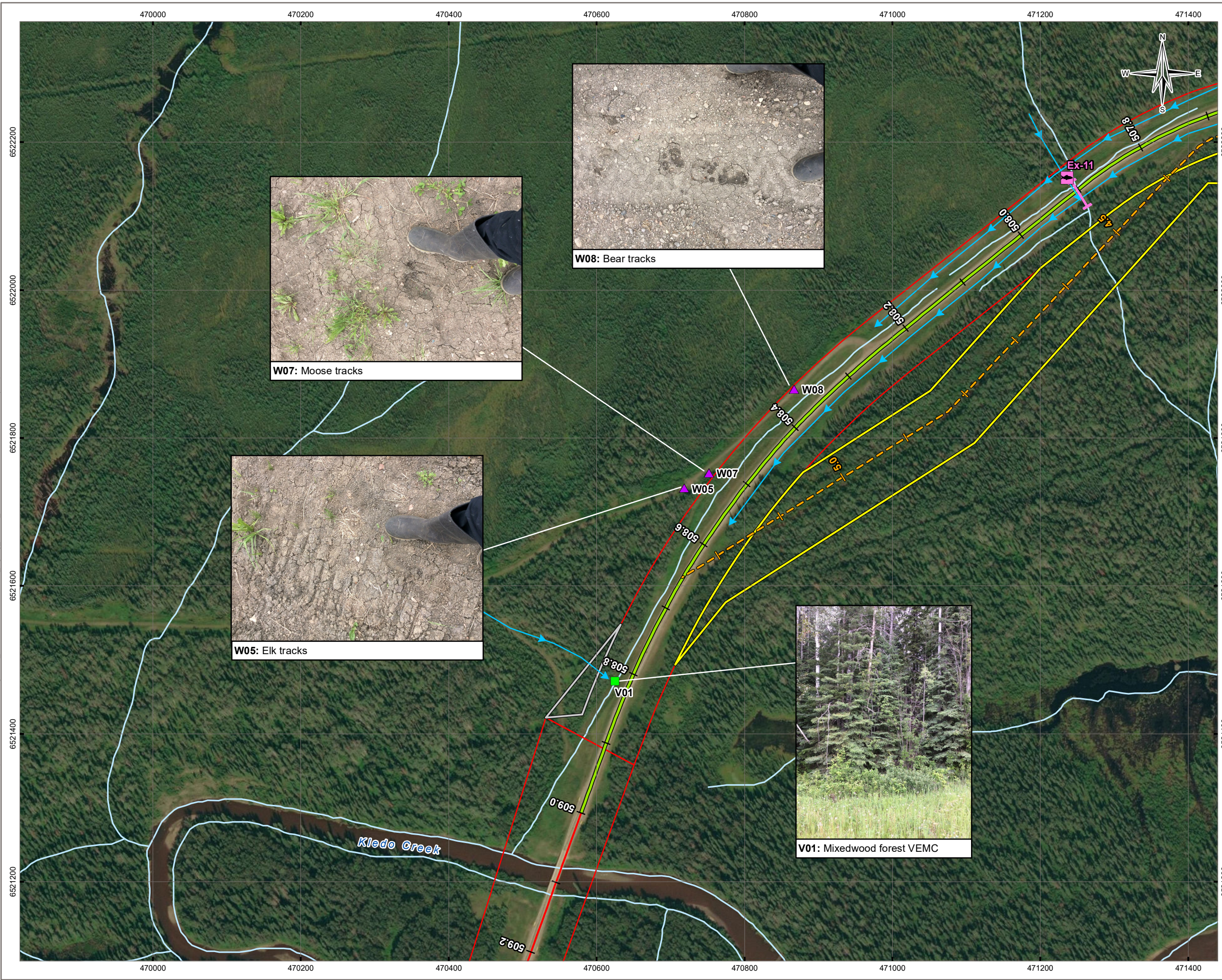
**KM 501 TO KM 509
 GEOMETRIC AND DRAINAGE IMPROVEMENTS
 ALASKA HIGHWAY, BC**

Field Results

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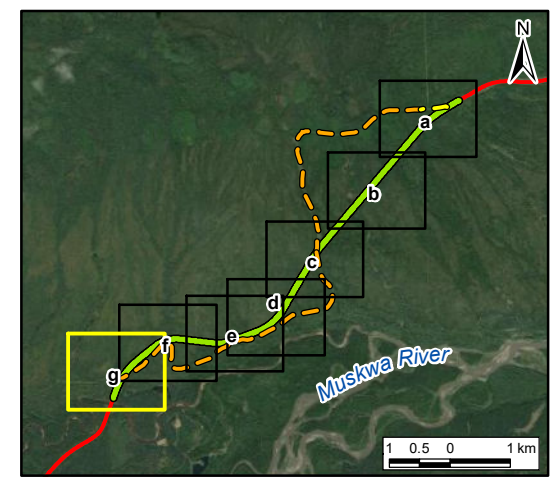
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LEGEND

- Wildlife Field Note
- Vegetation Assessment Site
- Existing Culvert and Fish Capture Location
- Drainage Flow
- Watercourse
- Waterbody
- Current Alaska Highway Alignment**
 - Current Alignment - KM 501-509
 - Current Alaska Highway
 - Current Alaska Highway ROW
- Former Alaska Highway Alignment**
 - Limited Vehicle Access
 - Former Alaska Highway ROW - KM 501-509
 - Former Alaska Highway ROW - Other Site



NOTES
 Base data source:
 CanVec 1:50,000.
 Imagery from ESRI; Maxar (2019).

STATUS
ISSUED FOR USE

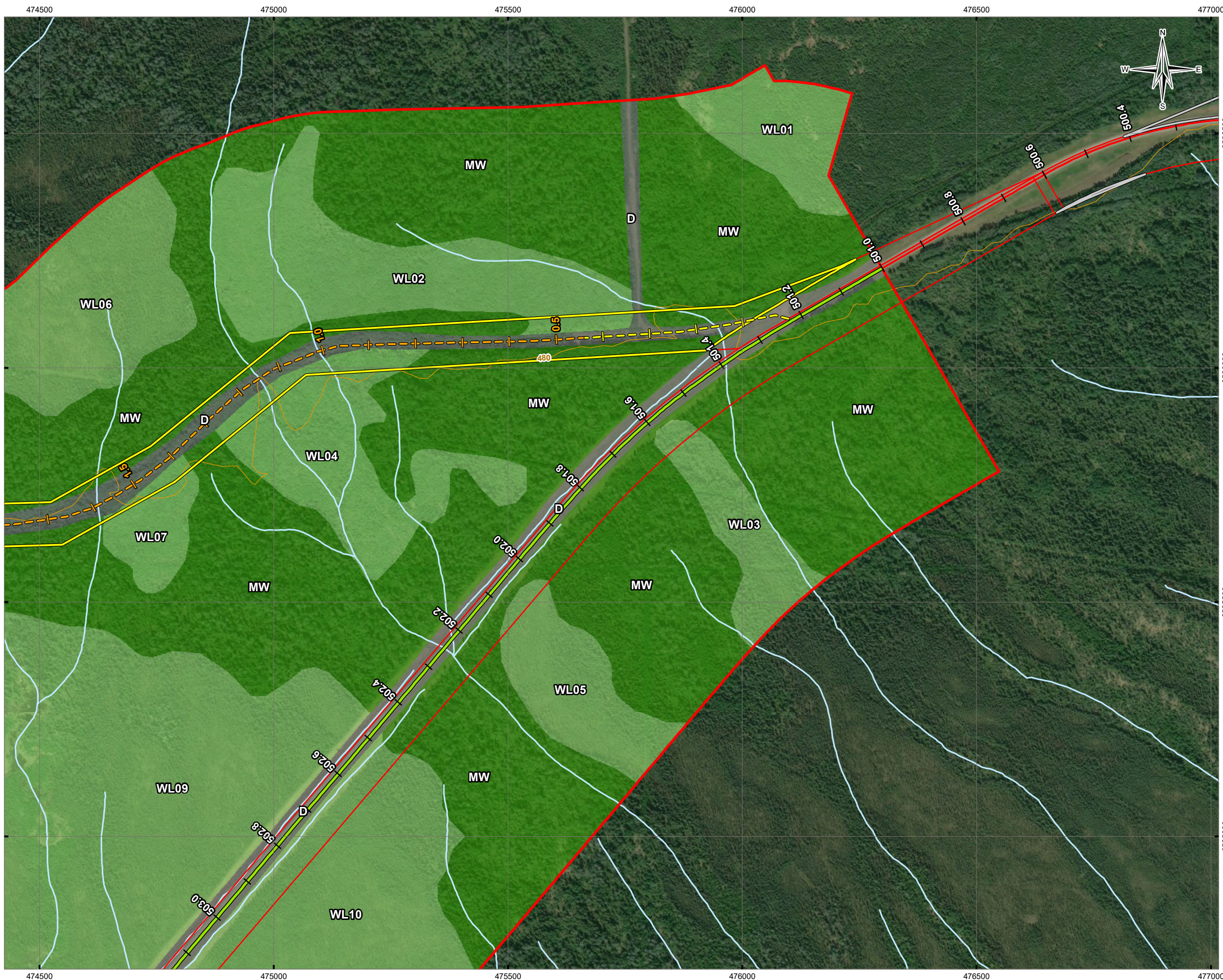
KM 501 TO KM 509 GEOMETRIC AND DRAINAGE IMPROVEMENTS ALASKA HIGHWAY, BC

Field Results

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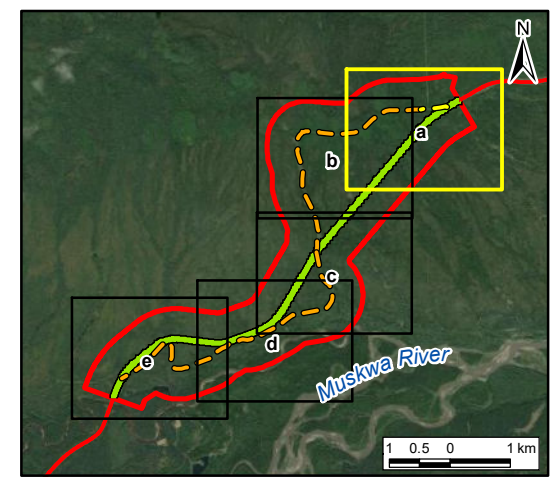


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LEGEND

- 500 m Buffer
- Current Alaska Highway Alignment**
- Current Alignment - KM 501-509
- Current Alaska Highway
- Current Alaska Highway ROW
- Former Alaska Highway Alignment**
- 2-Wheel Drive Access
- Limited Vehicle Access
- Former Alaska Highway ROW - KM 501-509
- Former Alaska Highway ROW - Other Site
- Ecosite Vegetation Management Unit**
- Disturbed (D)
- Mixedwood Forest (MW)
- Wetland (WL)
- Contour (40 m)
- Watercourse



NOTES
 Base data source:
 CanVec 1:50,000.
 Imagery from ESRI; Maxar (2019).

STATUS
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**KM 501 TO KM 509
 GEOMETRIC AND DRAINAGE IMPROVEMENTS
 ALASKA HIGHWAY, BC**

Ecosites			
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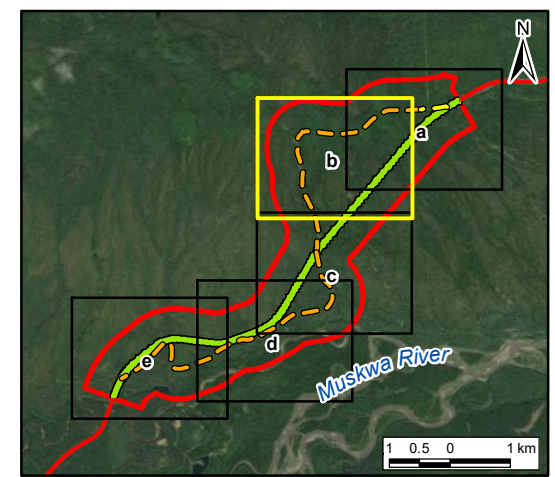
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LEGEND

- 500 m Buffer
- Current Alaska Highway Alignment**
 - Current Alignment - KM 501-509
 - Current Alaska Highway
 - Current Alaska Highway ROW
- Former Alaska Highway Alignment**
 - 2-Wheel Drive Access
 - Limited Vehicle Access
 - Former Alaska Highway ROW - KM 501-509
- Ecosite Vegetation Management Unit**
 - Disturbed (D)
 - Mixedwood Forest (MW)
 - Wetland (WL)
 - Contour (40 m)
 - Watercourse



NOTES
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 Imagery from ESRI; Maxar (2019).

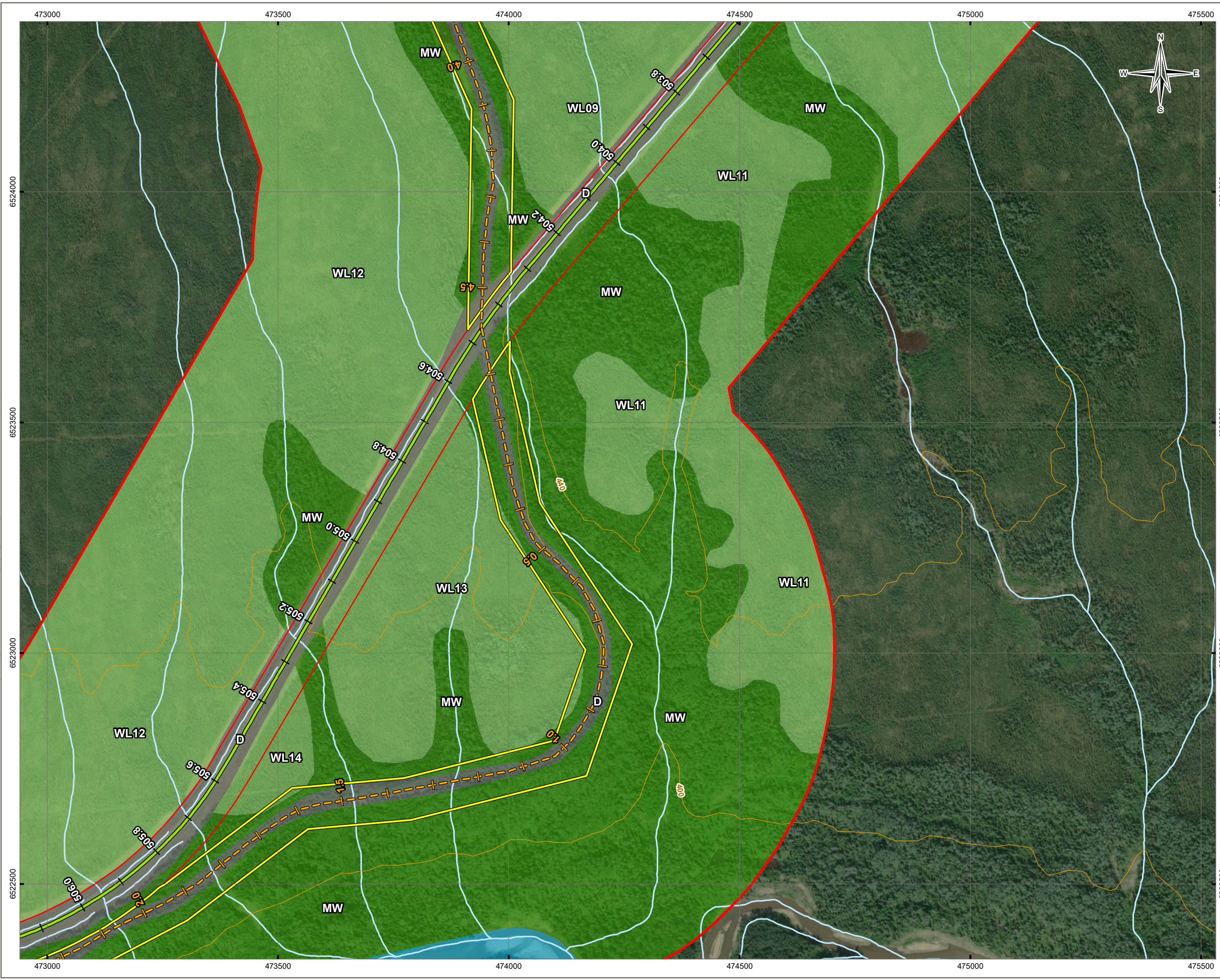
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**KM 501 TO KM 509
 GEOMETRIC AND DRAINAGE IMPROVEMENTS
 ALASKA HIGHWAY, BC**

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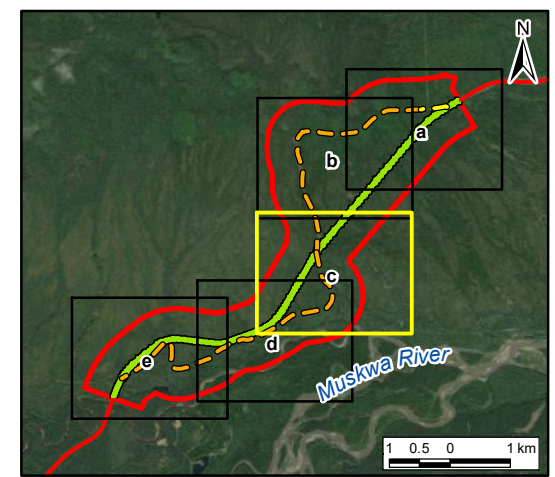
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LEGEND

- 500 m Buffer
- Current Alaska Highway Alignment**
- Current Alignment - KM 501-509
- Current Alaska Highway
- Current Alaska Highway ROW
- Former Alaska Highway Alignment**
- 2-Wheel Drive Access
- Limited Vehicle Access
- Former Alaska Highway ROW - KM 501-509
- Ecosite Vegetation Management Unit**
- Disturbed (D)
- Mixedwood Forest (MW)
- Wetland (WL)
- Watercourse (W)
- Contour (40 m)
- Watercourse
- Waterbody



NOTES
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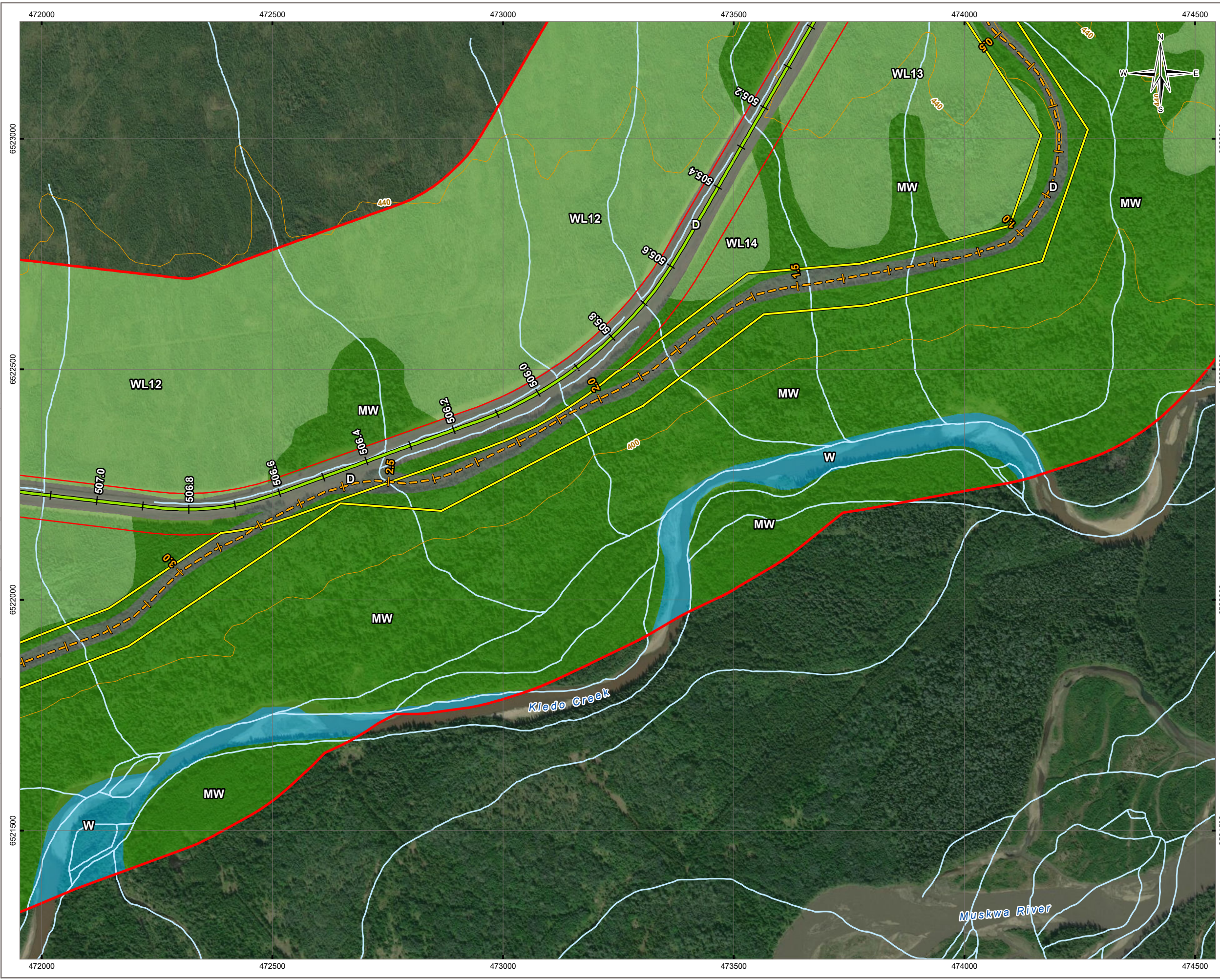
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KM 501 TO KM 509 GEOMETRIC AND DRAINAGE IMPROVEMENTS ALASKA HIGHWAY, BC

Ecosites

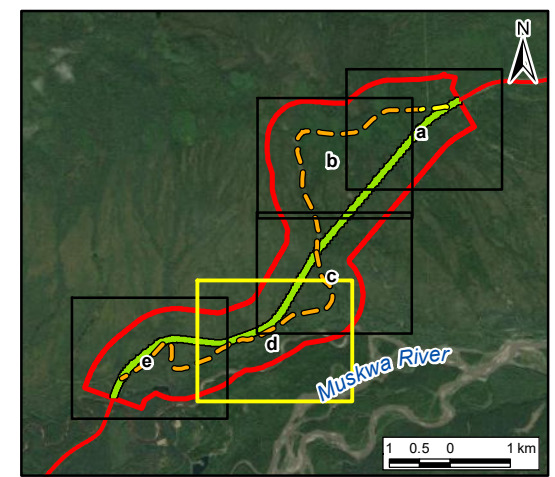
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LEGEND

- 500 m Buffer
- Current Alaska Highway Alignment**
 - Current Alignment - KM 501-509
 - Current Alaska Highway
 - Current Alaska Highway ROW
- Former Alaska Highway Alignment**
 - 2-Wheel Drive Access
 - Limited Vehicle Access
 - Former Alaska Highway ROW - KM 501-509
- Ecosite Vegetation Management Unit**
 - Disturbed (D)
 - Mixedwood Forest (MW)
 - Wetland (WL)
 - Watercourse (W)
 - Contour (40 m)
 - Watercourse
 - Waterbody



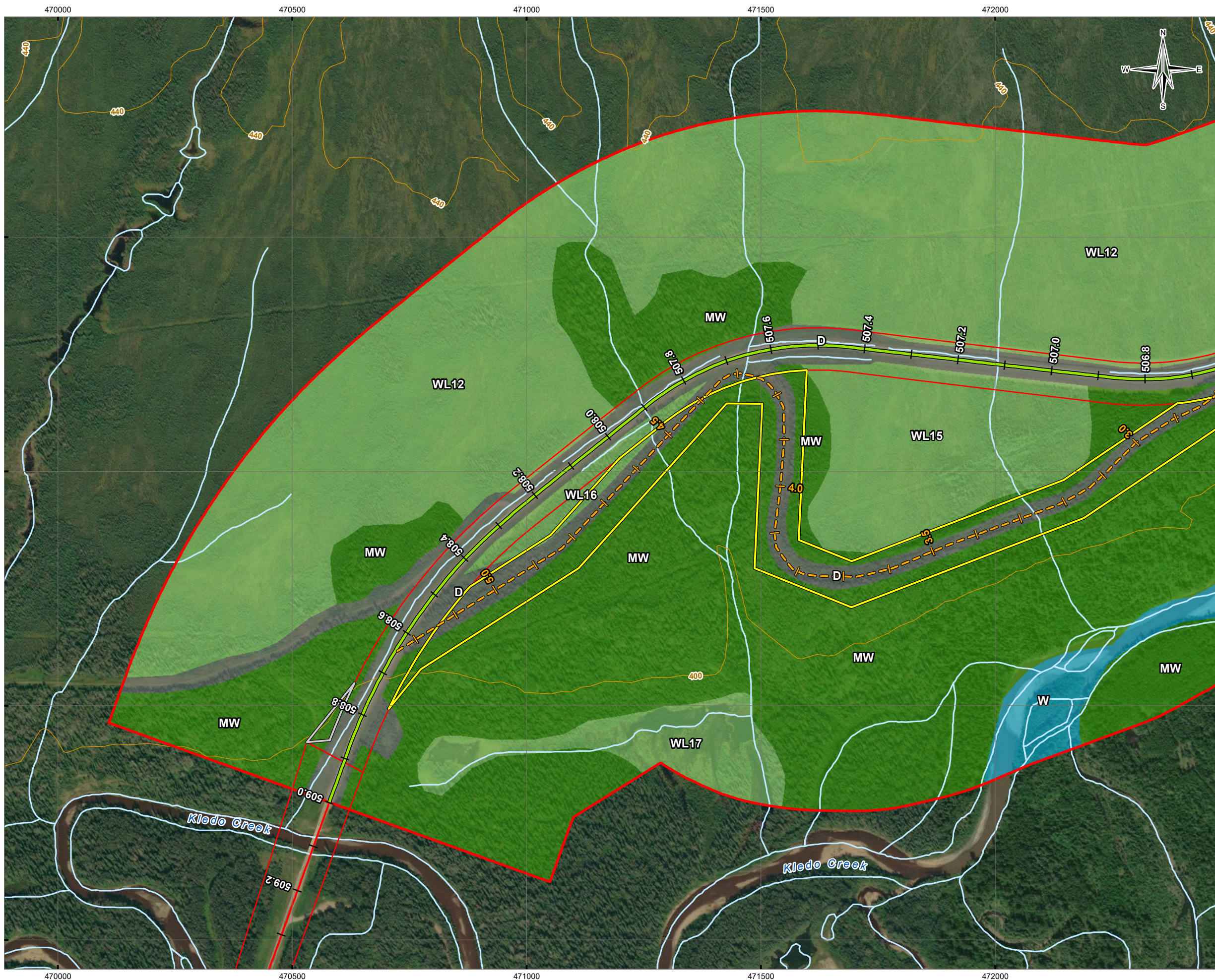
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**KM 501 TO KM 509
 GEOMETRIC AND DRAINAGE IMPROVEMENTS
 ALASKA HIGHWAY, BC**

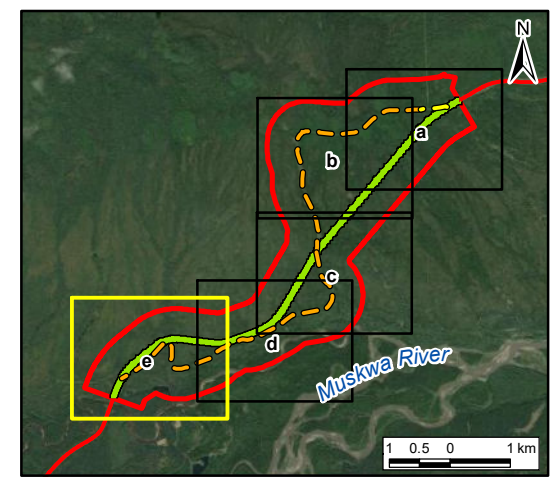
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LEGEND

- 500 m Buffer
- Current Alaska Highway Alignment**
- Current Alignment - KM 501-509
- Current Alaska Highway
- Current Alaska Highway ROW
- Former Alaska Highway Alignment**
- 2-Wheel Drive Access
- Limited Vehicle Access
- Former Alaska Highway ROW - KM 501-509
- Former Alaska Highway ROW - Other Site
- Ecosite Vegetation Management Unit**
- Disturbed (D)
- Mixedwood Forest (MW)
- Wetland (WL)
- Watercourse (W)
- Contour (40 m)
- Watercourse
- Waterbody



NOTES
 Base data source:
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 Imagery from ESRI; Maxar (2019).

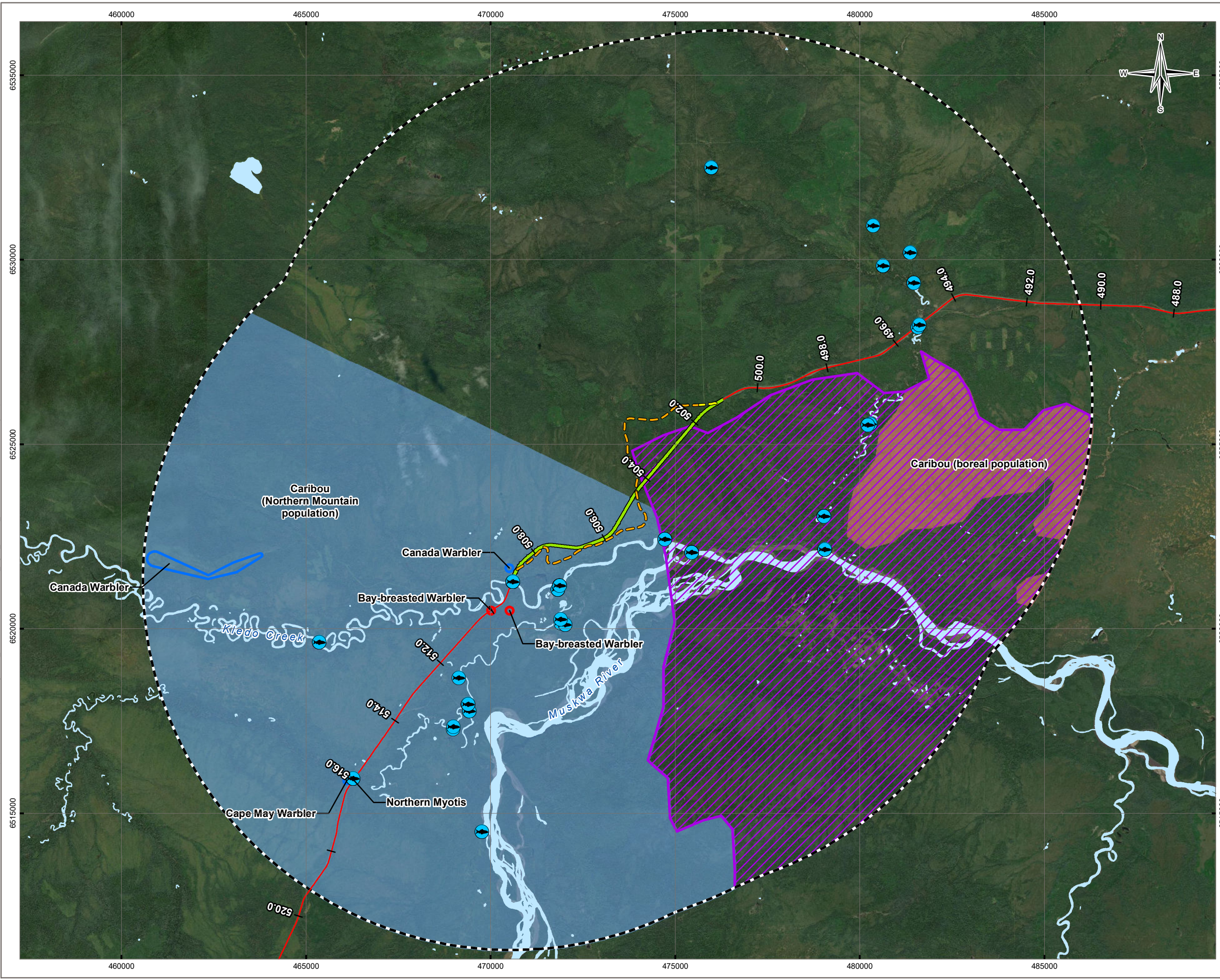
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**KM 501 TO KM 509
 GEOMETRIC AND DRAINAGE IMPROVEMENTS
 ALASKA HIGHWAY, BC**

Ecosites

PROJECTION UTM Zone 10	DATUM NAD83	CLIENT Public Services and Procurement Canada
Scale: 1:8,000 100 50 0 100 Metres		TETRA TECH
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PROJECT NO. TRN.VHWY03116-01		Figure 3e

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LEGEND

- Current Alaska Highway Alignment**
 - Current Alignment - KM 501-509
 - Current Alaska Highway
- Former Alaska Highway Alignment**
 - 2-Wheel Drive Access
 - Limited Vehicle Access
- 10 km Buffer**
- Waterbody**
- Known BC Fish Observations**
 - Fish Observation
- SARA Critical Habitat**
 - Boreal Caribou Critical Habitat
- CDC Species at Risk Occurrences**
 - Northern Mountain Caribou (Blue-Listed)
 - Boreal Caribou (Red-Listed)
 - Other Blue-Listed Species
 - Other Red-Listed Species

Fish Species Name	Number of Observations
Arctic Grayling	19
Bull Trout	3
Burbot	4
Finescale Dace	12
Fish Unidentified Species	2
Flathead Chub	3
Lake Chub	13
Longnose Dace	7
Longnose Sucker	13
Mountain Whitefish	5
Northern Pearl Dace	3
Northern Pike	3
Slimy Sculpin	14
Troutperch	5
White Sucker	3

NOTES
 Base data source:
 CDC Species at Risk and BC Fish Observations from DataBC (accessed July 2019).
 SARA Critical Habitat from Environment and Climate Change Canada (2018).
 CanVec 1:50,000.
 Imagery from ESRI; Maxar (2018/2019).

STATUS
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KM 501 TO KM 509 GEOMETRIC AND DRAINAGE IMPROVEMENTS ALASKA HIGHWAY, BC

Conservation Data Centre Occurrences and Known Fish Observations

PROJECTION UTM Zone 10	DATUM NAD83	CLIENT Public Services and Procurement Canada				
Scale: 1:100,000						
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OFFICE TL-VANC			DWN SL	CKD BB	APVD EH	REV 0
DATE March 4, 2021			PROJECT NO. TRN.VHWY03116-01			

Figure 4

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.

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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

ENVIRONMENTAL MANAGEMENT PLAN

Environmental Management Plan Geometric and Drainage Improvements KM 501+000 to KM 509+000, Alaska Highway, BC



PRESENTED TO
Public Services and Procurement Canada

MARCH 4, 2021
ISSUED FOR USE
FILE: 704-TRN.VHWY03116-01

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APPENDIX SECTIONS

APPENDICES

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Appendix 2	Archaeology Chance Find Protocol
Appendix 3	Example Spill Response Plan
Appendix 4	Environmental Incident Report Form

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) was retained by Public Services and Procurement Canada (PSPC) to prepare an Environmental Management Plan (EMP) for planned geometric and drainage upgrades along an 8.0 km section of the existing Alaska Highway between KM 501.0 and KM 509.0 (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. Sections of two former Alaska Highway alignments, that parallel the current alignment between Km 501-509, have been identified as a potential borrow source of gravel materials for use on the Project.

The Project is located east of Kleido Creek, approximately 40 km west of Fort Nelson, in northeast British Columbia. The Project area spans from KM 501+000 to KM 509+000 of the current Alaska Highway alignment. Sections of two former Alaska Highway alignments, that parallel the current alignment between Km 501-509, have been identified as a potential borrow source of gravel materials for use on the Project.

The majority of the Project will be occurring within PSPC’s current and deactivated transportation rights-of-way. At thirteen of the culvert replacement locations (Table 2-2) and at four locations along the interceptor ditch, Project works will be occurring beyond the current PSPC transportation ROW. PSPC is currently in the process of acquiring these lands from the Province to include within their ROW. Drawings showing the proposed ROW acquisition areas for the thirteen culverts are provided in Appendix E of the Environmental Overview Assessment (EOA) report.

The proposed acquisition areas for the interceptor ditch works beyond the current ROW are detailed below in Table 2-1.

Table 2-1. Station Ranges, Widths and Areas of the Interceptor Ditch Works Beyond the Right-of-Way

Station Range	Max Width (m)	Min Width (m)	Area (m ²)
STA 500+950 to STA 500+970	2.61	0.86	28.83
STA 501+340 to STA 504+320	29.73	6.64	65,519.95
STA 504+440 to STA 507+890	21.22	3.18	47,676.32
STA 507+940 to STA 508+580	23.75	2.01	8,059.57

2.2 Project Activities

The Alaska Highway between KM 501+000 and KM 509+000 will receive geometric and drainage improvements in preparation for future asphalt paving of the highway at this location. The geometric and drainage improvements will address existing safety concerns (i.e. traveled lane width and clear zone), increase drainage capacity, mitigate existing and future erosion issues, provide a more reliable highway infrastructure, improve safety for the travelling public, and reduce ongoing maintenance costs to PSPC.

The anticipated construction activities are likely to include:

- Stripping of vegetation and organic soils, stockpiling of stripped materials for reuse as topsoil, and isolated tree clearing to facilitate construction;
- Shoulder widening to achieve a finished road top width of 10.7 m (currently < 10 m), including supply, placement and compaction of embankment, sub-base course and crushed base gravel. The former Alaska Highway roadbed adjacent to the site will be used as a source of embankment materials;
- Flattening the embankment side slopes to 3V:1H (currently steeper than 2-2.5H:1V);
- Completing drainage improvements (as detailed in Table 2-2), including:
 - Installation of five steel pipe culverts at existing drainages not serviced by an existing culvert sized to convey flows anticipated from a 100-year rainfall event;
 - Replacement of 10 existing Corrugated Steel Pipe (CSP) culverts with new, larger steel pipe culverts sized to convey flows anticipated from a 100-year rainfall event;
 - Extending one existing steel pipe liner;
 - Infilling old CSP culverts with grout; and
 - Installation of ditch blocks and erosion protection to mitigate erosion issues within the existing interceptor ditch.
- Relocating the existing interceptor ditch in locations it conflicts with the proposed highway embankment. The existing interceptor ditch will be infilled with Common Fill and a new ditch excavated further from the highway to the same invert elevation. See Table 2-3 for specific locations;
- Signage installations and utility relocations; and
- Placing topsoil and hydroseeding all disturbed areas, riparian zones within the limits of construction.

Standard heavy equipment will be used throughout construction for various activities listed above. These may include excavators, dozers, trucks, graders, rollers, etc. The location and size of staging and laydown areas and construction material and debris stockpiles will be determined through detailed design phase of the Project. During construction, the Alaska Highway will remain fully operational with at least single-lane traffic maintained at all times.

Table 2-2: Proposed Culvert Installations / Replacements Between KM 501+00 and KM 509+00.

Culvert ID	Highway Kilometer Mark	UTM Coordinates		Length (m)	Existing Diameter (mm)	Proposed Diameter (mm)	Construction Footprint ¹ (m ²)	ROW Acquisition
		Easting	Northing					
Proposed locations for installation of additional culverts								
Prop-1	501+401	475947	6525999	45.16	-	2000	1900	Y
Prop-2	502+244	475362	6525396	34.99	-	2000	1800	Y
Prop-3	504+344	474008	6523792	87.73	-	2900	3800	Y
Prop-4	505+226	473550	6523038	39.25	-	1600	2100	Y
Prop-5	507+118	472000	6522227	33.93	-	1400	1400	Y
Existing culverts requiring replacement (Install new and abandon existing)								
Ex-1	501+172	476144	6526116	33.18	600	600	1000	N
Ex-2	503+480	474564	6524452	39.94	1200	2400	1900	Y
Ex-3	504+025	474212	6524035	42.68	900	900	2400	Y
Ex-5	505+690	473309	6522641	46.16	1200	1400	1600	Y
Ex-6	505+937	473126	6522476	42.49	900	1400	1200	Y
Ex-7	506+360	472738	6522310	48.17	900	1200	2000	Y
Ex-8	506+538	472570	6522251	41.82	900	900	1800	Y
Ex-9	506+629	472485	6522219	36.22	900	900	1700	Y
Ex-10	507+645	471478	6522245	60.34	1200	2200	3000	Y
Ex-11	507+908	471245	6522129	47.28	900	1400	1600	N
Culverts requiring extension								
Ex-4	504+358	474000	6523780	83.95	900	900	1000	N

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.

Table 2-3: Proposed Ditch Infill and Reconstruction Locations

North Side of Highway				
Infill Start UTM Coordinate		Infill End UTM Coordinate		Approx. Length (m)
Easting	Northing	Easting	Northing	
476271.4	6526211.8	476140.2	6526130.5	154
475991.5	6526050.9	475712.8	6525832.0	354
475043.0	6525050.3	474815.1	6524782.6	352
474754.4	6524707.8	474661.0	6524597.7	144
474628.8	6524560.2	474546.2	6524463.9	127
474510.9	6524418.6	474169.7	6524015.5	528
474119.5	6523955.8	473930.0	6523709.4	312
473836.4	6523562.4	473153.3	6522518.6	1255
473046.0	6522449.8	472767.3	6522339.1	300
472713.9	6522321.2	472594.9	6522277.5	127
472551.5	6522261.6	472496.2	6522241.9	59
472447.3	6522227.8	471999.9	6522243.2	451
South Side of Highway				
Infill Start UTM Coordinate		Infill End UTM Coordinate		Approx. Length (m)
Easting	Northing	Easting	Northing	
476041.6	6526037.4	476008.7	6526015.6	39
475908.6	6525942.7	475676.8	6525739.4	309
474940.7	6524865.8	474874.9	6524787.8	101
474596.5	6524458.7	474564.9	6524421.9	49
474263.0	6524062.3	474207.4	6523997.7	85
473829.8	6523486.0	473738.6	6523328.1	182
473617.9	6523120.6	473578.0	6523051.6	80
473244.2	6522548.6	472742.4	6522283.0	574

2.3 Project Schedule

PSPC anticipates the construction tender to be awarded to the successful Contractor in the September of 2021. Construction is expected to be completed over several months. The culvert works will be conducted in the Winter of 2021/22 and the highway widening and interceptor ditch work will be done during the summer of 2022.

3.0 ENVIRONMENTAL SENSITIVITIES

This Project entails work within environmentally sensitive areas, including Woodland Caribou habitat, watercourses, wetlands, and riparian areas and will require instream works to remove, replace and install culverts, and to excavate an interceptor ditch 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 the highway upgrades. 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.

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). Boreal Caribou are provincially red-listed and designated as 'threatened' under the SARA.</p> <p>There is potential for Woodland Caribou to be encountered during the construction activities since the majority of KM 501 to KM 509 along the Alaska highway is within provincially-mapped caribou range. Additionally, a portion of the Project alignment crosses through Critical Habitat for Boreal Caribou. Due to the close proximity of the Project to Boreal Caribou Critical Habitat, special care should be taken during construction to minimize impacts to caribou and caribou habitat and the Caribou Protection Plan enacted throughout construction.</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 D 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 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 EMP section 4.00 and the Caribou Protection Plan for further mitigation strategies.
Wildlife and Species at Risk	<p>The BC Conservation Data Centre (CDC) search revealed documented occurrences of three SARA-listed species, Northern Myotis (Endangered), Canada Warbler (Threatened), and Woodland Caribou (Threatened and Special Concern), within 10 km of the Project. In addition, the BC CDC Search showed two other documented occurrences of provincially-listed species, namely the Cape May Warbler (blue-listed) and Bay-breasted Warbler (red-listed) within 10 km. Thirty-five other SAR were identified as having the potential to be present or near to the Project.</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 and wooden structures for wildlife (especially bats) prior to their removal. ▪ Minimize vegetation clearing and clear vegetation outside of the breeding bird nesting period for the B6 region (i.e., April 30 until August 20) or immediately following a Qualified Environmental Professional (QEP) led nest survey. ▪ 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 EMP section 4.00 for further mitigation strategies.

Environmental Concern	Project-Specific Considerations	Mitigation Summary*
Birds and Their Nests	<p>Section 34 of the BC <i>Wildlife Act</i> specifically protects 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>Vegetation clearing may be required during the Project, either to facilitate the highway upgrades and/or the access of vehicles and machinery to the gravel borrow sites along the former alignment. It is important that these clearing activities do not disturb birds or their nests.</p>	<ul style="list-style-type: none"> ▪ When possible, clear vegetation outside of the breeding bird nesting period for the region (April 30 until August 20). If this is not possible, a QEP-led nest survey will be required prior to clearing. ▪ Minimize vegetation clearing. ▪ See EMP section 4.00 for further mitigation strategies.
Fish and Fish Habitat		
Instream Works	<p>The highway upgrades works include culvert replacements and installations which will involve instream works and placement of riprap to stabilize the banks. Based on the Project activities, Tetra Tech anticipates that a Notification will have to be obtained by PSPC under the <i>Water Sustainability Act</i>.</p> <p>The highway widening works, require that the interceptor ditch is relocated further into the highway ROW. As such, this Project will result in minor impacts to the wetland habitats directly adjacent to the road prism. Since wetlands meet the definition of a “stream” under the WSA, the infilling and relocation of the ditches further into the adjacent wetlands likely triggers a Change Approval.</p> <p>If there is water within the watercourse at the time of construction, the work area must be isolated from flowing water 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 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 Environmental Monitor (EM) must be on site for isolation and fish salvage operations. ▪ If there is no flow/water within the watercourse during the instream works the EM must be available/on-call in case of an emergency. ▪ See EMP sections 3.00 and 7.00 for further mitigation strategies.
Disturbance to Fish	<p>All watercourses assessed were small permanent or intermittent streams with poor to moderate habitat quality. No fish were captured during the field work. Regardless, each stream must be treated as if there is the potential for fish to be found within the watercourse, since these small streams may connect to larger fish-bearing streams downstream. As such, they are still considered “Fish Habitat” under the <i>Fisheries Act</i>.</p> <p>If there is water within the watercourse at the time of construction, the work area must be isolated, and a 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>	<ul style="list-style-type: none"> ▪ Instream work should be timed to occur within the window of least risk for fish in the Project Area (July 15 – August 15) or when water is at its lowest levels. ▪ Tetra Tech understands that some of the Project activities are proposed to occur outside of the Reduced Risk Timing Window during low flow conditions. Given the generally poor habitat quality at each culvert site, it is unlikely that the Project would negatively impact fish or fish habitat if works are conducted outside the reduced risk window as long as the mitigation detailed within this EMP is applied.

Environmental Concern	Project-Specific Considerations	Mitigation Summary*
	<p>The Project should be conducted during the appropriate regulatory timing windows. It is recommended that instream works should be carried out during the reduced risk work windows for streams in northeastern BC. Because the tributaries at the culvert crossing locations flow into watercourses known to contain both spring and fall spawners, the reduced risk work window for the Project is July 15 through August 15 (FLNRORD 2016).</p>	<ul style="list-style-type: none"> ▪ Fish salvages must be conducted after isolation of the work site and before dewatering. ▪ An EM must be on-site during fish salvage operations. ▪ See EMP section 3.00 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 highway upgrades and gravel borrow activities in such a manner that the risk of releasing sediment-laden water into nearby streams is minimized.</p>	<ul style="list-style-type: none"> ▪ Avoid construction during periods of poor weather and phase work appropriately. ▪ The Contractor should prepare an Erosion and Sediment Control (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 EMP section 6.00 for further mitigation strategies.
<p>Vegetation and Invasive Species Management</p>		
<p>Vegetation</p>	<p>Database searches identified no documented occurrences of vegetation SAR within 5 km of the Project.</p> <p>Minimal vegetation removal is expected as a result of this project to facilitate the highway upgrades. The majority of the trees to be removed would be young, early successional species such as Balsam Poplar.</p> <p>After construction is complete, disturbed areas will be seeded with a native grass mixture.</p>	<ul style="list-style-type: none"> ▪ Limit vegetation removal. ▪ Contain gravel borrow activities within the former highway 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. ▪ See EMP section 5.00 for further mitigation strategies.
<p>Non-native or invasive plant spread.</p>	<p>Measures must be taken to prevent the spread of invasive species into or out of the Project area.</p>	<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 EMP section 5.00 for further mitigation strategies.

Environmental Concern	Project-Specific Considerations	Mitigation Summary*
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> . A desktop search of the Project area found no identified archaeological sites nearby.	<ul style="list-style-type: none"> ▪ Retain an Archaeological Monitor provide a site walk-through prior to construction and to be on-call for any ground-disturbance activities and culvert removals. ▪ A Chance Find Protocol (CFP) has been developed for this Project in the event that cultural artifacts or anthropogenic deposits are uncovered during construction (Appendix 2). ▪ See EMP section 13.00 for further mitigation strategies.

*This summary of mitigation measures is not comprehensive. For a full list of mitigation measures, please refer to the EMP (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 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

The BC *Water Sustainability Act* (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 Project activities and recent experience with similar projects, Tetra Tech anticipates that twelve of the watercourses undergoing culvert replacement or installation works will require a *Notification*. Replacement of the three drainage culverts that are not associated with a mapped watercourse, will not require a Notification. Until the 45-day Notification period has passed without comment from FLNRORD, no Project works should be conducted on these watercourses.

The highway widening works, require that the interceptor ditch is relocated further into the highway ROW. As such, this Project will result in minor impacts to the wetland habitats directly adjacent to the road prism (Figure 3). Since wetlands meet the definition of a “stream” under the WSA, the infilling and relocation of the ditches further into the adjacent wetlands likely triggers a Change Approval.

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 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>)	

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 *Environment Management Act*. The 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.

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).

Known Heritage Resources have been investigated along the current highway alignment and at the adjacent former alignments (Soriak – Tetra Tech Canada 2018). No archaeological sites have been identified near the Project; however, 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 EMP (Appendix B).

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* (Government of Canada 2019) came into force on August 28, 2019 and included 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 the death of fish or a HADD if typical best management practices and mitigation (such as those detailed in the appended EMP [Appendix B]) are implemented. Therefore, no DFO Project Review or Authorization has been submitted.

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 SOMC 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 C). Should a SARA-listed species or any other rare species be identified on site prior to or during works, the Canadian Wildlife Service (CWS) 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.

Part of the current highway alignment passes through Boreal Caribou Critical Habitat (established in 2012). Special care should be taken in these areas and the Caribou Protection Plan implemented. Due to the already disturbed nature of the sites (i.e. mowed highway corridor), there will be no change to caribou habitat availability from direct impacts. The highway widening works will involve minor impacts to the wetland habitat directly adjacent to the

highway prism; however, a change in caribou habitat availability is not expected. The PSPC right-of-way corridor is provincial crown land maintained and operated by the federal government. If a change in caribou habitat availability may occur, the Habitat Branch of FLNRORD should be notified to advise on the next steps and provide input on mitigating the potential impacts to caribou.

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 (ECCC).

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 Act 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 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, permits, authorizations, 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, or permits/approvals acquired. Therefore, following selection of the successful Contractor, and acquisition of approvals and permits, the Contractor should prepare an EPP to meet all regulatory terms and conditions detailed or referenced therein. 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. 2020. 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.

5.1 General

1.01	The successful contractor must review this EMP and the applicable guidelines prior to starting the Project.
1.02	The Contractor is responsible for ensuring that a QEP prepares an EPP following the provisions outlined in this EMP.
1.03	All relevant federal and provincial acts, regulations, guidelines, and BMPs will apply to all work and activities associated with the Project.
1.04	The Contractor must be aware of and implement all permitting and approval requirements/conditions.
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.
1.06	Daily tailboard meetings should make reference to environmental issues that may arise and inform new employees about environmental compliance on site.
1.07	Plan and schedule project activities for dry weather whenever possible to minimize potential Erosion and Sediment Control (ESC) issues.
1.08	Ensure Contractors 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.

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.
1.10	All highway upgrade and gravel borrow activities will be maintained within the current and former Alaska Highway alignments, respectively. Upon completion of activities, all equipment, supplies, materials and waste will be removed from the work site.
1.11	All environmental incidents should be reported to the EM, Project Manager (Tetra Tech) the Contractor Site Superintendent, and PSPC’s Environmental Coordinator as soon as possible.
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 Contractors 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

2.01	Mobilization should be planned to minimize the number of trips to and from the site.
2.02	A laydown area for storage of equipment and materials should be established. It should be located on a flat, stable area at least 30 m from the top of bank any nearby watercourses.
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

3.01	The Contractor is responsible for implementing the terms and conditions outlined in the forthcoming WSA Notification/Change Approval. No work can occur before securing the permits, or after the permits expire.
3.02	Ideally, instream work should be timed to occur within the window of least risk for fish in the Project Area (July 15 through August 15) or when watercourses are dry or frozen. 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 construction, instream work can occur outside of the least risk window for fish without consultation of a QEP.
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.
3.04	Any work conducted below the high-water mark must occur in isolation of flow (including at the three 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. Special considerations should be made when infilling and relocating the interceptor ditch (see Section 5.6, mitigation measures 6.05 – 6.08 for more detail), to minimize ESC inputs into nearby watercourses. 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.
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)

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/measures-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).
3.07	All fish and wildlife (e.g., amphibians) 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.
3.08	Equipment and vehicles should avoid crossing watercourses (including the three 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".
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).
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 any watercourse and/or catch basin.
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 if necessary).
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).
3.13	No water should be extracted from any watercourse for Project use.
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 (EMP #6.00) and detailed more fully within the Contractor's ESC Plan.
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 5.5 for additional details).
3.16	No deleterious materials or Project-related debris are allowed to enter any watercourse. Debris generated from the Project must be contained, collected and disposed of properly off-site.
3.17	In the event of any fluid spills or leaks into a watercourse, the Spill Response Plan (Appendix 3) should be enacted and notifications are to begin immediately.

5.4 Protection of Wildlife and Wildlife Habitat

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.
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)

4.03	For highway upgrades occurring within known Caribou ranges, the Contractor is responsible for implementing the provisions outlined in the Caribou Protection Plan (Appendix D of the EOA).
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.
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.
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.
4.07	Wildlife species have been known to roost/den in old 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.
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.
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.
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.
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

5.01	Tree removal should be minimized as much as possible. 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.
5.02	Vegetation removal that will affect 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 EMP # 4.05).
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 soil and plant material (power washed if necessary).
5.04	In areas of known invasive plant infestations, 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.
5.05	Machinery and vehicles should be restricted to defined travel routes to avoid excess trampling/compaction of vegetation and soil. Construction activities should be contained within the current and former Alaska Highway ROWs.
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.

5.07	Vegetated areas disturbed by Project related works (including laydown sites, temporary work sites, and material stock pile 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.
5.08	To prevent soil compaction around the root zone, avoid storing machinery within the drip-line of trees.
5.09	To remediate soil compaction and encourage the re-establishment of native vegetation communities, the former road prism should be scarified and seeded.
5.10	Minimize use of equipment on exposed soils and when possible, restrict vehicle traffic to existing roadways or disturbed areas to avoid unnecessary soil compaction.
5.11	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

6.01	The Contractor is responsible for developing an Erosion and Sediment Control Plan as part of their EPP prior to starting construction.
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.
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 work day. Tracked materials should be removed by sweeping, shoveling, or vacuuming; materials should not be removed by hosing or sweeping sediments into drainage channels.
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.
6.05	The infilling of the existing ditch and excavation of the new ditch should be undertaken when water within the ditch is at its lowest level (i.e., following prolonged periods of no/low precipitation).
6.06	The infilling of the existing ditch must be achieved in such a manner so as to prevent disturbed, sediment-laden water from gaining access to a stream. Preferably, if water will be displaced during the infilling, it should be directed to ground within a topographic low point to allow for natural infiltration.
6.07	The last segments of the new ditch where it ties into a watercourse adjacent to a culvert, should not be excavated until the remainder of the ditch is completed and water within it is free of suspended sediments (i.e., the water has been undisturbed for a sufficient time to allow suspended sediments to settle out and once turbidity readings are comparable to the stream into which the ditch will flow).
6.08	When connecting the new ditch into a stream, flow from the ditch must be introduced gradually so as to avoid a surge of water to enter the stream.
6.09	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.
6.10	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. Work may be stopped completely or works may require additional ESC measures be implemented 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>

6.11	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.
6.12	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.
6.13	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, will be installed within 1 m around the perimeter.
6.14	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.
6.15	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.
6.16	Any exposed soils created as a result of construction must be protected from erosion by implementing the appropriate ESC measures (i.e., ESC blanket, straw etc.)

5.7 Water Quality

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 MOE's (2018) Approved Water Quality Guidelines (BCAWQG) for Aquatic Life, the EM may direct activities, including additional sediment control measures or halting work.
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.
7.03	The BC Aquatic Life Water Quality Guideline (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).
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).
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).
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.
7.07	Debris from the construction activities must not enter adjacent watercourses. Generated debris must be contained, collected and disposed of properly off site.
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 the 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)

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.
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.
8.03	Should garbage containers be required on site, they should be made inaccessible to wildlife, including bear-proof lids.
8.04	Non-hazardous construction waste should be collected at designated areas on the site and removed to appropriate facilities on a regular basis.
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.
8.06	Recycle materials whenever possible.
8.07	Waste materials should not be buried or burned.
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.
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.
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.
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.
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.
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.
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

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.
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, screeds, shovels, rakes, floats, trowels, and wheelbarrows into designated concrete washout areas.
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.
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.
9.05	A carbon dioxide (CO ₂) tank with regulator, hose and gas diffuser should 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.
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.
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.
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

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)
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.
10.03	If feasible, machinery used in proximity to watercourses should use environmentally friendly hydraulic fluids (i.e., biodegradable or vegetable oil based).
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.
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.
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.
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.

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.
10.09	The Contract is responsible for ensuring that site-specific Spill Response Plan is prepared and on-site at all times (Appendix 3).
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.
10.11	All Project personnel should be trained in the use of spill kit materials and supplies and be aware of their location. A spill to ground of a substance that is toxic, polluting, or deleterious to life of reportable quantities must immediately be reported to the EMBC 24-hour phone line at 1-800-663-3456 (see Spill Response Plan, Appendix 3). A spill of any volume 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.
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.
10.13	Hazardous materials and wastes should be stored in covered containers and in secondary containment.
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

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.
11.02	Vehicles or equipment producing excessive exhaust pollution should be repaired or replaced.
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 cannot be withdrawn from surrounding watercourses for this purpose.
11.04	When hauling materials with the potential to generate dust, loads should be tarped to avoid blow-off.
11.05	No burning of oils, rubber, tires and any other material should take place at the site.
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.
11.07	Equipment and vehicles should be turned off when not in active use so to reduce idling.

5.12 Noise and Vibration

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 work place 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
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.
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

13.01	Tetra Tech has developed a Chance Find Procedure (CFP) which should be part of the Contractor’s EPP and enacted in the event that cultural artifacts or anthropogenic deposits (e.g., remains of hearths, dwellings, storage pits) are uncovered during construction (Appendix 2).
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 5-1) for the works proposed in this EMP should be completed as soon as the information is known and made available to all parties. At the time this EMP was completed, PSPC was in the process of preparing tender documents for bidding. The successful contractor should provide details to complete and update this list as part of their EPP.

Table 5-1: Project Contact List

Name	Role	Phone Number	Email
TBD	Contractor Site Superintendent	TBD	TBD
TBD	Contractor’s Environmental Monitor (EM)	TBD	TBD
Charla Arnott	Tetra Tech Archaeological Monitor (AM)	(587) 460-3498	charla@soriakconsulting.com
Laurie Crawford	PSPC Environmental Coordinator	(250) 520-0363	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 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.
- 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 within the isolated work areas, should fish be present at a crossing location.
- 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 this EMP and the contractor's forthcoming Environmental Protection Plan (EPP) are implemented properly and function as intended. The selected contractor will retain a QEP as the environmental monitor (EM) to provide guidance on implementing the recommended measures outlined in the EMP and, if necessary, to develop additional mitigation measures if the need arises.

At a minimum, the EM should visit the Project area prior to the start of construction works to ensure all Project personnel are aware of environmental sensitivities and the requirements of the EMP, as well as to assess that the EPP is effectively implemented. Monitoring should be conducted with greater frequency during periods of inclement weather (i.e., heavy precipitation, strong winds) and during critical stages of the Project. Generally, work within the 30 m buffer of watercourses in which flow is present requires the close oversight of the EM. While the EM is not required to be on site when instream works (i.e., culvert removals) are being conducted on dry streams, it is recommended that the EM be on site when instream works are being conducted within streams (including the interceptor ditches) containing water, as isolation and fish salvage operations will be required in these instances.

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:

- **Compliance Monitoring:** Monitor compliance with the EMP, EPP, permits and other legal requirements;
- **Tailboard Meetings:** Communicate the requirements of the EMP and EPP to the contractors and their respective employees during pre-job and tailboard meetings;
- **Environmental Services:** The EM should provide the required environmental services/components of the Project including fish and/or wildlife salvage;
- **On-Site Monitoring:** Be on site full-time during all critical work periods which includes installation of the Erosion and Sediment Control (ESC) infrastructure, all instream works, work within 30 m of a watercourse, site isolation, fish salvage, and decommissioning/removal of mitigation measures (e.g., isolation infrastructure, ESC measures etc.). The EM should provide part-time monitoring during non-critical work periods at a frequency established between the EM and PSPC and remain on-call (via phone or email) to respond to emerging environmental issues or emergencies. and following any significant rainfall events.
- **Environmental Protection:** 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 species at risk (SAR) are observed in the Project area;
- **Environmental Incidents:** Advise Project personnel if Project activities have caused or are likely to cause an environmental incident and make recommendations for corrective action;
- **Technical Advice:** Liaise directly with Project personnel and provide technical advice to resolve situations that may impact the environment as they arise;
- **Water Quality Monitoring:** Conduct routine field water quality data collection (i.e., turbidity, pH, temperature, conductivity) using portable water quality meters prior to (baseline) and during construction activity near the watercourse. Results will be compared to the British Columbia Approved Water Quality Guidelines for Aquatic Life. If there are exceedances, the EM will direct the contractor to undertake corrective measures or, as necessary, halt works until the EM deems the issue that caused the non-compliance is effectively resolved; and
- **Monitoring Reports:** Complete and submit a Project Environmental Monitoring Report to PSPC at the completion of the Project. Unanticipated adverse effects to the environment will be reported to MOTI 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 Environmental Protection Plan, an EM and an AM 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 contractors 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 PSCP 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;
- Coordinate a site visit by Tetra Tech's AM and the Contractor prior to on-site work starting to review for any concerns and confirm that the Contractor understands all requirements of the Chance Find Protocol;
- Apply for environmental permits on behalf of PSCP required for Project activities;
- Liaise with PSCP's Environmental Coordinator to meet Project objectives; and
- Prepare project design details, drawings, and specifications on PSCP'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 PSCP 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 the construction activities.
- 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;
- 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)	1-250-785-43633
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. Contractors are responsible for completing the EIR and the EM should follow-up with the Contractors 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 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.


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Prepared by:
Elyse Hofs, B.Sc., Dipl.T.
Junior Environmental Scientist
Environment & 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 & Water Practice
Direct Line: 250.756.3966 x240
Nigel.Cavanagh@tetrattech.com

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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:** March 4, 2021
c: **Memo No.:**
From: Elyse Hofs, B.Sc., Dipl.T. **File:** 704-TRN.VHWY03116
Charla Arnott, MSc., RPCA, PMP, RPA
Andrew Horwood, B.Tech., ASCT
Subject: Archaeological Site Chance Find Protocol
Alaska Highway KM 501+000 and KM-509+000 Geometric and Drainage Improvements.

1.0 INTRODUCTION

Tetra Tech Canada Inc. (Tetra Tech) has been retained by Public Services and Procurement Canada (PSPC) to support highway upgrades along an 8 km segment of the current Alaska Highway alignment from KM 501 to KM 509. The proposed works primarily include widening the finished highway roadtop and shoulders, flattening the embankment sideslopes, drainage culvert repairs/replacements/installations, and ditch improvement and erosion protection works. Two adjacent former Alaska Highway alignments have been identified as a potential borrow source for gravel materials for use on the Project. After gravel has been extracted from these former alignment sites, PSPC is going to permanently decommission these two sites.

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). For mapped locations of KM 501-KM 509 of the current Alaska Highway and the two adjacent decommissioning sites, please refer to the Preliminary Archeological Assessment prepared for this Project (Soriak Consulting & Tetra Tech Canada 2018).

The purpose of this 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) ensures employees and contractors understand the regulations 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
Laurie Crawford	PSPC Project Manager / Representative	250.520.0363	Laurie.Crawford@pwgsc-tpsgc.gc.ca
Charla Arnott	Archaeologist, Soriak Consulting & Research Ltd.	780.995.4859	Charla@soriakconsulting.com
Andrew Horwood	Project Manager, Tetra Tech Inc.	778.945.5879	Andrew.Horwood@tetrattech.com

1.2 Preliminary Archaeological Assessment (Desktop Review)

A mapping review of KM 501 to KM 509 of the current alignment, and the two adjacent decommissioning sites was completed to determine the Project's potential to impact previously recorded cultural resource sites. Provincial site data files were obtained, and a review of ground disturbance relative to the Project was completed. No previously recorded archaeological sites are in conflict with the Project. However, potential remains for cultural material to be identified during construction, particularly in areas close to water sources. If cultural material is identified during construction additional assessment will be required and Project revision may be needed.

The findings of this assessment are summarized in the Preliminary Archaeological Assessment memo prepared by Soriak Consulting and Research Ltd. and Tetra Tech for PSPC (Soriak – Tetra Tech Canada 2018).

2.0 EDUCATION

This section ensures employees are aware 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).

No archaeological sites have been identified near the Project; however, it is recommended 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 construction.

There is always a limited possibility for unknown archaeological sites to exist, particularly in proximity to water sources. Archaeological sites (both recorded and unrecorded) protected under the *Act* (as described above) must not be altered or damaged without a site alteration permit issued by British Columbia'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 identified 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:</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 B.C. 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 the course of 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. All archaeological remains encountered at the Project location shall be deemed to be the property of Canada.
6. After consulting with PSPC, the Archaeological Monitor should notify the BC Archaeology Branch at 250-953-3334 for direction.

3.1 Form

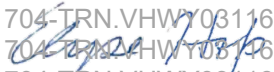
General Information		
Date of Discovery:		
Discovery Made By:		
Other Parties Present:		
Location (UTM):		
Site Description		
What is the closest waterbody (or other identifying feature – KM marker etc.)?		
Describe the Site Characteristics:		
Provide a sketch of the site with appropriate measurements:		
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.

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

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704-TRN.VHWY03116

Prepared by:
Charla Arnott, M.Sc., RPCA, PMP, RPA
Archaeologist, Soriak Consulting & Research Ltd.
Direct Line: 780.995.4859
charla@soriakconsulting.com

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Reviewed by:
Andrew Horwood, B.Tech, AScT
Project Manager
Transportation Group
Direct Line: 604.685.0275
Andrew.Horwood@tetratech.com

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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 A, which should be updated when information is available.

Table A: 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 (Please note there is no 911 service in the NRRD)		Police Emergency: 1-250-774-27777 Fire Emergency: 1-250-774-2222	Emergency Assistance
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 clean-up procedures and residue sampling.
 - All equipment and/or material used in clean-up (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 3). 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.

4.1 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 **1-800-663-3456**. 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*****

4.2 Reportable Spill Quantities

Table B 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 B: 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
21	Waste containing tetrachloroethylene as defined in Section 1 of the Hazardous Waste Regulation	50 kg or 50 L

Table B: Reportable Spill Quantities

Item	Substance Spilled	Specific Amount
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 Representative	<input type="checkbox"/>	Phone/cell:		EM	<input type="checkbox"/>	Phone/cell:	
Tetra Tech Representative	<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 6.3 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 C

SPECIES AT RISK SEARCH RESULTS

BC Species and Ecosystems Explorer Search Results

Scientific Name	English Name	Biogeoclimatic			Status			Provincial FRPA	Land Use Objectives
		Units	Provincial	BC List	Global	COSEWIC	SARA		
<i>Accipiter gentilis atricapillus</i>	Northern Goshawk, <i>atricapillus</i> subspecies	BWBS ESSF ICH IDF MS PP SBPS SBS SWB	S3S4 (2017)	Blue	G5T5 (2016)	NAR (1995)			
<i>Amblyodon dealbatus</i>		BWBS SWB	S3 (2015)	Blue	G3G5 (1991)				
<i>Anaxyrus boreas</i>	Western Toad	BG BWBS CDF CWH ESSF ICH IDF PP SBS SWB	S4 (2016)	Yellow	G4 (2008)	SC (2012)	1-SC (2018)		
<i>Antigone canadensis</i>	Sandhill Crane	BWBS CWH ESSF ICH IDF MS PP SBPS SBS	S4B (2018)	Yellow	G5 (2016)	NAR (1979)		Y	
<i>Aulacomnium acuminatum</i>		BWBS ESSF SWB	S2S3 (2011)	Blue	G4G5 (2012)				
<i>Bartramia longicauda</i>	Upland Sandpiper	BG BWBS CDF CWH ICH IDF SBPS SBS SWB	S2B (2015)	Red	G5 (2016)				
<i>Bos bison athabascaae</i>	Wood Bison	BWBS	S2 (2015)	Red	G4T3Q (2018)	SC (2013)	1-T (2003)		
<i>Bryobrittonia longipes</i>		BWBS MS SBS SWB	S3 (2015)	Blue	G4G5 (2017)				
<i>Buteo platypterus</i>	Broad-winged Hawk	BWBS ICH IDF SBS	S3?B (2015)	Blue	G5 (2016)				
<i>Callophrys niphon</i>	Eastern Pine Elfin	BWBS	S1S3 (2013)	Red	G5 (2016)				
<i>Calopteryx aequabilis</i>	River Jewelwing	BWBS IDF	S3 (2015)	Blue	G5 (2016)				
<i>Cardellina canadensis</i>	Canada Warbler	BWBS CDF CWH	S3S4B (2015)	Blue	G5 (2016)	T (2008)	1-T (2010)		
<i>Carex bicolor</i>	two-coloured sedge	BAFA BWBSdk BWBSmw BWBSvk ESSFmv ESSFmwp ESSFwv IMAutn SWBvk	S3 (2019)	Blue	G5 (2016)				
<i>Carex lapponica</i>	Lapland sedge	BWBSmw	S2S3 (2019)	Blue	G4G5 (2016)				
<i>Chordeiles minor</i>	Common Nighthawk	BG BWBS CDF CWH	S4B (2015)	Yellow	G5 (2016)	SC (2018)	1-T (2010)		

		ESSF ICH IDF MH MS PP SBPS SBS SWB					
<i>Chrosomus eos</i> x <i>Chrosomus neogaeus</i>	Northern Redbelly Dace X Finescale Dace	BWBS	S2 (2019)	Red	GNA (2002)		
<i>Coccothraustes vespertinus</i>	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)
<i>Contopus cooperi</i>	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)
<i>Coregonus artedi</i>	Cisco	BWBS	S2 (2019)	Red	G5 (2015)		
<i>Coregonus autumnalis</i>	Arctic Cisco	BWBS	S1S2 (2019)	Red	G5 (2011)		
<i>Coregonus sardinella</i>	Least Cisco	BWBS	S3 (2019)	Blue	G5 (2017)		
<i>Elymus lanceolatus ssp. psammophilus</i>	sand-dune wheatgrass	BWBSdk	S2S3 (2001)	Blue	G5TNR		
<i>Encalypta mutica</i>		BWBS ICH SWB	S3 (2015)	Blue	G3 (2015)		
<i>Erebia mackinleyensis</i>	Mt.McKinley Alpine	BAFA BWBS SWB	S1S3 (2013)	Red	G5 (2016)		
<i>Erebia pawloskii</i>	Yellow-dotted Alpine	BWBS SWB	S1S3 (2013)	Red	G5 (2016)		
<i>Euphagus carolinus</i>	Rusty Blackbird	BG BWBS CDF CWH ESSF MS PP SBPS SBS SWB	S3S4B (2015)	Blue	G4 (2016)	SC (2017)	1-SC (2009)
<i>Falco rusticolus</i>	Gyr Falcon	BAFA BG BWBS CDF CWH ICH IDF SBPS SBS SWB	S3S4B, SNRN (2015)	Blue	G5 (2016)	NAR (1987)	
<i>Gulo gulo</i>	Wolverine	BAFA BWBS CMA CWH ESSF ICH IDF IMA MH	S3 (2015)	No Status	G4 (2016)	SC (2014)	1-SC (2018)

		MS SBPS SBS SWB						
<i>Gulo gulo luscus</i>	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
<i>Hiodon alosoides</i>	Goldeye	BWBS	S3 (2019)	Blue	G5 (2017)			
<i>Hirundo rustica</i>	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)	
<i>Ischnura damula</i>	Plains Forktail	BWBS ICH	S1S3 (2015)	Red	G5 (2016)			
<i>Lycaena hyllus</i>	Bronze Copper	BWBS ESSF ICH MS	S3 (2013)	Blue	G5 (2013)			
<i>Meesia longiseta</i>		BWBS ESSF MS SBS SWB	S3 (2015)	Blue	G5 (2012)			
<i>Melanitta perspicillata</i>	Surf Scoter	BG BWBS CDF CWH ICH IDF MS PP SBPS SBS SWB	S3B,S4N (2015)	Blue	G5 (2016)			
<i>Myotis lucifugus</i>	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)	
<i>Myotis septentrionalis</i>	Northern Myotis	BWBS ICH MH SBS	S3S4 (2015)	Blue	G1G2 (2016)	E (2013)	1-E (2014)	
<i>Notropis hudsonius</i>	Spottail Shiner	BWBS	S1S2 (2019)	Red	G5 (2015)			
<i>Oeneis philipi</i>	Philip's Arctic	BWBS SWB	S1S3 (2013)	Red	G3G5 (2009)			
<i>Oporornis agilis</i>	Connecticut Warbler	BWBS CWH	S3B (2015)	Blue	G4G5 (2016)			Y
<i>Orthotrichum speciosum</i> var. <i>elegans</i>		BWBS	S2S3 (2011)	Blue	G5 (2015)			

<i>Oxytropis campestris</i> var. <i>davisii</i>	Davis' locoweed	BAFA BWBSdk BWBSmw CMA IMA SBSmh SWBmk	S3? (2019)	Blue	G5T3 (2015)			
<i>Oxytropis campestris</i> var. <i>jordalii</i>	Jordal's locoweed	BAFA BWBSdk BWBSvk CMA SBSmk	S3? (2018)	Blue	G5T4 (1997)			
<i>Oxytropis scammaniana</i>	Scamman's locoweed	BWBSmw SBSun SWBun SWBuns	S2S3 (2019)	Blue	G4 (2016)			
<i>Pekania pennanti</i>	Fisher	BAFA BWBS CDF CMA CWH ESSF ICH IDF IMA MH MS PP SBPS SBS SWB	S3 (2015)	Blue	G5 (2016)			Y
<i>Penstemon gormanii</i>	Gorman's penstemon	BWBSdk	S3? (2019)	Blue	G4 (2016)			
<i>Phyciodes batesii</i>	Tawny Crescent	BWBS SWB	S3 (2013)	Blue	G5 (2017)			
<i>Physella wrighti</i>	Hotwater Physa	BWBS	S1 (2015)	Red	G1Q (2015)	E (2008)	1-E (2003)	
<i>Planorbula armigera</i>	Thicklip Rams-horn	BWBS	S1S3 (2015)	Red	G5 (2017)			
<i>Plebejus optilete</i>	Cranberry Blue	BWBS MH SBPS SBS SWB	S3S4 (2013)	Blue	G5 (2016)			
<i>Polemonium boreale</i>	northern Jacob's-ladder	BAFA BWBSdk BWBSvk CMA ESSFmv IMA	S3 (2019)	Blue	G5 (2016)			
<i>Rangifer tarandus</i>	Caribou	BAFA BWBS ESSF ICH IMA MH SBS	S3? (2015)	No Status	G5 (2016)			Y
<i>Rangifer tarandus</i> pop. 14	Caribou (Boreal Population)	BWBS	S2? (2017)	Red	G5TNR	T (2014)	1-T (2003)	Y
<i>Rangifer tarandus</i> pop. 15	Caribou (Northern Mountain Population)	BWBS ESSF MH SBS	S2S3 (2017)	Blue	G5T4T5 (2013)	SC (2014)	1-SC (2005)	Y
<i>Salix petiolaris</i>	meadow willow	BWBSdk BWBSmw SBSdh	S3 (2019)	Blue	G5 (2015)			
<i>Salix raupii</i>	Raup's willow	BWBSdk BWBSmw SWBmk SWBun	SH (2019)	Red	G3 (2016)			
<i>Salvelinus confluentus</i>	Bull Trout	BG BWBS CWH ESSF ICH IDF MS PP SBPS	S3S4 (2018)	Blue	G5 (2017)	SC (2012)		Y

		SBS SWB						
<i>Sarracenia purpurea</i> ssp. <i>purpurea</i>	common pitcher-plant	BWBSmw	S2? (2019)	Red	G5T5 (2016)			
<i>Schistidium pulchrum</i>		BWBSdk BWBSmw SWBmk	S3 (2015)	Blue	GU (2015)			
<i>Schistidium trichodon</i>		BAFA BWBS CMA CWH SWB	S3 (2015)	Blue	G2G4 (2000)			
<i>Setophaga castanea</i>	Bay-breasted Warbler	BWBS CWH ICH MS SBS	S2B (2015)	Red	G5 (2016)			Y
<i>Setophaga tigrina</i>	Cape May Warbler	BWBS MS SBS	S3S4B (2018)	Blue	G5 (2016)			Y
<i>Setophaga virens</i>	Black-throated Green Warbler	BWBS CDF CWH ESSF ICH SBS	S3B (2015)	Blue	G5 (2016)			Y
<i>Silene repens</i>	pink campion	BAFA BWBSmw	S2S3 (2019)	Blue	G5 (2016)			
<i>Somatochlora kennedyi</i>	Kennedy's Emerald	BWBS ESSF MS SBPS SBS SWB	S3S4 (2015)	Blue	G5 (2015)			
<i>Splachnum vasculosum</i>		BWBS SBS	S2S3 (2015)	Blue	G4G5 (2015)			
<i>Stenodus leucichthys</i>	Inconnu	BWBS CWH	S3 (2019)	Blue	G5 (2016)			
<i>Tephrosieris palustris</i>	marsh fleabane	BWBSdk BWBSmw	S3 (2019)	Blue	G5 (2016)			
<i>Timmia norvegica</i>		BAFA BWBS SBS SWB	S3 (2015)	Blue	G5 (2015)			
<i>Ursus arctos</i>	Grizzly Bear	BAFA BWBS CMA CWH ESSF ICH IDF IMA MH MS SBPS SBS SWB	S3? (2015)	Blue	G4 (2016)	SC (2002)	1-SC (2018)	Y
<i>Utricularia ochroleuca</i>	ochroleucous bladderwort	BWBSdk CDFmm ESSFmv ICHmw	S2S3 (2019)	Blue	G4G5 (2016)			
<i>Warnstorfia tundrae</i>		BAFA BWBS ICH SWB	S2 (2015)	Red	G5 (2015)			

Search Summary

Time Performed Mon Sep 30 13:26:30 PDT 2019

Results 72 records.

Search Criteria Animals OR Plants
AND Forest Districts: Fort Nelson Forest District (DFN) (Restricted to Red, Blue, and Legally designated species)
AND Regional Districts: Northern Rockies (NRRM)
AND BGC Zone:
Sort Order: Scientific Name Ascending

Notes 1. Citation: B.C. Conservation Data Centre. 2019. BC Species and Ecosystems Explorer. B.C. Minist. of Environ. Victoria, B.C. Available: <http://a100.gov.bc.ca/pub/eswp/> (accessed Sep 30, 2019).

2. Forest District, MoE Region, Regional District and habitat lists are restricted to species that breed in the Forest District, MoE Region, Regional District or habitat (i.e., species will not be placed on lists where they occur only as migrants).

3. The data contained in the Results Export in BCSEE are provided under the [Open Government License - BC](#).

[Modify Search](#) | [New Search](#) | [Results](#)

APPENDIX D

CARIBOU PROTECTION PLAN

Caribou Protection Plan Geometric and Drainage Improvements KM 501+000 to KM 509+000, Alaska Highway, BC



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Public Services and Procurement Canada

MARCH 4, 2021
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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 (PSPC) 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 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 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) to supplement the Environmental Management Plan (EMP) being prepared for highway upgrades along an 8.0 km section of the existing Alaska Highway (herein referred to as the “Project”). This Project is located east of Kledo Creek, west of Fort Nelson, in northeast British Columbia (BC).

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 BC 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 can be found 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 BC 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 (i.e., 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 length of highway between KM 501 and KM 509 intersects with the ranges of two Woodland Caribou herds: the Parker herd and the Muskwa herd. The Parker herd is part of the boreal caribou ecotype and the Muskwa herd belongs to the northern mountain caribou ecotype (Figure 1).

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).

Boreal caribou are non-migratory and can be found at low-elevations in muskegs, peatlands and black spruce forests. Female boreal caribou calve in undisturbed swamps and wetlands and disturbance to these calving habitats can be highly detrimental to population numbers due to the site fidelity shown by reproducing females (FLNRORD 2014).

Regardless of ecotype, 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.

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).

Part of the current highway alignment passes through Boreal Caribou Critical Habitat (established in 2012). Special care should be taken in these areas and the Caribou Protection Plan implemented. Due to the already disturbed nature of the sites (i.e. mowed highway corridor), there will be no change to caribou habitat availability from direct impacts. The highway widening works will involve minor impacts to the wetland habitat directly adjacent to the highway prism; however, a change in caribou habitat availability is not expected.

The PSPC right-of-way corridor is provincial crown land maintained and operated by the federal government. If a change in caribou habitat availability may occur, the Habitat Branch of FLNRORD should be notified to advise on the next steps and provide input on mitigating the potential impacts to caribou.

Neither of the two decommissioning sites located between KM 501 to KM 509 fall within the Parker Range critical caribou habitat; however, the decommissioning sites are located immediately to the north and west of the critical habitat (Figure 1). Due to their proximity to critical habitat, special care should be taken when working at these two sites to avoid harm to caribou habitat.

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). An approved UWR (# u-9-010) that was established for Boreal Caribou is located east of the Project location (Figure 1). If work is to occur within this area, the General Wildlife Measures (GWM) outlined in the UWR order should be followed (FLNRORD 2011a). No work is anticipated in the UWR as the decommission sites are located 5 km to the west of the UWR (Figure 1).

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 BC Government considers critical habitat (i.e., necessary to fulfill the habitat requirements) of Identified Wildlife. To protect the critical habitats 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, and deactivation of former highway alignments (PSPC n.d.). PSPC’s current operational jurisdiction of the Alaska Highway extends from KM 133 (north of Fort St. John) to the BC-Yukon border at Km 968.

PSPC retained Tetra Tech to provide engineering services for highway upgrades along an 8.0 km section of the existing Alaska Highway. Gravel will be removed from nearby former alignment sites for the highway upgrades on the current alignment. The two former alignment sites are located at KM 501.05 – KM 504.50 and KM 504.45 – KM 508.80 (Figure 1).

Inside caribou range, the Project occurs entirely within the current and former Alaska Highway rights-of-way. Habitats immediately adjacent to roads are effectively lost to many species (Jalkotzy and Nasserden 1997), including caribou. Anticipated Project-related effects on caribou and caribou habitat are limited due to the Project’s location on or immediately adjacent to the Alaska Highway. Nonetheless PSPC is committed to mitigating Project-related effects to caribou and caribou habitat.

3.1 Project Activities

The Alaska Highway between KM 501+000 and KM 509+000 will receive geometric and drainage improvements in preparation for future asphalt paving of the highway at this location. The geometric and drainage improvements will address existing safety concerns (i.e., traveled lane width and clear zone), increase drainage capacity, mitigate

existing and future erosion issues, provide a more reliable highway infrastructure, improve safety for the travelling public, and reduce ongoing maintenance costs to PSPC. The anticipated construction activities are likely to include:

- Stripping of vegetation and organic soils, stockpiling of stripped materials for reuse as topsoil, and isolated tree clearing to facilitate construction;
- Shoulder widening to achieve a finished road top width of 10.7 m (currently < 10 m), including supply, placement and compaction of embankment, sub-base course and crushed base gravel. The former Alaska Highway roadbed adjacent to the site will be used as a source of embankment materials;
- Flattening the embankment side slopes to 3V:1H (currently steeper than 2-2.5H:1V);
- Completing drainage improvements, including:
 - Installation of five steel pipe culverts at existing drainages not serviced by an existing culvert sized to convey flows anticipated from a 100-year rainfall event;
 - Replacement of 10 existing Corrugated Steel Pipe (CSP) culverts with new, larger steel pipe culverts sized to convey flows anticipated from a 100-year rainfall event;
 - Extending one existing steel pipe liner;
 - Infilling old CSP culverts with grout; and
 - Installation of ditch blocks and erosion protection to mitigate erosion issues within the existing interceptor ditch.
- Relocating the existing interceptor ditch in locations it conflicts with the proposed highway embankment. The existing interceptor ditch will be infilled with Common Fill and a new ditch excavated further from the highway to the same invert elevation;
- Signage installations and utility relocations; and
- Placing topsoil and hydroseeding all disturbed areas, riparian zones within the limits of construction.

Standard heavy equipment will be used throughout construction for various activities listed above. These may include excavators, dozers, trucks, graders, rollers, etc. The location and size of staging and laydown areas and construction material and debris stockpiles will be determined through detailed design phase of the Project. During construction, the Alaska Highway will remain fully operational with at least single-lane traffic maintained at all times.

3.2 Project Footprint in Caribou Range

The total Project footprint is 157.15 ha and this area is split between the current (73.93 ha) and former (83.21 ha) alignments. The length of highway between KM 501 and KM 509 intersects with the ranges of the Parker herd and the Muskwa Herd. Inside caribou range, the total Project footprint is 98.91 ha. Of this area, 18.34 ha along the current highway alignment falls within the Boreal Caribou SARA-listed Critical Habitat (i.e., Parker Range). The remaining 80.57 ha (split between current and former alignments) is within the range of the Northern Mountain Caribou (Figure 1). The gravel mining, culvert replacements and paving activities will occur entirely within the former and current Alaska Highway rights-of-way to avoid new impacts to caribou habitat.

3.3 Project Schedule

PSPC anticipates the construction tender to be awarded to the successful Contractor in the Spring of 2021. Construction is expected to be completed over several months and anticipated to be completed by Fall 2021. This means that the construction will be completed within all three risk periods for Woodland Caribou (see CPP #1.3 in Section 4.0). Special care should be taken for activities conducted between January 15 and July 15 as this falls within the critical risk period (i.e., calving season).

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 occur near the Alaska Highway during the proposed Project activities (starting in the spring of 2020). During this time, caribou may be directly affected and disturbed by (i.e., flee) and or displaced (i.e., partial avoidance) from habitats by Project activities such as sustained or repeated noise or light disturbances. Behavioral response to Project activities may vary depending on the frequency, timing, and severity of the disturbing activity. Caribou, especially pregnant cows and young calves, are particularly sensitive to disturbances from late winter to early summer.

Indirectly, Project activities may affect caribou through land developments and activities that change caribou habitat quality (e.g., hydrology changes), quantity (i.e., direct habitat loss), distribution (e.g., habitat fragmentation), and or availability. Landscape changes as a result of the Project (i.e., removal of vegetation and/or revegetation) have the potential to expand predator distribution, enhance predator hunting efficiency (i.e., increase travel speeds), and increase alternate prey (e.g., moose, deer, elk) populations. These have the potential to indirectly increase caribou mortality risk.

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 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 (FLNRORD 2014);
- Recovery Strategy for the Woodland Caribou (*Rangifer tarandus caribou*), Boreal population, in Canada (ECCC 2012a);
- Interim Operating Practices for Oil and Gas Activities in Identified Boreal Caribou Habitat in British Columbia (FLNRO 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 2.

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).
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 decommissioning 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"> ▪ Deactivate the roads in a condition that discourages motorized access and passage by predators.
2.6	<ul style="list-style-type: none"> ▪ Sequence to avoid/reduce repeat operations or multiple entries in caribou range.
2.7	<ul style="list-style-type: none"> ▪ Prohibit workers feeding, harassing, and approaching wildlife.
2.8	<ul style="list-style-type: none"> ▪ Prohibit temporary work camps inside caribou range to minimize predator attraction.
2.9	<ul style="list-style-type: none"> ▪ Prohibit firearms or hunting and fishing by workers.
2.10	<ul style="list-style-type: none"> ▪ Avoid idling equipment and trucks.
2.11	<ul style="list-style-type: none"> ▪ Ensure all exhaust systems have mufflers and all equipment operates as per specifications.

CPP #	Mitigation Measures
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 and former 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 decommissioning 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"> ▪ When possible, retain visual buffers that will obstruct the line of sight along linear features. This could include minimizing vegetation clearing or strategically placing boulders/planted trees within the former highway ROW after decommissioning activities have been completed.
3.13	<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.


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FILE: 704-TRN.VHWY03116

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

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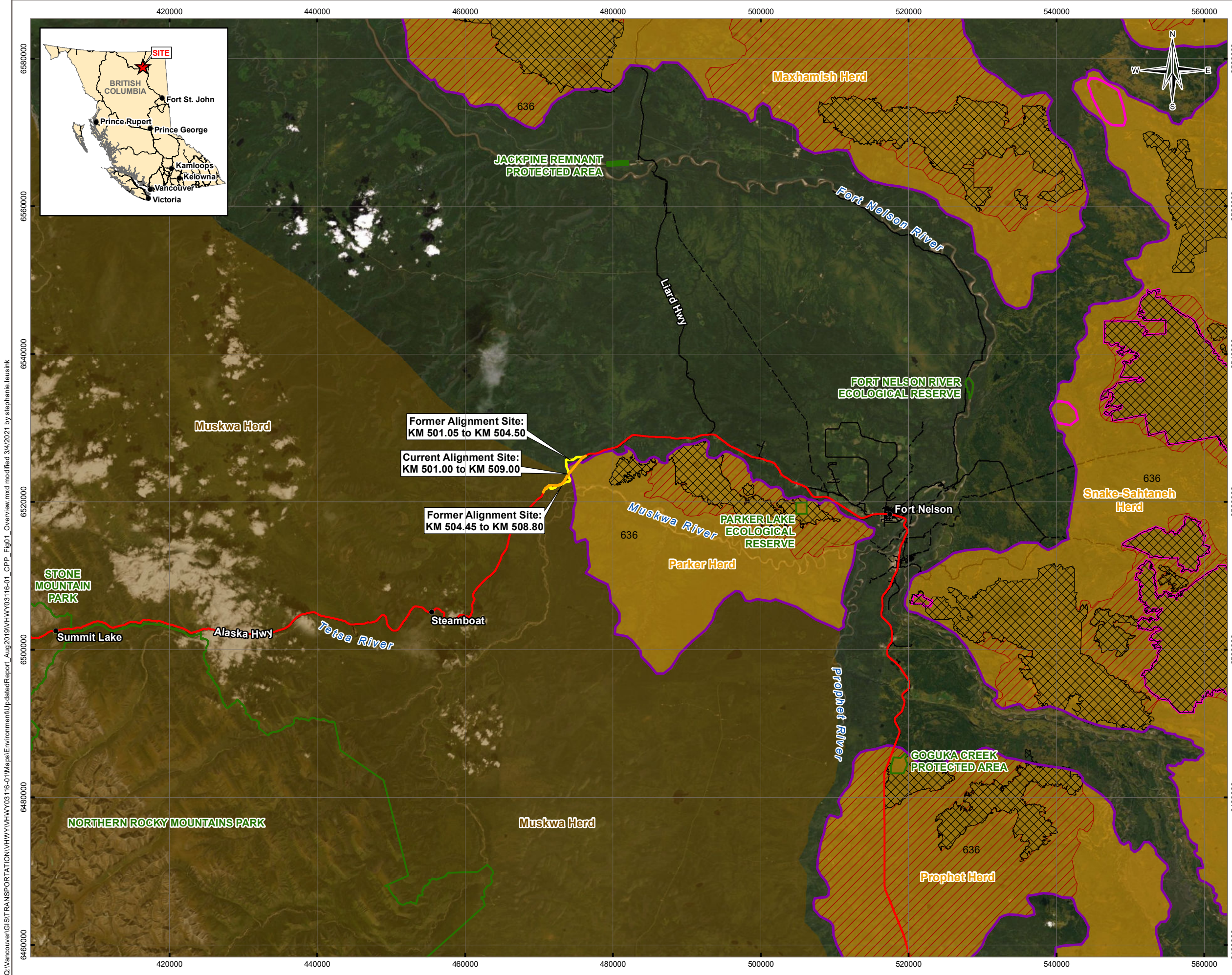
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FIGURES

Figure 1 Project Location Overview



LEGEND

- Current Alaska Highway Centerline - KM 501-509
- Former Alaska Highway Alignment - Priority Site
- Alaska Highway
- Populated Place
- Road
- Resource/Recreational Road
- Park or Protected Area

Caribou Distribution

- Boreal Caribou Herd
- Northern Mountain Caribou Herd

Critical Habitat for Species at Risk

- Boreal Caribou

Core Wildlife Habitat Area for Species at Risk

- Boreal Caribou

Ungulate Winter Range

- No Harvest Zone
- Conditional Harvest Zone

NOTES
 Base data sources:
 Caribou Distribution, SARA Critical Habitat Wildlife Habitat Areas, and Ungulate Winter Range from DataBC (accessed Jan 2019).
 Imagery from ESRI; DigitalGlobe.

STATUS
 ISSUED FOR USE

**KM 501-509
 ALASKA HIGHWAY**

Project Location Overview

PROJECTION UTM Zone 10	DATUM NAD83	CLIENT Public Services and Procurement Canada
Scale: 1:500,000 		
FILE NO. VHWY03116-01_CPP_Fig01_Overview.mxd		
OFFICE TL-VANC	DWN SL	CKD YL
DATE March 4, 2021	APVD EH	REV 0
PROJECT NO. TRN.VHWY03116-01		Figure 1

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APPENDIX 1

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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.

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

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

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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

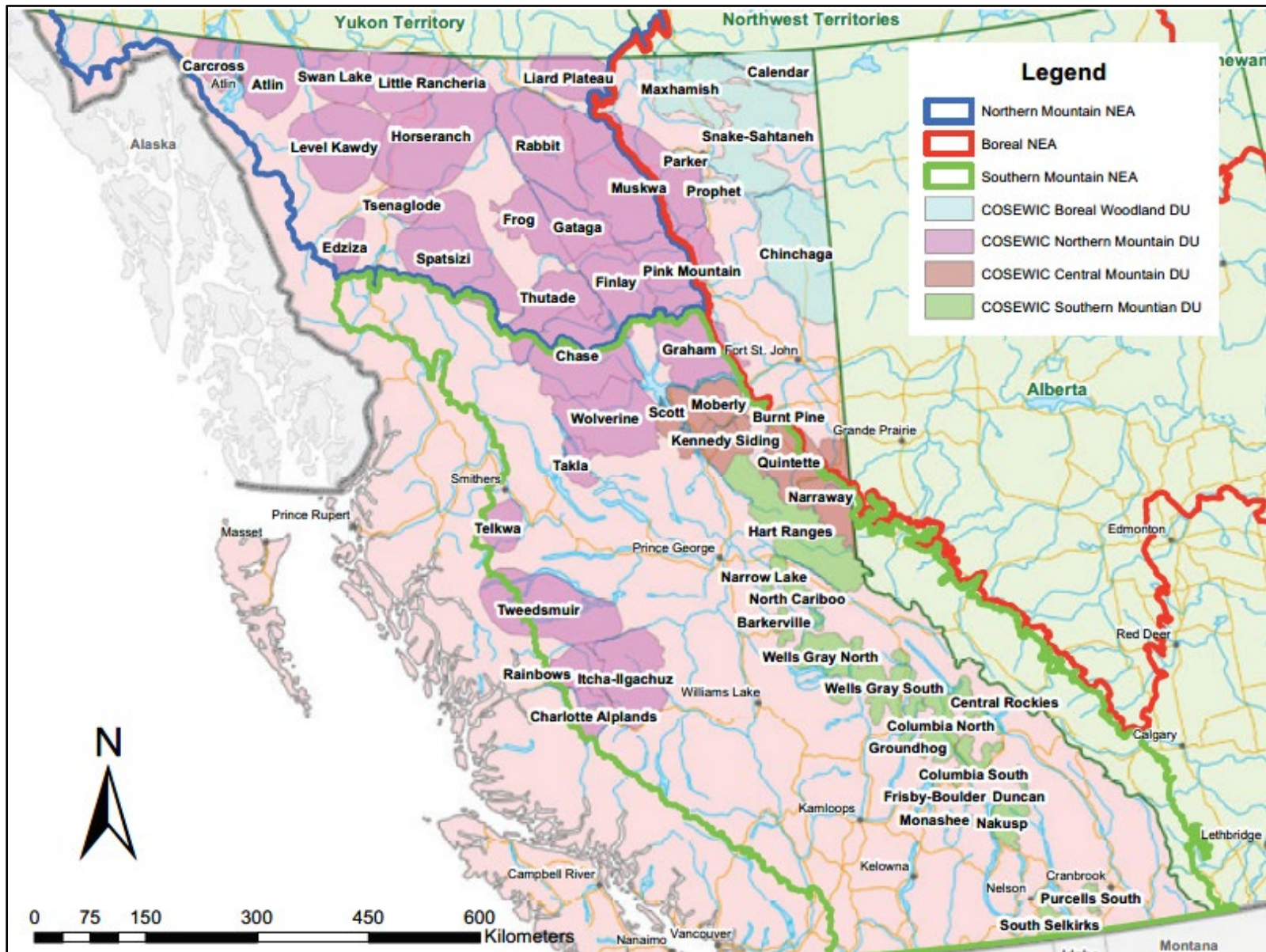
TETRA TECH professionals are bound by their ethical commitments to act within the bounds of all pertinent regulations. In certain instances, observations by TETRA TECH of regulatory contravention may require that regulatory agencies and other persons be informed. The client agrees that notification to 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]. 2018a. 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 E

ENGINEERING DESIGN DRAWINGS & ROW ACQUISITION SKETCHES



**Public Services and
Procurement Canada**

**Services publics et
Approvisionnement Canada**

**KM 501 - KM 509
GEOMETRIC AND DRAINAGE
IMPROVEMENTS
ALASKA HIGHWAY, BC**

**ALASKA HIGHWAY
BRITISH COLUMBIA**

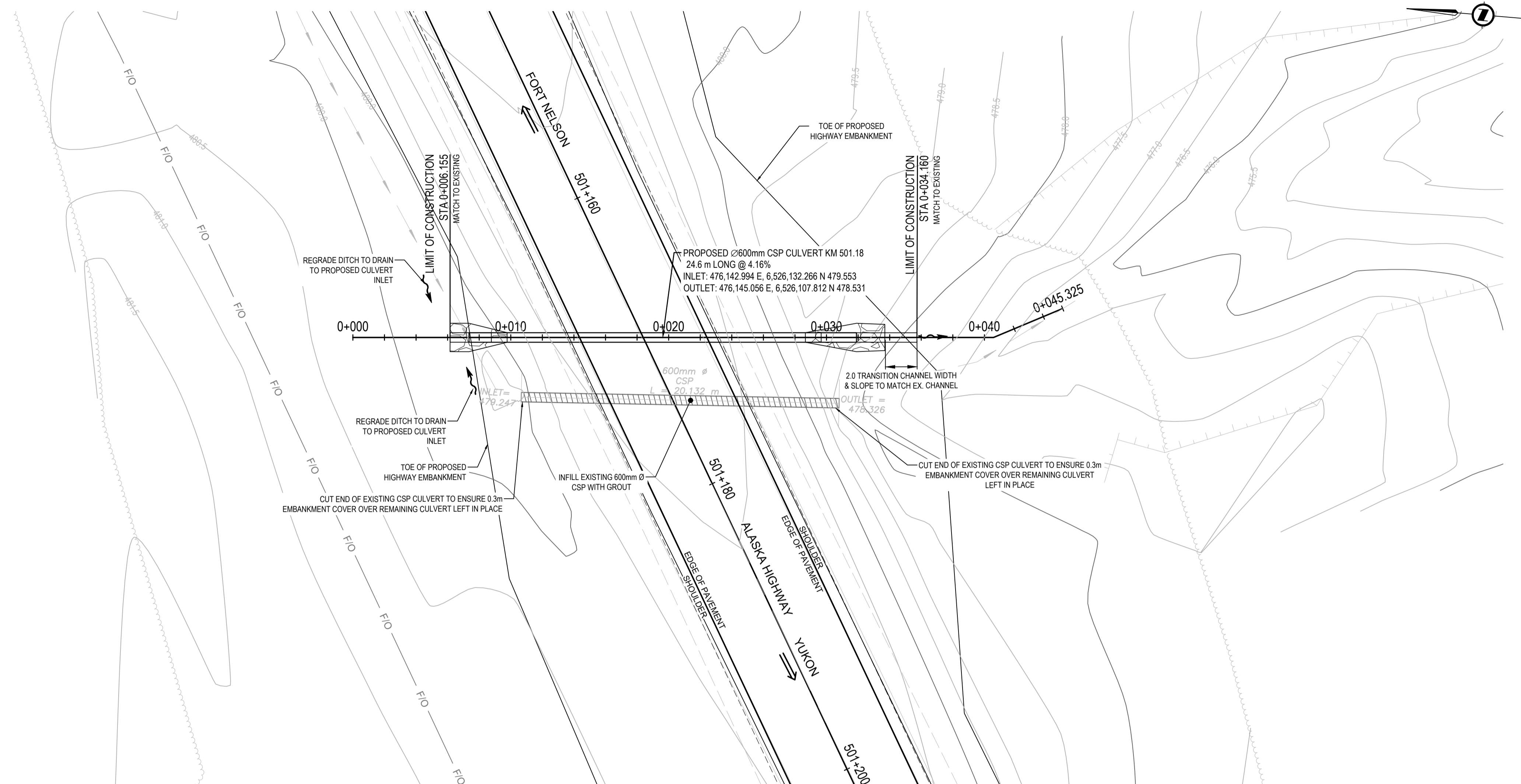


PROJECT No. R.017173.216

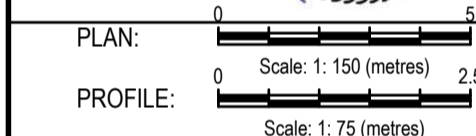
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MARCH 8, 2021**

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 3. HYDROSEED ALL DISTURBED AREAS.
 4. REFER TO DRAWINGS C501 TO C505 FOR CONSTRUCTION STAGING DETAILS.



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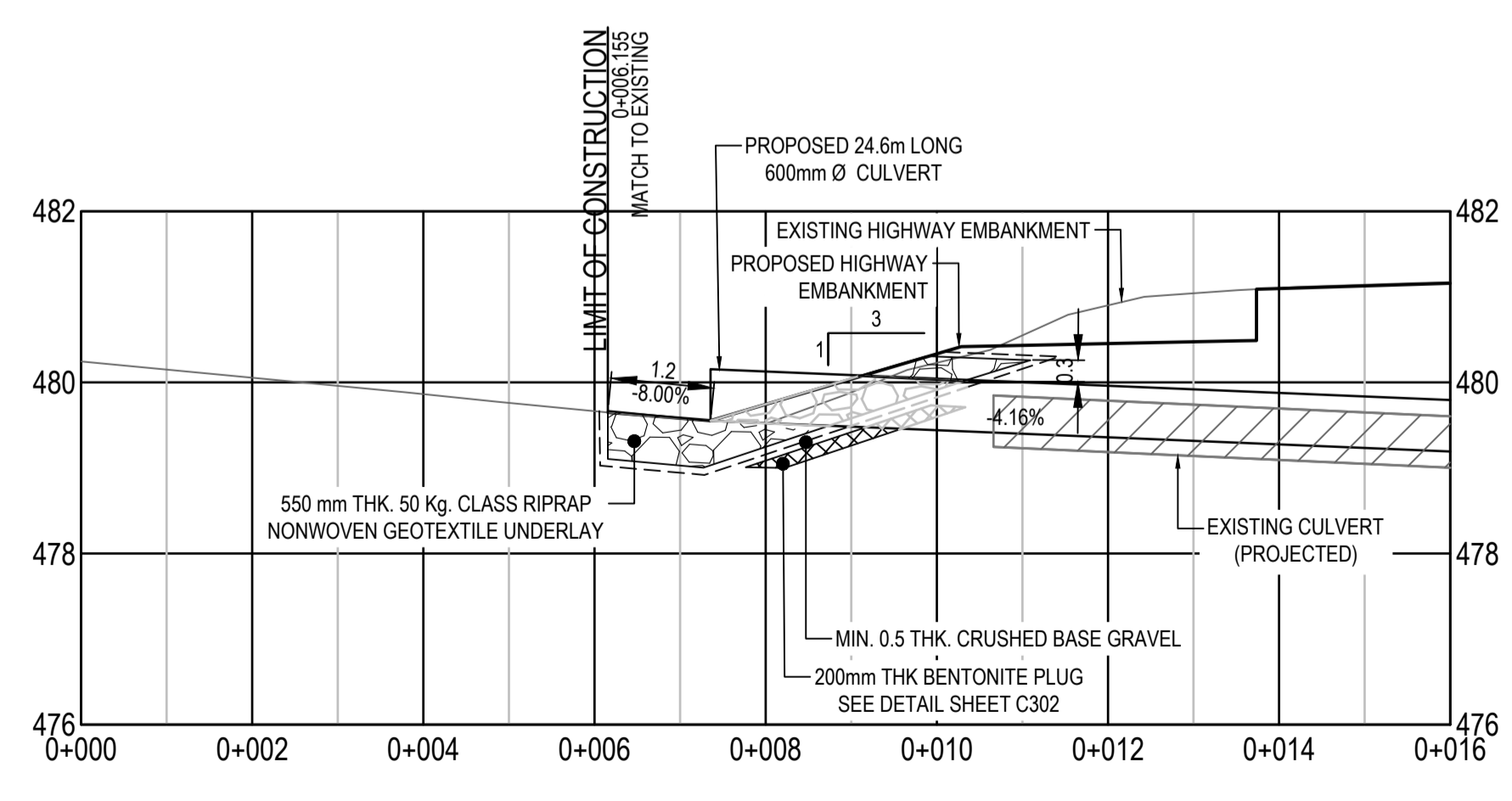


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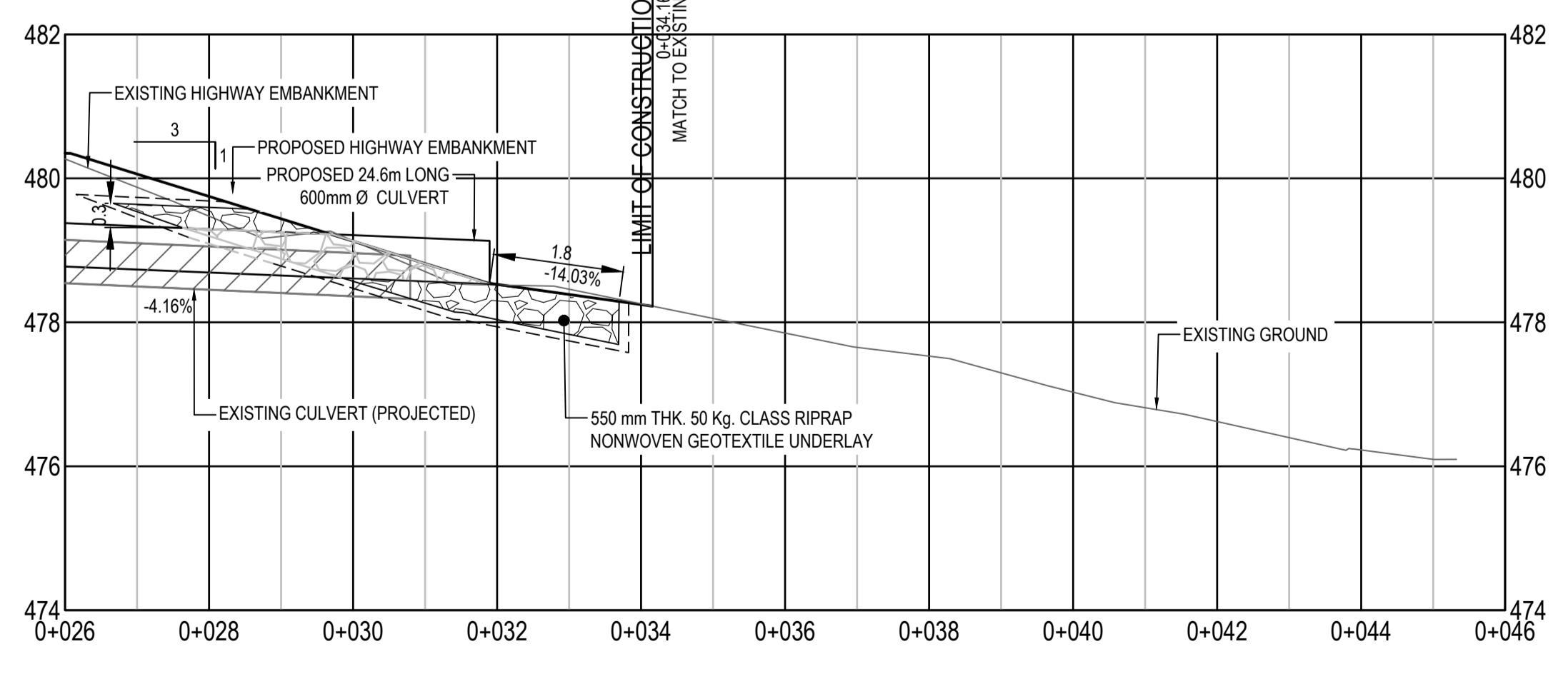
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S. LI
Designed by/Concepté par
M. KELEHER / T. CLENDENING
Drawn by/Dessiné par
P. SAMOLIA
PSPC Project Manager/Administrateur de Projets SPAC
A. TAHERI
PSPC Architectural and Engineering Resources Manager/
Ressources Architectural et de Directeur d'ingénierie, SPAC

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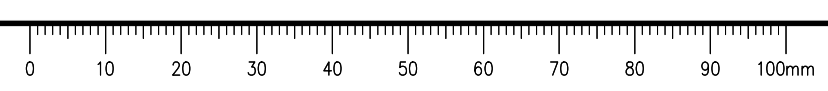
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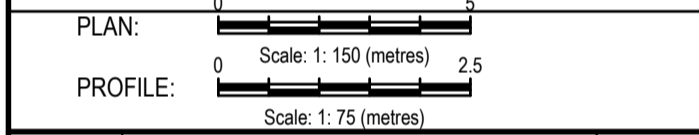
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 3. HYDROSEED ALL DISTURBED AREAS.
 4. REFER TO DRAWINGS C501 TO C505 FOR CONSTRUCTION STAGING DETAILS.



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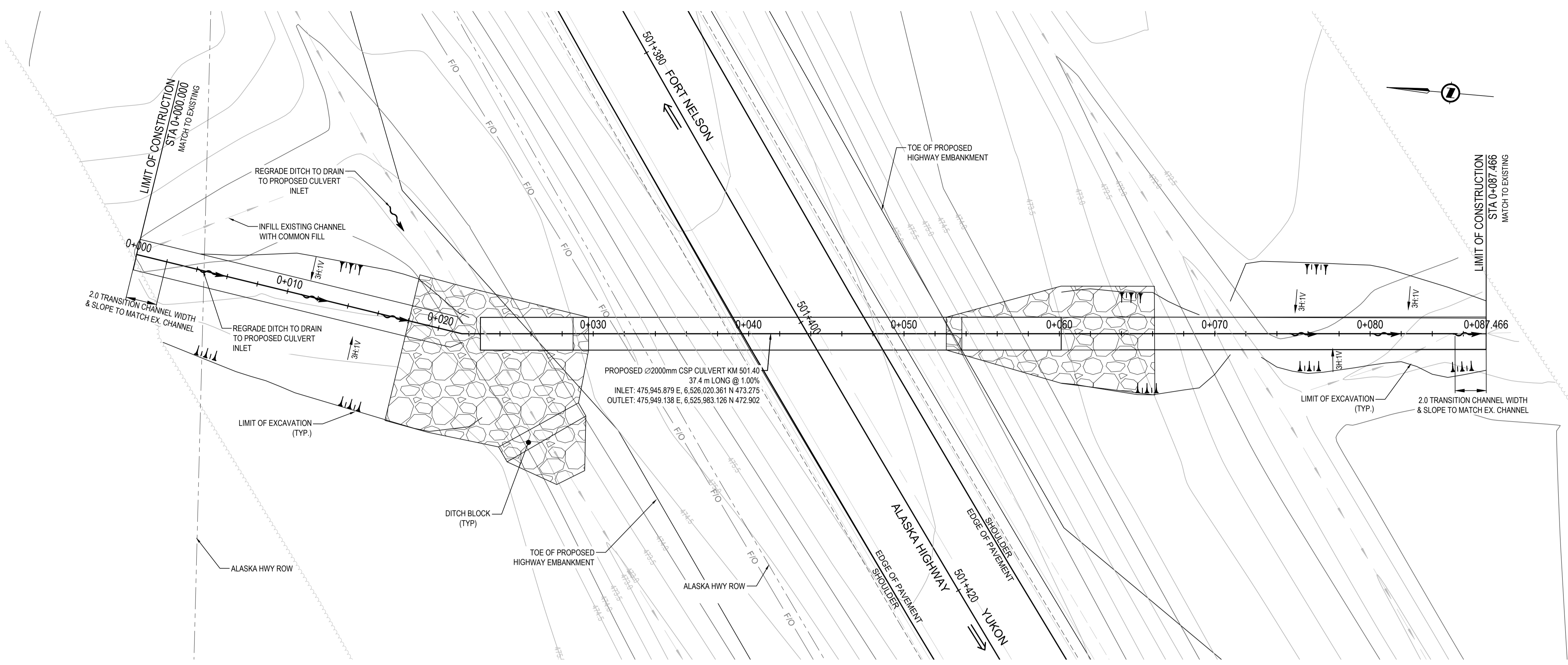
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IMPROVEMENTS
ALASKA HIGHWAY, BC**

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 Designed by/Concept par: **M. KELEHER / T. CLENDENING**
 Drawn by/Dessiné par: **P. SAMOLIA**
 PSPC Project Manager/Administrateur de Projets SPAC: **A. TAHERI**
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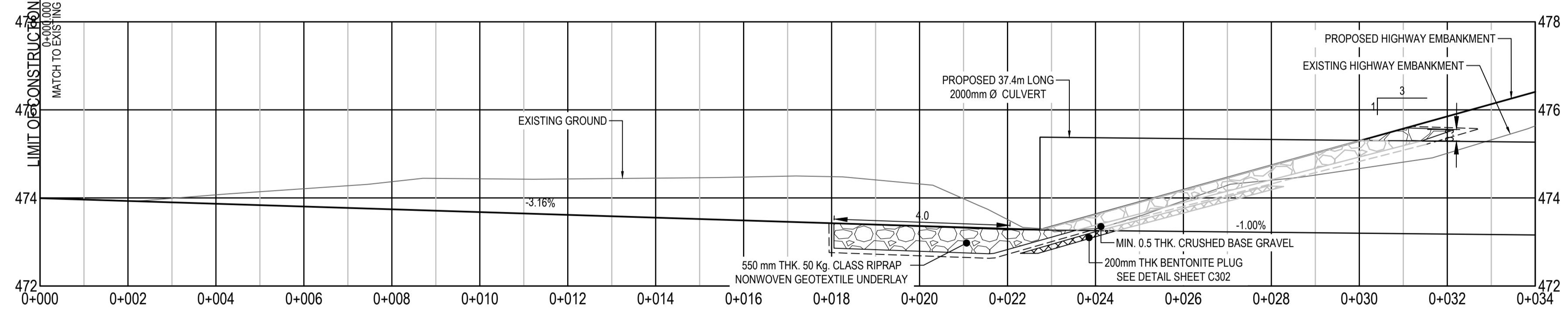
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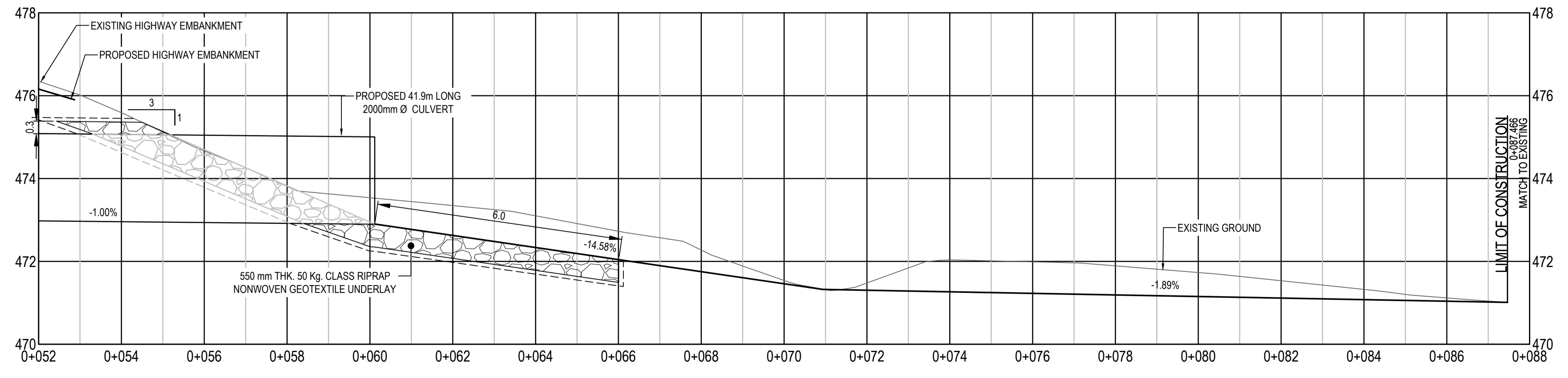
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R.017173.216	C202	A



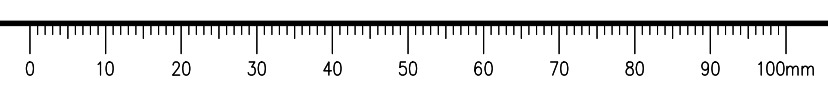
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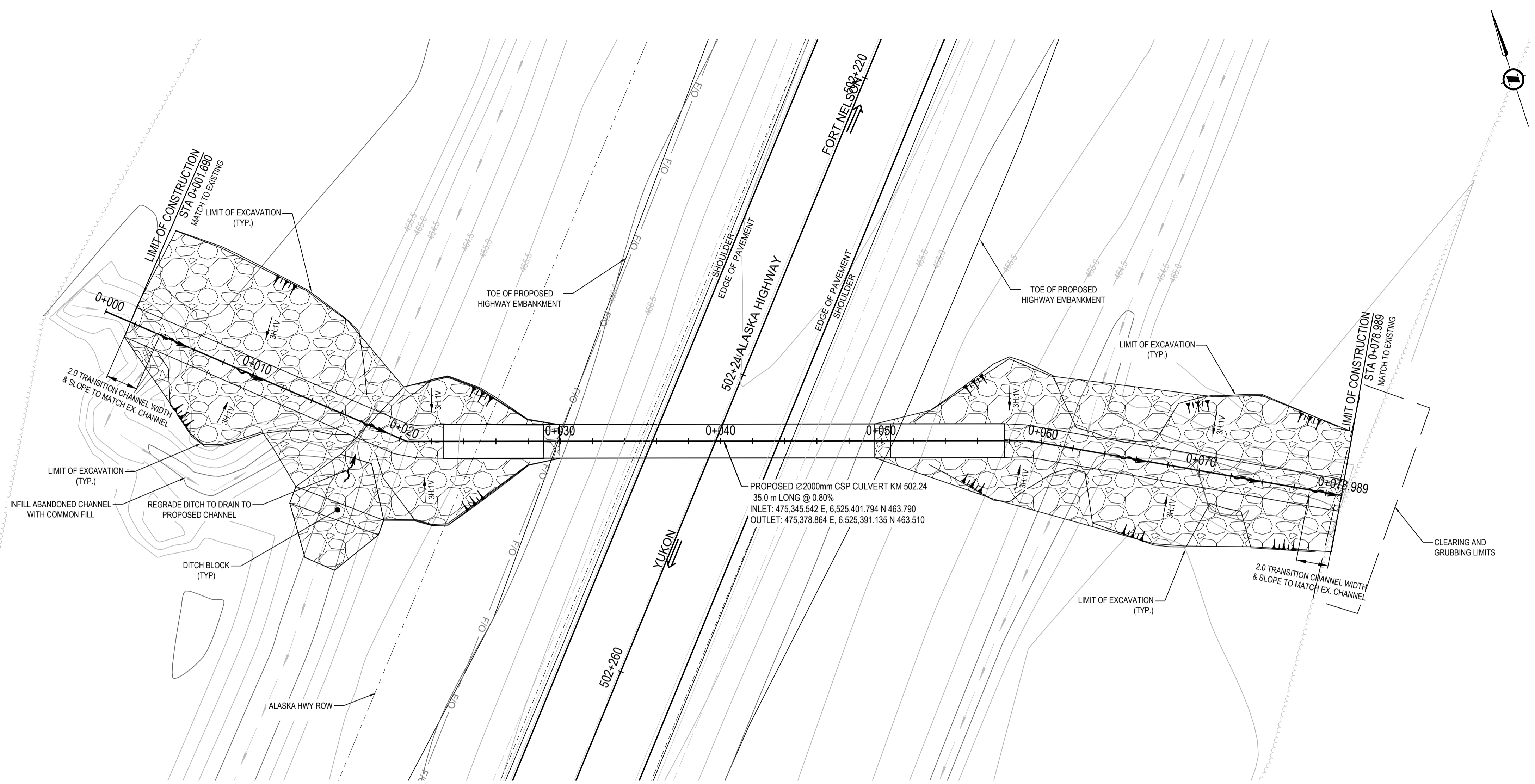
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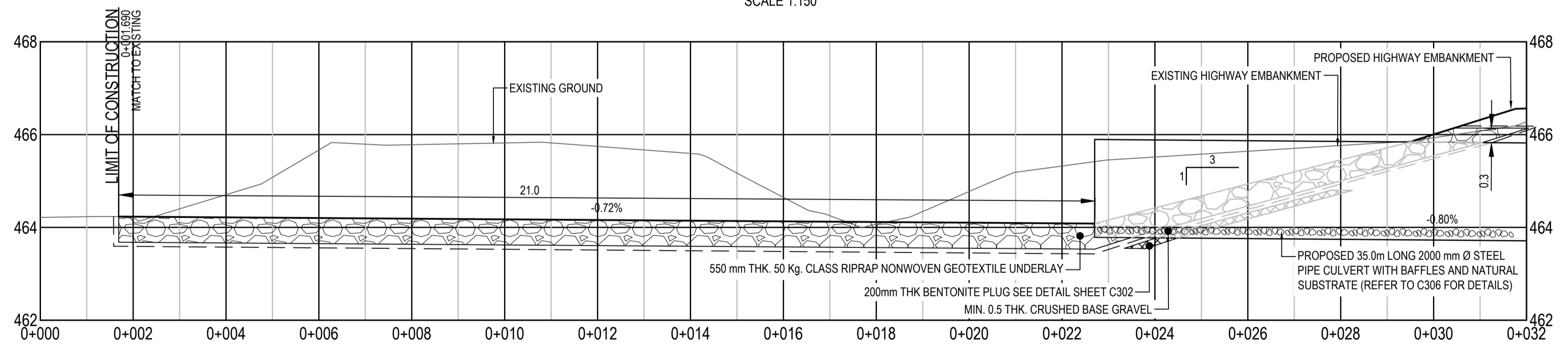
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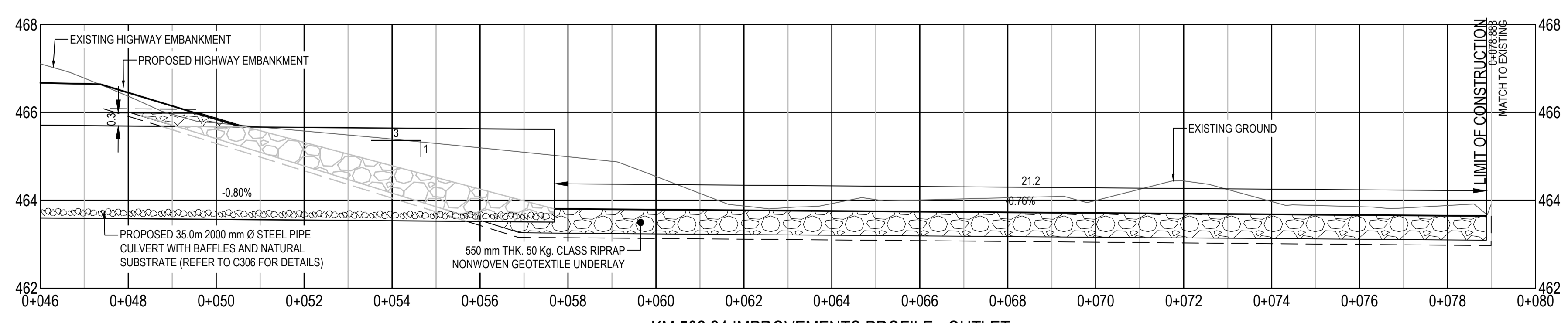
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 4. REFER TO DRAWINGS C501 TO C505 FOR CONSTRUCTION STAGING DETAILS.



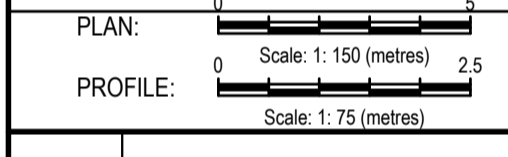
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KM 502.24 IMPROVEMENTS PROFILE - INLET
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KM 502.24 IMPROVEMENTS PROFILE - OUTLET
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Public Services and Procurement Canada



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 IMPROVEMENTS
 ALASKA HIGHWAY, BC**

Approved by/Approuvé par
S. LI

Designed by/Concepté par
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Drawn by/Dessiné par
P. SAMOLIA

PSPC Project Manager/Administrateur de Projets SPAC
A. TAHERI

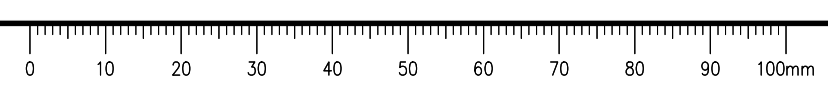
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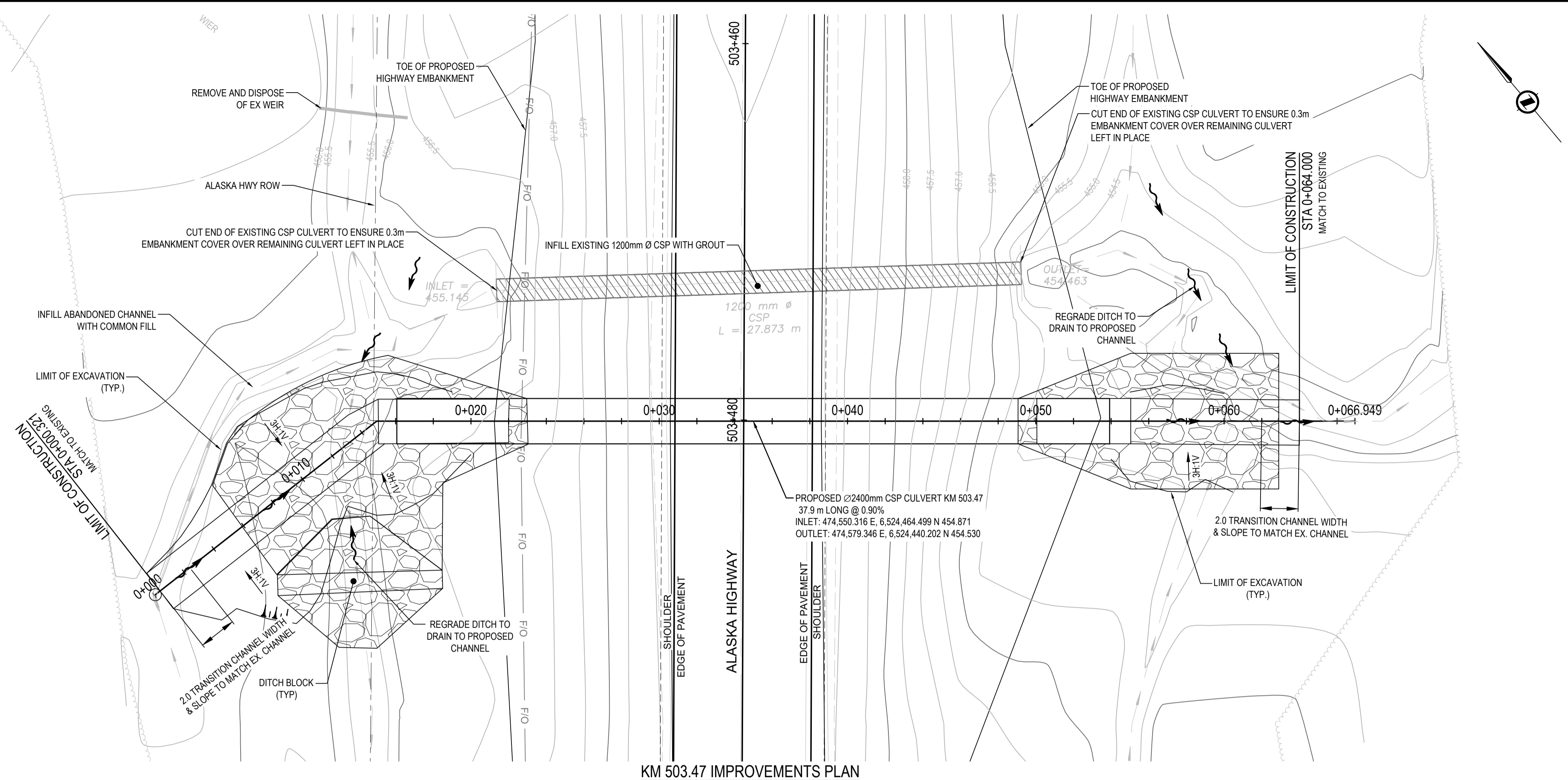
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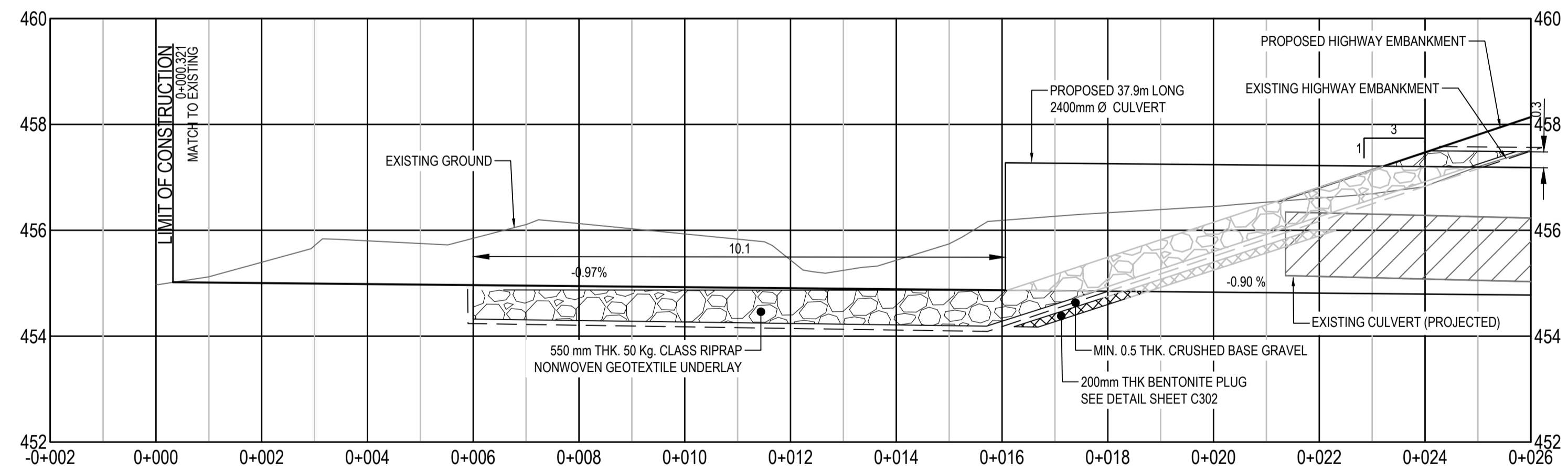


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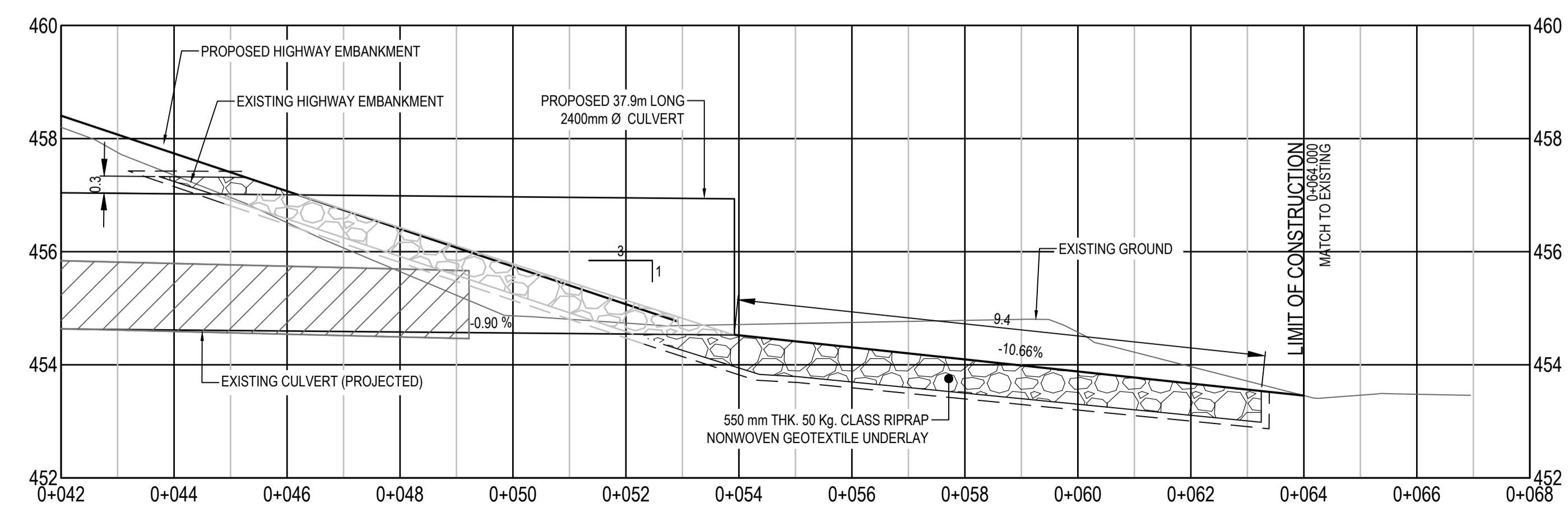
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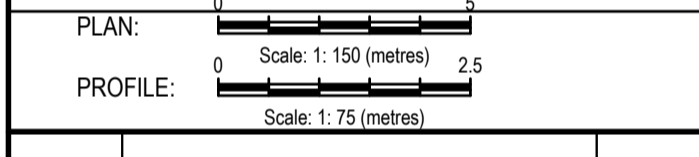
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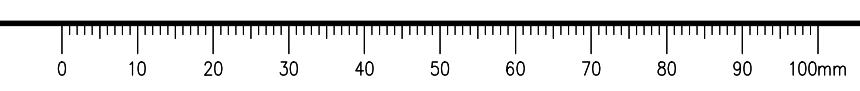
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Approved by/Approve par: **S. LI**
 Designed by/Concept par: **M. KELEHER / T. CLENDENING**
 Drawn by/Dessiné par: **P. SAMOLIA**
 PSPC Project Manager/Administrateur de Projets SPAC: **A. TAHERI**
 PSPC Architectural and Engineering Resources Manager/Ressources Architectural et de Directeur d'Ingénierie, SPAC

Client/client: **Public Services and Procurement Canada**
 Drawing title/Titre du dessin: **PLAN / PROFILE / SECTION CULVERT KM 503.47**

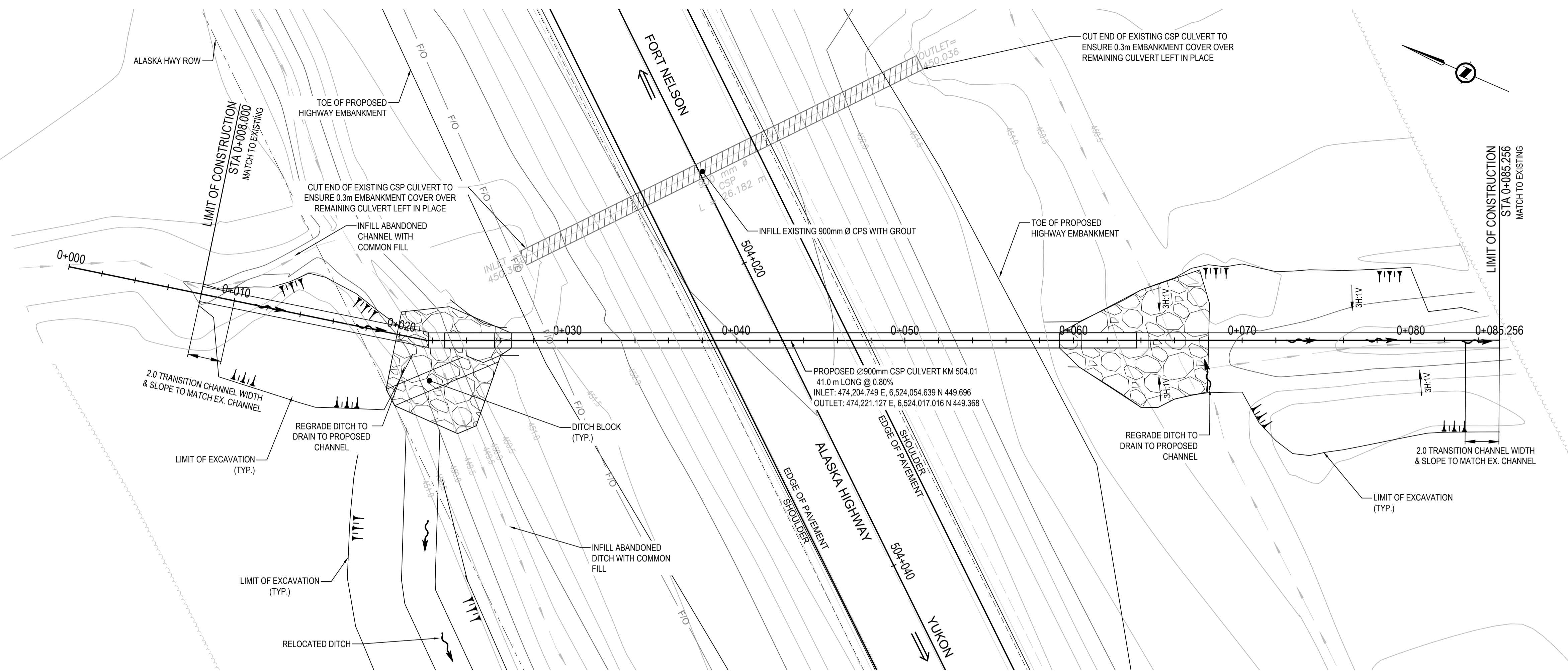
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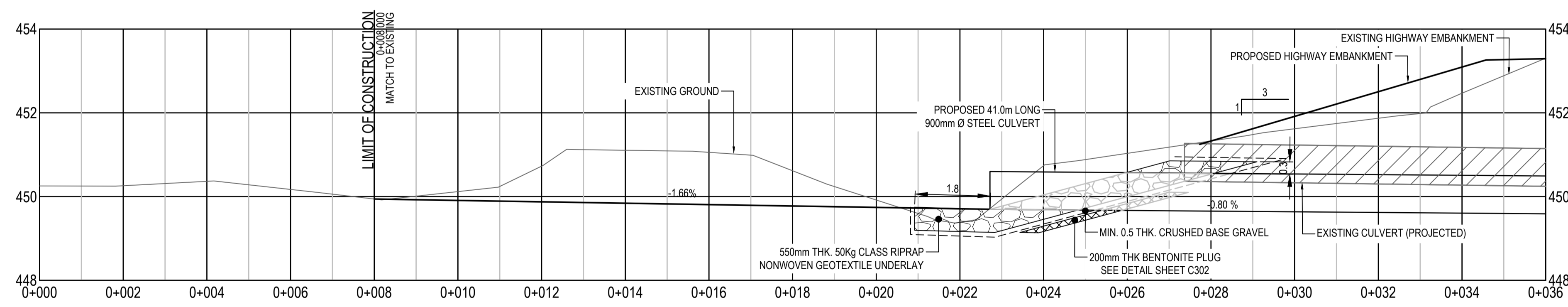


ISSUED FOR PERMITTING

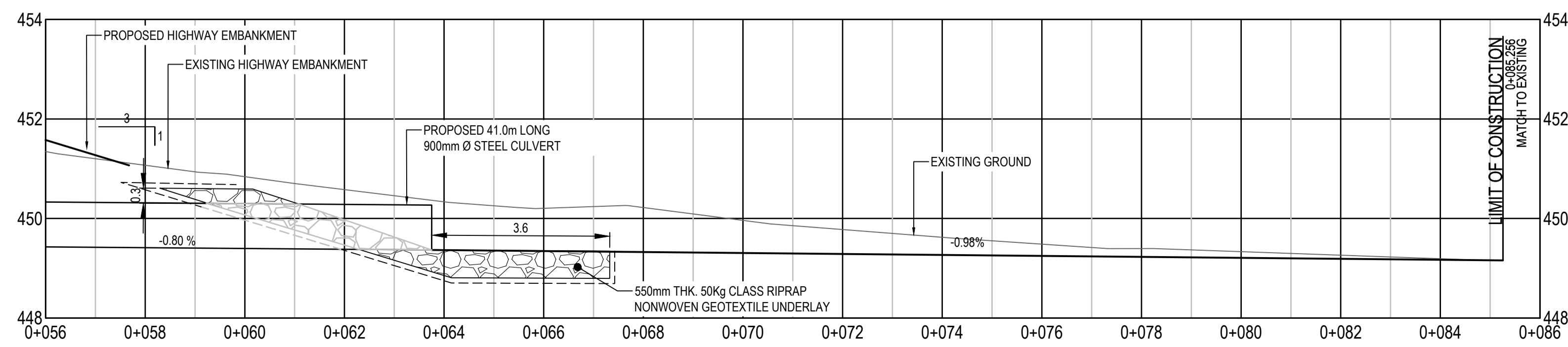
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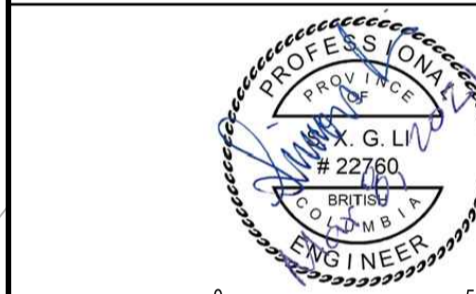
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SCALE 1:75



KM 504.01 IMPROVEMENTS PROFILE - OUTLET
SCALE 1:75



PLAN: 0 100 200
Scale: 1:150 (metres)
PROFILE: 0 2.5
Scale: 1:75 (metres)

Revision/Description	Date/Date
A ISSUED FOR PERMITTING	21/03/08

Client/client
Public Services and Procurement Canada



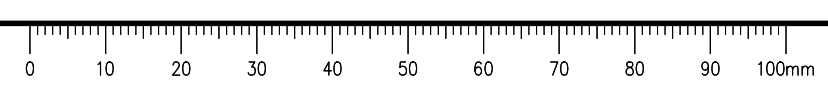
Project title/Titre du projet
**KM 501 - KM 509
GEOMETRIC AND DRAINAGE
IMPROVEMENTS
ALASKA HIGHWAY, BC**

Approved by/Approve par
S. LI
Designed by/Concept par
M. KELEHER / T. CLENDENING
Drawn by/Dessiné par
P. SAMOLIA
PSPC Project Manager/Administrateur de Projets SPAC
A. TAHERI
PSPC Architectural and Engineering Resources Manager/
Ressources Architectural et de Directeur d'Ingénierie, SPAC

Client/client
Public Services and Procurement Canada
Drawing title/Titre du dessin
**PLAN / PROFILE / SECTION
CULVERT KM 504.01**

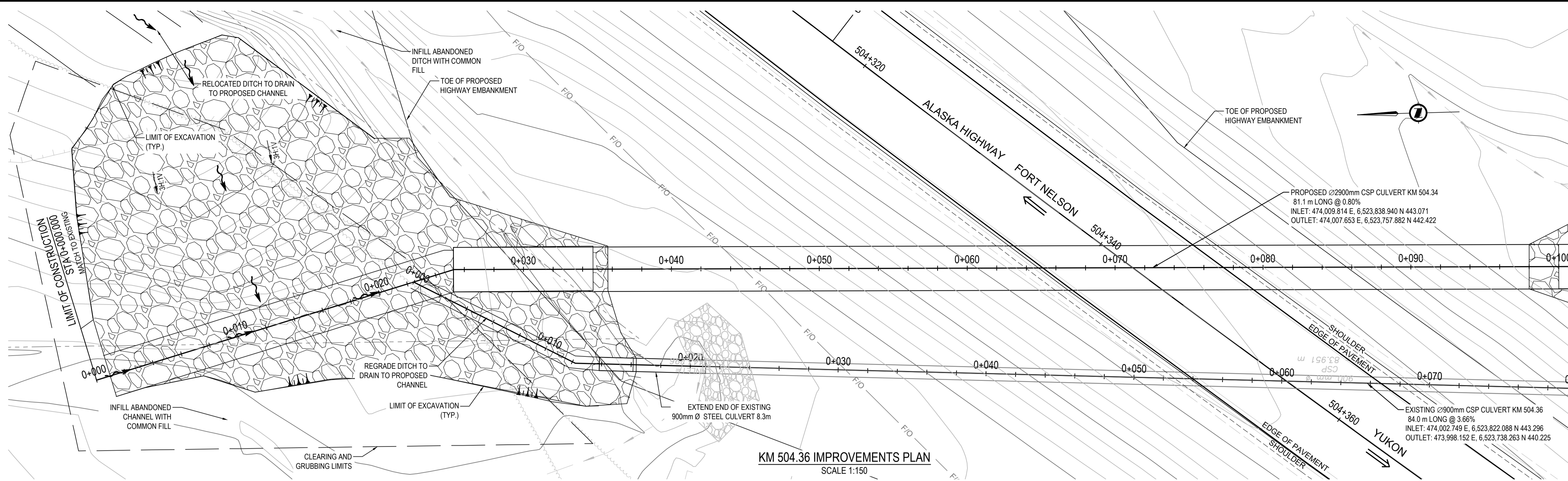
Project No./No. du projet	Sheet/Feuille	Revision no./La Révision no.
R.017173.216	C205	A

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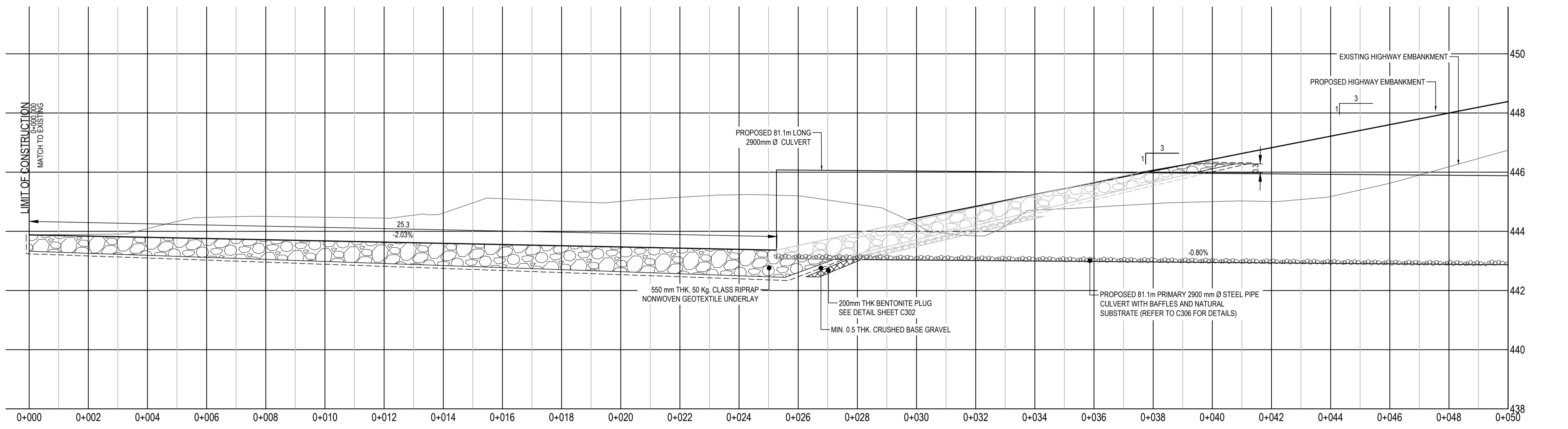


ISSUED FOR PERMITTING

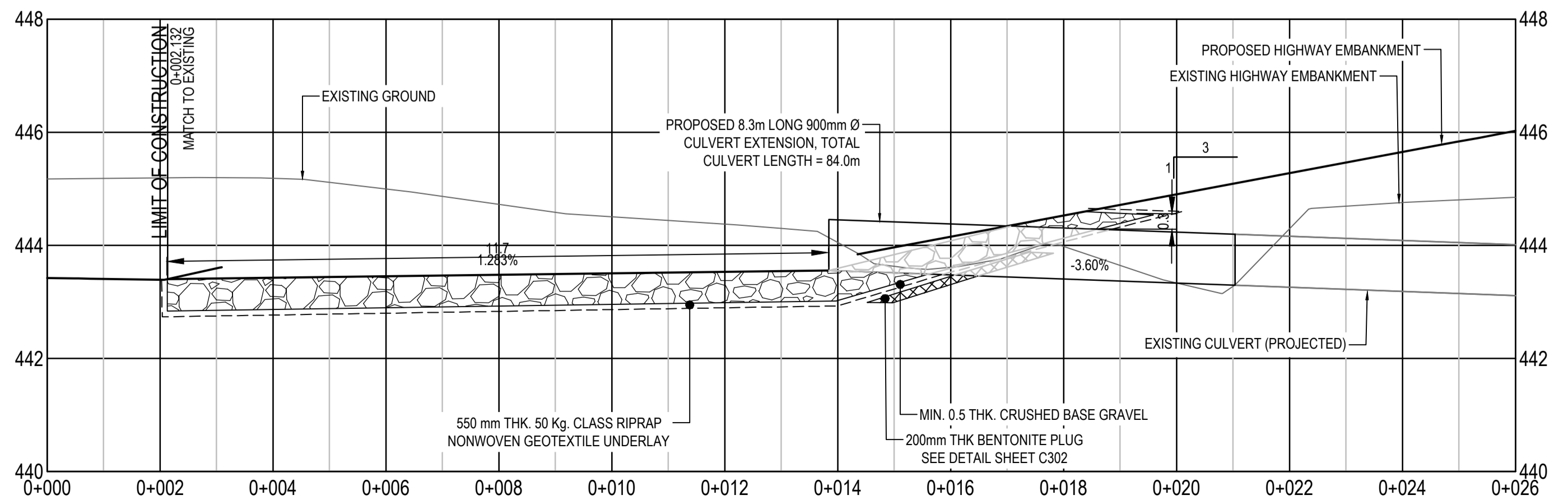
- GENERAL NOTES:
- DIMENSIONS, COORDINATES, ELEVATIONS ARE IN METRES UNLESS NOTED OTHERWISE.
 - THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING THE LOCATION OF ALL UTILITIES PRIOR TO CONSTRUCTION.
 - HYDROSEED ALL DISTURBED AREAS.
 - REFER TO DRAWINGS C501 TO C505 FOR CONSTRUCTION STAGING DETAILS.



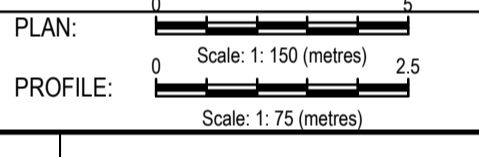
KM 504.36 IMPROVEMENTS PLAN
SCALE 1:150



KM 504.36 IMPROVEMENTS PROFILE - INLET
SCALE 1:75



KM 504.36 IMPROVEMENTS PROFILE - INLET
SCALE 1:75



Revision/	Description/Description	Date/Date
A	ISSUED FOR PERMITTING	21/03/08

Client/client: **Public Services and Procurement Canada**



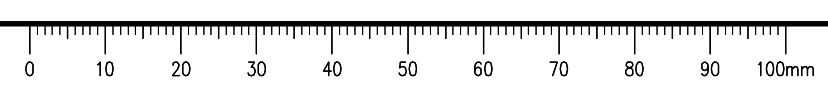
Project title/Titre du projet: **KM 501 - KM 509 GEOMETRIC AND DRAINAGE IMPROVEMENTS ALASKA HIGHWAY, BC**

Approved by/Approve par: **S. LI**
 Designed by/Concept par: **M. KELEHER / T. CLENDENING**
 Drawn by/Dessine par: **P. SAMOLIA**
 PSPC Project Manager/Administrateur de Projets SPAC: **A. TAHERI**
 PSPC Architectural and Engineering Resources Manager/Ressources Architectural et de Directeur d'Ingénierie, SPAC

Client/client: **Public Services and Procurement Canada**
 Drawing title/Titre du dessin: **PLAN / PROFILE / SECTION CULVERT KM 504.36 SHEET 1 OF 2**

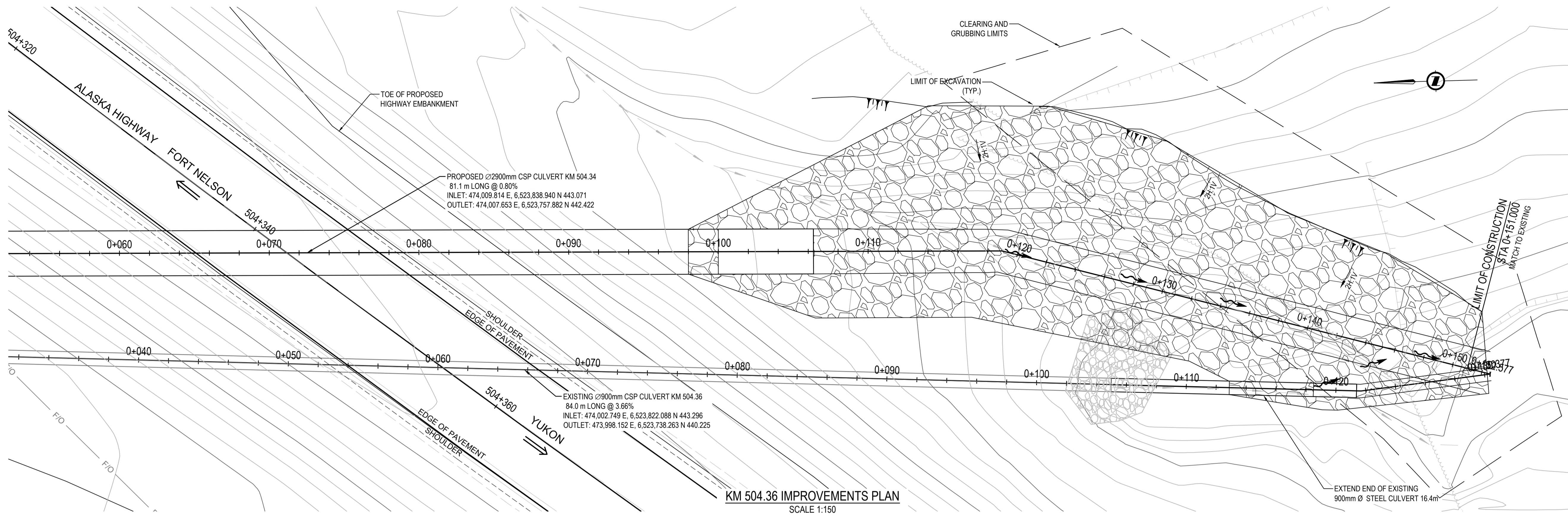
Project No./No. du projet	Sheet/Feuille	Revision no./La Révision no.
R.017173.216	C206.1	A

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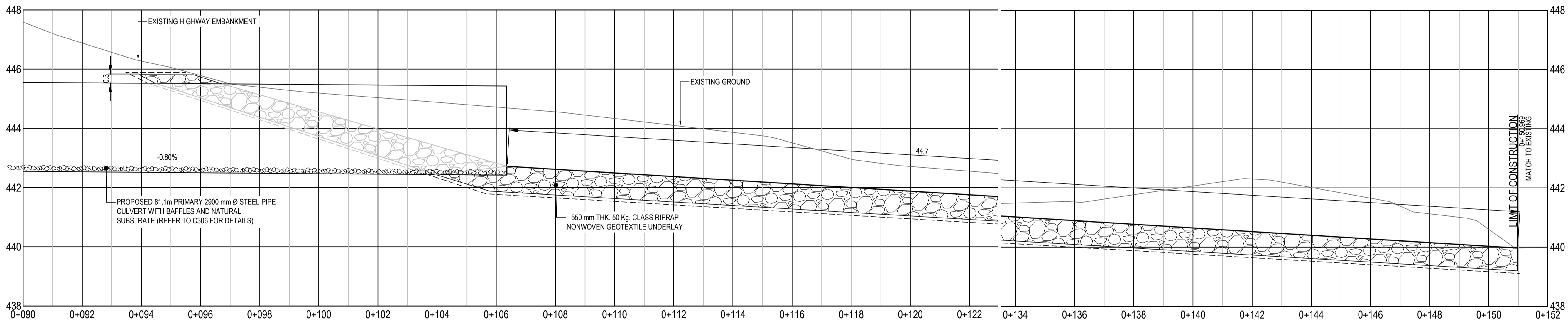


ISSUED FOR PERMITTING

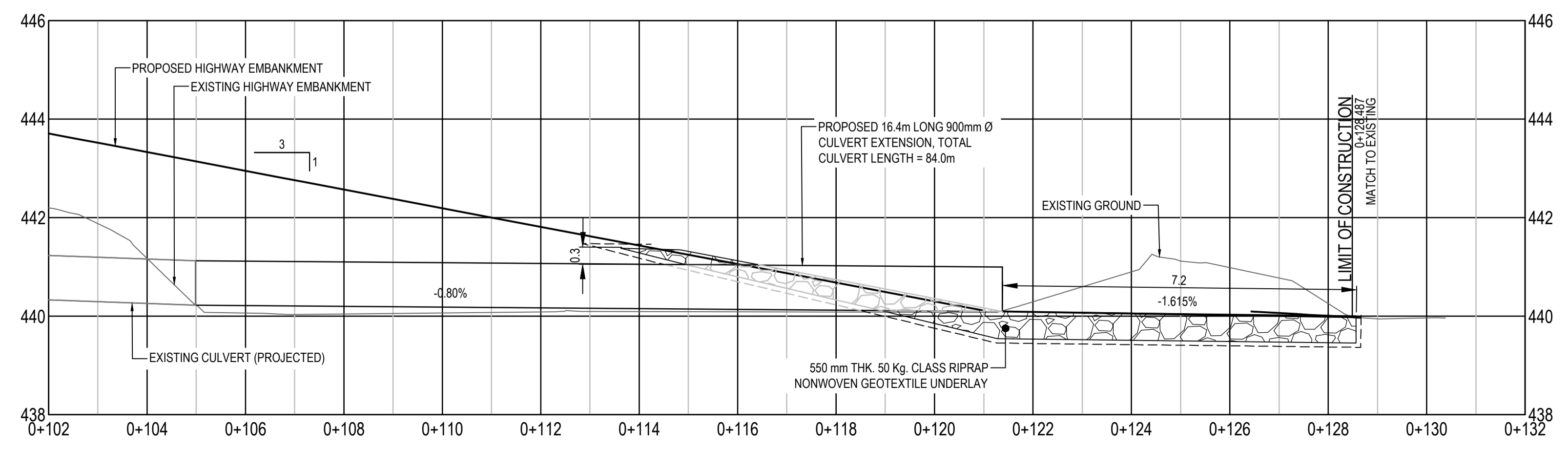
- GENERAL NOTES:
 1. DIMENSIONS, COORDINATES, ELEVATIONS ARE IN METRES UNLESS NOTED OTHERWISE.
 2. THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING THE LOCATION OF ALL UTILITIES PRIOR TO CONSTRUCTION.
 3. HYDROSEED ALL DISTURBED AREAS.
 4. REFER TO DRAWINGS C501 TO C505 FOR CONSTRUCTION STAGING DETAILS.



KM 504.36 IMPROVEMENTS PLAN
 SCALE 1:150



KM 504.36 IMPROVEMENTS PROFILE - OUTLET
 SCALE 1:75



KM 504.36 IMPROVEMENTS PROFILE - OUTLET
 SCALE 1:75



PLAN: Scale: 1:150 (metres) 2.5
 PROFILE: Scale: 1:75 (metres)

Revision/Revised	Description/Description	Date/Date
A	ISSUED FOR PERMITTING	21/03/08

Client/client
Public Services and Procurement Canada



Project title/Titre du projet

**KM 501 - KM 509
 GEOMETRIC AND DRAINAGE
 IMPROVEMENTS
 ALASKA HIGHWAY, BC**

Approved by/Approve par
S. LI
 Designed by/Concept par
M. KELEHER / T. CLENDENING
 Drawn by/Dessine par
P. SAMOLIA
 PSPC Project Manager/Administrateur de Projets SPAC
A. TAHERI
 PSPC Architectural and Engineering Resources Manager/
 Ressources Architectural et de Directeur d'Ingénierie, SPAC

Client/client
Public Services and Procurement Canada
 Drawing title/Titre du dessin
**PLAN / PROFILE / SECTION
 CULVERT KM 504.36
 SHEE 2 OF 2**

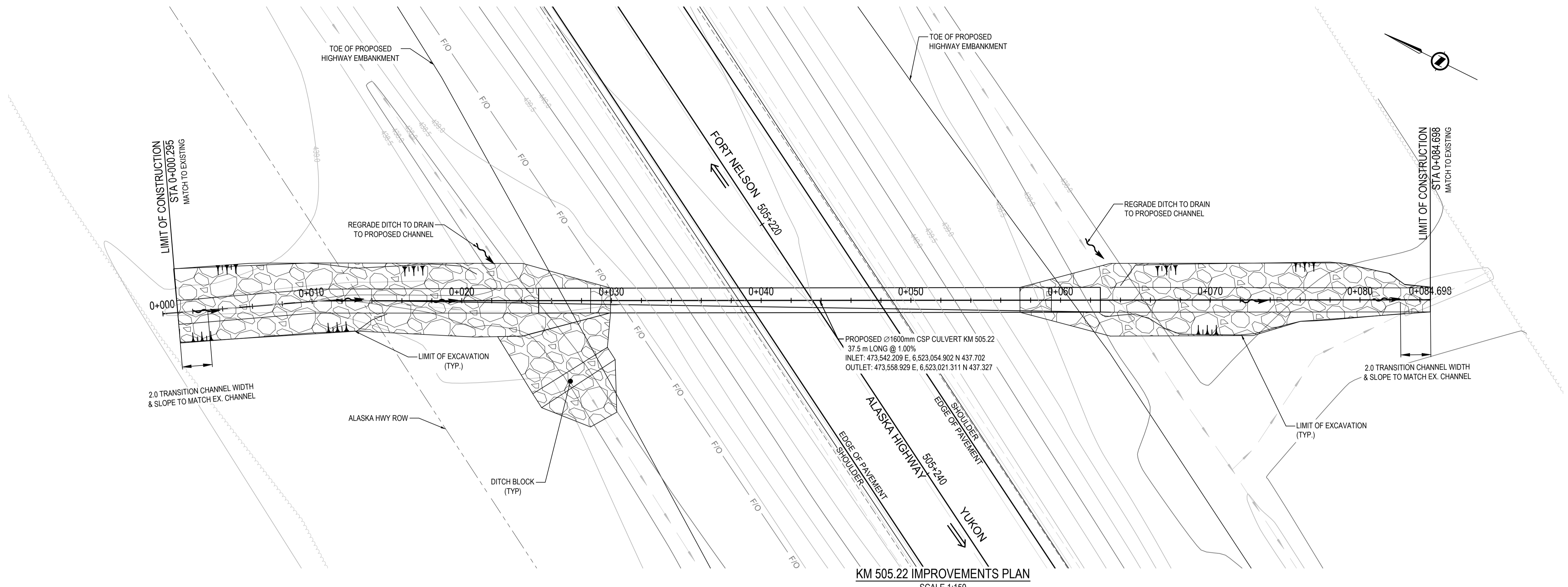
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R.017173.216	C206.2	A

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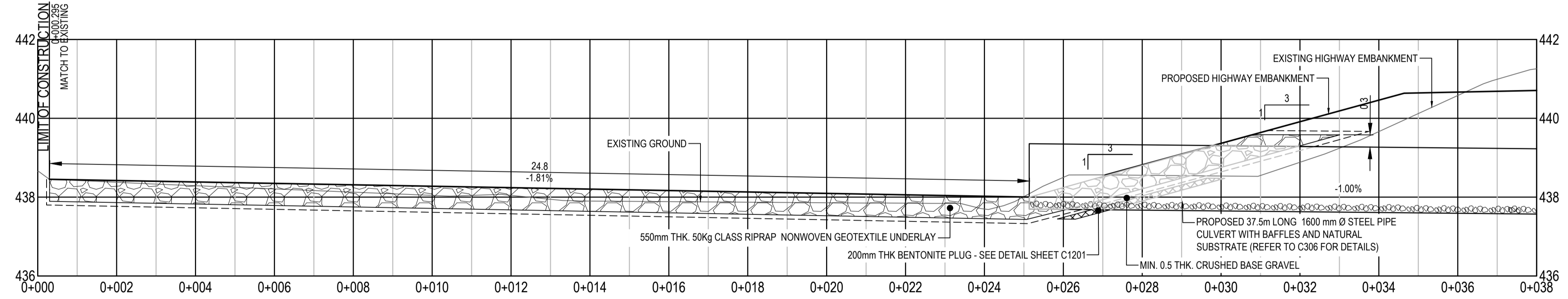


ISSUED FOR PERMITTING

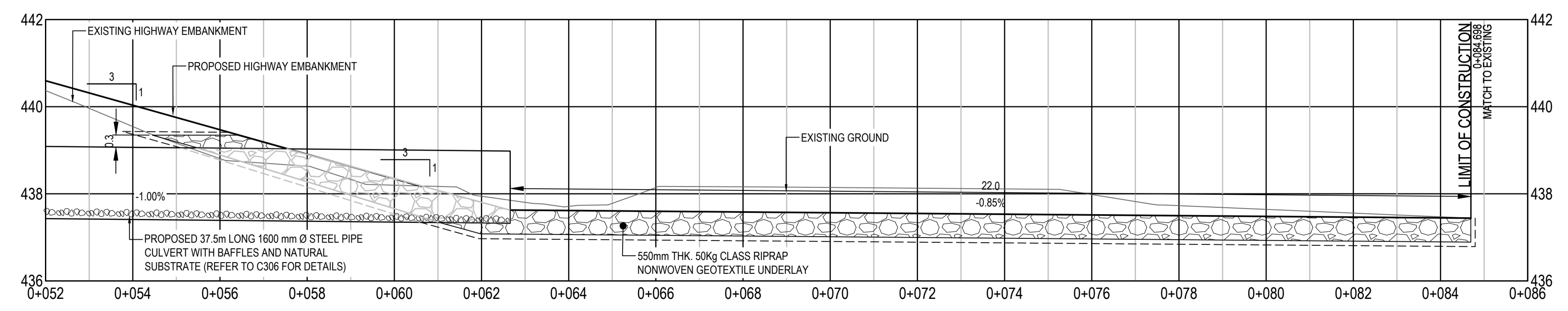
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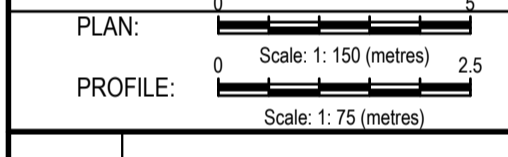
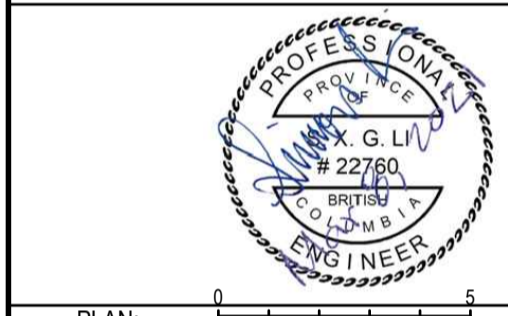
KM 505.22 IMPROVEMENTS PLAN
 SCALE 1:150



KM 505.22 IMPROVEMENTS PROFILE - INLET
 SCALE 1:75



KM 505.22 IMPROVEMENTS PROFILE - OUTLET
 SCALE 1:75



Revision/	Description/Description	Date/Date
A	ISSUED FOR PERMITTING	21/03/08

Client/client
Public Services and Procurement Canada



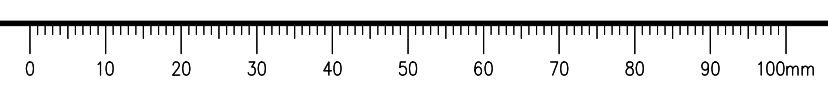
Project title/Titre du projet
**KM 501 - KM 509
 GEOMETRIC AND DRAINAGE
 IMPROVEMENTS
 ALASKA HIGHWAY, BC**

Approved by/Approuvé par
S. LI
 Designed by/Concept par
M. KELEHER / T. CLENDENING
 Drawn by/Dessiné par
P. SAMOLIA
 PSPC Project Manager/Administrateur de Projets SPAC
A. TAHERI
 PSPC Architectural and Engineering Resources Manager/
 Ressources Architectural et de Directeur d'ingénierie, SPAC

Client/client
Public Services and Procurement Canada
 Drawing title/Titre du dessin
**PLAN / PROFILE / SECTION
 CULVERT KM 505.22**

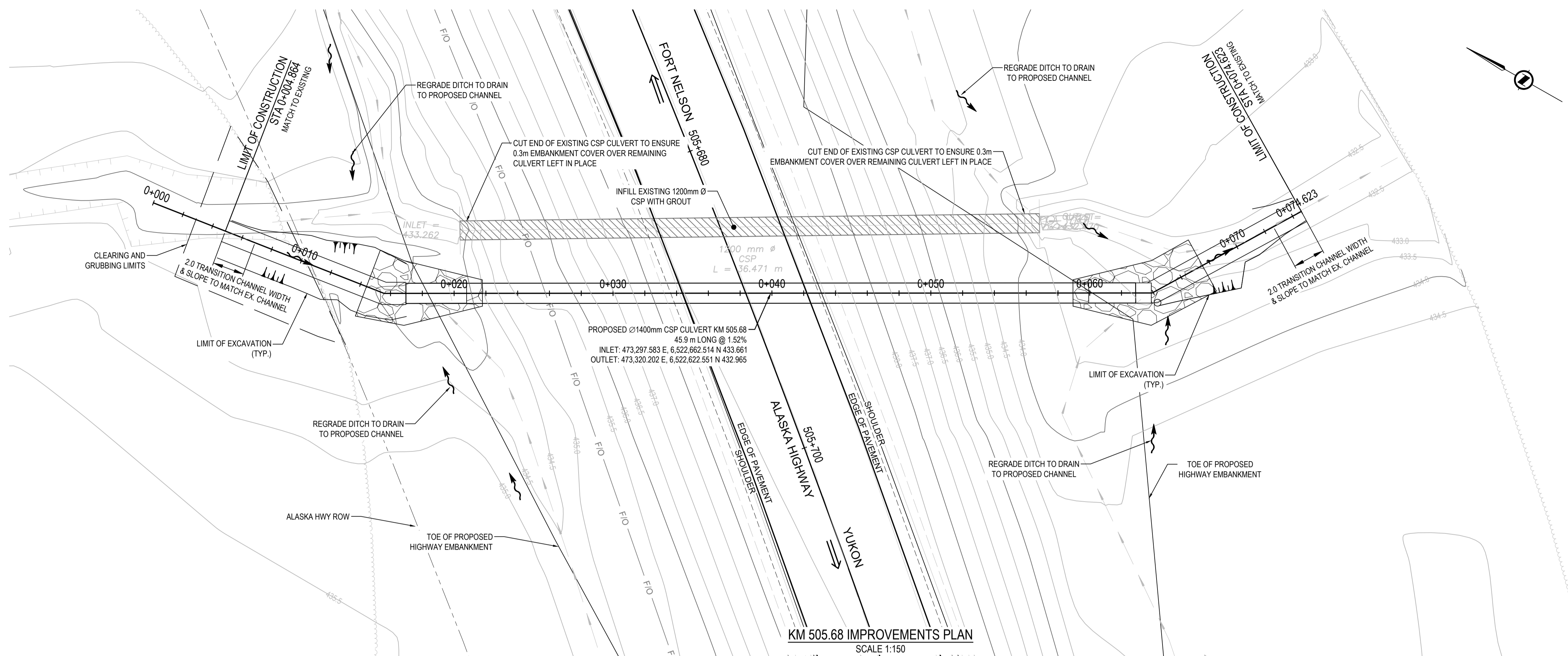
Project No./No. du projet	Sheet/Feuille	Revision no./La Révision no.
R.017173.216	C207	A

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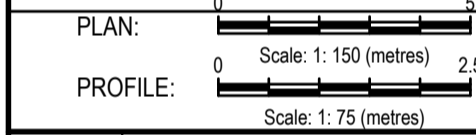
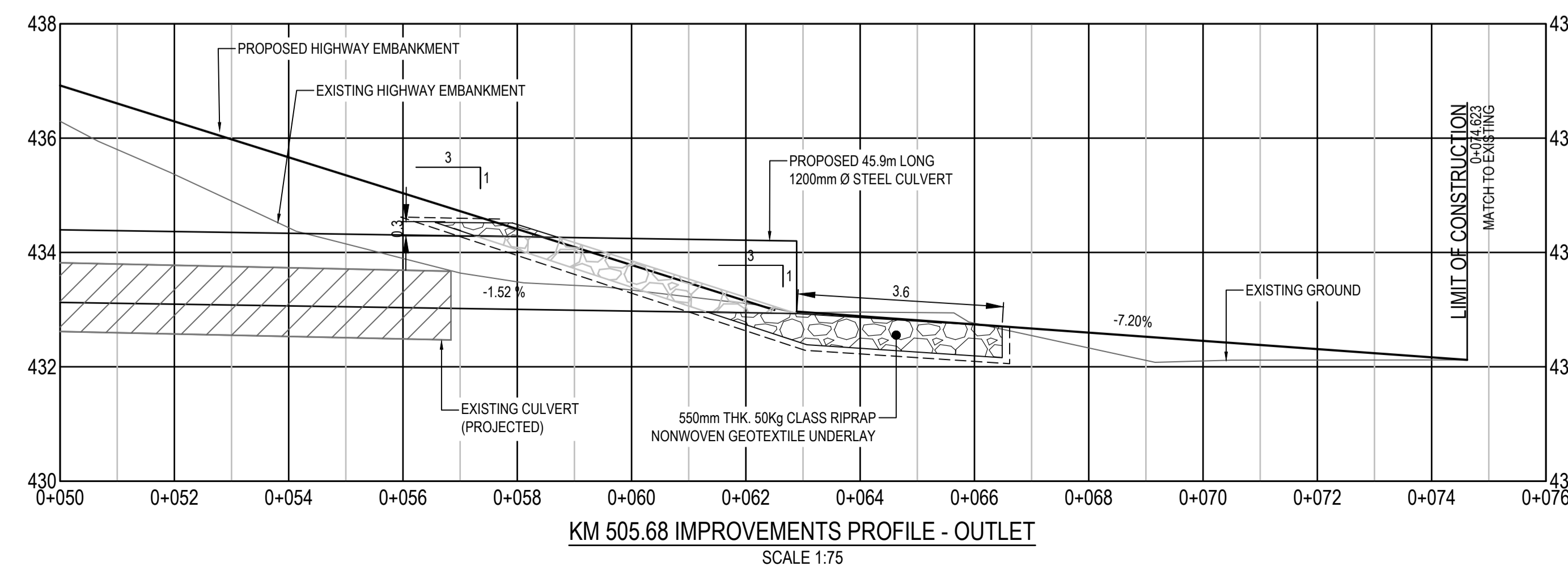
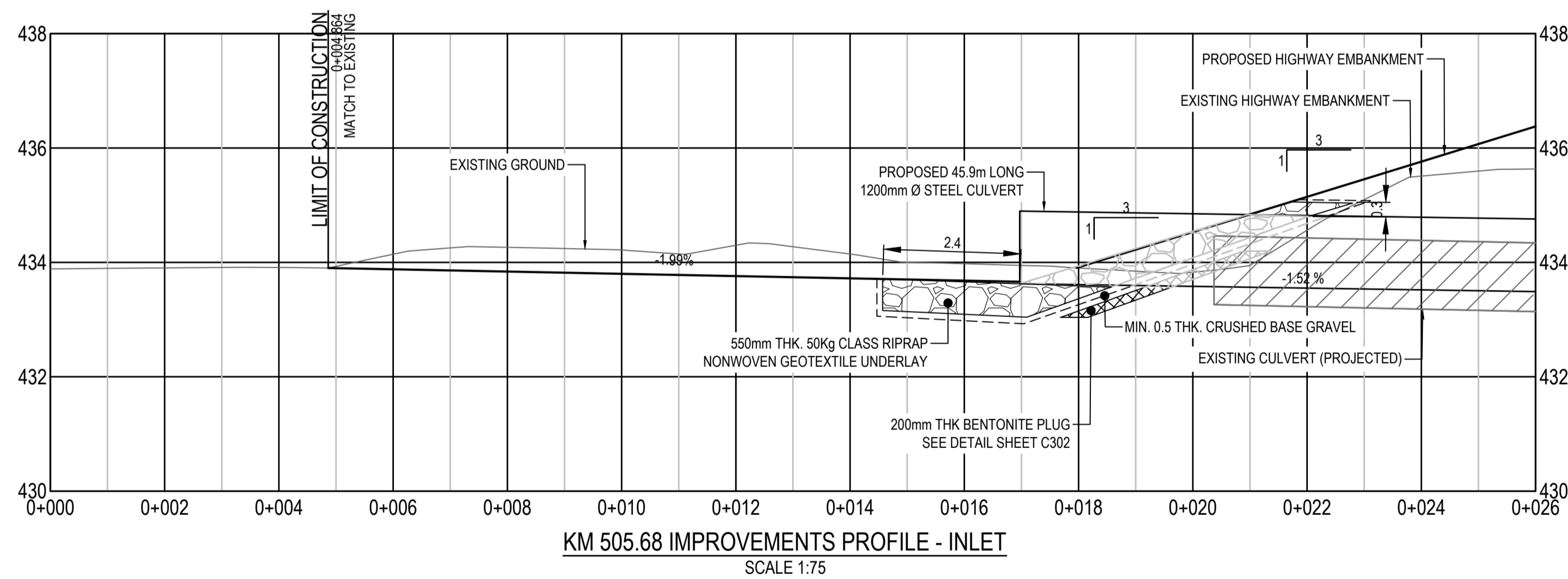


ISSUED FOR PERMITTING

- GENERAL NOTES:
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 4. REFER TO DRAWINGS C501 TO C505 FOR CONSTRUCTION STAGING DETAILS.



KM 505.68 IMPROVEMENTS PLAN
SCALE 1:150



Revision/Description	Date/Date
A ISSUED FOR PERMITTING	21/03/08

Client/client
Public Services and Procurement Canada



Project title/Titre du projet
**KM 501 - KM 509
GEOMETRIC AND DRAINAGE
IMPROVEMENTS
ALASKA HIGHWAY, BC**

Approved by/Approve par
S. LI

Designed by/Concept par
M. KELEHER / T. CLENDENING

Drawn by/Dessine par
P. SAMOLIA

PSPC Project Manager/Administrateur de Projets SPAC
A. TAHERI

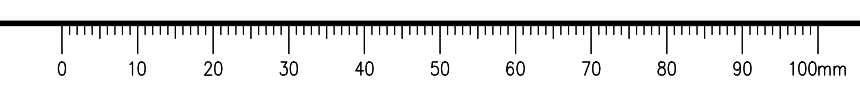
PSPC Architectural and Engineering Resources Manager/
Ressources Architectural et de Directeur d'Ingénierie, SPAC

Client/client
Public Services and Procurement Canada

Drawing title/Titre du dessin
**PLAN / PROFILE / SECTION
CULVERT KM 505.68**

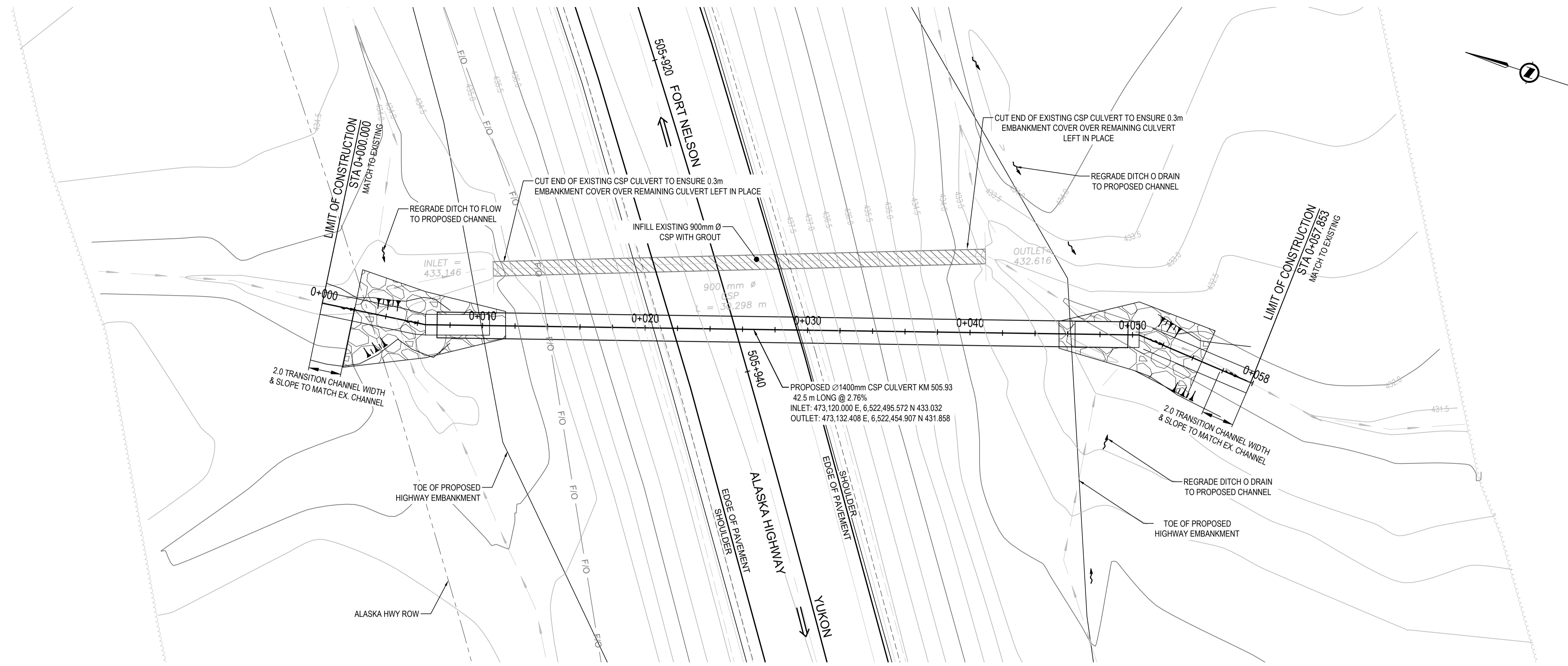
Project No./No. du projet	Sheet/Feuille	Revision no./La Révision no.
R.017173.216	C208	A

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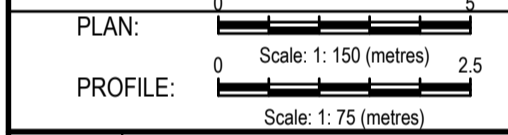
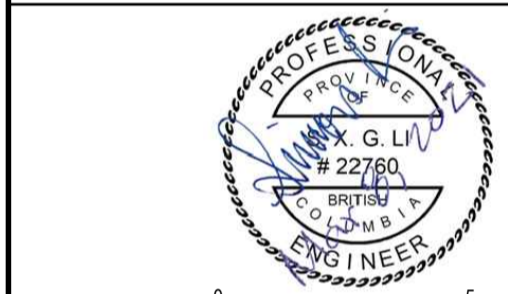


ISSUED FOR PERMITTING

- GENERAL NOTES:
1. DIMENSIONS, COORDINATES, ELEVATIONS ARE IN METRES UNLESS NOTED OTHERWISE.
 2. THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING THE LOCATION OF ALL UTILITIES PRIOR TO CONSTRUCTION.
 3. HYDROSEED ALL DISTURBED AREAS.
 4. REFER TO DRAWINGS C501 TO C505 FOR CONSTRUCTION STAGING DETAILS.



KM 505.93 IMPROVEMENTS PLAN
SCALE 1:150



Revision/Revisão	Description/Description	Date/Date
A	ISSUED FOR PERMITTING	21/03/08

Client/client
Public Services and Procurement Canada



Project title/Titre du projet
**KM 501 - KM 509
GEOMETRIC AND DRAINAGE
IMPROVEMENTS
ALASKA HIGHWAY, BC**

Approved by/Approuvé par
S. LI

Designed by/Concepté par
M. KELEHER / T. CLENDENING

Drawn by/Dessiné par
P. SAMOLIA

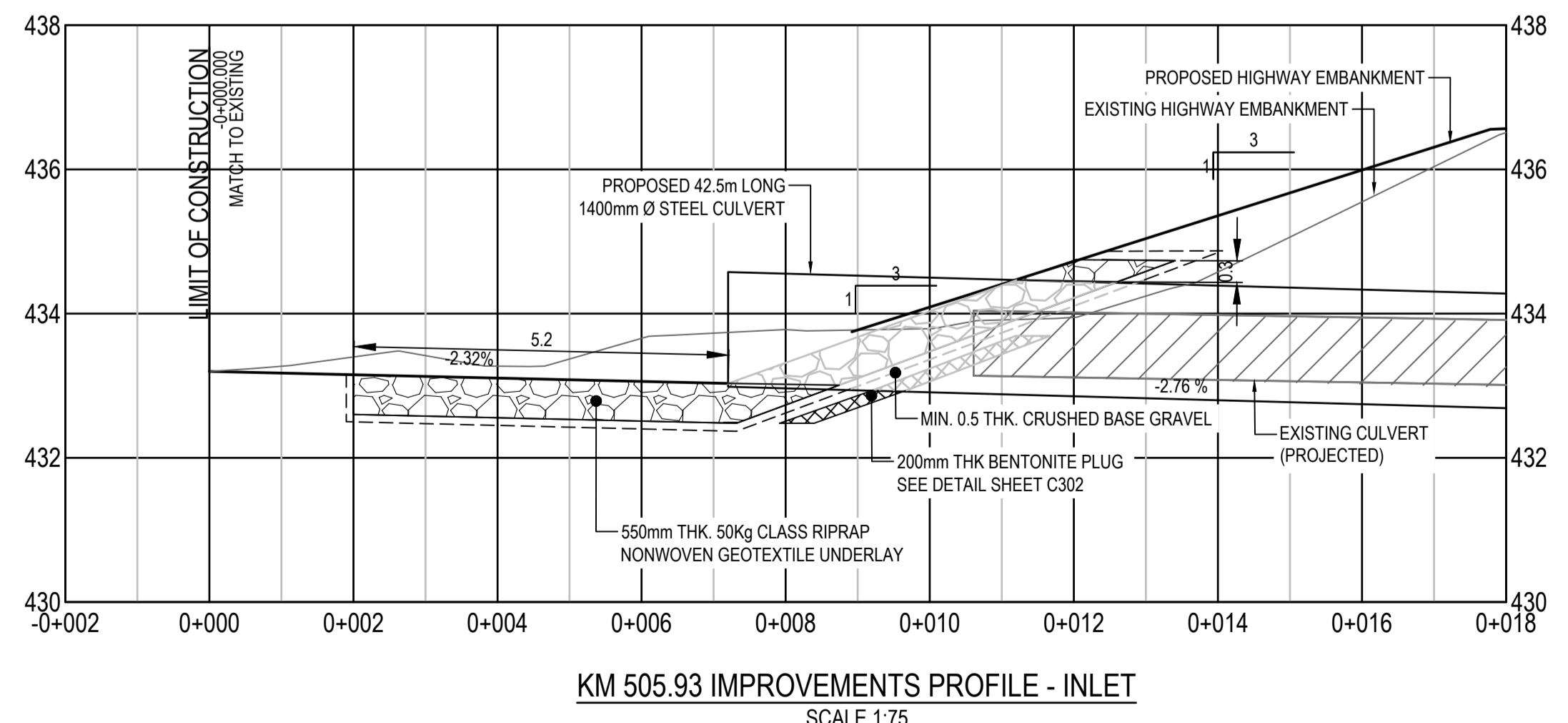
PSPC Project Manager/Administrateur de Projets SPAC
A. TAHERI

PSPC Architectural and Engineering Resources Manager/
Ressources Architectural et de Directeur d'Ingénierie, SPAC

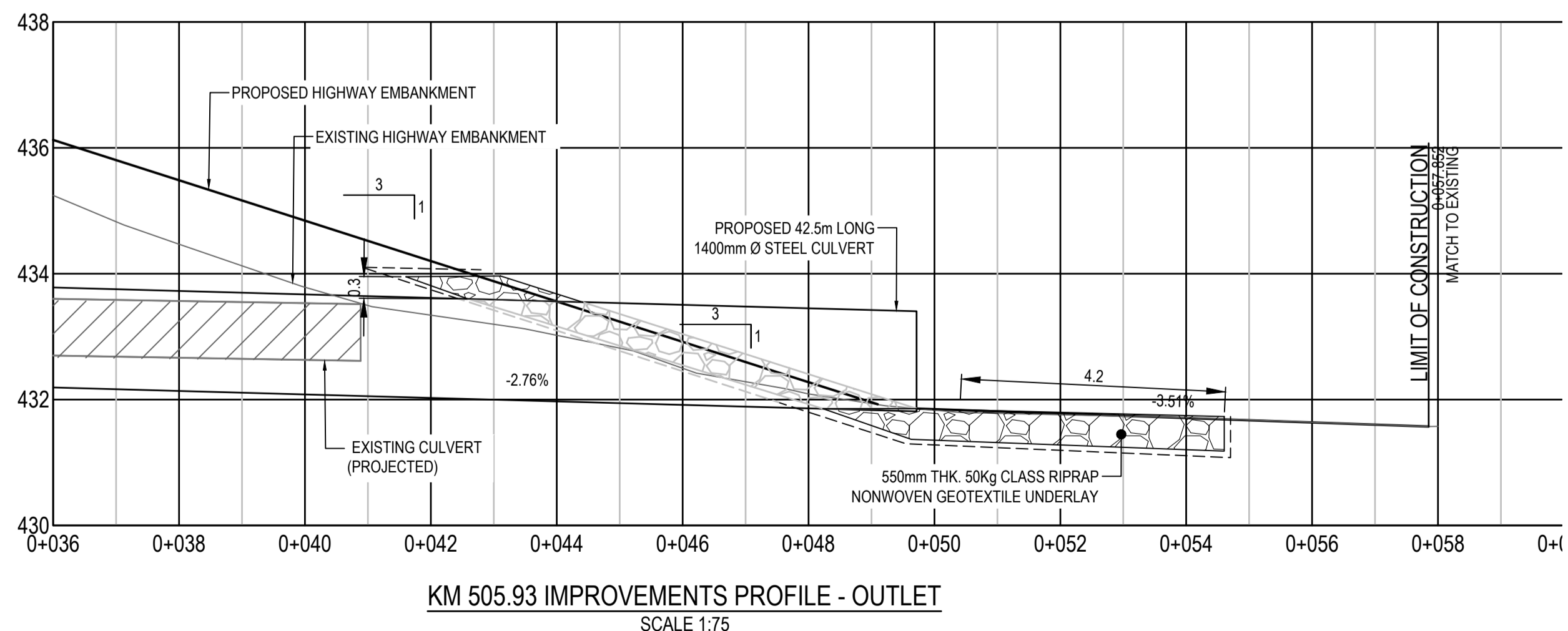
Client/client
Public Services and Procurement Canada

Drawing title/Titre du dessin
**PLAN / PROFILE / SECTION
CULVERT KM 505.93**

Project No./No. du projet	Sheet/Feuille	Revision no./ La Révision no.
R.017173.216	C209	A

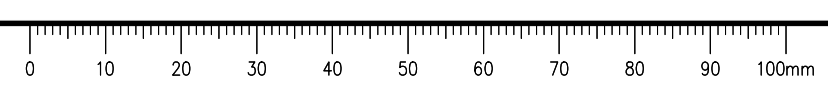


KM 505.93 IMPROVEMENTS PROFILE - INLET
SCALE 1:75



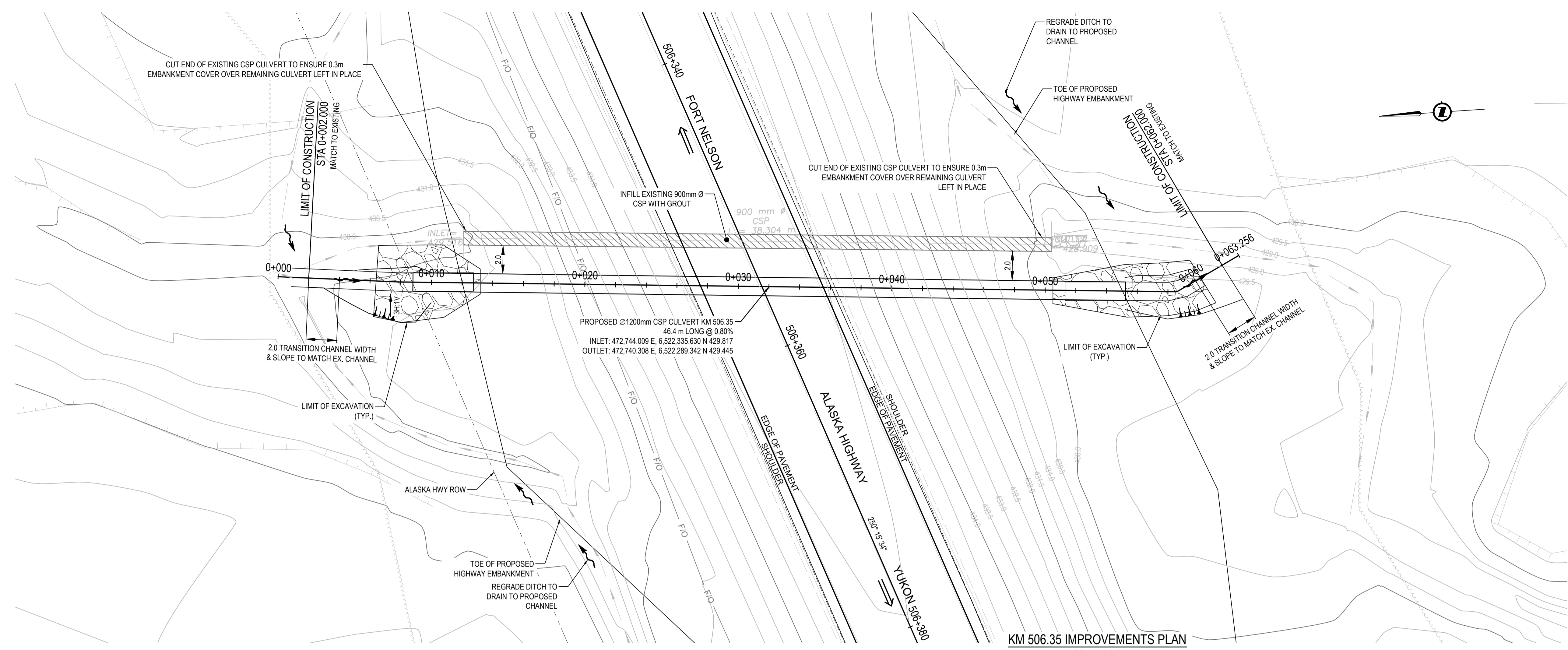
KM 505.93 IMPROVEMENTS PROFILE - OUTLET
SCALE 1:75

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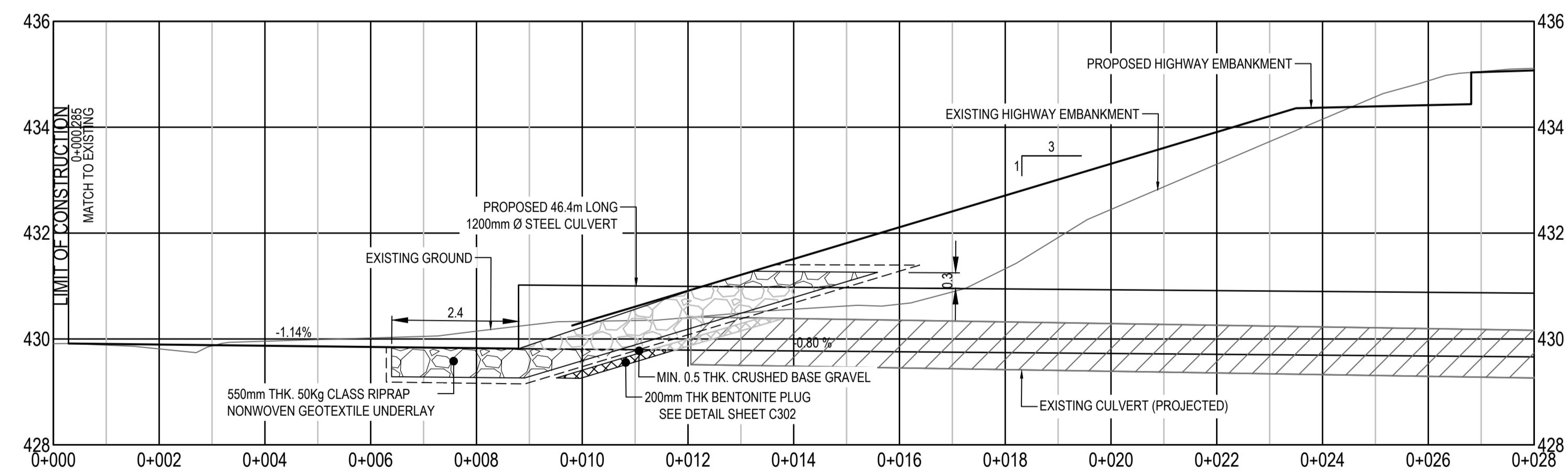


ISSUED FOR PERMITTING

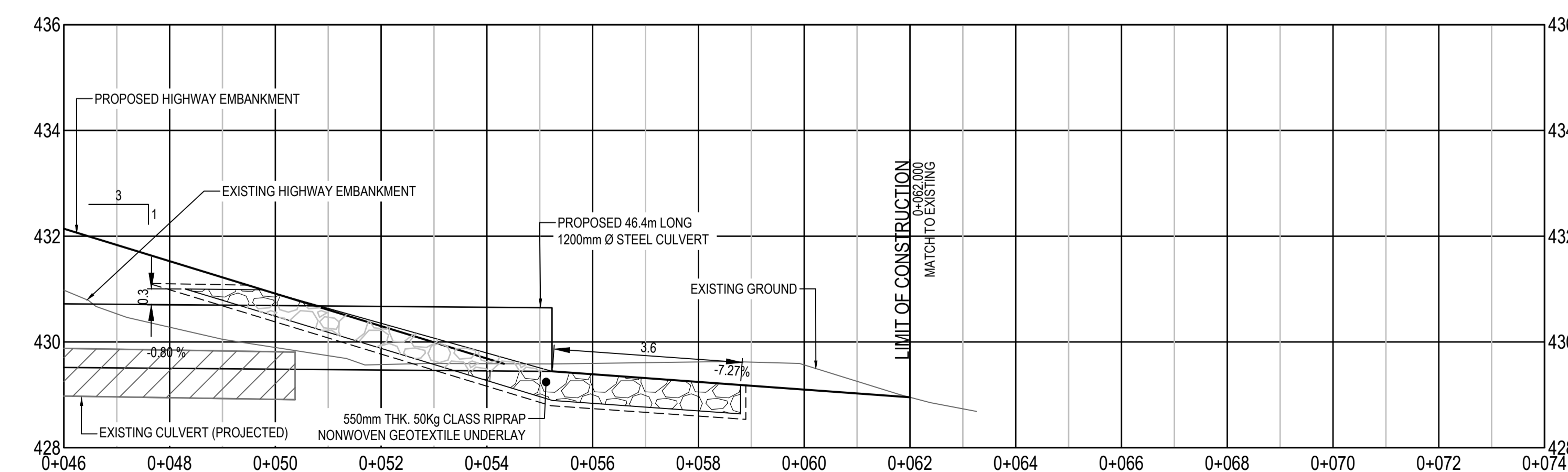
- GENERAL NOTES:
1. DIMENSIONS, COORDINATES, ELEVATIONS ARE IN METRES UNLESS NOTED OTHERWISE.
 2. THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING THE LOCATION OF ALL UTILITIES PRIOR TO CONSTRUCTION.
 3. HYDROSEED ALL DISTURBED AREAS.
 4. REFER TO DRAWINGS C501 TO C505 FOR CONSTRUCTION STAGING DETAILS.



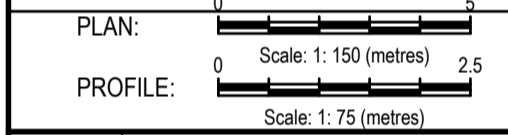
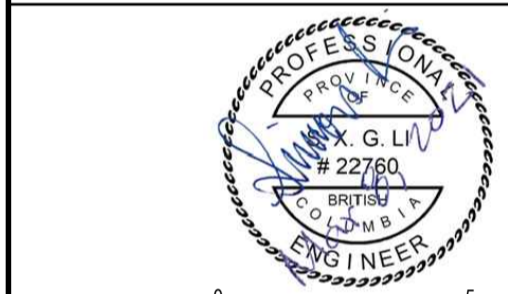
KM 506.35 IMPROVEMENTS PLAN
SCALE 1:150



KM 506.35 IMPROVEMENTS PROFILE - INLET
SCALE 1:75



KM 506.35 IMPROVEMENTS PROFILE - OUTLET
SCALE 1:75



PLAN:	0	150	300
PROFILE:	0	75	150
Scale:	1:150 (metres)	1:75 (metres)	

Revision/	ISSUED FOR PERMITTING	21/03/08
Description/		
Date/Date		



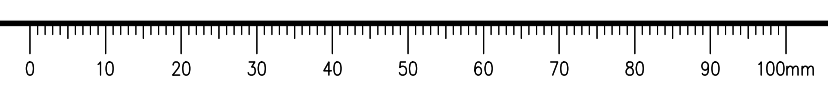
Project title/Titre du projet
**KM 501 - KM 509
GEOMETRIC AND DRAINAGE
IMPROVEMENTS
ALASKA HIGHWAY, BC**

Approved by/Approve par
S. LI
Designed by/Concept par
M. KELEHER / T. CLENDENING
Drawn by/Dessine par
P. SAMOLIA
PSPC Project Manager/Administrateur de Projets SPAC
A. TAHERI
PSPC Architectural and Engineering Resources Manager/
Ressources Architectural et de Directeur d'ingénierie, SPAC

Client/client
Public Services and Procurement Canada
Drawing title/Titre du dessin
**PLAN / PROFILE / SECTION
CULVERT KM 506+350**

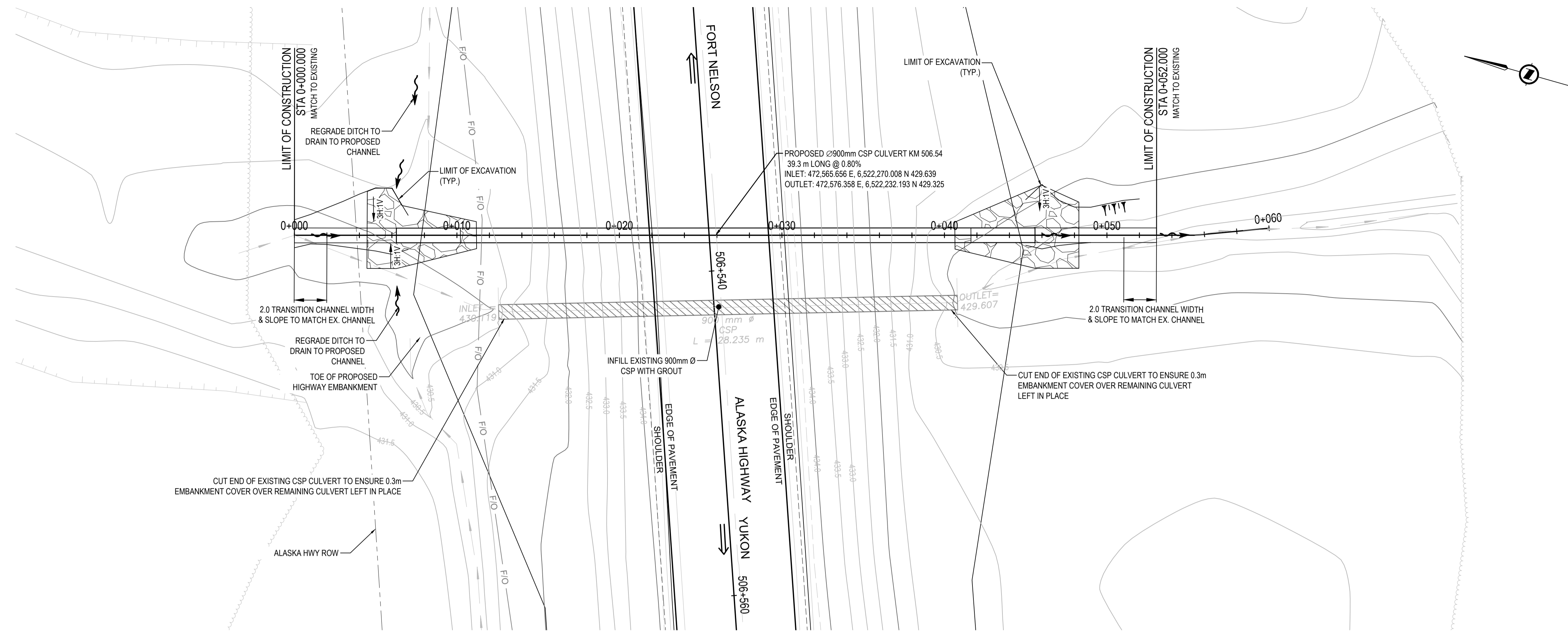
Project No./No. du projet	Sheet/Feuille	Revision no./ La Révision no.
R.017173.216	C210	A

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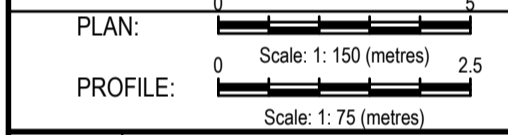
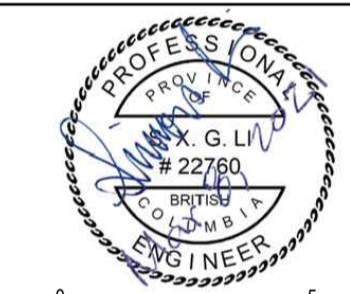


ISSUED FOR PERMITTING

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KM 506.54 IMPROVEMENTS PLAN
SCALE 1:150



Revision/Modification	Description/Description	Date/Date
A	ISSUED FOR PERMITTING	21/03/08

Client/client
Public Services and Procurement Canada



Project title/Titre du projet
**KM 501 - KM 509
GEOMETRIC AND DRAINAGE
IMPROVEMENTS
ALASKA HIGHWAY, BC**

Approved by/Approuvé par
S. LI

Designed by/Concepté par
M. KELEHER / T. CLENDENING

Drawn by/Dessiné par
P. SAMOLIA

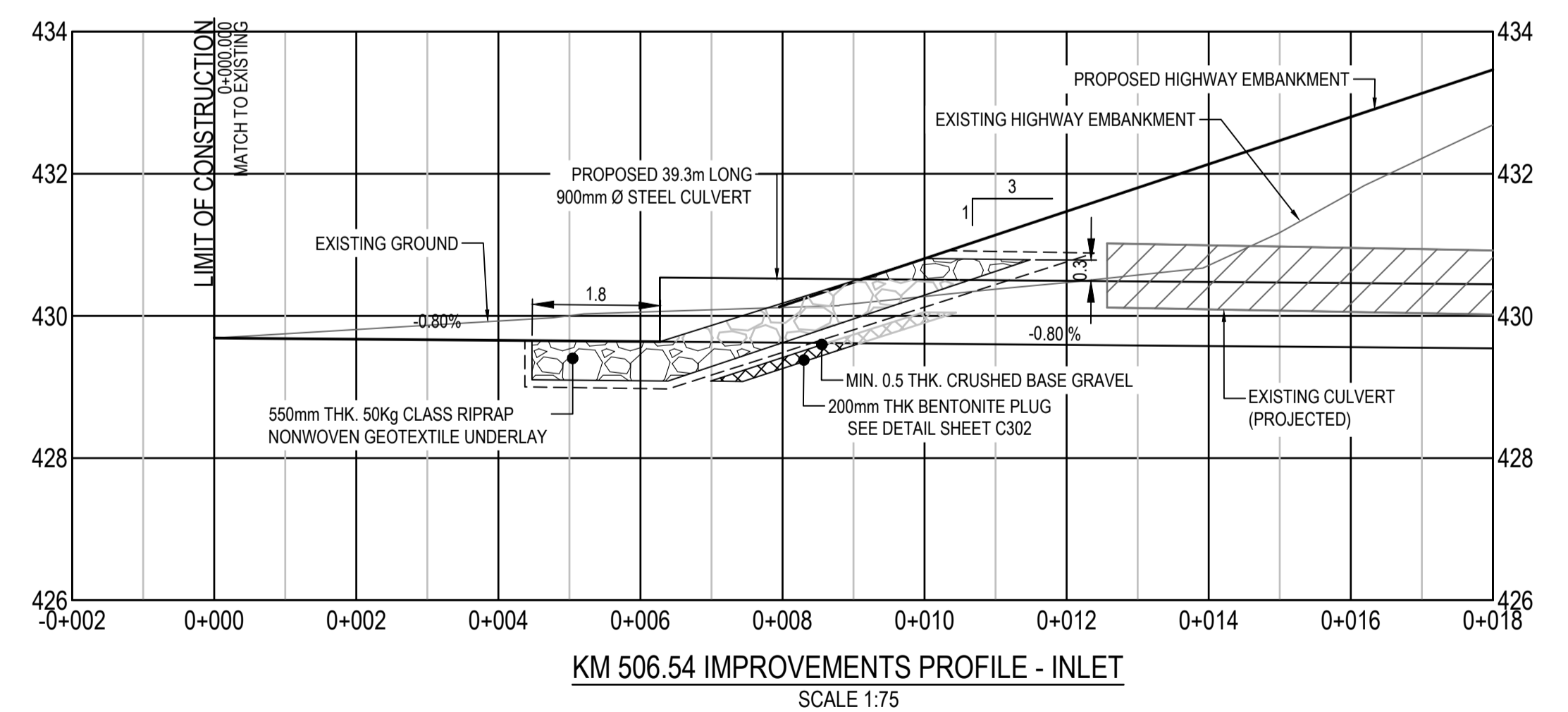
PSPC Project Manager/Administrateur de Projets SPAC
A. TAHERI

PSPC Architectural and Engineering Resources Manager/
Ressources Architectural et de Directeur d'Ingénierie, SPAC

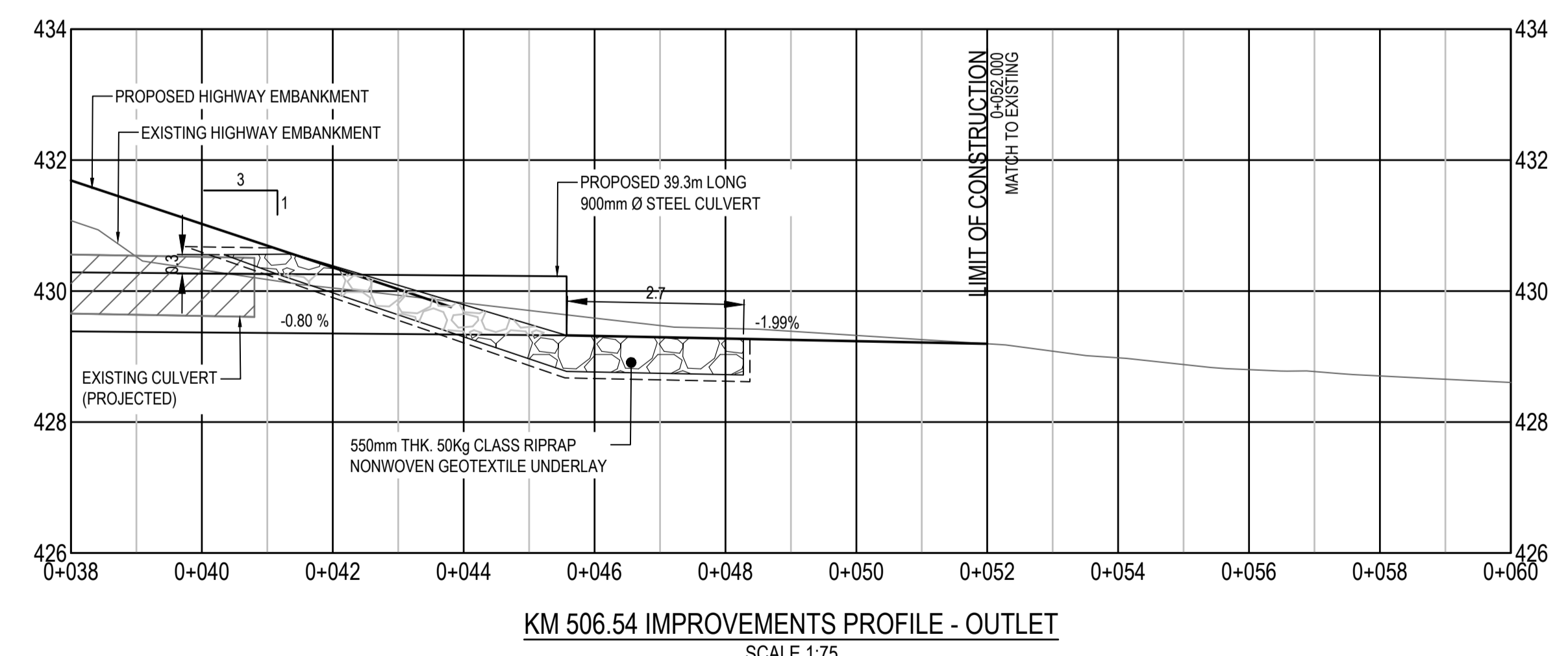
Client/client
Public Services and Procurement Canada

Drawing title/Titre du dessin
**PLAN / PROFILE / SECTION
CULVERT KM 506.54**

Project No./No. du projet	Sheet/Feuille	Revision no./La Révision no.
R.017173.216	C211	A

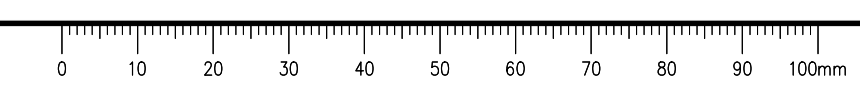


KM 506.54 IMPROVEMENTS PROFILE - INLET
SCALE 1:75



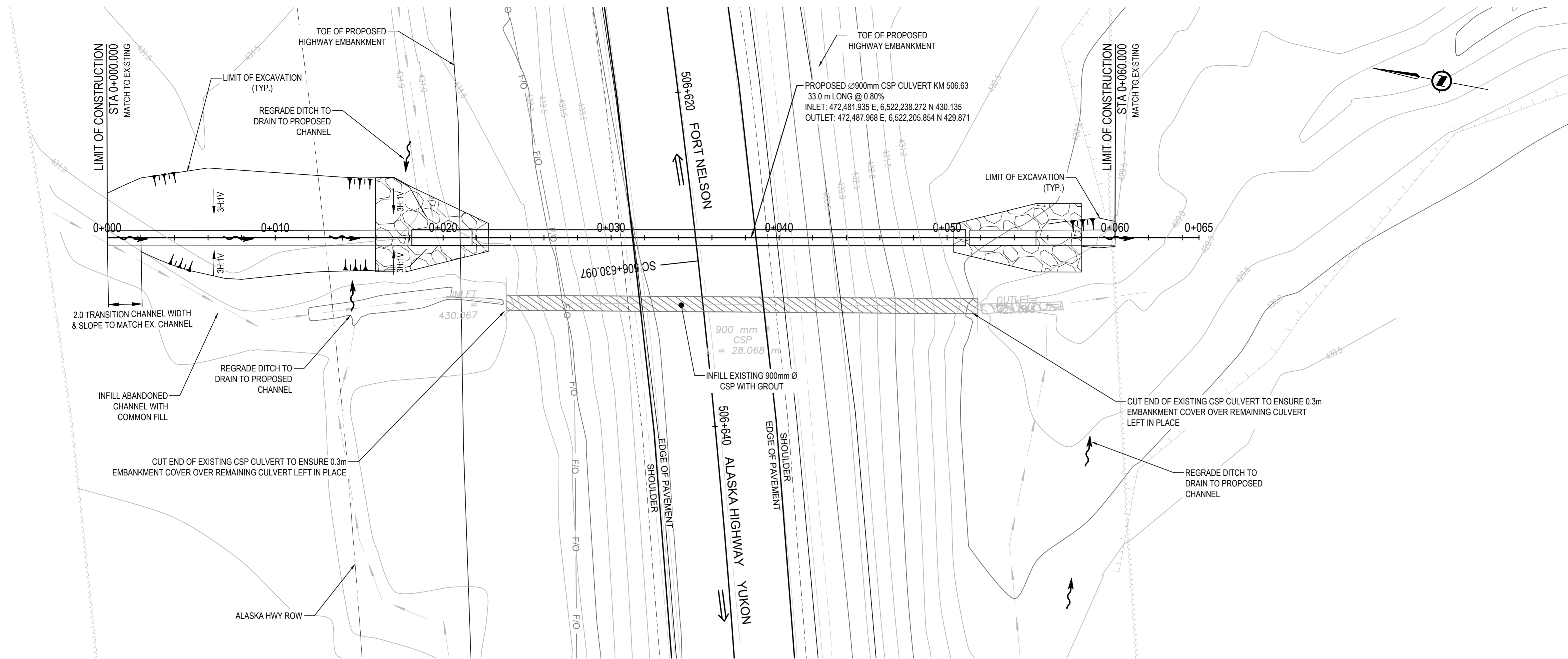
KM 506.54 IMPROVEMENTS PROFILE - OUTLET
SCALE 1:75

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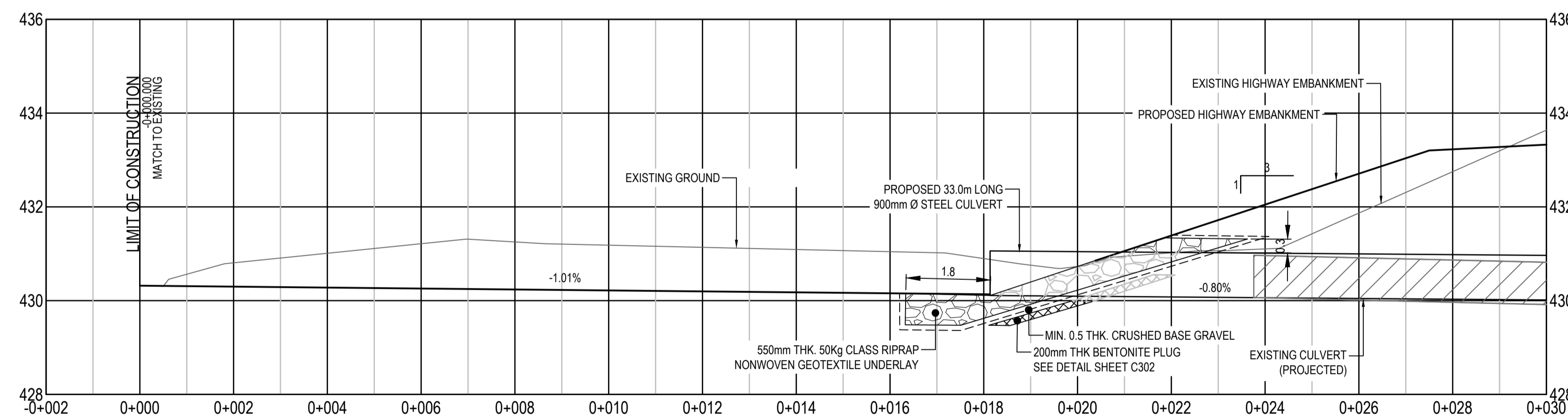


ISSUED FOR PERMITTING

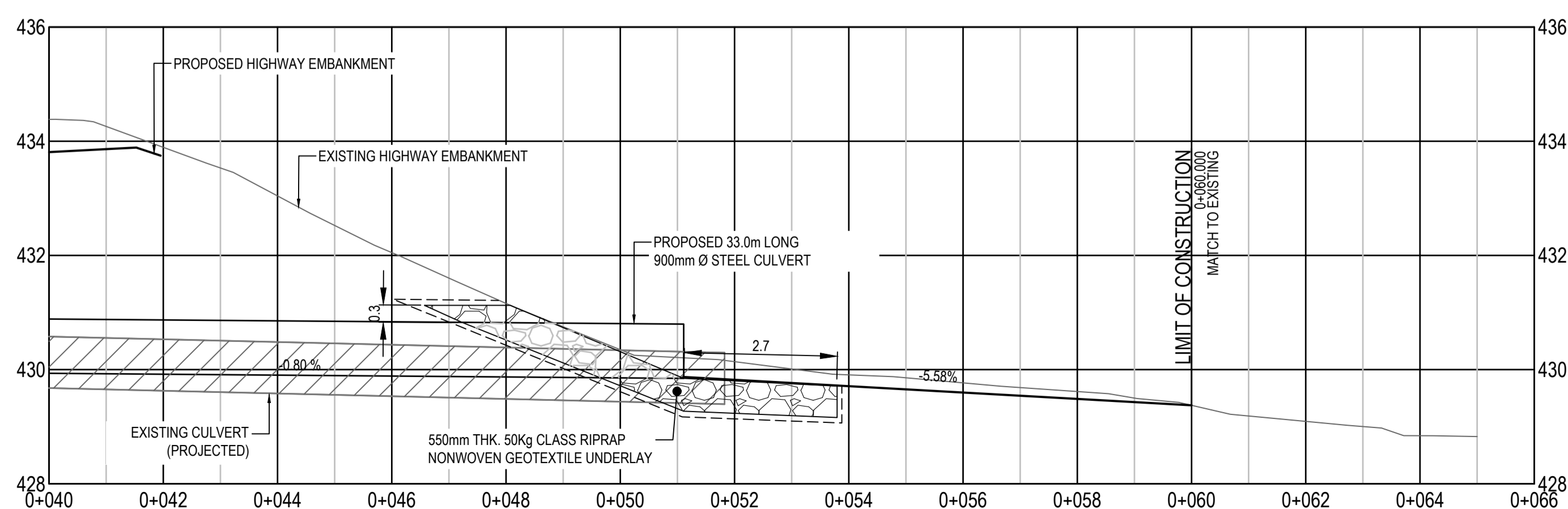
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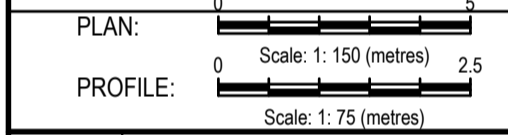
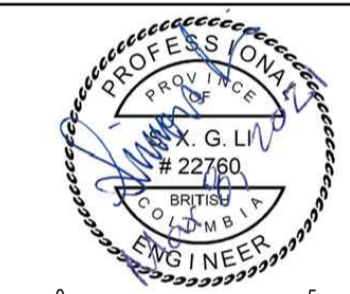
KM 506.63 IMPROVEMENTS PLAN
SCALE 1:150



KM 506.63 IMPROVEMENTS PROFILE - INLET
SCALE 1:75



KM 506.63 IMPROVEMENTS PROFILE - OUTLET
SCALE 1:75



Revision/Modification	Description/Description	Date/Date
A	ISSUED FOR PERMITTING	21/03/08

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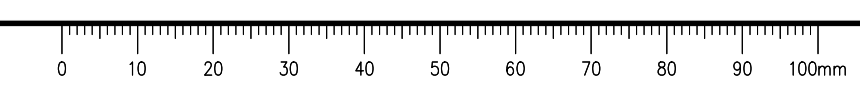
Project title/Titre du projet
KM 501 - KM 509 GEOMETRIC AND DRAINAGE IMPROVEMENTS ALASKA HIGHWAY, BC

Approved by/Approuvé par
S. LI
Designed by/Concepté par
M. KELEHER / T. CLENDENING
Drawn by/Dessiné par
P. SAMOLIA
PSPC Project Manager/Administrateur de Projets SPAC
A. TAHERI
PSPC Architectural and Engineering Resources Manager/Ressources Architectural et de Directeur d'Ingénierie, SPAC

Client/client
Public Services and Procurement Canada
Drawing title/Titre du dessin
PLAN / PROFILE / SECTION CULVERT KM 506.63

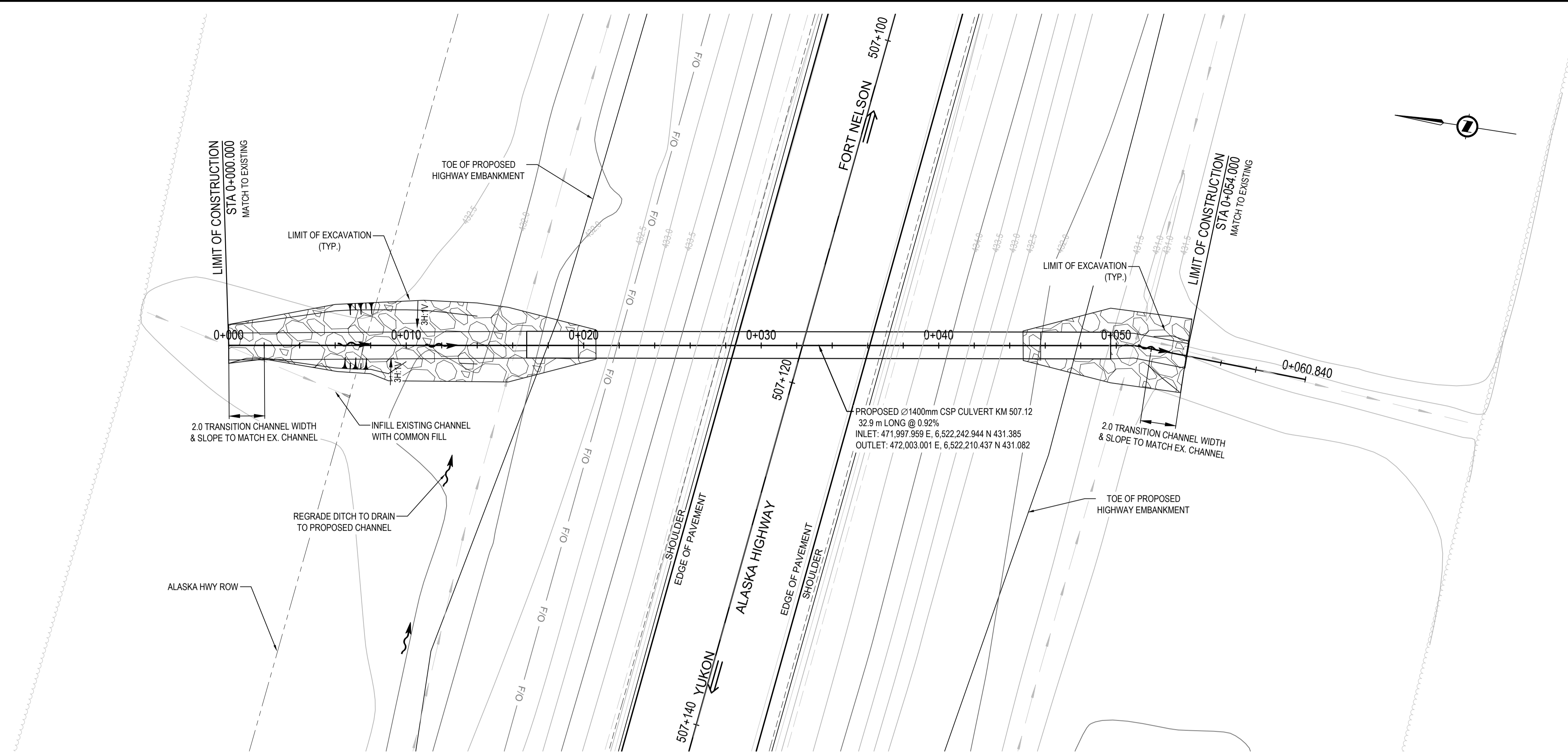
Project No./No. du projet R.017173.216	Sheet/Feuille C212	Revision no./La Révision no. A
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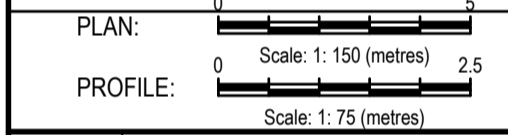


ISSUED FOR PERMITTING

- GENERAL NOTES:
1. DIMENSIONS, COORDINATES, ELEVATIONS ARE IN METRES UNLESS NOTED OTHERWISE.
 2. THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING THE LOCATION OF ALL UTILITIES PRIOR TO CONSTRUCTION.
 3. HYDROSEED ALL DISTURBED AREAS.
 4. REFER TO DRAWINGS C501 TO C505 FOR CONSTRUCTION STAGING DETAILS.



KM 507.12 IMPROVEMENTS PLAN
SCALE 1:150



Revision/Revisión	Description/Description	Date/Date
A	ISSUED FOR PERMITTING	21/03/08

Client/client
Public Services and Procurement Canada



Project title/Titre du projet
**KM 501 - KM 509
GEOMETRIC AND DRAINAGE
IMPROVEMENTS
ALASKA HIGHWAY, BC**

Approved by/Approve par
S. LI

Designed by/Concept par
M. KELEHER / T. CLENDENING

Drawn by/Dessine par
P. SAMOLIA

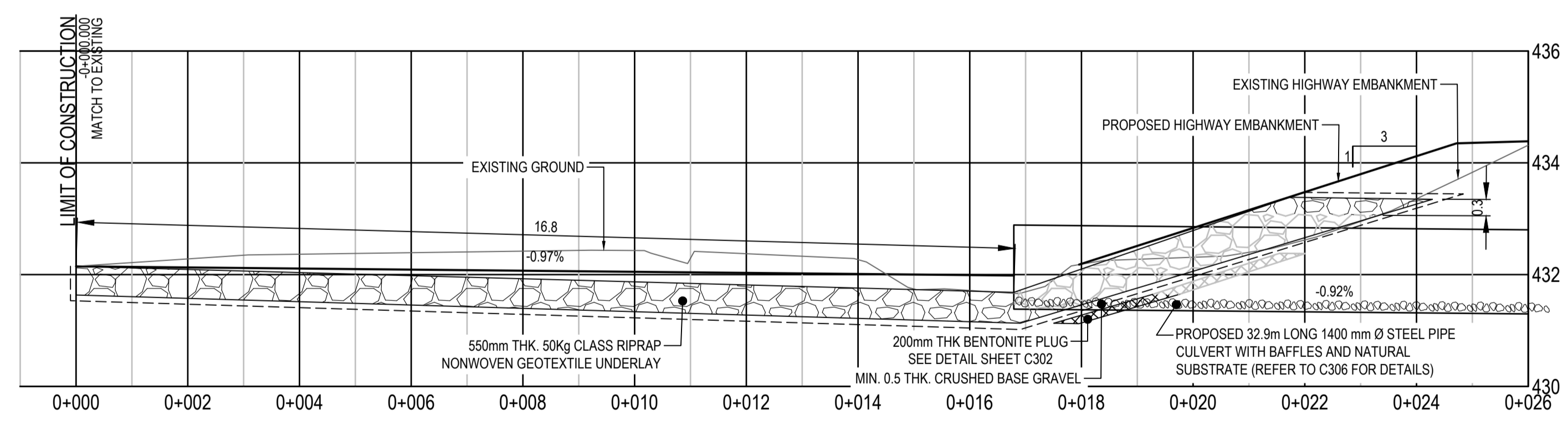
PSPC Project Manager/Administrateur de Projets SPAC
A. TAHERI

PSPC Architectural and Engineering Resources Manager/
Ressources Architectural et de Directeur d'ingénierie, SPAC

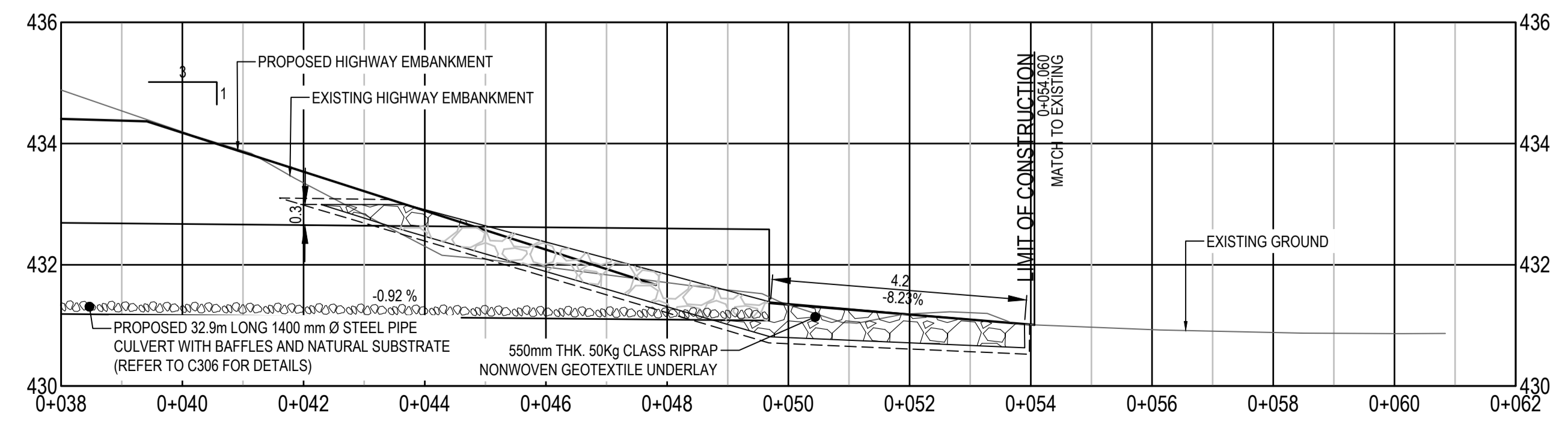
Client/client
Public Services and Procurement Canada

Drawing title/Titre du dessin
**PLAN / PROFILE / SECTION
CULVERT KM 507.12**

Project No./No. du projet R.017173.216	Sheet/Feuille C213	Revision no./ La Révision no. A
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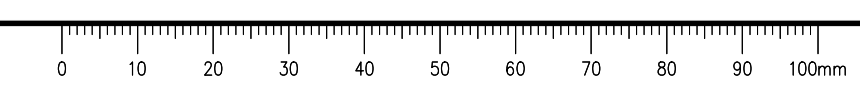


KM 507.12 IMPROVEMENTS PROFILE - INLET
SCALE 1:75



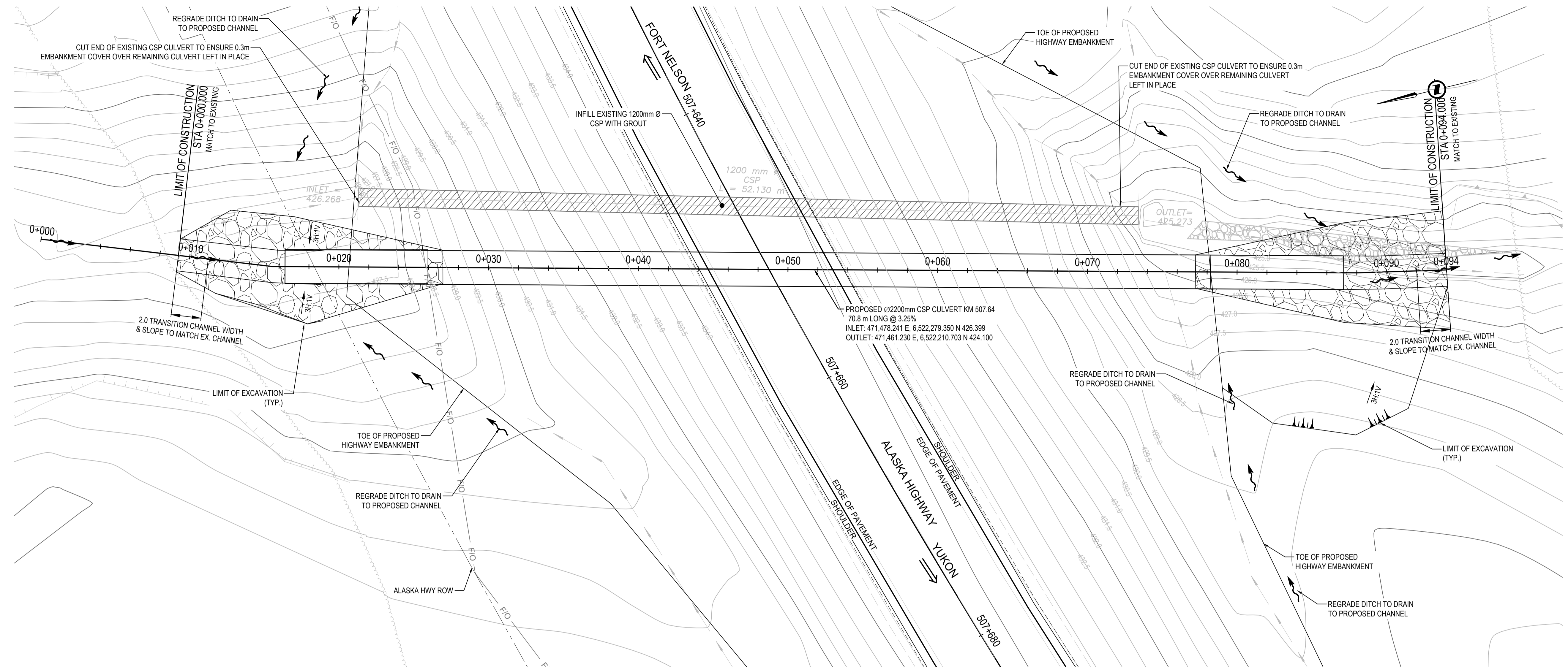
KM 507.12 IMPROVEMENTS PROFILE - OUTLET
SCALE 1:75

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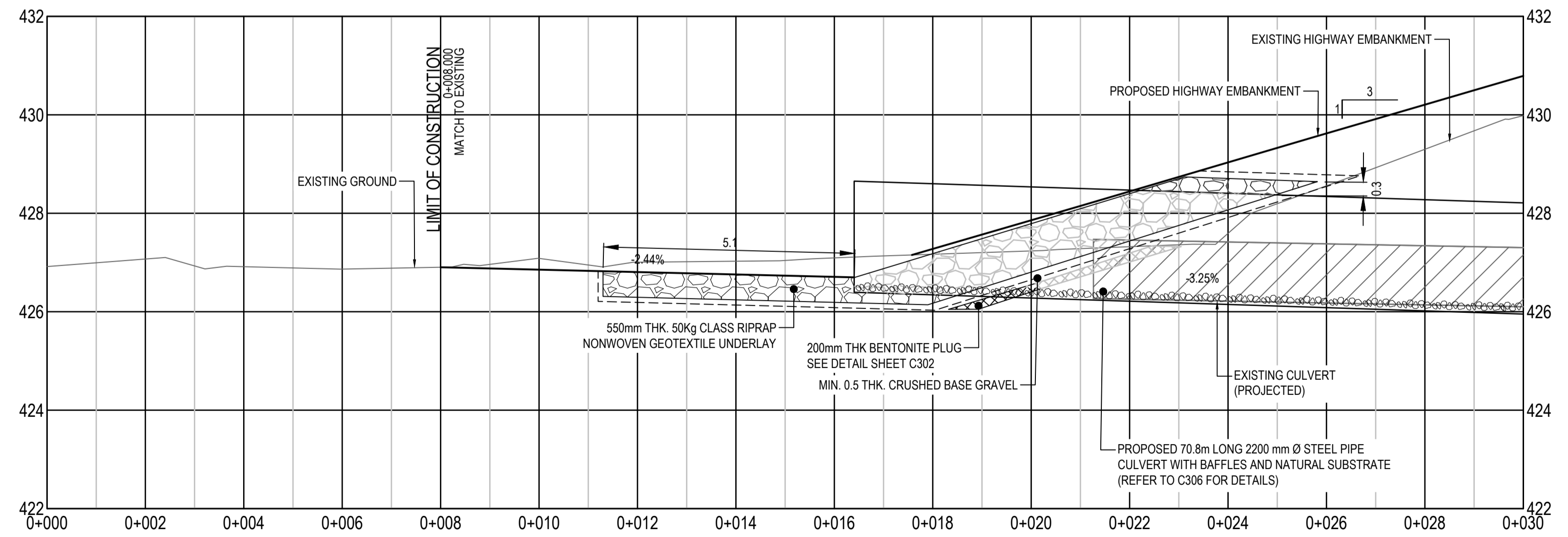


ISSUED FOR PERMITTING

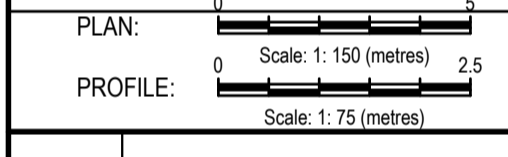
- GENERAL NOTES:
 1. DIMENSIONS, COORDINATES, ELEVATIONS ARE IN METRES UNLESS NOTED OTHERWISE.
 2. THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING THE LOCATION OF ALL UTILITIES PRIOR TO CONSTRUCTION.
 3. HYDROSEED ALL DISTURBED AREAS.
 4. REFER TO DRAWINGS C501 TO C505 FOR CONSTRUCTION STAGING DETAILS.



KM 507.64 IMPROVEMENTS PLAN
 SCALE 1:150



KM 507.64 IMPROVEMENTS PROFILE - INLET
 SCALE 1:75



Revision/Revisão	Description/Description	Date/Date
A	ISSUED FOR PERMITTING	21/03/08

Client/client
Public Services and Procurement Canada



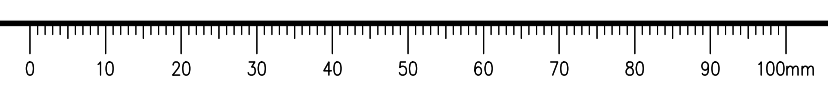
Project title/Titre du projet
**KM 501 - KM 509
 GEOMETRIC AND DRAINAGE
 IMPROVEMENTS
 ALASKA HIGHWAY, BC**

Approved by/Approuvé par
S. LI
 Designed by/Concepté par
M. KELEHER / T. CLENDENING
 Drawn by/Dessiné par
P. SAMOLIA
 PSPC Project Manager/Administrateur de Projets SPAC
A. TAHERI
 PSPC Architectural and Engineering Resources Manager/
 Ressources Architectural et de Directeur d'ingénierie, SPAC

Client/client
Public Services and Procurement Canada
 Drawing title/Titre du dessin
**PLAN / PROFILE / SECTION
 CULVERT KM 507.64
 SHEET 1 OF 2**

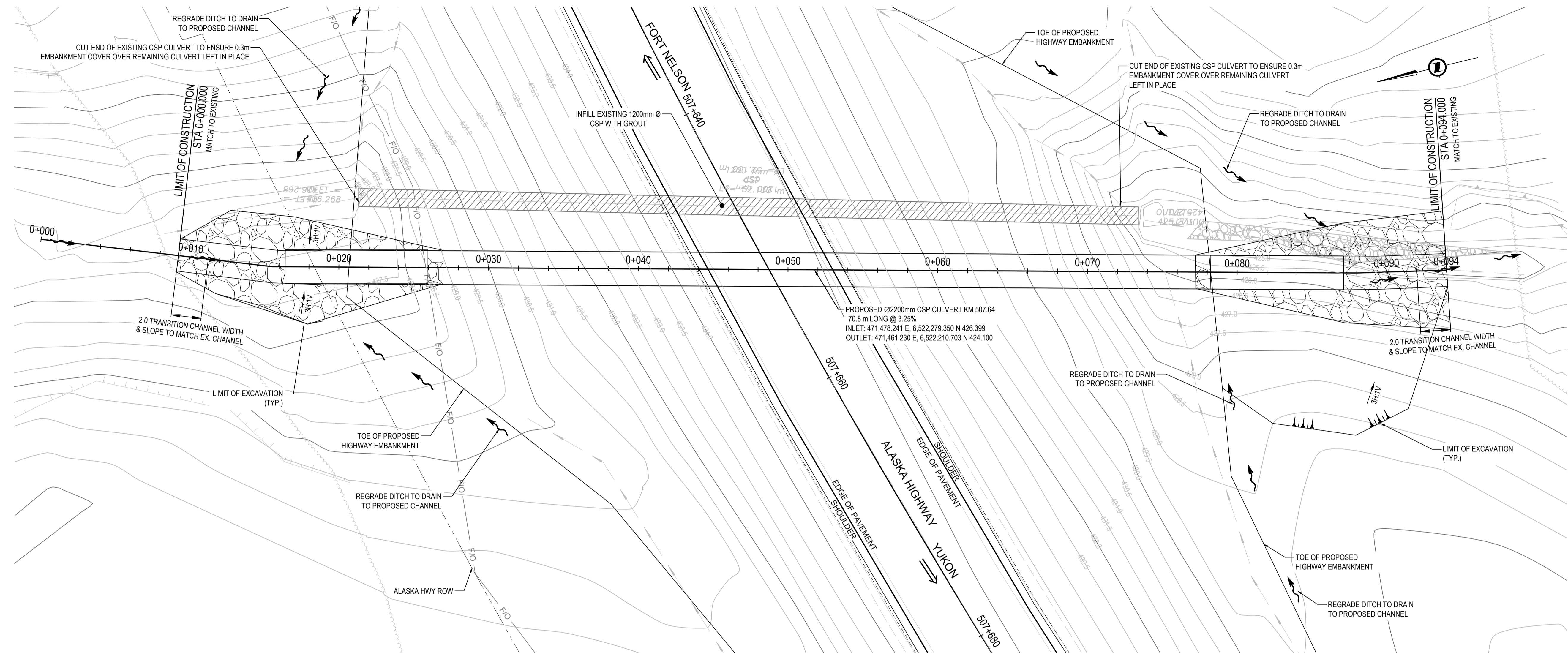
Project No./No. du projet	Sheet/Feuille	Revision no./ La Révision no.
R.017173.216	C214.1	A

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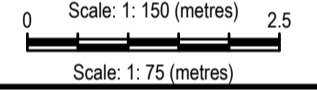
ISSUED FOR PERMITTING

- GENERAL NOTES:**
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 4. REFER TO DRAWINGS C501 TO C505 FOR CONSTRUCTION STAGING DETAILS.



KM 507.64 IMPROVEMENTS PLAN
SCALE 1:150



PLAN: 
 PROFILE: 

Revision/Revisão	Description/Description	Date/Date
A	ISSUED FOR PERMITTING	21/03/08

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Public Services and Procurement Canada



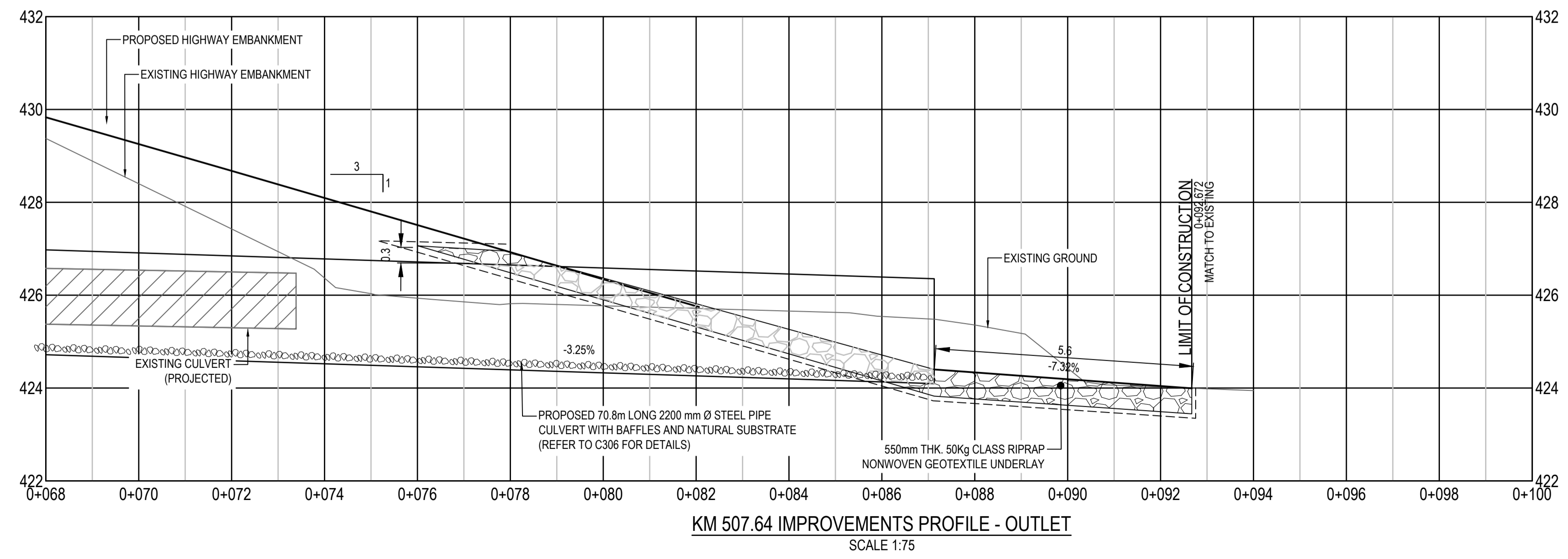
Project title/Titre du projet
**KM 501 - KM 509
GEOMETRIC AND DRAINAGE
IMPROVEMENTS
ALASKA HIGHWAY, BC**

Approved by/Approve par: **S. LI**
 Designed by/Concept par: **M. KELEHER / T. CLENDENING**
 Drawn by/Dessine par: **P. SAMOLIA**
 P.SPC Project Manager/Administrateur de Projets SPAC
A. TAHERI
 P.SPC Architectural and Engineering Resources Manager/
 Ressources Architectural et de Directeur d'ingénierie, SPAC

Client/client
Public Services and Procurement Canada

Drawing title/Titre du dessin
**PLAN / PROFILE / SECTION
CULVERT KM 507.64
SHEET 2 OF 2**

Project No./No. du projet R.017173.216	Sheet/Feuille C214.2	Revision no./ La Révision no. A
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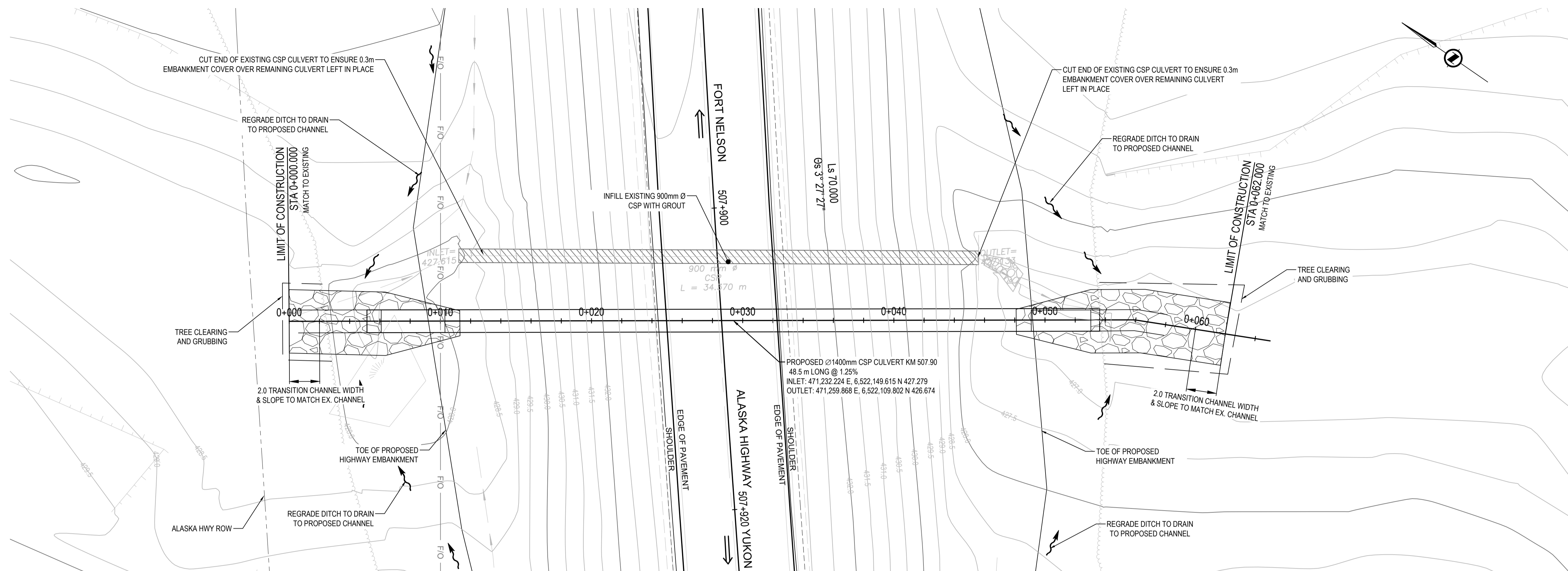


KM 507.64 IMPROVEMENTS PROFILE - OUTLET
SCALE 1:75

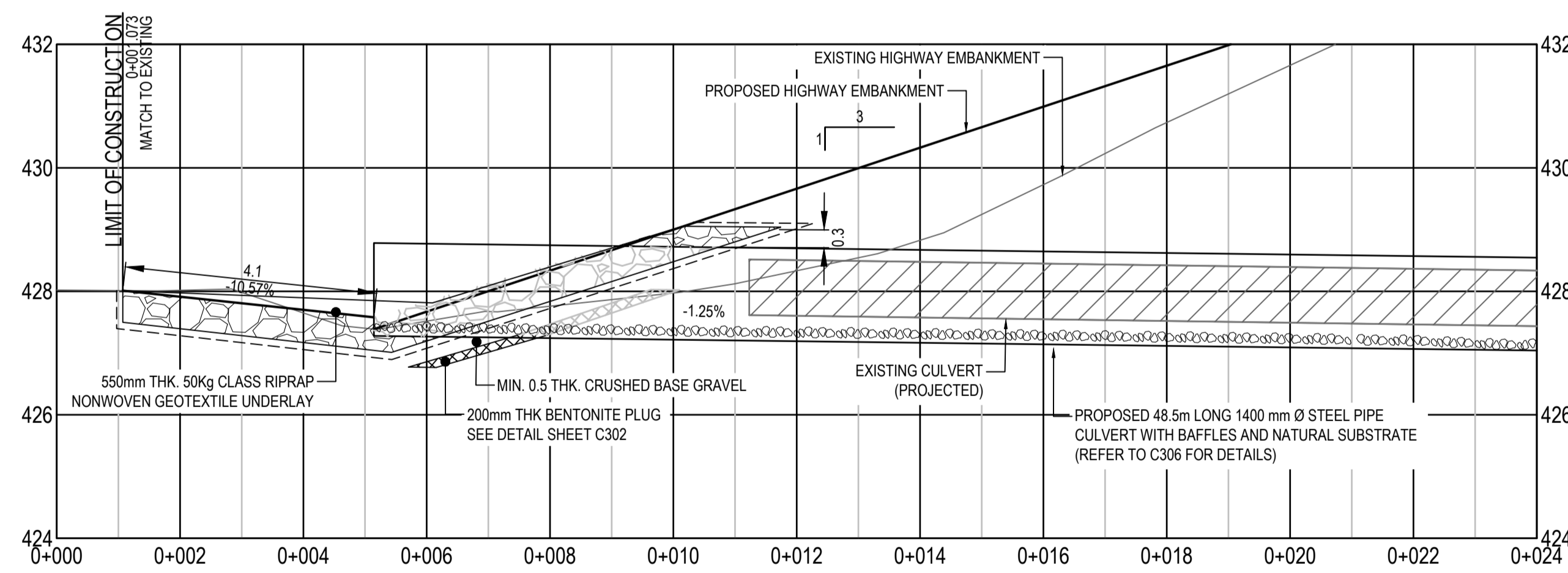
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ISSUED FOR PERMITTING

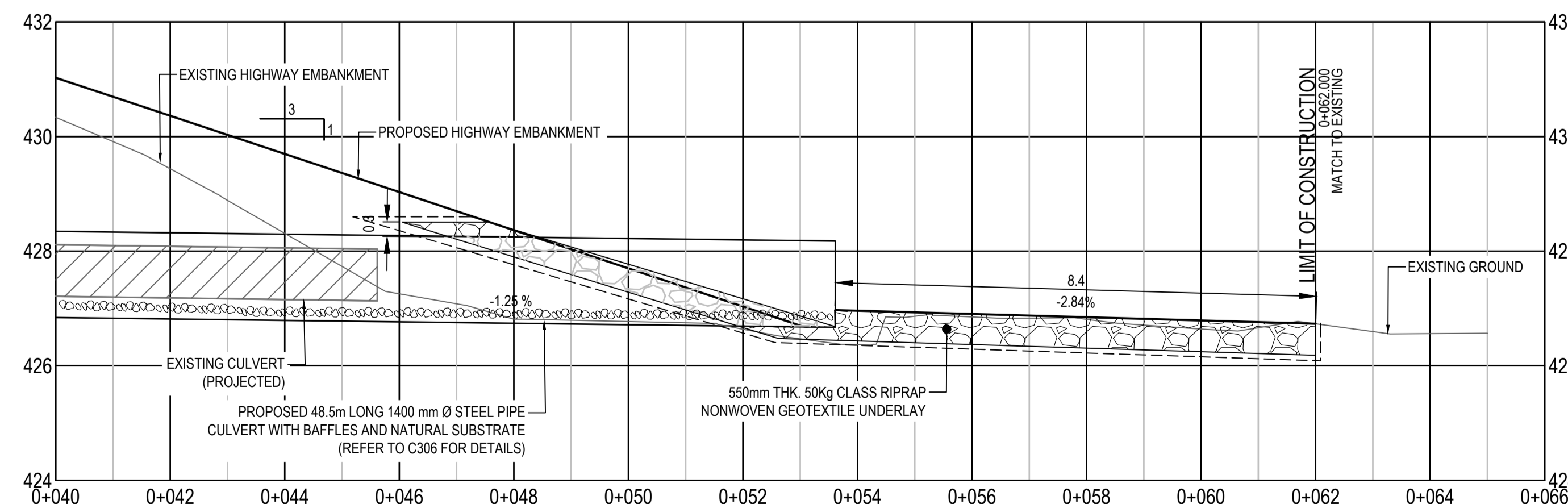
- GENERAL NOTES:
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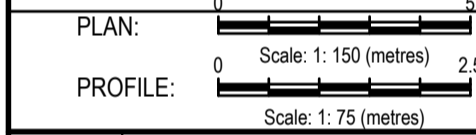
KM 507.90 IMPROVEMENTS PLAN
SCALE 1:150



KM 507.90 IMPROVEMENTS PROFILE - INLET
SCALE 1:75



KM 507.90 IMPROVEMENTS PROFILE - OUTLET
SCALE 1:75



Revision/	ISSUED FOR PERMITTING	21/03/08
Description/		
Date/		

Public Services and Procurement Canada



**KM 501 - KM 509
GEOMETRIC AND DRAINAGE
IMPROVEMENTS
ALASKA HIGHWAY, BC**

Approved by/Approve par
S. LI

Designed by/Concept par
M. KELEHER / T. CLEENING

Drawn by/Dessine par
P. SAMOLIA

PSPC Project Manager/Administrateur de Projets SPAC
A. TAHERI

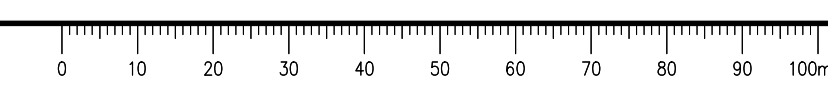
PSPC Architectural and Engineering Resources Manager/
Ressources Architectural et de Directeur d'Ingenierie, SPAC

Client/client
Public Services and Procurement Canada

**PLAN / PROFILE / SECTION
CULVERT KM 507.90**

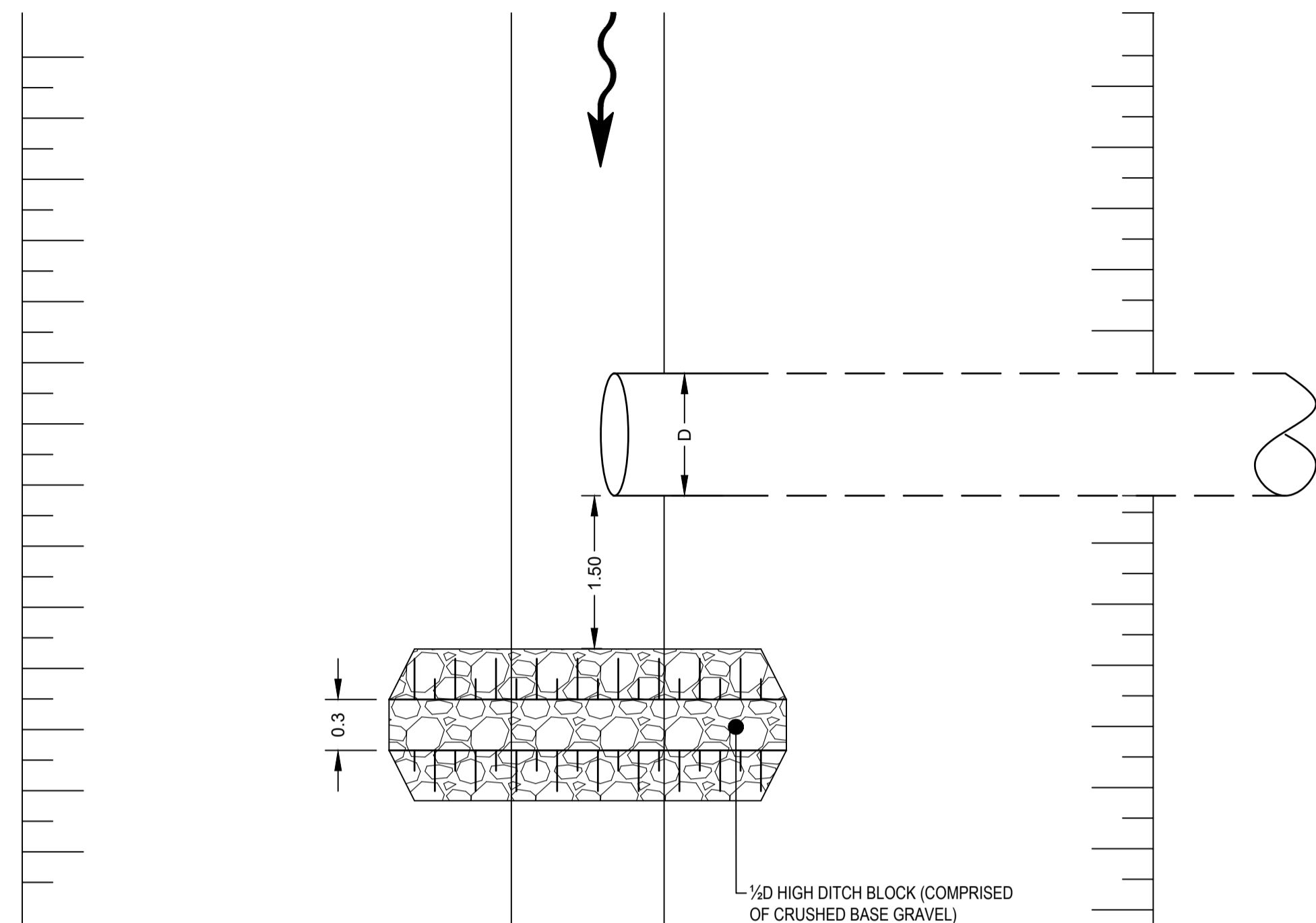
Project No./No. du projet	Sheet/Feuille	Revision no./La Révision no.
R.017173.216	C215	A

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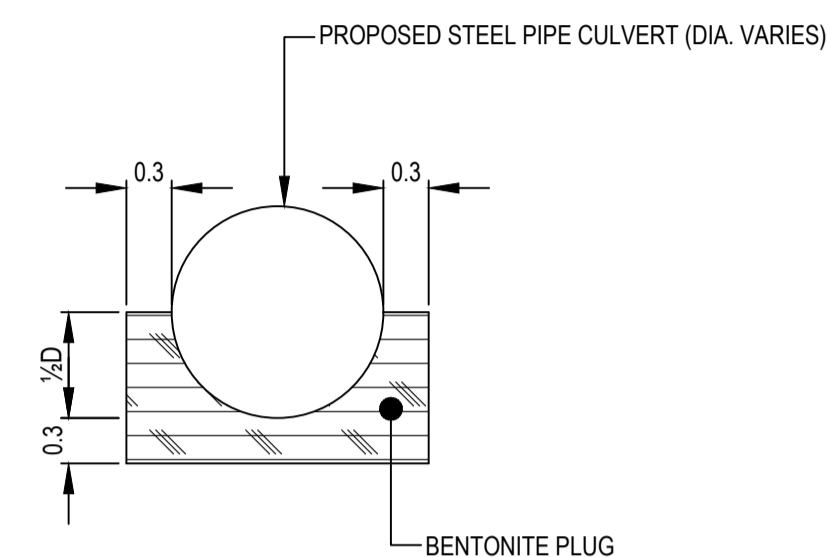


ISSUED FOR PERMITTING

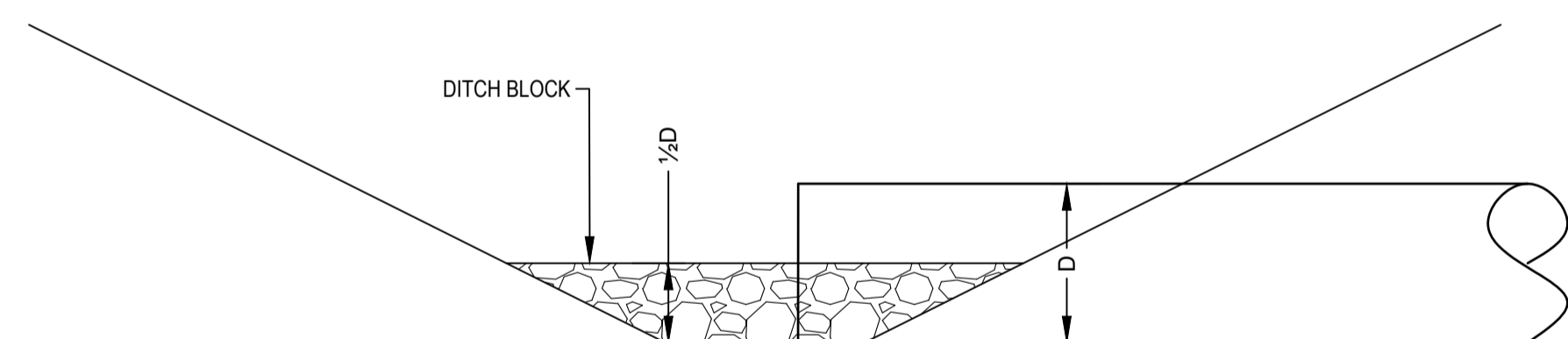
- GENERAL NOTES:
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 4. REFER TO DRAWINGS C501 TO C505 FOR CONSTRUCTION STAGING DETAILS.



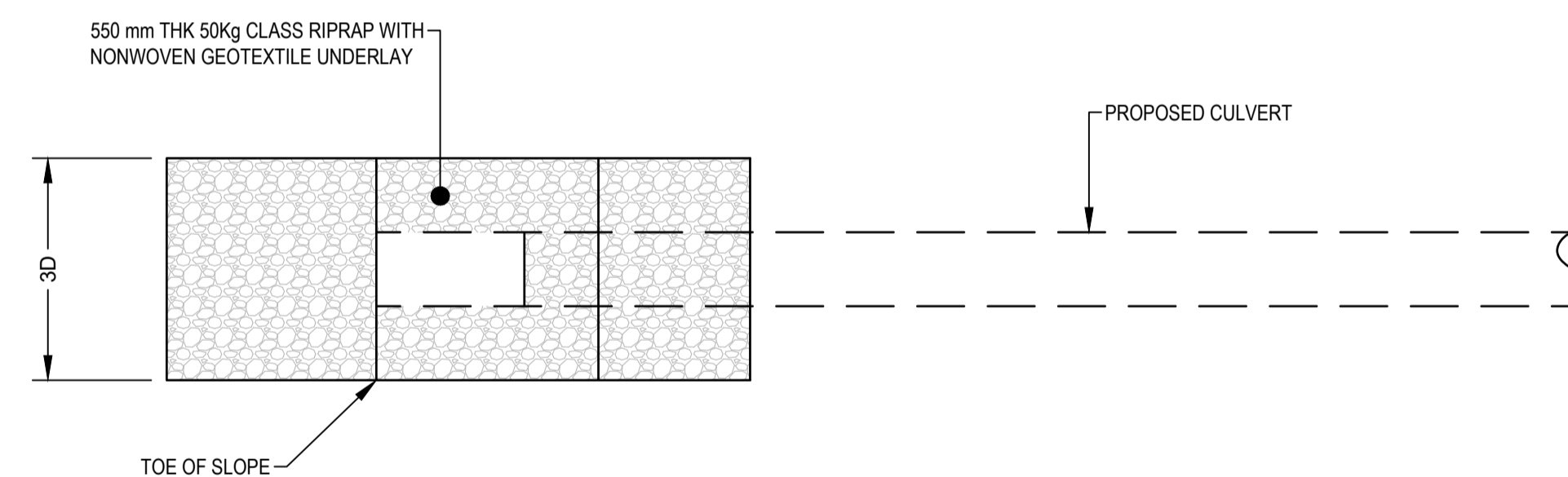
TYPICAL DITCH BLOCK - PLAN
SCALE: NTS



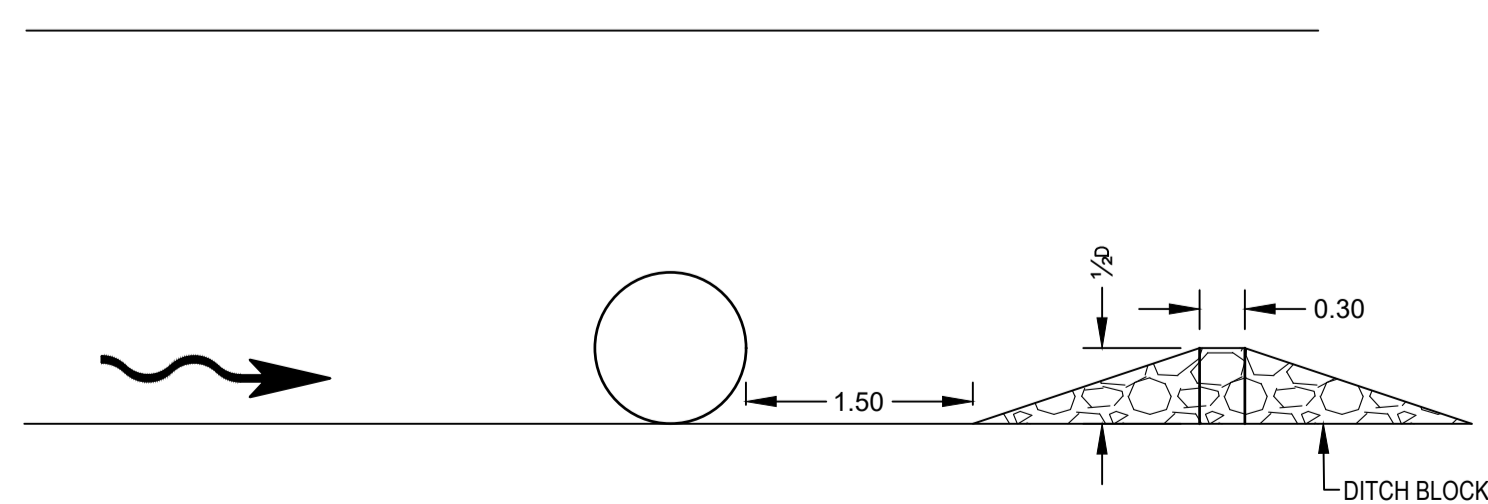
TYPICAL BENTONITE PLACEMENT
SCALE: NTS



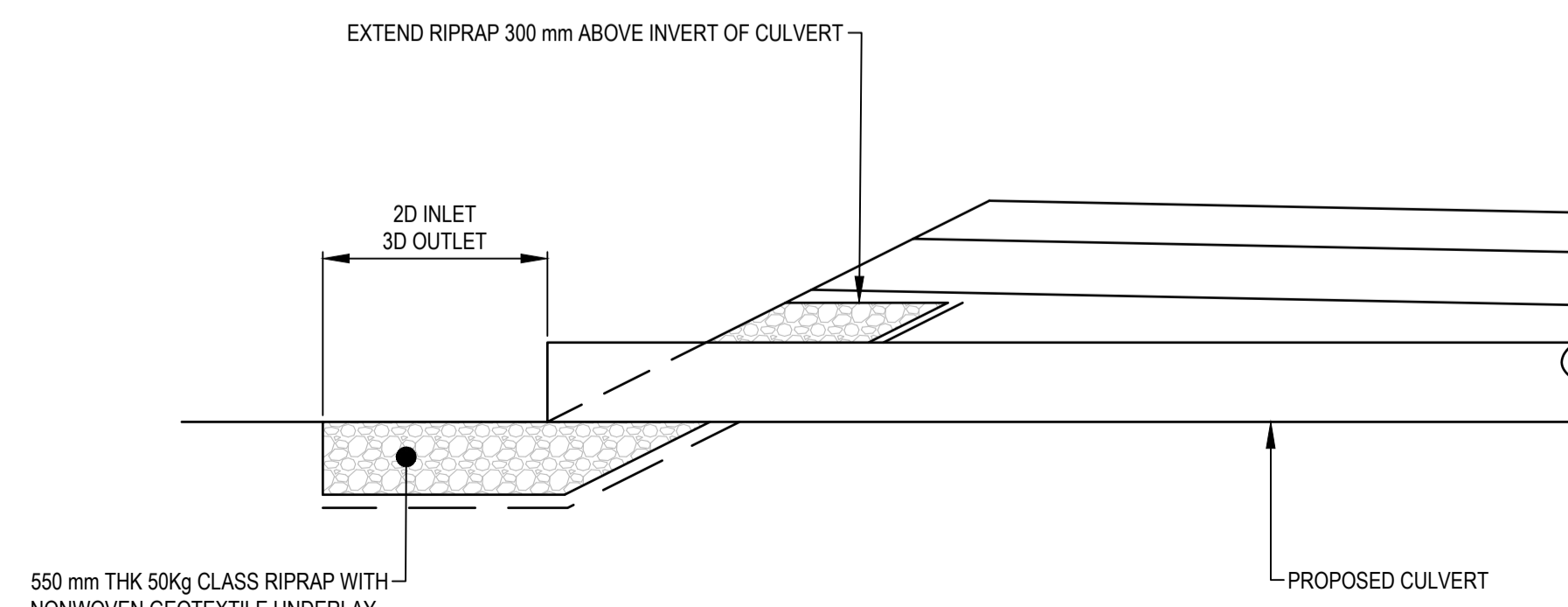
TYPICAL DITCH BLOCK - SECTION
SCALE: NTS



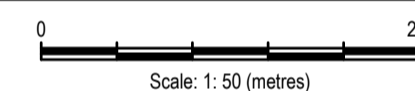
TYPICAL INLET / OUTLET RIPRAP PROTECTION (CULVERTS 600 mm Ø - 1000 mm Ø) - PLAN
SCALE: 1:50



TYPICAL DITCH BLOCK - PROFILE
SCALE: NTS



TYPICAL INLET / OUTLET RIPRAP PROTECTION (CULVERTS 600 mm Ø - 1000 mm Ø) - SECTION
SCALE: 1:50



Revision/Revisão	Description/Description	Date/Date
A	ISSUED FOR PERMITTING	21/03/08

Client/client
Public Services and Procurement Canada



Project title/Titre du projet
KM 501 - KM 509 GEOMETRIC AND DRAINAGE IMPROVEMENTS ALASKA HIGHWAY, BC

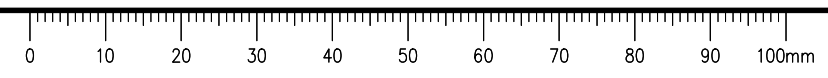
Approved by/Approve par
S. LI
Designed by/Concept par
M. KELEHER / T. CLENDENING
Drawn by/Dessine par
P. SAMOLIA
PSPC Project Manager/Administrateur de Projets SPAC
A. TAHERI
PSPC Architectural and Engineering Resources Manager/Ressources Architectural et de Directeur d'Ingénierie, SPAC

Client/client
Public Services and Procurement Canada

Drawing title/Titre du dessin
CULVERT DETAILS

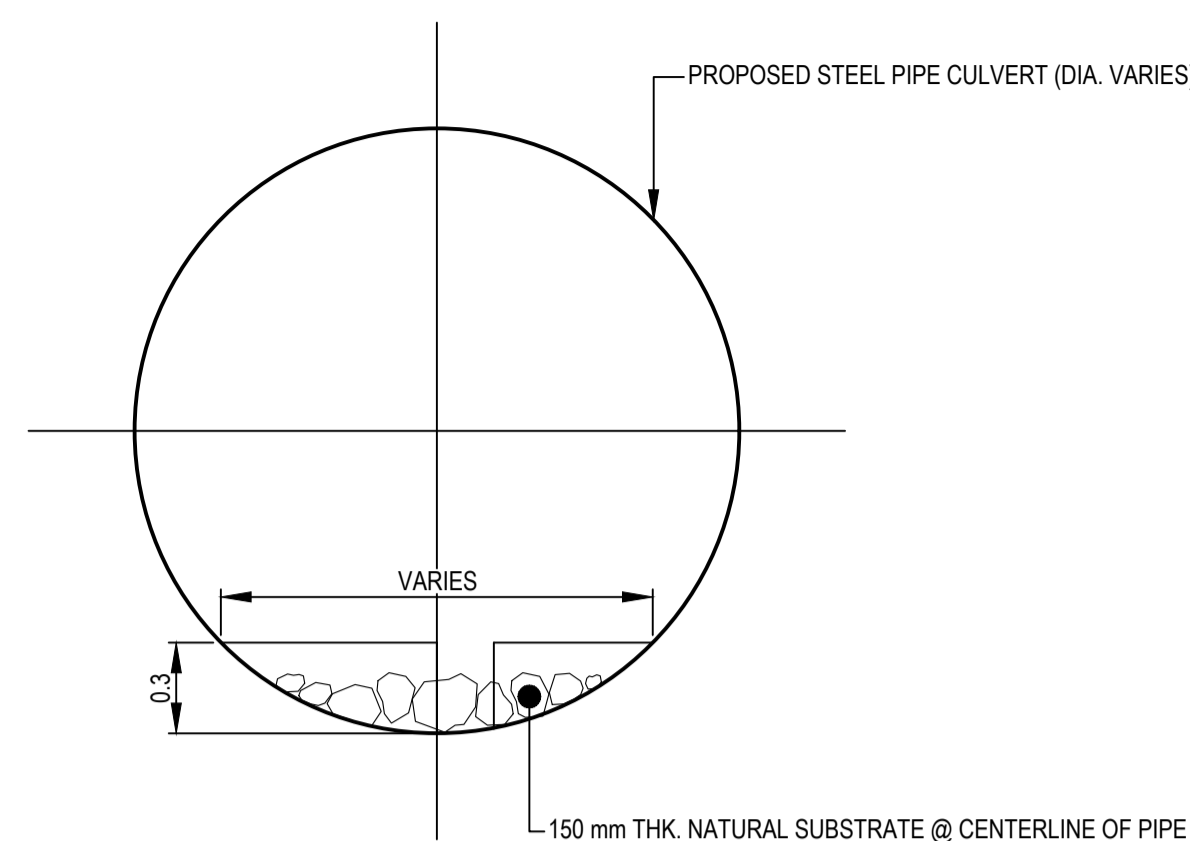
Project No./No. du projet	Sheet/Feuille	Revision no./La Révision no.
R.017173.216	C304	A

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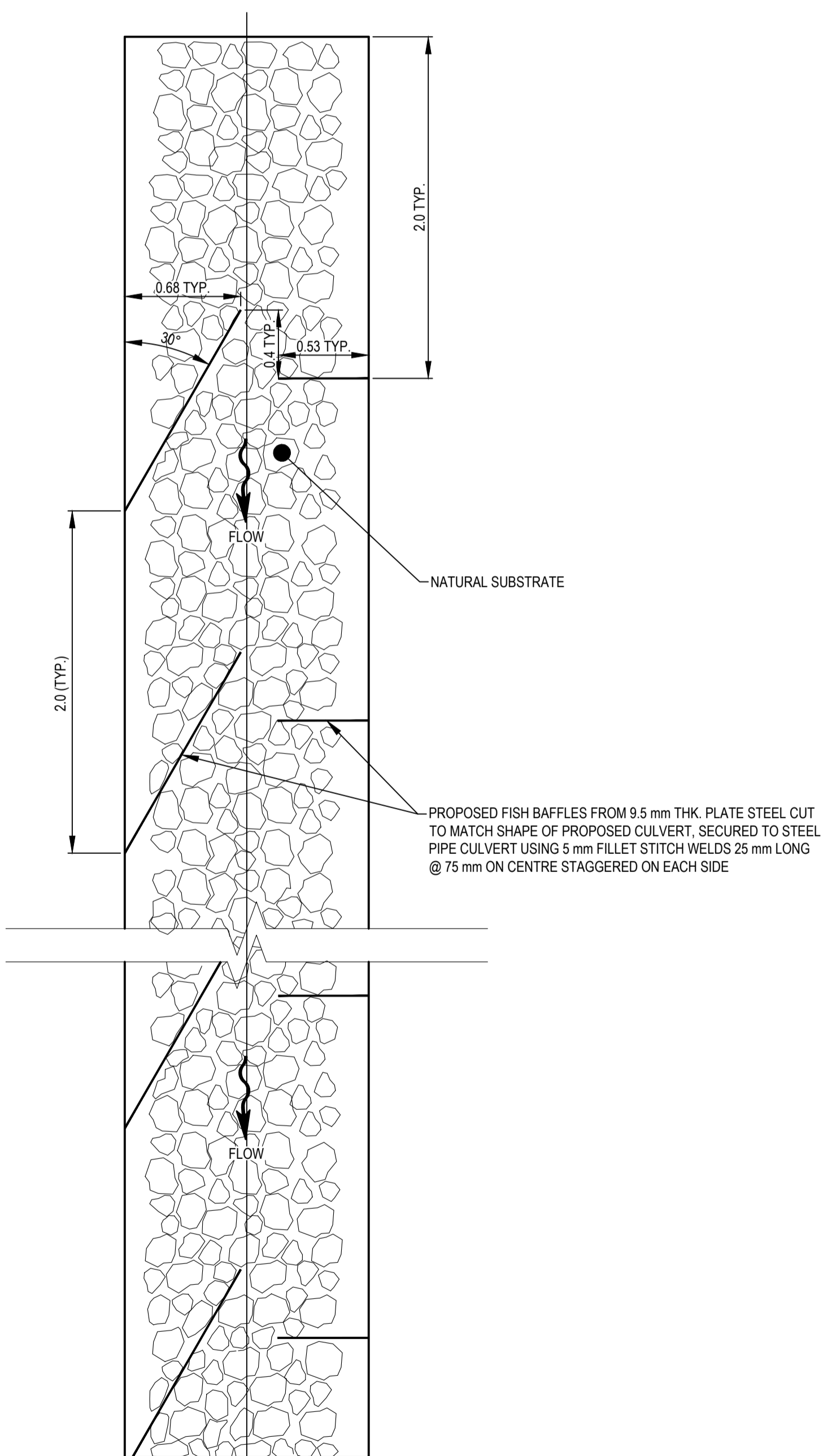


ISSUED FOR PERMITTING

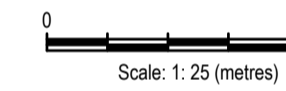
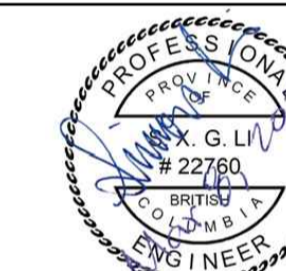
- GENERAL NOTES:
1. DIMENSIONS, COORDINATES, ELEVATIONS ARE IN METRES UNLESS NOTED OTHERWISE.
 2. THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING THE LOCATION OF ALL UTILITIES PRIOR TO CONSTRUCTION.
 3. HYDROSEED ALL DISTURBED AREAS.
 4. REFER TO DRAWINGS C501 TO C505 FOR CONSTRUCTION STAGING DETAILS.



TYPICAL FISH BAFFLE SECTION - PROPOSED PRIMARY CULVERT ONLY
SCALE 1:25



TYPICAL FISH BAFFLE PLAN - PROPOSED PRIMARY CULVERT ONLY
DRAWN AT TOP OF BAFFLES
SCALE 1:25



Revision/Revisão	Description/Description	Date/Date
A	ISSUED FOR PERMITTING	21/03/08

Client/client
Public Services and Procurement Canada



Project title/Titre du projet
**KM 501 - KM 509
GEOMETRIC AND DRAINAGE
IMPROVEMENTS
ALASKA HIGHWAY, BC**

Approved by/Approve par
S. LI

Designed by/Concept par
M. KELEHER / T. CLENDENING

Drawn by/Dessine par
P. SAMOLIA

PSPC Project Manager/Administrateur de Projets SPAC
A. TAHERI

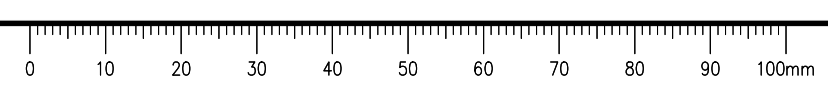
PSPC Architectural and Engineering Resources Manager/
Ressources Architectural et de Directeur d'Ingénierie, SPAC

Client/client
Public Services and Procurement Canada

Drawing title/Titre du dessin
FISH BAFFLE TYPICAL DETAILS

Project No./No. du projet	Sheet/Feuille	Revision no./La Révision no.
R.017173.216	C306	A

Q:\Vancouver\Transportation\TRN\VHWY03116 Alaska Hwy Km 501 - 509\CAD\C301-303 TYPICAL SECTIONS & DETAILS.dwg [C306] March 08, 2021 - 10:20:57 am (BY: CLENDENING, TODD)

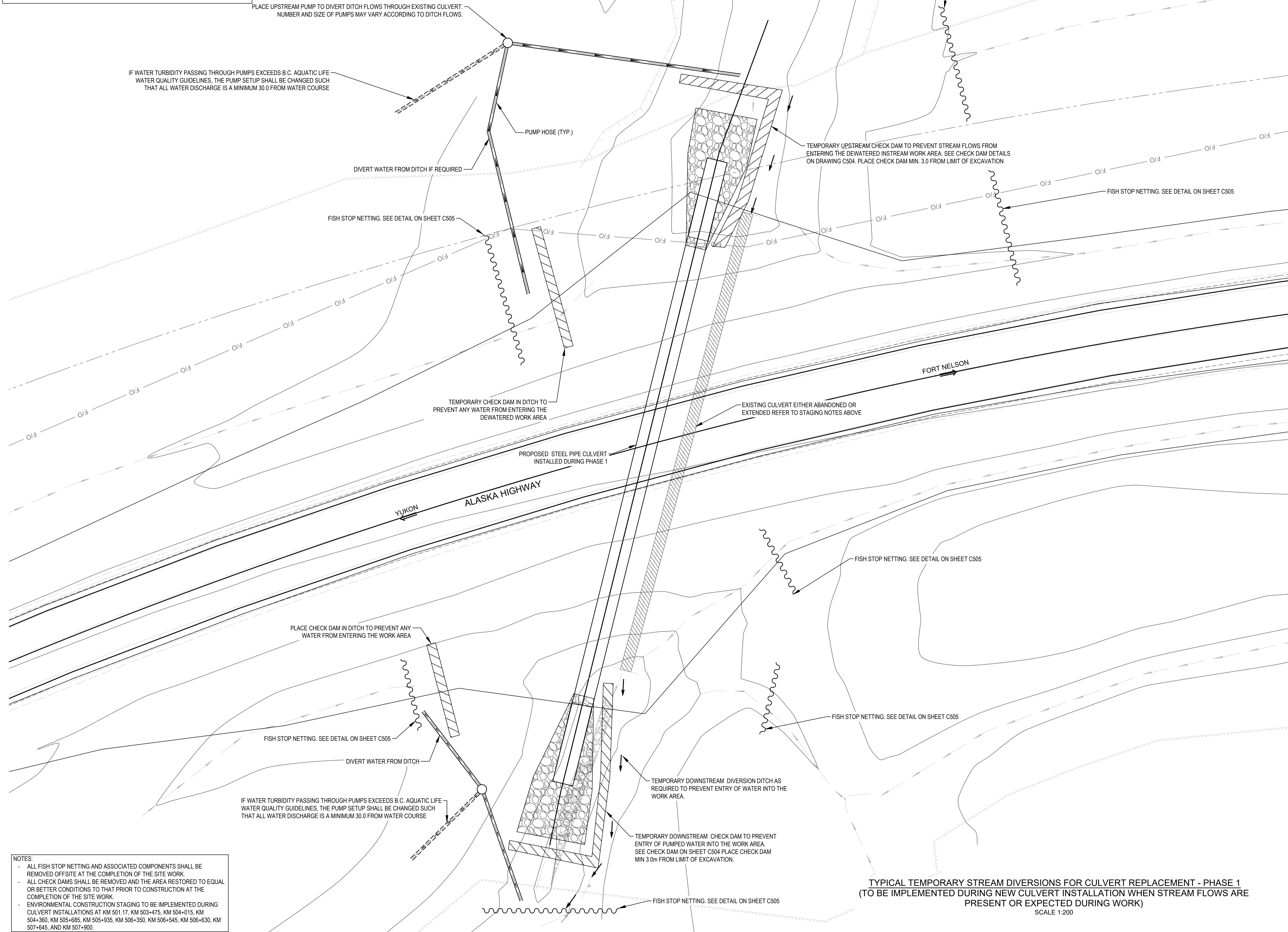


CONSTRUCTION SEQUENCING / STAGING

- PHASE 1:
1. INSTALL FISH STOP NETTING.
 2. EXECUTE FISH SALVAGE AT INLET AND OUTLET ISOLATED AREAS.
 3. INSTALL UPSTREAM AND DOWNSTREAM CHECK DAMS AND DIRECT STREAM FLOWS THROUGH EXISTING CULVERT.
 4. INSTALL UPSTREAM AND DOWNSTREAM PUMP(S) AND COMMENCE STREAM FLOW DIVERSION INTO PUMPS (IF REQUIRED).
 5. INSTALL NEW CULVERT AND RIPRAP EROSION PROTECTION IN THE DEWATERED INSTREAM WORK AREA.
 6. COMMENCE PHASE 2. SEE SHEET C502.

PLACE UPSTREAM PUMP TO DIVERT DITCH FLOWS THROUGH EXISTING CULVERT. NUMBER AND SIZE OF PUMPS MAY VARY ACCORDING TO DITCH FLOWS.

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

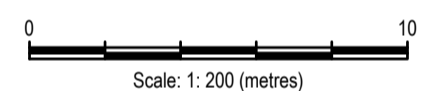


- NOTES:
- ALL FISH STOP NETTING AND ASSOCIATED COMPONENTS SHALL BE REMOVED OFFSITE AT THE COMPLETION OF THE SITE WORK.
 - ALL CHECK DAMS SHALL BE REMOVED AND THE AREA RESTORED TO EQUAL OR BETTER CONDITIONS TO THAT PRIOR TO CONSTRUCTION AT THE COMPLETION OF THE SITE WORK.
 - ENVIRONMENTAL CONSTRUCTION STAGING TO BE IMPLEMENTED DURING CULVERT INSTALLATIONS AT KM 501.17, KM 503+475, KM 504+015, KM 504+360, KM 505+685, KM 505+935, KM 506+350, KM 506+545, KM 506+630, KM 507+645, AND KM 507+900.

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)
SCALE 1:200

ISSUED FOR PERMITTING

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 3. HYDROSEED ALL DISTURBED AREAS.
 4. REFER TO DRAWINGS C201 TO C215 FOR CULVERT DETAILS.



Revision/Revisión	Description/Description	Date/Date
A	ISSUED FOR PERMITTING	21/03/08
Client/client		

Public Services and Procurement Canada



Project title/Titre du projet
**KM 501 - KM 509
GEOMETRIC AND DRAINAGE
IMPROVEMENTS
ALASKA HIGHWAY, BC**

Approved by/Approve par
S. LI

Designed by/Concept par
M. KELEHER / T. CLENDENING

Drawn by/Dessine par
P. SAMOLIA

PSPC Project Manager/Administrateur de Projets SPAC
A. TAHERI

PSPC Architectural and Engineering Resources Manager/
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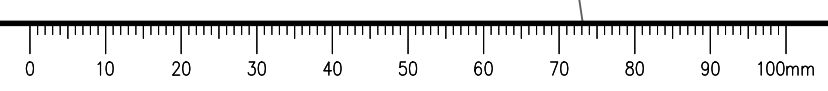
Client/client
Public Services and Procurement Canada

Drawing title/Titre du dessin

**REPLACEMENT CULVERT
TYPICAL ENVIRONMENTAL
CONSTRUCTION STAGING -
PLAN VIEW PHASE 1**

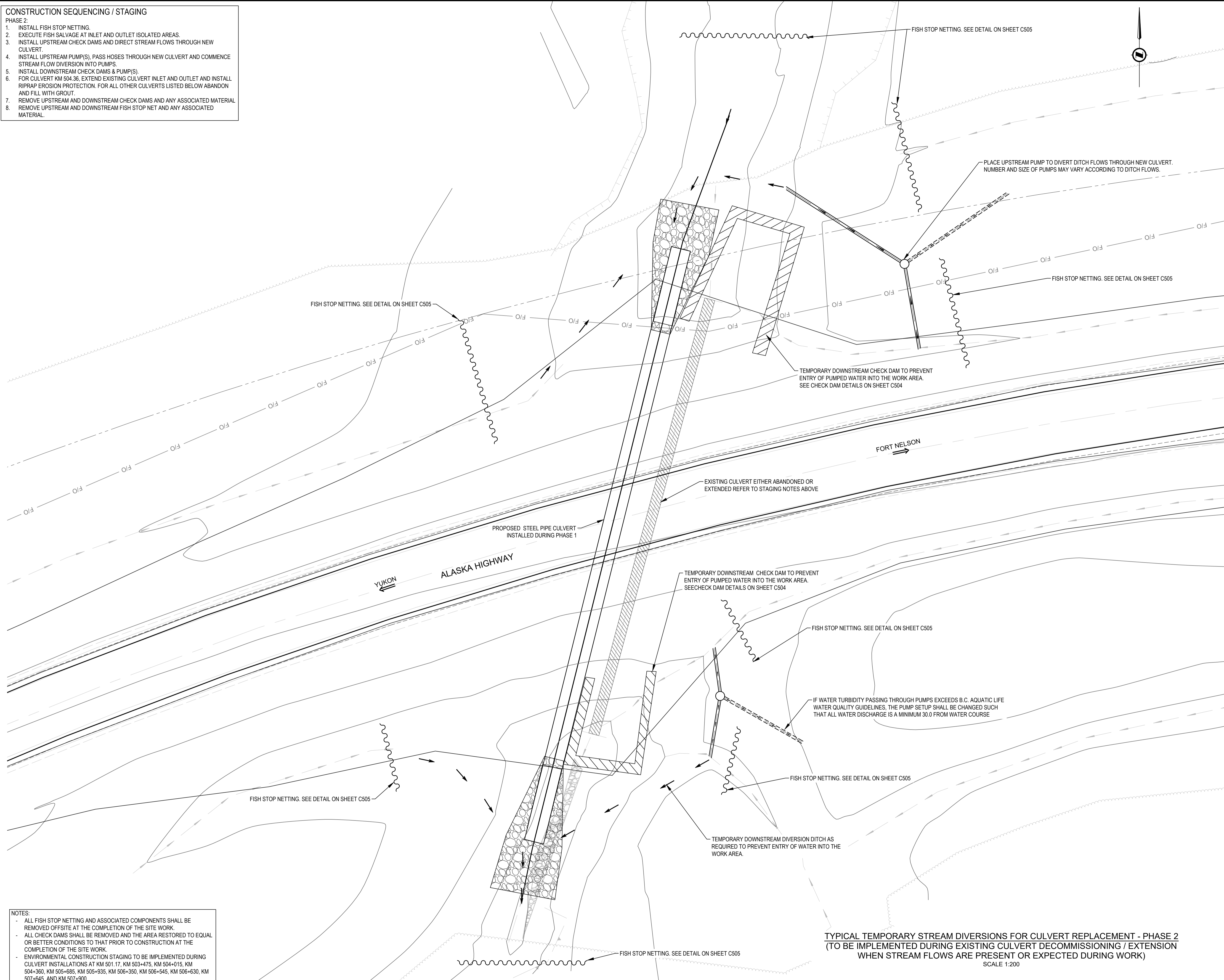
Project No./No. du projet	Sheet/Feuille	Revision no./ La Révision no.
R.017173.216	C501	A

Q:\Vancouver\Transportation\TRN\VHWY03116 Alaska Hwy Km 501 - 509\CAD\C501-505 TYP CONSTRUCTION STAGING.dwg [C501] March 08, 2021 - 11:21:07 am (BY: CLENDENING, TODD)



CONSTRUCTION SEQUENCING / STAGING

- PHASE 2:
1. INSTALL FISH STOP NETTING.
 2. EXECUTE FISH SALVAGE AT INLET AND OUTLET ISOLATED AREAS.
 3. INSTALL UPSTREAM CHECK DAMS AND DIRECT STREAM FLOWS THROUGH NEW CULVERT.
 4. INSTALL UPSTREAM PUMP(S), PASS HOSES THROUGH NEW CULVERT AND COMMENCE STREAM FLOW DIVERSION INTO PUMPS.
 5. INSTALL DOWNSTREAM CHECK DAMS & PUMP(S).
 6. FOR CULVERT KM 504.36, EXTEND EXISTING CULVERT INLET AND OUTLET AND INSTALL RIPRAP EROSION PROTECTION. FOR ALL OTHER CULVERTS LISTED BELOW ABANDON AND FILL WITH GROUT.
 7. REMOVE UPSTREAM AND DOWNSTREAM CHECK DAMS AND ANY ASSOCIATED MATERIAL.
 8. 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.
 - ENVIRONMENTAL CONSTRUCTION STAGING TO BE IMPLEMENTED DURING CULVERT INSTALLATIONS AT KM 501.17, KM 503+475, KM 504+015, KM 504+360, KM 505+685, KM 505+935, KM 506+350, KM 506+545, KM 506+630, KM 507+645, AND KM 507+900.

TYPICAL TEMPORARY STREAM DIVERSIONS FOR CULVERT REPLACEMENT - PHASE 2
 (TO BE IMPLEMENTED DURING EXISTING CULVERT DECOMMISSIONING / EXTENSION WHEN STREAM FLOWS ARE PRESENT OR EXPECTED DURING WORK)
 SCALE 1:200

ISSUED FOR PERMITTING

- GENERAL NOTES:
1. DIMENSIONS, COORDINATES, ELEVATIONS ARE IN METRES UNLESS NOTED OTHERWISE.
 2. THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING THE LOCATION OF ALL UTILITIES PRIOR TO CONSTRUCTION.
 3. HYDROSEED ALL DISTURBED AREAS.
 4. REFER TO DRAWINGS C201 TO C215 FOR CULVERT DETAILS.



Scale: 1:200 (metres)

Revision/Évaluation	Description/Description	Date/Date
A	ISSUED FOR PERMITTING	21/03/08

Client/client
Public Services and Procurement Canada



Project title/Titre du projet
**KM 501 - KM 509
 GEOMETRIC AND DRAINAGE
 IMPROVEMENTS
 ALASKA HIGHWAY, BC**

Approved by/Approuvé par
S. LI

Designed by/Concept par
M. KELEHER / T. CLENDENING

Drawn by/Dessiné par
P. SAMOLIA

PSPC Project Manager/Administrateur de Projets SPAC
A. TAHERI

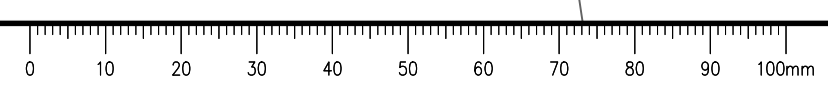
PSPC Architectural and Engineering Resources Manager/
 Ressources Architectural et de Directeur d'Ingénierie, SPAC

Client/client
Public Services and Procurement Canada

Drawing title/Titre du dessin
**REPLACEMENT CULVERT
 TYPICAL ENVIRONMENTAL
 CONSTRUCTION STAGING -
 PLAN VIEW PHASE 2**

Project No./No. du projet R.017173.216	Sheet/Feuille C502	Revision no./ La Révision no. A
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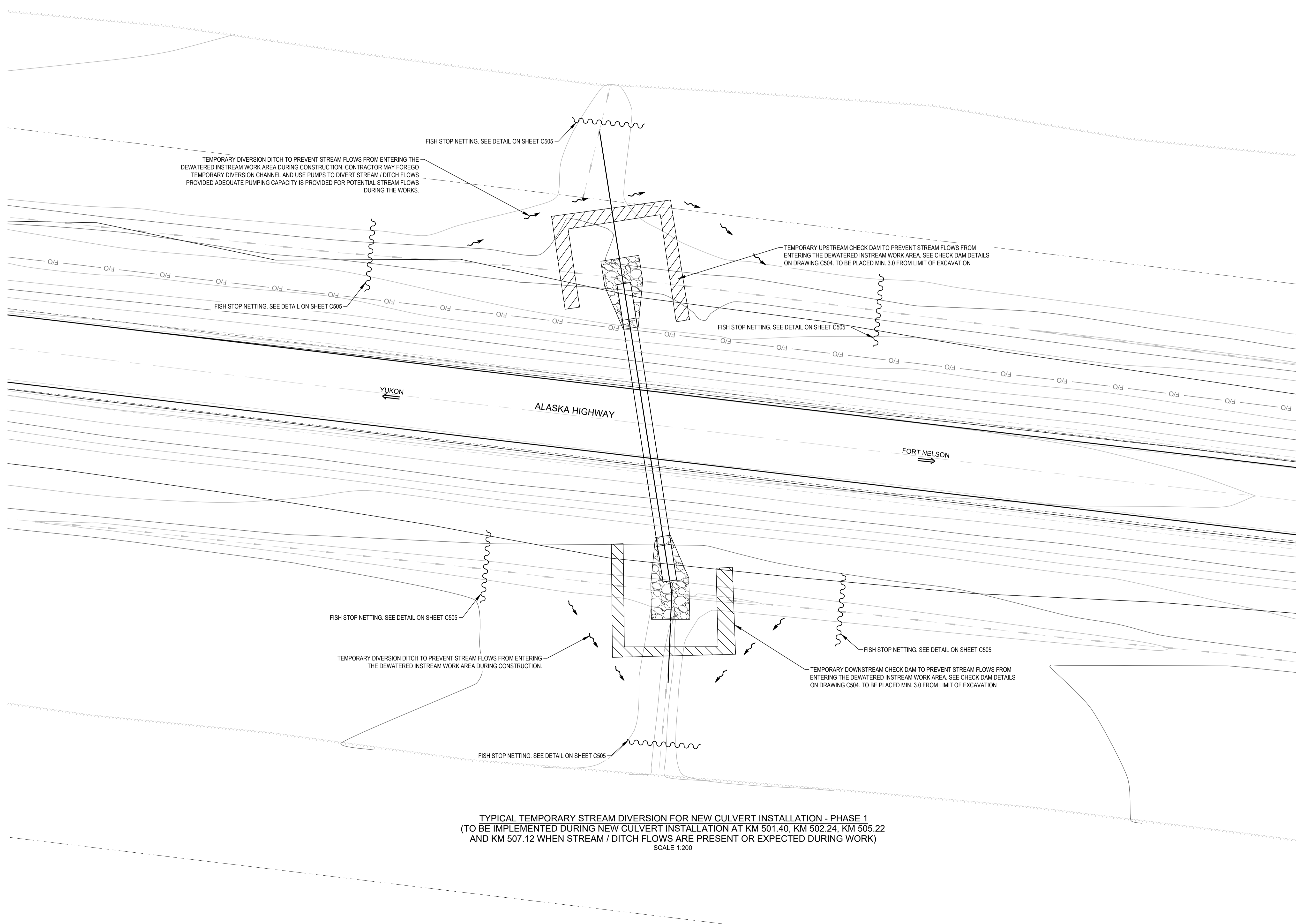
Q:\Vancouver\Transportation\TRN\VHWY\Projects\TRN\VHWY\03116 Alaska Hwy Km 501 - 509\CAD\C501-505 TYP CONSTRUCTION STAGING.dwg [C502] March 08, 2021 - 11:21:17 am (BY: CLENDENING, TODD)



- CONSTRUCTION SEQUENCING / STAGING**
PHASE 1:
1. INSTALL UPSTREAM CHECK DAMS.
 2. INSTALL DIVERSION DITCHES AND DIRECT STREAM FLOW AROUND CHECK DAMS DURING CONSTRUCTION.
 3. INSTALL DOWNSTREAM CHECK DAMS.
 4. INSTALL DOWNSTREAM DIVERSION DITCHES AND DIRECT STREAM FLOW AROUND CHECK DAMS DURING CONSTRUCTION.
 5. REMOVE UPSTREAM AND DOWNSTREAM CHECK DAMS AND ANY ASSOCIATED MATERIAL

ISSUED FOR PERMITTING

- GENERAL NOTES:**
1. DIMENSIONS, COORDINATES, ELEVATIONS ARE IN METRES UNLESS NOTED OTHERWISE.
 2. THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING THE LOCATION OF ALL UTILITIES PRIOR TO CONSTRUCTION.
 3. HYDROSEED ALL DISTURBED AREAS.
 4. REFER TO DRAWINGS C201 TO C215 FOR CULVERT DETAILS.



TYPICAL TEMPORARY STREAM DIVERSION FOR NEW CULVERT INSTALLATION - PHASE 1
 (TO BE IMPLEMENTED DURING NEW CULVERT INSTALLATION AT KM 501.40, KM 502.24, KM 505.22 AND KM 507.12 WHEN STREAM / DITCH FLOWS ARE PRESENT OR EXPECTED DURING WORK)
 SCALE 1:200



Scale 1:200 (metres)

Revision/Revisión	Description/Description	Date/Date
A	ISSUED FOR PERMITTING	21/03/08

Client/client
Public Services and Procurement Canada



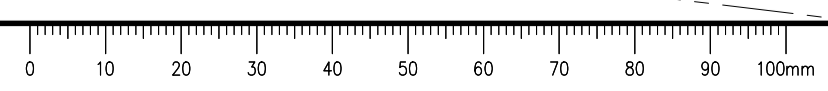
Project title/Titre du projet
**KM 501 - KM 509
 GEOMETRIC AND DRAINAGE
 IMPROVEMENTS
 ALASKA HIGHWAY, BC**

Approved by/Approve par
S. LI
 Designed by/Concept par
M. KELEHER / T. CLENDENING
 Drawn by/Dessine par
P. SAMOLIA
 P.S.P.C. Project Manager/Administrateur de Projets SPAC
A. TAHERI
 P.S.P.C. Architectural and Engineering Resources Manager/
 Ressources Architectural et de Directeur d'ingénierie, SPAC

Client/client
Public Services and Procurement Canada
 Drawing title/Titre du dessin
**NEW CULVERT INSTALLATION
 TYPICAL ENVIRONMENTAL
 CONSTRUCTION
 STAGING PLAN VIEW PHASE 1**

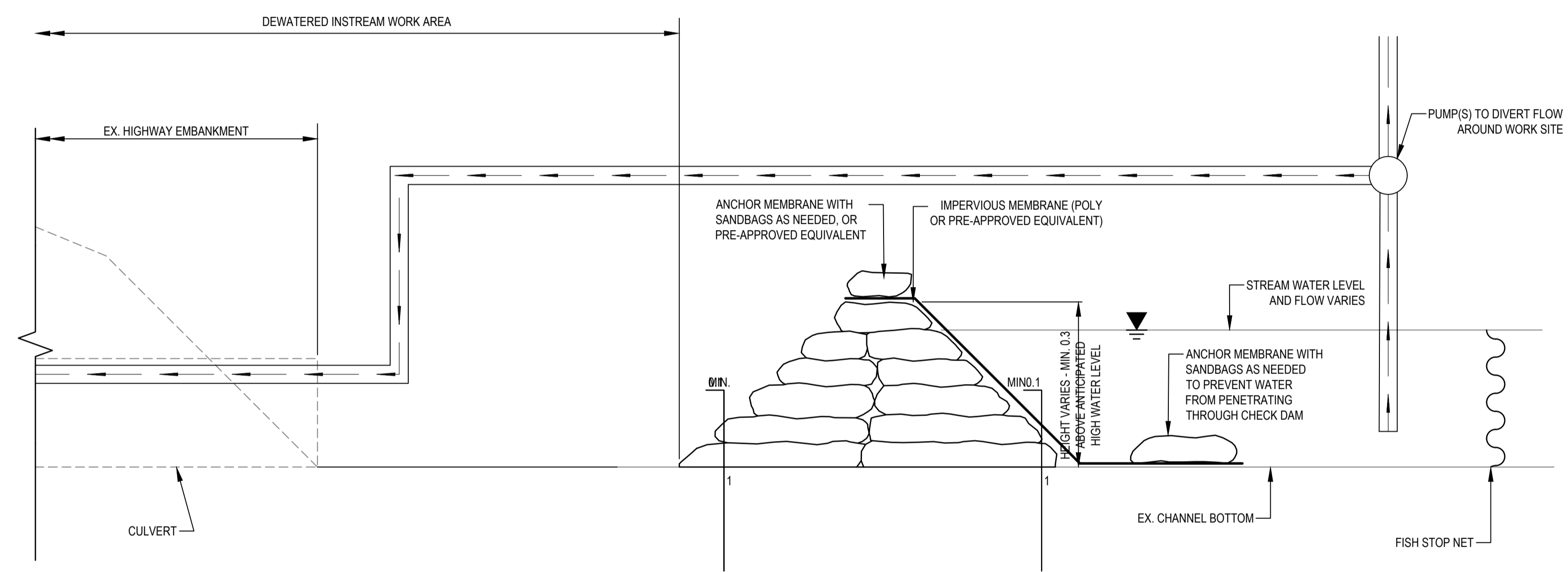
Project No./No. du projet	Sheet/Feuille	Revision no./La Révision no.
R.017173.216	C503	A

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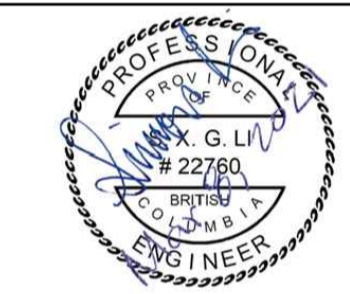
ISSUED FOR PERMITTING

- GENERAL NOTES:
1. DIMENSIONS, COORDINATES, ELEVATIONS ARE IN METRES UNLESS NOTED OTHERWISE.
 2. THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING THE LOCATION OF ALL UTILITIES PRIOR TO CONSTRUCTION.
 3. HYDROSEED ALL DISTURBED AREAS.
 4. REFER TO DRAWINGS C201 TO C215 FOR CULVERT DETAILS.



TYPICAL SECTION OF TEMPORARY CHECK DAM USING SANDBAGS
(UPSTREAM CHECK DAM ARRANGEMENT SHOWN, MIRROR ARRANGEMENT FOR DOWNSTREAM CHECK DAM)
N.T.S.

- NOTES:
1. 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.
 2. ONCE SITE WORK CONSTRUCTION IS COMPLETED EARTH CHECK DAM SHALL BE REMOVED.



Revision/Revisão	Description/Description	Date/Date
A	ISSUED FOR PERMITTING	21/03/08

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Public Services and Procurement Canada



Project title/Titre du projet
**KM 501 - KM 509
GEOMETRIC AND DRAINAGE
IMPROVEMENTS
ALASKA HIGHWAY, BC**

Approved by/Approve par
S. LI

Designed by/Concept par
M. KELEHER / T. CLENDENING

Drawn by/Dessine par
P. SAMOLIA

PSPC Project Manager/Administrateur de Projets SPAC
A. TAHERI

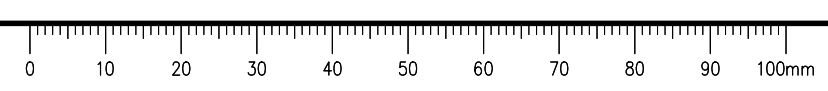
PSPC Architectural and Engineering Resources Manager/
Ressources Architectural et de Directeur d'Ingénierie, SPAC

Client/client
Public Services and Procurement Canada

Drawing title/Titre du dessin
**ENVIRONMENTAL CONSTRUCTION
STAGING - CHECK DAM DETAILS**

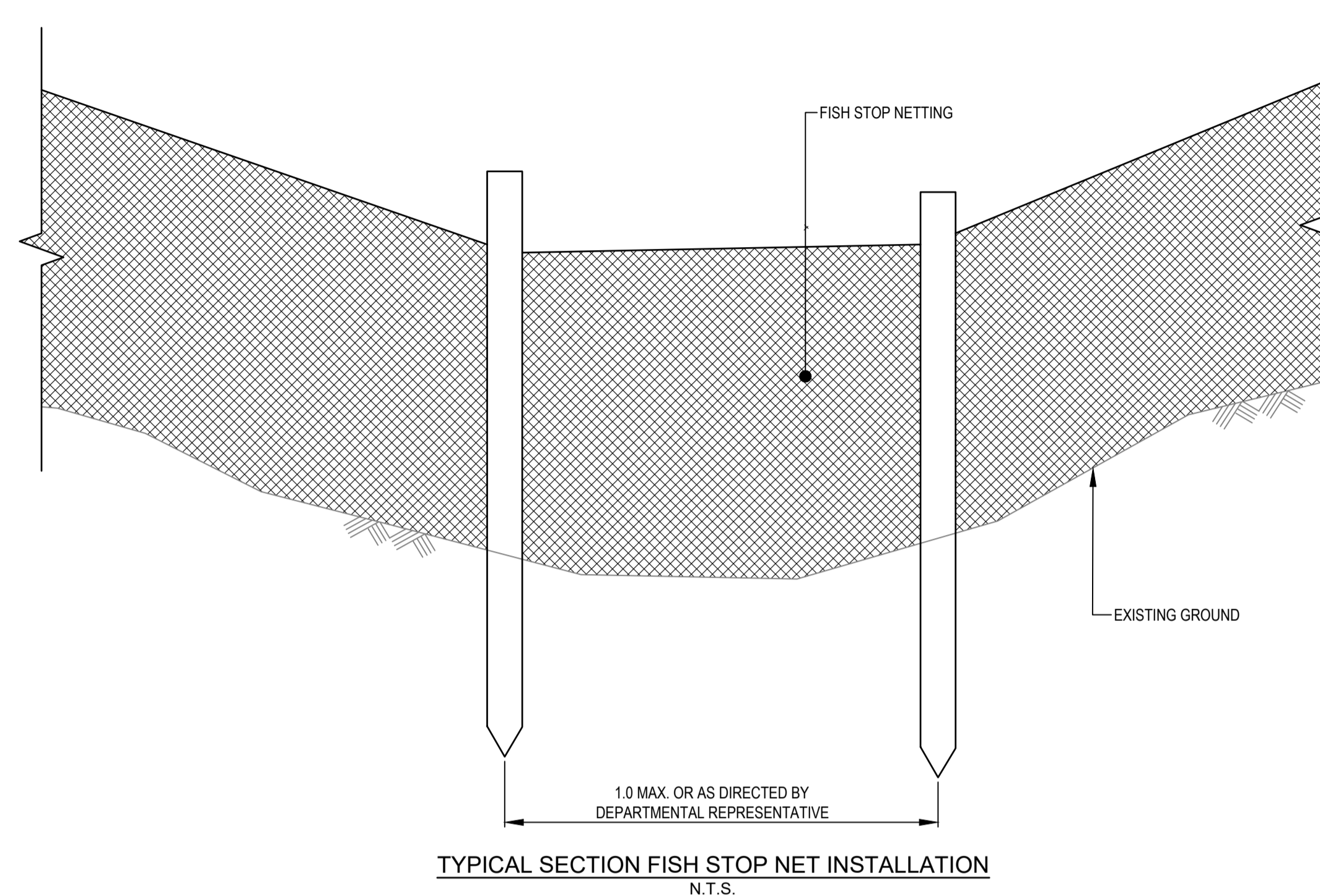
Project No./No. du projet R.017173.216	Sheet/Feuille C504	Revision no./ La Révision no. A
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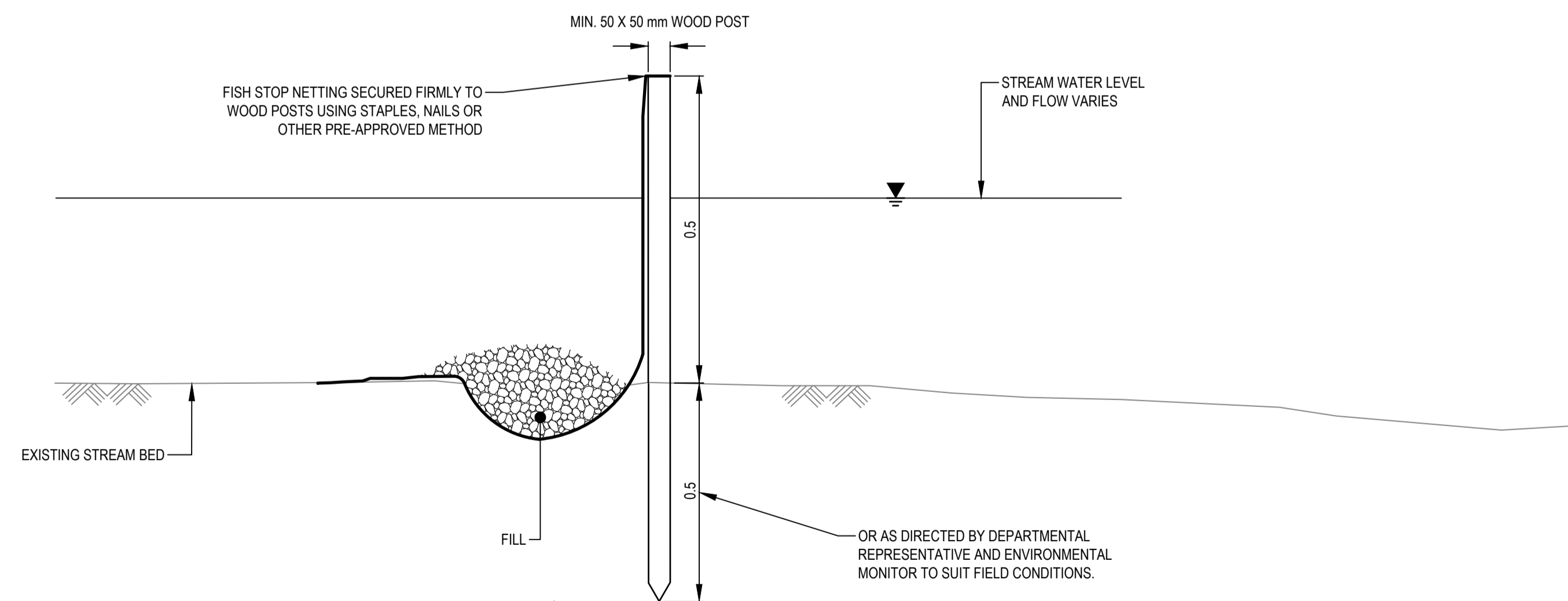


ISSUED FOR PERMITTING

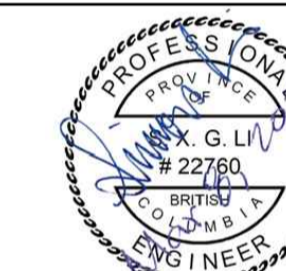
- GENERAL NOTES:
1. DIMENSIONS, COORDINATES, ELEVATIONS ARE IN METRES UNLESS NOTED OTHERWISE.
 2. THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING THE LOCATION OF ALL UTILITIES PRIOR TO CONSTRUCTION.
 3. HYDROSEED ALL DISTURBED AREAS.
 4. REFER TO DRAWINGS C201 TO C215 FOR CULVERT DETAILS.



TYPICAL SECTION FISH STOP NET INSTALLATION
N.T.S.



TYPICAL SECTION FISH STOP NET POST AND FABRIC
N.T.S.



Revision/Revisão	Description/Description	Date/Date
A	ISSUED FOR PERMITTING	21/03/08

Client/client
Public Services and Procurement Canada



Project title/Titre du projet
**KM 501 - KM 509
GEOMETRIC AND DRAINAGE
IMPROVEMENTS
ALASKA HIGHWAY, BC**

Approved by/Approve par
S. LI

Designed by/Concept par
M. KELEHER / T. CLENDENING

Drawn by/Dessine par
P. SAMOLIA

PSPC Project Manager/Administrateur de Projets SPAC
A. TAHERI

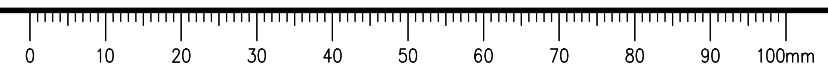
PSPC Architectural and Engineering Resources Manager/
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Client/client
Public Services and Procurement Canada

Drawing title/Titre du dessin
**ENVIRONMENTAL CONSTRUCTION
STAGING - FISH STOP NET DETAILS**

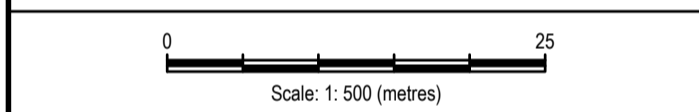
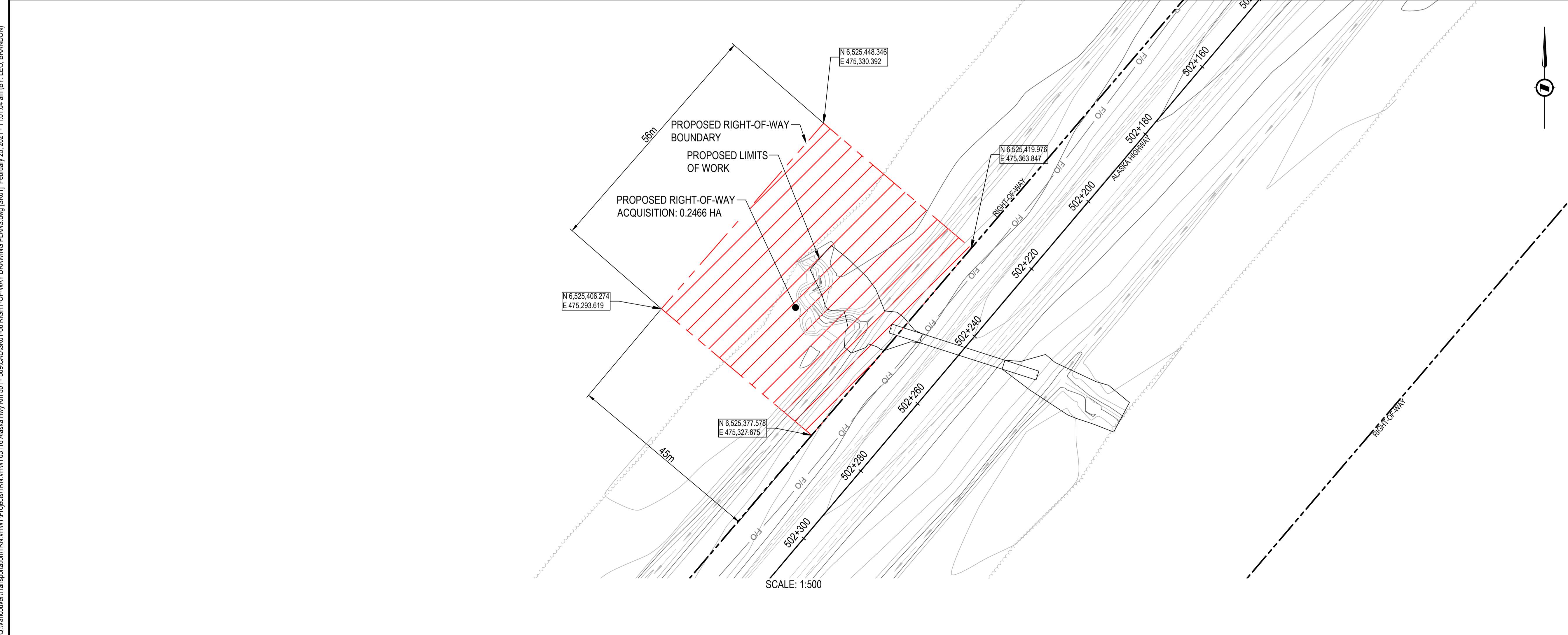
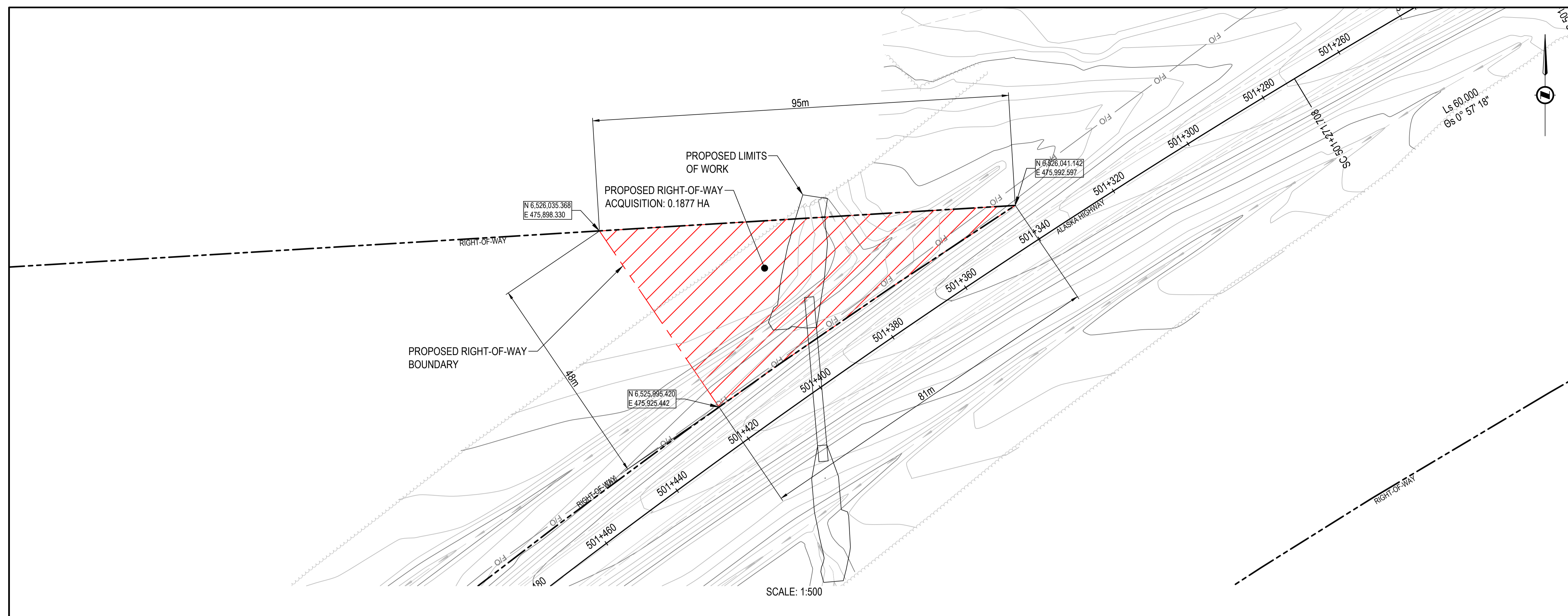
Project No./No. du projet	Sheet/Feuille	Revision no./La Révision no.
R.017173.216	C505	A

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ISSUED FOR REVIEW

- GENERAL NOTES:
1. DIMENSIONS, COORDINATES, ELEVATIONS ARE IN METRES UNLESS NOTED OTHERWISE.
 2. THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING THE LOCATION OF ALL UTILITIES PRIOR TO CONSTRUCTION.
 3. HYDROSEE ALL DISTURBED AREAS.
 4. REFER TO DRAWINGS C501 TO C505 FOR CONSTRUCTION STAGING DETAILS.



Revision/Revisão	Description/Description	Date/Date
A	ISSUED FOR REVIEW	21/03/19

Client/client
Public Services and Procurement Canada



Project title/Titre du projet
**KM 501 - KM 509
 GEOMETRIC AND DRAINAGE
 IMPROVEMENTS
 ALASKA HIGHWAY, BC**

Approved by/Approve par
S. LI

Designed by/Concept par
M. KELEHER / T. CLENDENING

Drawn by/Dessine par
P. SAMOLIA

PSPC Project Manager/Administrateur de Projets SPAC
A. TAHERI

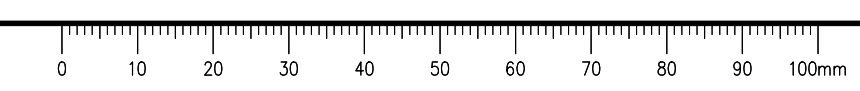
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Client/client
Public Services and Procurement Canada

Drawing title/Titre du dessin
**RIGHT-OF-WAY ACQUISITION AT
 KM 501.40 & KM 502.24**

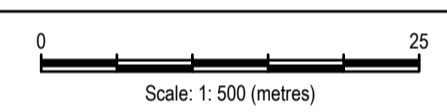
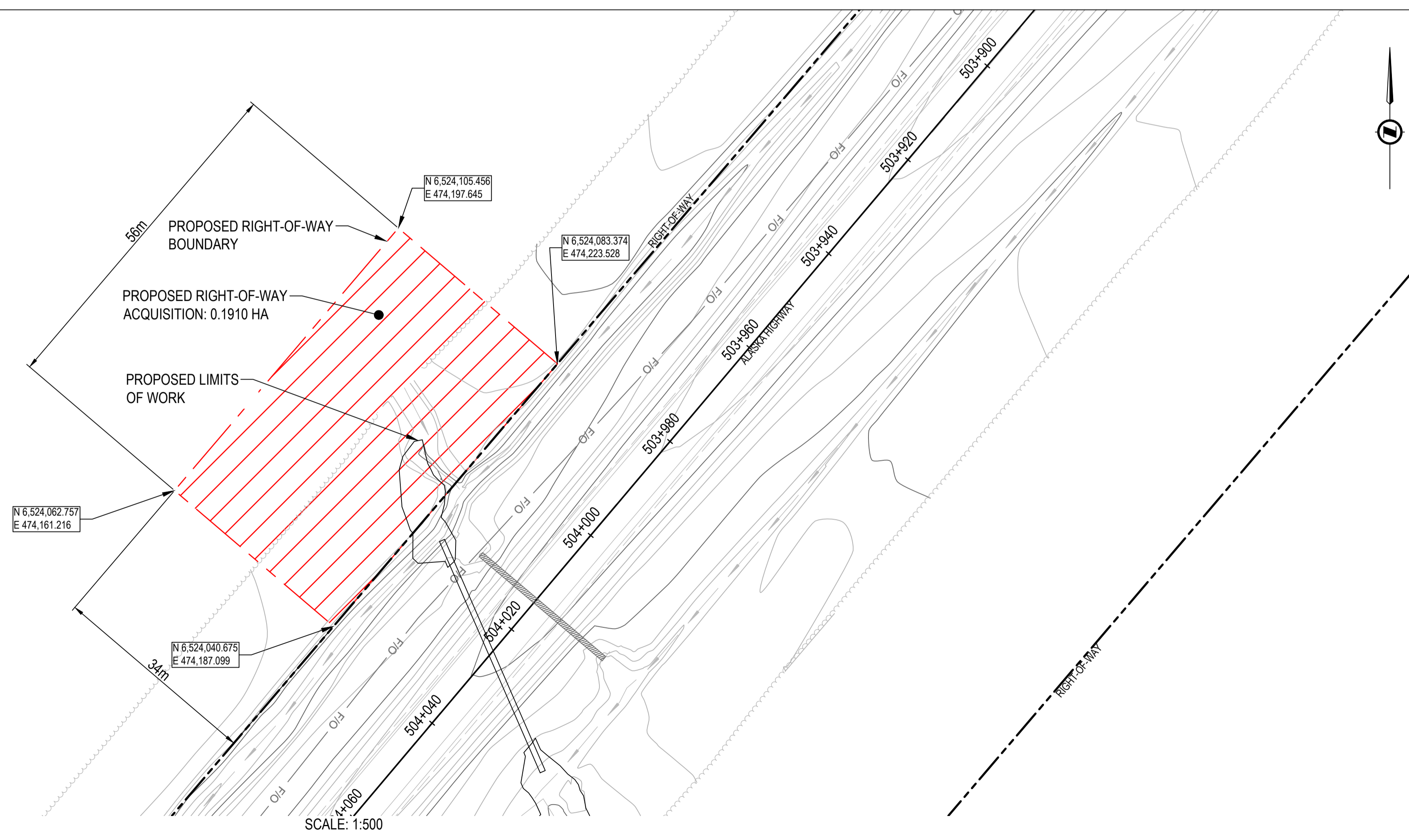
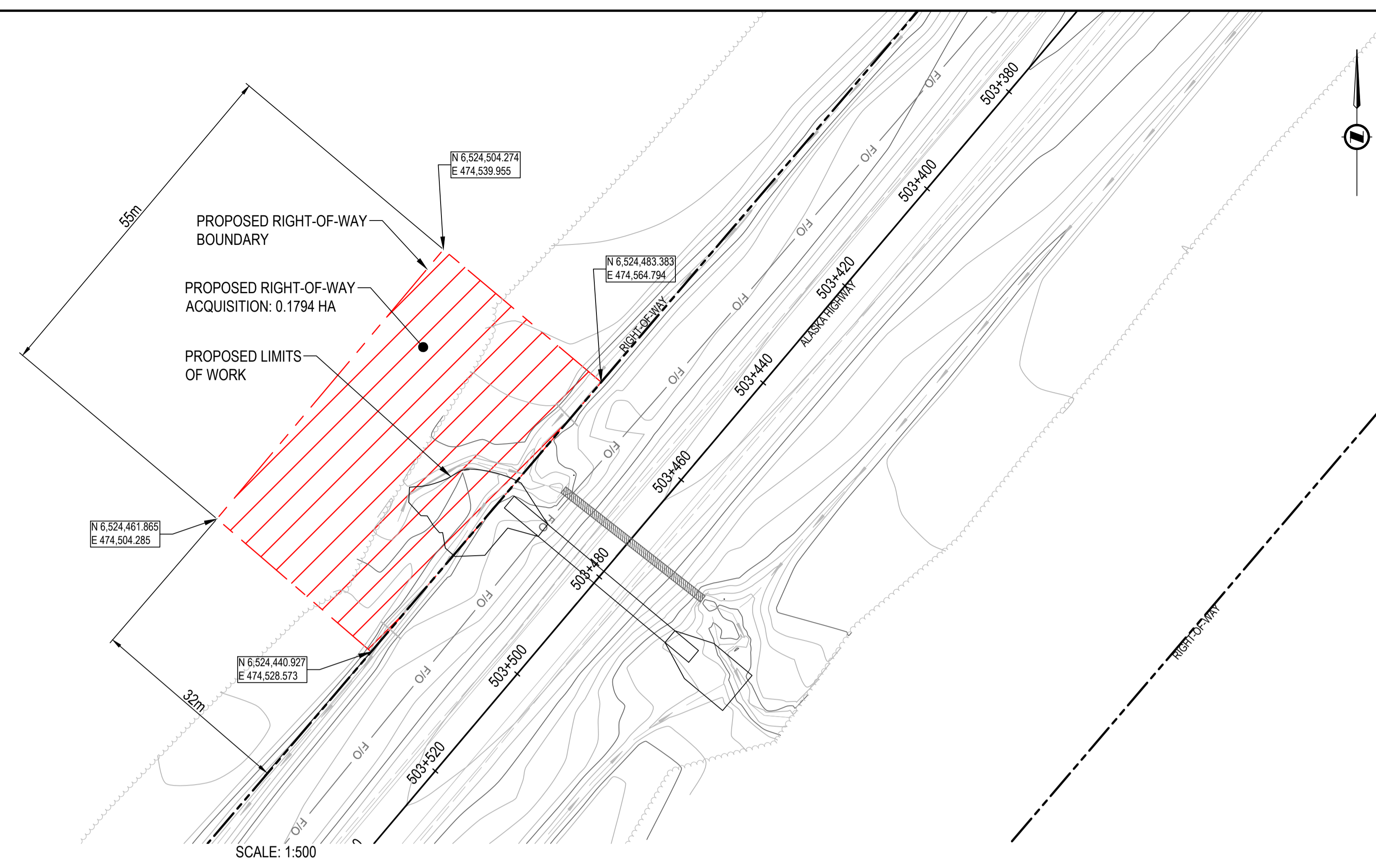
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R.017173.216	SK01	A

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ISSUED FOR REVIEW

- GENERAL NOTES:
1. DIMENSIONS, COORDINATES, ELEVATIONS ARE IN METRES UNLESS NOTED OTHERWISE.
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 3. HYDROSEED ALL DISTURBED AREAS.
 4. REFER TO DRAWINGS C501 TO C505 FOR CONSTRUCTION STAGING DETAILS.



Revision/Revisão	Description/Description	Date/Date
A	ISSUED FOR REVIEW	21/03/19

Client/client
Public Services and Procurement Canada



Project title/Titre du projet
**KM 501 - KM 509
GEOMETRIC AND DRAINAGE
IMPROVEMENTS
ALASKA HIGHWAY, BC**

Approved by/Approve par
S. LI

Designed by/Concept par
M. KELEHER / T. CLENDENING

Drawn by/Dessine par
P. SAMOLIA

PSPC Project Manager/Administrateur de Projets SPAC
A. TAHERI

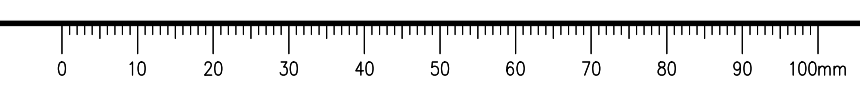
PSPC Architectural and Engineering Resources Manager/
Ressources Architectural et de Directeur d'Ingénierie, SPAC

Client/client
Public Services and Procurement Canada

Drawing title/Titre du dessin
**RIGHT-OF-WAY ACQUISITION AT
KM 501.40 & KM 502.24**

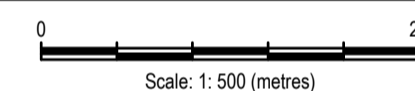
Project No./No. du projet	Sheet/Feuille	Revision no./La Révision no.
R.017173.216	SK02	A

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ISSUED FOR REVIEW

- GENERAL NOTES:
1. DIMENSIONS, COORDINATES, ELEVATIONS ARE IN METRES UNLESS NOTED OTHERWISE.
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 3. HYDROSEED ALL DISTURBED AREAS.
 4. REFER TO DRAWINGS C501 TO C505 FOR CONSTRUCTION STAGING DETAILS.



Revision/	Description/Description	Date/Date
A	ISSUED FOR REVIEW	21/03/19

Client/client
Public Services and Procurement Canada



Project title/Titre du projet
**KM 501 - KM 509
GEOMETRIC AND DRAINAGE
IMPROVEMENTS
ALASKA HIGHWAY, BC**

Approved by/Approve par
S. LI

Designed by/Concept par
M. KELEHER / T. CLENDENING

Drawn by/Dessine par
P. SAMOLIA

PSPC Project Manager/Administrateur de Projets SPAC
A. TAHERI

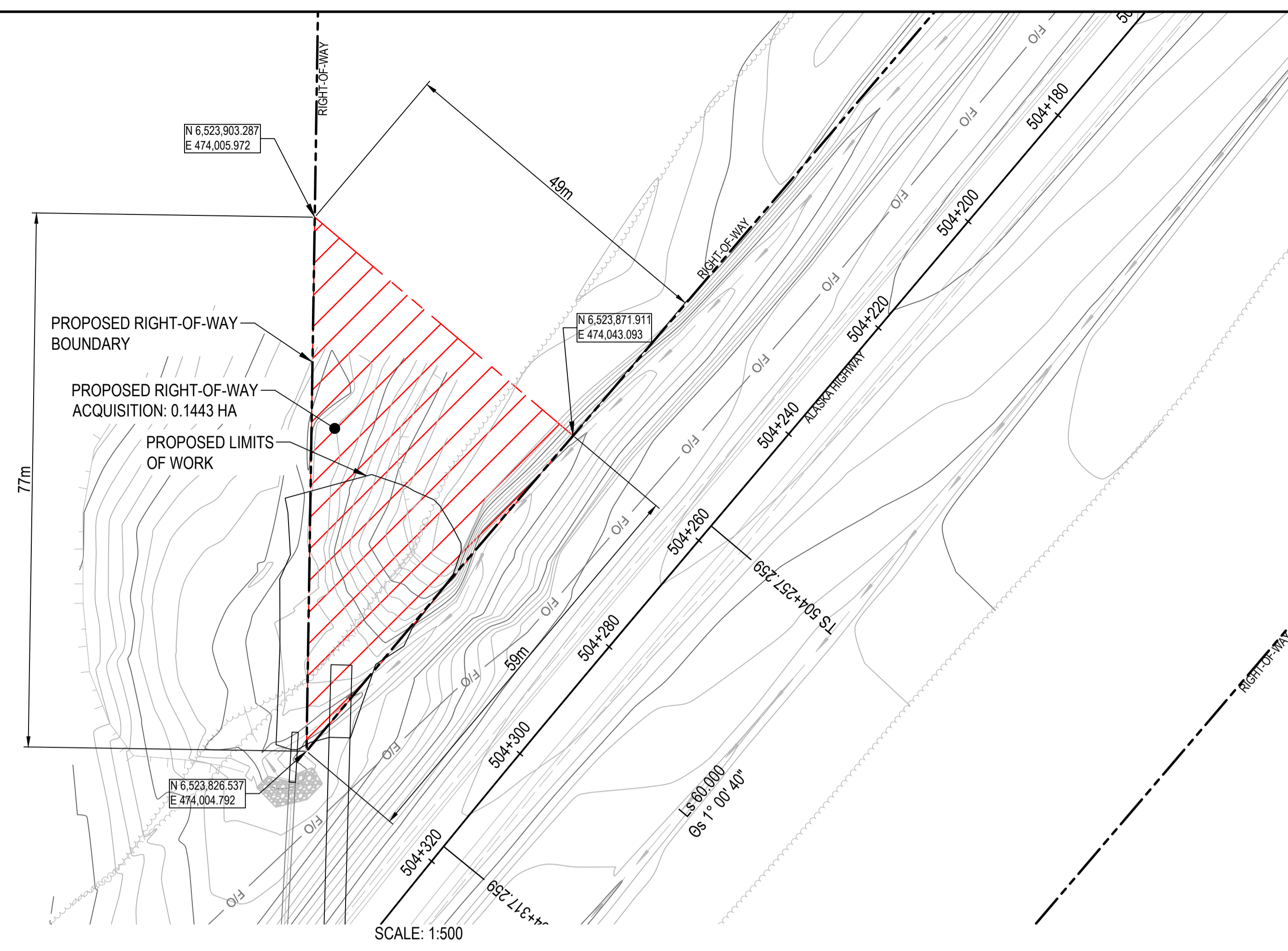
PSPC Architectural and Engineering Resources Manager/
Ressources Architectural et de Directeur d'Ingénierie, SPAC

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Public Services and Procurement Canada

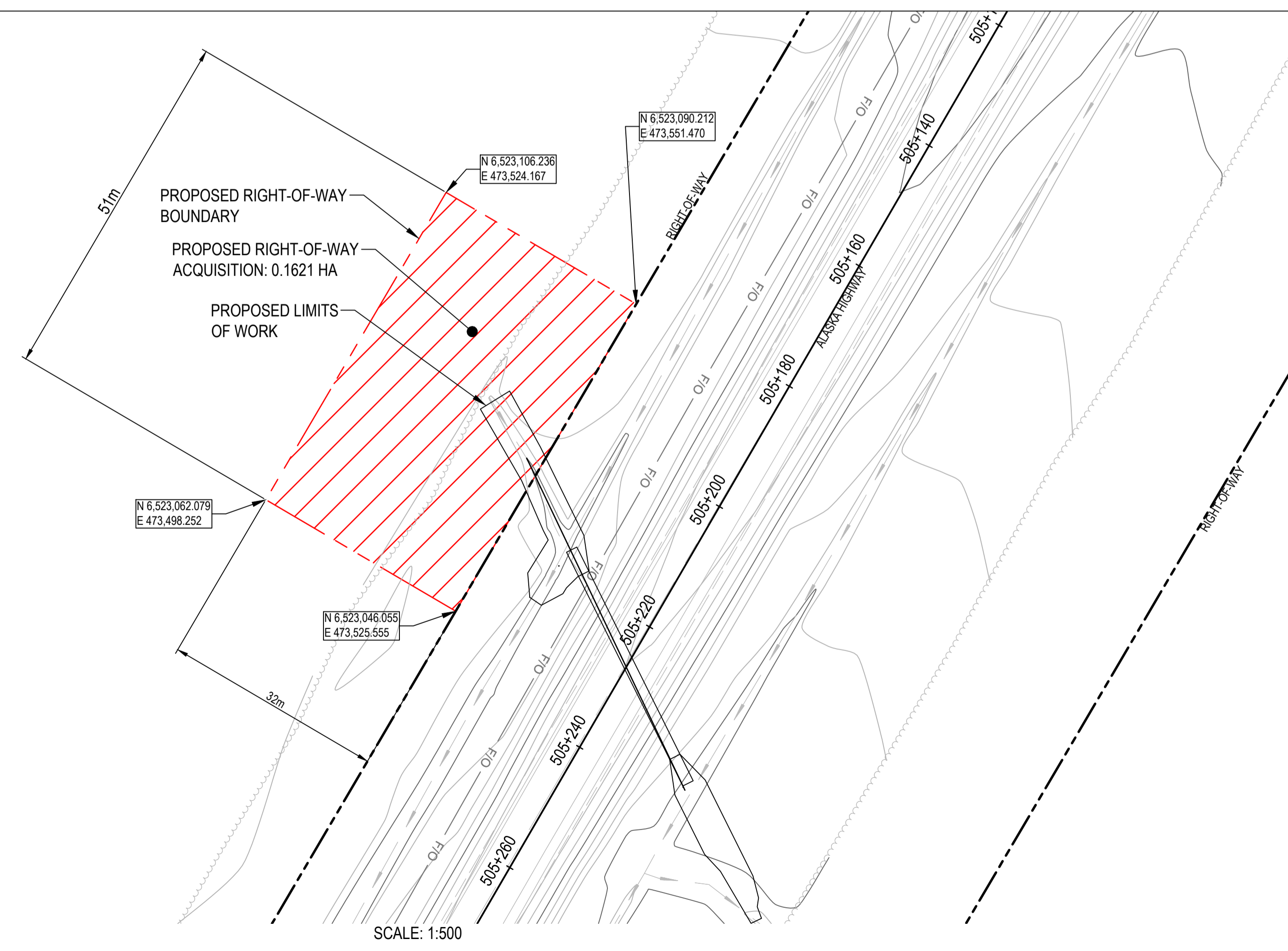
Drawing title/Titre du dessin
**RIGHT-OF-WAY ACQUISITION AT
KM 501.40 & KM 502.24**

Project No./No. du projet R.017173.216	Sheet/Feuille SK03	Revision no./ La Révision no. A
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RIGHT-OF-WAY

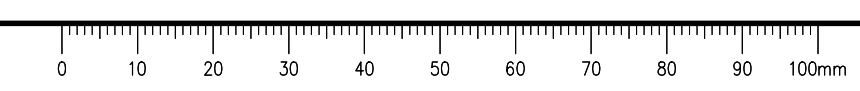


RIGHT-OF-WAY



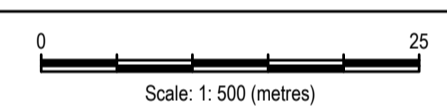
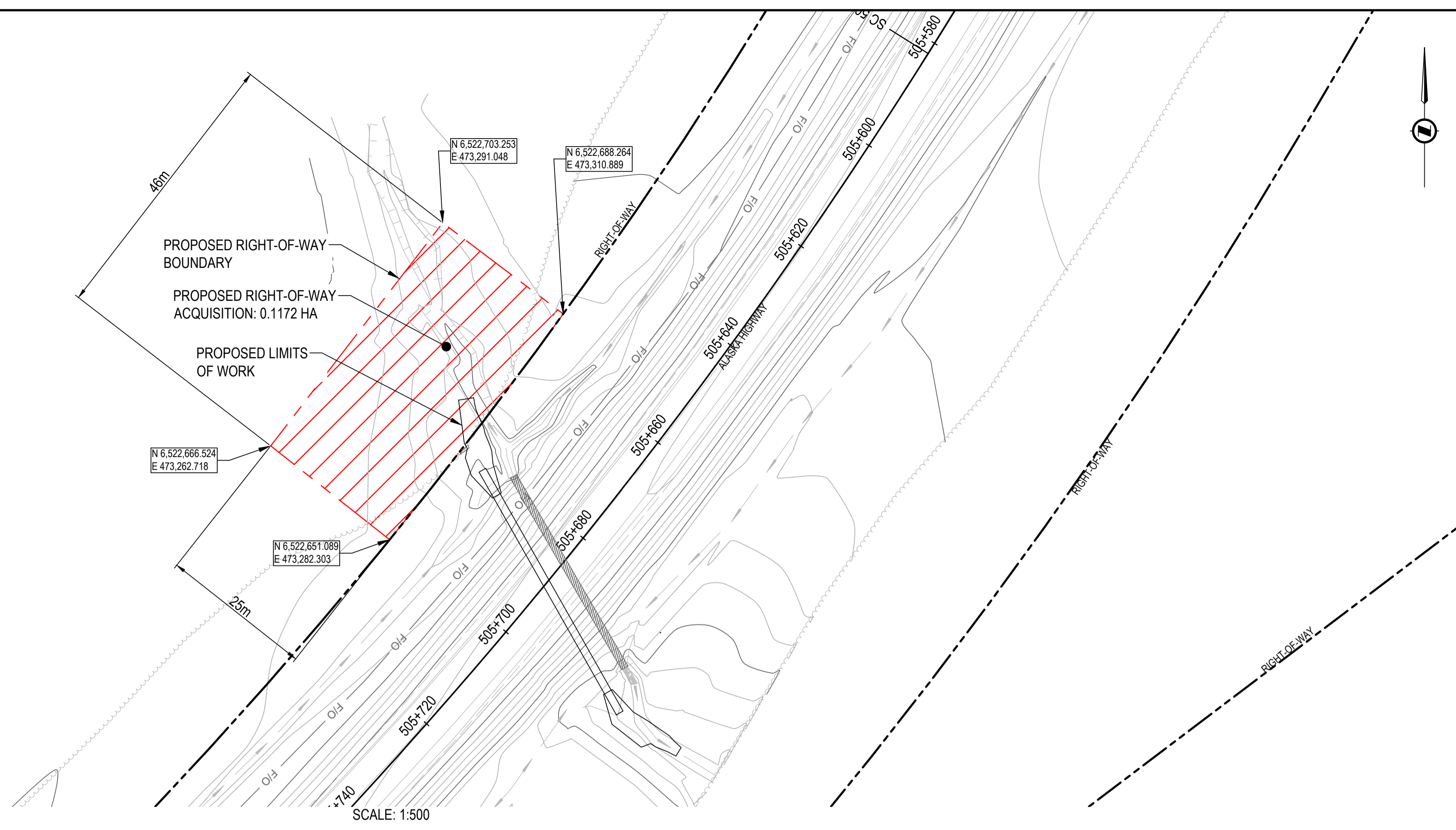
RIGHT-OF-WAY

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ISSUED FOR REVIEW

- GENERAL NOTES:
1. DIMENSIONS, COORDINATES, ELEVATIONS ARE IN METRES UNLESS NOTED OTHERWISE.
 2. THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING THE LOCATION OF ALL UTILITIES PRIOR TO CONSTRUCTION.
 3. HYDROSEED ALL DISTURBED AREAS.
 4. REFER TO DRAWINGS C501 TO C505 FOR CONSTRUCTION STAGING DETAILS.



Revision/	Description/Description	Date/Date
A	ISSUED FOR REVIEW	21/03/19

Client/client
Public Services and Procurement Canada



Project title/Titre du projet
**KM 501 - KM 509
GEOMETRIC AND DRAINAGE
IMPROVEMENTS
ALASKA HIGHWAY, BC**

Approved by/Approve par
S. LI

Designed by/Concept par
M. KELEHER / T. CLENDENING

Drawn by/Dessine par
P. SAMOLIA

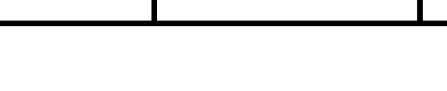
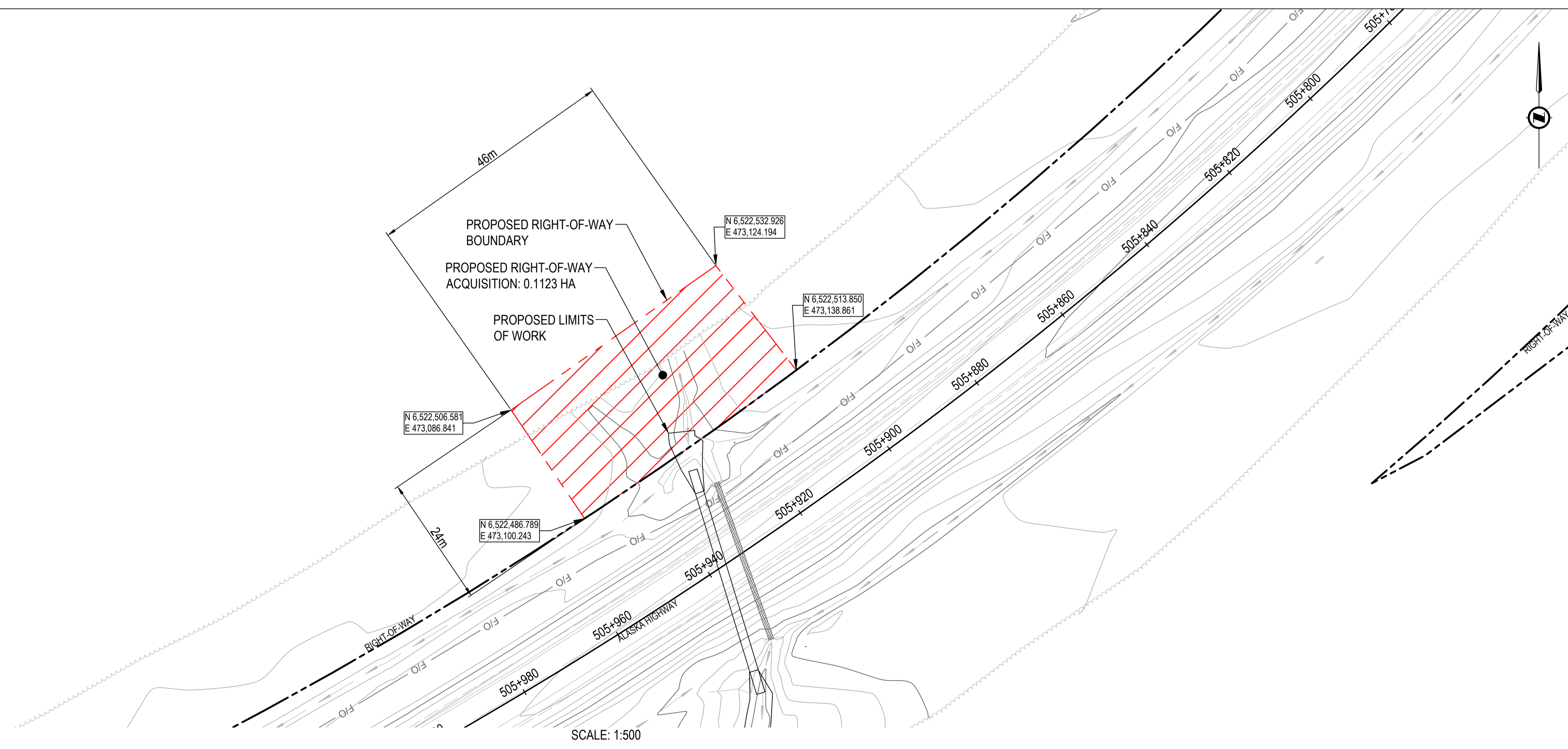
PSPC Project Manager/Administrateur de Projets SPAC
A. TAHERI

PSPC Architectural and Engineering Resources Manager/
Ressources Architectural et de Directeur d'Ingénierie, SPAC

Client/client
Public Services and Procurement Canada

Drawing title/Titre du dessin
**RIGHT-OF-WAY ACQUISITION AT
KM 501.40 & KM 502.24**

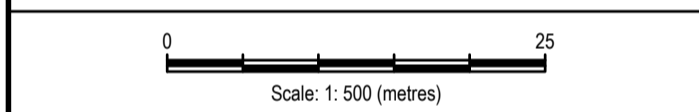
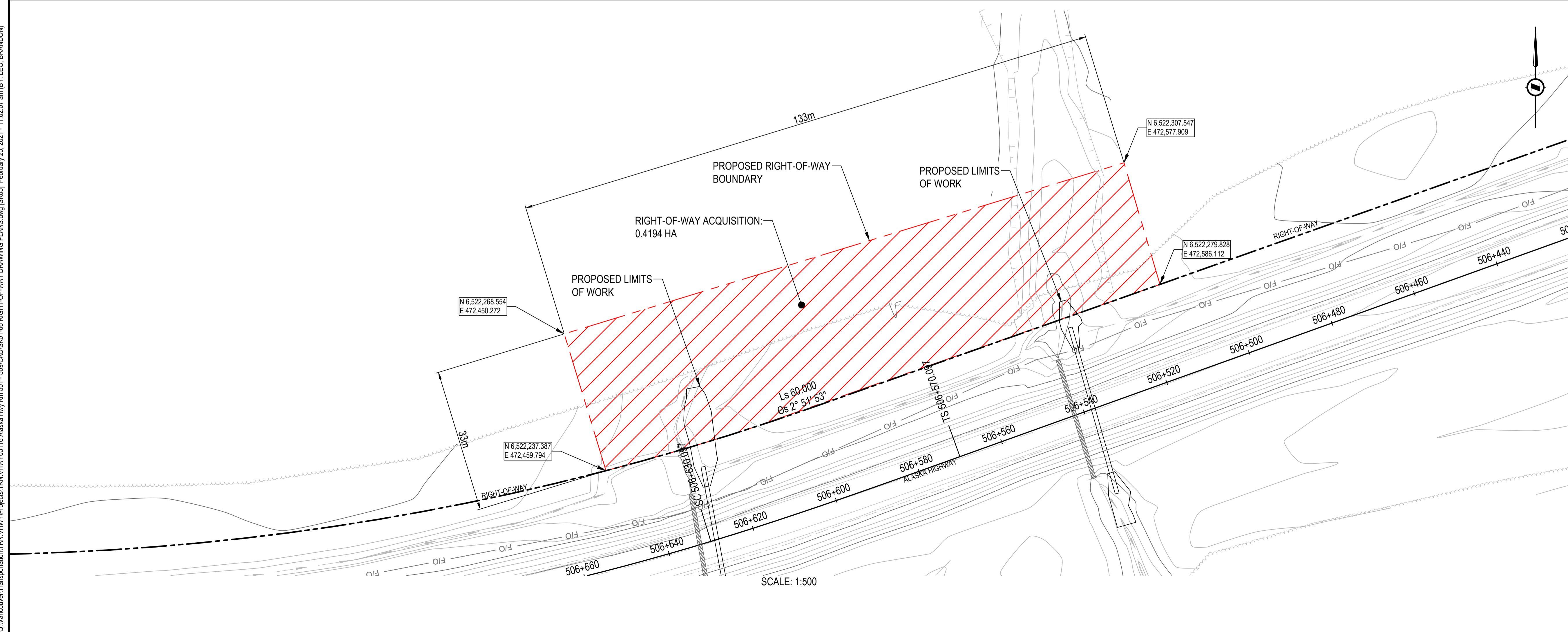
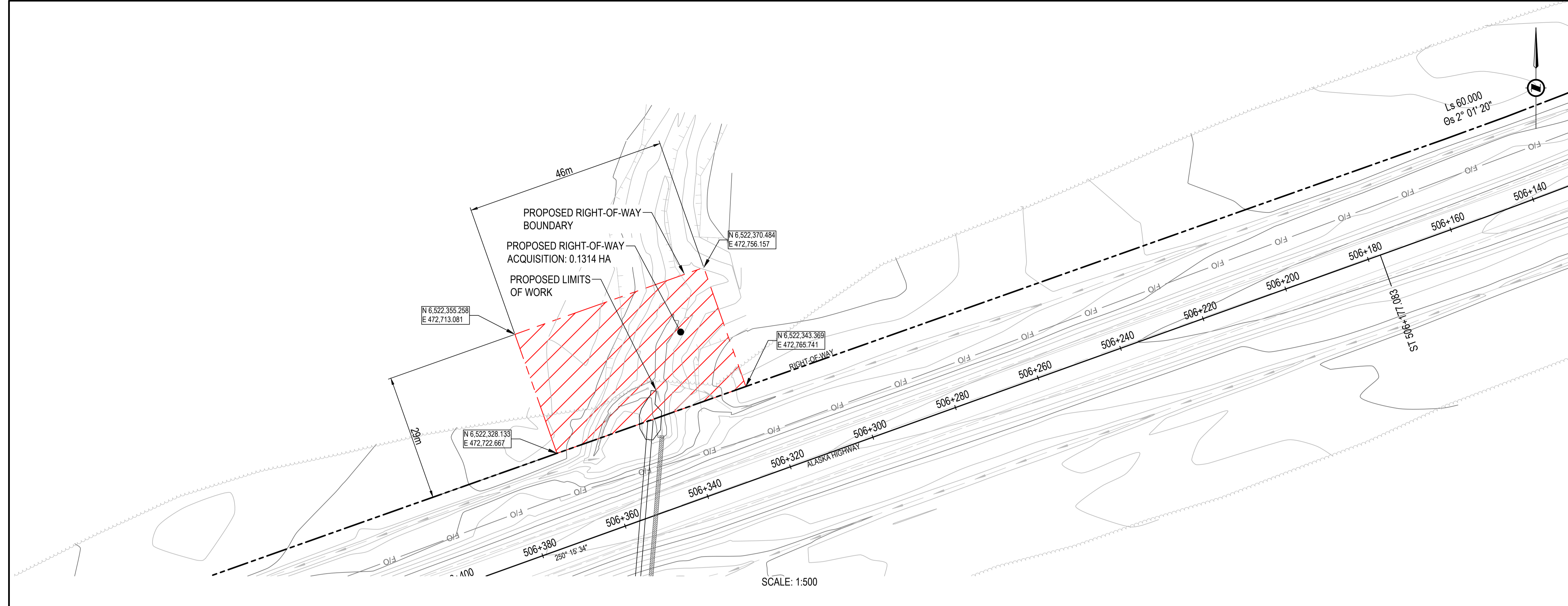
Project No./No. du projet R.017173.216	Sheet/Feuille SK04	Revision no./ La Révision no. A
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ISSUED FOR REVIEW

- GENERAL NOTES:
1. DIMENSIONS, COORDINATES, ELEVATIONS ARE IN METRES UNLESS NOTED OTHERWISE.
 2. THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING THE LOCATION OF ALL UTILITIES PRIOR TO CONSTRUCTION.
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 4. REFER TO DRAWINGS C501 TO C505 FOR CONSTRUCTION STAGING DETAILS.



Revision/Revisión	Description/Description	Date/Date
A	ISSUED FOR REVIEW	21/03/19

Client/Client: **Public Services and Procurement Canada**



Project Title/Titre du projet:
**KM 501 - KM 509
 GEOMETRIC AND DRAINAGE
 IMPROVEMENTS
 ALASKA HIGHWAY, BC**

Approved by/Approve par: **S. LI**

Designed by/Concept par: **M. KELEHER / T. CLENDENING**

Drawn by/Dessiné par: **P. SAMOLIA**

PSPC Project Manager/Administrateur de Projets SPAC: **A. TAHERI**

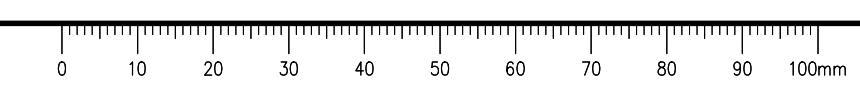
PSPC Architectural and Engineering Resources Manager/Ressources Architectural et de Directeur d'Ingénierie, SPAC

Client/Client: **Public Services and Procurement Canada**

Drawing Title/Titre du dessin:
**RIGHT-OF-WAY ACQUISITION AT
 KM 501.40 & KM 502.24**

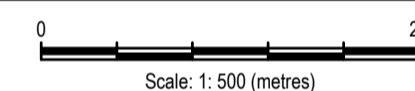
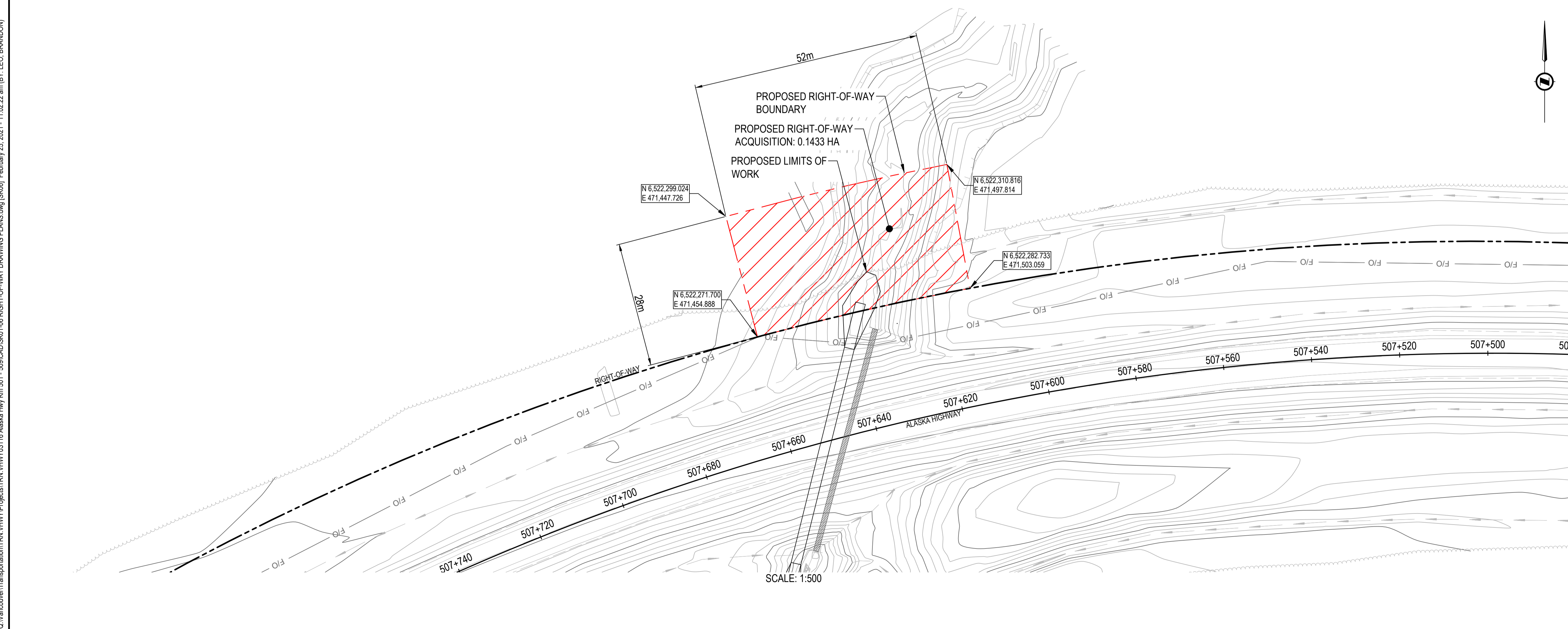
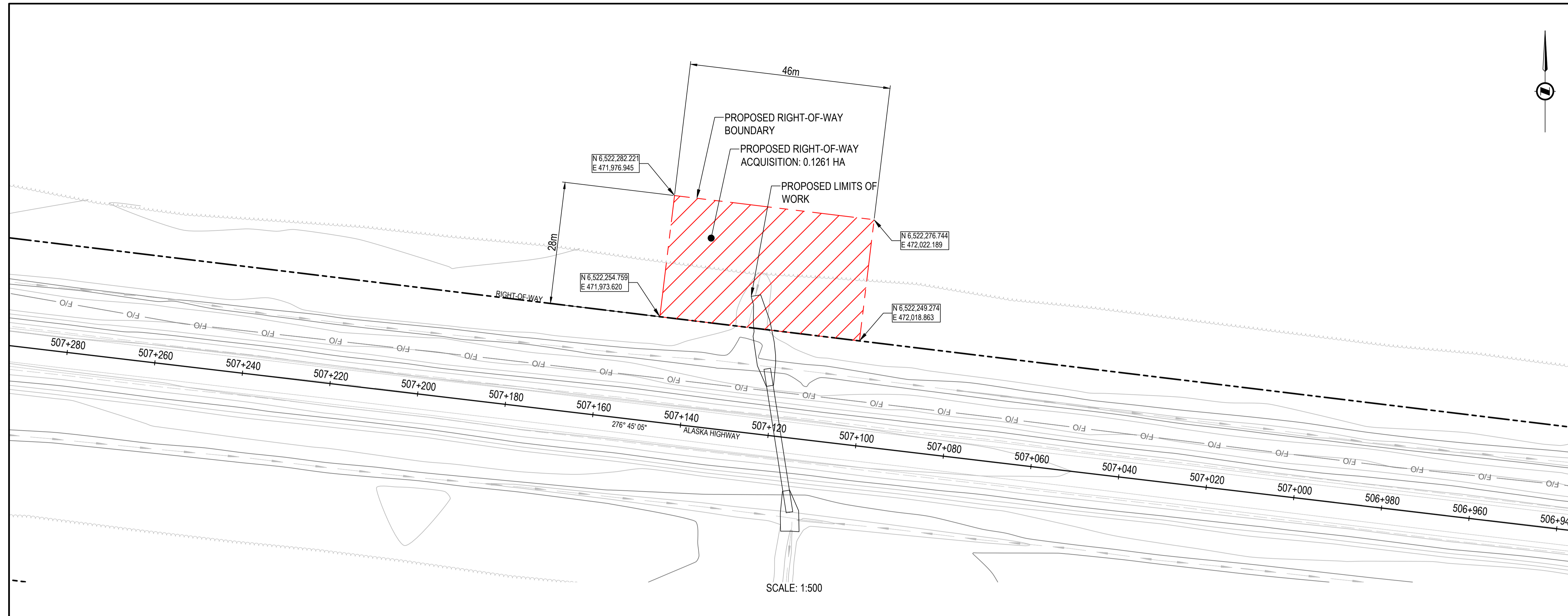
Project No./No. du projet	Sheet/Feuille	Revision no./La Révision no.
R.017173.216	SK05	A

Q:\Vancouver\Transportation\TRN\VHWY\Projects\TRN\VHWY\03116 Alaska Hwy Km 501 - 509\CAD\SK01-06 RIGHT-OF-WAY DRAWING PLANS.dwg [SK05] February 25, 2021 - 11:02:07 am [BY: LEO BRANDON]



ISSUED FOR REVIEW

- GENERAL NOTES:
1. DIMENSIONS, COORDINATES, ELEVATIONS ARE IN METRES UNLESS NOTED OTHERWISE.
 2. THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING THE LOCATION OF ALL UTILITIES PRIOR TO CONSTRUCTION.
 3. HYDROSEED ALL DISTURBED AREAS.
 4. REFER TO DRAWINGS C501 TO C505 FOR CONSTRUCTION STAGING DETAILS.



Revision/Revisão	Description/Description	Date/Date
A	ISSUED FOR REVIEW	21/03/19

Client/client
Public Services and Procurement Canada



Project title/Titre du projet
**KM 501 - KM 509
GEOMETRIC AND DRAINAGE
IMPROVEMENTS
ALASKA HIGHWAY, BC**

Approved by/Approuvé par
S. LI

Designed by/Concepté par
M. KELEHER / T. CLENDENING

Drawn by/Dessiné par
P. SAMOLIA

PSPC Project Manager/Administrateur de Projets SPAC
A. TAHERI

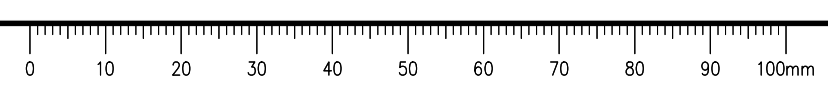
PSPC Architectural and Engineering Resources Manager/
Ressources Architectural et de Directeur d'Ingénierie, SPAC

Client/client
Public Services and Procurement Canada

Drawing title/Titre du dessin
**RIGHT-OF-WAY ACQUISITION AT
KM 501.40 & KM 502.24**

Project No./No. du projet	Sheet/Feuille	Revision no./La Révision no.
R.017173.216	SK06	A

Q:\Vancouver\Transportation\TRN\VHWY\Projects\TRN\VHWY\03116 Alaska Hwy Km 501 - 509\CAD\SK01-06 RIGHT-OF-WAY DRAWING PLANS.dwg [SK06] February 25, 2021 - 11:02:22 am [BY: LEO BRANDON]



APPENDIX F

PRELIMINARY ARCHAEOLOGICAL ASSESSMENT



To:	Reza Haghighi, Public Works and Government Services Canada	Date:	September 5, 2018
c:		Memo No.:	01
From:	Matt Keleher, Charla Arnott	File:	704-TRN.VHWY03116-01
Subject:	PWGSC Alaska Highway Km 501-509 Geometric and Drainage Improvements. Preliminary Archaeological Assessment (Desktop Assessment)		

This document may contain 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. It is not to be disseminated, and no copies of this document are to be made without written permission of Public Services and Procurement Canada.

1.0 INTRODUCTION

Tetra Tech Canada Inc. (Tetra Tech) was retained by Public Works and Government Services Canada (PWGSC) to support highway upgrades along an 8 km segment of the current Alaska Highway alignment from Km 501 to Km 509. This section of the Alaska Highway is located east of Kledo Creek, west of Fort Nelson, in northeast British Columbia (the Project). The proposed works primarily include widening the finished highway roadtop and shoulders, flattening the embankment sideslopes, drainage culvert repairs/replacements/installations, and ditch improvement and erosion protection works. The former Alaska Highway alignment, that mostly parallels the current alignment between Km 501-509, is identified as a potential borrow source for gravel materials for use on the Project.

As part of this work, Tetra Tech requested the services of Soriak Consulting and Research Ltd. (Soriak Consulting) to complete a Preliminary Archaeological Assessment for the Project. This work was undertaken to determine potential impacts to cultural heritage resources within the proposed Project area. Heritage resources include a range of culturally and naturally modified materials deposited both above and below ground surfaces. Ground disturbance, therefore, has potential to damage these materials. Land developers can facilitate cultural heritage resource protection through appropriate planning prior to development.

1.1 Objectives

While the primary objective of this review is to determine if development of the Project will adversely impact cultural heritage resources, it also serves to identify the potential extent of these impacts and outlines mitigative options prior to development.

Through a review of satellite imagery and other topographic data, an analysis of the Project's geographic location and ground cover was completed. Existing archaeological and historic site records in the region were reviewed. Both past and proposed project construction activities were studied; early road construction techniques from when the highway was first constructed were focused upon. In summary, the scope of this assessment included evaluation of:

- Existing databases and archaeological site records, including the British Columbia Archaeology Branch's Remote Access to Archaeological Data (RAAD) online database 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
- General soil stratigraphy and geomorphology of the area to understand how geomorphic processes or other environmental conditions may have impacted site distribution within the Project area.

Although a Preliminary Field Reconnaissance (PFR) was not part of this scope of work, supplemental information about the Project footprint was obtained through consultation with Tetra Tech biologists upon the completion of the Project's Environmental Field Reconnaissance and Habitat Assessment (EFR) in June 11-14, 2018.

1.2 Assessment of Archaeological Potential

An area's archaeological potential is determined through a review of its geography, the nature and distribution of previously recorded cultural resources in the region, traditional knowledge, and levels of ground disturbance and site preservation. If these factors, in combination or individually, are suggestive of prehistoric or historic use of an area, then a moderate to high probability rating for archaeological sites is normally designated regarding the presence and/or preservation of cultural resource sites within a development area. This designation may trigger recommendations for further archaeological studies. A PFR or Archaeological Impact Assessment (AIA) may be undertaken to better understand a project's archaeological potential, particularly when existing datasets are limited, outdated, or unavailable. A designation of low archaeological potential does not mean that heritage resources are not present; in these instances, it is advisable to implement a tailored Chance Find Procedure for the Project and to stop work in the event cultural materials are recovered during construction.

2.0 STUDY AREA DESCRIPTION

The Project encompasses the existing cleared right-of-way of the Alaska Highway between Km 501 and 509, and the former Alaska Highway alignment which parallels much of the Project site. Figure 1 (Appendix A) outlines the location of the current alignment in comparison to the former highway alignment. The current alignment crosses level to gently undulating terrain that transitions from high ground situated above the Muskwa River valley to lower, poorly terrain adjacent to Kledo Creek. Three significant hydrological features are in proximity of the Project – the Muskwa River, Kledo Creek and Raspberry Creek as well as numerous seasonal drainages. Terrain is characterised as level to steeply sloping with south and southwest aspects. There are two vegetation communities within the project area: mixedwood forest and peatland. The mixedwood forest is comprised of large trembling aspen, balsam poplar, white spruce, and tamarack. The peatland consists of small black spruce and paper birch. The understory is characterised by rose, strawberry, grasses, clover, and horsetail.

The Alaska Highway is subject to continual repair and realignment. Since 1942 when the highway was first constructed it has transitioned into a straighter, less dangerous, paved roadway. The new alignment is straighter and is situated further back from Kledo Creek than its predecessor. Portions of the Project footprint are significantly disturbed.

3.0 EVALUATION

3.1 Cultural Heritage Resources and Archaeological Sites

Cultural heritage 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 areas protected from the elements, can justify why certain areas were, and may continue to be favoured for use. Micro-topographic features, such as knolls, eskers, banks, terraces and ridges frequently contain subsurface cultural materials.

There are no previously recorded archaeological sites located within 5 km of the Project. The closest recorded pre-contact archaeological site is IfRv-1, located approximately 7.8 km northwest of the Project (Appendix A – Figure 1). There are no previously recorded historic period sites located within 5 km of the Project. Cultural materials associated with modern forestry and transportation activities are located within the footprint.

3.2 Ground Disturbance

Cultural heritage resources can occur at various locations and soil depths. Ground alteration activities have the potential of causing damage to, or the displacement of, artifacts and other cultural heritage resources, particularly those occurring in shallow deposits. Ground disturbances 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, which may result in incorrect interpretations of archaeological data. For this reason, ground disturbance is a factor to be considered when determining if an area exhibits elevated archaeological potential.

Significant ground disturbances within the Project area are the result of previous highway road construction activities and natural impacts caused by wind, water and animals. Small construction pits within the right-of-way have filled with water and are functioning as small ephemeral wetlands. The degree of impact to soil horizons within these areas is unknown. Impacts to soil stratigraphy and possible subsurface cultural deposits within disturbed Areas of Potential (AOP), if present, can be determined through further assessment, notably an AIA. Accordingly, documentation of intact native soils can confirm whether AOPs are naturally occurring or the result of previous construction activities.

3.3 Archaeological Potential

A multi-year assessment of archaeological potential within select areas of northeast British Columbia was undertaken between 2000 and 2005. This assessment served to create a predictive archaeological model and was completed on behalf of the British Columbia Oil and Gas Commission and British Columbia Archaeology Branch. The goal of the project was to improve upon a previously developed model that was created when little information was known regarding archaeological site distribution in the region. Portions of the Project fall within areas of modelled high archaeological potential (Millenia Research Ltd., 2005¹). These areas are primarily associated with terrain near seasonal drainages and high ground near Kledo Creek.

The lack of previously recorded archaeological sites within (or near) the Project does not indicate that past populations did not inhabit the area. Rather, a lack of archaeological sites recorded in remote areas is generally

¹ Millenia Research Ltd., *Archaeological Overview of Northeastern British Columbia, Heritage Inspection Permit #2005-0504 Final Report*. Prepared on behalf of the Oil and Gas Commission, Ministry of Forests, Archaeology and Registry Services Branch, University of Victoria and Ministry of Energy and Mines, 2005.

due to the paucity of new development. Most archaeological sites recorded in northeast British Columbia are discovered during AIAs completed for oil and gas, forestry, geophysical and highway development projects. Aside from past highway construction activities, the greater Project area remains relatively undisturbed.

The Project area was favoured by past populations because of its south facing slopes and proximity to the confluence Kledo Creek and the Muskwa River. The Muskwa River is a major tributary of the Fort Nelson River which is part of the MacKenzie River system and it is believed that prehistoric peoples migrated from Asia to North America through the MacKenzie valley over 10,000 years ago. The MacKenzie River is also highly documented in historical literature as being a major route into Canada's northern interior, used by European explorers. Thus, not only were creeks and rivers a source of fresh water they were utilised for transportation and exploration purposes. Early trails often paralleled rivers and later, roads were built along traditional travel corridors.

Predominantly sloping, micro topographic features indicative of moderate or higher archaeological potential (e.g. knolls, ridges, rises, banks) may be situated outside of the existing alignment, particularly in proximity of Kledo Creek. Avoidance of AOPs is generally recommended unless additional fieldwork confirms the presence or absence of topographic features.

4.0 RECOMMENDATIONS AND CONCLUSIONS

The Project is situated within an area of low archaeological potential due to its predominantly disturbed and sloping terrain. No further work is recommended for previously cleared areas within the current and former Alaska Highway alignments. However, terrain adjacent to the Project may include AOPs indicative of moderate and higher potential. A PFR is recommended if any ground altering activities, including tree removal, are proposed outside the cleared right-of-way. 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 (under Section 14 of the *Heritage Conservation Act*) is required for lands held by the Province of British Columbia. For federal lands under the jurisdiction of PWGSC, a Provincial Heritage Inspection permit may not be required (permit requirements to be discussed with PWGSC).

It is further recommended that the Construction Contract for the Project include PWGSC'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 PWGSC 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 PWGSC 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 General Conditions are attached to this memo (Appendix B).

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,

Soriak Consulting & Research Ltd.

Tetra Tech Canada Inc.



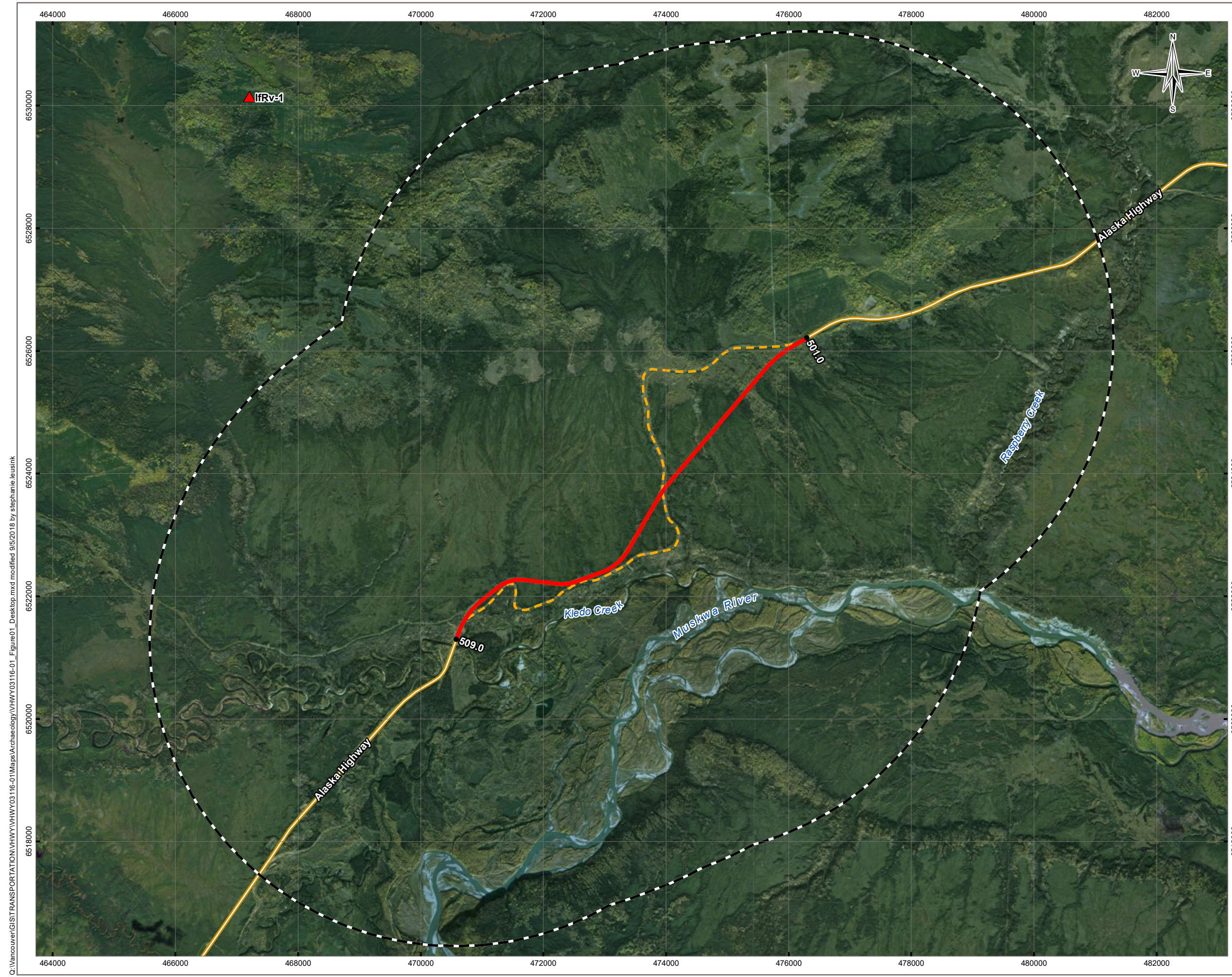
Prepared by:
Charla Arnott, M.Sc., RPCA, PMP, RPA
Archaeologist, Soriak Consulting & Research Ltd.
Direct Line: 780.995.4859
charla@soriakconsulting.com

Reviewed by:
Matt Keleher, B.Eng., E.I.T
Transportation Engineer
Direct Line: 604.608.8615
matt.keleher@tetrattech.com

Attachments: Appendix A – Figure 1
Appendix B – Tetra Tech’s General Conditions

APPENDIX A - FIGURES

Figure 1 Heritage Resources Review – Desktop Assessment



LEGEND

- ▲ Approximate Archaeological Site
- Archaeology Study Area
- Former Highway Alignment
- 5 km Search Area
- Highway

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NOTES
 Base data source:
 Imagery from ESRI; DigitalGlobe (2008).

STATUS
ISSUED FOR USE

**ALASKA HIGHWAY KM 501-509
 WIDENING AND DITCH WORK
 PRELIMINARY ARCHAEOLOGICAL ASSESSMENT**

Desktop Assessment

PROJECTION UTM Zone 10		DATUM NAD83		CLIENT Public Works and Government Services Canada	
Scale: 1:60,000					
FILE NO. VHWY03116-01_Figure01_Desktop.mxd					
OFFICE TL-VANC	DWN SL	CKD BB	APVD CD	REV 0	TETRA TECH
DATE September 5, 2018	PROJECT NO. TRN.VHWY03116-01				

Figure 1

APPENDIX B

TETRA TECH'S GENERAL CONDITIONS

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 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.

R.115628.001
Appendix L

Km 501-509 Geometric and Drainage Improvements

**Notice of Authorized Changes – Changes In and About a Stream
(File 9000628)**



June 8, 2021

Job Number: 117333
vFCBC Tracking Number: 100338776

Public Services and Procurement Canada
219-800 Burrard ST
Vancouver, BC V6Z 0B9

Dear Public Services and Procurement Canada,

Notice of Authorized Changes - Changes In and About a Stream (File 9000628)

Thank you for your Authorized Change Application for changes in and about a stream regarding the road crossing culvert construction/maintenance/removal activities and construction of temporary diversions around worksites, for the geometric and drainage improvement project along km 501+000 to km 509+000 of the Alaska Highway, at the following stream crossing locations:

Stream Name	Site ID	Latitude	Longitude
Unnamed Stream	km 503+480 (site ID Ex-2)	58.8591480	-123.4409350
Unnamed Stream	km 504+025 (site ID Ex-3)	58.8553820	-123.4469880
Unnamed Stream	km 505+690 (site ID Ex-5)	58.8428080	-123.4624730
Unnamed Stream	km 505+937 (site ID Ex-6)	58.8413150	-123.4656240
Unnamed Stream	km 506+360 (site ID Ex-7)	58.8398000	-123.4723260
Unnamed Stream	km 506+538 (site ID Ex-8)	58.8392590	-123.4752290
Unnamed Stream	km 506+629 (site ID Ex-9)	58.8389660	-123.4766980
Unnamed Stream	km 507+645 (site ID Ex-10)	58.8391340	-123.4941460
Unnamed Stream	km 507+908 (site ID Ex-11)	58.8380770	-123.4981680
Unnamed Stream	km 501+401 (site ID Prop-1)	58.8731200	-123.4171280
Unnamed Stream	km 502+244 (site ID Prop-2)	58.8676720	-123.4272060
Unnamed Stream	km 504+344 (site location ID Prop-3/Ex-4)	58.8531870	-123.4504960
Unnamed Stream	km 505+226 (site ID Prop-4)	58.8463880	-123.4583440
Unnamed Stream	km 507+118 (site ID Prop-5)	58.8390070	-123.4851010

This letter acknowledges that the proposed activities meet the requirements as identified for Authorized Changes under the *Water Sustainability Act*.

As per Section 39(1)(a) and (w), you may make changes as per the regulation.

Should the work plan or scope of work change, you must notify the Habitat Officer. If the proposal is outside the authorized changes as described by Section 39 of the *Water Sustainability Regulation*, you will be directed to obtain an Approval under Section 11 of the *Water Sustainability Act*.

All works shall be completed in accordance with the:

- Notification submitted on March 9, 2021 (tracking number 100338776).
- Environmental Overview Assessment Geometric and Drainage Improvements KM 501+000 to KM 509+000, Alaska Highway, BC, prepared for Public Services and Procurement Canada by Tetra Tech Canada Inc. (File 704-TRN. VHUY03116-01) on March 4, 2021. This includes the various management and protection plans attached as appendices in the assessment.
- Provincial "Standards and Best Practices for In-stream Works 2004" <http://www.env.gov.bc.ca/wld/documents/bmp/iswstdsbpsmarch2004.pdf> and "A Users' Guide to Working In and Around Water" https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/natural-resource-use/land-water-use/crown-land/working_around_water.pdf.

As the Habitat Officer under the *Water Sustainability Act*, I am requiring that the proposed changes in and about a stream be made in accordance with the following terms and conditions to protect fish, fish habitat, and/or water quality as per Section 42(2) of the *Water Sustainability Regulation*.

TERMS AND CONDITIONS:

a) THE TIMING WINDOW DURING WHICH THE CHANGE MAY BE MADE

The least risk fish window is between July 15 and August 15 to accommodate both spring and fall spawning fish species that may be present.

As a Habitat Officer I authorize your instream works; permitting works from September 1 or October 1, 2021 to March 31, 2024 with conditions:

- instream works are to be undertaken during the least risk window of July 15-August 15, 2021, July 15-August 15, 2022 and July 15-August 15, 2023 or
- when the worksite stream channel is naturally dry (no flow) or completely frozen to the bottom at the time of construction. A QEP must be onsite to make a determination whether or not the stream is dry or frozen to the bottom prior to the commencement of the project works to ensure the instream activity will not adversely impact fish or fish habitat (e.g. result in the introduction of sediment into fish habitat).

Minimize the amount of time the work site is in a disturbed state by completing work as quickly as possible, while considering worker safety and minimizing environmental risk.

b) THE MINIMUM INSTREAM FLOW OR THE MINIMUM FLOW OF WATER THAT MUST REMAIN IN THE STREAM WHILE THE CHANGE IS BEING MADE

The natural rate of water flow must be maintained upstream and downstream of the worksite during all phases of instream activity.

c) THE REMOVAL OF MATERIAL FROM THE STREAM OR STREAM CHANNEL IN CONNECTION WITH THE CHANGE

The removal of material must not lead to stream channel instability or increase the risk of sedimentation into the watercourse.

Minimize the removal of stable, functioning woody debris. Retain, where possible, existing instream and riparian vegetation and other habitat features. These include trees, bushes, shrubs, weeds, or tall grasses along any stream bank, mats of floating vegetation, overhanging vegetation, natural, large woody debris that does not appear to be causing damage to the bottom, and large boulders.

Any spoil materials must be placed in a location which ensures that sediment or debris does not enter the watercourse.

d) THE ADDITION OF SUBSTANCE, SEDIMENT, DEBRIS OR MATERIAL TO THE STREAM OR STREAM CHANNEL IN CONNECTION WITH THE CHANGE

Instream activities must be conducted in the dry and the worksite must be isolated from water flowing in the stream channel.

All equipment must be located and operated in the dry, outside the wetted perimeter of the stream.

Measures must be taken to ensure that no harmful material (e.g. fuel and other hydrocarbons, soil, road fill, or sediment) which could adversely impact water quality, fish and other aquatic life, and/or fish habitat, be allowed to enter the wetted perimeter as a result of the project activities.

Equipment used in close proximity to the wetted perimeter must be free of deleterious material (e.g. hydrocarbons) and in good mechanical condition (e.g. no fuel or hydraulic leaks).

Ensure all hydraulic machinery working near a stream uses environmentally sensitive hydraulic fluids that are non-toxic to aquatic life and that are readily or inherently biodegradable.

Fuelling and servicing of vehicles and equipment must occur a minimum of 30 metres away from all streams, lakes and waterbodies. Keep a spill containment kit on site and train onsite staff in its use. Immediately report any spill of a substance that is toxic, polluting, or deleterious to aquatic life of reportable quantities to the Provincial Emergency Program 24-hour phone line at **1-800-663-3456**.

All rock used in the works shall be clean and free of sediment producing material, durable, non-acid generating and suitably graded.

Ensure that all works involving the use of concrete, cement, mortars, and other Portland cement or lime-containing construction materials will not deposit, directly or indirectly, sediments, debris, concrete, concrete fines, wash or contact water into or about any watercourse. Concrete materials cast in place must remain inside sealed formed structures.

Concrete leachate is alkaline and highly toxic to fish and other aquatic life. A CO₂ tank with regulator, hose and gas diffuser must be readily available during concrete work to neutralize pH levels should a spill occur. On-site staff must be trained to use this equipment.

Erosion and sediment control structures are to be available onsite and utilized as necessary.

Do not work in weather conditions likely to contribute to sediment production to the stream.

e) THE SALVAGE OR PROTECTION OF FISH OR WILDLIFE WHILE THE CHANGE IS BEING MADE OR AFTER THE CHANGE HAS BEEN MADE

If dewatering of the worksite is necessary, fish salvage must occur on a fish-bearing stream prior to commencing works. A fish salvage permit must be obtained <http://www.env.gov.bc.ca/pasb/>.

Do not disturb wildlife and/or their residences (e.g. beaver lodges) within the project area.

Measures must be taken to ensure that equipment (e.g. water pumps) does not harm aquatic life.

Given the potential for Bull Trout (a species at risk) to be present in these watersheds, prior to the commencement of instream works, an Aquatic Biologist must evaluate each

culvert construction site to ensure no Bull Trout or their spawning habitat (redds) are present.

f) THE PROTECTION OF NATURAL MATERIALS AND VEGETATION THAT CONTRIBUTE TO THE AQUATIC ECOSYSTEM OR STREAM CHANNEL STABILITY

Minimize disturbance to natural materials (e.g. embedded logs) and vegetation that contribute to habitat or stream channel stability.

Minimize the disturbance to existing vegetation on and adjacent to the stream banks.

g) THE RESTORATION OF THE WORKSITE AFTER THE CHANGE HAS BEEN MADE

Protect disturbed soil areas on the banks and areas adjacent to the stream from surface erosion.

Revegetate any disturbed areas using appropriately selected species, as required. Riparian areas which are disturbed by the works shall be restored to their original condition and protected from erosion.

Remove any remaining sediment and erosion control measures.

Complete post-construction multi-year monitoring to ensure your revegetation meets full survival.

h) THE REQUIREMENT TO OBTAIN AN APPROVAL FROM THE FEDERAL DEPARTMENT OF FISHERIES AND OCEANS IN CONNECTION WITH THE CHANGES

Proponents are responsible for complying with the federal *Fisheries Act*. No serious harm to fish is authorized by this document, where serious harm is the death of fish or any permanent alteration to, or destruction of, fish habitat.

Proponents are responsible for determining whether Fisheries and Oceans Canada (FOC) must be consulted and whether an authorization from FOC is required prior to making the change.

i) OTHER

To ensure protection of fish, fish habitat and aquatic resources, an Environmental Monitor must be on site while instream operations take place for the scenarios described in the Environmental Overview Assessment (including its management plans which are attached as appendices to the assessment).

This Notification **does not** constitute a ***Wildlife Act Authorization***.

This letter does not cover works previously conducted without Authority.

This document does not supersede the requirements of the *Water Sustainability Act* and Regulations, *Federal Fisheries Act* or any other related legislation. The proponent is obligated to comply with all applicable federal, provincial or municipal enactments. For more information on the *Water Sustainability Act*, Section 11 Change Approval and Authorization for “Changes In and About a Stream” can be found at: <http://www2.gov.bc.ca/gov/content/environment/air-land-water/water/water-licensing-rights/working-around-water>.

Retain a copy of this document on site during construction of the works.

If you have any questions or concerns, please contact Kerry.Harvey@gov.bc.ca who can also be reached at 778-576-1136.

Sincerely,



Kerry Harvey
Senior Ecosystems Biologist

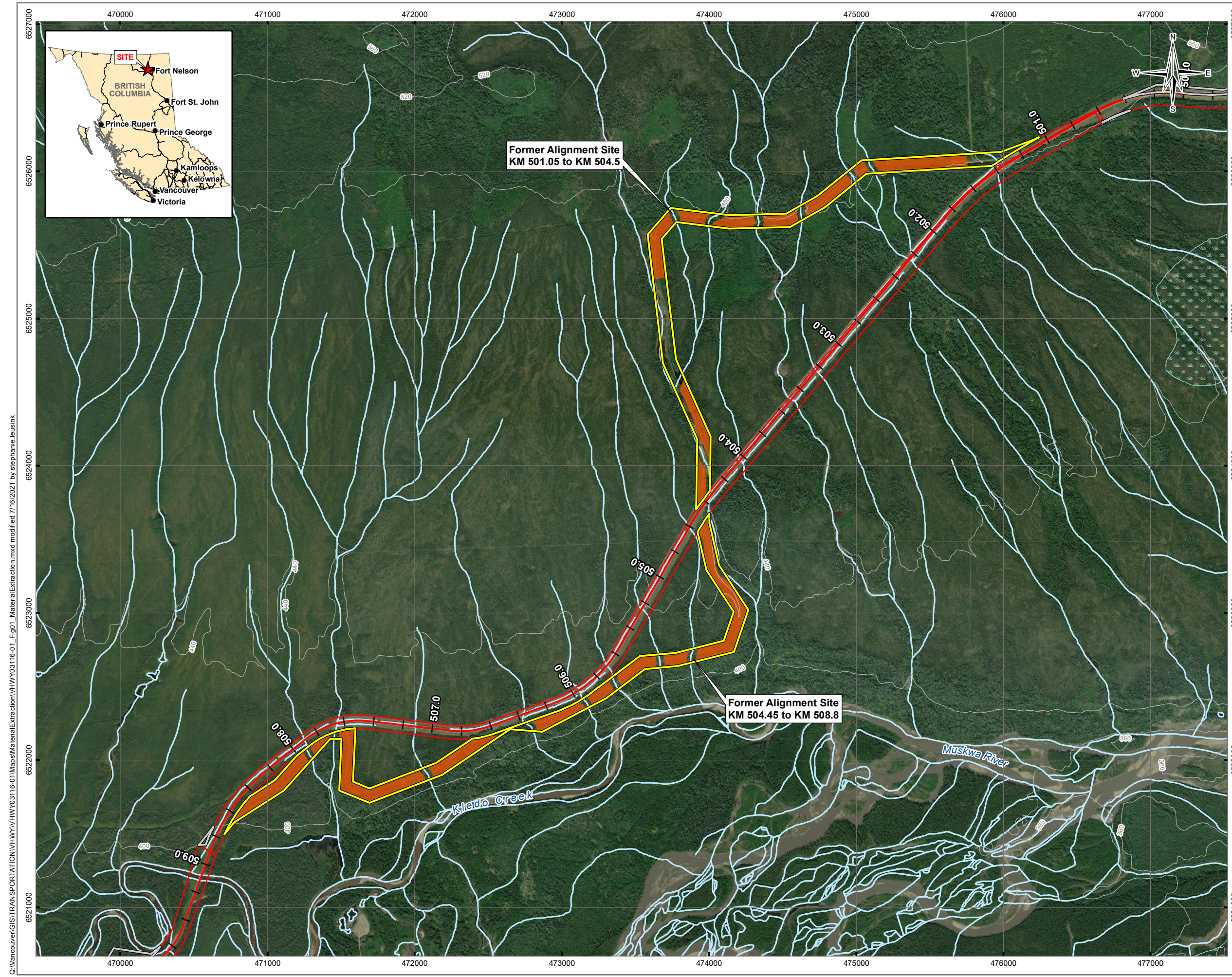
Cc:
Enclosure(s)

R.115628.001

Appendix M

Km 501-509 Geometrics and Drainage Improvements

Pit / Borrow Source Location Plans



LEGEND

- Suggested Embankment Material Extraction
- Current Alaska Highway
- Current Alaska Highway ROW
- Former Alaska Highway ROW - KM 501-509
- Former Alaska Highway ROW - Other Site

Base Features

- Contour (40 m)
- Watercourse
- Waterbody
- Wetland

NOTES
 Base data source:
 CanVec 1:50,000.
 Imagery from ESRI; Maxar (2018/2019).

STATUS
 ISSUED FOR REVIEW

**KM 501 TO KM 509
 GEOMETRIC AND DRAINAGE IMPROVEMENTS
 ALASKA HIGHWAY, BC**

**Suggested Embankment
 Material Extraction Plan**

PROJECTION UTM Zone 10		DATUM NAD83		CLIENT Public Services and Procurement Canada	
Scale: 1:25,000					
FILE NO. VHWY03116-01_Fig01_MaterialExtraction.mxd					
OFFICE TL-VANC		DWN SL	CKD BB	APVD PD	REV 0
DATE July 16, 2021		PROJECT NO. TRN.VHWY03116-01			

Figure 1

Q:\vancouver\GIS\TRANSPORTATION\VHWY03116-01\Maps\MaterialExtraction\MaterialExtraction.mxd modified 7/16/2021 by stephanie.leusink

R.115628.001
Appendix N

Km 501-509 Geometrics and Drainage Improvements
Finished Grading Tables Km 501+000 to Km 509+000

FINISHED GRADING TABLES Km 501+000 to Km 509+000

Station Range: Start: 501+020.000, End: 508+960.000

Location	Easting	Northing	Elevation	Offset
CHAINAGE 501+020.000				
CUT LINE	476,276.20	6,526,191.69	483.761	-5.373m
EDGE OF SHLD	476,276.20	6,526,191.70	483.762	-5.370m
CHAINAGE 501+040.000				
CUT LINE	476,258.89	6,526,181.68	483.454	-5.357m
EDGE OF SHLD	476,258.60	6,526,182.18	483.471	-4.787m
CHAINAGE 501+060.000				
CUT LINE	476,241.58	6,526,171.66	483.107	-5.356m
EDGE OF SHLD	476,241.11	6,526,172.47	483.135	-4.416m
CHAINAGE 501+080.000				
CHAINAGE 501+160.000				
CUT LINE	476,155.05	6,526,121.53	481.281	-5.352m
EDGE OF SHLD	476,154.47	6,526,122.54	481.316	-4.187m
CHAINAGE 501+180.000				
CUT LINE	476,137.74	6,526,111.51	480.861	-5.351m
EDGE OF SHLD	476,137.19	6,526,112.46	480.894	-4.248m
CHAINAGE 501+200.000				
CHAINAGE 501+560.000				
CUT LINE	475,825.25	6,525,898.05	474.269	-5.350m
EDGE OF SHLD	475,824.62	6,525,898.79	474.301	-4.371m
CHAINAGE 501+580.000				
CUT LINE	475,810.09	6,525,885.09	473.958	-5.350m
EDGE OF SHLD	475,809.44	6,525,885.84	473.99	-4.360m
CHAINAGE 501+600.000				
CUT LINE	475,795.08	6,525,871.96	473.668	-5.350m
EDGE OF SHLD	475,794.45	6,525,872.67	473.7	-4.397m
CHAINAGE 501+620.000				
CUT LINE	475,780.22	6,525,858.67	473.391	-5.350m
EDGE OF SHLD	475,779.58	6,525,859.37	473.422	-4.399m
CHAINAGE 501+640.000				

CHAINAGE 501+720.000				
CUT LINE	475,708.17	6,525,789.77	472.05	-5.350m
EDGE OF SHLD	475,707.59	6,525,790.34	472.077	-4.539m
CHAINAGE 501+740.000				
CUT LINE	475,694.22	6,525,775.52	471.824	-5.350m
EDGE OF SHLD	475,693.61	6,525,776.11	471.852	-4.494m
CHAINAGE 501+760.000				
CUT LINE	475,680.44	6,525,761.11	471.607	-5.350m
EDGE OF SHLD	475,679.89	6,525,761.63	471.632	-4.593m
CHAINAGE 501+780.000				
CHAINAGE 502+120.000				
CUT LINE	475,446.12	6,525,488.25	468.275	-5.350m
EDGE OF SHLD	475,445.45	6,525,488.82	468.302	-4.466m
CHAINAGE 502+140.000				
CUT LINE	475,433.22	6,525,472.97	468.107	-5.350m
EDGE OF SHLD	475,432.51	6,525,473.57	468.135	-4.420m
CHAINAGE 502+160.000				
CUT LINE	475,420.31	6,525,457.70	467.944	-5.350m
EDGE OF SHLD	475,419.59	6,525,458.31	467.972	-4.404m
CHAINAGE 502+180.000				
CUT LINE	475,407.41	6,525,442.42	467.791	-5.350m
EDGE OF SHLD	475,406.70	6,525,443.02	467.819	-4.420m
CHAINAGE 502+200.000				
CUT LINE	475,394.50	6,525,427.14	467.657	-5.350m
EDGE OF SHLD	475,393.76	6,525,427.76	467.686	-4.380m
CHAINAGE 502+220.000				
CUT LINE	475,381.60	6,525,411.86	467.519	-5.350m
EDGE OF SHLD	475,380.83	6,525,412.51	467.549	-4.344m
CHAINAGE 502+240.000				
CUT LINE	475,368.69	6,525,396.58	467.328	-5.350m
EDGE OF SHLD	475,367.93	6,525,397.22	467.358	-4.352m
CHAINAGE 502+260.000				
CHAINAGE 502+960.000				
CUT LINE	474,904.10	6,524,846.53	462.707	-5.350m
EDGE OF SHLD	474,903.32	6,524,847.19	462.738	-4.329m
CHAINAGE 502+980.000				

KM 501-509 GEOMETRIC AND DRAINAGE IMPROVEMENTS, ALASKA HIGHWAY, BC
FINISHED GRADING TABLES Km 501+000 to Km 509+000

Location	Easting	Northing	Elevation	Offset
CUT LINE	474,891.20	6,524,831.25	462.505	-5.350m
EDGE OF SHLD	474,890.41	6,524,831.92	462.536	-4.311m
CHAINAGE 503+000.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	474,878.29	6,524,815.97	462.289	-5.350m
EDGE OF SHLD	474,877.60	6,524,816.55	462.316	-4.444m
CHAINAGE 503+020.000				
CHAINAGE 503+180.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	474,762.15	6,524,678.46	460.922	-5.350m
EDGE OF SHLD	474,761.38	6,524,679.11	460.952	-4.343m
CHAINAGE 503+200.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	474,749.24	6,524,663.18	460.797	-5.350m
EDGE OF SHLD	474,748.49	6,524,663.81	460.827	-4.362m
CHAINAGE 503+220.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	474,736.34	6,524,647.90	460.622	-5.350m
EDGE OF SHLD	474,735.68	6,524,648.45	460.648	-4.487m
CHAINAGE 503+240.000				
CHAINAGE 503+420.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	474,607.28	6,524,495.10	459.526	-5.350m
EDGE OF SHLD	474,606.79	6,524,495.52	459.545	-4.708m
CHAINAGE 503+440.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	474,594.38	6,524,479.83	459.464	-5.350m
EDGE OF SHLD	474,593.58	6,524,480.50	459.495	-4.308m
CHAINAGE 503+460.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	474,581.47	6,524,464.55	459.382	-5.350m
EDGE OF SHLD	474,580.58	6,524,465.30	459.417	-4.184m
CHAINAGE 503+480.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	474,568.57	6,524,449.27	459.208	-5.350m
EDGE OF SHLD	474,567.63	6,524,450.06	459.245	-4.119m
CHAINAGE 503+500.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	474,555.66	6,524,433.99	459.036	-5.350m
EDGE OF SHLD	474,554.94	6,524,434.59	459.064	-4.410m
CHAINAGE 503+520.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	474,542.76	6,524,418.71	458.872	-5.350m
EDGE OF SHLD	474,542.21	6,524,419.17	458.894	-4.634m
CHAINAGE 503+540.000				
Location	Easting	Northing	Elevation	Offset

KM 501-509 GEOMETRIC AND DRAINAGE IMPROVEMENTS, ALASKA HIGHWAY, BC
FINISHED GRADING TABLES Km 501+000 to Km 509+000

CUT LINE	474,529.85	6,524,403.43	458.692	-5.350m
EDGE OF SHLD	474,529.21	6,524,403.97	458.717	-4.514m
CHAINAGE 503+560.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	474,516.95	6,524,388.15	458.473	-5.350m
EDGE OF SHLD	474,516.30	6,524,388.70	458.499	-4.505m
CHAINAGE 503+580.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	474,504.04	6,524,372.87	458.299	-5.350m
EDGE OF SHLD	474,503.41	6,524,373.40	458.324	-4.524m
CHAINAGE 503+600.000				
CHAINAGE 503+980.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	474,245.94	6,524,067.29	454.353	-5.350m
EDGE OF SHLD	474,245.23	6,524,067.88	454.381	-4.430m
CHAINAGE 504+000.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	474,233.03	6,524,052.01	454.181	-5.350m
EDGE OF SHLD	474,232.32	6,524,052.60	454.209	-4.426m
CHAINAGE 504+020.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	474,220.13	6,524,036.73	453.966	-5.350m
EDGE OF SHLD	474,219.52	6,524,037.24	453.99	-4.558m
CHAINAGE 504+040.000				
CHAINAGE 504+400.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	473,978.12	6,523,744.30	449.734	-5.350m
EDGE OF SHLD	473,977.37	6,523,744.85	449.765	-4.413m
CHAINAGE 504+420.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	473,966.39	6,523,728.18	449.589	-5.350m
EDGE OF SHLD	473,965.41	6,523,728.88	449.629	-4.150m
CHAINAGE 504+440.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	473,954.85	6,523,711.92	449.341	-5.350m
EDGE OF SHLD	473,954.01	6,523,712.51	449.375	-4.327m
CHAINAGE 504+460.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	473,943.50	6,523,695.53	449.062	-5.350m
EDGE OF SHLD	473,942.76	6,523,696.03	449.091	-4.461m
CHAINAGE 504+480.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	473,932.34	6,523,679.01	448.852	-5.350m
EDGE OF SHLD	473,931.40	6,523,679.64	448.889	-4.216m
CHAINAGE 504+500.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	473,921.38	6,523,662.35	448.67	-5.350m

KM 501-509 GEOMETRIC AND DRAINAGE IMPROVEMENTS, ALASKA HIGHWAY, BC
FINISHED GRADING TABLES Km 501+000 to Km 509+000

EDGE OF SHLD	473,920.42	6,523,662.98	448.708	-4.205m
CHAINAGE 504+520.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	473,910.62	6,523,645.57	448.456	-5.350m
EDGE OF SHLD	473,909.80	6,523,646.09	448.488	-4.383m
CHAINAGE 504+540.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	473,900.05	6,523,628.67	448.221	-5.350m
EDGE OF SHLD	473,899.34	6,523,629.11	448.249	-4.512m
CHAINAGE 504+560.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	473,889.68	6,523,611.63	447.975	-5.350m
EDGE OF SHLD	473,889.10	6,523,611.98	447.997	-4.670m
CHAINAGE 504+580.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	473,879.49	6,523,594.48	447.781	-5.350m
EDGE OF SHLD	473,878.72	6,523,594.93	447.81	-4.464m
CHAINAGE 504+600.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	473,869.40	6,523,577.24	447.592	-5.350m
EDGE OF SHLD	473,868.69	6,523,577.66	447.619	-4.530m
CHAINAGE 504+620.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	473,859.35	6,523,559.96	447.364	-5.350m
EDGE OF SHLD	473,858.65	6,523,560.36	447.388	-4.539m
CHAINAGE 504+640.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	473,849.31	6,523,542.66	447.09	-5.350m
EDGE OF SHLD	473,848.64	6,523,543.05	447.114	-4.576m
CHAINAGE 504+660.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	473,839.27	6,523,525.37	446.842	-5.350m
EDGE OF SHLD	473,838.58	6,523,525.76	446.866	-4.560m
CHAINAGE 504+680.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	473,829.22	6,523,508.07	446.645	-5.350m
EDGE OF SHLD	473,828.46	6,523,508.52	446.671	-4.466m
CHAINAGE 504+700.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	473,819.18	6,523,490.78	446.404	-5.350m
EDGE OF SHLD	473,818.46	6,523,491.20	446.429	-4.514m
CHAINAGE 504+720.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	473,809.13	6,523,473.48	446.215	-5.350m
EDGE OF SHLD	473,808.37	6,523,473.93	446.242	-4.461m
CHAINAGE 504+740.000				
Location	Easting	Northing	Elevation	Offset

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KM 501-509 GEOMETRIC AND DRAINAGE IMPROVEMENTS, ALASKA HIGHWAY, BC
FINISHED GRADING TABLES Km 501+000 to Km 509+000

CUT LINE	473,799.09	6,523,456.19	445.965	-5.350m
EDGE OF SHLD	473,798.16	6,523,456.73	445.997	-4.274m
CHAINAGE 504+760.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	473,789.05	6,523,438.89	445.735	-5.350m
EDGE OF SHLD	473,788.15	6,523,439.41	445.766	-4.316m
CHAINAGE 504+780.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	473,779.00	6,523,421.60	445.515	-5.350m
EDGE OF SHLD	473,778.19	6,523,422.07	445.543	-4.410m
CHAINAGE 504+800.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	473,768.96	6,523,404.30	445.313	-5.350m
EDGE OF SHLD	473,768.19	6,523,404.75	445.34	-4.466m
CHAINAGE 504+820.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	473,758.91	6,523,387.01	445.123	-5.350m
EDGE OF SHLD	473,758.13	6,523,387.46	445.15	-4.447m
CHAINAGE 504+840.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	473,748.87	6,523,369.71	444.915	-5.350m
EDGE OF SHLD	473,748.12	6,523,370.15	444.941	-4.481m
CHAINAGE 504+860.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	473,738.83	6,523,352.42	444.675	-5.350m
EDGE OF SHLD	473,738.14	6,523,352.82	444.699	-4.556m
CHAINAGE 504+880.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	473,728.78	6,523,335.12	444.426	-5.350m
EDGE OF SHLD	473,728.03	6,523,335.56	444.452	-4.476m
CHAINAGE 504+900.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	473,718.74	6,523,317.83	444.213	-5.350m
EDGE OF SHLD	473,717.90	6,523,318.32	444.242	-4.378m
CHAINAGE 504+920.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	473,708.69	6,523,300.53	444.053	-5.350m
EDGE OF SHLD	473,707.83	6,523,301.04	444.084	-4.345m
CHAINAGE 504+940.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	473,698.65	6,523,283.24	443.851	-5.350m
EDGE OF SHLD	473,697.77	6,523,283.75	443.881	-4.335m
CHAINAGE 504+960.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	473,688.61	6,523,265.94	443.582	-5.350m
EDGE OF SHLD	473,687.83	6,523,266.39	443.609	-4.457m
CHAINAGE 504+980.000				

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KM 501-509 GEOMETRIC AND DRAINAGE IMPROVEMENTS, ALASKA HIGHWAY, BC
FINISHED GRADING TABLES Km 501+000 to Km 509+000

Location	Easting	Northing	Elevation	Offset
CUT LINE	473,678.56	6,523,248.65	443.366	-5.350m
EDGE OF SHLD	473,677.85	6,523,249.06	443.391	-4.529m
CHAINAGE 505+000.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	473,668.52	6,523,231.35	443.158	-5.350m
EDGE OF SHLD	473,667.87	6,523,231.73	443.181	-4.605m
CHAINAGE 505+020.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	473,658.47	6,523,214.06	442.948	-5.350m
EDGE OF SHLD	473,657.72	6,523,214.49	442.975	-4.481m
CHAINAGE 505+040.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	473,648.43	6,523,196.76	442.753	-5.350m
EDGE OF SHLD	473,647.68	6,523,197.20	442.779	-4.487m
CHAINAGE 505+060.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	473,638.39	6,523,179.47	442.58	-5.350m
EDGE OF SHLD	473,637.72	6,523,179.85	442.603	-4.585m
CHAINAGE 505+080.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	473,628.34	6,523,162.17	442.419	-5.350m
EDGE OF SHLD	473,627.63	6,523,162.59	442.444	-4.521m
CHAINAGE 505+100.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	473,618.30	6,523,144.88	442.234	-5.350m
EDGE OF SHLD	473,617.67	6,523,145.24	442.256	-4.622m
CHAINAGE 505+120.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	473,608.25	6,523,127.58	442.054	-5.350m
EDGE OF SHLD	473,607.53	6,523,128.00	442.079	-4.519m
CHAINAGE 505+140.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	473,598.21	6,523,110.29	441.89	-5.350m
EDGE OF SHLD	473,597.47	6,523,110.71	441.915	-4.500m
CHAINAGE 505+160.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	473,588.17	6,523,092.99	441.755	-5.350m
EDGE OF SHLD	473,587.46	6,523,093.40	441.78	-4.531m
CHAINAGE 505+180.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	473,578.12	6,523,075.70	441.627	-5.350m
EDGE OF SHLD	473,577.46	6,523,076.08	441.65	-4.583m
CHAINAGE 505+200.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	473,568.08	6,523,058.40	441.477	-5.350m
EDGE OF SHLD	473,567.42	6,523,058.78	441.5	-4.589m

KM 501-509 GEOMETRIC AND DRAINAGE IMPROVEMENTS, ALASKA HIGHWAY, BC
FINISHED GRADING TABLES Km 501+000 to Km 509+000

CHAINAGE 505+220.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	473,558.03	6,523,041.11	441.319	-5.350m
EDGE OF SHLD	473,557.25	6,523,041.56	441.346	-4.438m
CHAINAGE 505+240.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	473,547.99	6,523,023.81	441.197	-5.350m
EDGE OF SHLD	473,547.18	6,523,024.28	441.225	-4.417m
CHAINAGE 505+260.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	473,537.95	6,523,006.52	441.081	-5.350m
EDGE OF SHLD	473,537.11	6,523,007.00	441.11	-4.387m
CHAINAGE 505+280.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	473,527.90	6,522,989.22	440.918	-5.350m
EDGE OF SHLD	473,527.24	6,522,989.60	440.94	-4.588m
CHAINAGE 505+300.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	473,517.86	6,522,971.93	440.779	-5.350m
EDGE OF SHLD	473,517.16	6,522,972.33	440.804	-4.541m
CHAINAGE 505+320.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	473,507.81	6,522,954.63	440.655	-5.350m
EDGE OF SHLD	473,507.29	6,522,954.93	440.673	-4.747m
CHAINAGE 505+340.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	473,497.77	6,522,937.34	440.533	-5.350m
EDGE OF SHLD	473,497.24	6,522,937.65	440.551	-4.736m
CHAINAGE 505+360.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	473,487.73	6,522,920.04	440.418	-5.350m
EDGE OF SHLD	473,487.05	6,522,920.44	440.442	-4.567m
CHAINAGE 505+380.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	473,477.68	6,522,902.75	440.312	-5.350m
EDGE OF SHLD	473,476.97	6,522,903.16	440.337	-4.532m
CHAINAGE 505+400.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	473,467.64	6,522,885.45	440.181	-5.350m
EDGE OF SHLD	473,466.94	6,522,885.86	440.204	-4.543m
CHAINAGE 505+420.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	473,457.59	6,522,868.16	440.028	-5.350m
EDGE OF SHLD	473,456.93	6,522,868.54	440.048	-4.587m
CHAINAGE 505+440.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	473,447.55	6,522,850.86	439.913	-5.350m

KM 501-509 GEOMETRIC AND DRAINAGE IMPROVEMENTS, ALASKA HIGHWAY, BC
FINISHED GRADING TABLES Km 501+000 to Km 509+000

EDGE OF SHLD	473,446.88	6,522,851.25	439.932	-4.578m
CHAINAGE 505+460.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	473,437.50	6,522,833.57	439.813	-5.350m
EDGE OF SHLD	473,436.91	6,522,833.91	439.828	-4.664m
CHAINAGE 505+480.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	473,427.46	6,522,816.27	439.714	-5.350m
EDGE OF SHLD	473,426.99	6,522,816.54	439.725	-4.807m
CHAINAGE 505+500.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	473,417.42	6,522,798.98	439.654	-5.350m
EDGE OF SHLD	473,416.88	6,522,799.29	439.665	-4.732m
CHAINAGE 505+520.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	473,407.37	6,522,781.68	439.543	-5.350m
EDGE OF SHLD	473,406.98	6,522,781.91	439.552	-4.893m
CHAINAGE 505+540.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	473,397.30	6,522,764.38	439.514	-5.350m
EDGE OF SHLD	473,396.76	6,522,764.70	439.515	-4.720m
CHAINAGE 505+560.000				
CHAINAGE 505+720.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	473,292.40	6,522,617.22	438.664	-5.350m
EDGE OF SHLD	473,291.94	6,522,617.63	438.648	-4.736m
CHAINAGE 505+740.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	473,278.89	6,522,602.30	438.558	-5.350m
EDGE OF SHLD	473,277.99	6,522,603.14	438.527	-4.121m
CHAINAGE 505+760.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	473,265.04	6,522,587.70	438.485	-5.350m
EDGE OF SHLD	473,264.31	6,522,588.41	438.456	-4.331m
CHAINAGE 505+780.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	473,250.85	6,522,573.43	438.365	-5.350m
EDGE OF SHLD	473,250.28	6,522,574.01	438.348	-4.540m
CHAINAGE 505+800.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	473,236.33	6,522,559.50	438.342	-5.350m
EDGE OF SHLD	473,235.17	6,522,560.73	438.298	-3.661m
CHAINAGE 505+820.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	473,221.48	6,522,545.91	438.244	-5.350m
EDGE OF SHLD	473,220.66	6,522,546.83	438.221	-4.115m
CHAINAGE 505+840.000				

KM 501-509 GEOMETRIC AND DRAINAGE IMPROVEMENTS, ALASKA HIGHWAY, BC
FINISHED GRADING TABLES Km 501+000 to Km 509+000

Location	Easting	Northing	Elevation	Offset
CUT LINE	473,206.32	6,522,532.68	438.147	-5.350m
EDGE OF SHLD	473,205.50	6,522,533.63	438.127	-4.096m
CHAINAGE 505+860.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	473,190.85	6,522,519.80	438.084	-5.350m
EDGE OF SHLD	473,190.07	6,522,520.76	438.053	-4.124m
CHAINAGE 505+880.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	473,175.08	6,522,507.30	437.944	-5.350m
EDGE OF SHLD	473,174.22	6,522,508.41	437.907	-3.949m
CHAINAGE 505+900.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	473,159.02	6,522,495.17	437.862	-5.350m
EDGE OF SHLD	473,158.26	6,522,496.20	437.825	-4.061m
CHAINAGE 505+920.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	473,142.68	6,522,483.42	437.846	-5.350m
EDGE OF SHLD	473,141.82	6,522,484.64	437.795	-3.854m
CHAINAGE 505+940.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	473,126.07	6,522,472.05	437.768	-5.350m
EDGE OF SHLD	473,125.18	6,522,473.38	437.72	-3.751m
CHAINAGE 505+960.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	473,109.20	6,522,461.09	437.645	-5.350m
EDGE OF SHLD	473,108.41	6,522,462.33	437.617	-3.874m
CHAINAGE 505+980.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	473,092.07	6,522,450.52	437.515	-5.350m
EDGE OF SHLD	473,091.51	6,522,451.45	437.503	-4.257m
CHAINAGE 506+000.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	473,074.70	6,522,440.35	437.438	-5.350m
EDGE OF SHLD	473,074.14	6,522,441.34	437.416	-4.214m
CHAINAGE 506+020.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	473,057.09	6,522,430.60	437.328	-5.350m
EDGE OF SHLD	473,056.64	6,522,431.45	437.312	-4.386m
CHAINAGE 506+040.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	473,039.26	6,522,421.27	437.263	-5.350m
EDGE OF SHLD	473,038.81	6,522,422.17	437.239	-4.342m
CHAINAGE 506+060.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	473,021.22	6,522,412.36	437.167	-5.350m
EDGE OF SHLD	473,020.93	6,522,412.95	437.154	-4.691m

KM 501-509 GEOMETRIC AND DRAINAGE IMPROVEMENTS, ALASKA HIGHWAY, BC
FINISHED GRADING TABLES Km 501+000 to Km 509+000

Location	Easting	Northing	Elevation	Offset
CHAINAGE 506+080.000				
CUT LINE	473,002.97	6,522,403.87	437.031	-5.350m
EDGE OF SHLD	473,002.71	6,522,404.45	437.019	-4.711m
CHAINAGE 506+100.000				
CUT LINE	472,984.53	6,522,395.82	436.897	-5.350m
EDGE OF SHLD	472,984.30	6,522,396.36	436.892	-4.757m
CHAINAGE 506+120.000				
CUT LINE	472,965.90	6,522,388.20	436.732	-5.350m
EDGE OF SHLD	472,965.65	6,522,388.82	436.73	-4.687m
CHAINAGE 506+140.000				
CUT LINE	472,947.14	6,522,381.00	436.587	-5.350m
EDGE OF SHLD	472,946.79	6,522,381.93	436.587	-4.354m
CHAINAGE 506+160.000				
CUT LINE	472,928.31	6,522,374.08	436.417	-5.350m
EDGE OF SHLD	472,927.96	6,522,375.03	436.421	-4.336m
CHAINAGE 506+180.000				
CUT LINE	472,909.48	6,522,367.31	436.245	-5.350m
EDGE OF SHLD	472,909.18	6,522,368.14	436.255	-4.461m
CHAINAGE 506+200.000				
CUT LINE	472,890.65	6,522,360.55	436.086	-5.350m
EDGE OF SHLD	472,890.32	6,522,361.48	436.102	-4.357m
CHAINAGE 506+220.000				
CUT LINE	472,871.83	6,522,353.79	435.902	-5.350m
EDGE OF SHLD	472,871.51	6,522,354.68	435.921	-4.408m
CHAINAGE 506+240.000				
CUT LINE	472,853.00	6,522,347.04	435.769	-5.350m
EDGE OF SHLD	472,852.68	6,522,347.94	435.791	-4.395m
CHAINAGE 506+260.000				
CUT LINE	472,834.18	6,522,340.28	435.608	-5.350m
EDGE OF SHLD	472,833.79	6,522,341.36	435.64	-4.206m
CHAINAGE 506+280.000				
CUT LINE	472,815.35	6,522,333.53	435.415	-5.350m
EDGE OF SHLD	472,814.99	6,522,334.53	435.447	-4.284m
CHAINAGE 506+300.000				
CUT LINE	472,796.53	6,522,326.77	435.314	-5.350m

KM 501-509 GEOMETRIC AND DRAINAGE IMPROVEMENTS, ALASKA HIGHWAY, BC
FINISHED GRADING TABLES Km 501+000 to Km 509+000

Location	Easting	Northing	Elevation	Offset
EDGE OF SHLD	472,796.17	6,522,327.78	435.347	-4.276m
CHAINAGE 506+320.000				
CUT LINE	472,777.70	6,522,320.02	435.209	-5.350m
EDGE OF SHLD	472,777.42	6,522,320.80	435.234	-4.516m
CHAINAGE 506+340.000				
CUT LINE	472,758.88	6,522,313.26	435.174	-5.350m
EDGE OF SHLD	472,758.44	6,522,314.48	435.212	-4.062m
CHAINAGE 506+360.000				
CUT LINE	472,740.05	6,522,306.51	434.911	-5.350m
EDGE OF SHLD	472,739.64	6,522,307.65	434.948	-4.138m
CHAINAGE 506+380.000				
CUT LINE	472,721.23	6,522,299.75	434.754	-5.350m
EDGE OF SHLD	472,720.89	6,522,300.71	434.784	-4.336m
CHAINAGE 506+400.000				
CUT LINE	472,702.40	6,522,293.00	434.676	-5.350m
EDGE OF SHLD	472,701.97	6,522,294.20	434.715	-4.069m
CHAINAGE 506+420.000				
CUT LINE	472,683.58	6,522,286.24	434.604	-5.350m
EDGE OF SHLD	472,683.20	6,522,287.31	434.638	-4.213m
CHAINAGE 506+440.000				
CUT LINE	472,664.76	6,522,279.49	434.478	-5.350m
EDGE OF SHLD	472,664.45	6,522,280.34	434.506	-4.440m
CHAINAGE 506+460.000				
CUT LINE	472,645.93	6,522,272.73	434.361	-5.350m
EDGE OF SHLD	472,645.67	6,522,273.45	434.384	-4.584m
CHAINAGE 506+480.000				
CUT LINE	472,627.11	6,522,265.98	434.264	-5.350m
EDGE OF SHLD	472,626.87	6,522,266.62	434.285	-4.665m
CHAINAGE 506+500.000				
CUT LINE	472,608.28	6,522,259.22	434.267	-5.350m
EDGE OF SHLD	472,607.99	6,522,260.03	434.293	-4.495m
CHAINAGE 506+520.000				
CUT LINE	472,589.46	6,522,252.47	434.237	-5.350m
EDGE OF SHLD	472,589.22	6,522,253.14	434.259	-4.637m
CHAINAGE 506+540.000				
CUT LINE				

KM 501-509 GEOMETRIC AND DRAINAGE IMPROVEMENTS, ALASKA HIGHWAY, BC
FINISHED GRADING TABLES Km 501+000 to Km 509+000

CUT LINE	472,570.63	6,522,245.71	434.199	-5.350m
EDGE OF SHLD	472,570.38	6,522,246.41	434.22	-4.611m
CHAINAGE 506+560.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	472,551.81	6,522,238.96	434.23	-5.350m
EDGE OF SHLD	472,551.54	6,522,239.70	434.243	-4.565m
CHAINAGE 506+580.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	472,532.97	6,522,232.20	434.335	-5.350m
EDGE OF SHLD	472,532.70	6,522,232.96	434.33	-4.548m
CHAINAGE 506+600.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	472,514.05	6,522,225.54	434.378	-5.350m
EDGE OF SHLD	472,513.94	6,522,225.88	434.373	-4.992m
CHAINAGE 506+620.000				
CHAINAGE 506+820.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	472,296.22	6,522,190.22	434.798	-5.350m
EDGE OF SHLD	472,296.25	6,522,191.44	434.757	-4.129m
CHAINAGE 506+840.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	472,276.06	6,522,191.00	434.855	-5.350m
EDGE OF SHLD	472,276.11	6,522,191.85	434.832	-4.500m
CHAINAGE 506+860.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	472,255.95	6,522,192.44	434.888	-5.350m
EDGE OF SHLD	472,256.04	6,522,193.56	434.868	-4.225m
CHAINAGE 506+880.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	472,235.93	6,522,194.40	434.781	-5.350m
EDGE OF SHLD	472,236.07	6,522,195.71	434.789	-4.033m
CHAINAGE 506+900.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	472,216.01	6,522,196.67	434.717	-5.350m
EDGE OF SHLD	472,216.13	6,522,197.69	434.738	-4.318m
CHAINAGE 506+920.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	472,196.14	6,522,199.02	434.683	-5.350m
EDGE OF SHLD	472,196.24	6,522,199.87	434.707	-4.489m
CHAINAGE 506+940.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	472,176.28	6,522,201.37	434.671	-5.350m
EDGE OF SHLD	472,176.38	6,522,202.19	434.696	-4.522m
CHAINAGE 506+960.000				
CHAINAGE 507+080.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	472,037.25	6,522,217.83	434.933	-5.350m

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KM 501-509 GEOMETRIC AND DRAINAGE IMPROVEMENTS, ALASKA HIGHWAY, BC
FINISHED GRADING TABLES Km 501+000 to Km 509+000

EDGE OF SHLD	472,037.35	6,522,218.62	434.957	-4.556m
CHAINAGE 507+100.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	472,017.39	6,522,220.18	434.997	-5.350m
EDGE OF SHLD	472,017.49	6,522,220.98	435.022	-4.540m
CHAINAGE 507+120.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	471,997.53	6,522,222.53	435.028	-5.350m
EDGE OF SHLD	471,997.63	6,522,223.34	435.052	-4.536m
CHAINAGE 507+140.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	471,977.67	6,522,224.88	435.034	-5.350m
EDGE OF SHLD	471,977.77	6,522,225.73	435.059	-4.498m
CHAINAGE 507+160.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	471,957.81	6,522,227.23	435.04	-5.350m
EDGE OF SHLD	471,957.91	6,522,228.11	435.067	-4.462m
CHAINAGE 507+180.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	471,937.95	6,522,229.58	435.055	-5.350m
EDGE OF SHLD	471,938.05	6,522,230.45	435.081	-4.479m
CHAINAGE 507+200.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	471,918.08	6,522,231.93	435.063	-5.350m
EDGE OF SHLD	471,918.21	6,522,233.00	435.095	-4.279m
CHAINAGE 507+220.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	471,898.22	6,522,234.29	435.054	-5.350m
EDGE OF SHLD	471,898.34	6,522,235.23	435.082	-4.395m
CHAINAGE 507+240.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	471,878.36	6,522,236.64	435.037	-5.350m
EDGE OF SHLD	471,878.47	6,522,237.59	435.066	-4.390m
CHAINAGE 507+260.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	471,858.50	6,522,238.99	434.961	-5.350m
EDGE OF SHLD	471,858.61	6,522,239.88	434.988	-4.454m
CHAINAGE 507+280.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	471,838.64	6,522,241.34	434.957	-5.350m
EDGE OF SHLD	471,838.74	6,522,242.18	434.981	-4.505m
CHAINAGE 507+300.000				
CHAINAGE 507+420.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	471,699.64	6,522,257.73	434.731	-5.350m
EDGE OF SHLD	471,699.77	6,522,258.91	434.779	-4.162m
CHAINAGE 507+440.000				

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KM 501-509 GEOMETRIC AND DRAINAGE IMPROVEMENTS, ALASKA HIGHWAY, BC
FINISHED GRADING TABLES Km 501+000 to Km 509+000

Location	Easting	Northing	Elevation	Offset
CUT LINE	471,679.84	6,522,259.78	434.588	-5.350m
EDGE OF SHLD	471,679.95	6,522,260.94	434.638	-4.178m
CHAINAGE 507+460.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	471,660.05	6,522,261.38	434.498	-5.350m
EDGE OF SHLD	471,660.11	6,522,262.29	434.539	-4.434m
CHAINAGE 507+480.000				
CHAINAGE 507+600.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	471,521.87	6,522,253.94	434.032	-5.350m
EDGE OF SHLD	471,521.72	6,522,254.79	434.079	-4.494m
CHAINAGE 507+620.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	471,502.42	6,522,250.17	433.989	-5.350m
EDGE OF SHLD	471,502.16	6,522,251.39	434.058	-4.098m
CHAINAGE 507+640.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	471,483.11	6,522,245.72	433.883	-5.350m
EDGE OF SHLD	471,482.86	6,522,246.75	433.941	-4.296m
CHAINAGE 507+660.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	471,463.97	6,522,240.62	433.766	-5.350m
EDGE OF SHLD	471,463.68	6,522,241.63	433.824	-4.298m
CHAINAGE 507+680.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	471,445.01	6,522,234.85	433.711	-5.350m
EDGE OF SHLD	471,444.63	6,522,236.01	433.778	-4.132m
CHAINAGE 507+700.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	471,426.26	6,522,228.44	433.645	-5.350m
EDGE OF SHLD	471,425.93	6,522,229.37	433.699	-4.363m
CHAINAGE 507+720.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	471,407.75	6,522,221.38	433.643	-5.350m
EDGE OF SHLD	471,407.38	6,522,222.29	433.697	-4.369m
CHAINAGE 507+740.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	471,389.48	6,522,213.69	433.637	-5.350m
EDGE OF SHLD	471,388.95	6,522,214.91	433.71	-4.020m
CHAINAGE 507+760.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	471,371.50	6,522,205.38	433.576	-5.350m
EDGE OF SHLD	471,370.89	6,522,206.65	433.653	-3.940m
CHAINAGE 507+780.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	471,353.81	6,522,196.45	433.514	-5.350m

KM 501-509 GEOMETRIC AND DRAINAGE IMPROVEMENTS, ALASKA HIGHWAY, BC
FINISHED GRADING TABLES Km 501+000 to Km 509+000

EDGE OF SHLD	471,353.28	6,522,197.46	433.577	-4.205m
CHAINAGE 507+800.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	471,336.44	6,522,186.91	433.372	-5.350m
EDGE OF SHLD	471,335.86	6,522,187.93	433.436	-4.175m
CHAINAGE 507+820.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	471,319.41	6,522,176.78	433.251	-5.350m
EDGE OF SHLD	471,318.80	6,522,177.77	433.315	-4.186m
CHAINAGE 507+840.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	471,302.74	6,522,166.07	433.163	-5.350m
EDGE OF SHLD	471,302.11	6,522,167.02	433.225	-4.218m
CHAINAGE 507+860.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	471,286.45	6,522,154.80	433.212	-5.350m
EDGE OF SHLD	471,285.68	6,522,155.87	433.276	-4.031m
CHAINAGE 507+880.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	471,270.49	6,522,142.99	433.216	-5.350m
EDGE OF SHLD	471,269.60	6,522,144.15	433.284	-3.885m
CHAINAGE 507+900.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	471,254.77	6,522,130.78	433.151	-5.350m
EDGE OF SHLD	471,253.80	6,522,132.00	433.218	-3.796m
CHAINAGE 507+920.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	471,239.16	6,522,118.35	433.09	-5.351m
EDGE OF SHLD	471,238.15	6,522,119.61	433.154	-3.733m
CHAINAGE 507+940.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	471,223.56	6,522,105.83	432.964	-5.350m
EDGE OF SHLD	471,222.76	6,522,106.83	433.008	-4.063m
CHAINAGE 507+960.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	471,207.97	6,522,093.31	432.802	-5.350m
EDGE OF SHLD	471,207.35	6,522,094.07	432.832	-4.366m
CHAINAGE 507+980.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	471,192.37	6,522,080.79	432.64	-5.350m
EDGE OF SHLD	471,191.71	6,522,081.61	432.672	-4.290m
CHAINAGE 508+000.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	471,176.77	6,522,068.27	432.554	-5.350m
EDGE OF SHLD	471,176.07	6,522,069.14	432.588	-4.226m
CHAINAGE 508+020.000				
Location	Easting	Northing	Elevation	Offset

KM 501-509 GEOMETRIC AND DRAINAGE IMPROVEMENTS, ALASKA HIGHWAY, BC
FINISHED GRADING TABLES Km 501+000 to Km 509+000

CUT LINE	471,161.18	6,522,055.75	432.458	-5.350m
EDGE OF SHLD	471,160.54	6,522,056.54	432.488	-4.327m
CHAINAGE 508+040.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	471,145.58	6,522,043.23	432.341	-5.350m
EDGE OF SHLD	471,144.91	6,522,044.06	432.374	-4.279m
CHAINAGE 508+060.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	471,129.99	6,522,030.71	432.194	-5.350m
EDGE OF SHLD	471,129.41	6,522,031.43	432.222	-4.425m
CHAINAGE 508+080.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	471,114.39	6,522,018.18	431.987	-5.350m
EDGE OF SHLD	471,113.59	6,522,019.18	432.025	-4.072m
CHAINAGE 508+100.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	471,098.79	6,522,005.66	431.79	-5.350m
EDGE OF SHLD	471,097.87	6,522,006.81	431.835	-3.877m
CHAINAGE 508+120.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	471,083.20	6,521,993.14	431.504	-5.350m
EDGE OF SHLD	471,082.53	6,521,993.98	431.536	-4.283m
CHAINAGE 508+140.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	471,067.60	6,521,980.62	431.244	-5.350m
EDGE OF SHLD	471,066.94	6,521,981.45	431.276	-4.293m
CHAINAGE 508+160.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	471,052.01	6,521,968.10	430.971	-5.350m
EDGE OF SHLD	471,051.21	6,521,969.09	431.009	-4.083m
CHAINAGE 508+180.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	471,036.41	6,521,955.58	430.691	-5.350m
EDGE OF SHLD	471,035.73	6,521,956.43	430.723	-4.265m
CHAINAGE 508+200.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	471,020.81	6,521,943.06	430.359	-5.350m
EDGE OF SHLD	471,020.06	6,521,944.00	430.395	-4.149m
CHAINAGE 508+220.000				
CHAINAGE 508+380.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	470,886.97	6,521,823.91	424.352	-5.350m
EDGE OF SHLD	470,886.10	6,521,824.76	424.4	-4.129m
CHAINAGE 508+400.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	470,873.24	6,521,809.50	423.447	-5.350m
EDGE OF SHLD	470,872.02	6,521,810.64	423.512	-3.689m

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KM 501-509 GEOMETRIC AND DRAINAGE IMPROVEMENTS, ALASKA HIGHWAY, BC
FINISHED GRADING TABLES Km 501+000 to Km 509+000

CHAINAGE 508+420.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	470,859.75	6,521,794.86	422.327	-5.350m
EDGE OF SHLD	470,858.73	6,521,795.78	422.381	-3.977m
CHAINAGE 508+440.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	470,846.51	6,521,779.99	421.16	-5.350m
EDGE OF SHLD	470,845.58	6,521,780.80	421.208	-4.109m
CHAINAGE 508+460.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	470,833.53	6,521,764.89	419.936	-5.350m
EDGE OF SHLD	470,832.86	6,521,765.46	419.97	-4.466m
CHAINAGE 508+480.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	470,820.81	6,521,749.58	418.693	-5.350m
EDGE OF SHLD	470,819.98	6,521,750.26	418.735	-4.272m
CHAINAGE 508+500.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	470,808.36	6,521,734.05	417.38	-5.350m
EDGE OF SHLD	470,807.52	6,521,734.71	417.421	-4.276m
CHAINAGE 508+520.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	470,796.17	6,521,718.30	416.008	-5.350m
EDGE OF SHLD	470,795.33	6,521,718.94	416.049	-4.296m
CHAINAGE 508+540.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	470,784.25	6,521,702.36	414.531	-5.350m
EDGE OF SHLD	470,783.27	6,521,703.08	414.579	-4.128m
CHAINAGE 508+560.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	470,772.61	6,521,686.21	413.025	-5.350m
EDGE OF SHLD	470,771.61	6,521,686.91	413.072	-4.129m
CHAINAGE 508+580.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	470,761.25	6,521,669.86	411.499	-5.350m
EDGE OF SHLD	470,760.17	6,521,670.60	411.55	-4.043m
CHAINAGE 508+600.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	470,750.16	6,521,653.33	409.92	-5.350m
EDGE OF SHLD	470,749.03	6,521,654.07	409.973	-3.991m
CHAINAGE 508+620.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	470,739.36	6,521,636.60	408.32	-5.350m
EDGE OF SHLD	470,738.21	6,521,637.33	408.373	-3.990m
CHAINAGE 508+640.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	470,728.85	6,521,619.70	406.736	-5.350m

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KM 501-509 GEOMETRIC AND DRAINAGE IMPROVEMENTS, ALASKA HIGHWAY, BC
FINISHED GRADING TABLES Km 501+000 to Km 509+000

EDGE OF SHLD	470,727.73	6,521,620.38	406.787	-4.041m
CHAINAGE 508+660.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	470,718.63	6,521,602.61	405.192	-5.350m
EDGE OF SHLD	470,717.69	6,521,603.16	405.235	-4.267m
CHAINAGE 508+680.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	470,708.70	6,521,585.36	403.671	-5.350m
EDGE OF SHLD	470,707.85	6,521,585.83	403.709	-4.375m
CHAINAGE 508+700.000				
CHAINAGE 508+780.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	470,663.56	6,521,496.67	396.198	-5.350m
EDGE OF SHLD	470,662.72	6,521,497.05	396.234	-4.430m
CHAINAGE 508+800.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	470,655.45	6,521,478.49	394.923	-5.350m
EDGE OF SHLD	470,654.54	6,521,478.89	394.961	-4.360m
CHAINAGE 508+820.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	470,647.65	6,521,460.17	393.722	-5.350m
EDGE OF SHLD	470,646.61	6,521,460.60	393.766	-4.226m
CHAINAGE 508+840.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	470,640.17	6,521,441.72	392.605	-5.350m
EDGE OF SHLD	470,638.93	6,521,442.21	392.657	-4.018m
CHAINAGE 508+860.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	470,632.99	6,521,423.15	391.552	-5.350m
EDGE OF SHLD	470,631.56	6,521,423.68	391.608	-3.826m
CHAINAGE 508+880.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	470,626.05	6,521,404.45	390.574	-5.350m
EDGE OF SHLD	470,624.60	6,521,404.98	390.628	-3.810m
CHAINAGE 508+900.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	470,619.23	6,521,385.67	389.746	-5.350m
EDGE OF SHLD	470,617.67	6,521,386.23	389.801	-3.688m
CHAINAGE 508+920.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	470,612.45	6,521,366.86	388.945	-5.350m
EDGE OF SHLD	470,610.91	6,521,367.41	388.994	-3.712m
CHAINAGE 508+940.000				
Location	Easting	Northing	Elevation	Offset
CUT LINE	470,605.66	6,521,348.04	388.106	-5.350m
EDGE OF SHLD	470,604.27	6,521,348.54	388.15	-3.873m

R.115628.001, R.106984.001
Appendix O

**Geotechnical Exploration Report: Km 501 to Km 509 of the
Alaska Highway, BC**

Geotechnical Exploration Report: Km 501 to Km 509 of the Alaska Highway, BC



PRESENTED TO
Public Works and Procurement Canada

AUGUST 16, 2021
ISSUED FOR USE
PWGSC PROJECT NUMBER: R.017173.216
TETRA TECH FILE: 704-TRN.VHWY03116-01

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Appendix A	Limitations on the Use of this Document
Appendix B	Test Pit Logs
Appendix C	Laboratory Test Results

LIMITATIONS OF REPORT

This report and its contents are intended for the sole use of Public Works and Government Services Canada and its agents. Tetra Tech Canada Inc. (Tetra Tech) does not accept any responsibility for the accuracy of any of the data, the analysis, or the recommendations contained or referenced in the report when the report is used or relied upon by any Party other than Public Works and Government Services Canada or for any Project other than the proposed development at the subject site. Any such unauthorized use of this report is at the sole risk of the user. Use of this document is subject to the Limitations on the Use of this Document attached in Appendix A.

1.0 INTRODUCTION

Tetra Tech Canada Inc. (Tetra Tech) was retained by Public Works and Procurement Canada (PWPC) to provide engineering services for geometric and drainage improvements at Km 501 to Km 509 of the Alaska Highway, BC. Our scope of work was developed based on PWPC's Terms of Reference (ToR) for Project No. R.017173.216 and subsequent correspondence between PWPC and Tetra Tech. The project was completed under the Standing Offer Agreement (SOA) No. EZ899-161629/001/TPV. This report presents the results of our geotechnical exploration for the project.

2.0 PROJECT BACKGROUND

The objective of this project is to upgrade the section of the Alaska Highway between Km 501 and Km 509, about 40 km west of Fort Nelson, BC. The upgrades will include widening the highway roadtop to 12 m, flattening the embankment side slopes, and improving drainage within the site through the addition of culverts and infilling of the existing interceptor ditch.

Two sections of the former Alaska Highway alignment parallel much of the project site. The first section is located north of the current alignment between about Km 501 and Km 504.5, and the second is located south of the current alignment between about Km 504.4 and Km 508.7. PWPC has identified these former alignment sections as potential sources of common borrow material for the proposed works.

3.0 GEOTECHNICAL EXPLORATION

3.1 Field Exploration

Tetra Tech carried out a geotechnical exploration for the project from June 24 to 30, 2018. Test pits were advanced along both the current and former Alaska Highway alignments as discussed below.

- **Current Alaska Highway alignment:** Test pits were conducted on both shoulders of the highway at about 400 m intervals. These test pits were completed to identify the types and depths of the materials in the current highway road structure, in addition to topsoil depths along the highway shoulder.
- **Former Alaska Highway alignment:** Test pits were conducted at 100 m to 200 m intervals, alternating between the shoulders and centre of the alignment. These test pits were completed to identify the types and depths of materials present within the former alignment to assess the quantity of material available for use on the project. Testing of the excavated materials was completed to assess the suitability of the former alignment road structure material for use within the proposed works.

North Country Maintenance Inc., based in Fort Nelson, was hired to supply and operate an excavator, lowbed, and associated equipment necessary to complete the test pits. A NorthwesTel fibre optic line, located north of the northbound shoulder of the current Alaska Highway alignment, was identified and flagged by NorthwesTel staff prior to commencement of the test pit program. Upon completion, the test pits were backfilled with the excavated material and compacted.

In total, 98 test pits were completed during the exploration: 36 on the current Alaska Highway shoulders and 62 along the former highway alignment. The test pit locations are shown on Figures 1 and 2, and test pit logs are presented in Appendix B.

3.2 Laboratory Testing

Laboratory testing was carried out to assess the geotechnical parameters of selected soil samples from the current and former highway alignments. Laboratory testing was carried out in general accordance with American Society for Testing and Materials (ASTM) standards. The testing program included moisture content and grain size testing. A summary of the test methods and number of tests performed is presented in Table 1.

Table 1: Laboratory Testing Summary

Location	Test Pit No.	Moisture Content Test	Particle Size Analysis (Hydrometer)	Particle Size Analysis (Sieve)
		ASTM D2216	ASTM D422	ASTM C117 & C136
Former alignment, northern section	TP18-08			✓
	TP18-11			✓
	TP18-13			✓
	TP18-16			✓
	TP18-18			✓
	TP18-20			✓
	TP18-21			✓
	TP18-23			✓
Former alignment, southern section	TH18-47	✓		
	TP18-50			✓
	TH18-51	✓		
	TP18-55			✓
	TP18-57			✓
	TP18-61			✓
	TP18-67			✓
	TP18-71			✓
	TH18-45	✓		
	TP18-84			✓
	TP18-85		✓	
TP18-87		✓		
Current alignment, northbound shoulder	TP18-26		✓	
	TP18-27			✓
	TP18-28			✓
	TP18-32			✓
	TP18-36			✓
	TP18-41			✓
	TP18-44			✓
Current alignment, southbound shoulder	TP18-74			✓
	TP18-76	✓		
	TP18-77		✓	
	TP18-78			✓
	TP18-92			✓
	TP18-97		✓	
Totals		4	5	24

Laboratory test results were used for soil classification. The results are presented on the test pit logs in Appendix B and are also provided in Appendix C.

4.0 SOIL CONDITIONS

4.1 Former Alaska Highway Alignment

The soil stratigraphy encountered within test pits along the former highway alignment consisted of the following:

- BST surfacing, 0.05 m to 0.1 m thick where present;
- Gravel / Sand fill:
 - Northern Former Alignment: about 0.26 m thick on average;
 - Southern Former Alignment: about 0.46 m thick on average; and
- Clay / Silt fill for the remaining depth of the test pits, typically between 1.5 m and 2.6 m.

Moisture contents of soil samples collected from the test pits ranged from 8% to 21% by weight. Compactness was typically observed to increase with depth. Bedrock was not encountered. No discernable groundwater table was observed in the test pits along the former highway alignment.

4.2 Current Alaska Highway Alignment Shoulders

The soil stratigraphy within test pits conducted along the current Alaska Highway alignment shoulders consisted of the following:

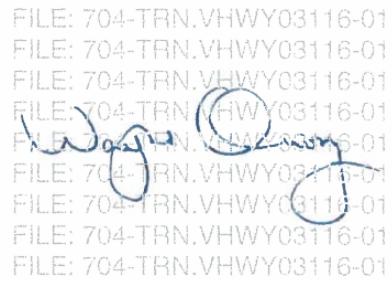
- Topsoil, 0.1 m to 0.3 m thick;
- Gravel / Sand fill, typically 0.9 m to 1.6 m thick; and,
- Clay / Silt fill for the remaining depth of the test pits, typically between 1.5 m and 2.5 m.

Moisture contents of soil samples collected from the test pits ranged from 3% to 14% by weight. Compactness was typically observed to increase with depth. Bedrock was not encountered. Groundwater was observed at three locations: in TP18-33 at a depth of 1.5 m, in TP18-34 at a depth of 2.0 m, and in TP18-43 at a depth of 1.3 m.

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.



Prepared by:
Chris Longley, M.Eng., P.Eng.
Geotechnical Engineer
Direct Line: 778-945-5734
chris.longley@tetrattech.com

Reviewed by:
Wayne Quong, M.A.Sc., P.Eng.
Senior Geotechnical Engineer
Direct Line: 778-891-9877
wayne.quong@tetrattech.com

CL/WQ

FIGURES

- Figure 1 Test Pit Locations
- Figure 2 Test Pit Locations

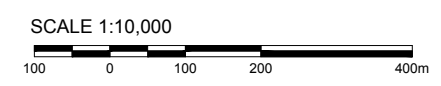


Q:\Vancouver\Drafting\Transportation\HVHWY\TRN.VHWY03116-01 TH PLAN R1.dwg [FIGURE 1] September 25, 2018 - 4:29:07 pm (BY: HALL, ROBERT J)

LEGEND
 ■ Testpit locations
 ● Station markers

NOTES
 1. Imagery from Google Earth Pro, dated Sept 13, 2010.
 2. Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).

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**GEOTECHNICAL INVESTIGATION AND FIELD DATA COLLECTION
 ALASKA HIGHWAY KM 501 TO KM 509**

TESTPIT LOCATIONS

PROJECT NO. TRN.VHWY03116-01	DWN RH	CKD MK	REV 1
OFFICE VANC	DATE September 25, 2018		

Figure 1

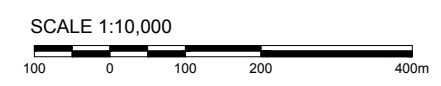


Q:\Vancouver\Drafting\Transportation\TRN.VHWY03116-01 TH PLAN R1.dwg [FIGURE 2] September 25, 2018 - 4:29:11 pm (BY: HALL, ROBERT J)

LEGEND
 ■ Testpit locations
 ● Station markers

NOTES
 1. Imagery from Google Earth Pro, dated Sept 13, 2010.
 2. Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).

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**GEOTECHNICAL INVESTIGATION AND FIELD DATA COLLECTION
 ALASKA HIGHWAY KM 501 TO KM 509**

TESTPIT LOCATIONS

PROJECT NO. TRN.VHWY03116-01	DWN RH	CKD MK	REV 1
OFFICE VANC	DATE September 25, 2018		

Figure 2

APPENDIX A

LIMITATIONS ON THE USE OF THIS DOCUMENT

LIMITATIONS ON USE OF THIS DOCUMENT

GEOTECHNICAL

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1.6 GENERAL LIMITATIONS OF DOCUMENT

This Professional Document is based solely on the conditions presented and the data available to TETRA TECH at the time the data were collected in the field or gathered from available databases.

The Client, and any Authorized Party, acknowledges that the Professional Document is based on limited data and that the conclusions, opinions, and recommendations contained in the Professional Document are the result of the application of professional judgment to such limited data.

The Professional Document is not applicable to any other sites, nor should it be relied upon for types of development other than those to which it refers. Any variation from the site conditions present, or variation in assumed conditions which might form the basis of design or recommendations as outlined in this document, at or on the development proposed as of the date of the Professional Document requires a supplementary exploration, investigation, and assessment.

TETRA TECH is neither qualified to, nor is it making, any recommendations with respect to the purchase, sale, investment or development of the property, the decisions on which are the sole responsibility of the Client.

1.7 ENVIRONMENTAL AND REGULATORY ISSUES

Unless stipulated in the report, TETRA TECH has not been retained to explore, address or consider and has not explored, addressed or considered any environmental or regulatory issues associated with development on the subject site.

1.8 NATURE AND EXACTNESS OF SOIL AND ROCK DESCRIPTIONS

Classification and identification of soils and rocks are based upon commonly accepted systems, methods and standards employed in professional geotechnical practice. This report contains descriptions of the systems and methods used. Where deviations from the system or method prevail, they are specifically mentioned.

Classification and identification of geological units are judgmental in nature as to both type and condition. TETRA TECH does not warrant conditions represented herein as exact, but infers accuracy only to the extent that is common in practice.

Where subsurface conditions encountered during development are different from those described in this report, qualified geotechnical personnel should revisit the site and review recommendations in light of the actual conditions encountered.

1.9 LOGS OF TESTHOLES

The testhole logs are a compilation of conditions and classification of soils and rocks as obtained from field observations and laboratory testing of selected samples. Soil and rock zones have been interpreted. Change from one geological zone to the other, indicated on the logs as a distinct line, can be, in fact, transitional. The extent of transition is interpretive. Any circumstance which requires precise definition of soil or rock zone transition elevations may require further investigation and review.

1.10 STRATIGRAPHIC AND GEOLOGICAL INFORMATION

The stratigraphic and geological information indicated on drawings contained in this report are inferred from logs of test holes and/or soil/rock exposures. Stratigraphy is known only at the locations of the test hole or exposure. Actual geology and stratigraphy between test holes and/or exposures may vary from that shown on these drawings. Natural variations in geological conditions are inherent and are a function of the historical environment. TETRA TECH does not represent the conditions illustrated as exact but recognizes that variations will exist. Where knowledge of more precise locations of geological units is necessary, additional exploration and review may be necessary.

1.11 PROTECTION OF EXPOSED GROUND

Excavation and construction operations expose geological materials to climatic elements (freeze/thaw, wet/dry) and/or mechanical disturbance which can cause severe deterioration. Unless otherwise specifically indicated in this report, the walls and floors of excavations must be protected from the elements, particularly moisture, desiccation, frost action and construction traffic.

1.12 SUPPORT OF ADJACENT GROUND AND STRUCTURES

Unless otherwise specifically advised, support of ground and structures adjacent to the anticipated construction and preservation of adjacent ground and structures from the adverse impact of construction activity is required.

1.13 INFLUENCE OF CONSTRUCTION ACTIVITY

Construction activity can impact structural performance of adjacent buildings and other installations. The influence of all anticipated construction activities should be considered by the contractor, owner, architect and prime engineer in consultation with a geotechnical engineer when the final design and construction techniques, and construction sequence are known.

1.14 OBSERVATIONS DURING CONSTRUCTION

Because of the nature of geological deposits, the judgmental nature of geotechnical engineering, and the potential of adverse circumstances arising from construction activity, observations during site preparation, excavation and construction should be carried out by a geotechnical engineer. These observations may then serve as the basis for confirmation and/or alteration of geotechnical recommendations or design guidelines presented herein.

1.15 DRAINAGE SYSTEMS

Where temporary or permanent drainage systems are installed within or around a structure, the systems which will be installed must protect the structure from loss of ground due to internal erosion and must be designed so as to assure continued satisfactory performance of the drains. Specific design detail of such systems should be developed or reviewed by the geotechnical engineer. Unless otherwise specified, it is a condition of this report that effective temporary and permanent drainage systems are required and that they must be considered in relation to project purpose and function.

1.16 DESIGN PARAMETERS

Bearing capacities for Limit States or Allowable Stress Design, strength/stiffness properties and similar geotechnical design parameters quoted in this report relate to a specific soil or rock type and condition. Construction activity and environmental circumstances can materially change the condition of soil or rock. The elevation at which a soil or rock type occurs is variable. It is a requirement of this report that structural elements be founded in and/or upon geological materials of the type and in the condition used in this report. Sufficient observations should be made by qualified geotechnical personnel during construction to assure that the soil and/or rock conditions considered in this report in fact exist at the site.

1.17 SAMPLES

TETRA TECH will retain all soil and rock samples for 30 days after this report is issued. Further storage or transfer of samples can be made at the Client's expense upon written request, otherwise samples will be discarded.

1.18 APPLICABLE CODES, STANDARDS, GUIDELINES & BEST PRACTICE

This document has been prepared based on the applicable codes, standards, guidelines or best practice as identified in the report. Some mandated codes, standards and guidelines (such as ASTM, AASHTO Bridge Design/Construction Codes, Canadian Highway Bridge Design Code, National/Provincial Building Codes) are routinely updated and corrections made. TETRA TECH cannot predict nor be held liable for any such future changes, amendments, errors or omissions in these documents that may have a bearing on the assessment, design or analyses included in this report.

APPENDIX B

TEST PIT LOGS



Public Works and
Government Services
Canada

Testpit No: TP18-01

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 478.5 m

Fort Nelson, BC

UTM: 476041.4 E; 6526098.8 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Moisture Content (%)	Elevation (m)
0				Plastic Limit: 20 Moisture Content: 40 Liquid Limit: 80	
0 to 2	Excavator	ASPHALT CLAY, silty, trace sand, damp, very stiff, high plastic, dark grey.			478 to 474
2 to 5		End of testpit at 2.0 m (target depth reached). - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).			476 to 474



Contractor: North Country Maintenance Inc.

Completion Depth: 2 m

Drilling Rig Type:

Start Date: June 25, 2018

Logged By: OB

Completion Date: June 25, 2018

Reviewed By: KJ

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Public Works and
Government Services
Canada

Testpit No: TP18-02

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 486.1 m

Fort Nelson, BC

UTM: 475896.3 E; 6526068.5 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Moisture Content (%)	Elevation (m)
0		ASPHALT CLAY, silty, trace sand, damp, very stiff, high plastic, dark grey.			486
1	Excavator				485
2		End of testpit at 2.0 m (target depth reached). - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).			484
3					483
4					482
5					



Contractor: North Country Maintenance Inc.

Completion Depth: 2 m

Drilling Rig Type:

Start Date: June 25, 2018

Logged By: OB

Completion Date: June 25, 2018

Reviewed By: KJ

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Public Works and
Government Services
Canada

Testpit No: TP18-03

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 482.2 m

Fort Nelson, BC

UTM: 475734.4 E; 6526057.3 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Moisture Content (%)	Elevation (m)
				Plastic Limit Moisture Content Liquid Limit 20 40 60 80	
0		ASPHALT			482
0 - 2	Excavator	CLAY, silty, trace sand, damp, very stiff, high plastic, dark grey.			481
2		End of testpit at 2.0 m (target depth reached). - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).			480
3					479
4					478
5					



Contractor: North Country Maintenance Inc.

Completion Depth: 2 m

Drilling Rig Type:

Start Date: June 25, 2018

Logged By: OB

Completion Date: June 25, 2018

Reviewed By: KJ

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Public Works and
Government Services
Canada

Testpit No: TP18-04

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 480.4 m

Fort Nelson, BC

UTM: 475605.7 E; 6526054.3 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Moisture Content (%)	Elevation (m)
0				Plastic Limit: 20 Moisture Content: 40 Liquid Limit: 80	
0 to 2.0	Excavator	ASPHALT CLAY, silty, trace sand, damp, very stiff, high plastic, dark grey.			480 to 478
2.0 to 5.0		End of testpit at 2.0 m (target depth reached). - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).			478 to 476



Contractor: North Country Maintenance Inc.

Completion Depth: 2.5 m

Drilling Rig Type:

Start Date: June 25, 2018

Logged By: OB

Completion Date: June 25, 2018

Reviewed By: KJ

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Public Works and
Government Services
Canada

Testpit No: TP18-05

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 475.5 m

Fort Nelson, BC

UTM: 475488.8 E; 6526045.3 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Moisture Content (%)	Elevation (m)
0				Plastic Limit: 20 Moisture Content: 40 Liquid Limit: 80	
0 to 0.8	Excavator	TOPSOIL, gravelly, sandy, with organics, dry, brown. CLAY, silty, some sand, damp, very stiff, high plastic, dark grey.			475.5
0.8 to 2.2	Excavator	- trace sand below 0.8 m.			474
2.2 to 5		End of testpit at 2.2 m (target depth reached). - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).			473
					472
					471



TETRA TECH

Contractor: North Country Maintenance Inc.

Completion Depth: 2.2 m

Drilling Rig Type:

Start Date: June 25, 2018

Logged By: OB

Completion Date: June 25, 2018

Reviewed By: KJ

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Public Works and
Government Services
Canada

Testpit No: TP18-06

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 477.5 m

Fort Nelson, BC

UTM: 475356.1 E; 6526053.3 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Moisture Content (%)	Elevation (m)
0				Plastic Limit: 20 Moisture Content: 40 Liquid Limit: 80	
0 to 2.3	Excavator	<p>TOPSOIL, gravelly, sandy, with organics, dry, brown.</p> <p>CLAY, silty, some sand, damp, very stiff, high plastic, dark grey.</p> <p>- trace sand below 0.7 m.</p>	[Hatched Box]		477 to 475
2.3 to 5		<p>End of testpit at 2.3 m (target depth reached).</p> <ul style="list-style-type: none"> - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit). 			475 to 473



Contractor: North Country Maintenance Inc.

Completion Depth: 2.3 m

Drilling Rig Type:

Start Date: June 25, 2018

Logged By: OB

Completion Date: June 25, 2018

Reviewed By: KJ

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Public Works and
Government Services
Canada

Testpit No: TP18-07

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 487.8 m

Fort Nelson, BC

UTM: 475243.5 E; 6526055.3 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Moisture Content (%)	Elevation (m)
0				Plastic Limit Moisture Content Liquid Limit 20 40 60 80	
0 to 2.3	Excavator	<p>TOPSOIL, gravelly, sandy, with organics, dry, brown.</p> <p>CLAY, silty, some sand, damp, very stiff, high plastic, dark grey.</p> <p>- trace sand below 0.5 m</p>	[Hatched Box]		487 to 485
2.3 to 5		<p>End of testpit at 2.3 m (target depth reached).</p> <ul style="list-style-type: none"> - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit). 			485 to 483



Contractor: North Country Maintenance Inc.

Completion Depth: 2.3 m

Drilling Rig Type:

Start Date: June 25, 2018

Logged By: OB

Completion Date: June 25, 2018

Reviewed By: KJ

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Testpit No: TP18-08

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 485.5 m

Fort Nelson, BC

UTM: 475120.1 E; 6526043.4 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Sample Type	Sample Number	Moisture Content (%)	Plastic Limit	Moisture Content	Liquid Limit	Elevation (m)
0							20	40	80	
0		TOPSOIL, gravelly, sandy, with organics, dry, brown. SILT, some sand, trace gravel, damp, very stiff, medium to high plastic, dark brown. - trace to some gravel below 0.3 m.			1	15				485
1	Excavator									484
2										483
3		End of testpit at 2.6 m (target depth reached). - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).								482
4										481
5										



Contractor: North Country Maintenance Inc.

Completion Depth: 2.6 m

Drilling Rig Type:

Start Date: June 25, 2018

Logged By: OB

Completion Date: June 25, 2018

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Public Works and
Government Services
Canada

Testpit No: TP18-09

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 482.1 m

Fort Nelson, BC

UTM: 475021.3 E; 6526006.9 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Moisture Content (%)	Elevation (m)
0				Plastic Limit Moisture Content Liquid Limit 20 40 60 80	
0 to 1.3	Excavator	TOPSOIL, gravelly, sandy, with organics, dry, brown. CLAY, silty, trace sand, damp, very stiff, high plastic, dark grey. - trace organics below 0.3 m.			482 to 481
1.3 to 5		End of testpit at 1.3 m (target depth reached). - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).			480 to 478



Contractor: North Country Maintenance Inc.

Completion Depth: 1.3 m

Drilling Rig Type:

Start Date: June 25, 2018

Logged By: OB

Completion Date: June 25, 2018

Reviewed By: KJ

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Public Works and
Government Services
Canada

Testpit No: TP18-10

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 486.5 m

Fort Nelson, BC

UTM: 474915.3 E; 6525920.3 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Moisture Content (%)	Elevation (m)
0				Plastic Limit: 20 Moisture Content: 40 Liquid Limit: 80	
0 - 0.1		TOPSOIL, gravelly, sandy, with organics, dry, brown.			486.5
0.1 - 0.2		CLAY (FILL), gravelly, some sand and silt, dry, stiff, dark brown.			486.5
0.2 - 2.3	Excavator	CLAY, silty, trace sand, damp, very stiff, high plastic, dark grey.			486.5 to 484
2.3 - 5		End of testpit at 2.3 m (target depth reached). - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).			484 to 482



Contractor: North Country Maintenance Inc.

Completion Depth: 2.3 m

Drilling Rig Type:

Start Date: June 25, 2018

Logged By: OB

Completion Date: June 25, 2018

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Public Works and
Government Services
Canada

Testpit No: TP18-11

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 482.9 m

Fort Nelson, BC

UTM: 474824.2 E; 6525839 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Sample Type	Sample Number	Moisture Content (%)	Plastic Limit	Moisture Content	Liquid Limit	Elevation (m)
0							20	40	80	
0		TOPSOIL, gravelly, sandy, with organics, dry, brown. GRAVEL and SAND (FILL), some silt, trace clay, dry, compact, dark brown; fine to coarse subangular to subrounded gravel; fine to coarse sand. CLAY, silty, trace sand, damp, very stiff, high plastic, dark grey.			1	8.7				482
1	Excavator									481
2										480
3		End of testpit at 2.5 m (target depth reached). - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).								479
4										478
5										



Contractor: North Country Maintenance Inc.

Completion Depth: 2.5 m

Drilling Rig Type:

Start Date: June 25, 2018

Logged By: OB

Completion Date: June 25, 2018

Reviewed By: KJ

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Public Works and
Government Services
Canada

Testpit No: TP18-12

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 481.1 m

Fort Nelson, BC

UTM: 474739.2 E; 6525761.1 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Moisture Content (%)	Elevation (m)
				Plastic Limit Moisture Content Liquid Limit 20 40 60 80	
0		TOPSOIL, gravelly, sandy, with organics, dry, brown.			481
0.5		GRAVEL and SAND (FILL), some silt, trace clay, dry, compact, dark brown; fine to coarse subangular to subrounded gravel; fine to coarse sand.			
1	Excavator	CLAY, silty, trace sand, damp, very stiff, high plastic, dark grey.			480
2					479
3		End of testpit at 2.3 m (target depth reached). - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).			478
4					477
5					



Contractor: North Country Maintenance Inc.

Completion Depth: 2.3 m

Drilling Rig Type:

Start Date: June 25, 2018

Logged By: OB

Completion Date: June 25, 2018

Reviewed By: KJ

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Testpit No: TP18-13

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 482.5 m

Fort Nelson, BC

UTM: 474670.6 E; 6525710.3 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Sample Type	Sample Number	Moisture Content (%)	Plastic Limit	Moisture Content	Liquid Limit	Elevation (m)
0							20	40	60	80
0	Excavator	<p>TOPSOIL, gravelly, sandy, with organics, dry, brown.</p> <p>GRAVEL (FILL), sandy, silty, dry, compact, dark brown; fine to coarse angular to subangular gravel.</p> <p>CLAY, silty, trace sand, damp, very stiff, high plastic, dark grey.</p>			1	14.1				482
1										481
2		<p>End of testpit at 1.1 m (target depth reached).</p> <ul style="list-style-type: none"> - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit). 								480
3										479
4										478
5										



Contractor: North Country Maintenance Inc.

Completion Depth: 1.1 m

Drilling Rig Type:

Start Date: June 25, 2018

Logged By: OB

Completion Date: June 25, 2018

Reviewed By: KJ

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Public Works and
Government Services
Canada

Testpit No: TP18-14

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 481.8 m

Fort Nelson, BC

UTM: 474558.2 E; 6525673.7 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Moisture Content (%)	Elevation (m)
0				Plastic Limit: 20 Moisture Content: 40 Liquid Limit: 80	
0 to 0.2		TOPSOIL, gravelly, sandy, with organics, dry, brown.			481
0.2 to 0.5		GRAVEL and SAND (FILL), some silt, some clay, dry, compact, dark brown; fine to coarse subangular to subrounded gravel; fine to coarse sand.			
0.5 to 2.4	Excavator	CLAY, silty, trace sand, damp, very stiff, high plastic, dark grey.			480
2.4 to 5.0		End of testpit at 2.4 m (target depth reached). - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).			479 478 477



Contractor: North Country Maintenance Inc.

Completion Depth: 2.4 m

Drilling Rig Type:

Start Date: June 25, 2018

Logged By: OB

Completion Date: June 25, 2018

Reviewed By: KJ

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Public Works and
Government Services
Canada

Testpit No: TP18-15

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 518.2 m

Fort Nelson, BC

UTM: 474462.4 E; 6525688.1 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Moisture Content (%)	Elevation (m)
0				Plastic Limit: 20 Moisture Content: 40 Liquid Limit: 80	
0 to 0.2		TOPSOIL, gravelly, sandy, with organics, dry, brown.			518
0.2 to 0.5		GRAVEL and SAND (FILL), some silt, trace clay, dry, compact, dark brown; fine to coarse subangular to subrounded gravel; fine to coarse sand.			
0.5 to 2.5	Excavator	CLAY, silty, trace sand, damp, very stiff, high plastic, dark grey.			517 to 516
2.5 to 5		End of testpit at 2.5 m (target depth reached). - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).			515 to 514



Contractor: North Country Maintenance Inc.

Completion Depth: 2.5 m

Drilling Rig Type:

Start Date: June 26, 2018

Logged By: OB

Completion Date: June 26, 2018

Reviewed By: KJ

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Testpit No: TP18-16

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 460 m

Fort Nelson, BC

UTM: 474350 E; 6525659.4 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Sample Type	Sample Number	Moisture Content (%)	Plastic Limit	Moisture Content	Liquid Limit	Elevation (m)	
0							20	40	60	80	460
0		TOPSOIL, gravelly, sandy, with organics, dry, brown. GRAVEL and SAND (FILL), some silt, dry, compact, dark brown; fine to coarse subangular to subrounded gravel; fine to coarse sand. CLAY, silty, trace sand, damp, stiff, high plastic, dark grey.			1	9.3				460	
1	Excavator	- very stiff below 1.5 m.								459	
2										458	
3		End of testpit at 2.5 m (target depth reached). - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).								457	
4										456	
5										455	



Contractor: North Country Maintenance Inc.

Completion Depth: 2.5 m

Drilling Rig Type:

Start Date: June 26, 2018

Logged By: OB

Completion Date: June 26, 2018

Reviewed By: KJ

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Public Works and
Government Services
Canada

Testpit No: TP18-17

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 468.1 m

Fort Nelson, BC

UTM: 474242.2 E; 6525653.1 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Moisture Content (%)	Elevation (m)
				Plastic Limit Moisture Content Liquid Limit 20 40 60 80	
0		TOPSOIL, gravelly, sandy, with organics, dry, brown.			468
	Excavator	GRAVEL and SAND (FILL), some silt, trace clay, dry, compact, dark brown; fine to coarse subangular to subrounded gravel; fine to coarse sand.			
		CLAY, silty, trace sand, damp, very stiff, high plastic, dark grey.			
1					467
2		End of testpit at 2.1 m (target depth reached). - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).			466
3					465
4					464
5					



Contractor: North Country Maintenance Inc.

Completion Depth: 2.1 m

Drilling Rig Type:

Start Date: June 26, 2018

Logged By: OB

Completion Date: June 26, 2018

Reviewed By: KJ

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Public Works and
Government Services
Canada

Testpit No: TP18-18

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 471.6 m

Fort Nelson, BC

UTM: 474120.5 E; 6525660.9 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Sample Type	Sample Number	Moisture Content (%)	Plastic Limit	Moisture Content	Liquid Limit	Elevation (m)
0							20	40	60	80
0		TOPSOIL, gravelly, sandy, with organics, dry, brown. SAND (FILL), gravelly, some silt, dry, compact, dark brown; fine to coarse sand.			1	8.9				471
1	Excavator	CLAY, silty, trace sand, damp, very stiff, high plastic, dark grey.								470
2										469
3		End of testpit at 2.2 m (target depth reached). - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).								468
4										467
5										467



Contractor: North Country Maintenance Inc.

Completion Depth: 2.2 m

Drilling Rig Type:

Start Date: June 26, 2018

Logged By: OB

Completion Date: June 26, 2018

Reviewed By: KJ

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Public Works and
Government Services
Canada

Testpit No: TP18-19

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 471.8 m

Fort Nelson, BC

UTM: 473990.5 E; 6525679.8 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Moisture Content (%)	Elevation (m)
0				Plastic Limit: 20 Moisture Content: 40 Liquid Limit: 80	
0 to 0.2		TOPSOIL, gravelly, sandy, with organics, dry, brown.			471.8
0.2 to 0.8		GRAVEL and SAND (FILL), some silt, dry, compact, dark brown; fine to coarse subangular to subrounded gravel; fine to coarse sand.			471.8
0.8 to 2.2	Excavator	CLAY, silty, trace sand, damp, very stiff, high plastic, dark grey.			471.8 to 467.0
2.2 to 5.0		End of testpit at 2.2 m (target depth reached). - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).			469.0 to 467.0



TETRA TECH

Contractor: North Country Maintenance Inc.

Completion Depth: 2.2 m

Drilling Rig Type:

Start Date: June 26, 2018

Logged By: OB

Completion Date: June 26, 2018

Reviewed By: KJ

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Public Works and
Government Services
Canada

Testpit No: TP18-20

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 465.2 m

Fort Nelson, BC

UTM: 473796.6 E; 6525700 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Sample Type	Sample Number	Moisture Content (%)	Plastic Limit Moisture Content Liquid Limit	Elevation (m)
0								
0 to 2.2	Excavator	<p>TOPSOIL, gravelly, sandy, with organics, dry, brown.</p> <p>ASPHALT</p> <p>GRAVEL and SAND (FILL), some silt, trace clay, dry, compact, dark brown; fine to coarse subangular to subrounded gravel; fine to coarse sand.</p> <p>CLAY, silty, trace sand, damp, very stiff, high plastic, dark grey.</p>			1	8.4		465
2.2		<p>End of testpit at 2.2 m (target depth reached).</p> <ul style="list-style-type: none"> - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit). 						463
3								462
4								461
5								



TETRA TECH

Contractor: North Country Maintenance Inc.

Completion Depth: 2.2 m

Drilling Rig Type:

Start Date: June 26, 2018

Logged By: OB

Completion Date: June 26, 2018

Reviewed By: KJ

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Testpit No: TP18-21

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 464.3 m

Fort Nelson, BC

UTM: 473710 E; 6525676.1 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Sample Type	Sample Number	Moisture Content (%)	Plastic Limit	Moisture Content	Liquid Limit	Elevation (m)
0										
0 to 2.1	Excavator	<p>TOPSOIL, gravelly, sandy, with organics, dry, brown.</p> <p>ASPHALT</p> <p>GRAVEL and SAND (FILL), some silt, trace clay, dry, compact, dark brown; fine to coarse subangular to subrounded gravel; fine to coarse sand.</p> <p>CLAY, silty, trace sand, damp, very stiff, high plastic, dark grey.</p>			1	5				464
2.1 to 5		<p>End of testpit at 2.1 m (target depth reached).</p> <ul style="list-style-type: none"> - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit). 								462



Contractor: North Country Maintenance Inc.

Completion Depth: 2.1 m

Drilling Rig Type:

Start Date: June 26, 2018

Logged By: OB

Completion Date: June 26, 2018

Reviewed By: KJ

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Public Works and
Government Services
Canada

Testpit No: TP18-22

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 461.9 m

Fort Nelson, BC

UTM: 473636.4 E; 6525547.7 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Moisture Content (%)	Elevation (m)
0				Plastic Limit: 20 Moisture Content: 40 Liquid Limit: 80	
0 - 0.1		TOPSOIL, gravelly, sandy, with organics, dry, brown.			
0.1 - 0.2		ASPHALT			
0.2 - 0.9		GRAVEL and SAND (FILL), some silt, dry, compact, dark brown; fine to coarse subangular to subrounded gravel; fine to coarse sand.			
0.9 - 2.1	Excavator	CLAY, silty, trace sand, damp, very stiff, high plastic, dark grey.			461
2.1 - 2.2		End of testpit at 2.1 m (target depth reached).			460
2.2 - 3.0		<ul style="list-style-type: none"> - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit). 			459
3.0 - 4.0					458
4.0 - 5.0					457



Contractor: North Country Maintenance Inc.

Completion Depth: 2.1 m

Drilling Rig Type:

Start Date: June 26, 2018

Logged By: OB

Completion Date: June 26, 2018

Reviewed By: KJ

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Testpit No: TP18-23

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 461.8 m

Fort Nelson, BC

UTM: 473628.9 E; 6525380.6 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Sample Type	Sample Number	Moisture Content (%)	Plastic Limit	Moisture Content	Liquid Limit	Elevation (m)
0							20	40	60	80
0	Excavator	<p>TOPSOIL, gravelly, sandy, with organics, dry, brown.</p> <p>GRAVEL and SAND (FILL), some silt, trace clay, dry, compact, dark brown; fine to coarse subangular to subrounded gravel; fine to coarse sand.</p> <p>CLAY, silty, some sand, damp, very stiff, high plastic, dark grey.</p> <p>- trace sand below 0.5 m.</p>			1	14.1				461
1										460
2										459
3		<p>End of testpit at 2.1 m (target depth reached).</p> <ul style="list-style-type: none"> - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit). 								458
4										457
5										



TETRA TECH

Contractor: North Country Maintenance Inc.

Completion Depth: 2.1 m

Drilling Rig Type:

Start Date: June 26, 2018

Logged By: OB

Completion Date: June 26, 2018

Reviewed By: KJ

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Public Works and
Government Services
Canada

Testpit No: TP18-24

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 459.2 m

Fort Nelson, BC

UTM: 473715.5 E; 6525044.2 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Moisture Content (%)	Elevation (m)
0				Plastic Limit: 20 Moisture Content: 40 Liquid Limit: 80	
0 to 2.1	Excavator	TOPSOIL, gravelly, sandy, with organics, dry, brown. GRAVEL and SAND (FILL), some silt, trace organics, dry, compact, dark brown; fine to coarse subangular to subrounded gravel; fine to coarse sand. CLAY, silty, some sand, damp, very stiff, high plastic, dark grey. - trace sand below 0.5 m.			459 to 457
2.1 to 5		End of testpit at 2.1 m (target depth reached). - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).			457 to 455



Contractor: North Country Maintenance Inc.

Completion Depth: 2.1 m

Drilling Rig Type:

Start Date: June 26, 2018

Logged By: OB

Completion Date: June 26, 2018

Reviewed By: KJ

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Public Works and
Government Services
Canada

Testpit No: TP18-25

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 457.8 m

Fort Nelson, BC

UTM: 473671.7 E; 6525197 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Moisture Content (%)	Elevation (m)
0				Plastic Limit: 20 Moisture Content: 40 Liquid Limit: 80	
0 to 2.1	Excavator	<p>TOPSOIL, gravelly, sandy, with organics, dry, brown.</p> <p>GRAVEL and SAND (FILL), some silt, trace clay, dry, compact, dark brown; fine to coarse subangular to subrounded gravel; fine to coarse sand.</p> <p>CLAY, silty, some sand, damp, very stiff, high plastic, dark grey.</p> <p>- trace sand below 0.5 m.</p>			457.8 to 455.0
2.1 to 5.0		<p>End of testpit at 2.1 m (target depth reached).</p> <ul style="list-style-type: none"> - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit). 			455.0 to 453.0



Contractor: North Country Maintenance Inc.

Completion Depth: 2.1 m

Drilling Rig Type:

Start Date: June 26, 2018

Logged By: OB

Completion Date: June 26, 2018

Reviewed By: KJ

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Public Works and
Government Services
Canada

Testpit No: TP18-26R 501+255

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 475.8 m

Fort Nelson, BC

UTM: 476065.8 E; 6526084.1 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Sample Type	Sample Number	Moisture Content (%)	Plastic Limit Moisture Content Liquid Limit	Elevation (m)
0								
0 - 1	Excavator	GRAVEL and SAND (FILL), some silt, trace clay, occasional shale fragments, dry, compact, dark brown; fine to coarse subangular to subrounded gravel; fine to coarse sand; shale fragments platy, up to 50 mm in diameter. ----- CLAY, silty, trace sand, damp, very stiff, high plastic, dark grey.			1	10.2		475
1 - 2		End of testpit at 1.5 m (target depth reached). - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).						474
2 - 3								473
3 - 4								472
4 - 5								471



Contractor: North Country Maintenance Inc.

Completion Depth: 1.5 m

Drilling Rig Type:

Start Date: June 26, 2018

Logged By: OB

Completion Date: June 26, 2018

Reviewed By: KJ

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Public Works and
Government Services
Canada

Testpit No: TP18-27R 501+665

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 466.7 m

Fort Nelson, BC

UTM: 475738.1 E; 6525836.7 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Sample Type	Sample Number	Moisture Content (%)	Plastic Limit Moisture Content Liquid Limit	Elevation (m)
0								
0	Excavator	GRAVEL and SAND (FILL), some organics, dry, brown.						
0.5		GRAVEL and SAND (FILL), some silt, trace clay, occasional shale fragments, dry, compact, dark brown; fine to coarse subangular to subrounded gravel; fine to coarse sand; shale fragments platy, up to 50 mm in diameter.		1	13.6	●		466
1		CLAY, silty, trace sand, damp, very stiff, high plastic, dark grey.						465
2		End of testpit at 2.0 m (target depth reached). - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).						464
3								463
4								462
5								



TETRA TECH

Contractor: North Country Maintenance Inc.

Completion Depth: 2 m

Drilling Rig Type:

Start Date: June 26, 2018

Logged By: OB

Completion Date: June 26, 2018

Reviewed By: KJ

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Public Works and
Government Services
Canada

Testpit No: TP18-28R 502+088

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 458.8 m

Fort Nelson, BC

UTM: 475457.6 E; 6525520.9 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Sample Type	Sample Number	Moisture Content (%)	Plastic Limit Moisture Content Liquid Limit	Elevation (m)
0								
0 to 1.8	Excavator	<p>SAND (FILL), gravelly, some silt, dry, compact, dark brown; fine to coarse sand.</p> <p>- some cobbles below 0.2 m; up to 150 mm in diameter.</p> <p>CLAY, silty, trace sand, damp, very stiff, high plastic, dark grey.</p>			1	11.2		458
1.8 to 5		<p>End of testpit at 1.8 m (target depth reached).</p> <p>- Upon completion, testhole was backfilled to surface with excavated material.</p> <p>- Soil description is based on visual assessment.</p> <p>- Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement.</p> <p>- Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).</p>						457 456 455 454



TETRA TECH

Contractor: North Country Maintenance Inc.

Completion Depth: 1.8 m

Drilling Rig Type:

Start Date: June 26, 2018

Logged By: OB

Completion Date: June 26, 2018

Reviewed By: KJ

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Public Works and
Government Services
Canada

Testpit No: TP18-29R 502+553

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 455.6 m

Fort Nelson, BC

UTM: 475158.4 E; 6525163.9 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Moisture Content (%)	Elevation (m)
0				Plastic Limit: 20 Moisture Content: 40 Liquid Limit: 80	
0 - 0.5	Excavator	GRAVEL and SAND (FILL), some silt, trace clay, dry, compact, dark brown; fine to coarse subangular to subrounded gravel; fine to coarse sand.			455.6
0.5 - 2.0		CLAY, silty, trace sand, damp, very stiff, high plastic, dark grey.			455.0
2.0		End of testpit at 2.0 m (target depth reached). - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).			453.0
3.0					452.0
4.0					451.0
5.0					



TETRA TECH

Contractor: North Country Maintenance Inc.

Completion Depth: 2 m

Drilling Rig Type:

Start Date: June 26, 2018

Logged By: OB

Completion Date: June 26, 2018

Reviewed By: KJ

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Public Works and
Government Services
Canada

Testpit No: TP18-30R 502+943

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 456.9 m

Fort Nelson, BC

UTM: 474904.7 E; 6524866.1 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Moisture Content (%)	Elevation (m)
0				Plastic Limit: 20 Moisture Content: 40 Liquid Limit: 80	
0 - 0.5	Excavator	GRAVEL and SAND (FILL), some silt, trace clay, dry, compact, dark brown; fine to coarse subangular to subrounded gravel; fine to coarse sand.			
0.5 - 2.0		CLAY, silty, trace sand, damp, very stiff, high plastic, dark grey.			456
2.0		End of testpit at 2.0 m (target depth reached). - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).			455
3.0					454
4.0					453
5.0					452



Contractor: North Country Maintenance Inc.

Completion Depth: 2 m

Drilling Rig Type:

Start Date: June 26, 2018

Logged By: OB

Completion Date: June 26, 2018

Reviewed By: KJ

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Public Works and
Government Services
Canada

Testpit No: TP18-31R 503+366

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 455.4 m

Fort Nelson, BC

UTM: 474634.7 E; 6524543.3 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Moisture Content (%)	Elevation (m)
0				Plastic Limit: 20 Moisture Content: 40 Liquid Limit: 80	
0 to 1.9	Excavator	GRAVEL and SAND (FILL), some silt, trace clay, dry, compact, dark brown; fine to coarse subangular to subrounded gravel; fine to coarse sand. CLAY, silty, trace sand, damp, very stiff, high plastic, dark grey.			455 to 451
1.9 to 5		End of testpit at 1.9 m (target depth reached). - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).			



TETRA TECH

Contractor: North Country Maintenance Inc.

Completion Depth: 1.9 m

Drilling Rig Type:

Start Date: June 27, 2018

Logged By: OB

Completion Date: June 27, 2018

Reviewed By: KJ

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Public Works and
Government Services
Canada

Testpit No: TP18-32R 503+806

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 454.6 m

Fort Nelson, BC

UTM: 474350.1 E; 6524207 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Sample Type	Sample Number	Moisture Content (%)	Plastic Limit	Moisture Content	Liquid Limit	Elevation (m)
0							20	40	60	80
0	Excavator	GRAVEL and SAND (FILL), some silt, trace clay, dry, compact, dark brown; fine to coarse subangular to subrounded gravel; fine to coarse sand. CLAY, silty, trace sand, damp, very stiff, high plastic, dark grey.			1	3				454
1										453
2										452
3		End of testpit at 2.1 m (target depth reached). - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).								451
4										450
5										



TETRA TECH

Contractor: North Country Maintenance Inc.

Completion Depth: 2.1 m

Drilling Rig Type:

Start Date: June 27, 2018

Logged By: OB

Completion Date: June 27, 2018

Reviewed By: KJ

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Public Works and
Government Services
Canada

Testpit No: TP18-33R 504+220

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 451.9 m

Fort Nelson, BC

UTM: 474080.7 E; 6523890.9 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Moisture Content (%)	Elevation (m)
0				Plastic Limit: 20 Moisture Content: 40 Liquid Limit: 80	
0 to 1	Excavator	GRAVEL and SAND (FILL), some silt, trace clay, trace organics, dry, compact, dark brown; fine to coarse subangular to subrounded gravel; fine to coarse sand. - no organics below 0.3 m.			451
1 to 1.5	Excavator	CLAY, silty, damp, very stiff, high plastic, dark grey.			450
1.5 to 5		End of testpit at 1.5 m (target depth reached). - Water table observed at 1.5 m. - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).			449, 448, 447



TETRA TECH

Contractor: North Country Maintenance Inc.

Completion Depth: 1.5 m

Drilling Rig Type:

Start Date: June 27, 2018

Logged By: OB

Completion Date: June 27, 2018

Reviewed By: KJ

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Public Works and
Government Services
Canada

Testpit No: TP18-34R 504+624

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 445.6 m

Fort Nelson, BC

UTM: 473847.8 E; 6523563 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Moisture Content (%)	Elevation (m)
0				Plastic Limit: 20 Moisture Content: 40 Liquid Limit: 80	
0 to 2	Excavator	GRAVEL and SAND (FILL), clayey, some organics, dry, compact, dark brown; fine to coarse subangular to subrounded gravel. CLAY, some gravel, dry, hard, high plastic, brown.			445 to 443
2		End of testpit at 2.0 m (target depth reached). - Water table observed at 2.0 m. - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).			443
3					442
4					441
5					



TETRA TECH

Contractor: North Country Maintenance Inc.

Completion Depth: 2 m

Drilling Rig Type:

Start Date: June 27, 2018

Logged By: OB

Completion Date: June 27, 2018

Reviewed By: KJ

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Public Works and
Government Services
Canada

Testpit No: TP18-35R 505+032

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 441.8 m

Fort Nelson, BC

UTM: 473643.3 E; 6523208.5 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Moisture Content (%)	Elevation (m)
0				Plastic Limit: 20 Moisture Content: 40 Liquid Limit: 80	
0 to 2.2	Excavator	GRAVEL and SAND (FILL), some silt, trace clay, trace organics, dry, compact, dark brown; fine to coarse subangular to subrounded gravel; fine to coarse sand. CLAY, silty, trace sand, damp, very stiff, high plastic, dark grey.			441 to 437
2.2 to 5		End of testpit at 2.2 m (target depth reached). - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).			



TETRA TECH

Contractor: North Country Maintenance Inc.

Completion Depth: 2.2 m

Drilling Rig Type:

Start Date: June 27, 2018

Logged By: OB

Completion Date: June 27, 2018

Reviewed By: KJ

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Public Works and
Government Services
Canada

Testpit No: TP18-36R 505+458

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 436.8 m

Fort Nelson, BC

UTM: 473427.4 E; 6522843 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Sample Type	Sample Number	Moisture Content (%)	Plastic Limit	Moisture Content	Liquid Limit	Elevation (m)
0							20	40	60	80
0	Excavator	GRAVEL (FILL), some sand, some silt, trace organics, dry, compact, dark brown; fine to coarse subangular to subrounded gravel. no organics below 0.2 m.			1	3.7				436
1		CLAY, silty, trace sand, damp, very stiff, high plastic, dark grey.								
2										435
3		End of testpit at 2.2 m (target depth reached). - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).								434
4										433
5										432



TETRA TECH

Contractor: North Country Maintenance Inc.

Completion Depth: 2.2 m

Drilling Rig Type:

Start Date: June 27, 2018

Logged By: OB

Completion Date: June 27, 2018

Reviewed By: KJ

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Public Works and
Government Services
Canada

Testpit No: TP18-37R 505+866

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 434.5 m

Fort Nelson, BC

UTM: 473180.3 E; 6522524.9 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Moisture Content (%)	Elevation (m)
0				Plastic Limit: 20 Moisture Content: 40 Liquid Limit: 80	
0 to 0.25	Excavator	GRAVEL and SAND (FILL), some silt, trace organics, dry, compact, dark brown; fine to coarse subangular to subrounded gravel; fine to coarse sand. - no organics below 0.25 m.			434
0.25 to 2.1		CLAY, silty, trace sand, damp, very stiff, high plastic, dark grey.			433
2.1 to 5		End of testpit at 2.1 m (target depth reached). - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).			432 431 430



TETRA TECH

Contractor: North Country Maintenance Inc.

Completion Depth: 2.1 m

Drilling Rig Type:

Start Date: June 27, 2018

Logged By: OB

Completion Date: June 27, 2018

Reviewed By: KJ

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Public Works and
Government Services
Canada

Testpit No: TP18-38R 506+275

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 432.5 m

Fort Nelson, BC

UTM: 472817.4 E; 6522343.3 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Moisture Content (%)	Elevation (m)
0				Plastic Limit: 20 Moisture Content: 40 Liquid Limit: 80	
0 to 2.1	Excavator	GRAVEL and SAND (FILL), some silt, trace organics, dry, compact, dark brown; fine to coarse subangular to subrounded gravel; fine to coarse sand. - no organics below 0.2 m. - broken shale fragments observed below 0.4 m; up to 20 mm in diameter.			432 to 430
2.1 to 5		End of testpit at 2.1 m (target depth reached). - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).			430 to 428



TETRA TECH

Contractor: North Country Maintenance Inc.

Completion Depth: 2.1 m

Drilling Rig Type:

Start Date: June 27, 2018

Logged By: OB

Completion Date: June 27, 2018

Reviewed By: KJ

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Public Works and
Government Services
Canada

Testpit No: TP18-39R 506+691

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 425.1 m

Fort Nelson, BC

UTM: 472425.9 E; 6522211.6 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Moisture Content (%)	Elevation (m)
				Plastic Limit Moisture Content Liquid Limit 20 40 60 80	
0					425
1	Excavator	GRAVEL and SAND (FILL), some silt, trace organics, dry, compact, dark brown; fine to coarse subangular to subrounded gravel; fine to coarse sand. - no organics below 0.2 m.			424
2		End of testpit at 1.9 m (target depth reached). - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).			423
3					422
4					421
5					



Contractor: North Country Maintenance Inc.

Completion Depth: 1.9 m

Drilling Rig Type:

Start Date: June 27, 2018

Logged By: OB

Completion Date: June 27, 2018

Reviewed By: KJ

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Public Works and
Government Services
Canada

Testpit No: TP18-40R 507+130

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 422.9 m

Fort Nelson, BC

UTM: 471990 E; 6522233.5 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Moisture Content (%)	Elevation (m)
0				Plastic Limit: 20 Moisture Content: 40 Liquid Limit: 80	
0 to 1.9	Excavator	GRAVEL and SAND (FILL), silty, clayey, some organics, dry, compact, brown; fine to coarse subangular to subrounded gravel. - trace to no organics below 0.2 m.	[Cross-hatched pattern]		422.9 to 421.0
1.9 to 5.0		End of testpit at 1.9 m (target depth reached). - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).			421.0 to 418.0



Contractor: North Country Maintenance Inc.

Completion Depth: 1.9 m

Drilling Rig Type:

Start Date: June 27, 2018

Logged By: OB

Completion Date: June 27, 2018

Reviewed By: KJ

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Public Works and
Government Services
Canada

Testpit No: TP18-41R 507+562

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 425.7 m

Fort Nelson, BC

UTM: 471558.7 E; 6522271.3 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Sample Type	Sample Number	Moisture Content (%)	Plastic Limit	Moisture Content	Liquid Limit	Elevation (m)
0	Excavator	GRAVEL and SAND (FILL), silty, clayey, some organics, dry, compact, brown; fine to coarse subangular to subrounded gravel. - trace to no organics below 0.15 m.			1	3	20	40	80	425.7
2		End of testpit at 2.0 m (target depth reached). - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).								423
3										422
4										421
5										



TETRA TECH

Contractor: North Country Maintenance Inc.

Completion Depth: 2 m

Drilling Rig Type:

Start Date: June 27, 2018

Logged By: OB

Completion Date: June 27, 2018

Reviewed By: KJ

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Public Works and
Government Services
Canada

Testpit No: TP18-42R 507+972

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 436.5 m

Fort Nelson, BC

UTM: 471191.1 E; 6522096.7 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Moisture Content (%)	Elevation (m)
0				Plastic Limit: 20 Moisture Content: 40 Liquid Limit: 80	
0 - 0.5	Excavator	GRAVEL and SAND (FILL), some silt, trace clay, dry, compact, dark brown; fine to coarse subangular to subrounded gravel; fine to coarse sand.			436
0.5 - 2.0		CLAY, silty, trace sand, damp, very stiff, high plastic, dark grey.			435
2.0		End of testpit at 2.0 m (target depth reached). - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).			434
3					433
4					432
5					



Contractor: North Country Maintenance Inc.

Completion Depth: 2 m

Drilling Rig Type:

Start Date: June 27, 2018

Logged By: OB

Completion Date: June 27, 2018

Reviewed By: KJ

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Public Works and
Government Services
Canada

Testpit No: TP18-43R 508+374

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 425.6 m

Fort Nelson, BC

UTM: 470882.9 E; 6521836.2 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Moisture Content (%)	Elevation (m)
0				Plastic Limit Moisture Content Liquid Limit 20 40 60 80	
0 to 1.5	Excavator	GRAVEL and SAND (FILL), some silt, trace organics, dry, compact, dark brown; fine to coarse subangular to subrounded gravel; fine to coarse sand. - trace to no organics below 0.3 m. - water table observed at 1.3 m.	[Cross-hatched pattern]		425 to 424
1.5 to 5		End of testpit at 1.5 m (target depth reached). - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).			424 to 421



TETRA TECH

Contractor: North Country Maintenance Inc.

Completion Depth: 1.5 m

Drilling Rig Type:

Start Date: June 27, 2018

Logged By: OB

Completion Date: June 27, 2018

Reviewed By: KJ

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Public Works and
Government Services
Canada

Testpit No: TP18-44R 508+784

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 396.1 m

Fort Nelson, BC

UTM: 470650.3 E; 6521499.4 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Sample Type	Sample Number	Moisture Content (%)	Plastic Limit	Moisture Content	Liquid Limit	Elevation (m)
0							20	40	60	80
0	Excavator	GRAVEL (FILL), some sand, trace silt, trace organics, dry, compact, dark brown; fine to coarse subangular to subrounded gravel; fine to coarse sand. - no organics below 0.2 m.			1	2.3				396
1										395
2		End of testpit at 1.8 m (target depth reached). - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).								394
3										393
4										392
5										



TETRA TECH

Contractor: North Country Maintenance Inc.

Completion Depth: 1.8 m

Drilling Rig Type:

Start Date: June 27, 2018

Logged By: OB

Completion Date: June 27, 2018

Reviewed By: KJ

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Public Works and
Government Services
Canada

Testpit No: TP18-45

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 390.8 m

Fort Nelson, BC

UTM: 470756.7 E; 6521633.1 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Sample Type	Sample Number	Moisture Content (%)	Elevation (m)
0							
0 to 1	Excavator	<p>TOPSOIL, gravelly, sandy, with organics, dry, brown.</p> <p>GRAVEL and SAND (FILL), some silt, trace organics, damp, compact, dark brown; fine to coarse subangular to subrounded gravel; fine to coarse sand.</p> <p>- wood fragments observed at 0.8 m.</p>					390
1 to 2	Excavator	<p>PEAT, silty, damp, stiff, brown.</p>			P18-45 24		389
2 to 5		<p>End of testpit at 2.0 m (target depth reached).</p> <ul style="list-style-type: none"> - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit). 					388 387 386



Contractor: North Country Maintenance Inc.

Completion Depth: 2 m

Drilling Rig Type:

Start Date: June 27, 2018

Logged By: OB

Completion Date: June 27, 2018

Reviewed By: KJ

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Public Works and
Government Services
Canada

Testpit No: TP18-46

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 412 m

Fort Nelson, BC

UTM: 470873.1 E; 6521696.7 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Moisture Content (%)	Elevation (m)
0				Plastic Limit: 20 Moisture Content: 40 Liquid Limit: 80	412
0 - 1	Excavator	GRAVEL and SAND (FILL), some silt, trace clay, dry, compact, dark brown; fine to coarse subangular to subrounded gravel; fine to coarse sand.			
1 - 2		CLAY, silty, trace sand, damp, very stiff, high plastic, dark grey.			
2 - 5		End of testpit at 2.0 m (target depth reached). - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).			410 - 407



TETRA TECH

Contractor: North Country Maintenance Inc.

Completion Depth: 2 m

Drilling Rig Type:

Start Date: June 28, 2018

Logged By: OB

Completion Date: June 28, 2018

Reviewed By: KJ

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Public Works and
Government Services
Canada

Testpit No: TP18-47

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 419.2 m

Fort Nelson, BC

UTM: 471001.7 E; 6521784.8 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Sample Type	Sample Number	Moisture Content (%)	Plastic Limit	Moisture Content	Liquid Limit	Elevation (m)
0							20	40	60	80
0		TOPSOIL, gravelly, sandy, with organics, dry, brown. GRAVEL and SAND (FILL), some silt, trace clay, dry, compact, dark brown; fine to coarse subangular to subrounded gravel; fine to coarse sand. CLAY, silty, trace sand, damp, very stiff, high plastic, dark grey.								419
1	Excavator				1	20.8				418
2										417
3		End of testpit at 2.2 m (target depth reached). - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).								416
4										415
5										



TETRA TECH

Contractor: North Country Maintenance Inc.

Completion Depth: 2.2 m

Drilling Rig Type:

Start Date: June 28, 2018

Logged By: OB

Completion Date: June 28, 2018

Reviewed By: KJ

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Public Works and
Government Services
Canada

Testpit No: TP18-48

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 421 m

Fort Nelson, BC

UTM: 471103.6 E; 6521857.2 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Moisture Content (%)	Elevation (m)
0				Plastic Limit: 20 Moisture Content: 40 Liquid Limit: 80	421
0 - 1	Excavator	TOPSOIL, gravelly, sandy, with organics, dry, brown. CLAY, silty, trace sand, damp, very stiff, high plastic, dark grey.			421 - 420
1 - 2		End of testpit at 1.9 m (target depth reached). - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).			419
2 - 3					418
3 - 4					417
4 - 5					416



Contractor: North Country Maintenance Inc.

Completion Depth: 1.9 m

Drilling Rig Type:

Start Date: June 28, 2018

Logged By: OB

Completion Date: June 28, 2018

Reviewed By: KJ

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Testpit No: TP18-49

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 423.2 m

Fort Nelson, BC

UTM: 471205.4 E; 6521969.2 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Moisture Content (%)	Elevation (m)
0				Plastic Limit: 20 Moisture Content: 40 Liquid Limit: 80	
0 to 0.2		TOPSOIL, gravelly, sandy, with organics, dry, brown.			423
0.2 to 2.2	Excavator	CLAY, silty, trace to some sand, damp, very stiff, high plastic, dark grey.			422 to 421
2.2 to 5		End of testpit at 2.2 m (target depth reached). - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).			421 to 419



TETRA TECH

Contractor: North Country Maintenance Inc.

Completion Depth: 2.2 m

Drilling Rig Type:

Start Date: June 28, 2018

Logged By: OB

Completion Date: June 28, 2018

Reviewed By: KJ

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Public Works and
Government Services
Canada

Testpit No: TP18-50

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 423.3 m

Fort Nelson, BC

UTM: 471290.2 E; 6522059.5 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Sample Type	Sample Number	Moisture Content (%)	Plastic Limit Moisture Content Liquid Limit	Elevation (m)
0								
0 to 1.7	Excavator	<p>TOPSOIL, gravelly, sandy, with organics, dry, brown.</p> <p>GRAVEL and SAND (FILL), some silt, trace clay, dry, compact, dark brown; fine to coarse subangular to subrounded gravel; fine to coarse sand.</p>			1	10.7		423
1.7 to 5		<p>End of testpit at 1.7 m (target depth reached).</p> <ul style="list-style-type: none"> - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit). 						421 to 419



Contractor: North Country Maintenance Inc.

Completion Depth: 1.7 m

Drilling Rig Type:

Start Date: June 28, 2018

Logged By: OB

Completion Date: June 28, 2018

Reviewed By: KJ

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Public Works and
Government Services
Canada

Testpit No: TP18-51

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 426.6 m

Fort Nelson, BC

UTM: 471358.6 E; 6522133.1 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Sample Type	Sample Number	Moisture Content (%)	Plastic Limit	Moisture Content	Liquid Limit	Elevation (m)
0							20	40	80	426.6
0 - 1	Excavator	TOPSOIL, gravelly, sandy, with organics, dry, brown. GRAVEL and SAND (FILL), some silt, trace clay, dry, compact, dark brown; fine to coarse subangular to subrounded gravel; fine to coarse sand. CLAY, silty, trace sand, damp, very stiff, high plastic, dark grey.			1	21.9				425
2		End of testpit at 2.0 m (target depth reached). - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).								424
3										423
4										422
5										422



TETRA TECH

Contractor: North Country Maintenance Inc.

Completion Depth: 2 m

Drilling Rig Type:

Start Date: June 28, 2018

Logged By: OB

Completion Date: June 28, 2018

Reviewed By: KJ

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Public Works and
Government Services
Canada

Testpit No: TP18-52

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 426.8 m

Fort Nelson, BC

UTM: 471409.6 E; 6522191.1 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Moisture Content (%)	Elevation (m)
0					
0 to 2.1	Excavator	<p>TOPSOIL, gravelly, sandy, with organics, dry, brown.</p> <p>GRAVEL and SAND (FILL), some silt, trace clay, dry, compact, dark brown; fine to coarse subangular to subrounded gravel; fine to coarse sand.</p> <p>CLAY, silty, trace sand, damp, very stiff, high plastic, dark grey.</p>			426.8 to 422.8
2.1 to 5		<p>End of testpit at 2.1 m (target depth reached).</p> <ul style="list-style-type: none"> - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit). 			424.8 to 422.8



Contractor: North Country Maintenance Inc.

Completion Depth: 2.1 m

Drilling Rig Type:

Start Date: June 28, 2018

Logged By: OB

Completion Date: June 28, 2018

Reviewed By: KJ

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Public Works and
Government Services
Canada

Testpit No: TP18-53

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 421 m

Fort Nelson, BC

UTM: 471499.4 E; 6522193.3 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Moisture Content (%)	Elevation (m)
				Plastic Limit Moisture Content Liquid Limit 20 40 60 80	
0	Excavator	GRAVEL and SAND (FILL), some clay, dry, compact, dark brown; fine to coarse subangular to subrounded gravel; fine to coarse sand.			421
1		CLAY, silty, some sand, damp, very stiff, high plastic, dark grey.			420
2		End of testpit at 2.0 m (target depth reached). - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).			419
3					418
4					417
5					416



Contractor: North Country Maintenance Inc.

Completion Depth: 2 m

Drilling Rig Type:

Start Date: June 28, 2018

Logged By: OB

Completion Date: June 28, 2018

Reviewed By: KJ

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Public Works and
Government Services
Canada

Testpit No: TP18-54

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 421 m

Fort Nelson, BC

UTM: 471547.3 E; 6522112.7 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Moisture Content (%)	Elevation (m)
0				Plastic Limit: 20 Moisture Content: 40 Liquid Limit: 80	421
0 - 0.5	Excavator	GRAVEL and SAND (FILL), some silt, trace clay, dry, compact, dark brown; fine to coarse subangular to subrounded gravel; fine to coarse sand.			
0.5 - 2.0		CLAY, silty, trace sand, damp, very stiff, high plastic, dark grey.			
2.0		End of testpit at 2.0 m (target depth reached). - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).			419
3					418
4					417
5					416



Contractor: North Country Maintenance Inc.

Completion Depth: 2 m

Drilling Rig Type:

Start Date: June 29, 2018

Logged By: OB

Completion Date: June 29, 2018

Reviewed By: KJ

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Public Works and
Government Services
Canada

Testpit No: TP18-55

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 416.7 m

Fort Nelson, BC

UTM: 471536.8 E; 6521935.9 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Sample Type	Sample Number	Moisture Content (%)	Elevation (m)
0						Plastic Limit: 20 Moisture Content: 40 Liquid Limit: 80	
0 - 0.5	Excavator	GRAVEL and SAND (FILL), trace silt, dry, compact, dark brown; fine to coarse subangular to subrounded gravel; fine to coarse sand.					416.7
0.5 - 2.0		CLAY, some silt, trace sand, damp, very stiff, high plastic, dark grey.			1		416.0
2.0		End of testpit at 2.0 m (target depth reached). - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).					414.0
3.0							413.0
4.0							412.0
5.0							411.0



Contractor: North Country Maintenance Inc.

Completion Depth: 2 m

Drilling Rig Type:

Start Date: June 29, 2018

Logged By: OB

Completion Date: June 29, 2018

Reviewed By: KJ

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Public Works and
Government Services
Canada

Testpit No: TP18-56

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 417.9 m

Fort Nelson, BC

UTM: 471527.6 E; 6521855.8 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Moisture Content (%)	Elevation (m)
0				Plastic Limit: 20 Moisture Content: 40 Liquid Limit: 80	
0 - 0.5	Excavator	GRAVEL and SAND (FILL), some silt, trace clay, dry, compact, dark brown; fine to coarse subangular to subrounded gravel; fine to coarse sand.			
0.5 - 2.0		CLAY, silty, trace sand, damp, very stiff, high plastic, dark grey.			417
2.0		End of testpit at 2.0 m (target depth reached). - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).			416
3					415
4					414
5					413



Contractor: North Country Maintenance Inc.

Completion Depth: 2 m

Drilling Rig Type:

Start Date: June 29, 2018

Logged By: OB

Completion Date: June 29, 2018

Reviewed By: KJ

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Public Works and
Government Services
Canada

Testpit No: TP18-57

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 418.5 m

Fort Nelson, BC

UTM: 471570.8 E; 6521785.6 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Sample Type	Sample Number	Moisture Content (%)	Plastic Limit	Moisture Content	Liquid Limit	Elevation (m)
0							20	40	60	80
0	Excavator	GRAVEL and SAND (FILL), some silt, trace clay, dry, compact, dark brown; fine to coarse subangular to subrounded gravel; fine to coarse sand.			1	4.2				418
1		CLAY, silty, trace sand, damp, very stiff, high plastic, dark grey.								417
2		End of testpit at 2.0 m (target depth reached). - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).								416
3										415
4										414
5										



TETRA TECH

Contractor: North Country Maintenance Inc.

Completion Depth: 2 m

Drilling Rig Type:

Start Date: June 29, 2018

Logged By: OB

Completion Date: June 29, 2018

Reviewed By: KJ

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Public Works and
Government Services
Canada

Testpit No: TP18-58

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 418 m

Fort Nelson, BC

UTM: 471646.4 E; 6521762.5 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Moisture Content (%)	Elevation (m)
0				Plastic Limit: 20 Moisture Content: 40 Liquid Limit: 80	418
0 - 0.2		TOPSOIL, gravelly, sandy, with organics, dry, brown.			
0.2 - 0.5		GRAVEL and SAND (FILL), some silt, dry, compact, dark brown; fine to coarse subangular to subrounded gravel; fine to coarse sand.			
0.5 - 2.1	Excavator	CLAY, silty, trace sand, damp, very stiff, high plastic, dark grey.			
2.1 - 2.1		End of testpit at 2.1 m (target depth reached). - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).			
3					415
4					414
5					413



TETRA TECH

Contractor: North Country Maintenance Inc.

Completion Depth: 2.1 m

Drilling Rig Type:

Start Date: June 29, 2018

Logged By: OB

Completion Date: June 29, 2018

Reviewed By: KJ

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Public Works and
Government Services
Canada

Testpit No: TP18-59

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 418.4 m

Fort Nelson, BC

UTM: 471712.1 E; 6521768.4 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Moisture Content (%)	Elevation (m)
0				Plastic Limit: 20 Moisture Content: 40 Liquid Limit: 80	
0 to 0.2		TOPSOIL, gravelly, sandy, with organics, dry, brown.			418.4
0.2 to 0.5		GRAVEL and SAND (FILL), some silt, trace clay, dry, compact, dark brown; fine to coarse subangular to subrounded gravel; fine to coarse sand.			
0.5 to 2.3	Excavator	CLAY, silty, trace sand, damp, very stiff, high plastic, dark grey.			417 to 416
2.3 to 5		End of testpit at 2.3 m (target depth reached). - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).			416 to 414



Contractor: North Country Maintenance Inc.

Completion Depth: 2.3 m

Drilling Rig Type:

Start Date: June 29, 2018

Logged By: OB

Completion Date: June 29, 2018

Reviewed By: KJ

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Public Works and
Government Services
Canada

Testpit No: TP18-60

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 418.7 m

Fort Nelson, BC

UTM: 471827 E; 6521807 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Moisture Content (%)	Elevation (m)
0				Plastic Limit: 20 Moisture Content: 40 Liquid Limit: 80	
0 - 1	Excavator	GRAVEL and SAND (FILL), some silt, trace clay, dry, compact, dark brown; fine to coarse subangular to subrounded gravel; fine to coarse sand.			418
1 - 1.9	Excavator	CLAY, silty, trace sand, damp, very stiff, high plastic, dark grey.			417
1.9 - 5		End of testpit at 1.9 m (target depth reached). - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).			416 415 414



Contractor: North Country Maintenance Inc.

Completion Depth: 1.9 m

Drilling Rig Type:

Start Date: June 29, 2018

Logged By: OB

Completion Date: June 29, 2018

Reviewed By: KJ

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Public Works and
Government Services
Canada

Testpit No: TP18-61

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 419.3 m

Fort Nelson, BC

UTM: 471910.9 E; 6521838.7 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Sample Type	Sample Number	Moisture Content (%)	Plastic Limit	Moisture Content	Liquid Limit	Elevation (m)
0							20	40	60	80
0	Excavator	TOPSOIL, gravelly, sandy, with organics, dry, brown.			1	6.2	●			419
		GRAVEL and SAND (FILL), some silt, trace clay, dry, compact, dark brown; fine to coarse subangular to subrounded gravel; fine to coarse sand.								
		CLAY, silty, trace sand, damp, very stiff, high plastic, dark grey.								
1										418
2		End of testpit at 2.0 m (target depth reached). - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).								417
3										416
4										415
5										



Contractor: North Country Maintenance Inc.

Completion Depth: 2 m

Drilling Rig Type:

Start Date: June 29, 2018

Logged By: OB

Completion Date: June 29, 2018

Reviewed By: KJ

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Public Works and
Government Services
Canada

Testpit No: TP18-62

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 418.8 m

Fort Nelson, BC

UTM: 471996.3 E; 6521871 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Moisture Content (%)	Elevation (m)
0				Plastic Limit: 20 Moisture Content: 40 Liquid Limit: 80	
0 to 0.2		TOPSOIL, gravelly, sandy, with organics, dry, brown.	[Cross-hatched pattern]		418.8
0.2 to 0.8		GRAVEL and SAND (FILL), some silt, dry, compact, dark brown; fine to coarse subangular to subrounded gravel; fine to coarse sand.	[Cross-hatched pattern]		
0.8 to 2.1	Excavator	CLAY, silty, trace sand, damp, very stiff, high plastic, dark grey.	[Diagonal hatched pattern]		418 to 416
2.1 to 5		End of testpit at 2.1 m (target depth reached). - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).			416 to 414



Contractor: North Country Maintenance Inc.

Completion Depth: 2.1 m

Drilling Rig Type:

Start Date: June 29, 2018

Logged By: OB

Completion Date: June 29, 2018

Reviewed By: KJ

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Public Works and
Government Services
Canada

Testpit No: TP18-63

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 418.2 m

Fort Nelson, BC

UTM: 472061 E; 6521897.1 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Moisture Content (%)	Elevation (m)
0				Plastic Limit: 20 Moisture Content: 40 Liquid Limit: 80	
0 to 0.2	Excavator	TOPSOIL, gravelly, sandy, with organics, dry, brown.			418
0.2 to 0.8	Excavator	GRAVEL and SAND (FILL), some silt, trace clay, dry, compact, dark brown; fine to coarse subangular to subrounded gravel; fine to coarse sand.			418 to 417
0.8 to 2.0	Excavator	CLAY, silty, trace sand, damp, very stiff, high plastic, dark grey.			417 to 416
2.0 to 5.0		End of testpit at 2.0 m (target depth reached). - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).			416 to 414



TETRA TECH

Contractor: North Country Maintenance Inc.

Completion Depth: 2 m

Drilling Rig Type:

Start Date: June 29, 2018

Logged By: OB

Completion Date: June 29, 2018

Reviewed By: KJ

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Public Works and
Government Services
Canada

Testpit No: TP18-64

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 418.3 m

Fort Nelson, BC

UTM: 472144.7 E; 6521928 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Moisture Content (%)	Elevation (m)
0				Plastic Limit: 20 Moisture Content: 40 Liquid Limit: 80	
0 to 2	Excavator	GRAVEL and SAND (FILL), some silt, trace clay, dry, compact, dark brown; fine to coarse subangular to subrounded gravel; fine to coarse sand. CLAY, silty, trace sand, damp, very stiff, high plastic, dark grey.			418 to 416
2 to 5		End of testpit at 2.0 m (target depth reached). - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).			416 to 414



TETRA TECH

Contractor: North Country Maintenance Inc.

Completion Depth: 2 m

Drilling Rig Type:

Start Date: June 29, 2018

Logged By: OB

Completion Date: June 29, 2018

Reviewed By: KJ

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Public Works and
Government Services
Canada

Testpit No: TP18-65

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 422.1 m

Fort Nelson, BC

UTM: 472268.2 E; 6522027.9 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Moisture Content (%)	Elevation (m)
				Plastic Limit Moisture Content Liquid Limit 20 40 60 80	
0		GRAVEL and SAND (FILL), some silt, trace clay, dry, compact, dark brown; fine to coarse subangular to subrounded gravel; fine to coarse sand.			422
1	Excavator	CLAY, silty, trace sand, damp, very stiff, high plastic, dark grey.			421
2		End of testpit at 1.9 m (target depth reached). - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).			420
3					419
4					418
5					



Contractor: North Country Maintenance Inc.

Completion Depth: 1.9 m

Drilling Rig Type:

Start Date: June 29, 2018

Logged By: OB

Completion Date: June 29, 2018

Reviewed By: KJ

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Public Works and
Government Services
Canada

Testpit No: TP18-66

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 425.9 m

Fort Nelson, BC

UTM: 472414.4 E; 6522125.3 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Moisture Content (%)	Elevation (m)
0				Plastic Limit: 20 Moisture Content: 40 Liquid Limit: 80	
0 - 1	Excavator	GRAVEL and SAND (FILL), some silt, trace clay, dry, compact, dark brown; fine to coarse subangular to subrounded gravel; fine to coarse sand.			425
1 - 2		CLAY, silty, trace sand, damp, very stiff, high plastic, dark grey.			424
2 - 5		End of testpit at 2.0 m (target depth reached). - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).			423 422 421



Contractor: North Country Maintenance Inc.

Completion Depth: 2 m

Drilling Rig Type:

Start Date: June 29, 2018

Logged By: OB

Completion Date: June 29, 2018

Reviewed By: KJ

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Public Works and
Government Services
Canada

Testpit No: TP18-67

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 427.2 m

Fort Nelson, BC

UTM: 472516.6 E; 6522186.8 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Sample Type	Sample Number	Moisture Content (%)	Plastic Limit Moisture Content Liquid Limit	Elevation (m)
0								
0	Excavator	GRAVEL and SAND (FILL), some silt, dry, compact, dark brown; fine to coarse subangular to subrounded gravel; fine to coarse sand.			1	3.8		427
1		CLAY, silty, trace sand, damp, very stiff, high plastic, dark grey.						426
2		End of testpit at 2.0 m (target depth reached). - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).						425
3								424
4								423
5								



TETRA TECH

Contractor: North Country Maintenance Inc.

Completion Depth: 2 m

Drilling Rig Type:

Start Date: June 29, 2018

Logged By: OB

Completion Date: June 29, 2018

Reviewed By: KJ

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Public Works and
Government Services
Canada

Testpit No: TP18-68

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 429.8 m

Fort Nelson, BC

UTM: 472614.6 E; 6522229.4 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Moisture Content (%)	Elevation (m)
0				Plastic Limit: 20 Moisture Content: 40 Liquid Limit: 80	
0 to 2	Excavator	GRAVEL and SAND (FILL), some silt, trace clay, dry, compact, dark brown; fine to coarse subangular to subrounded gravel; fine to coarse sand. CLAY, silty, trace sand, damp, very stiff, high plastic, dark grey.			429 to 427
2 to 5		End of testpit at 2.0 m (target depth reached). - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).			427 to 425



Contractor: North Country Maintenance Inc.

Completion Depth: 2 m

Drilling Rig Type:

Start Date: June 29, 2018

Logged By: OB

Completion Date: June 29, 2018

Reviewed By: KJ

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Public Works and
Government Services
Canada

Testpit No: TP18-69

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 430.5 m

Fort Nelson, BC

UTM: 472731.3 E; 6522246.9 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Moisture Content (%)	Elevation (m)
0				Plastic Limit: 20 Moisture Content: 40 Liquid Limit: 80	
0 to 2.0	Excavator	GRAVEL and SAND (FILL), some silt, trace clay, dry, compact, dark brown; fine to coarse subangular to subrounded gravel; fine to coarse sand. CLAY, silty, trace sand, damp, very stiff, high plastic, dark grey.			430 to 426
2.0 to 5.0		End of testpit at 2.0 m (target depth reached). - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).			428 to 426



TETRA TECH

Contractor: North Country Maintenance Inc.

Completion Depth: 2.2 m

Drilling Rig Type:

Start Date: June 29, 2018

Logged By: OB

Completion Date: June 29, 2018

Reviewed By: KJ

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Public Works and
Government Services
Canada

Testpit No: TP18-70

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 433.1 m

Fort Nelson, BC

UTM: 472913.9 E; 6522274.3 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Moisture Content (%)	Elevation (m)
0				Plastic Limit: 20 Moisture Content: 40 Liquid Limit: 80	
0 to 2.3	Excavator	GRAVEL and SAND (FILL), some silt, trace clay, dry, compact, dark brown; fine to coarse subangular to subrounded gravel; fine to coarse sand. CLAY, silty, trace sand, damp, very stiff, high plastic, dark grey.			433 to 429
2.3 to 5		End of testpit at 2.3 m (target depth reached). - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).			430 to 429



Contractor: North Country Maintenance Inc.

Completion Depth: 2.3 m

Drilling Rig Type:

Start Date: June 29, 2018

Logged By: OB

Completion Date: June 29, 2018

Reviewed By: KJ

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Testpit No: TP18-71

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 435.4 m

Fort Nelson, BC

UTM: 473077.9 E; 6522358.3 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Sample Type	Sample Number	Moisture Content (%)	Plastic Limit	Moisture Content	Liquid Limit	Elevation (m)
0							20	40	60	80
0	Excavator	GRAVEL and SAND (FILL), some silt, dry, compact, dark brown; fine to coarse subangular to subrounded gravel; fine to coarse sand.			1	7.1		●		435
1		CLAY, silty, trace sand, damp, very stiff, high plastic, dark grey.								434
2		End of testpit at 1.9 m (target depth reached). - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).								433
3										432
4										431
5										



TETRA TECH

Contractor: North Country Maintenance Inc.

Completion Depth: 1.9 m

Drilling Rig Type:

Start Date: June 29, 2018

Logged By: OB

Completion Date: June 29, 2018

Reviewed By: KJ

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Public Works and
Government Services
Canada

Testpit No: TP18-72

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 437.6 m

Fort Nelson, BC

UTM: 473217.6 E; 6522436.5 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Moisture Content (%)	Elevation (m)
0				Plastic Limit: 20 Moisture Content: 40 Liquid Limit: 80	
0 - 0.5	Excavator	GRAVEL and SAND (FILL), some silt, dry, compact, dark brown; fine to coarse subangular to subrounded gravel; fine to coarse sand.			437.6
0.5 - 2.1		CLAY, silty, trace sand, damp, very stiff, high plastic, dark grey.			437.6
2.1 - 5		End of testpit at 2.1 m (target depth reached). - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).			433 - 435



TETRA TECH

Contractor: North Country Maintenance Inc.

Completion Depth: 2.1 m

Drilling Rig Type:

Start Date: June 29, 2018

Logged By: OB

Completion Date: June 29, 2018

Reviewed By: KJ

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Public Works and
Government Services
Canada

Testpit No: TP18-73

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 437.9 m

Fort Nelson, BC

UTM: 473341.5 E; 6522504.5 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Moisture Content (%)	Elevation (m)
0				Plastic Limit: 20 Moisture Content: 40 Liquid Limit: 80	
0 - 0.5		GRAVEL and SAND (FILL), some silt, dry, compact, dark brown; fine to coarse subangular to subrounded gravel; fine to coarse sand.			437.9
0.5 - 2.3	Excavator	CLAY, silty, trace sand, damp, very stiff, high plastic, dark grey.			437.9
2.3 - 5		End of testpit at 2.3 m (target depth reached). - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).			435



Contractor: North Country Maintenance Inc.

Completion Depth: 2.3 m

Drilling Rig Type:

Start Date: June 29, 2018

Logged By: OB

Completion Date: June 29, 2018

Reviewed By: KJ

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Public Works and
Government Services
Canada

Testpit No: TP18-74L 507+740

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 428.9 m

Fort Nelson, BC

UTM: 471389.6 E; 6522214 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Sample Type	Sample Number	Moisture Content (%)	Plastic Limit	Moisture Content	Liquid Limit	Elevation (m)
0							20	40	60	80
0		TOPSOIL, gravelly, sandy, with organics, dry, brown.			1	3.6				
0		GRAVEL and SAND (FILL), some silt, dry, compact, dark brown; fine to coarse subangular to subrounded gravel; fine to coarse sand.								
0		CLAY, silty, trace sand, damp, very stiff, high plastic, dark grey.								
1	Excavator									428
2		End of testpit at 1.5 m (target depth reached). - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).								427
3										426
4										425
5										424



Contractor: North Country Maintenance Inc.

Completion Depth: 1.5 m

Drilling Rig Type:

Start Date: June 29, 2018

Logged By: OB

Completion Date: June 29, 2018

Reviewed By: KJ

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Public Works and
Government Services
Canada

Testpit No: TP18-75L 507+274

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 429.1 m

Fort Nelson, BC

UTM: 471844.8 E; 6522238 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Moisture Content (%)	Elevation (m)
				Plastic Limit Moisture Content Liquid Limit 20 40 60 80	
0		TOPSOIL, gravelly, sandy, with organics, dry, brown. GRAVEL and SAND (FILL), some silt, dry, compact, dark brown; fine to coarse subangular to subrounded gravel; fine to coarse sand.			429
1	Excavator				428
2		End of testpit at 1.5 m (target depth reached). - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).			427
3					426
4					425
5					



Contractor: North Country Maintenance Inc.

Completion Depth: 1.5 m

Drilling Rig Type:

Start Date: June 29, 2018

Logged By: OB

Completion Date: June 29, 2018

Reviewed By: KJ

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Public Works and
Government Services
Canada

Testpit No: TP18-76L 506+854

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 430.1 m

Fort Nelson, BC

UTM: 472262.2 E; 6522188.3 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Sample Type	Sample Number	Moisture Content (%)	Plastic Limit Moisture Content Liquid Limit	Elevation (m)
0								
0	Excavator	<p>TOPSOIL, gravelly, sandy, with organics, dry, brown.</p> <p>GRAVEL and SAND (FILL), some silt, dry, compact, dark brown; fine to coarse subangular to subrounded gravel; fine to coarse sand.</p>			1	2.6		430
1								429
2		<p>End of testpit at 1.5 m (target depth reached).</p> <ul style="list-style-type: none"> - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit). 						428
3								427
4								426
5								



Contractor: North Country Maintenance Inc.

Completion Depth: 1.5 m

Drilling Rig Type:

Start Date: June 29, 2018

Logged By: OB

Completion Date: June 29, 2018

Reviewed By: KJ

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Public Works and
Government Services
Canada

Testpit No: TP18-77L 506+432

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 429.6 m

Fort Nelson, BC

UTM: 472672.8 E; 6522280.1 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Sample Type	Sample Number	Moisture Content (%)	Plastic Limit	Moisture Content	Liquid Limit	Elevation (m)
0							20	40	80	
0	Excavator	<p>TOPSOIL, gravelly, sandy, with organics, dry, brown.</p> <p>GRAVEL and SAND (FILL), some silt, occasional shale fragments, dry, compact, dark brown; fine to coarse subangular to subrounded gravel; fine to coarse sand; shale fragments platy, up to 50 mm in diameter.</p>								429
1.5		<p>End of testpit at 1.5 m (target depth reached).</p> <ul style="list-style-type: none"> - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit). 			1	7.4				428
2										427
3										426
4										425
5										



Contractor: North Country Maintenance Inc.

Completion Depth: 1.5 m

Drilling Rig Type:

Start Date: June 29, 2018

Logged By: OB

Completion Date: June 29, 2018

Reviewed By: KJ

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Public Works and
Government Services
Canada

Testpit No: TP18-78L 506+022

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 433.7 m

Fort Nelson, BC

UTM: 473055.9 E; 6522430.2 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Sample Type	Sample Number	Moisture Content (%)	Plastic Limit	Moisture Content	Liquid Limit	Elevation (m)
0							20	40	80	
0	Excavator	<p>TOPSOIL, gravelly, sandy, with organics, dry, brown.</p> <p>GRAVEL (FILL), some sand, trace silt, trace organics, dry, compact, dark brown; fine to coarse subangular to subrounded gravel; fine to coarse sand.</p> <p>- no organics, occasional shale fragments below 0.40 m; shale fragments platy, up to 50 mm in diameter.</p>			1	2.1				433
1										432
2		<p>End of testpit at 1.75 m (target depth reached).</p> <p>- Upon completion, testhole was backfilled to surface with excavated material.</p> <p>- Soil description is based on visual assessment.</p> <p>- Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement.</p> <p>- Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).</p>								431
3										430
4										429
5										



Contractor: North Country Maintenance Inc.

Completion Depth: 1.75 m

Drilling Rig Type:

Start Date: June 29, 2018

Logged By: OB

Completion Date: June 29, 2018

Reviewed By: KJ

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Public Works and
Government Services
Canada

Testpit No: TP18-79L 505+609

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 436 m

Fort Nelson, BC

UTM: 473361.5 E; 6522706.8 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Moisture Content (%)	Elevation (m)
0				Plastic Limit: 20 Moisture Content: 40 Liquid Limit: 80	436
0 - 1.75	Excavator	<p>TOPSOIL, gravelly, sandy, with organics, dry, brown.</p> <p>GRAVEL (FILL), some sand, trace silt, trace organics, dry, compact, dark brown; fine to coarse subangular to subrounded gravel; fine to coarse sand.</p> <p>- no organics, occasional shale fragments below 0.35 m; shale fragments platy, up to 50 mm in diameter.</p>			436 - 435
1.75 - 5		<p>End of testpit at 1.75 m (target depth reached).</p> <p>- Upon completion, testhole was backfilled to surface with excavated material.</p> <p>- Soil description is based on visual assessment.</p> <p>- Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement.</p> <p>- Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).</p>			434 - 431



TETRA TECH

Contractor: North Country Maintenance Inc.

Completion Depth: 1.75 m

Drilling Rig Type:

Start Date: June 29, 2018

Logged By: OB

Completion Date: June 29, 2018

Reviewed By: KJ

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Public Works and
Government Services
Canada

Testpit No: TP18-80L 505+202

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 434.9 m

Fort Nelson, BC

UTM: 473567.8 E; 6523056.3 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Moisture Content (%)	Elevation (m)
0				Plastic Limit: 20 Moisture Content: 40 Liquid Limit: 80	
0 to 1.75	Excavator	<p>TOPSOIL, gravelly, sandy, with organics, dry, brown.</p> <p>GRAVEL (FILL), some sand, trace silt, trace organics, dry, compact, dark brown; fine to coarse subangular to subrounded gravel; fine to coarse sand.</p> <p>- no organics, occasional shale fragments below 0.35 m; shale fragments platy, up to 50 mm in diameter.</p>			434
1.75 to 1.75		<p>End of testpit at 1.75 m (target depth reached).</p> <p>- Upon completion, testhole was backfilled to surface with excavated material.</p> <p>- Soil description is based on visual assessment.</p> <p>- Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement.</p> <p>- Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).</p>			433
1.75 to 5					432
					431
					430



TETRA TECH

Contractor: North Country Maintenance Inc.

Completion Depth: 1.75 m

Drilling Rig Type:

Start Date: June 29, 2018

Logged By: OB

Completion Date: June 29, 2018

Reviewed By: KJ

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Public Works and
Government Services
Canada

Testpit No: TP18-81L 504+803

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 440.9 m

Fort Nelson, BC

UTM: 473768 E; 6523402.4 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Moisture Content (%)	Elevation (m)
0				Plastic Limit: 20 Moisture Content: 40 Liquid Limit: 80	
0 to 1.75	Excavator	<p>TOPSOIL, gravelly, sandy, with organics, dry, brown.</p> <p>GRAVEL (FILL), some sand, trace silt, trace organics, dry, compact, dark brown; fine to coarse subangular to subrounded gravel; fine to coarse sand.</p> <p>- no organics, occasional shale fragments below 0.40 m; shale fragments platy, up to 50 mm in diameter.</p>			440
1.75 to 5		<p>End of testpit at 1.75 m (target depth reached).</p> <p>- Upon completion, testhole was backfilled to surface with excavated material.</p> <p>- Soil description is based on visual assessment.</p> <p>- Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement.</p> <p>- Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).</p>			439 438 437 436



TETRA TECH

Contractor: North Country Maintenance Inc.

Completion Depth: 1.75 m

Drilling Rig Type:

Start Date: June 29, 2018

Logged By: OB

Completion Date: June 29, 2018

Reviewed By: KJ

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Public Works and
Government Services
Canada

Testpit No: TP18-82

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 442.2 m

Fort Nelson, BC

UTM: 473952.6 E; 6523648 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Moisture Content (%)	Elevation (m)
0				Plastic Limit: 20 Moisture Content: 40 Liquid Limit: 80	
0 to 0.2		TOPSOIL, gravelly, sandy, with organics, dry, brown.			442
0.2 to 0.5		GRAVEL and SAND (FILL), some silt, dry, compact, dark brown; fine to coarse subangular to subrounded gravel; fine to coarse sand.			
0.5 to 2.3	Excavator	CLAY, silty, trace sand, damp, very stiff, high plastic, dark grey.			441 to 440
2.3 to 5		End of testpit at 2.3 m (target depth reached). - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).			439 to 438



Contractor: North Country Maintenance Inc.

Completion Depth: 2.3 m

Drilling Rig Type:

Start Date: June 29, 2018

Logged By: OB

Completion Date: June 29, 2018

Reviewed By: KJ

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Public Works and
Government Services
Canada

Testpit No: TP18-83

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 439.2 m

Fort Nelson, BC

UTM: 473991.5 E; 6523455.7 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Moisture Content (%)	Elevation (m)
0				Plastic Limit: 20 Moisture Content: 40 Liquid Limit: 80	
0 to 0.2		TOPSOIL, gravelly, sandy, with organics, dry, brown.			439
0.2 to 0.5		GRAVEL and SAND (FILL), some silt, trace clay, dry, compact, dark brown; fine to coarse subangular to subrounded gravel; fine to coarse sand.			
0.5 to 2.3	Excavator	CLAY, silty, trace sand, damp, very stiff, high plastic, dark grey.			438 to 437
2.3 to 5		End of testpit at 2.3 m (target depth reached). - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).			436 to 435



Contractor: North Country Maintenance Inc.

Completion Depth: 2.3 m

Drilling Rig Type:

Start Date: June 29, 2018

Logged By: OB

Completion Date: June 29, 2018

Reviewed By: KJ

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Public Works and
Government Services
Canada

Testpit No: TP18-84

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 436.9 m

Fort Nelson, BC

UTM: 474063.1 E; 6523236.5 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Sample Type	Sample Number	Moisture Content (%)	Plastic Limit	Moisture Content	Liquid Limit	Elevation (m)
0							20	40	80	
0		TOPSOIL, gravelly, sandy, with organics, dry, brown.								
0		GRAVEL and SAND (FILL), some silt, trace clay, dry, compact, dark brown; fine to coarse subangular to subrounded gravel; fine to coarse sand.			1	2.4				
0		CLAY, silty, trace sand, damp, very stiff, high plastic, dark grey.								
1	Excavator									436
2		End of testpit at 1.9 m (target depth reached). - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).								435
3										434
4										433
5										432



Contractor: North Country Maintenance Inc.

Completion Depth: 1.9 m

Drilling Rig Type:

Start Date: June 29, 2018

Logged By: OB

Completion Date: June 29, 2018

Reviewed By: KJ

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Testpit No: TP18-85

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 432.6 m

Fort Nelson, BC

UTM: 474196.6 E; 6523068.9 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Sample Type	Sample Number	Moisture Content (%)	Plastic Limit Moisture Content Liquid Limit	Elevation (m)
0		TOPSOIL, gravelly, sandy, with organics, dry, brown. CLAY, silty, some sand, damp, very stiff, high plastic, dark grey.					20 40 60 80	432.6
0.4 - 0.6		- iron oxidation from 0.4 m to 0.6 m.						
0.6 - 2.3	Excavator	- trace to no sand below 0.6 m.			1	20.8	●	431
2.3 - 5		End of testpit at 2.3 m (target depth reached). - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).						430 429 428



Contractor: North Country Maintenance Inc.

Completion Depth: 2.3 m

Drilling Rig Type:

Start Date: June 29, 2018

Logged By: OB

Completion Date: June 29, 2018

Reviewed By: KJ

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Public Works and
Government Services
Canada

Testpit No: TP18-86

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 428.9 m

Fort Nelson, BC

UTM: 474182.5 E; 6522865.3 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Moisture Content (%)	Elevation (m)
0		TOPSOIL, gravelly, sandy, with organics, dry, brown. CLAY, silty, some sand, damp, very stiff, high plastic, dark grey. - iron oxidation from 0.4 m to 0.6 m. - trace to no sand below 0.6 m.			428.9
1	Excavator				428
2					427
3		End of testpit at 2.3 m (target depth reached). - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).			426
4					425
5					424



Contractor: North Country Maintenance Inc.

Completion Depth: 2.3 m

Drilling Rig Type:

Start Date: June 29, 2018

Logged By: OB

Completion Date: June 29, 2018

Reviewed By: KJ

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Testpit No: TP18-87

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 429 m

Fort Nelson, BC

UTM: 474033.2 E; 6522745.7 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Sample Type	Sample Number	Moisture Content (%)	Plastic Limit	Moisture Content	Liquid Limit	Elevation (m)
0		TOPSOIL, gravelly, sandy, with organics, dry, brown. CLAY, silty, some sand, damp, very stiff, high plastic, dark grey.					20	40	80	429
1	Excavator	- trace to no sand below 0.6 m.			1	21.9				428
2										427
3		End of testpit at 2.5 m (target depth reached). - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).								426
4										425
5										424



Contractor: North Country Maintenance Inc.

Completion Depth: 2.5 m

Drilling Rig Type:

Start Date: June 29, 2018

Logged By: OB

Completion Date: June 29, 2018

Reviewed By: KJ

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Public Works and
Government Services
Canada

Testpit No: TP18-88

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 426.5 m

Fort Nelson, BC

UTM: 473769.7 E; 6522700.2 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Moisture Content (%)	Elevation (m)
0				Plastic Limit: 20 Moisture Content: 40 Liquid Limit: 80	
0 - 0.2		TOPSOIL, gravelly, sandy, with organics, dry, brown.			426.5
0.2 - 0.5		GRAVEL and SAND (FILL), some silt, trace clay, dry, compact, dark brown; fine to coarse subangular to subrounded gravel; fine to coarse sand.			426.5
0.5 - 2.2	Excavator	CLAY, silty, trace sand, damp, very stiff, high plastic, dark grey.			426.5 to 422.5
2.2 - 5.0		End of testpit at 2.2 m (target depth reached). - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).			424 to 422



Contractor: North Country Maintenance Inc.

Completion Depth: 2.2 m

Drilling Rig Type:

Start Date: June 29, 2018

Logged By: OB

Completion Date: June 29, 2018

Reviewed By: KJ

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Public Works and
Government Services
Canada

Testpit No: TP18-89

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 430 m

Fort Nelson, BC

UTM: 473570.5 E; 6522668.4 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Moisture Content (%)	Elevation (m)
0				Plastic Limit: 20 Moisture Content: 40 Liquid Limit: 80	430
0 - 2.2	Excavator	<p>TOPSOIL, gravelly, sandy, with organics, dry, brown.</p> <p>GRAVEL and SAND (FILL), some silt, occasional cobbles, dry, compact, dark brown; fine to coarse subangular to subrounded gravel; fine to coarse sand; cobbles up to 100 mm in diameter.</p> <p>- trace silt, no cobbles below 0.3 m.</p>			429 - 430
2.2 - 5		<p>End of testpit at 2.2 m (target depth reached).</p> <ul style="list-style-type: none"> - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit). 			425 - 428



Contractor: North Country Maintenance Inc.

Completion Depth: 2.2 m

Drilling Rig Type:

Start Date: June 29, 2018

Logged By: OB

Completion Date: June 29, 2018

Reviewed By: KJ

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Public Works and
Government Services
Canada

Testpit No: TP18-90

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 431.2 m

Fort Nelson, BC

UTM: 473427.5 E; 6522581.3 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Moisture Content (%)	Elevation (m)
0				Plastic Limit: 20 Moisture Content: 40 Liquid Limit: 80	
0 to 0.2		TOPSOIL, gravelly, sandy, with organics, dry, brown.			431
0.2 to 0.8		GRAVEL and SAND (FILL), some silt, trace clay, dry, compact, dark brown; fine to coarse subangular to subrounded gravel; fine to coarse sand.			
0.8 to 2.2	Excavator	CLAY, silty, trace sand, damp, very stiff, high plastic, dark grey.			430
2.2 to 5.0		End of testpit at 2.2 m (target depth reached). - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).			429 428 427



Contractor: North Country Maintenance Inc.

Completion Depth: 2.2 m

Drilling Rig Type:

Start Date: June 29, 2018

Logged By: OB

Completion Date: June 29, 2018

Reviewed By: KJ

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Public Works and
Government Services
Canada

Testpit No: TP18-91L 504+341

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 446.2 m

Fort Nelson, BC

UTM: 474020.9 E; 6523798.4 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Moisture Content (%)	Elevation (m)
0				Plastic Limit Moisture Content Liquid Limit 20 40 60 80	
0 to 2.05	Excavator	<p>TOPSOIL, gravelly, sandy, with organics, dry, brown.</p> <p>GRAVEL and SAND (FILL), some silt, trace clay, dry, compact, dark brown; fine to coarse subangular to subrounded gravel; fine to coarse sand.</p> <p>- occasional shale fragments below 0.5 m; shale fragments platy, up to 50 mm in diameter.</p>			446 to 444
2.05 to 5		<p>End of testpit at 2.05 m (target depth reached).</p> <p>- Upon completion, testhole was backfilled to surface with excavated material.</p> <p>- Soil description is based on visual assessment.</p> <p>- Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement.</p> <p>- Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).</p>			444 to 442



TETRA TECH

Contractor: North Country Maintenance Inc.

Completion Depth: 2.05 m

Drilling Rig Type:

Start Date: June 30, 2018

Logged By: OB

Completion Date: June 30, 2018

Reviewed By: KJ

Page 1 of 1



Public Works and
Government Services
Canada

Testpit No: TP18-92L 504+000

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 450.4 m

Fort Nelson, BC

UTM: 474231.6 E; 6524053.3 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Sample Type	Sample Number	Moisture Content (%)	Plastic Limit	Moisture Content	Liquid Limit	Elevation (m)
0										
0	Excavator	TOPSOIL, gravelly, sandy, with organics, dry, brown.			1	7.5	20	40	80	450
1		GRAVEL and SAND (FILL), some silt, trace clay, dry, compact, dark brown; fine to coarse subangular to subrounded gravel; fine to coarse sand. - occasional shale fragments below 0.5 m; shale fragments platy, up to 50 mm in diameter.								449
2		End of testpit at 2.05 m (target depth reached). - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).								448
3										447
4										446
5										



TETRA TECH

Contractor: North Country Maintenance Inc.

Completion Depth: 2.05 m

Drilling Rig Type:

Start Date: June 30, 2018

Logged By: OB

Completion Date: June 30, 2018

Reviewed By: KJ

Page 1 of 1



Public Works and
Government Services
Canada

Testpit No: TP18-93L 503+607

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 454.8 m

Fort Nelson, BC

UTM: 474487.7 E; 6524354 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Moisture Content (%)	Elevation (m)
0				Plastic Limit: 20 Moisture Content: 40 Liquid Limit: 80	
0 to 2.05	Excavator	<p>TOPSOIL, gravelly, sandy, with organics, dry, brown.</p> <p>GRAVEL and SAND (FILL), some silt, trace clay, dry, compact, dark brown; fine to coarse subangular to subrounded gravel; fine to coarse sand.</p> <p>- occasional shale fragments below 0.5 m; shale fragments platy, up to 50 mm in diameter.</p>			454 to 450
2.05		<p>End of testpit at 2.05 m (target depth reached).</p> <p>- Upon completion, testhole was backfilled to surface with excavated material.</p> <p>- Soil description is based on visual assessment.</p> <p>- Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement.</p> <p>- Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).</p>			452 to 450



TETRA TECH

Contractor: North Country Maintenance Inc.

Completion Depth: 2.05 m

Drilling Rig Type:

Start Date: June 30, 2018

Logged By: OB

Completion Date: June 30, 2018

Reviewed By: KJ

Page 1 of 1



Public Works and
Government Services
Canada

Testpit No: TP18-94L 503+125

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 457 m

Fort Nelson, BC

UTM: 474799.9 E; 6524721.6 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Moisture Content (%)	Elevation (m)
0				Plastic Limit: 20 Moisture Content: 40 Liquid Limit: 80	457
0 - 2	Excavator	TOPSOIL, gravelly, sandy, with organics, dry, brown. GRAVEL and SAND (FILL), some silt, trace clay, dry, compact, dark brown; fine to coarse subangular to subrounded gravel; fine to coarse sand.	[Cross-hatched pattern]		456 - 457
2		End of testpit at 2.0 m (target depth reached). - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).			455
3					454
4					453
5					452



Contractor: North Country Maintenance Inc.

Completion Depth: 2 m

Drilling Rig Type:

Start Date: June 30, 2018

Logged By: OB

Completion Date: June 30, 2018

Reviewed By: KJ

Page 1 of 1



Public Works and
Government Services
Canada

Testpit No: TP18-95L 502+685

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 461.3 m

Fort Nelson, BC

UTM: 475082 E; 6525057.2 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Moisture Content (%)	Elevation (m)
0				Plastic Limit: 20 Moisture Content: 40 Liquid Limit: 80	
0 to 2	Excavator	<p>TOPSOIL, gravelly, sandy, with organics, dry, brown.</p> <p>GRAVEL and SAND (FILL), some silt, trace clay, dry, compact, dark brown; fine to coarse subangular to subrounded gravel; fine to coarse sand.</p>	[Cross-hatched pattern]		461 to 459
2 to 5		<p>End of testpit at 2.0 m (target depth reached).</p> <ul style="list-style-type: none"> - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit). 			459 to 457



TETRA TECH

Contractor: North Country Maintenance Inc.

Completion Depth: 2 m

Drilling Rig Type:

Start Date: June 30, 2018

Logged By: OB

Completion Date: June 30, 2018

Reviewed By: KJ

Page 1 of 1



Public Works and
Government Services
Canada

Testpit No: TP18-96L 502+255

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 464.2 m

Fort Nelson, BC

UTM: 475359.5 E; 6525386.2 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Moisture Content (%)	Elevation (m)
0				Plastic Limit: 20 Moisture Content: 40 Liquid Limit: 80	
0 to 1.9	Excavator	TOPSOIL, gravelly, sandy, with organics, dry, brown. GRAVEL and SAND (FILL), some silt, trace clay, dry, compact, dark brown; fine to coarse subangular to subrounded gravel; fine to coarse sand.			464 to 462
1.9 to 5		End of testpit at 1.9 m (target depth reached). - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).			462 to 460



Contractor: North Country Maintenance Inc.

Completion Depth: 1.9 m

Drilling Rig Type:

Start Date: June 30, 2018

Logged By: OB

Completion Date: June 30, 2018

Reviewed By: KJ

Page 1 of 1



Public Works and
Government Services
Canada

Testpit No: TP18-97L 501+824

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 469.3 m

Fort Nelson, BC

UTM: 475637.8 E; 6525714.9 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Sample Type	Sample Number	Moisture Content (%)	Elevation (m)
0							
0 - 0.5		TOPSOIL, gravelly, sandy, with organics, dry, brown.					469
0.5 - 2.5	Excavator	CLAY, silty, trace sand, damp, very stiff, high plastic, dark grey.			1	10.5	468
2.5 - 5		<p>End of testpit at 2.5 m (target depth reached).</p> <ul style="list-style-type: none"> - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit). 					466



Contractor: North Country Maintenance Inc.

Completion Depth: 2.5 m

Drilling Rig Type:

Start Date: June 30, 2018

Logged By: OB

Completion Date: June 30, 2018

Reviewed By: KJ

Page 1 of 1



Public Works and
Government Services
Canada

Testpit No: TP18-98L 501+406

Project: Alaska Highway Upgrades Km 501-509

Project No: 704-TRN.VHWY03116-01

Location: Alaska Highway km 501-509

Ground Elev: 476.7 m

Fort Nelson, BC

UTM: 475947.8 E; 6525993.2 N; Z 10 WGS84

Depth (m)	Method	Soil Description	Graphical Representation	Moisture Content (%)	Elevation (m)
				Plastic Limit Moisture Content Liquid Limit 20 40 60 80	
0					
1	Excavator	GRAVEL and SAND (FILL), some silt, dry, compact, dark brown; fine to coarse subangular to subrounded gravel; fine to coarse sand. - trace clay below 0.35 m.			476
2					475
3		End of testpit at 2.5 m (target depth reached). - Upon completion, testhole was backfilled to surface with excavated material. - Soil description is based on visual assessment. - Estimates of soil consistency were determined from excavator performance, in situ test data, and visual classification of recovered samples. These estimates are based on engineering judgement. - Testpit coordinates and elevation are approximate (obtained using a handheld GPS unit).			474
4					473
5					472



Contractor: North Country Maintenance Inc.

Completion Depth: 2.5 m

Drilling Rig Type:

Start Date: June 30, 2018

Logged By: OB

Completion Date: June 30, 2018

Reviewed By: KJ

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APPENDIX C

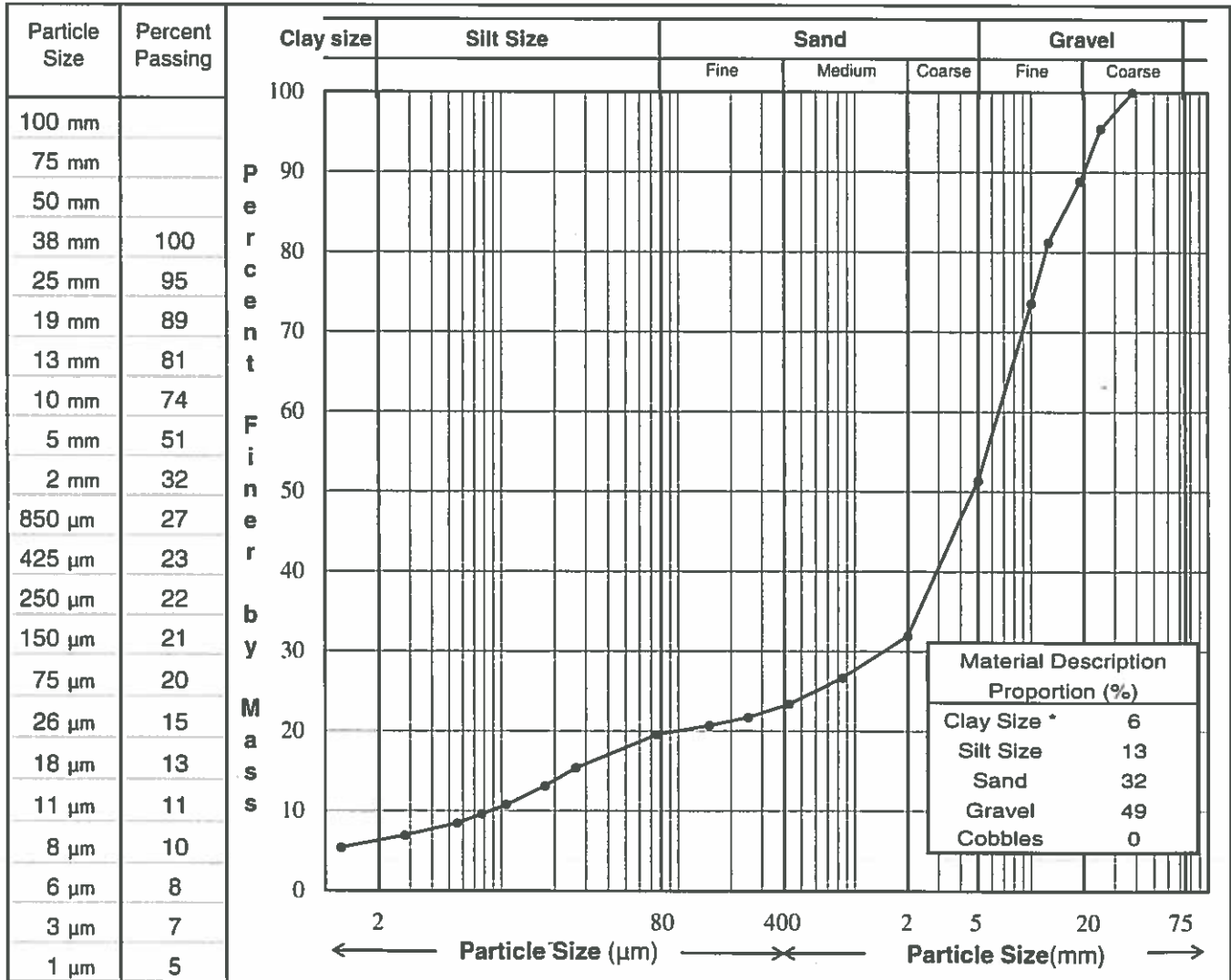
LABORATORY TEST RESULTS

PARTICLE SIZE ANALYSIS (Hydrometer) TEST REPORT

ASTM D422

Project:	Alaska Hwy Upgrades Km 501-509	Sample No.:	S2
Client:	Public Works and Government Services Canada	Borehole/ TP:	TH18-26
Project No.:	704-TRN.VHWY03116-01	Depth:	0.35-0.45 m
Location:		Date Tested	July 18, 2018
Description **:	GRAVEL, shale fragments as sand and silt and clay	Tested By:	BG

moist, grey



Remarks: * The upper clay size of 2 µm is as per the Canadian Foundation Manual.
 ** The description is behaviour based & subject to EBA description protocols.

Moisture content= 10.2% Lab Number -N-288

Reviewed By: P.Eng.

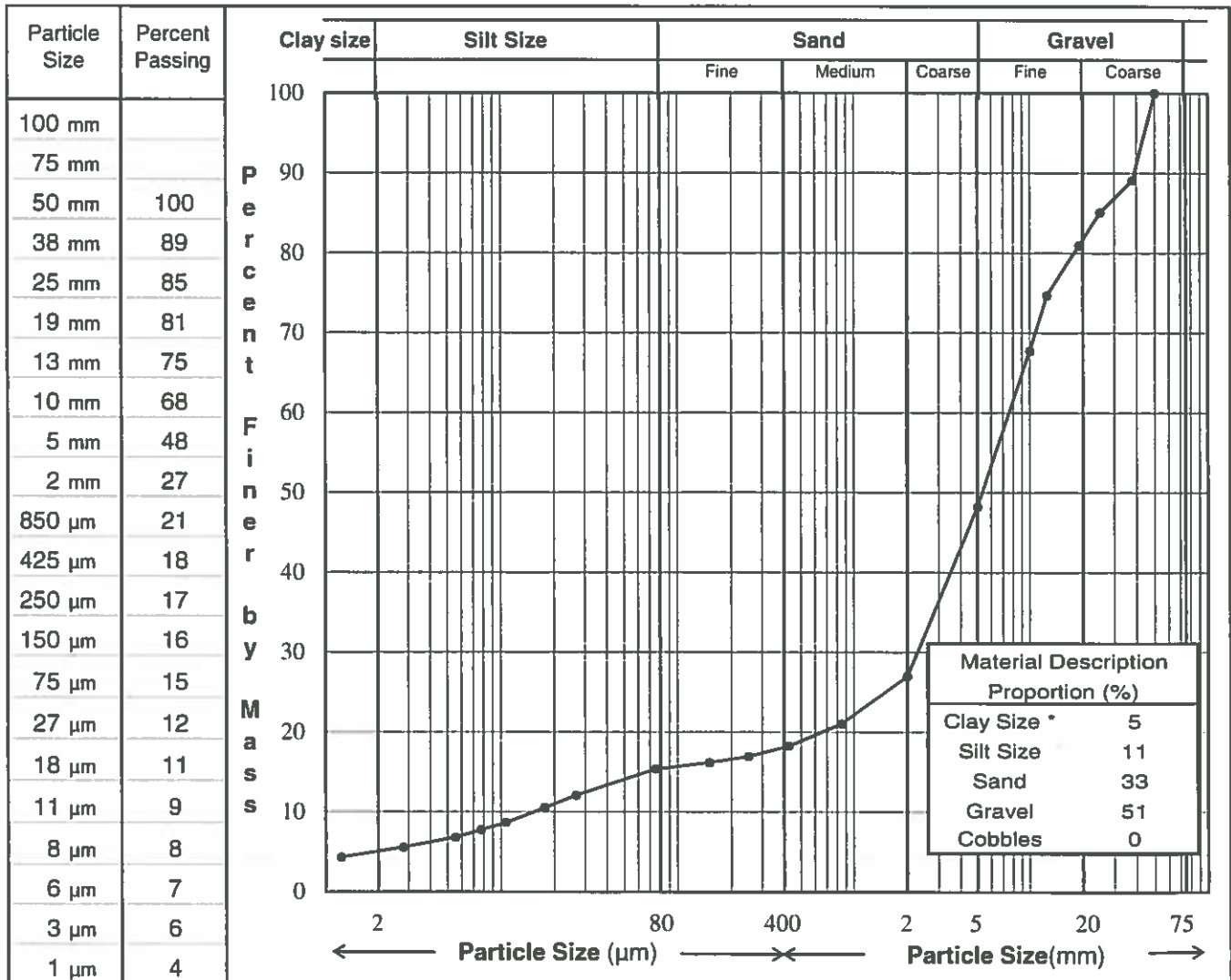
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PARTICLE SIZE ANALYSIS (Hydrometer) TEST REPORT

ASTM D422

Project:	Alaska Hwy Upgrades Km 501-509	Sample No.:	S1
Client:	Public Works and Government Services Canada	Borehole/ TP:	TH18-77
Project No.:	704-TRN.VHWY03116-01	Depth:	1.5-1.6 m
Location:		Date Tested	July 18, 2018
Description **:	GRAVEL, shale fragments as sand, silt and clay, moist, grey	Tested By:	BG



Remarks: * The upper clay size of 2 µm is as per the Canadian Foundation Manual.
 ** The description is behaviour based & subject to EBA description protocols.

Moisture content= 7.4% Lab Number -N-289

Reviewed By: P.Eng.

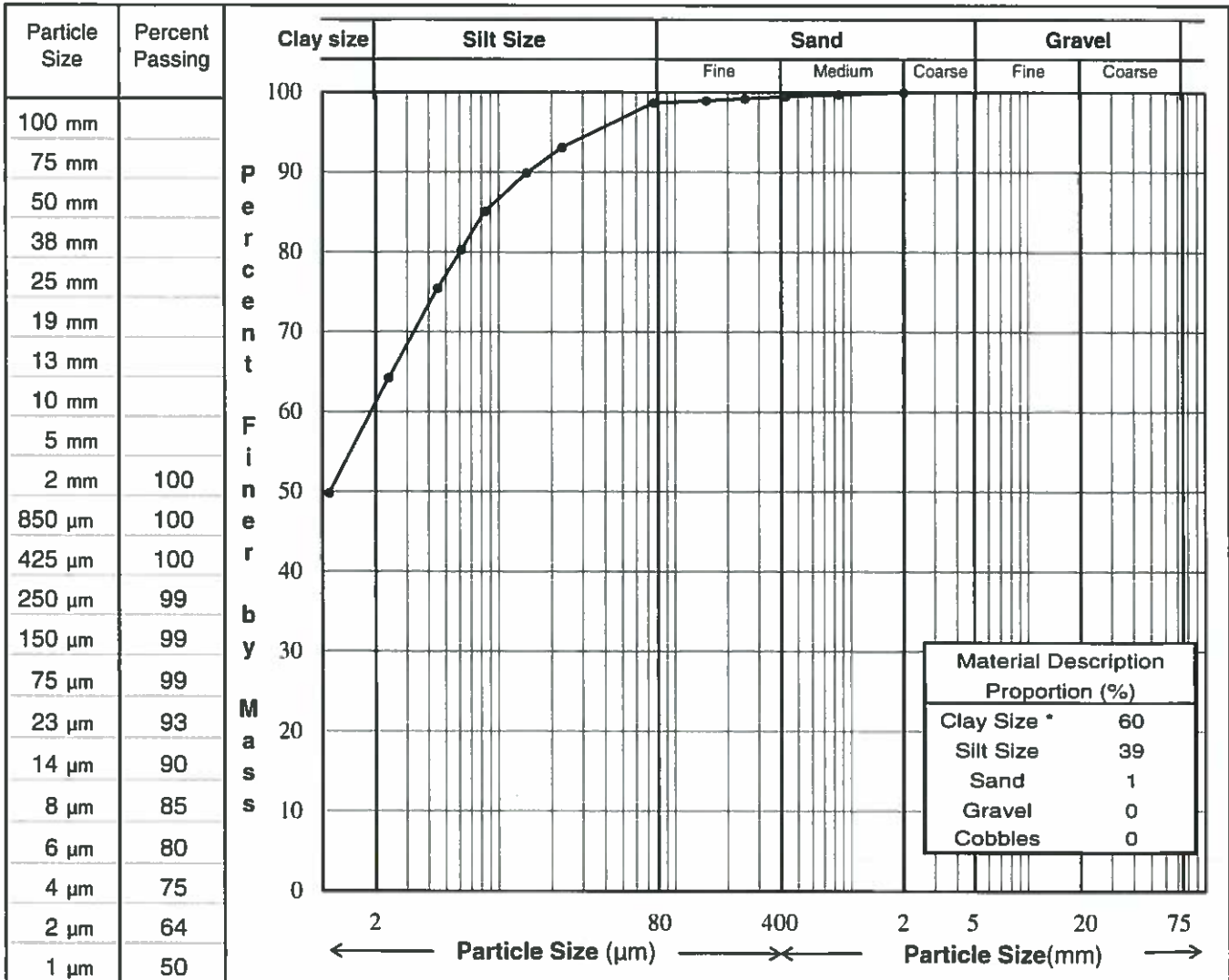
Data presented hereon is for the sole use of the stipulated client. Tetra Tech is not responsible, nor can be held liable, for use made of this report by any other party, with or without the knowledge of Tetra Tech. The testing services reported herein have been performed to recognized industry standards, 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.



PARTICLE SIZE ANALYSIS (Hydrometer) TEST REPORT

ASTM D422

Project:	Alaska Hwy Upgrades Km 501-509	Sample No.:	S1
Client:	Public Works and Government Services Canada	Borehole/ TP:	TH18-85
Project No.:	704-TRN.VHWY03116-01	Depth:	1.75-1.85
Location:		Date Tested	July 18, 2018
Description **:	CLAY, silty, trace sand, firm, moist, grey	Tested By:	BG



Remarks: * The upper clay size of 2 µm is as per the Canadian Foundation Manual.

** The description is behaviour based & subject to EBA description protocols.

Moisture content= 20.8% Lab Number -N-290

Reviewed By: P.Eng.

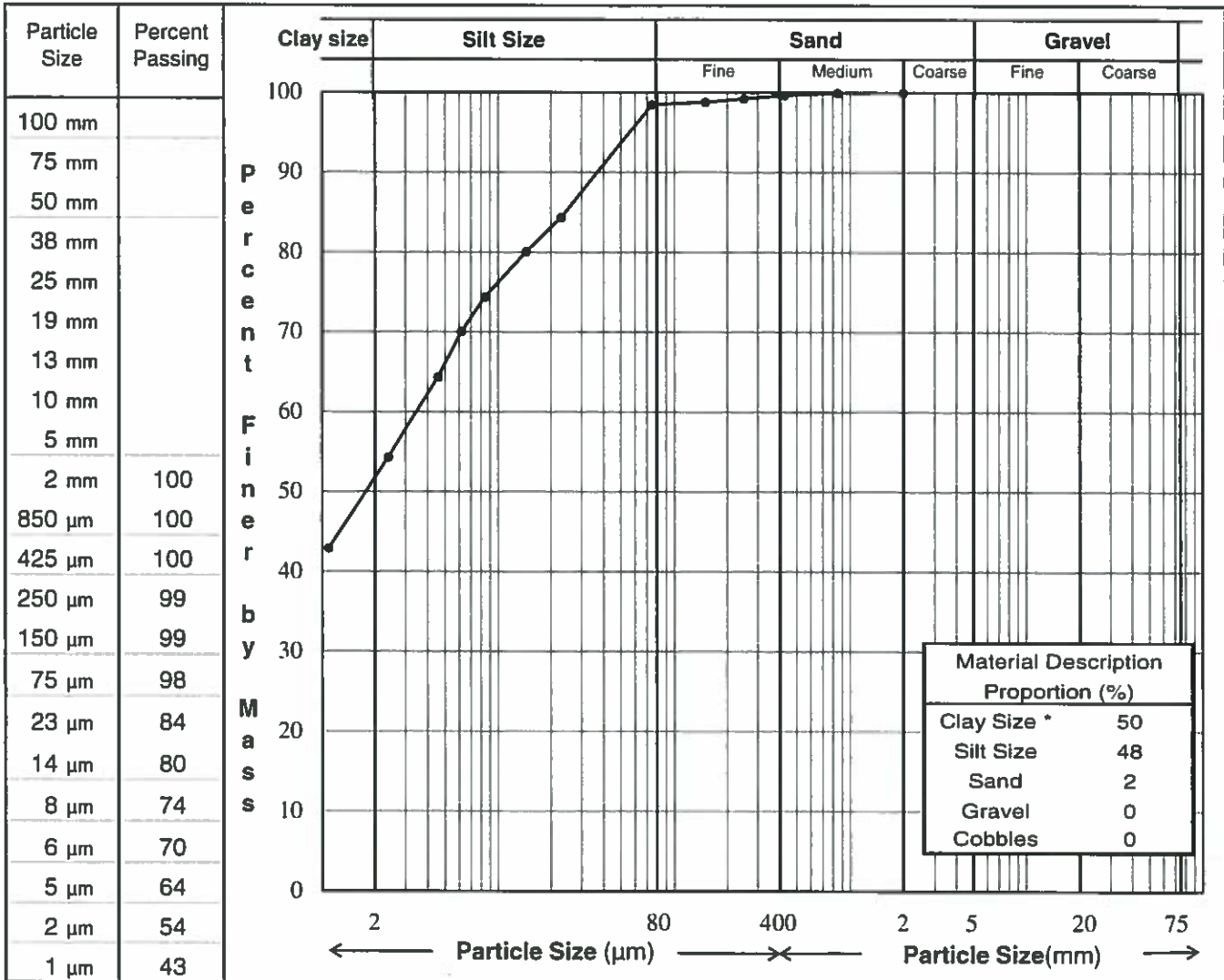
Data presented hereon is for the sole use of the stipulated client. Tetra Tech is not responsible, nor can be held liable, for use made of this report by any other party, with or without the knowledge of Tetra Tech. The testing services reported herein have been performed to recognized industry standards, 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.



PARTICLE SIZE ANALYSIS (Hydrometer) TEST REPORT

ASTM D422

Project:	Alaska Hwy Upgrades Km 501-509	Sample No.:	S1
Client:	Public Works and Government Services Canada	Borehole/ TP:	TH18-87
Project No.:	704-TRN.VHWY03116-01	Depth:	1.5-1.6
Location:		Date Tested	July 18, 2018
Description **:	CLAY, silty, trace sand, trace rootlets, firm, moist, grey	Tested By:	BG



Remarks: * The upper clay size of 2 µm is as per the Canadian Foundation Manual.

** The description is behaviour based & subject to EBA description protocols.

Moisture content= 21.9% Lab Number -N-291

Reviewed By: P.Eng.

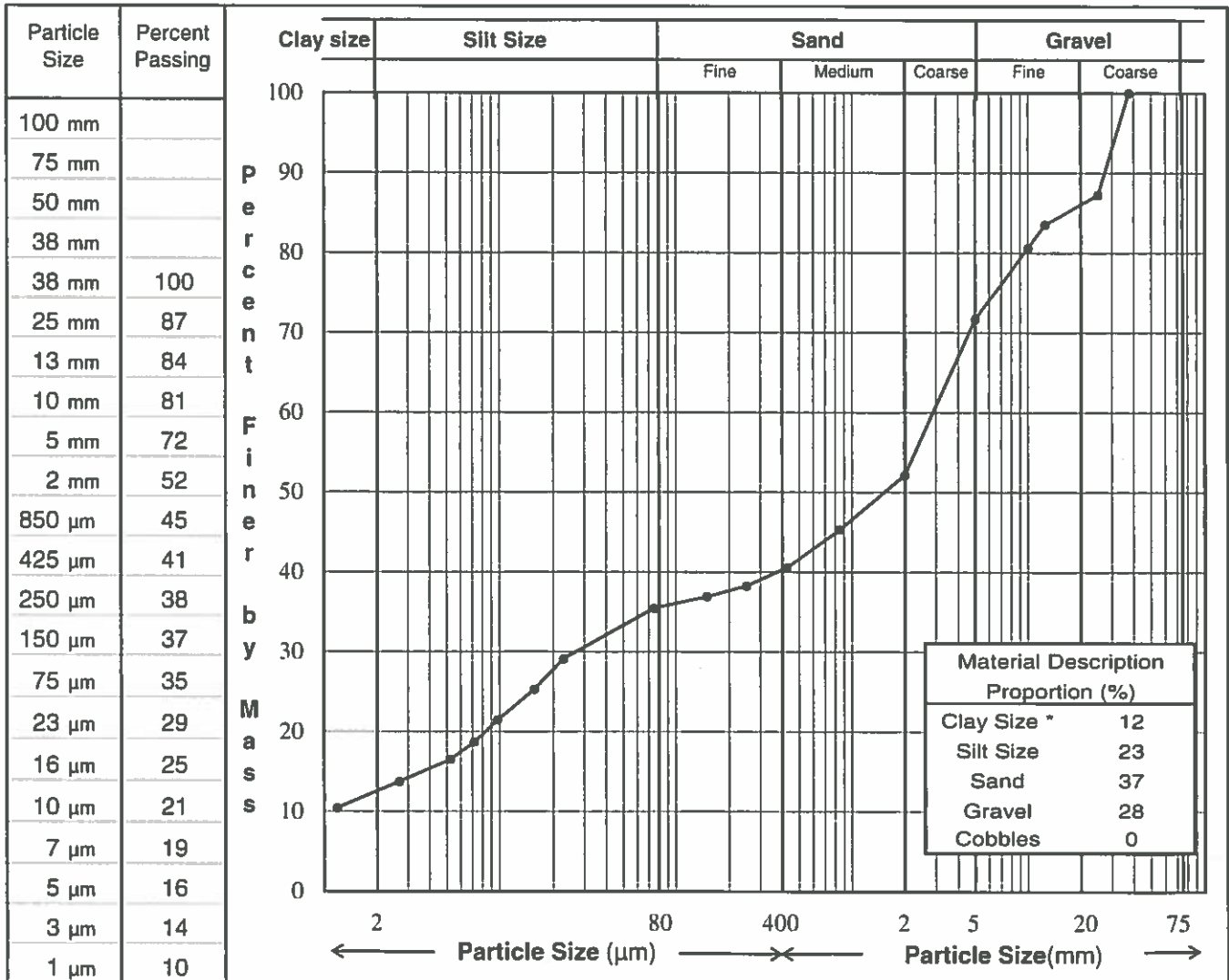
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PARTICLE SIZE ANALYSIS (Hydrometer) TEST REPORT

ASTM D422

Project:	Alaska Hwy Upgrades Km 501-509	Sample No.:	S1
Client:	Public Works and Government Services Canada	Borehole/ TP:	TH18-97
Project No.:	704-TRN.VHWY03116-01	Depth:	0.75-0.85
Location:		Date Tested	July 18, 2018
Description **:	GRAVEL, shale fragments as sand and silt, moist, grey	Tested By:	BG



Remarks: * The upper clay size of 2 µm is as per the Canadian Foundation Manual.

** The description is behaviour based & subject to EBA description protocols.

Moisture content= 10.5% Lab Number -N-292

Reviewed By: P.Eng.

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PARTICLE SIZE ANALYSIS REPORT

ASTM C136 & C117

Project: Alaska Highway Upgrades km 501-509

Project Number: TRN.VHWY03116-01

Date Tested: July 18, 2018

Testhole Number: TP18-08

Depth: 0.25 m

Soil Description: SILT, some sand, trace gravel, moist, dark brown

Cu: _____

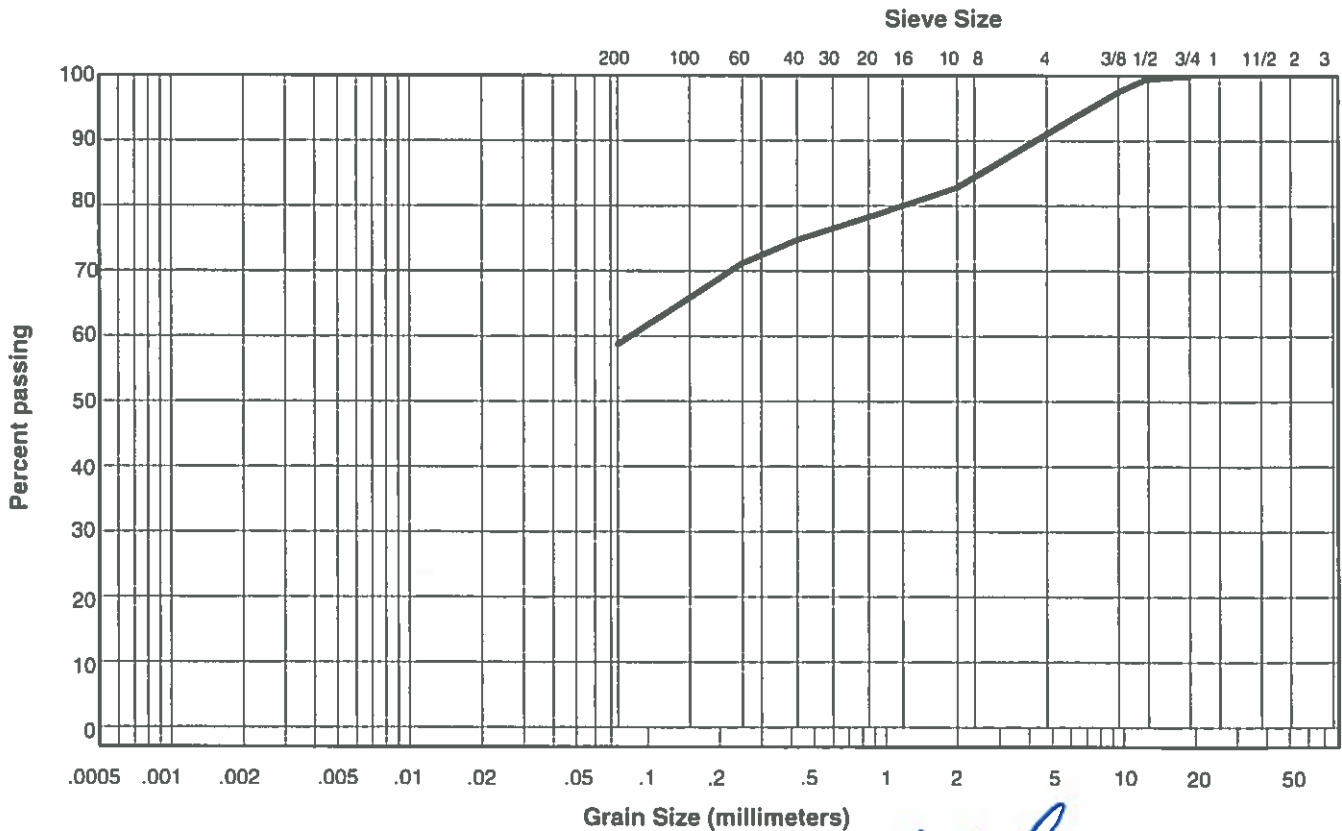
Cc: _____

Natural Moisture Content: 15.0%

Remarks: Shale particles described as sand and gravel

Sieve Size (mm)	Percent Passing
50.000	#N/A
37.500	#N/A
25.000	#N/A
19.000	100
12.500	100
9.500	97
4.750	91
2.000	83
0.850	78
0.425	75
0.250	71
0.150	66
0.075	59

Clay	Silt	Sand			Gravel	
		Fine	Medium	Coarse	Fine	Coarse



Reviewed By: Brian Gunnerson A.ScT.

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PARTICLE SIZE ANALYSIS REPORT

ASTM C136 & C117

Project: Alaska Highway Upgrades km 501-509

Project Number: TRN.VHWY03116-01

Date Tested: July 18, 2018

Testhole Number: TP18-11

Depth: 0.2 m

Soil Description: GRAVEL and SAND, some silt, trace clay, moist, dark brown

Cu: _____

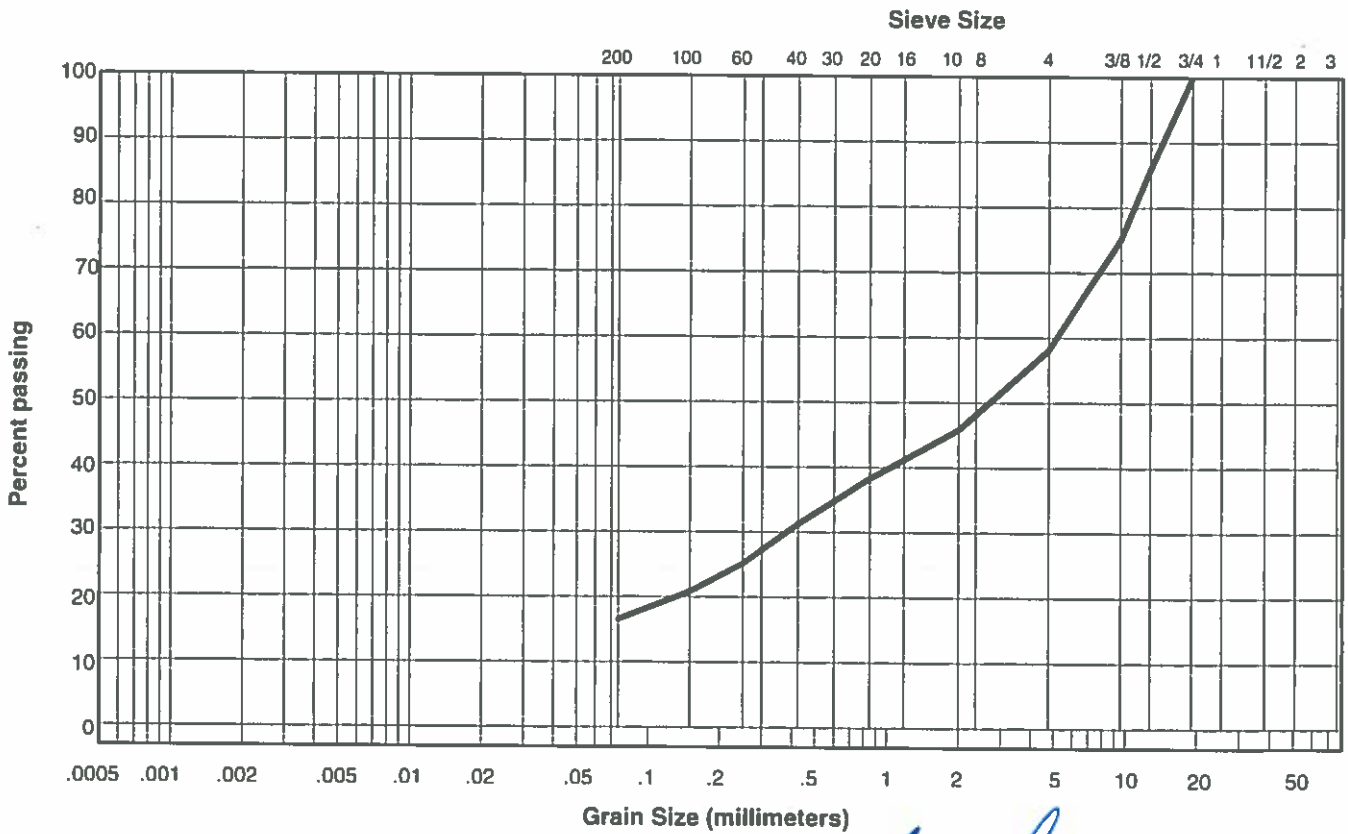
Cc: _____

Natural Moisture Content: 8.7%

Remarks: _____

Sieve Size (mm)	Percent Passing
50.000	#N/A
37.500	#N/A
25.000	#N/A
19.000	100
12.500	85
9.500	75
4.750	58
2.000	46
0.850	38
0.425	31
0.250	25
0.150	21
0.075	17

Clay	Silt	Sand			Gravel	
		Fine	Medium	Coarse	Fine	Coarse



Reviewed By: *David Gammeson* A.Sc.T.

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PARTICLE SIZE ANALYSIS REPORT

ASTM C136 & C117

Project: Alaska Highway Upgrades km 501-509

Project Number: TRN.VHWY03116-01

Date Tested: July 18, 2018

Testhole Number: TP18-13

Depth: 0.1 m

Soil Description: SAND, gravelly, silty, trace clay, moist, dark brown

Cu: _____

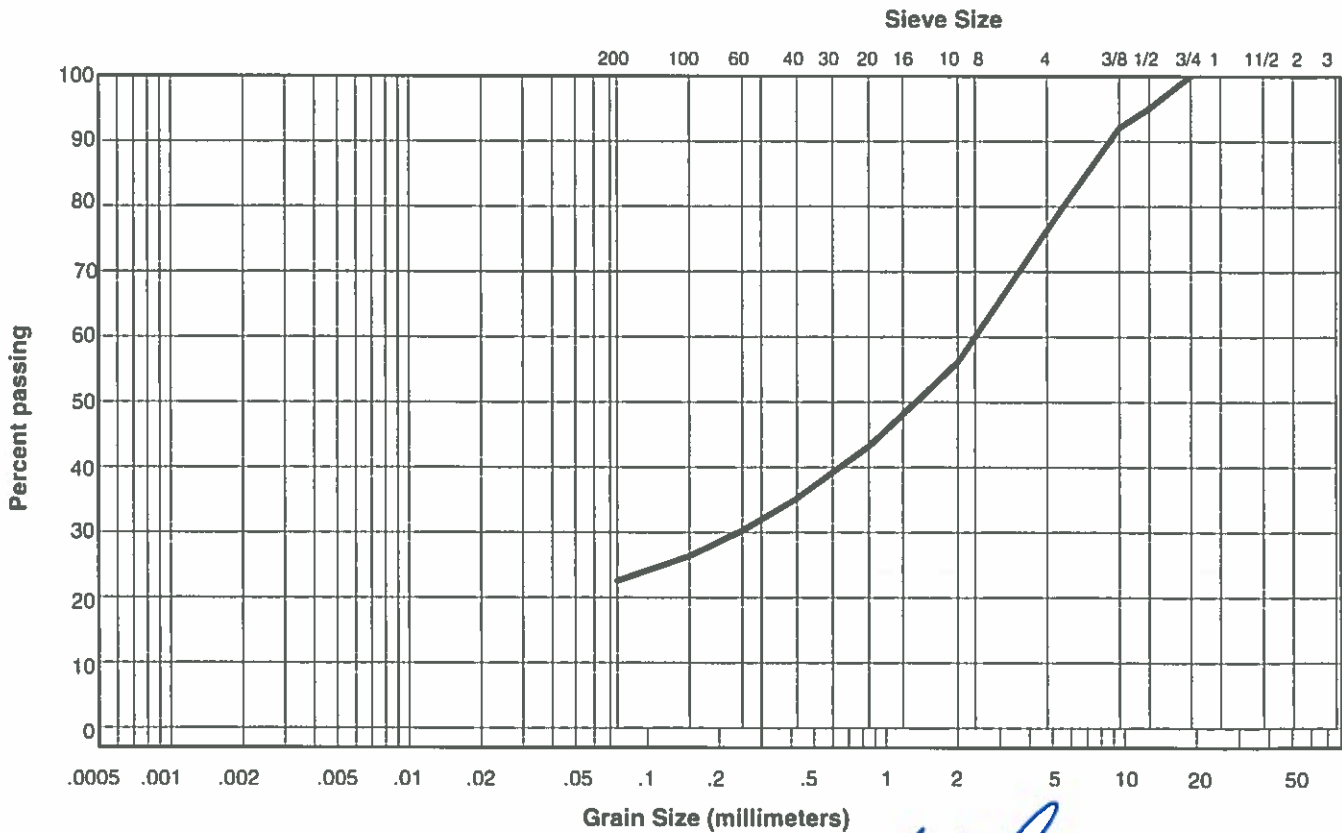
Cc: _____

Natural Moisture Content: 14.1%

Remarks: Shale particles described as sand and gravel

Sieve Size (mm)	Percent Passing
50.000	#N/A
37.500	#N/A
25.000	#N/A
19.000	100
12.500	95
9.500	92
4.750	76
2.000	56
0.850	43
0.425	35
0.250	30
0.150	26
0.075	23

Clay	Silt	Sand			Gravel	
		Fine	Medium	Coarse	Fine	Coarse



Reviewed By: *Oliver Gunnerson* A.Sc.T.

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PARTICLE SIZE ANALYSIS REPORT

ASTM C136 & C117

Project: Alaska Highway Upgrades km 501-509

Project Number: TRN.VHWY03116-01

Date Tested: July 18, 2018

Testhole Number: TP18-16

Depth: 0.2 m

Soil Description: GRAVEL and SAND, some silt, damp, dark brown

Cu: _____

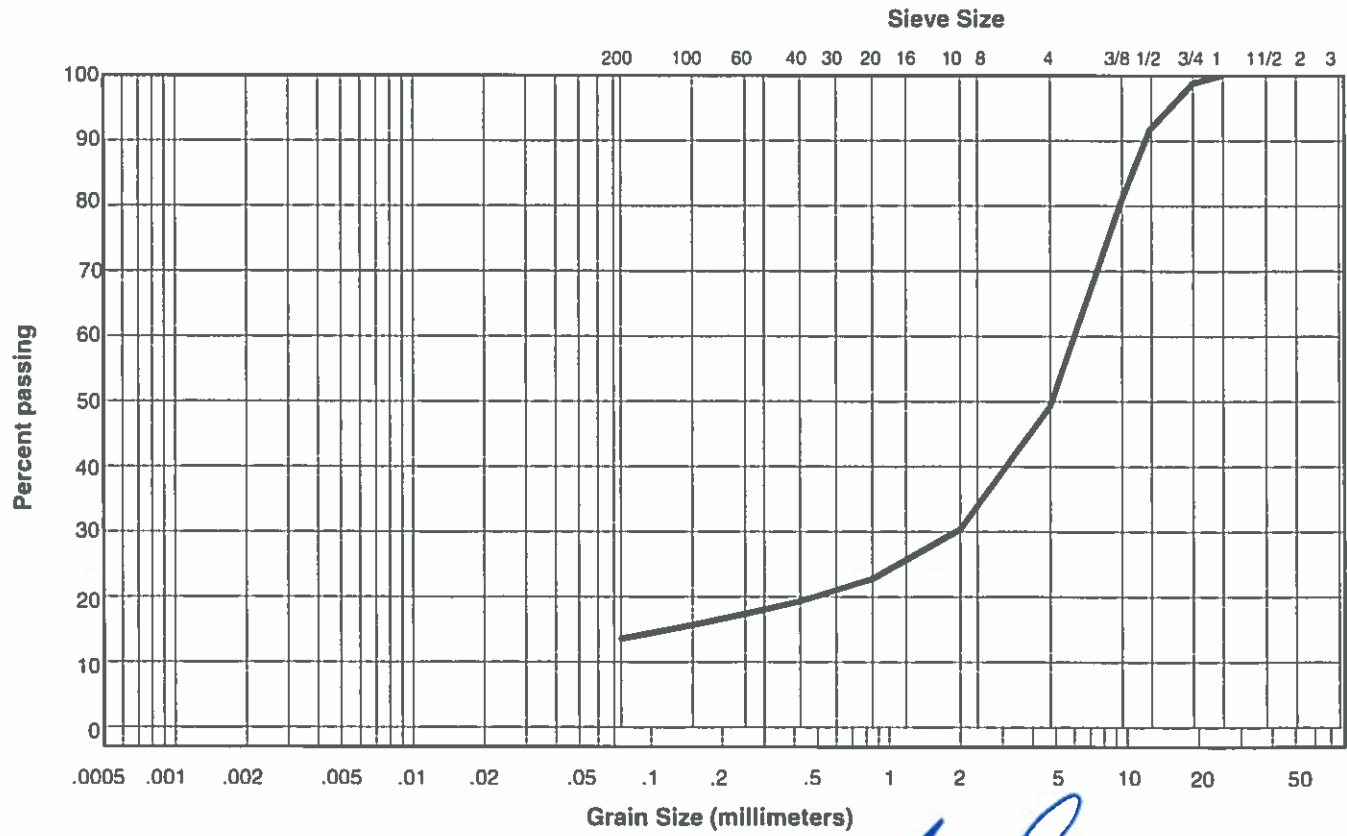
Cc: _____

Natural Moisture Content: 9.3%

Remarks: Shale particles described as sand and gravel

Sieve Size (mm)	Percent Passing
50.000	#N/A
37.500	#N/A
25.000	100
19.000	99
12.500	92
9.500	81
4.750	49
2.000	30
0.850	23
0.425	19
0.250	17
0.150	16
0.075	14

Clay	Silt	Sand			Gravel	
		Fine	Medium	Coarse	Fine	Coarse



Reviewed By: *Kevin Zimmerman* A.ScT.

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PARTICLE SIZE ANALYSIS REPORT

ASTM C136 & C117

Project: Alaska Highway Upgrades km 501-509

Project Number: TRN.VHWY03116-01

Date Tested: July 18, 2018

Testhole Number: TP18-18

Depth: 0.2 m

Soil Description: SAND, gravelly, some silt, moist, dark brown

Cu: _____

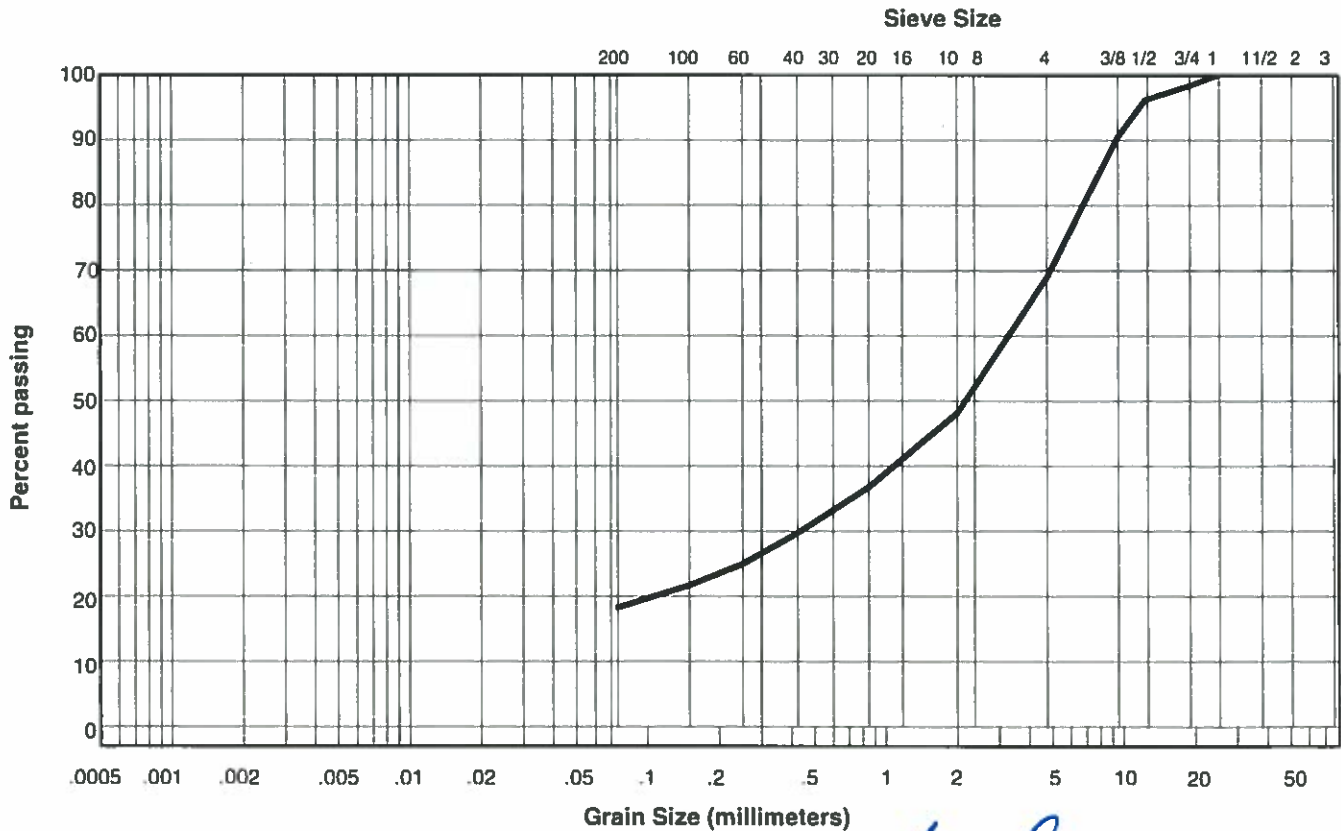
Cc: _____

Natural Moisture Content: 8.9%

Remarks: Shale particles described as sand and gravel

Sieve Size (mm)	Percent Passing
50.000	#N/A
37.500	#N/A
25.000	100
19.000	98
12.500	96
9.500	90
4.750	69
2.000	48
0.850	37
0.425	30
0.250	25
0.150	22
0.075	18

Clay	Silt	Sand			Gravel	
		Fine	Medium	Coarse	Fine	Coarse



Reviewed By: *Brian Jensen* A.Sc.T.

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PARTICLE SIZE ANALYSIS REPORT

ASTM C136 & C117

Project: Alaska Highway Upgrades km 501-509

Project Number: TRN.VHWY03116-01

Date Tested: July 18, 2018

Testhole Number: TP18-20

Depth: 0.2 m

Soil Description: SAND and GRAVEL, some silt, moist, dark brown

Cu: _____

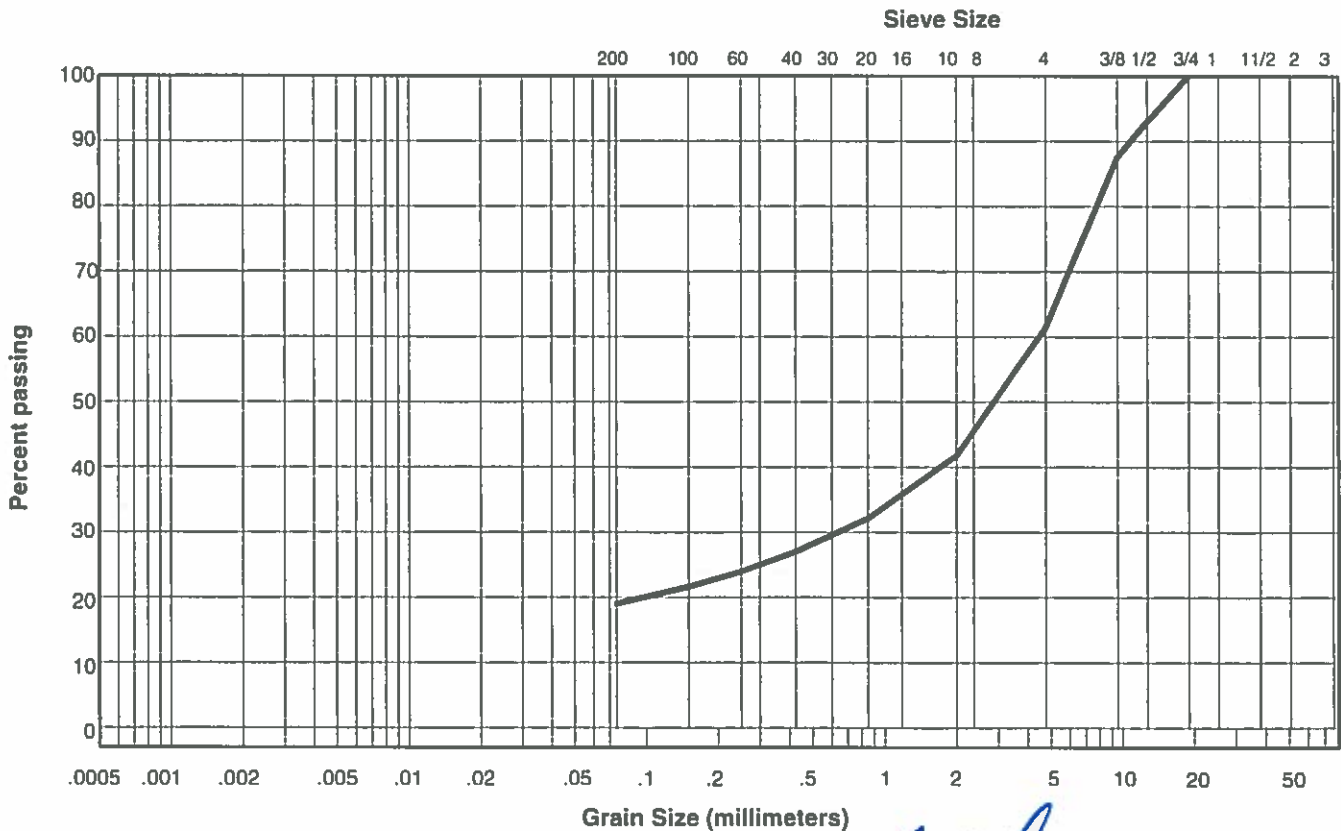
Cc: _____

Natural Moisture Content: 8.4%

Remarks: Shale particles described as sand and gravel

Sieve Size (mm)	Percent Passing
50.000	#N/A
37.500	#N/A
25.000	#N/A
19.000	100
12.500	93
9.500	87
4.750	61
2.000	42
0.850	32
0.425	27
0.250	24
0.150	22
0.075	19

Clay	Silt	Sand			Gravel	
		Fine	Medium	Coarse	Fine	Coarse



Reviewed By: *Blair Summers* A.Sc.T.

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PARTICLE SIZE ANALYSIS REPORT

ASTM C136 & C117

Project: Alaska Highway Upgrades km 501-509

Project Number: TRN.VHWY03116-01

Date Tested: July 18, 2018

Testhole Number: TP18-21

Depth: 0.2 m

Soil Description: GRAVEL and SAND, trace silt, moist, dark brown

Cu: _____

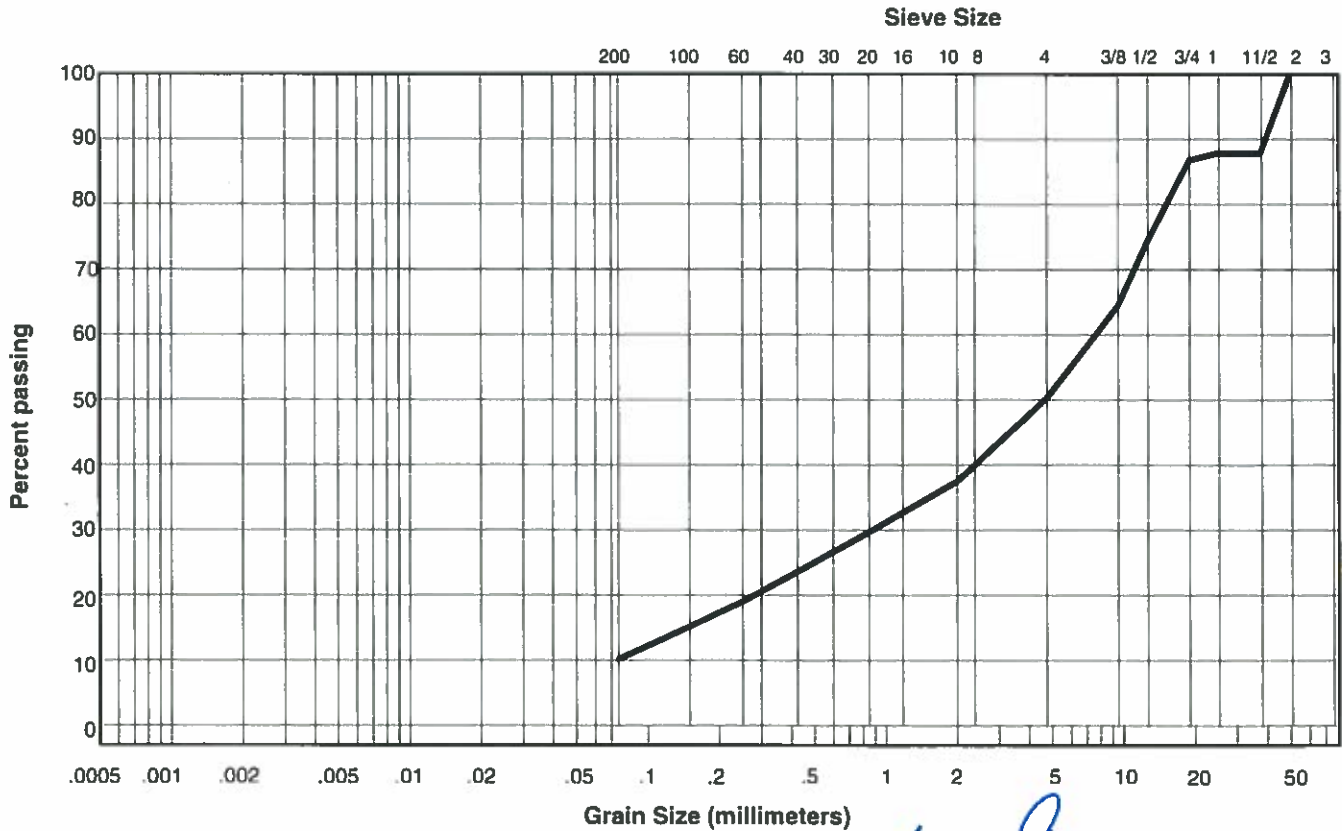
Cc: _____

Natural Moisture Content: 5.0%

Remarks: Asphalt remnants in sample, retained on 37.5 mm sieve

Sieve Size (mm)	Percent Passing
50.000	100
37.500	88
25.000	88
19.000	87
12.500	74
9.500	64
4.750	50
2.000	38
0.850	30
0.425	24
0.250	19
0.150	15
0.075	10

Clay	Silt	Sand			Gravel	
		Fine	Medium	Coarse	Fine	Coarse



Reviewed By: *Brian Gunnerson* A.ScT.

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PARTICLE SIZE ANALYSIS REPORT

ASTM C136 & C117

Project: Alaska Highway Upgrades km 501-509

Project Number: TRN.VHWY03116-01

Date Tested: July 18, 2018

Testhole Number: TP18-23

Depth: 0.2 m

Soil Description: SAND, clayey, gravelly, some silt trace organics, moist, dark brown

Cu: _____

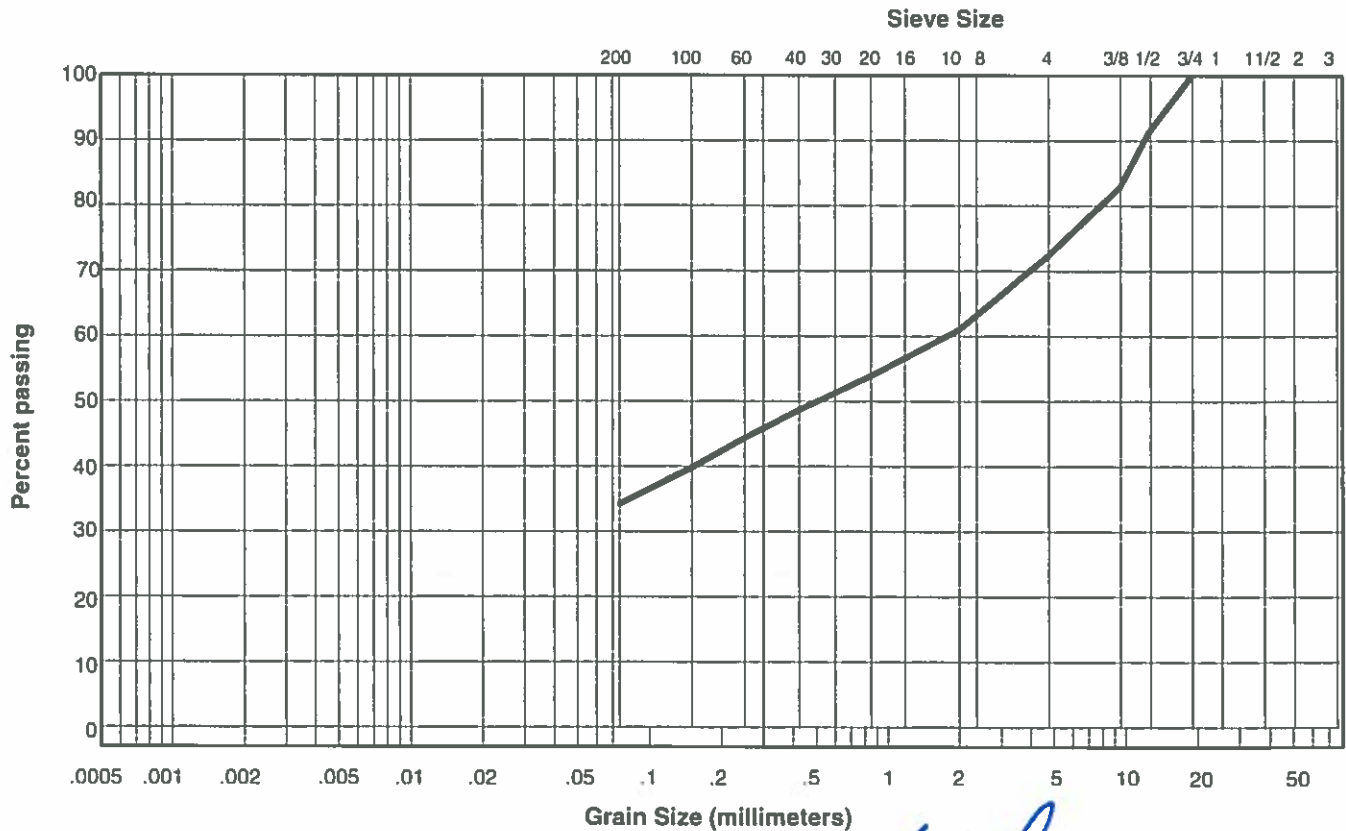
Cc: _____

Natural Moisture Content: 14.1%

Remarks: Shale particles described as sand and gravel

Sieve Size (mm)	Percent Passing
50.000	#N/A
37.500	#N/A
25.000	#N/A
19.000	100
12.500	91
9.500	83
4.750	72
2.000	61
0.850	54
0.425	49
0.250	44
0.150	40
0.075	34

Clay	Silt	Sand			Gravel	
		Fine	Medium	Coarse	Fine	Coarse



Reviewed By: *Olivia Gunnerson* A.Sc.T.

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PARTICLE SIZE ANALYSIS REPORT

ASTM C136 & C117

Project: Alaska Highway Upgrades km 501-509

Project Number: TRN.VHWY03116-01

Date Tested: July 18, 2018

Testhole Number: TP18-27

Depth: 0.3 m

Soil Description: SAND, gravelly, some clay, trace silt, moist, dark brown

Cu: _____

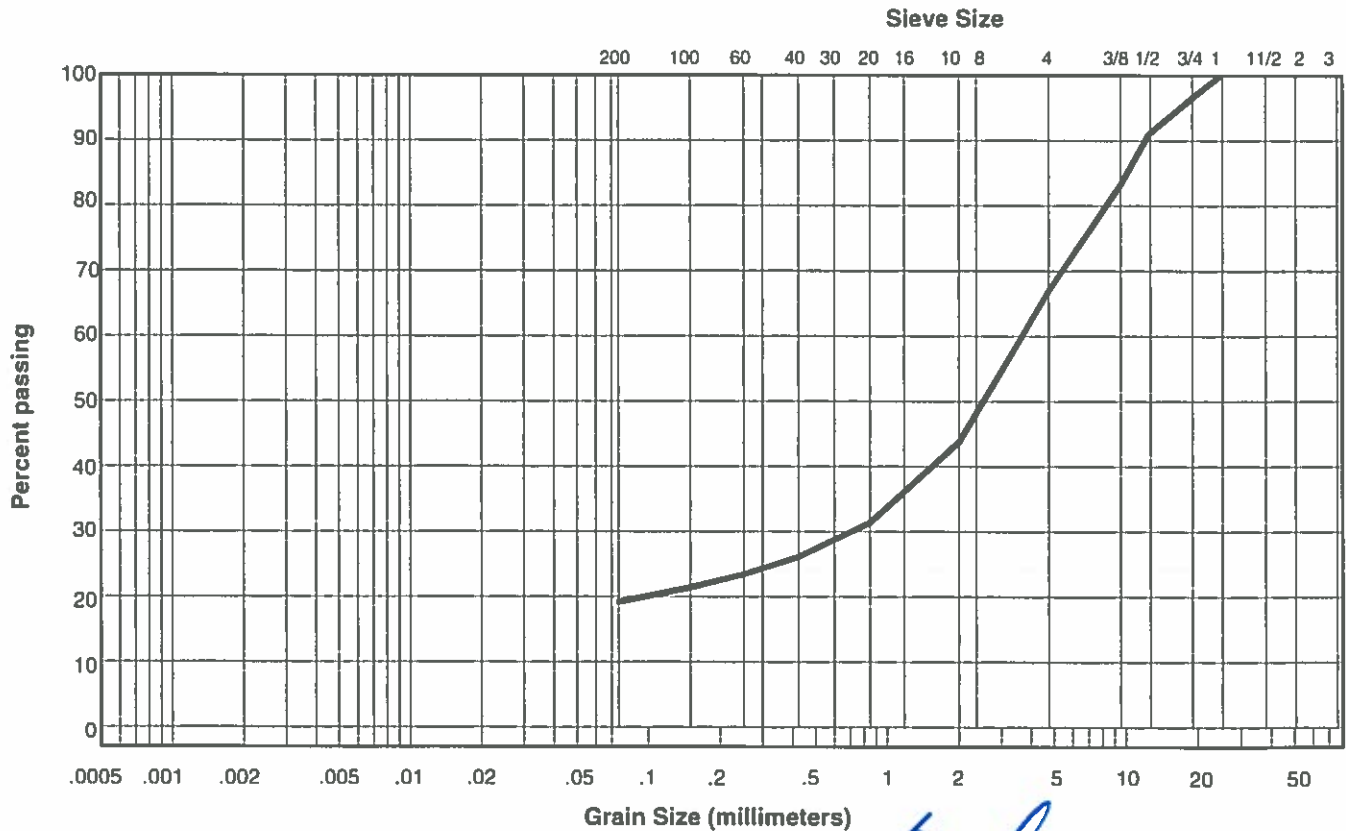
Cc: _____

Natural Moisture Content: 13.6%

Remarks: Shale particles described as sand and gravel

Sieve Size (mm)	Percent Passing
50.000	#N/A
37.500	#N/A
25.000	100
19.000	97
12.500	91
9.500	83
4.750	67
2.000	44
0.850	31
0.425	26
0.250	23
0.150	21
0.075	19

Clay	Silt	Sand			Gravel	
		Fine	Medium	Coarse	Fine	Coarse



Reviewed By: *Oliver Gunnerson* A.Sc.T.

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PARTICLE SIZE ANALYSIS REPORT

ASTM C136 & C117

Project: Alaska Highway Upgrades km 501-509

Project Number: TRN.VHWY03116-01

Date Tested: July 18, 2018

Testhole Number: TP18-28

Depth: 0.1 m

Soil Description: SAND, some gravel, some silt, moist, dark brown

Cu: _____

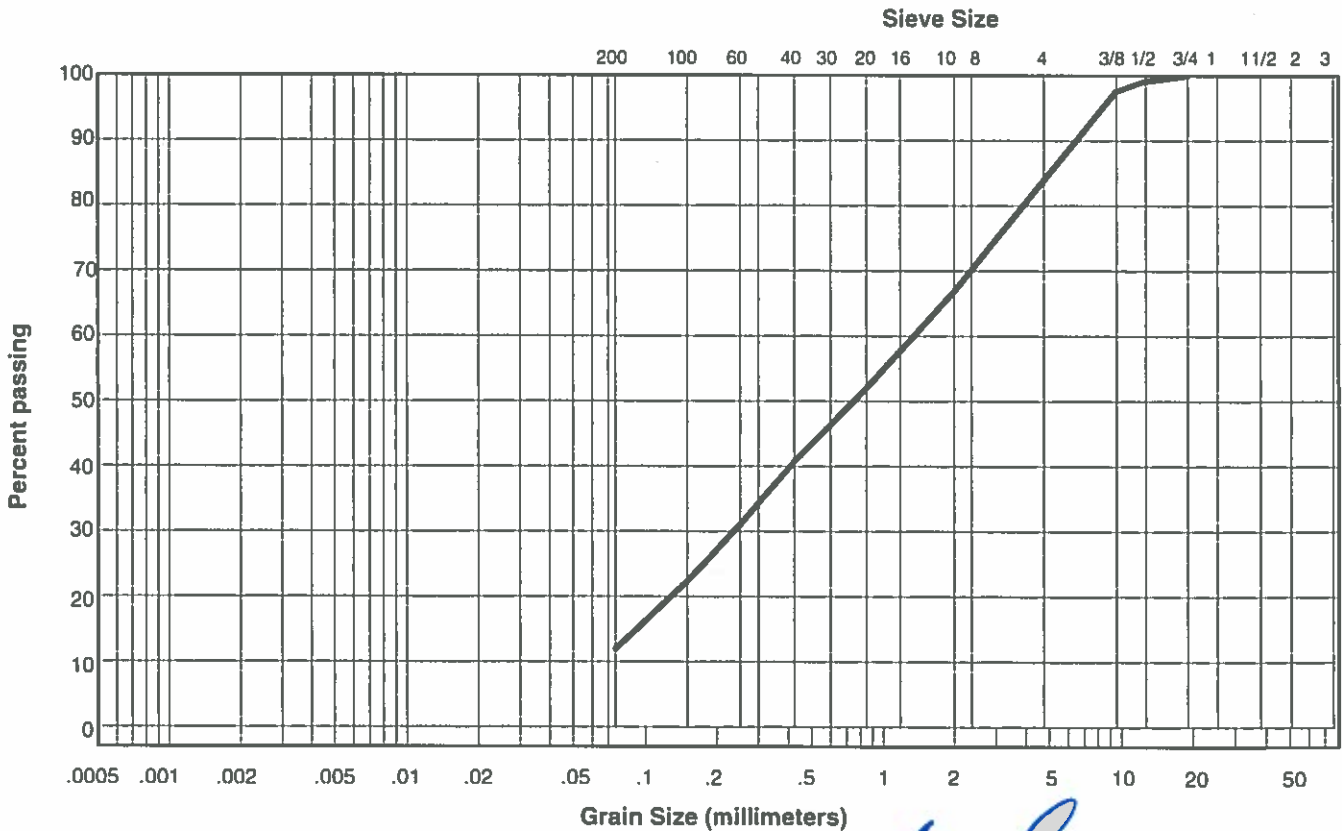
Cc: _____

Natural Moisture Content: 11.2%

Remarks: Rootlet inclusions

Sieve Size (mm)	Percent Passing
50.000	#N/A
37.500	#N/A
25.000	#N/A
19.000	100
12.500	99
9.500	98
4.750	84
2.000	67
0.850	52
0.425	41
0.250	31
0.150	22
0.075	12

Clay	Silt	Sand			Gravel	
		Fine	Medium	Coarse	Fine	Coarse



Reviewed By: *David Summers* A.Sc.T.

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PARTICLE SIZE ANALYSIS REPORT

ASTM C136 & C117

Project: Alaska Highway Upgrades km 501-509

Project Number: TRN.VHWY03116-01

Date Tested: July 18, 2018

Testhole Number: TP18-32

Depth: 0.1 m

Soil Description: GRAVEL, some sand, trace silt, damp, dark brown

Cu: 69.4

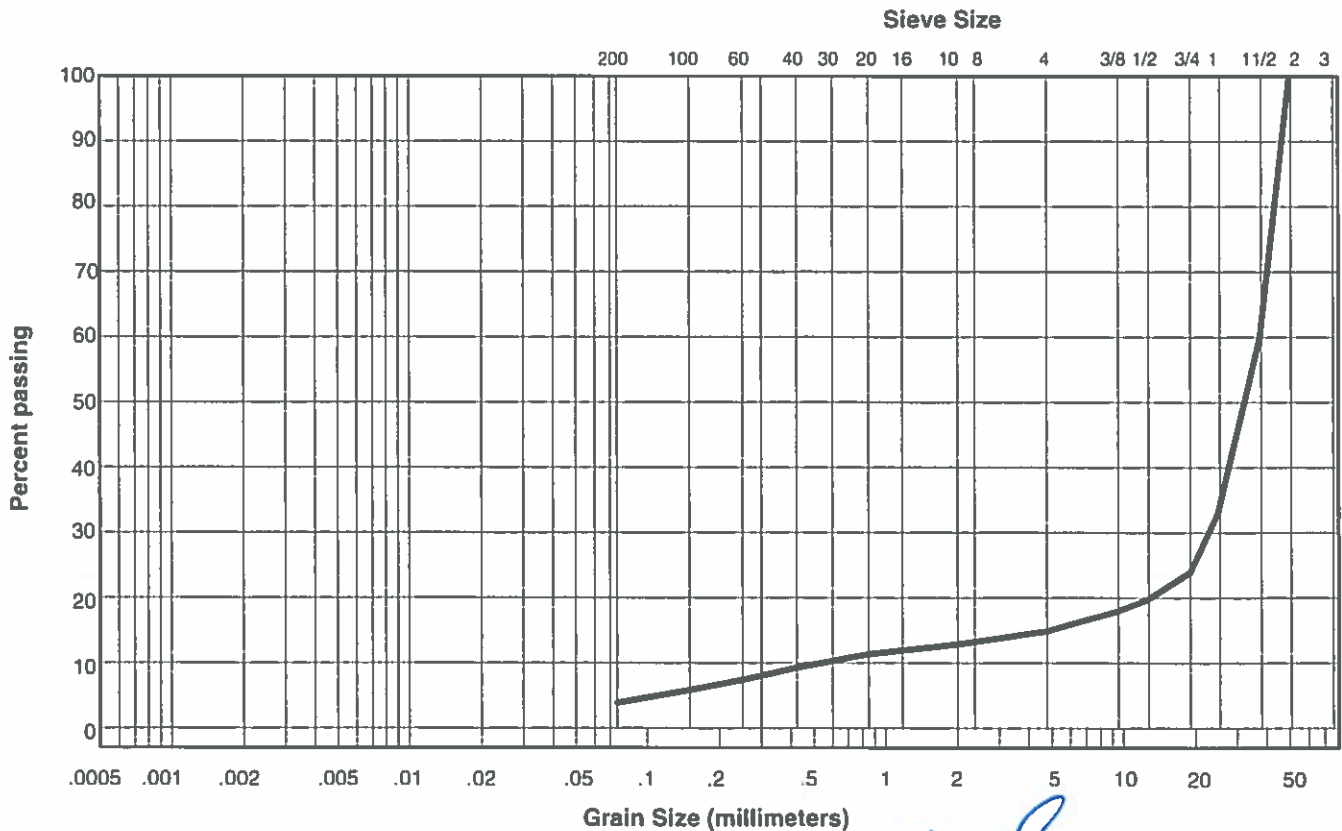
Cc: 25.6

Natural Moisture Content: 3.0%

Remarks: Organic inclusions

Sieve Size (mm)	Percent Passing
50.000	100
37.500	60
25.000	33
19.000	24
12.500	20
9.500	18
4.750	15
2.000	13
0.850	11
0.425	9
0.250	7
0.150	6
0.075	3.9

Clay	Silt	Sand			Gravel	
		Fine	Medium	Coarse	Fine	Coarse



Reviewed By: *[Signature]* A.ScT.

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PARTICLE SIZE ANALYSIS REPORT

ASTM C136 & C117

Project: Alaska Highway Upgrades km 501-509

Project Number: TRN.VHWY03116-01

Date Tested: July 18, 2018

Testhole Number: TP18-36

Depth: 0.1 m

Soil Description: GRAVEL, some sand, trace silt, damp, dark brown

Cu: 116.5

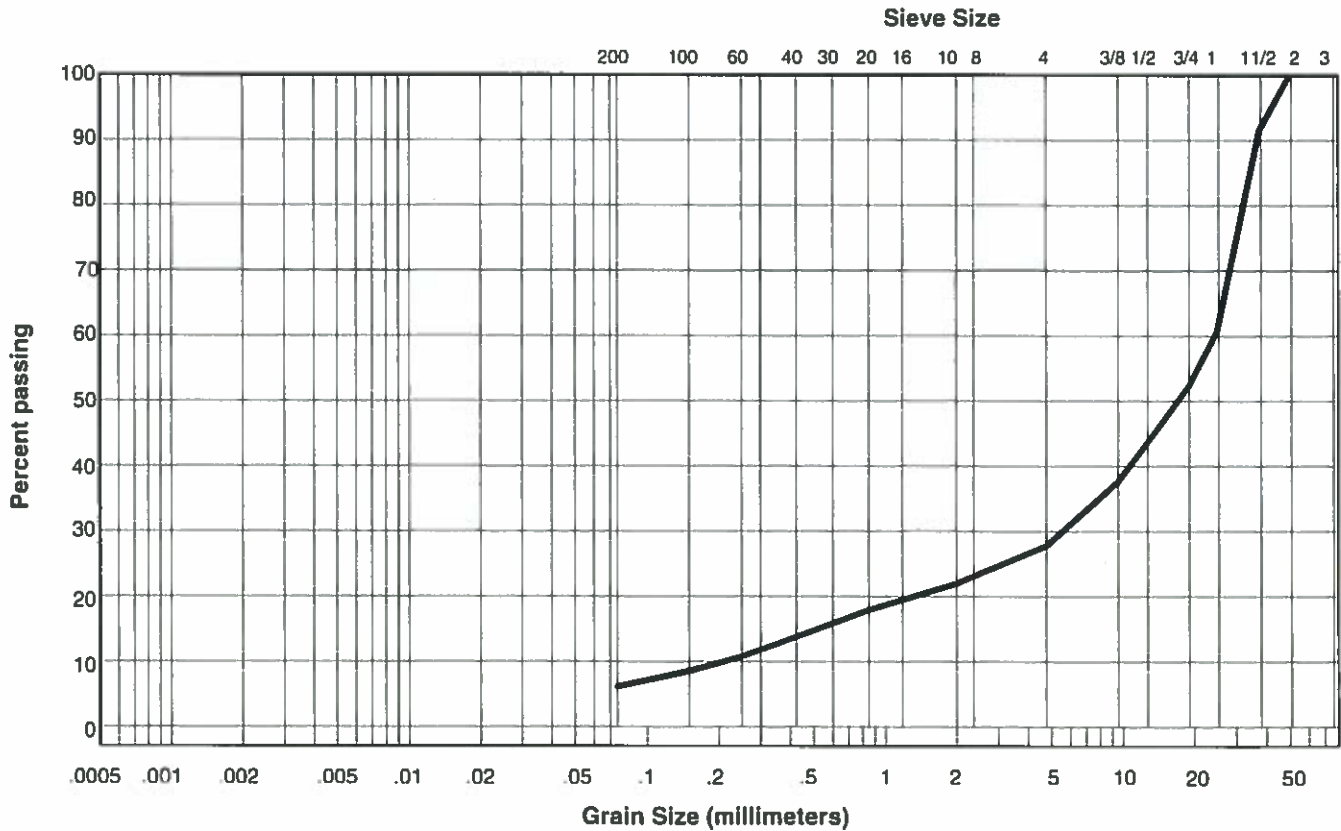
Cc: 6.0

Natural Moisture Content: 3.7%

Remarks: _____

Sieve Size (mm)	Percent Passing
50.000	100
37.500	92
25.000	61
19.000	52
12.500	43
9.500	38
4.750	28
2.000	22
0.850	18
0.425	14
0.250	11
0.150	9
0.075	6.2

Clay	Silt	Sand			Gravel	
		Fine	Medium	Coarse	Fine	Coarse



Reviewed By: _____ A.ScT.

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PARTICLE SIZE ANALYSIS REPORT

ASTM C136 & C117

Project: Alaska Highway Upgrades km 501-509

Project Number: TRN.VHWY03116-01

Date Tested: July 18, 2018

Testhole Number: TP18-41

Depth: 0.1 m

Soil Description: GRAVEL, some sand, trace silt, damp, dark brown

Cu: 154.3

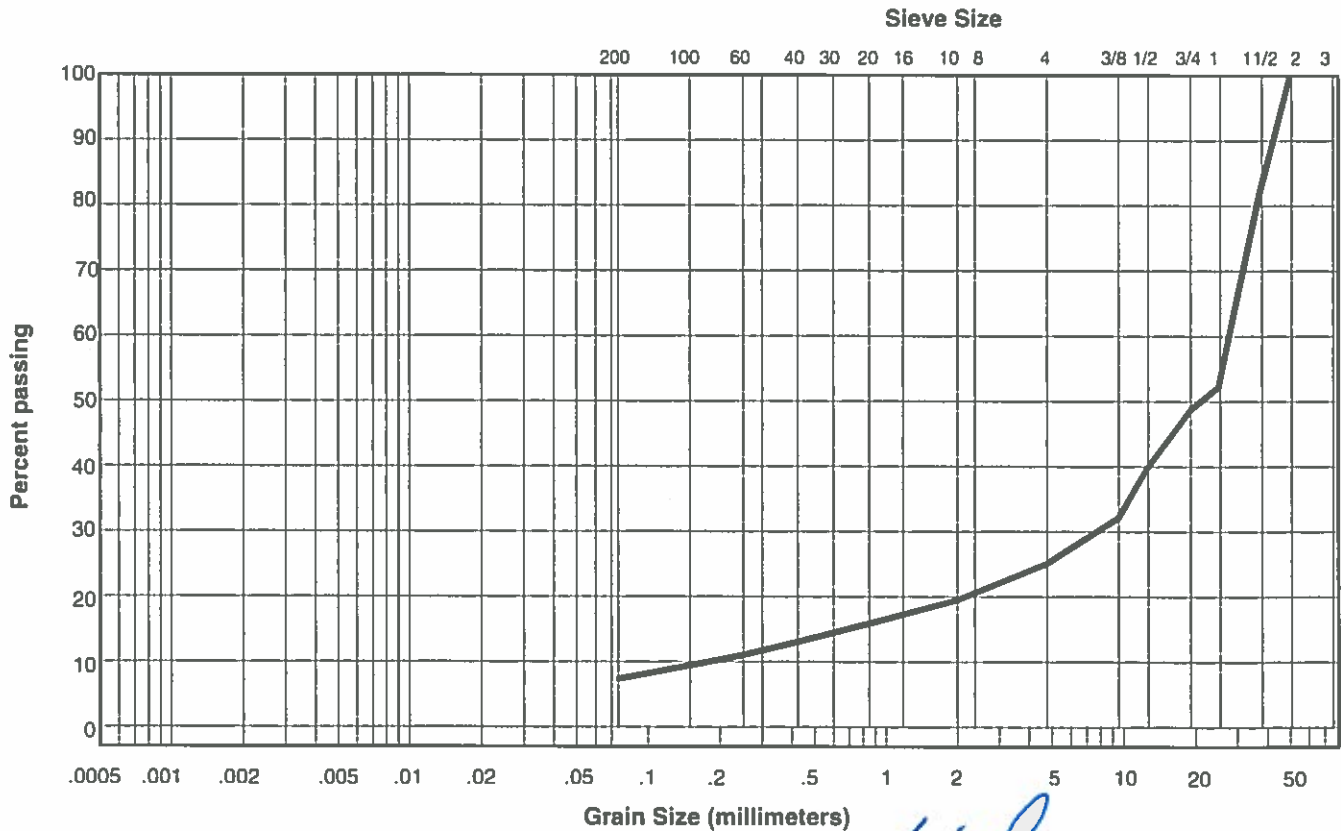
Cc: 12.0

Natural Moisture Content: 3.0%

Remarks: _____

Sieve Size (mm)	Percent Passing
50.000	100
37.500	83
25.000	52
19.000	49
12.500	40
9.500	32
4.750	25
2.000	20
0.850	16
0.425	13
0.250	11
0.150	9
0.075	7.4

Clay	Silt	Sand			Gravel	
		Fine	Medium	Coarse	Fine	Coarse



Reviewed By: *Diana Gunnison* A.Sc.T.

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PARTICLE SIZE ANALYSIS REPORT

ASTM C136 & C117

Project: Alaska Highway Upgrades km 501-509

Project Number: TRN.VHWY03116-01

Date Tested: July 18, 2018

Testhole Number: TP18-44

Depth: 1.5 m

Soil Description: GRAVEL, some sand, trace silt, damp, dark brown

Cu: 62.8

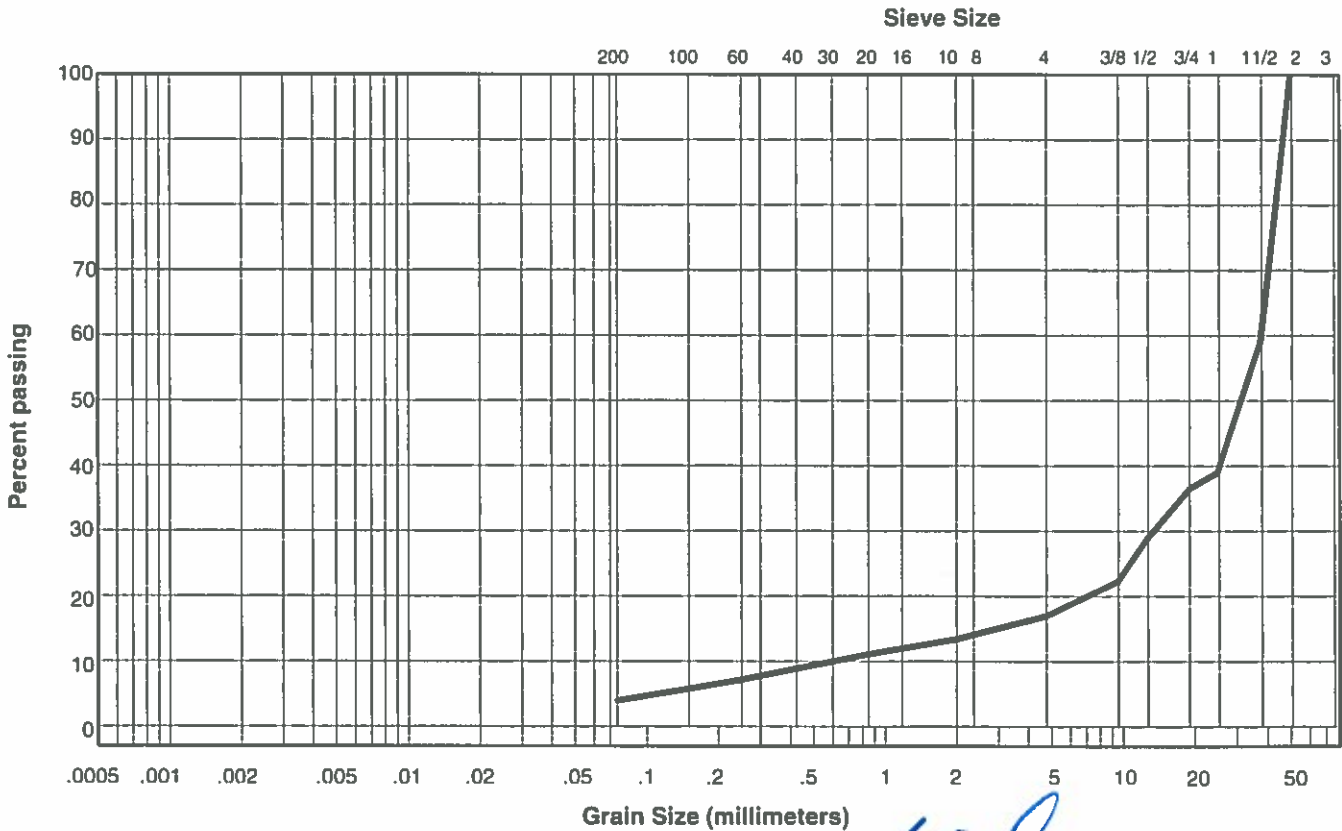
Cc: 7.9

Natural Moisture Content: 2.3%

Remarks: _____

Sieve Size (mm)	Percent Passing
50.000	100
37.500	59
25.000	39
19.000	36
12.500	29
9.500	22
4.750	17
2.000	13
0.850	11
0.425	9
0.250	7
0.150	6
0.075	4.0

Clay	Silt	Sand			Gravel	
		Fine	Medium	Coarse	Fine	Coarse



Reviewed By: _____

Dean Gunnora

A.ScT.

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PARTICLE SIZE ANALYSIS REPORT

ASTM C136 & C117

Project: Alaska Highway Upgrades km 501-509

Project Number: TRN.VHWY03116-01

Date Tested: July 18, 2018

Testhole Number: TP18-50

Depth: 0.2 m

Soil Description: SAND, gravelly, some clay, some silt, moist, dark brown

Cu: _____

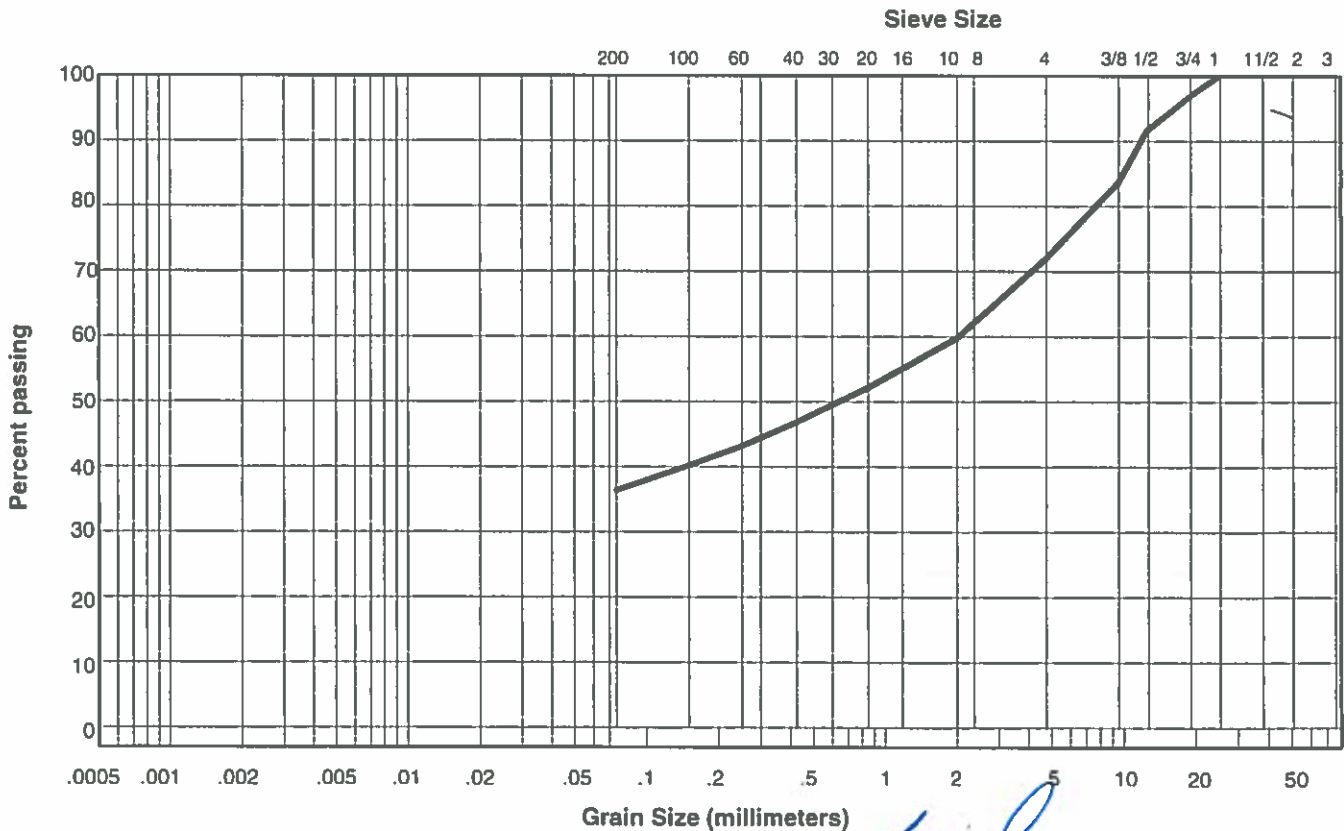
Cc: _____

Natural Moisture Content: 10.7%

Remarks: _____

Sieve Size (mm)	Percent Passing
50.000	#N/A
37.500	#N/A
25.000	100
19.000	97
12.500	92
9.500	84
4.750	72
2.000	60
0.850	52
0.425	47
0.250	43
0.150	40
0.075	36

Clay	Silt	Sand			Gravel	
		Fine	Medium	Coarse	Fine	Coarse



Reviewed By: *Blair Summersell* A.ScT.

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PARTICLE SIZE ANALYSIS REPORT

ASTM C136 & C117

Project: Alaska Highway Upgrades km 501-509

Project Number: TRN.VHWY03116-01

Date Tested: July 18, 2018

Testhole Number: TP18-55

Depth: 1.0 m - 1.1 m

Soil Description: CLAY, some silt, moist, dark brown

Cu: _____

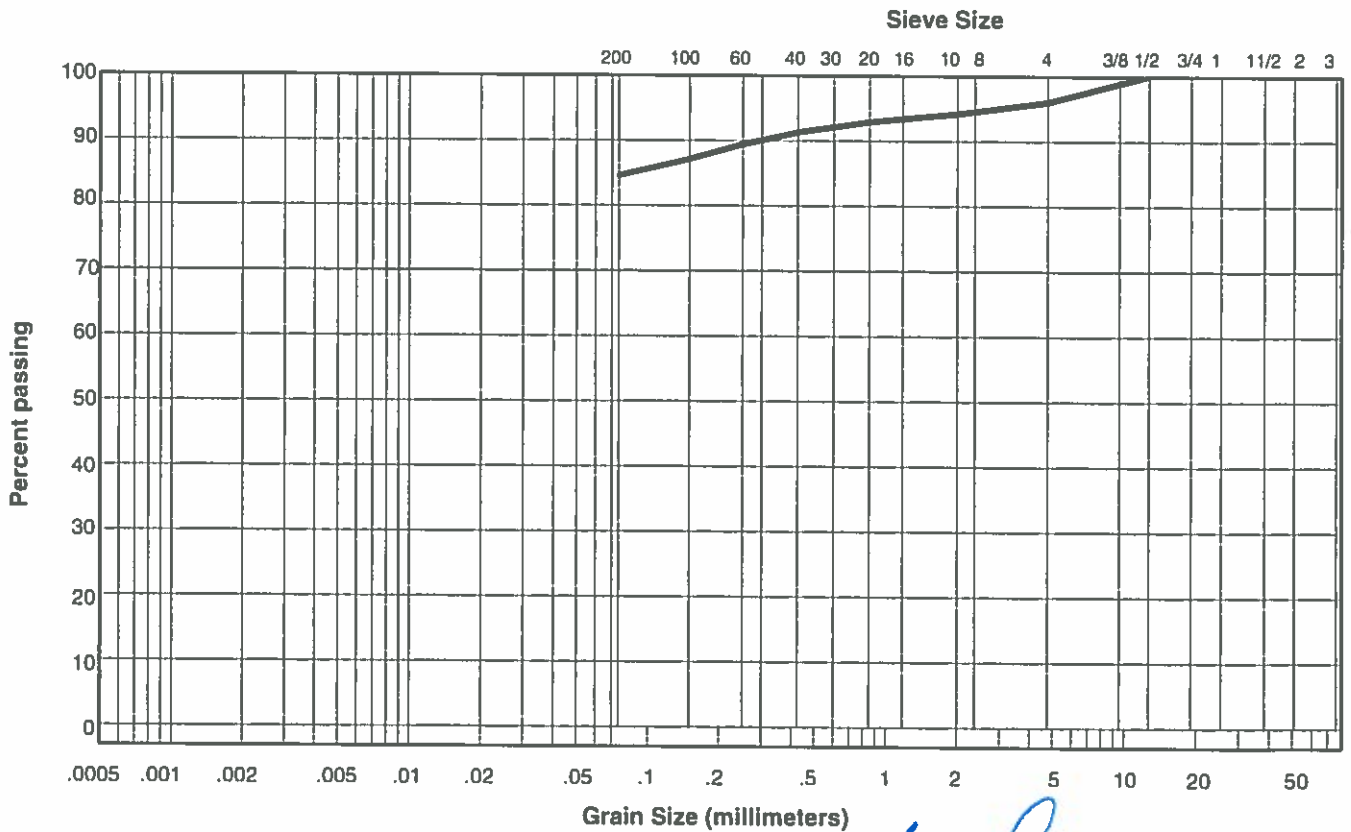
Cc: _____

Natural Moisture Content: Not done

Remarks: _____

Sieve Size (mm)	Percent Passing
50.000	#N/A
37.500	#N/A
25.000	#N/A
19.000	#N/A
12.500	100
9.500	99
4.750	96
2.000	94
0.850	93
0.425	91
0.250	89
0.150	87
0.075	85

Clay	Silt	Sand			Gravel	
		Fine	Medium	Coarse	Fine	Coarse



Reviewed By: *Oliver J. Gummer* A.ScT.

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PARTICLE SIZE ANALYSIS REPORT

ASTM C136 & C117

Project: Alaska Highway Upgrades km 501-509

Project Number: 704-TRN.VHWY03116-01

Date Tested: July 18, 2018

Borehole Number: TP18-57

Depth: 0.15 m

Soil Description: GRAVEL and SAND, some silt, ,moist, dark brown

Cu: _____

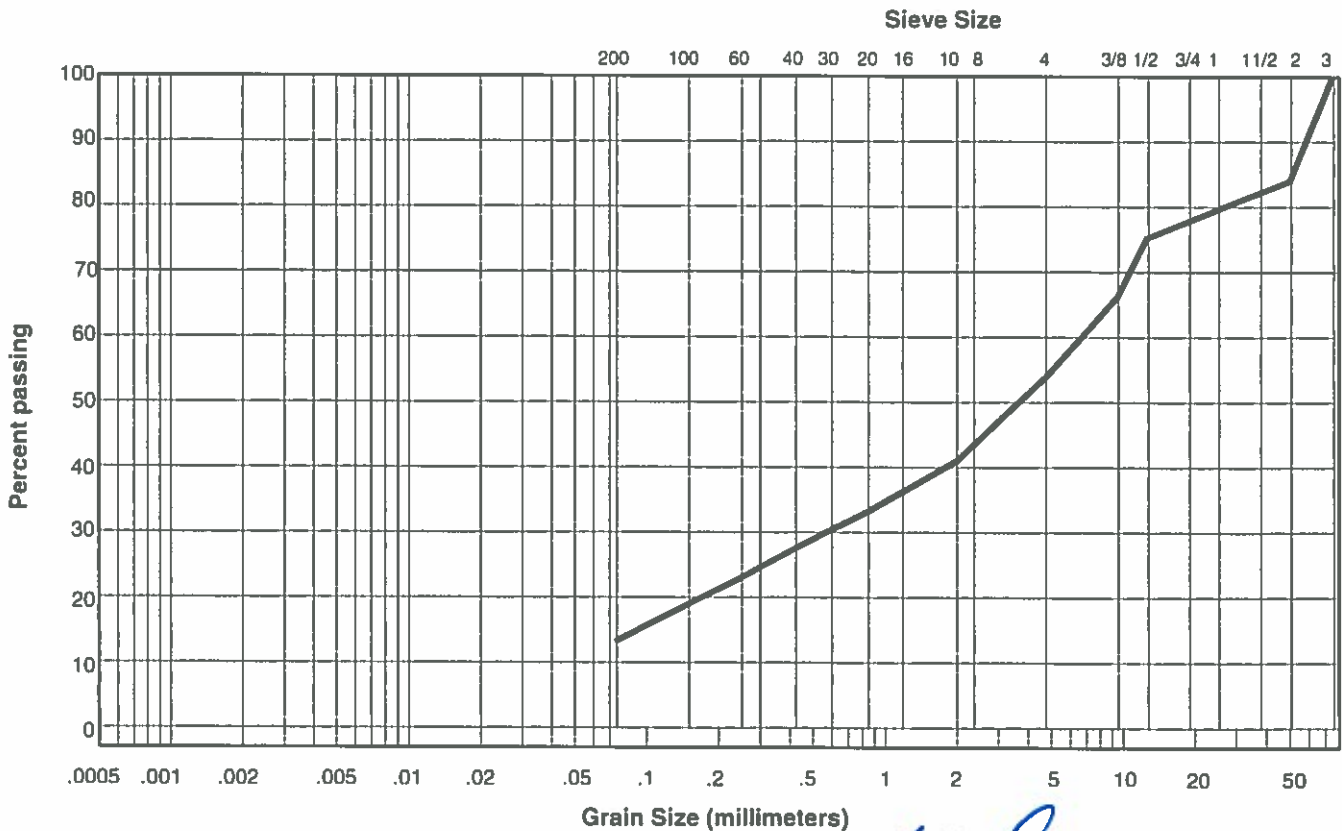
Cc: _____

Natural Moisture Content: 4.2%

Remarks: _____

Sieve Size (mm)	Percent Passing
	#N/A
	#N/A
75.000	100
50.000	84
12.500	75
9.500	66
4.750	54
2.000	41
0.850	33
0.425	28
0.250	23
0.150	19
0.075	13.4

Clay	Silt	Sand			Gravel	
		Fine	Medium	Coarse	Fine	Coarse



Reviewed By: *Brian Sumner* A.ScT.

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PARTICLE SIZE ANALYSIS REPORT

ASTM C136 & C117

Project: Alaska Highway Upgrades km 501-509

Project Number: TRN.VHWY03116-01

Date Tested: July 18, 2018

Testhole Number: TP18-61

Depth: 0.1 m

Soil Description: SAND and GRAVEL, some silt, moist, dark brown

Cu: _____

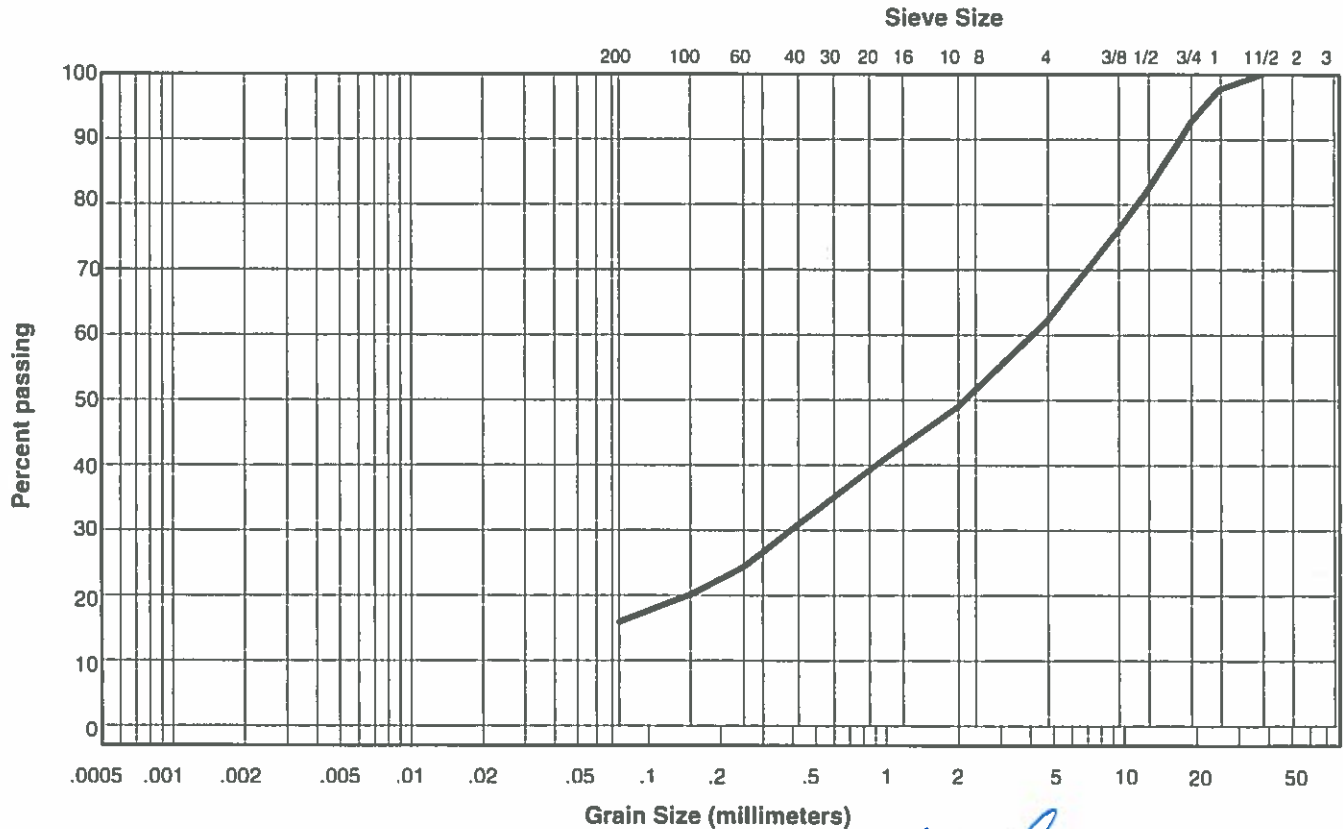
Cc: _____

Natural Moisture Content: 6.2%

Remarks: Shale particles described as sand and gravel

Sieve Size (mm)	Percent Passing
50.000	#N/A
37.500	100
25.000	98
19.000	93
12.500	82
9.500	76
4.750	62
2.000	49
0.850	39
0.425	31
0.250	24
0.150	20
0.075	16

Clay	Silt	Sand			Gravel	
		Fine	Medium	Coarse	Fine	Coarse



Reviewed By: *Allen Gunnerson* A.ScT.

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PARTICLE SIZE ANALYSIS REPORT

ASTM C136 & C117

Project: Alaska Highway Upgrades km 501-509

Project Number: TRN.VHWY03116-01

Date Tested: July 18, 2018

Testhole Number: TP18-67

Depth: 0.1 m

Soil Description: GRAVEL, sandy, some silt, damp, dark brown

Cu: _____

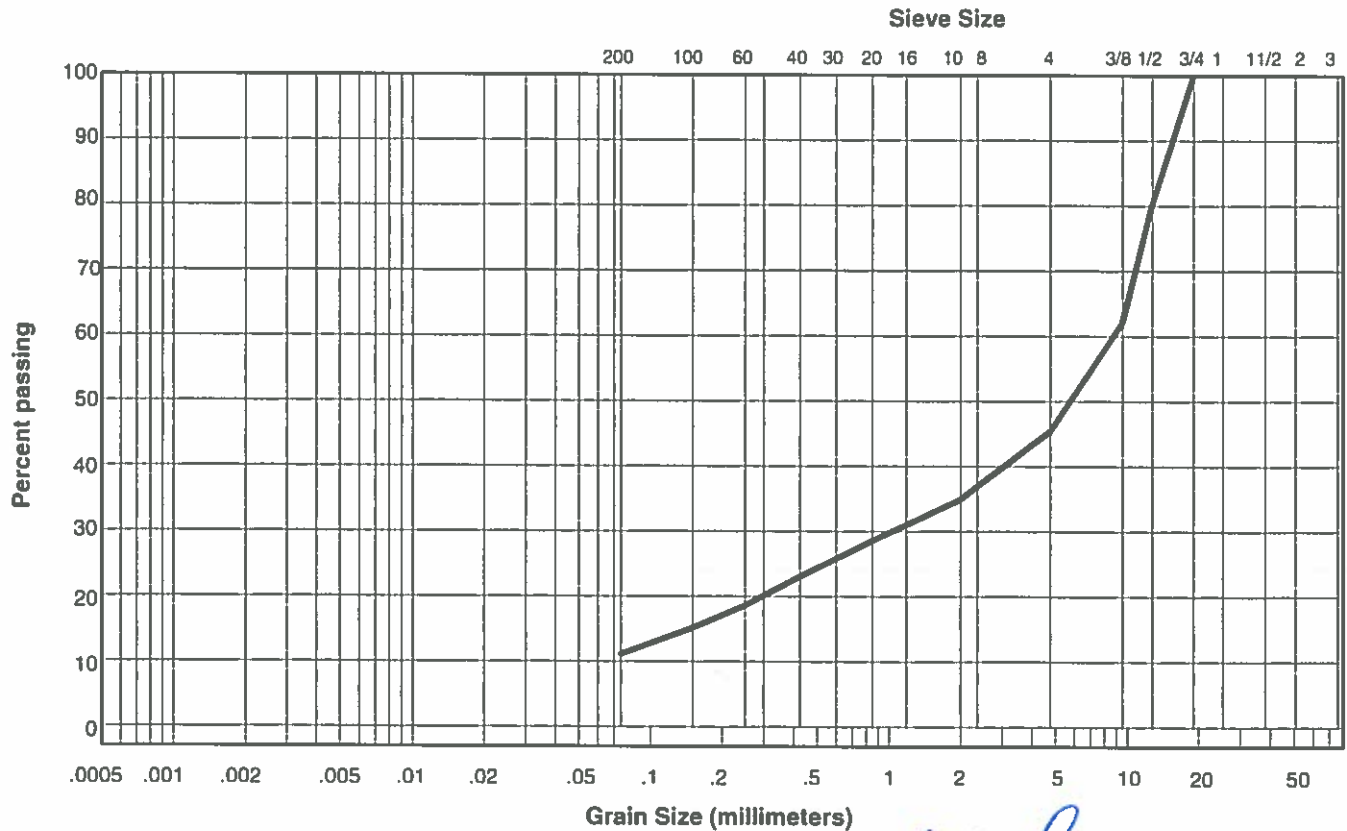
Cc: _____

Natural Moisture Content: 3.8%

Remarks: _____

Sieve Size (mm)	Percent Passing
50.000	#N/A
37.500	#N/A
25.000	#N/A
19.000	100
12.500	79
9.500	62
4.750	45
2.000	35
0.850	29
0.425	23
0.250	19
0.150	15
0.075	11

Clay	Silt	Sand			Gravel	
		Fine	Medium	Coarse	Fine	Coarse



Reviewed By: *Brian J. Sumner* A.Sc.T.

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PARTICLE SIZE ANALYSIS REPORT

ASTM C136 & C117

Project: Alaska Highway Upgrades km 501-509

Project Number: TRN.VHWY03116-01

Date Tested: July 18, 2018

Testhole Number: TP18-71

Depth: 0.15 m

Soil Description: GRAVEL and SAND, some silt, damp, dark brown

Cu: _____

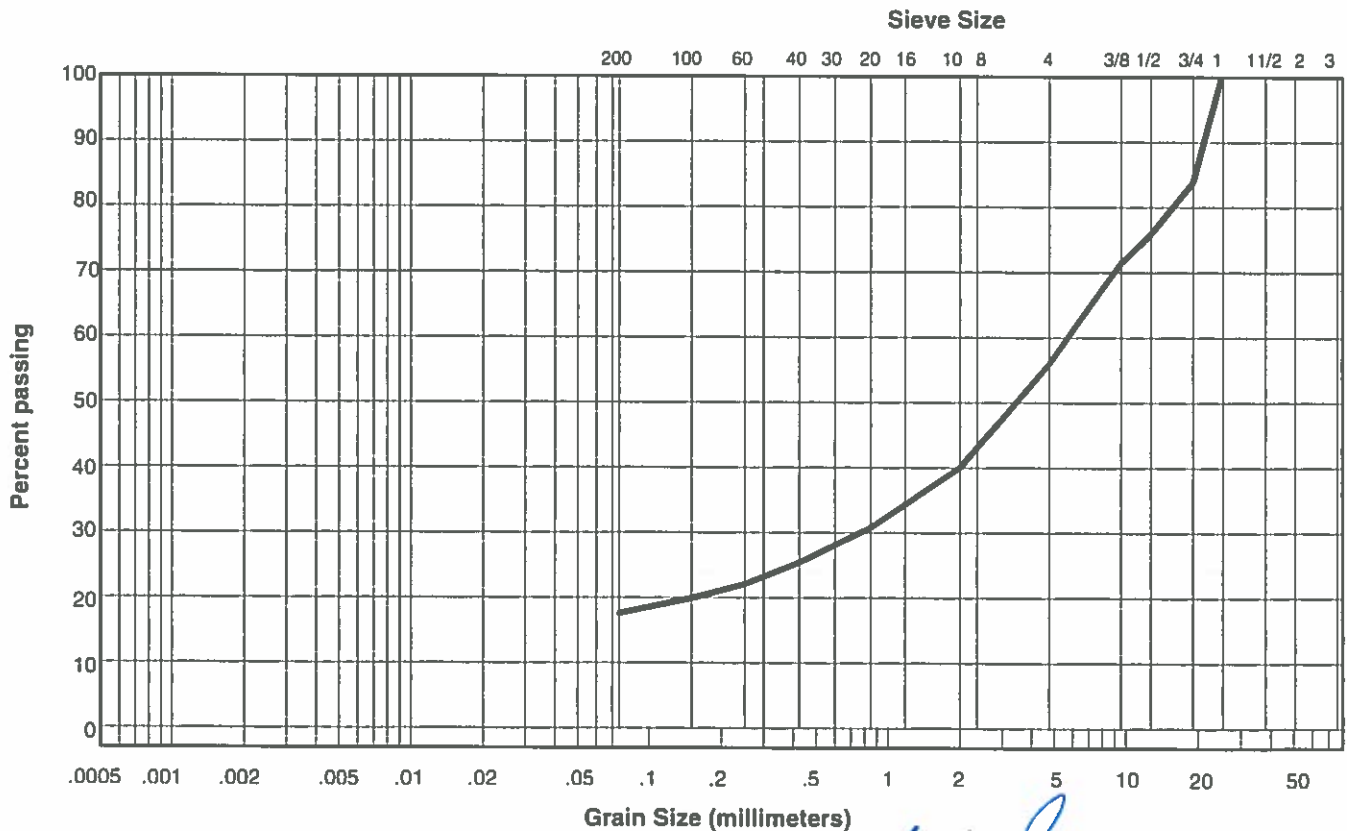
Cc: _____

Natural Moisture Content: 7.1%

Remarks: _____

Sieve Size (mm)	Percent Passing
100.000	#N/A
75.000	#N/A
50.000	100
37.500	84
12.500	76
9.500	71
4.750	56
2.000	40
0.850	31
0.425	25
0.250	22
0.150	20
0.075	18

Clay	Silt	Sand			Gravel	
		Fine	Medium	Coarse	Fine	Coarse



Reviewed By: *Brian J. Emerson* A.ScT.

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PARTICLE SIZE ANALYSIS REPORT

ASTM C136 & C117

Project: Alaska Highway Upgrades km 501-509

Project Number: TRN.VHWY03116-01

Date Tested: July 18, 2018

Testhole Number: TP18-74

Depth: 0.1 m

Soil Description: GRAVEL, some sand, trace silt, damp, brown

Cu: 130.3

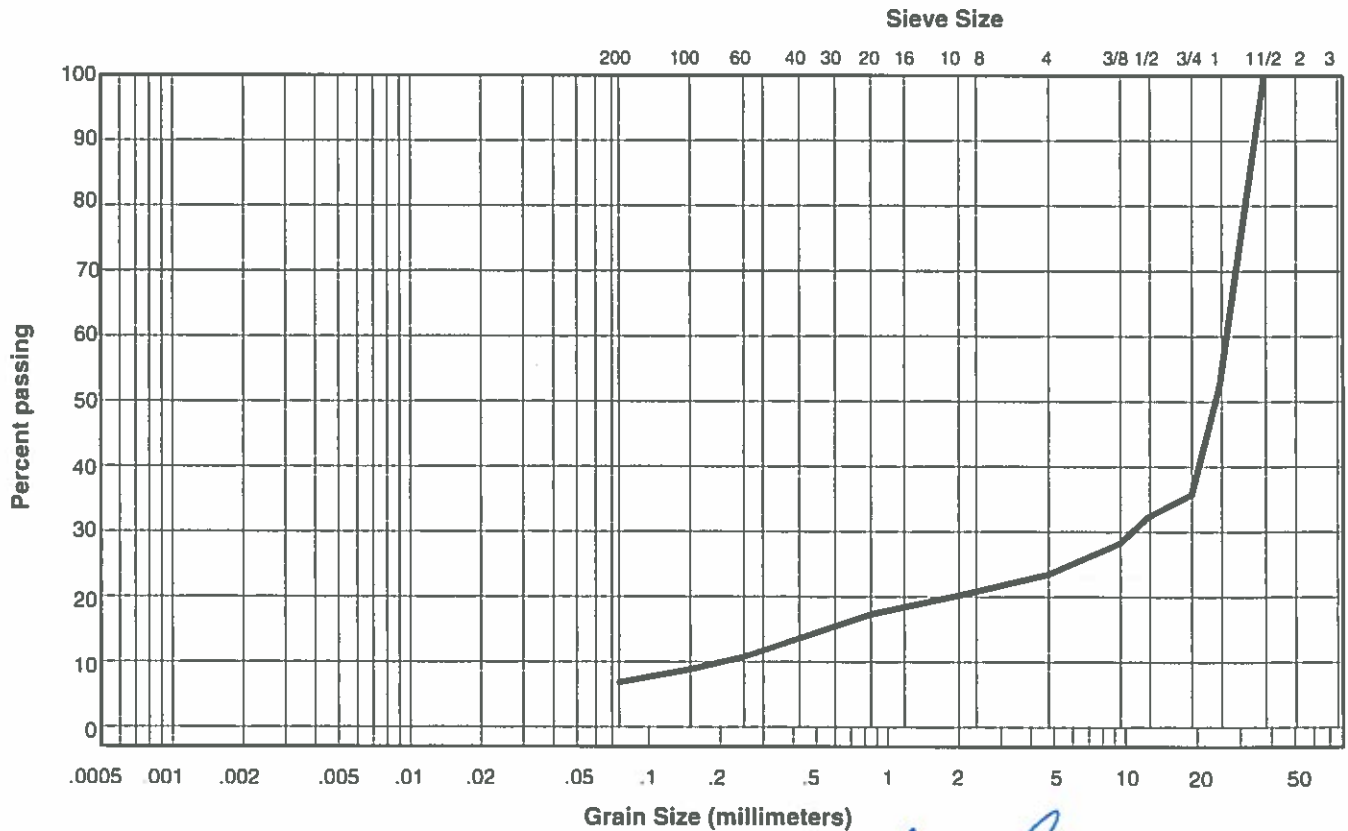
Cc: 21.1

Natural Moisture Content: 3.6%

Remarks: _____

Sieve Size (mm)	Percent Passing
50.000	#N/A
37.500	100
25.000	53
19.000	36
12.500	32
9.500	28
4.750	23
2.000	20
0.850	17
0.425	14
0.250	11
0.150	9
0.075	6.8

Clay	Silt	Sand			Gravel	
		Fine	Medium	Coarse	Fine	Coarse



Reviewed By: *Dan J. Johnson* A.Sc.T.

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PARTICLE SIZE ANALYSIS REPORT

ASTM C136 & C117

Project: Alaska Highway Upgrades km 501-509

Project Number: TRN.VHWY03116-01

Date Tested: July 18, 2018

Testhole Number: TP18-78

Depth: 0.2 m

Soil Description: GRAVEL, some sand, trace silt, damp, dark brown

Cu: 61.0

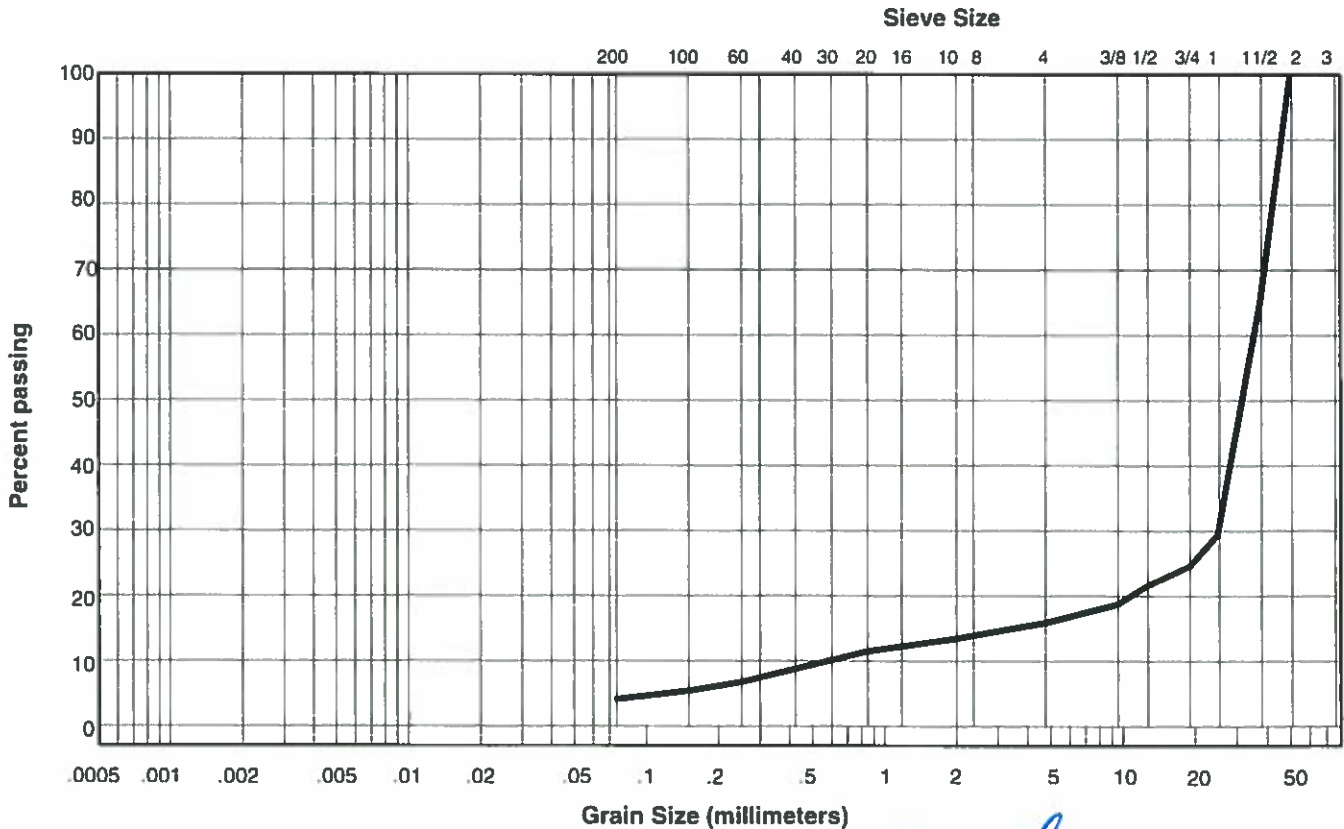
Cc: 30.8

Natural Moisture Content: 2.1%

Remarks: _____

Sieve Size (mm)	Percent Passing
50.000	100
37.500	65
25.000	29
19.000	25
12.500	22
9.500	19
4.750	16
2.000	13
0.850	11
0.425	9
0.250	7
0.150	5
0.075	4.1

Clay	Silt	Sand			Gravel	
		Fine	Medium	Coarse	Fine	Coarse



Reviewed By: *Erin Summers* A.Sc.T.

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PARTICLE SIZE ANALYSIS REPORT

ASTM C136 & C117

Project: Alaska Highway Upgrades km 501-509

Project Number: TRN.VHWY03116-01

Date Tested: July 18, 2018

Testhole Number: TP18-84

Depth: 0.2 m

Soil Description: SAND and GRAVEL, trace silt, damp, brown

Cu: _____

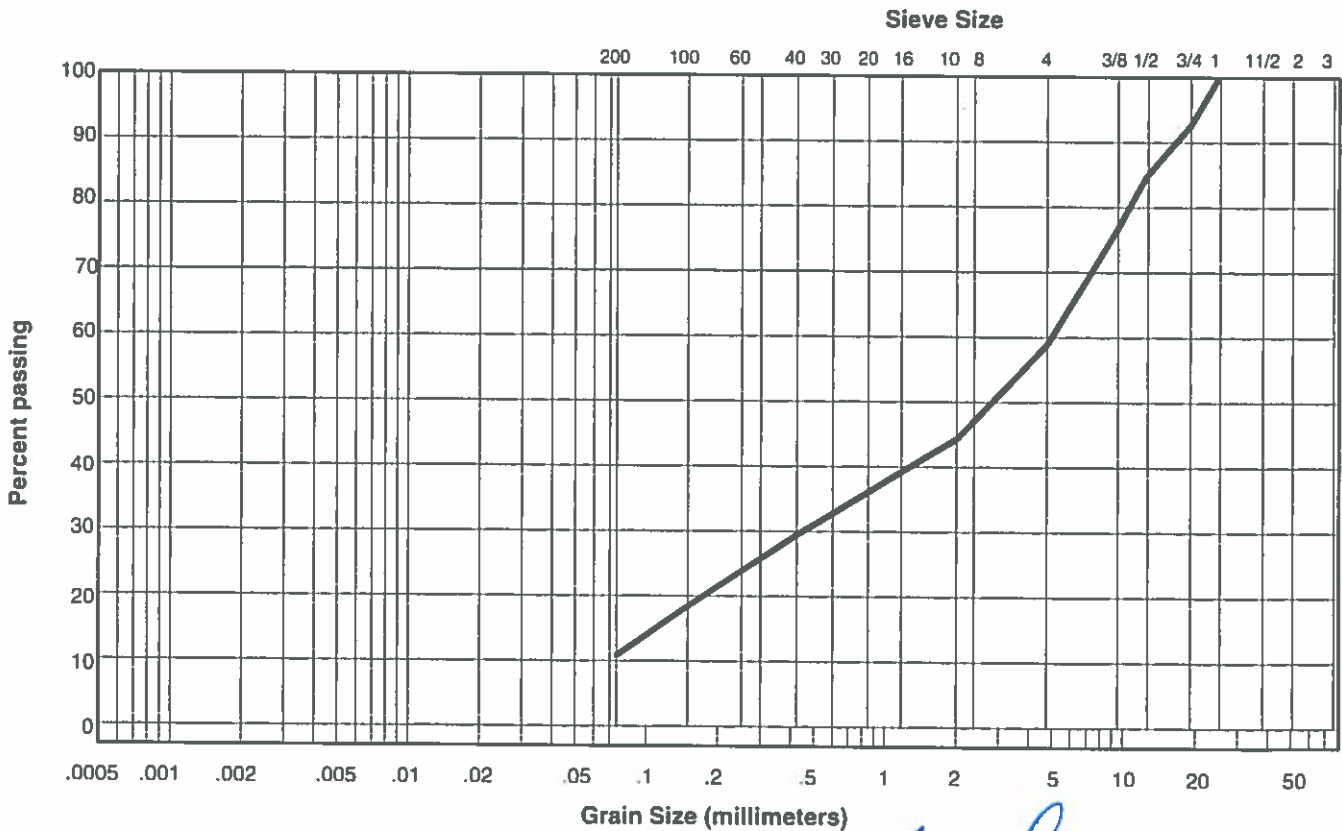
Cc: _____

Natural Moisture Content: 2.4%

Remarks: Asphalt remnants retained on 37.5 mm sieve

Sieve Size (mm)	Percent Passing
100.000	#N/A
75.000	#N/A
50.000	100
37.500	93
12.500	85
9.500	77
4.750	59
2.000	44
0.850	36
0.425	29
0.250	24
0.150	18
0.075	11

Clay	Silt	Sand			Gravel	
		Fine	Medium	Coarse	Fine	Coarse



Reviewed By: _____

Diana J. Sumner

A.Sc.T.

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PARTICLE SIZE ANALYSIS REPORT

ASTM C136 & C117

Project: Alaska Highway Upgrades km 501-509

Project Number: TRN.VHWY03116-01

Date Tested: July 18, 2018

Testhole Number: TP18-92

Depth: 0.0 m

Soil Description: SAND, gravelly, trace silt, trace rootlets, moist, dark brown

Cu: 31.8

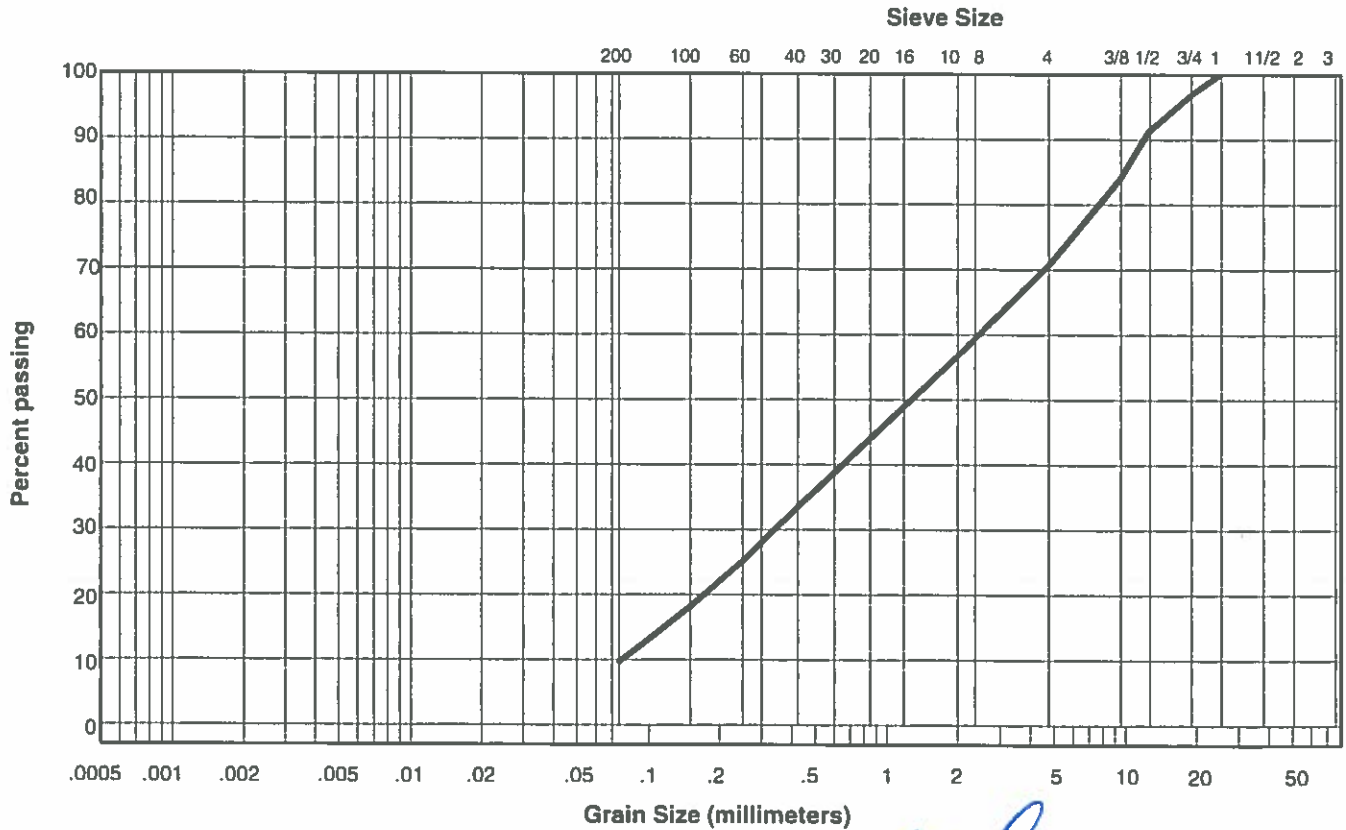
Cc: 0.6

Natural Moisture Content: 7.5%

Remarks: _____

Sieve Size (mm)	Percent Passing
50.000	#N/A
37.500	#N/A
25.000	100
19.000	97
12.500	91
9.500	84
4.750	71
2.000	57
0.850	44
0.425	34
0.250	25
0.150	18
0.075	10

Clay	Silt	Sand			Gravel	
		Fine	Medium	Coarse	Fine	Coarse



Reviewed By: *Dean Gunnerson* A.Sc.T.

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R.106984.001
Appendix P

Deactivation of Former Alignments Km 501.05 to Km 508.80

Environmental Overview Assessment (EOA)

Environmental Management Plan (EMP)

Caribou Protection Plan (CPP)

Environmental Overview Assessment Deactivation of Former Alignments KM 501.05 to KM 508.80, Alaska Highway, BC



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Public Services and Procurement Canada

JUNE 4, 2021
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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
ECCC	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

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1.0 INTRODUCTION

Tetra Tech Canada Inc. (Tetra Tech) was retained by Public Services and Procurement Canada (PSPC) to conduct and Environmental Overview Assessment (EOA) for the planned decommissioning of two sections of the former Alaska Highway (herein referred to as the “Project”), located between KM 501.05 and KM 508.80 of the current alignment

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

2.1 Project Location

The Project area includes two former alignments located between KM 501.05 and KM 508.80 of the Alaska Highway (Figure 1) in Northern BC and is approximately 40 km west of Fort Nelson.

- Section A is northwest of the current highway alignment from KM 501.05 to KM 504.50.
- Section B is southeast of the current highway alignment from KM 504.45 to KM 508.80.

2.2 Project Description

Since 1964, PSPC has been the federal custodian for the Alaska Highway and is responsible for the maintenance of the current highway and deactivation of former highway alignments (PSPC n.d.). PSPC’s current operational jurisdiction of the Alaska Highway extends from KM 133 (north of Fort St. John) to the BC-Yukon border at KM 968 and the highway has undergone multiple alignment modifications since its construction in 1942 (PSPC n.d.). As such, there are many former alignment sites along the Alaska Highway that are no longer active and require deactivation and divestiture.

Former alignment sites were prioritized for deactivation and grouped into tender packages based on geographical proximity and/or the types of deactivation works required. The two priority sites between KM 501.05 to KM 508.80 of the Alaska Highway were grouped together to undergo decommissioning/deactivation works.

These two former alignments have been identified as a potential source for highway construction materials (i.e., embankment or common fill). Deactivation may take place following or at the same time as extraction of these materials. Material extraction would not take place within 30 meters of any watercourses. The deactivation prescriptions are proposed to be based primarily on the BC Ministry of Forestry Guidelines as described in the Tetra Tech report, *Alaska Highway Former Alignments Project: Typical Criteria / Standards for Road Deactivation (August 14, 2018)*; as well as feedback received from PSPC, BC Ministry of Transportation and Infrastructure, and BC Ministry of Environment and Climate Change Strategy.

These two sites have been identified for permanent deactivation, which is typically applied when use of the road will no longer be required and no further inspections or maintenance is required. Decommissioning works for permanent deactivation on these two former alignments will include:

- Clearing of existing trees and stripping vegetation within the former highway road prism;

- Excavation and off-site stockpiling of materials in the former highway road prism for re-use in the highway widening construction;
- Revegetation through seeding once required materials have been extracted;
- Removal of 25 culverts (Table 1-1) and replacement with cross-ditches, berms, or water bars to re-establish drainage patterns;
- Slope stabilization at Km 21.85 of Section B (KM 504.40 to KM 508.60);
- Scarifying the remaining former gravel driving surface and Bituminous Surface Treatment (BST) layer;
- Removal of Beaver Dam’s to facilitate removal of culverts from Km 13.70 to Km 14.00.
- Removal of debris including abandoned car body, tire and axel, drum barrel, traffic barricades, hanging garbage cans/existing signs at various locations along both alignments; and
- Access removal at each entry point to the former alignment, with placement of large boulders at the east end of Section A (KM 501.05 to KM 504.50) to remove ATV/vehicle access to these deactivated road segments.

Standard heavy equipment will be used throughout construction for various activities listed above. These may include excavators, dozers, rock trucks, graders, rollers, etc. The location and size of staging and laydown areas and debris stockpiles will be determined through detailed design phase of the Project.

Table 1-1: Existing Culverts along the Former Alignment

Station	UTM Coordinates		Size (mm)	Type
	Easting	Northing		
Section A (KM 501+200 to KM 504+400)				
11+150	474969	6525972	900	CSP
11+350	474824	6525843	600	CSP
11+610	474613	6525692	800	CSP
12+150	474079	6525667	750	CSP
13+230	473721	6525012	800	CSP
13+680	473782	6524577	750	CSP
13+910	473879	6524363	750	CSP
13+920	473888	6524366	800 (Assumed)	Wood Stake
14+280	473974	6524010	1000	Wood Stake
Section B (KM 504+400 to KM 508+600)				
20+470	474053	6523247	600	CSP
20+970	474143	6522809	800	CSP
21+470	473673	6522682	750	CSP
21+480	473659	6522667	750	CSP
21+830	473362	6522522	600	CSP
22+070	473149	6522409	800 (Assumed)	Wood Stake
22+540	472714	6522238	800	CSP
22+680	472582	6522213	900	CSP
23+020	472289	6522043	600	CSP
23+260	472093	6521902	800 (Wood) 750 (CSP)	Wood Stake & CSP
23+940	471536	6521914	800 (Wood) 750 (CSP)	Wood Stake & CSP
24+290	471458	6522200	1200 (Wood) 600 (CSP)	Wood Stake & CSP
24+550	471285	6522050	600	Wood Stake
24+810	471100	6521854	600	Wood Stake
25+020	470927	6521739	600	CSP
25+060	470895	6521708	650 (Wood) 750 (CSP)	Wood Stake & CSP

2.3 Project Schedule

PSPC anticipates awarding the construction contract in the Fall of 2021.

PSPC anticipates construction to begin November 2021. Construction may be completed over multiple years with all construction works completed by March 31st 2024. Active construction will occur during dry or frozen conditions (e.g., winter) or during the least risk work window for fish (because both spring and fall spawners are potentially present in downstream watercourses, the least risk window is July 15 to August 15). Beaver removal, if necessary, to facilitate dam removal, will be conducted by a licenced trapper during open season (October 15 and April 30).

3.0 RELEVANT ENVIRONMENTAL LEGISLATION

3.1.1 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.

Under Section 9 of the *Wildlife Act*, it is an offence to disturb, molest or destroy a beaver den or dam except where that person is a trapper licensed under the act or under “lawful authority” for the protection of property where the action is authorized by regulation. A General Wildlife Permit (type 3(1)(a)) must be obtained through FrontCounter BC for beaver dam removal and a Notification under the Water Sustainability Act (see Section 3.1.2) must also be submitted.

3.1.2 BC Water Sustainability Act

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 FLNRORD and recent experience with similar projects, the Project activities (i.e., beaver dam removal, culvert removals and cross-ditch installation), Tetra Tech anticipates that a Notification will be required for the Project. Until the 45-day Notification period has passed without comment from FLNRORD on the activities, no Project works should be conducted.

3.1.3 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 3-1) 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 3-1: 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 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>)	

3.1.4 BC Environmental Management Act

The BC *Environmental Management Act* (EMA) was enacted in July 2004 and combined the *Waste Management Act* and *Environment Management Act*. The 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.

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.

3.1.5 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).

Known Heritage Resources have been investigated along the current highway alignment and at the adjacent decommissioning sites (Soriak – Tetra Tech Canada 2018). No archaeological sites have been identified near the Project; however, 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 (Appendix B).

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.

3.2 Federal

3.2.1 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* (Government of Canada 2019) came into force on August 28, 2019 and included 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 (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 the death of fish or a HADD if typical best management practices and mitigation (such as those detailed in the appended EMP [Appendix B]) are implemented. Therefore, no DFO Project Review or Authorization has been submitted.

3.2.2 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 SOMC 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 C). 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.

3.2.3 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 (ECCC).

3.2.4 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 Act 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.

4.0 METHODOLOGY

4.1 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 2020a);
- BC CDC Species and Ecosystems Explorer (BC CDC 2020b);
- BC Ministry of Environment and Climate Change Strategy (MOE) Fisheries Information Summary System (FISS) databases (BC MOE 2020a);
- BC MOE Habitat Wizard (BC MOE 2020b);
- 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 10 km search area was applied around each culvert to identify nearby watercourses and known occurrences of Species of Management Concern (SOMC), vegetation elements of management concern (VEMCs), and fish occurrences near to the Project area (Figure 2).

For the purposes of this EOA, sensitive fish species, VEMCs, and SOMCs were any species or ecosystems that met one or more of the following criteria:

- Present on the Red or Blue List in the provincial Species Ranking system (BC CDC 2020b);
- 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.

4.2 Field Assessment

Biophysical field assessments were conducted by Tetra Tech field staff in June 2018. The surrounding wetland and vegetation communities present within the former Alaska Highway alignment were characterized, and a list of identified vegetation species was compiled. All incidental wildlife observed during the biophysical field assessments were recorded. General characteristics and photographs of watercourses along the former alignment were also recorded. Detailed aquatic assessments of the watercourses were conducted on the watercourses at locations within the current highway ROW.

5.0 EXISTING CONDITIONS

The existing environment at the Project was characterized through a desktop study and field assessment. Photos from the field assessment are provided on Figure 2.

5.1 Air Quality and Noise

Air quality is typically determined by the concentrations of pollutants in the atmosphere which are 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 and Landforms

The Project lies within the Fort Nelson Lowland of the Alberta Plateau, which is the largest physiographic unit in the Boreal White and Black Spruce (BWBS) biogeoclimatic zone. The Alberta Plateau is an extensive lowland that has formed on sedimentary sandstones and shales. The Fort Nelson Lowland part of the Alberta Plateau is 600 m above mean sea level in elevation. The low elevation and flat terrain of the Fort Nelson Lowland is dominated by poorly drained black spruce peatlands. The dominant soil type in the Fort Nelson Lowland is Organic soils (i.e., Mesisols and Fibrisols), and the subdominant soil types are Brunisols on glaciofluvial deposits and Regosols on river floodplains and valley sides. Organic soils are associated with the vast peatlands in the Fort Nelson Lowland, Brunisols are associated with forests, and Regosols are associated with rivers and streams.

5.3 Fish and Aquatic Habitat

5.3.1 Watercourse Information

The Project area is located west and north of Kledo Creek and the Muskwa River, respectively. While the Project does not directly cross either of these watercourses, seventeen unnamed tributaries to Kledo Creek and the Muskwa River cross the former alignments between KM 501.05 to KM 508.80 (Figure 2). These small headwater tributaries provide water, food and nutrients to known fish-bearing waters downstream.

Section A of the former alignment (i.e., north of the current highway) is crossed by nine provincially mapped watercourses, five of which will be undergoing culvert removal works at their point of intersection with the former alignment road prism (Figure 1). Four additional drainage culverts are being removed along Section A, for a total of nine culvert removals (Table 5-1). Section B of the former alignment (i.e., south of the current highway) is crossed by eight provincially mapped watercourses, six of which will be undergoing culvert removal works at their point of intersection with the former alignment road prism (Figure 1). Six additional drainage culverts are being removed along Section B, for a total of 13 culvert removals (Table 5-1). With the exception of the culvert removal at 24+290, all of the culverts along Sections A and B are smaller 1st or 2nd order watercourses, or drainage culverts that used to convey road run-off from the old ditches on either side of the road during rainy periods.

Table 5-1. Watercourse Information Summary for the Culvert Installation and Replacement works.

Culvert KM Marking	Culvert ID (in current ROW) ¹	Stream Name/ Watershed Code 50K	Stream Info	Documented Fish Presence ²
Section A – KM 501.05 to KM 504.50 (north of current ROW)				
11+150	Prop-2	Unnamed Watercourse No 50K Watershed Code FWA ² Watershed Code: 200-692231-350733-577347-202295	2 nd order watercourse that drains the land northwest of the highway. This watercourse joins with other small tributaries before flowing into the Muskwa River (4.3 km downstream).	No
11+350	N/A	Not located on a provincially mapped watercourse.	Drainage culvert that conveys seepage and road run-off during rainy periods. Likely drains into the mapped 1 st order watercourse just to the south. <i>Drainage only. Not considered a watercourse.</i>	No

Culvert KM Marking	Culvert ID (in current ROW) ¹	Stream Name/ Watershed Code 50K	Stream Info	Documented Fish Presence ²
11+590	Ex-2	Unnamed Watercourse No 50K Watershed Code FWA ² Watershed Code: 200-692231-350733-577347- 207450-464663	1 st order watercourse that drains the land northwest of the highway. This watercourse joins other small tributaries before flowing into the Muskwa River (4.2 km downstream).	No
12+160	Ex-4	Unnamed Watercourse No 50K Watershed Code FWA ² Watershed Code: 200-692231-350733-577347- 208764-011705-287125-217898	1 st order watercourse that drains the land northwest of the highway. This watercourse flows south and joins with another first order stream before crossing the former alignment again through Culvert 13+680.	No
13+200	N/A	Not located on a provincially mapped watercourse.	Drainage culvert that conveys seepage and road run-off during rainy periods. Likely drains the old roadside ditch into the wetland area/mapped 3 rd order watercourse directly to the west of the former alignment. <i>Drainage only. Not considered a watercourse.</i>	No
13+680	Ex-4	Unnamed Watercourse No 50K Watershed Code FWA ² Watershed Code: 200- 692231-350733-577347- 208764-011705-287125	2 nd order watercourse that connects wetland habitats on either side of the highway. This watercourse flows south and drains into Kledo Creek (2.2 km downstream).	No
13+910	N/A	Not located on a provincially mapped watercourse.	Drainage culvert that conveys seepage and road run-off during rainy periods. Likely drains the old roadside ditch into the wetland area/mapped 3 rd order watercourse directly to the west of the former alignment. <i>Drainage only. Not considered a watercourse.</i>	No
13+920	N/A	Not located on a provincially mapped watercourse.	Drainage culvert that conveys seepage and road run-off during rainy periods. Likely drains the old roadside ditch into the wetland area/mapped 3 rd order watercourse directly to the west of the former alignment. <i>Drainage only. Not considered a watercourse.</i>	No
14+300	Ex-4	Unnamed Watercourse 50K Watershed Code: 212- 58080-02020-002800	3 rd order watercourse that drains the land north of the highway. Located 1.9 km from the confluence with Kledo Creek.	No
Section B – KM 504.45 to KM 508.80 (south of current ROW)				
20+450	N/A	Not located on a provincially mapped watercourse.	Drainage culvert that conveys seepage and road run-off during rainy periods. <i>Drainage only. Not considered a watercourse.</i>	No
20+990	N/A	Not located on a provincially mapped watercourse.	Drainage culvert that conveys seepage and road run-off during rainy periods. <i>Drainage only. Not considered a watercourse.</i>	No

Culvert KM Marking	Culvert ID (in current ROW) ¹	Stream Name/ Watershed Code 50K	Stream Info	Documented Fish Presence ²
21+480 & 21+490	Prop-4	Unnamed Watercourse No 50K Watershed Code FWA ² Watershed Code: 200-692231-350733-577347-208764-015315	1 st order watercourse that drains the land north of the highway. The confluence with Kledo Creek is 370 m downstream of the culvert.	No
21+830	Ex-5	Unnamed Watercourse No 50K Watershed Code FWA ² Watershed Code: 200-692231-350733-577347-208764-015683	2 nd order watercourse that drains the land north of the highway. The confluence with Kledo Creek is 380 m downstream of the culvert.	No
22+070	Ex-6	Unnamed Watercourse No 50K Watershed Code FWA ² Watershed Code: 200-692231-350733-577347-208764-020994	1 st order watercourse that drains the land north of the highway. The confluence with Kledo Creek is 321 m downstream of the culvert.	No
22+510	Ex-7	Unnamed Watercourse No 50K Watershed Code FWA ² Watershed Code: 200-692231-350733-577347-208764-023742	2 nd order watercourse that drains the land north of the highway. Joins with other tributaries before draining into Kledo Creek (923 m downstream)	No
22+680	Ex-8	Not located on a provincially mapped watercourse.	Drainage culvert that conveys seepage and road run-off during rainy periods. <i>Drainage only. Not considered a watercourse.</i>	No
23+030	N/A	Not located on a provincially mapped watercourse.	Drainage culvert that conveys seepage and road run-off during rainy periods. <i>Drainage only. Not considered a watercourse.</i>	No
23+270	Prop-5	Unnamed Watercourse No 50K Watershed Code FWA ² Watershed Code: 200-692231-350733-577347-208764-034301	2 nd order watercourse that drains the land north of the highway. Flows into Kledo Creek (300 m downstream)	No
23+990	N/A	Not located on a provincially mapped watercourse.	Drainage culvert that conveys seepage and road run-off during rainy periods. <i>Drainage only. Not considered a watercourse.</i>	No
24+290	Ex-10	Unnamed Watercourse 50K Watershed Code 212-580800-20200-05900	4 th order watercourse that drains the land north of the highway. The confluence with Kledo Creek is 1 km downstream of the culvert.	No
24+550	Ex-11	Unnamed Watercourse No 50K Watershed Code FWA ² Watershed Code: 200-692231-350733-577347-208764-044164-116045	2 nd order watercourse that drains the land north of the highway. The confluence with Kledo Creek is 1 km downstream of the culvert.	No
24+800	N/A	Not located on a provincially mapped watercourse.	Drainage culvert that conveys seepage and road run-off during rainy periods. <i>Drainage only. Not considered a watercourse.</i>	No

Culvert KM Marking	Culvert ID (in current ROW) ¹	Stream Name/ Watershed Code 50K	Stream Info	Documented Fish Presence ²
25+020	N/A	Not located on a provincially mapped watercourse.	Drainage culvert that conveys seepage and road run-off during rainy periods. <i>Drainage only. Not considered a watercourse.</i>	No
25+040	N/A	Not located on a provincially mapped watercourse.	Drainage culvert that conveys seepage and road run-off during rainy periods. <i>Drainage only. Not considered a watercourse.</i>	No

¹ see Tetra Tech report “Environmental Overview Assessment Geometric and Drainage Improvements KM 501.05 to KM 508.80, Alaska Highway, BC” (Issued for Use March 4, 2021), Figure 2

² in provincial databases (FISS, HabitatWizard etc.)

Each culvert identified in Table 5-1 conveys an unnamed watercourse from upstream peatlands (north) of the Highway towards Kledo Creek and the Muskwa River to the south. Kledo Creek (Watershed Code: 212-580800-20200) is a long (101.59 km), 6th order watercourse that flows into the Muskwa River, and is primarily fed from surrounding peatlands. The Muskwa River (Watershed Code: 212-580800) is a 396.38 km, 8th order watercourse that originates in the Northern Rocky Mountains and flows north-east into the Fort Nelson River. The confluence of each tributary with Kledo Creek or Muskwa River was not assessed and therefore it is unknown if fish obstacles are present between the former alignment culverts and the known fish-bearing watercourses. No obstacles to fish passage are recorded in the provincial databases therefore fish species present downstream in Kledo Creek and/or Muskwa River have the potential to occur in the Project area. And, since each tributary is connected to fish-bearing waters and provide a source of water, food and nutrients to downstream fish habitat, they are protected under the *Fisheries Act*.

5.3.2 Fish Presence

5.3.2.1 Database Results

Provincial mapping databases did not have records of fish observations in the watercourses identified at the culvert locations; however, all of these watercourses flow directly to the Muskwa River or indirectly to the Muskwa River via Kledo Creek, both of which are known fish-bearing streams. 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 5-2 and Figure 4 shows the location of each culvert along with the surrounding watercourse network and documented fish occurrences within 5 km of the culvert locations.

Table 5-2: Fish Species Present in the Muskwa River and Kledo Creek

Common Name	Scientific Name	Muskwa River	Kledo Creek
Arctic Grayling	<i>Thymallus arcticus</i>	X	X
Bull Trout	<i>Salvelinus confluentus</i>	X	X
Burbot	<i>Lota lota</i>	X	X
Chum Salmon	<i>Oncorhynchus keta</i>	X	
Dolly Varden	<i>Salvelinus malma</i>	X	
Finescale Dace	<i>Chrosomus neogaeus</i>		X
Flathead Chub	<i>Platygobio gracilis</i>	X	X
Lake Chub	<i>Couesius plumbeus</i>	X	X

Common Name	Scientific Name	Muskwa River	Kledo Creek
Inconnu	<i>Stenodus leucichthys</i>	X	
Longnose Dace	<i>Rhinichthys cataractae</i>	X	X
Longnose Sucker	<i>Catostomus catostomus</i>	X	X
Largescale Sucker	<i>Catostomus macrocheilus</i>	X	
Mountain Whitefish	<i>Prosopium williamsoni</i>	X	X
Northern Pike	<i>Esox lucius</i>	X	
Pearl Dace	<i>Margariscus nachtriebi</i>	X	X
Prickly Sculpin	<i>Cottus asper</i>	X	
Spoonhead Sculpin	<i>Cottus ricei</i>	X	
Torrent Sculpin	<i>Cottus rhotheus</i>	X	
Slimy Sculpin	<i>Cottus cognatus</i>	X	X
Walleye	<i>Sander vitreus</i>	X	
Trout-perch	<i>Percopsis omiscomaycus</i>	X	X
White Sucker	<i>Catostomus commersonii</i>	X	

Three of the species documented in Kledo Creek and the Muskwa River are either federally or provincially listed (Table 5-3).

Table 5-3: Federally and Provincially Listed Fish Species in Kledo Creek and the Muskwa River

Common Name	Scientific Name	COSEWIC Status	SARA Schedule	BC List
Bull Trout (Western Arctic populations)	<i>Salvelinus confluentus</i>	Special Concern	-	Blue
Pearl Dace	<i>Margariscus nachtriebi</i>	-	-	Blue
Inconnu	<i>Stenodus leucichthys</i>	-	-	Blue

5.3.2.2 Fish Capture Results

Fish capture efforts were conducted in 2018 at watercourse crossings within the current ROW. As noted in Table 5-1, watercourse crossings in the current ROW correspond to downstream or upstream locations within the former alignment. Electrofishing was conducted at 5 of the culverted watercourses. No fish were captured during the electrofishing surveys (Table 5-4). At sites where water levels were too low, or there was no defined watercourse, fish capture was not conducted.

Table 5-4: Fish Presence in Existing Culverts along the Current Highway Alignment

Culvert KM Marking	Current ROW Culvert ID	Effort (s)	Voltage (V)	Frequency (Hz)	Duty Cycle (%)	Fish Captured?	
						Species	Length (mm)
Section A – KM 501.05 to KM 504.50 (north of current ROW)							
11+590	Ex-2	165	250	30	12	NFC	NFC
12+160	Ex-4	246	350	40	12	NFC	NFC
Section B – KM 504.45 to KM 508.80 (south of current ROW)							
22+510	Ex-7	71	250	30	12	NFC	NFC
24+290	Ex-10	194	350	40	12	NFC	NFC
24+550	Ex-11	250	300	30	12	NFC	NFC
NFC = No Fish Captured							

5.3.3 Fish Habitat Assessment

Detailed fish habitat assessments were conducted at 10 of the culvert locations on the current highway alignment in 2018. All assessed watercourses were small permanent or intermittent streams. Culvert EX-1 was not assessed for fish habitat because it was a dry, ephemeral drainage.

Overall habitat quality at most culvert locations was rated as poor and was considered to be of marginal value (Table 5-5). The *Fish Stream Crossing Guidebook* (BC MFLNRO, BC MOE and DFO 2012) notes that “marginal” habitat lacks spawning gravels, deep pools, undercut banks and stable debris and therefore contributes to low productive capacity. Alternatively, “important” habitat provides some suitable spawning gravels and rearing cover but is not considered critical because large amounts are available.

At the assessed locations, low flows, lack of instream cover and lack of suitable spawning substrates was observed to limit fish use of these watercourses. Channels were generally poorly defined with fine-dominated substrates. These watercourses may provide some rearing habitat for small bodies fish species, if water is present during summer months. Given the shallow depths, they do not likely provide over-wintering habitat as they would freeze to bottom.

Table 5-5: Habitat Quality at Existing Culverts in the Current Highway Alignment

Current ROW Culvert ID	EX-2	EX-3	EX-4	EX-5	EX-6	EX-7	EX-8	EX-9	EX-10	EX-11
Culvert KM Marking	11+590	N/A	12+160 13+680 14+300	21+830	22+070	22+510	22+680	N/A	24+290	24+550
Spawning	P	P	M	P	P	P	P	P	M	P
Rearing	M	P	M	M	P	P	P	P	M	M
Over-wintering	P	P	M	P	P	P	P	P	M	P, M
Open water	L	N	L	N	N	N	N	N	-	L
Winter	N	N	N	N	N	N	N	N	-	N, L
Overall	P	P	P, M	P	P	P	P	P	M	P, M

N=none; P= poor; L= low; M= moderate

Although no fish habitat assessments have been conducted on the watercourses at the culvert crossing locations within the former alignment, it is likely that habitat quality is similar to the corresponding watercourses in the current ROW.

5.3.4 Fish Habitat Requirements

Mapping databases had records of three SAR observed in Kledo Creek and the Muskwa River, within 10 km of the Project. Each species has unique habitat requirements that influence where they are likely to be found.

Bull Trout (*Salvelinus confluentus*)

Bull Trout are documented as occurring within Keldo Creek and the Muskwa River and 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 Muskwa 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).

Pearl Dace (*Margariscus nachtriebii*)

Pearl Dace are documented as occurring within Keldo Creek and the Muskwa River. They are a non-migratory species preferring cool, slow-moving water and usually found in peat-stained creeks, bog drainage streams, small lakes, and beaver ponds (Scott and Crossman 1973). Both immature and adult Pearl Dace are herbivorous and invertivorous (Scott and Crossman 1973). Pearl Dace live 3-4 years and reach sexual maturity at two years, and adults typically grow up to 16 cm long (BC CDC 2013). Spawning occurs in the spring in areas of slow-moving water with a sand, gravel, or organic bed (Scott and Crossman 1973). Males defend territories but do not build nests (Roberge *et al* 2002).

Inconnu (*Stenodus leucichthys*)

Inconnu are documented as occurring within the Muskwa River. They are the largest and fastest growing member of the whitefish family. They are primarily anadromous, migrating long distances up the Mackenzie River and into the lower Liard River and Fort Nelson River (McPhail 2007). Spawning occurs just prior to freeze up in October; however, spawning locations are largely unknown within the lower Liard River (McPhail 2007). After spawning, Inconnu move back downstream to the lower reaches of the Mackenzie River, Tuktoyaktuk Harbour and west along the Beaufort Sea coast to feed and overwinter (Stephenson *et al.* 2005). At maturity, these fish are greater than a half-meter in length (Scott and Crossman 1973).

5.3.5 Wetlands

The Boreal White and Black Spruce Zone (BWBS) is largely dominated by wetlands, including peatlands (fens and bogs). Peatlands are expansive wetlands that have slow-moving water and develop deep layers of peat. Peatlands provide habitat for wildlife such as moose, beavers, and amphibians.

Wetlands within the Project were identified, classified, and delineated. The wetlands identified were classified according to the *Canadian Wetland Classification System* (Warner and Rubec 1997). Wetland classification is based on the developmental characteristics, surrounding landscape, vegetation communities, and amount of surface water present. The wetlands were assessed in their current state. The wetlands were delineated from recent

aerial photos and the wetland sizes were calculated based on the delineation. There are seventeen wetlands that were delineated in the Project area (Figure 3 and Table 5-6).

The wetlands on the former alignment are highly influenced by beaver activity; beaver ponds have been created by holding back water along channels within forested areas and peatlands.

Table 5-6: Wetlands within Project Area

Wetland ID	Wetland Location	Wetland Classification	Natural or Man-made	Wetland Size (ha) (within 500 m buffer around Project Area)
WL01	501+000 - 501+190 (northwest)	Fen	Natural	4.45
WL02	501+460 - 501+750 (northwest)	Fen	Natural	5.15
WL03	501+500 - 501+805 (southeast)	Fen	Natural	5.84
WL04	501+800 - 501+240 (northwest)	Fen	Natural	8.30
WL05	501+995 - 501+250 (southeast)	Fen	Natural	7.67
WL06	502+445 - 502+180 (northwest)	Fen	Natural	70.50
WL07	502+460 - 502+645 (southeast)	Fen	Natural	47.98
WL08	503+680 - 503+660 (southeast)	Fen	Natural	18.53
WL09	504+115 - 504+895 (northwest)	Fen	Natural	189.68
WL10	504+620 - 504+390 (southeast)	Fen	Natural	23.22
WL11	505+295 - 505+655 (southeast)	Fen	Natural	3.47
WL12	506+900 - 506+565 (southeast)	Fen	Natural	17.85
WL13	507+750 - 507+430 (southeast)	Fen	Natural	2.98
WL14	508+360 - 508+910 (southeast)	Fen	Natural	2.61
WL15	506+900 - 507+565 (southeast)	-	Natural	17.85
WL16	507+750 - 508+430 (southeast)	-	Natural	2.98
WL17	508+105 - 508+910 (southeast)	-	Natural	8.07

Decommissioning activities (e.g., culvert removal, scarification, gravel removal etc.) will occur directly within or adjacent to wetland areas. However, Project activities are anticipated to have minor impacts as they are intended to return the area to a natural condition. Potential project impacts are expected to be temporary and reversible (see Section 6.1).

Should any further effects be incurred to natural wetlands, approval per the Federal Policy on Wetland Conservation may be required from Environment and Climate Change Canada (ECCC). Canada’s priority is to reduce loss of wetlands by first, avoiding; second, minimizing; and third, replacing for effects. If the wetlands cannot be avoided and effects to the wetlands are incurred during development of the Project, compensation/mitigation may be required.

5.4 Flora

The Biogeoclimatic Ecosystem Classification 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.

According to iMap BC, the Project site falls within the boreal white and black spruce (BWBS) biogeoclimatic zone. The BWBS zone is characterized by cold winters with little precipitation and short, warm summers. Ecosystems found in the BWBS zone are dominantly uplands forests and peatlands (Ministry of Forests 2018a). In the northeast area of the BWBS, upland forest types are typically comprised of trembling aspen (*Populus tremuloides*) and white spruce (*Picea glauca*) mixed stands. The poorly-drained peatlands are dominated by black spruce (*Picea mariana*) and tamarack (*Larix laricina*), accompanied by sedges and brown mosses. Other common trees found in the BWBS zone include lodgepole pine (*Pinus contorta*) and balsam poplar (*Populus balsamifera*). Characteristic understory plants include soopolallie (*Shepherdia canadensis*), prickly rose (*Rosa acicularis*), highbush-cranberry (*Viburnum edule*), fireweed (*Epilobium angustifolium*), tall bluebells (*Mertensia paniculata*), bunchberry (*Cornus canadensis*), step moss (*Hylocomium splendens*), and red-stemmed feathermoss (*Pleurozium schreberi*) (DeLong et al. 2011).

5.4.1 Vegetation Species of Management Concern

Based on the search criteria set using BC CDC Internet Mapping Tool, no VEMCs were identified. When using BC CDC Species and Ecosystem Explorer with the above search criteria, a total of 32 plant species and 15 ecological communities were identified as VEMC’s (Tables 5-7 and 5-8).

Table 5-7: Federally and Provincially Listed Plant Species Potentially Present at or Near the Project Location

Common Name	Scientific Name	BC List
Not Given	<i>Amblyodon dealbatus</i>	Blue
Not Given	<i>Aulacomnium acuminatum</i>	Blue
smooth northern-rockcress	<i>Braya glabella</i> ssp. <i>glabella</i>	Red
Not Given	<i>Bryobrittonia longipes</i>	Blue
two-coloured sedge	<i>Carex bicolor</i>	Blue
Lapland sedge	<i>Carex lapponica</i>	Red
sand-dune wheatgrass	<i>Elymus lanceolatus</i> ssp. <i>psammophilus</i>	Blue
Not Given	<i>Encalypta mutica</i>	Blue
whitish rush	<i>Juncus triglumis</i> ssp. <i>albescens</i>	Blue
Yukon lupine	<i>Lupinus kuschei</i>	Blue
rusty wood-rush	<i>Luzula rufescens</i>	Red
Not Given	<i>Meesia longiseta</i>	Blue
Not Given	<i>Orthotrichum speciosum</i> var. <i>elegans</i>	Blue
Davis' locoweed	<i>Oxytropis campestris</i> var. <i>davisii</i>	Blue
Jordal's locoweed	<i>Oxytropis campestris</i> var. <i>jordalii</i>	Blue
Maydell's locoweed	<i>Oxytropis maydelliana</i>	Blue
Scamman's locoweed	<i>Oxytropis scammaniana</i>	Blue

Common Name	Scientific Name	BC List
Gorman's penstemon	<i>Penstemon gormanii</i>	Blue
arctic bladderpod	<i>Physaria arctica</i>	Blue
northern Jacob's-ladder	<i>Polemonium boreale</i>	Blue
meadow willow	<i>Salix petiolaris</i>	Blue
Raup's willow	<i>Salix raupii</i>	Red
common pitcher-plant	<i>Sarracenia purpurea</i> ssp. <i>purpurea</i>	Red
Not Given	<i>Schistidium pulchrum</i>	Blue
Not Given	<i>Schistidium trichodon</i>	Blue
Taimyr campion	<i>Silene ostenfeldii</i>	Blue
pink campion	<i>Silene repens</i>	Red
Not Given	<i>Splachnum vasculosum</i>	Blue
marsh fleabane	<i>Tephrosieris palustris</i>	Blue
Not Given	<i>Timmia norvegica</i>	Blue
ochroleucous bladderwort	<i>Utricularia ochroleuca</i>	Blue
Not Given	<i>Warnstorfia tundrae</i>	Red

Table 5-8: Provincially Listed Ecological Communities Potentially Present at or Near the Project Location

Common Name	Scientific Name	BC Listing
mountain alder / common horsetail	<i>Alnus incana</i> / <i>Equisetum arvense</i>	Blue
scrub birch / water sedge	<i>Betula nana</i> / <i>Carex aquatilis</i>	Blue
slender sedge / common hook-moss	<i>Carex lasiocarpa</i> / <i>Drepanocladus aduncus</i>	Blue
shore sedge - buckbean / hook-mosses	<i>Carex limosa</i> - <i>Menyanthes trifoliata</i> / <i>Drepanocladus</i> spp.	Blue
swamp horsetail - beaked sedge	<i>Equisetum fluviatile</i> - <i>Carex utriculata</i>	Blue
tamarack / scrub birch / buckbean	<i>Larix laricina</i> / <i>Betula nana</i> / <i>Menyanthes trifoliata</i>	Blue
tamarack / water sedge / golden fuzzy fen moss	<i>Larix laricina</i> / <i>Carex aquatilis</i> / <i>Tomentypnum nitens</i>	Blue
white spruce - subalpine fir / black huckleberry / red-stemmed feathermoss	<i>Picea glauca</i> - <i>Abies lasiocarpa</i> / <i>Vaccinium membranaceum</i> / <i>Pleurozium schreberi</i>	Blue
white spruce - black spruce / Labrador-tea / glow moss	<i>Picea glauca</i> - <i>Picea mariana</i> / <i>Rhododendron groenlandicum</i> / <i>Aulacomnium palustre</i>	Blue
white spruce / red swamp currant / horsetails	<i>Picea glauca</i> / <i>Ribes triste</i> / <i>Equisetum</i> spp.	Blue
black spruce / lingonberry / peat-mosses	<i>Picea mariana</i> / <i>Vaccinium vitis-idaea</i> / <i>Sphagnum</i> spp.	Blue
balsam poplar - white spruce / mountain alder - red-osier dogwood	<i>Populus balsamifera</i> - <i>Picea glauca</i> / <i>Alnus incana</i> - <i>Cornus stolonifera</i>	Blue
narrow-leaf willow Shrubland	<i>Salix exigua</i> Shrubland	Red
Pacific willow / red-osier dogwood / horsetails	<i>Salix lasiandra</i> var. <i>lasiandra</i> / <i>Cornus stolonifera</i> / <i>Equisetum</i> spp.	Red
tufted clubbrush / golden star-moss	<i>Trichophorum cespitosum</i> / <i>Campylium stellatum</i>	Blue

During the 2019 field reconnaissance, plants typical of mixedwood forests, wetlands, disturbed areas and riparian zones were observed. Natural vegetation communities observed at the Project consisted primarily of mature mixedwood forest, wetlands, and disturbed sites. All vegetation communities were categorized into three vegetation management units (Figure 3; Table 5-9). One provincially regulated noxious species, perennial sow-thistle (*Sonchus arvensis*), was observed. A complete list of plant species observed during the field reconnaissance is included in Table 5-9, and photos of representative vegetation communities are shown in Figure 2.

Proposed Project activities will occur primarily within the former alignment of the Alaska Highway and some clearing of regenerated vegetation within the former highway alignment will be required. Regenerated vegetation within the former highway alignment mostly includes trembling aspen, balsam poplar, and low-lying native plants. The clearing of the regenerated vegetation within the former highway alignment is expected to be minimal. Vegetation communities within the current Alaska Highway ROW have largely regenerated with low-lying native plants. The current ROW is occasionally cleared of woody and/or tall vegetation.

Table 5-9: Field Observations of Flora Within the Project Area

Scientific Name	Common Name	Native/ Non-Native	Mixedwood	Wetland	Disturbed
<i>Achillea alpina</i>	Siberian yarrow	Native			X
<i>Achillea millefolium</i>	yarrow	Non-Native	X		
<i>Actaea rubra</i>	baneberry	Native	X		
<i>Alnus viridis ssp. crispa</i>	green alder	Native	X		X
<i>Amelanchier alnifolia</i>	saskatoon	Native	X		
<i>Andromeda polifolia</i>	bog-rosemary	Native		X	
<i>Aquilegia brevistyla</i>	blue columbine	Native	X		
<i>Aralia nudicaulis</i>	wild sarsaparilla	Native	X		
<i>Arctostaphylos uva-ursi</i>	kinnikinnick	Native	X		
<i>Astragalus alpinus var. alpinus</i>	alpine milk-vetch	Native		X	
<i>Astragalus canadensis var. canadensis</i>	Canadian milk-vetch	Native	X		
<i>Betula papyrifera</i>	paper birch	Native	X		
<i>Betula pumila var. glandulifera</i>	low birch	Native		X	
<i>Carex aenea</i>	bronze sedge	Native	X		
<i>Carex bebbii</i>	Bebb's sedge	Native		X	
<i>Carex canescens</i>	grey sedge	Native			X
<i>Carex capillaris</i>	hair-like sedge	Native	X		
<i>Carex disperma</i>	soft-leaved sedge	Native	X	X	
<i>Carex gynocrates</i>	yellow bog sedge	Native			X
<i>Carex hirta</i>	hairy sedge	Non-Native			
<i>Carex lasiocarpa</i>	slender sedge	Native			X
<i>Carex media</i>	Scandinavian sedge	Native	X		
<i>Chamerion angustifolium</i>	fireweed	Native	X		
<i>Cicuta maculata var. angustifolia</i>	spotted cowbane	Native			
<i>Cladonia chlorophaea</i>	granulating pixie-cup	Native	X		
<i>Comarum palustre</i>	marsh cinquefoil	Native	X		
<i>Cornus canadensis</i>	bunchberry	Native	X		
<i>Drepanocladus uncinatus</i>	sickle moss	Native		X	
<i>Eleocharis palustris</i>	common spike-rush	Native	X		
<i>Equisetum arvense</i>	common horsetail	Native	X	X	
<i>Equisetum hyemale ssp. affine</i>	scouring-rush	Native		X	

Scientific Name	Common Name	Native/ Non-Native	Mixedwood	Wetland	Disturbed
<i>Equisetum scirpoides</i>	dwarf scouring-rush	Native		X	
<i>Equisetum sylvaticum</i>	wood horsetail	Native		X	
<i>Eriophorum</i> spp.	cottongrass spp.	Native			
<i>Eriophorum vaginatum</i>	sheathed cotton-grass	Native		X	
<i>Fragaria virginiana</i> ssp. <i>glauca</i>	wild strawberry	Native	X		
<i>Galium boreale</i>	northern bedstraw	Native	X		
<i>Hedysarum alpinum</i>	alpine hedysarum	Native	X		
<i>Larix laricina</i>	tamarack	Native		X	
<i>Lathyrus ochroleucus</i>	creamy peavine	Native	X		
<i>Linnaea borealis</i> ssp. <i>longiflora</i>	twinflower	Native	X		
<i>Luzula parviflora</i> ssp. <i>parviflora</i>	small-flowered wood-rush	Native		X	
<i>Medicago sativa</i>	alfalfa	Non-Native	X		
<i>Melilotus officinalis</i>	yellow sweet-clover	Non-Native	X		
<i>Mertensia paniculata</i> var. <i>paniculata</i>	tall bluebells	Native	X		
<i>Mitella nuda</i>	common mitrewort	Native	X		
<i>Moehringia lateriflora</i>	blunt-leaved sandwort	Native	X		
<i>Myrrhis odorata</i>	sweet cicely	Non-Native	X		
<i>Nymphaea tetragona</i>	pygmy waterlily	Native		X	
<i>Orthilia secunda</i>	one-sided wintergreen	Native	X		
<i>Pedicularis labradorica</i>	Labrador lousewort	Native		X	
<i>Petasites frigidus</i> var. <i>palmatus</i>	sweet coltsfoot	Native		X	
<i>Picea glauca</i>	white spruce	Native	X		
<i>Picea mariana</i>	black spruce	Native		X	
<i>Poa palustris</i>	fowl bluegrass	Native	X		
<i>Populus tremuloides</i>	trembling aspen	Native	X		
<i>Pyrola asarifolia</i>	pink wintergreen	Native	X		
<i>Ranunculus gmelinii</i>	small yellow water-buttercup	Native		X	
<i>Rhododendron groenlandicum</i>	Labrador tea	Native		X	
<i>Ribes glandulosum</i>	skunk currant	Native		X	
<i>Ribes hudsonianum</i> var. <i>hudsonianum</i>	northern blackcurrant	Native	X		
<i>Ribes oxycanthoides</i> ssp. <i>oxycanthoides</i>	northern gooseberry	Native	X		
<i>Rosa acicularis</i> ssp. <i>sayi</i>	prickly rose	Native	X		
<i>Rubus chamaemorus</i>	cloudberry	Native		X	
<i>Rubus idaeus</i> ssp. <i>strigosus</i>	red raspberry	Native	X		
<i>Rubus pubescens</i>	dwarf red raspberry	Native	X		
<i>Salix</i> species	willow species	Native	X		
<i>Scirpus microcarpus</i>	small-flowered bulrush	Native			X

Scientific Name	Common Name	Native/ Non-Native	Mixedwood	Wetland	Disturbed
<i>Shagnum</i> species	sphagnum	Native		X	
<i>Shepherdia canadensis</i>	soopolallie	Native	X		
<i>Sonchus arvensis</i>	perennial sow-thistle	Non-Native	X		
<i>Sphagnum riparium</i>	shore-growing peat moss	Native		X	
<i>Stellaria longifolia</i>	long-leaved starwort	Native		X	
<i>Symphotrichum puniceum</i> var. <i>puniceum</i>	purple-stemmed aster	Native	X		
<i>Taraxacum officinale</i>	common dandelion	Non-Native	X		
<i>Trifolium hybridum</i>	alsike clover	Non-Native			
<i>Trifolium pratense</i>	red clover	Non-Native	X		
<i>Vaccinium oxycoccos</i>	bog cranberry	Native		X	
<i>Vaccinium uliginosum</i>	bog blueberry	Native		X	
<i>Viburnum edule</i>	highbush-cranberry	Native	X		
<i>Vicia americana</i>	American vetch	Native	X		
<i>Viola canadensis</i> var. <i>rugulosa</i>	Canada violet	Native	X		

5.5 Fauna

Common wildlife found within the Project area include American Black Bear (*Ursus americana*), Grey Wolf (*Canis lupus*), Coyote (*Canis latrans*), Canada Lynx (*Lynx canadensis*), Northwestern Moose (*Alces americanus*), Rocky Mountain Elk (*Cervus elaphus*), caribou (*Rangifer tarandus*), and American beaver (*Castor canadensis*). 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 (*Lithobates sylvaticus*), Boreal Chorus Frog (*Pseudacris maculata*), and Western Toad (*Anaxyrus boreas*) are commonly found in wetlands and moist upland habitats. The forested areas provide habitat for several songbirds 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 2019 field reconnaissance, several wildlife species and wildlife sign were observed within the Project area; however, no nests were observed at the Project. A list of wildlife species and sign observed at the Project during the field reconnaissance is included in Table 5-10 below.

Table 5-10: Field Observations of Fauna within the Project Area

Common Name	Latin Name	Type of Observation	Notes
Wood Frog	<i>Lithobates sylvaticus</i>	Visual	
Pileated Woodpecker	<i>Dryocopus pileatus</i>	Audio	
White-throated Sparrow	<i>Zonotrichia albicollis</i>	Audio	
American Robin	<i>Turdus migratorius</i>	Audio	
Common Raven	<i>Corvus corax</i>	Visual	
Black-capped Chickadee	<i>Poecile atricapillus</i>	Audio	
Canada Jay	<i>Perisoreus canadensis</i>	Audio	
Ovenbird	<i>Seiurus aurocapilla</i>	Audio	
Yellow-rumped Warbler	<i>Setophaga coronata</i>	Visual	
Tennessee Warbler	<i>Oreothlypis peregrina</i>	Audio	
Blue Jay	<i>Cyanocitta cristata</i>	Audio	
Ruffed Grouse	<i>Bonasa umbellus</i>	Visual	Hen and chicks
Grouse sp.	Grouse sp.	Scat	
Snowshoe Hare	<i>Lepus americanus</i>	Visual	
Vole sp.	Vole sp.	Visual	
Rocky Mountain Elk	<i>Cervus elaphus</i> ssp. <i>nelsoni</i>	Tracks, Elk Kill	
Northwestern Moose	<i>Alces americanus</i> ssp. <i>andersoni</i>	Visual, tracks, and scat	Young bull moose
Bear spp.	<i>Ursus</i> spp.	Tracks and scat	
Mule Deer or White-tailed Deer	<i>Odocoileus</i> spp.	Scat	
Common Muskrat	<i>Ondatra zibethicus</i>	Tracks	
Grey Wolf	<i>Canis lupus</i>	Scat and tracks	
American Beaver	<i>Castor canadensis</i>	Active beaver lodge and beaver dam	
Coyote or Red Fox	<i>Canis latrans</i> or <i>Vulpes vulpes</i>	Scat	

Beaver dams are present in Section A, between approximately 13+700 and 14+000. Because the ponded water has submerged several culverts the dams must be removed to facilitate decommissioning activities.

5.5.1 Wildlife Species of Management Concern

The Species and Ecosystems Explorer search revealed 35 potential wildlife SOMC (1 amphibian, 14 birds, 8 mammals, and 12 invertebrates) that could be found in the BWBS zone of the NRRM (Appendix C). Of these species, 1 amphibian, 13 birds, all 8 mammals and 6 invertebrates have the potential to be present in or near to the Project (Table 5-11).

The CDC Internet Mapping tool search revealed that 5 wildlife SOMC (3 birds and 2 mammals [Figure 4]) have been observed within 10 km of the Project. These wildlife species were ranked as having a high potential for presence at the Project area because they have been previously observed near or at the Project.

Table 5-11: Wildlife Species of Management Concern with Potential to Occur Near the Project

Common Name	Scientific Name	COSEWIC	SARA Schedule 1	BC List	Potential for Presence in Project Area
Amphibians					
Western Toad	<i>Anaxyrus boreas</i>	Special Concern	Special Concern	Yellow	Moderate – wetlands, streams, and mixedwood forests are present.
Mammals					
Wood Bison	<i>Bos bison athabascae</i>	Special Concern	Threatened	Red	None – herds only occur north and west of the Project.
Caribou (boreal population)	<i>Rangifer tarandus</i> pop. 14	Threatened	Threatened	Red	High – known occurrences within a 10 km radius of the Project (BC CDC 2018b). Wetlands and riparian habitats nearby.
Caribou (northern mountain population)	<i>Rangifer tarandus</i> pop. 15	Special Concern	Special Concern	Blue	High – known occurrences within a 10 km radius of the Project (BC CDC 2018b). Wetlands and riparian habitats nearby.
Wolverine	<i>Gulo gulo luscus</i>	Special Concern	Special Concern	Blue (<i>luscus</i> ssp.)	Low – mixedwood forest, wetlands and riparian habitats nearby (occasional use).
Fisher	<i>Pekania pennanti</i>	-	-	Blue	Moderate – mixedwood forest, wetlands and riparian habitats nearby.
Grizzly Bear	<i>Ursus arctos</i>	Special Concern	Special Concern	Blue	Moderate – mixedwood forest, streams, wetlands and riparian habitats nearby.
Little Brown Myotis	<i>Myotis lucifugus</i>	Endangered	Endangered	Yellow	Moderate – mixedwood forest and riparian habitats nearby.
Northern Myotis	<i>Myotis septentrionalis</i>	Endangered	Endangered	Blue	High – known occurrences within a 10 km radius of the Project (BC CDC 2018b). Streams and riparian habitats nearby.
Canada Warbler	<i>Cardellina canadensis</i>	Threatened	Threatened	Blue	High – known occurrences within a 10 km radius of the Project (BC CDC 2018b). Mixedwood forest and riparian habitats nearby.
Birds					
Common Nighthawk	<i>Chordeiles minor</i>	Special Concern	Threatened	Yellow	Moderate – mixedwood forest, wetlands, and streams nearby.
Olive-sided Flycatcher	<i>Contopus cooperi</i>	Special Concern	Threatened	Blue	Low – mixedwood forest, wetland and riparian habitats nearby.
Evening Grosbeak	<i>Coccothraustes vespertinus</i>	Special Concern	-	Yellow	Moderate – mixedwood forest and riparian habitats nearby.
Rusty Blackbird	<i>Euphagus carolinus</i>	Special Concern	Special Concern	Blue	Moderate – wetlands and mixedwood forest nearby.

Table 5-11: Wildlife Species of Management Concern with Potential to Occur Near the Project

Common Name	Scientific Name	COSEWIC	SARA Schedule 1	BC List	Potential for Presence in Project Area
Barn Swallow	<i>Hirundo rustica</i>	Threatened	Threatened	Blue	Moderate – wetlands, streams, mixedwood forest and riparian habitats nearby.
Upland Sandpiper	<i>Bartramia longicauda</i>	-	-	Red	None – no suitable habitats nearby.
Broad-winged Hawk	<i>Buteo platypterus</i>	-	-	Blue	Moderate – mixed wood forests with aspen nearby.
Gyr Falcon	<i>Falco rusticolus</i>	Not At Risk	-	Blue	Moderate – wetland and streams nearby.
Connecticut Warbler	<i>Oporornis agilis</i>	-	-	Blue	Moderate – mixedwood, spruce and tamarack bogs, and riparian habitats nearby
Surf Scoter	<i>Melanitta perspicillata</i>	-	-	Blue	Moderate – migratory route, riparian habitats nearby
Bay-breasted Warbler	<i>Setophaga castanea</i>	-	-	Red	High – known occurrences within a 10 km radius of the Project (BC CDC 2018b). Mixedwood forest and riparian habitats nearby.
Cape May Warbler	<i>Setophaga tigrina</i>	-	-	Blue	High – known occurrences within a 10 km radius of the Project (BC CDC 2018b). Mixedwood forest and riparian habitats nearby.
Black-throated Green Warbler	<i>Setophaga virens</i>	-	-	Blue	Moderate – mixedwood forest and riparian habitats nearby.
Invertebrates					
Mt. McKinley Alpine	<i>Erebia mackinleyensis</i>	-	-	Red	None – no suitable habitats nearby.
Yellow-dotted Alpine	<i>Erebia pawloskii</i>	-	-	Red	None – no suitable habitats nearby.
Philip's Arctic	<i>Oeneis philipi</i>	-	-	Red	Low – wetland habitats nearby; disjunct occurrence in BC.
Plains Forktail	<i>Ischnura damula</i>	-	-	Red	None – no suitable habitat nearby. Only found in BC at the Liard Hotsprings.
Bronze Copper	<i>Lycaena hyllus</i>	-	-	Blue	Moderate – wetland and riparian habitats nearby
Tawny Crescent	<i>Phyciodes batesii</i>	-	-	Blue	None – no suitable habitats nearby.
Thicklip Rams-horn	<i>Planorbula armigera</i>	-	-	Red	Moderate – Found in slow flowing water, streams nearby.
Cranberry Blue	<i>Plebejus optilete</i>	-	-	Blue	Moderate – Wetland habitats nearby.
Hotwater Physa	<i>Physella wrighti</i>	Endangered	Endangered	Red	None – no suitable habitats nearby.
Eastern Pine Elfin	<i>Callophrys niphon</i>	-	-	Red	None – No suitable habitats nearby.
River Jewelwing	<i>Calopteryx aequabilis</i>	-	-	Blue	Low – known occurrences in southern part of BC
Kennedy's Emerald	<i>Somatochlora kennedyi</i>	-	-	Blue	Moderate – wetland and riparian habitats nearby

Woodland Caribou

The Project is within the range of Woodland Caribou (*Rangifer tarandus*), and there is high potential for both the blue-listed northern mountain (pop. 15) and red-listed boreal (pop. 14) ecotypes to be present within the Project area (Figure 4). The Muskwa Herd (northern mountain ecotype) occupies the west side of the Project area and the Parker Herd (boreal ecotype) is found to the east and south of the Project area. Caribou from both herds likely occur infrequently along the highway, especially in winter when lower elevation habitats are used more for foraging (COSEWIC 2014). A segment of the Project area lies immediately adjacent to the Parker Range critical caribou habitat as defined by SARA (Figure 4). ECCC has determined that on federal lands managed outside of the jurisdiction of Parks Canada Agency (PCA) “existing federal laws and regulations do not currently provide for mandatory, enforceable prohibitions against the destruction of boreal caribou critical habitat” (ECCC 2018).

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). Boreal caribou are non-migratory and can be found at low-elevations in muskegs, peatlands and black spruce forests. Female boreal caribou calve in undisturbed swamps and wetlands and disturbance to these calving habitats can be highly detrimental to population numbers due to the site fidelity shown by reproducing females. Regardless of ecotype, 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 15th to July 15th) as a critical timing window for caribou and the fall rut (September 15th to January 14th) 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 D).

Northern Myotis

The CDC Internet Mapping tool search showed one occurrence of **Northern Myotis** (*Myotis septentrionalis*) within 10 km of the Project area (Figure 4). The Northern Myotis is provincially blue-listed and designated as endangered under SARA. This bat species is an obligate user of caves as both night roosts and as hibernacula from early fall to spring. Northern Myotis are often associated with old-growth forests, where they rely on the intact interior forest habitat for summer day roosting and foraging habitat and as nursery sites to rear their young. They are opportunistic insectivores and are known to forage on a wide variety of insects (BC CDC 2014).

Canada Warbler

Two occurrences of Canada Warbler (*Cardellina canadensis*) were found within 10 km of the Project area (Figure 4). The Canada Warbler is provincially blue-listed and designated as threatened under SARA. This warbler is a neotropical migrant, breeding in Canada’s boreal forests and overwintering in the foothills and mountains of northern South America. Breeding habitat in northeastern BC consists of deciduous and mixed wood forests with a good shrub layer and abundant woody debris. This complex understory provides cover for their nests which they build on or near the ground under shrubs, logs or in cavities. Three to five eggs are laid between May and June (BC CDC 2009).

Cape May Warbler

One occurrence of the provincially blue-listed Cape May Warbler (*Setophaga tigrine*) was found within 10 km of the Project area (Figure 4). This warbler overwinters primarily in mature tropical forests of the Bahamas and Greater

Antilles, migrating north to breed in conifer forests located between northeastern BC and Nova Scotia. They construct their nests at the top of mature conifers, usually spruce or fir with a clutch of 4-9 eggs laid in June. During the breeding season, they forage primarily on invertebrates and show large populations increases during infestations of spruce-budworm (BC CDC 1990).

Bay-breasted Warbler

One occurrence of the provincially red-listed Bay-breasted Warbler (*Setophaga castanea*) was detected within 10 km of the Project area (Figure 4). This warbler overwinters in Panama and northern Columbia, migrating north to breed in boreal coniferous forests (and occasionally second growth or deciduous forests) located between northeastern BC and Nova Scotia. They construct their nests on horizontal tree branches, usually up to 6 m from the ground. A clutch of 3-7 eggs is laid in June and reproduction increases during years of spruce-budworm infestations. Throughout the breeding season they forage primarily on insects found on trees or captured midair (BC CDC 1994).

Vegetation, including trees and shrubs, may be cleared along the former highway alignment as part of the construction activities. Nests could be disturbed during clearing activities. Best management practices are recommended to avoid impacts to nests and nesting birds.

5.6 Cultural Resources

Cultural resources are summarized in the Preliminary Archaeological Assessment memo prepared by Soriak Consulting and Research Ltd. and Tetra Tech for PSPC (Soriak – Tetra Tech Canada 2018; Appendix F).

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

An Environmental Management Plan (EMP; Appendix B) has been prepared for the Project and includes a summary of Project-specific environmental considerations. 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, 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., culvert removal, cross ditch construction, slope stabilization, gravel extraction).</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 and former highway ROWs). 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. Gravel extraction activities must remain more than 30 m from the high-water mark of any watercourse. 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 the decommissioning activities. Disturbed soils will be seeded with an approved mixture to deter weed growth and allowed to naturally revegetate. Soil disturbances will be localized around the culvert removal and slope stabilization sites and will be limited to the former Alaska Highway ROWs.

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

Potential Effect	Interaction	Suggested Mitigation	Residual Effect	Comment
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.) Removal of old cars & debris have potential to spill hydrocarbons. 	<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. Before removing old debris (e.g., abandoned car body, drum barrel etc.) check for remnant fluids (hydrocarbons) and remove if possible. Carefully transfer the materials to an appropriate storage container and dispose of off-site at the appropriate facility. If removal is not possible, secure the existing container and wrap in absorbent pads before moving. The contractor should assign a person to watch for leaks and spills while the debris is being removed so that immediate clean up can occur if necessary. 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). 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. 	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 former highway ROWs and is considered reversible with remediation effort (e.g., soil removal).
Surface Water Quality				
Changes to water quality because of accidental spill or release of deleterious substances.	<p>Equipment with engines and/or hydraulics have a potential for leaks and spills (may include: diesel/gas, hydraulic fluids, lubricating oil, glycols).</p>	<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 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. It is anticipated that some of the watercourses/drainages within the Project area will be at low-flow or dry conditions during the culvert removals which will limit the transport of deleterious substance to downstream habitats. This potential effect would be contained with appropriately and timely implementation of the Contractor's Spill Response Plan and is considered reversible with remediation effort (e.g., sediment removal).
Decreases to water quality because of increased turbidity.	<p>Project activities may disturb soils and sediments that could mobilize to watercourse(s).</p>	<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. 	Temporary increase of total suspended solids (increased turbidity) in surface water.	<ul style="list-style-type: none"> Project works are expected to primarily occur either (1) when the watercourse is dry/frozen or (2) in isolation of flow so works can be conducted in the dry, which reduces potential for sediment inputs to the watercourse. Any turbidity increases are anticipated to be temporary and dissipate relatively quickly.

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"> Gravel extraction must occur more than 30 m from the high-water mark of any watercourse. All instream work (e.g. culvert removals) must occur “in-the-dry”. Given the proposed schedule, many of the watercourses may be frozen, dry or have very low-flow during Project works. However, if flows are present the work area must be isolated. 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. 		
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.
Disturbance or destruction of vegetation.	Project activities (e.g. equipment movement, material laydown, vegetation clearing on the former highway road prism) may/will damage or destroy vegetation.	<ul style="list-style-type: none"> Avoid vegetation removal where possible. Where vegetation removal is necessary, clearly delineate work areas to minimize accidental disturbances. Limit equipment movement to the former 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 the former transportation ROW with minimal vegetation clearing anticipated. Disturbed areas will be seeded at an appropriate time (e.g., spring) with an approved mix to discourage weed growth and facilitate natural revegetation. 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. Western Toad may breed in aquatic habitats at the Project site and may be affected if suitable habitats are disturbed during the toad breeding season (April to July). Beavers may be disturbed (e.g. avoidance) during dam removal.	<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"> 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. 	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"> Beaver removal, if necessary, must only be undertaken by a licensed trapper during the open season between October 15 and April 30. For Project activities that occur within Caribou range, the contractor must implement the Caribou Protection Plan (Appendix D). Measures to reduce the potential for an accidental spill of a harmful substance should be implemented (see <i>Soils</i>, above). If Western Toad are observed in the construction area, the area must be isolated and a wildlife salvage must take place to relocate the toads. 	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.

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

Potential Effect	Interaction	Suggested Mitigation	Residual Effect	Comment
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> <p>Beaver dam removal will disturb/destroy habitat.</p>	<ul style="list-style-type: none"> Vegetation removal, if required, should be conducted outside the breeding bird window. Environment and Climate Change Canada 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 during the nesting season 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. Beaver Dam removal should consider the following: <ul style="list-style-type: none"> Removal must be comply with the federal <i>Fisheries Act</i> and the provincial <i>Water Sustainability Act</i>. Conduct a fish salvage in the area of disturbance (upstream and downstream of the dam). Wherever possible, dam debris should be removed by hand or light machinery. To control and prevent the release of silt to downstream fish habitat, appropriate silt fencing should be installed prior to any debris removal. To allow the pond head to gently discharge with minimal silt transfer and minor instream impacts, dam should be removed in sections of roughly 6-12 inches staged every few hours. If possible, conduct removal during low flow or frozen conditions to minimize the amount of water released. If machinery is used, it should be positioned above the high-water mark on a stable surface to minimize ground and vegetation disturbance to the stream bank. All debris be removed from the site to prevent the beaver from reusing it in their repairs. 	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 to the former highway ROW Project activities are temporary and are not anticipated to change the long-term habitat quality/potential use of the area. The habitat loss for SOMC identified with high potential at the Project is very small and of low quality relative to availability in the landscape and is unlikely to affect these species. Beaver dams will be removed, altering habitat.
Fish and Fish Habitat				
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"> Project works are expected to be conducted during frozen, low flow periods or dry conditions which reduces potential for sediment contributions to the watercourses. If there is flow in a watercourse, 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"> Conduct works in the dry. If flows are present, then work site isolation would be required. Isolation activities require fish salvage and ongoing turbidity monitoring. Additional permitting would be required under this scenario. 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 some of the Project activities may occur outside of the Reduced Risk Timing Window during low flow conditions. Given the generally poor habitat quality at each culvert site, it is unlikely that the Project works conducted outside the reduced risk window would negatively impact fish or fish habitat if the mitigation detailed above in the preceding sections is applied. 	Temporary disturbances below the high-water mark.	<ul style="list-style-type: none"> The majority of Project works are not anticipated to result in permanent changes to habitat quality or quantity. Disturbances will be temporary and will likely occur during frozen, low flow or dry conditions. Removal of old culverts and replacement with cross ditches will improve and emulate the natural hydrology between wetlands intersected by the former Alaska highway alignment and will improve the condition of the wetlands.

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"> Disturbances below the high-water mark will be remediated as soon as possible and should emulate pre-disturbance conditions as closely as possible. 		
Cultural Resources				
Disturbance of Archaeological resources	Unknown Archaeological resources or sites may be damaged or disturbed by construction activities that require ground disturbance.	<ul style="list-style-type: none"> Have an Archaeologist conduct an Archaeological Overview Assessment prior to starting construction. 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. 	Archaeological sites may be disturbed.	<ul style="list-style-type: none"> No known archaeological sites have been documented within the Project Area.

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 EOA and the attached EMP are implemented, and, that the contractor develops and effectively implements a Project specific EPP.

8.0 CLOSURE

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

Respectfully submitted,
Tetra Tech Canada Inc.

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

Prepared by:
Shawneen Walker, B.Sc., R.P.Bio., P.Biol
Biologist
Environment and Water Practice
Direct Line: 250.713.8793
Shawneen.Walker@tetrattech.com

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Reviewed by:
Jeff Matheson, M.Sc., R.P.Bio.
Senior Biologist
Environment and Water Practice
Direct Line: 604.608.8908
Jeff.Matheson@tetrattech.com

Reviewed by:
Nigel Cavanagh, M.Sc., R.P.Bio.
Senior Aquatic Biologist
Environment and Water Practice
Direct Line: 250.756.2256
Nigel.Cavanagh@tetrattech.com

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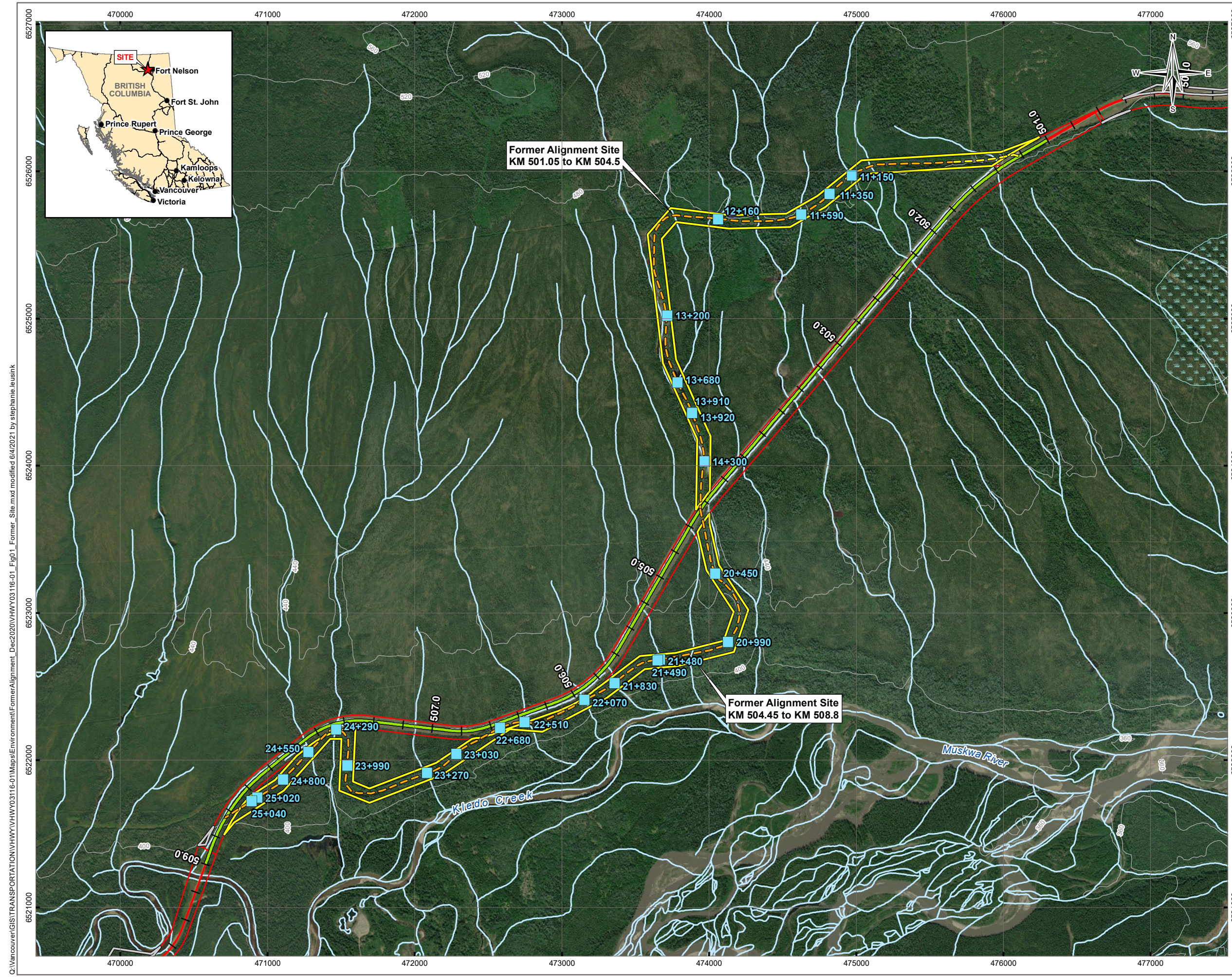
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FIGURES

- Figure 1 Site Location
- Figure 2 Field Results
- Figure 3 Ecosites
- Figure 4 Conservation Data Centre Occurrences and Known Fish Observations



LEGEND

- Existing Culvert
- Former Alaska Highway Alignment
 - 2-Wheel Drive Access
 - Limited Vehicle Access
- Former Alaska Highway ROW - KM 501.05-508.80
- Former Alaska Highway ROW - Other Site
- Current Alaska Highway Alignment
 - Current Alignment - KM 501-509
 - Current Alaska Highway
 - Current Alaska Highway ROW
- Base Features
 - Contour (40 m)
 - Watercourse
 - Waterbody
 - Wetland

NOTES
 Base data source:
 CanVec 1:50,000.
 Imagery from ESRI; Maxar (2018/2019).

STATUS
 ISSUED FOR USE

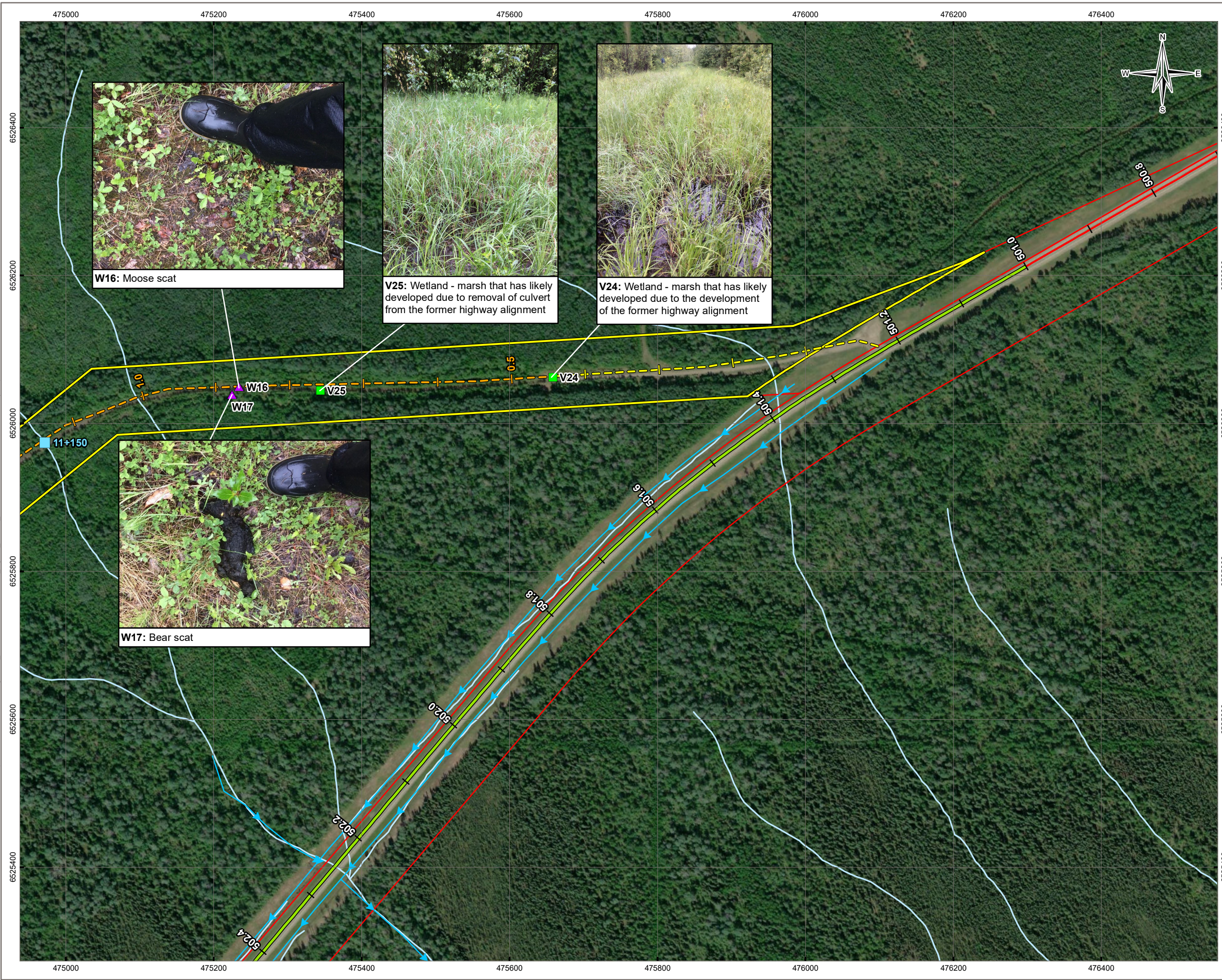
DEACTIVATION OF FORMER ALIGNMENTS KM 501.05 TO KM 508.80 ALASKA HIGHWAY, BC

Site Location

PROJECTION UTM Zone 10	DATUM NAD83	CLIENT Public Services and Procurement Canada
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OFFICE TL-VANC	DWN SL	CKD BB
DATE June 4, 2021	APVD EH	REV 0
PROJECT NO. TRN.VHWY03116-01		Figure 1

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W16: Moose scat



V25: Wetland - marsh that has likely developed due to removal of culvert from the former highway alignment



V24: Wetland - marsh that has likely developed due to the development of the former highway alignment



W17: Bear scat

LEGEND

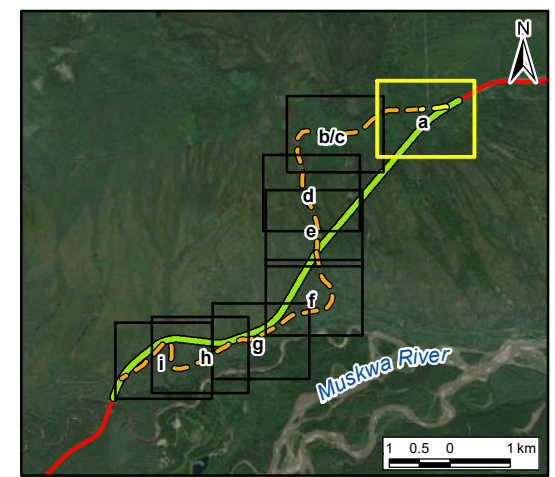
- ▲ Wildlife Field Note
- Vegetation Assessment Site
- Existing Culvert
- ← Drainage Flow
- ~ Watercourse

Former Alaska Highway Alignment

- 2-Wheel Drive Access
- Limited Vehicle Access
- Former Alaska Highway ROW - KM 501.05-508.80

Current Alaska Highway Alignment

- Current Alignment - KM 501-509
- Current Alaska Highway
- Current Alaska Highway ROW



NOTES
 Base data source:
 CanVec 1:50,000.
 Imagery from ESRI; Maxar (2019).

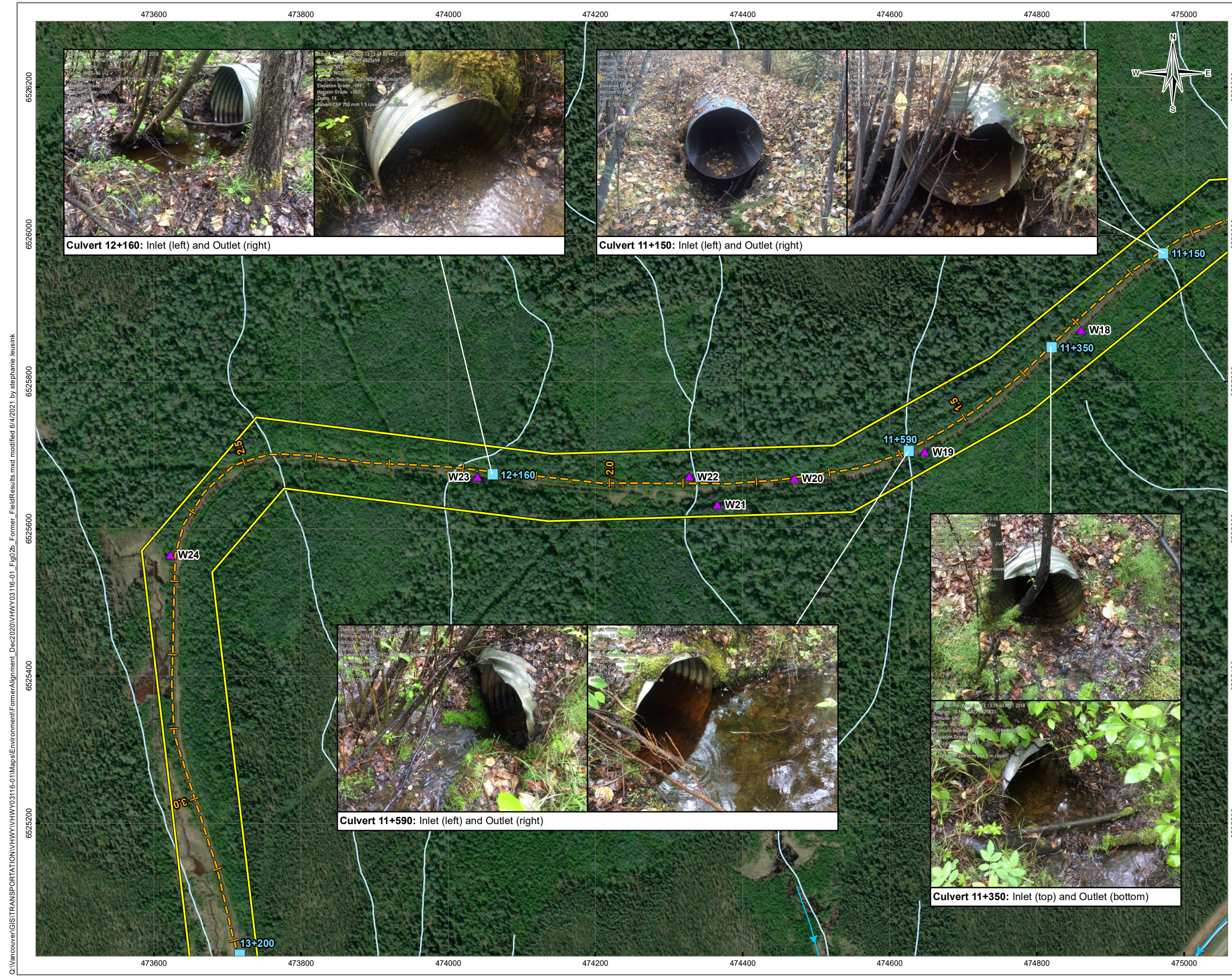
STATUS
ISSUED FOR USE

**DEACTIVATION OF FORMER ALIGNMENTS
 KM 501.05 TO KM 508.80
 ALASKA HIGHWAY, BC**

Field Results

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FILE NO. VHWY03116-01_Fig02a_Former_FieldResults.mxd					
OFFICE TL-VANC	DWN SL	CKD BB	APVD EH	REV 0	Figure 2a
DATE June 4, 2021	PROJECT NO. TRN.VHWY03116-01				



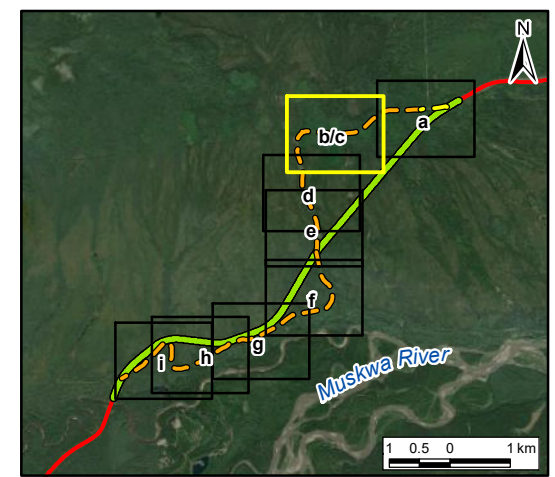


LEGEND

- Wildlife Field Note
- Existing Culvert
- Drainage Flow
- Watercourse

Former Alaska Highway Alignment

- Limited Vehicle Access
- Former Alaska Highway ROW - KM 501.05-508.80



NOTES
 Base data source: CanVec 1:50,000.
 Imagery from ESRI; Maxar (2019).

STATUS
ISSUED FOR USE

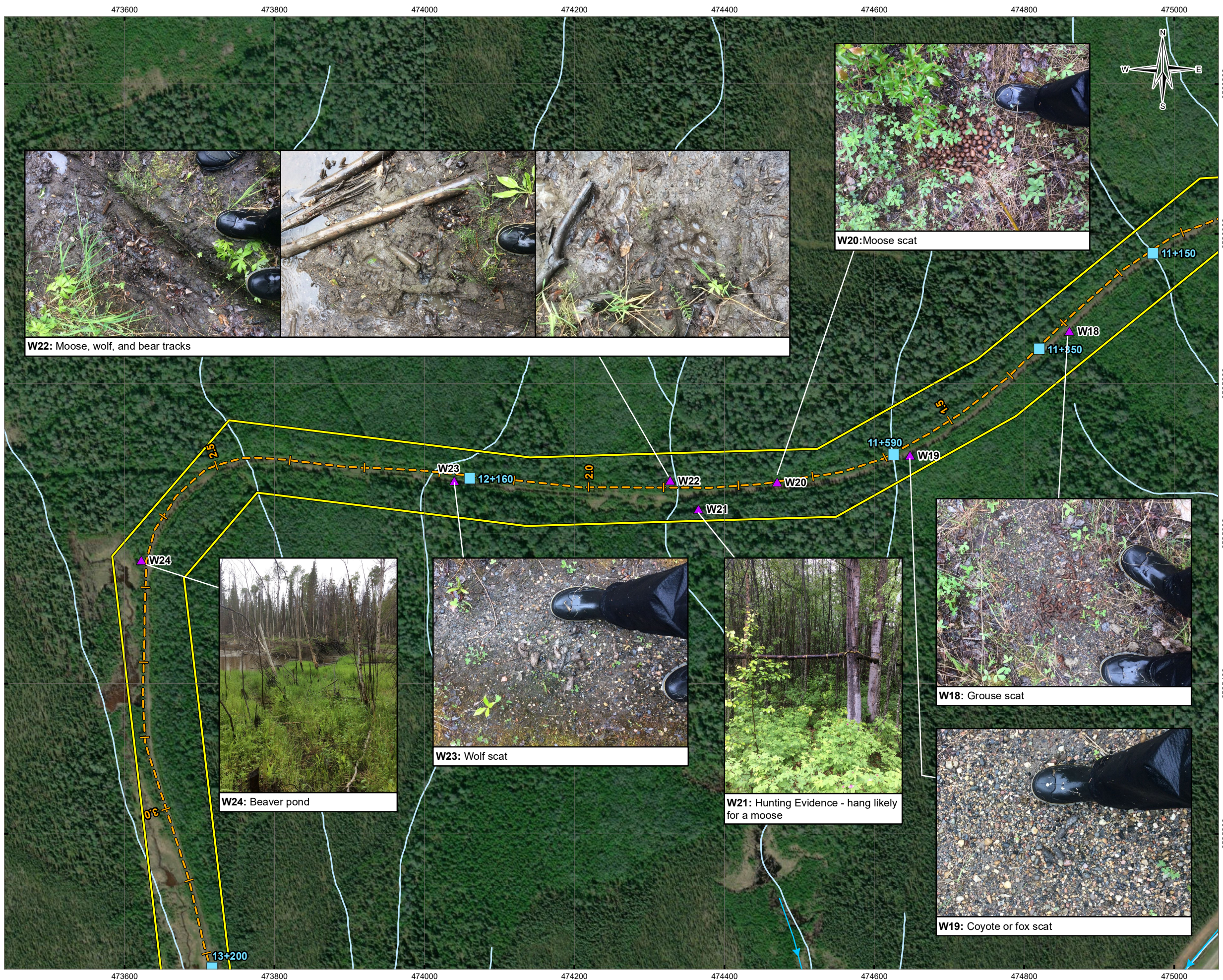
**DEACTIVATION OF FORMER ALIGNMENTS
 KM 501.05 TO KM 508.80
 ALASKA HIGHWAY, BC**

Field Results

PROJECTION UTM Zone 10	DATUM NAD83	CLIENT Public Services and Procurement Canada
Scale: 1:5,000 Metres		
FILE NO. VHWY03116-01_Fig02b_Former_FieldResults.mxd	TETRA TECH	
OFFICE TL-VANC	DWN SL	CKD BB
DATE June 4, 2021	APVD EH	REV 0
PROJECT NO. TRN.VHWY03116-01		Figure 2b

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W22: Moose, wolf, and bear tracks



W20: Moose scat



W24: Beaver pond



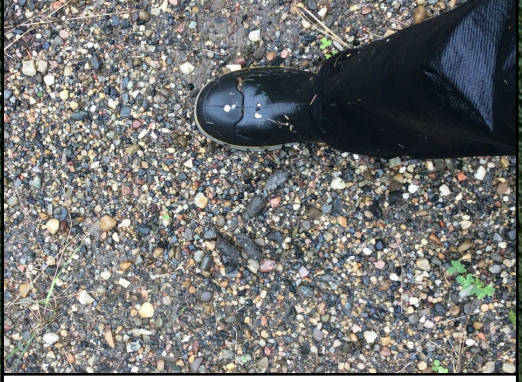
W23: Wolf scat



W21: Hunting Evidence - hang likely for a moose



W18: Grouse scat



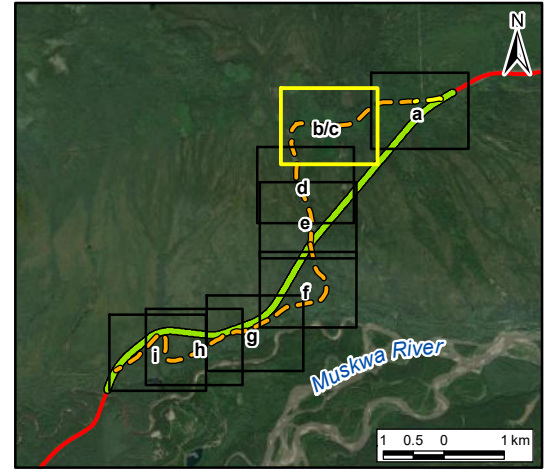
W19: Coyote or fox scat

LEGEND

- Wildlife Field Note
- Existing Culvert
- Drainage Flow
- Watercourse

Former Alaska Highway Alignment

- Limited Vehicle Access
- Former Alaska Highway ROW - KM 501.05-508.80



NOTES
 Base data source:
 CanVec 1:50,000.
 Imagery from ESRI; Maxar (2019).

STATUS
ISSUED FOR USE

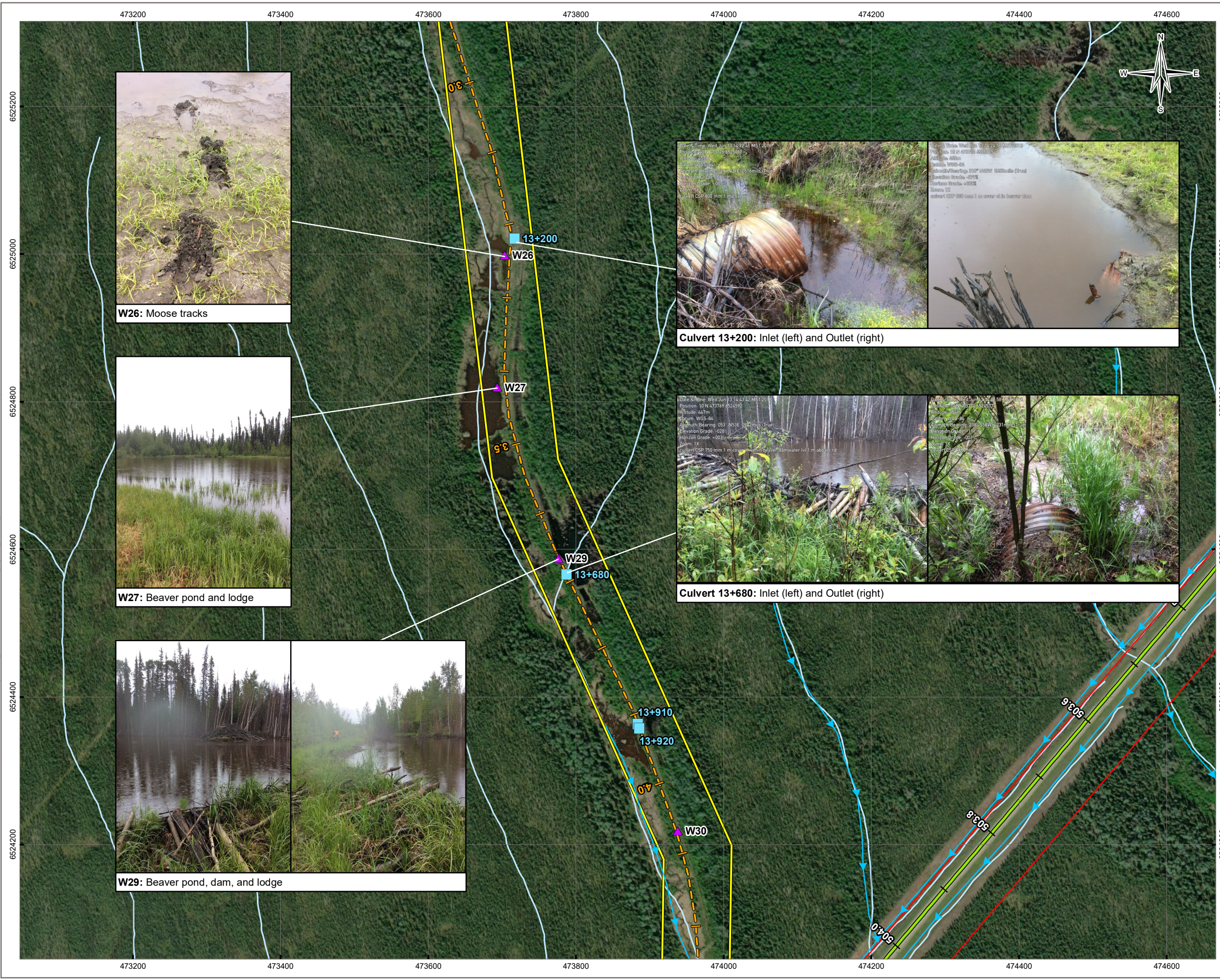
**DEACTIVATION OF FORMER ALIGNMENTS
 KM 501.05 TO KM 508.80
 ALASKA HIGHWAY, BC**

Field Results

PROJECTION UTM Zone 10		DATUM NAD83		CLIENT Public Services and Procurement Canada	
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OFFICE TL-VANC	DWN SL	CKD BB	APVD EH	REV 0	TETRA TECH
DATE June 4, 2021	PROJECT NO. TRN.VHWY03116-01				

Figure 2c

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W26: Moose tracks



Culvert 13+200: Inlet (left) and Outlet (right)



W27: Beaver pond and lodge



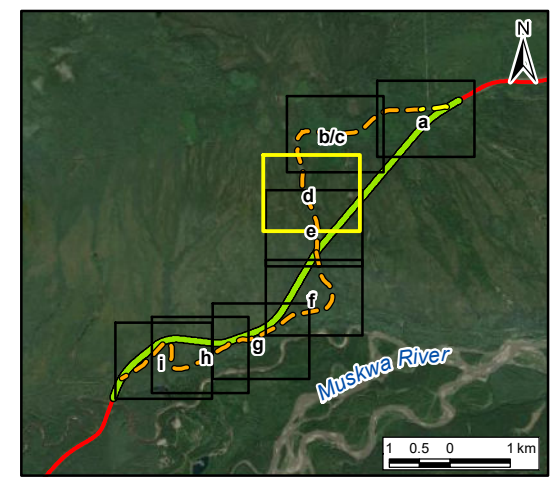
Culvert 13+680: Inlet (left) and Outlet (right)



W29: Beaver pond, dam, and lodge

LEGEND

- Wildlife Field Note
- Existing Culvert
- Drainage Flow
- Watercourse
- Former Alaska Highway Alignment**
 - Limited Vehicle Access
 - Former Alaska Highway ROW - KM 501.05-508.80
- Current Alaska Highway Alignment**
 - Current Alignment - KM 501-509
 - Current Alaska Highway
 - Current Alaska Highway ROW



NOTES
 Base data source:
 CanVec 1:50,000.
 Imagery from ESRI; Maxar (2019).

STATUS
ISSUED FOR USE

DEACTIVATION OF FORMER ALIGNMENTS KM 501.05 TO KM 508.80 ALASKA HIGHWAY, BC

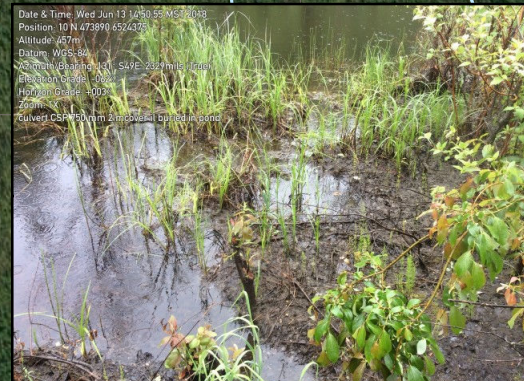
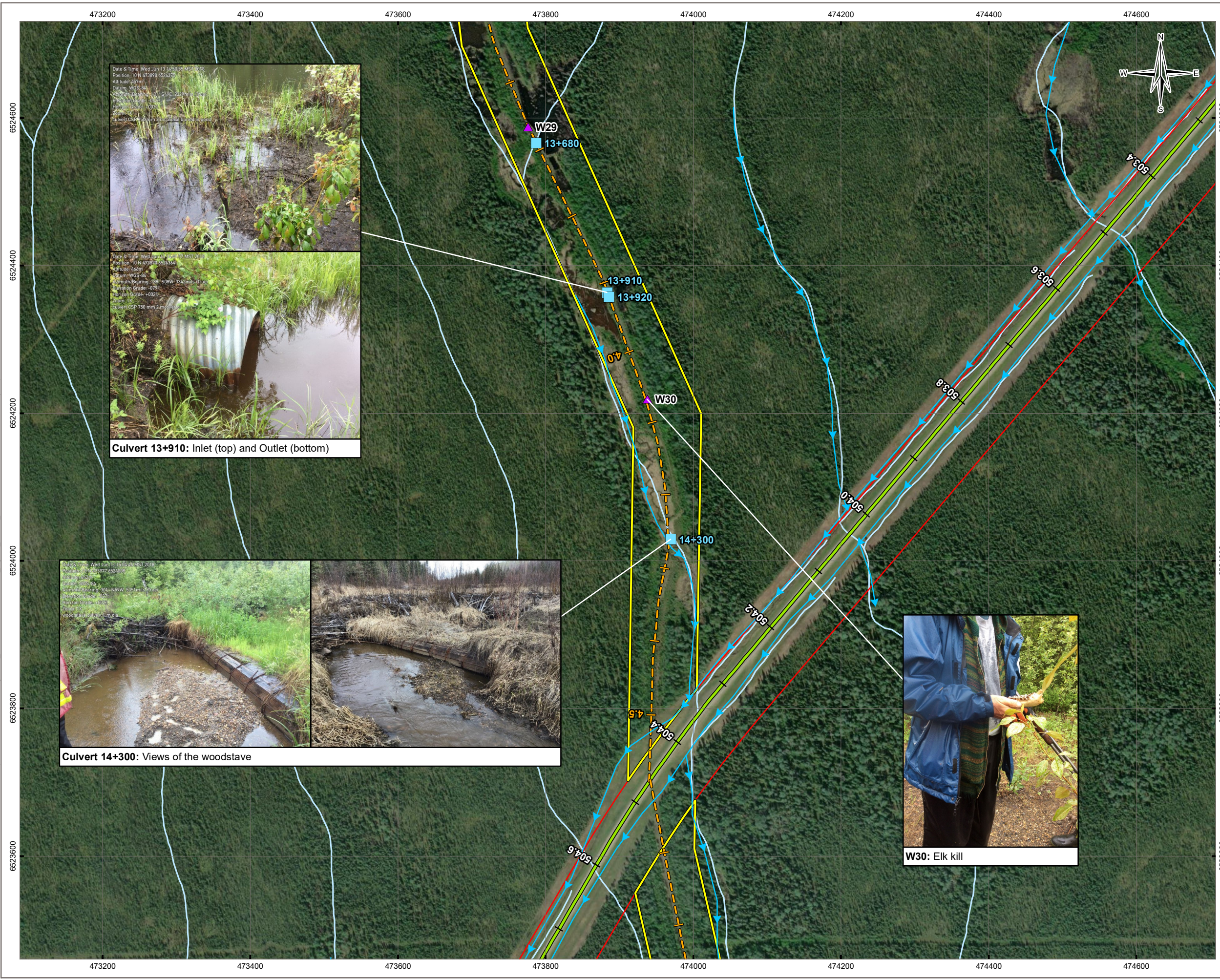
Field Results

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OFFICE TL-VANC		DWN SL	CKD BB	APVD EH	REV 0
DATE June 4, 2021		PROJECT NO. TRN.VHWY03116-01			



Figure 2d

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Culvert 13+910: Inlet (top) and Outlet (bottom)



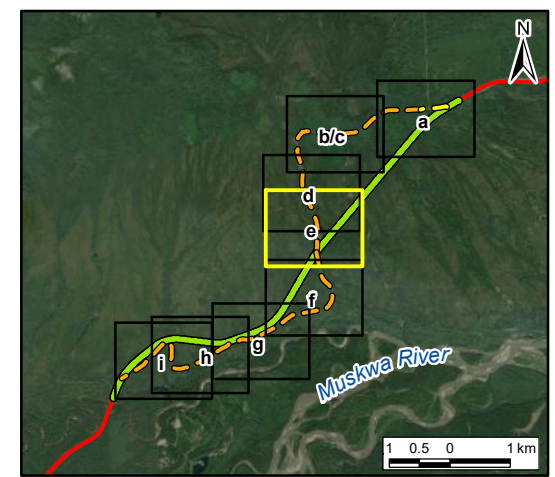
Culvert 14+300: Views of the woodstave



W30: Elk kill

LEGEND

- ▲ Wildlife Field Note
- Existing Culvert
- ← Drainage Flow
- ~ Watercourse
- Former Alaska Highway Alignment**
- Limited Vehicle Access
- Former Alaska Highway ROW - KM 501.05-508.80
- Current Alaska Highway Alignment**
- Current Alignment - KM 501-509
- Current Alaska Highway
- Current Alaska Highway ROW



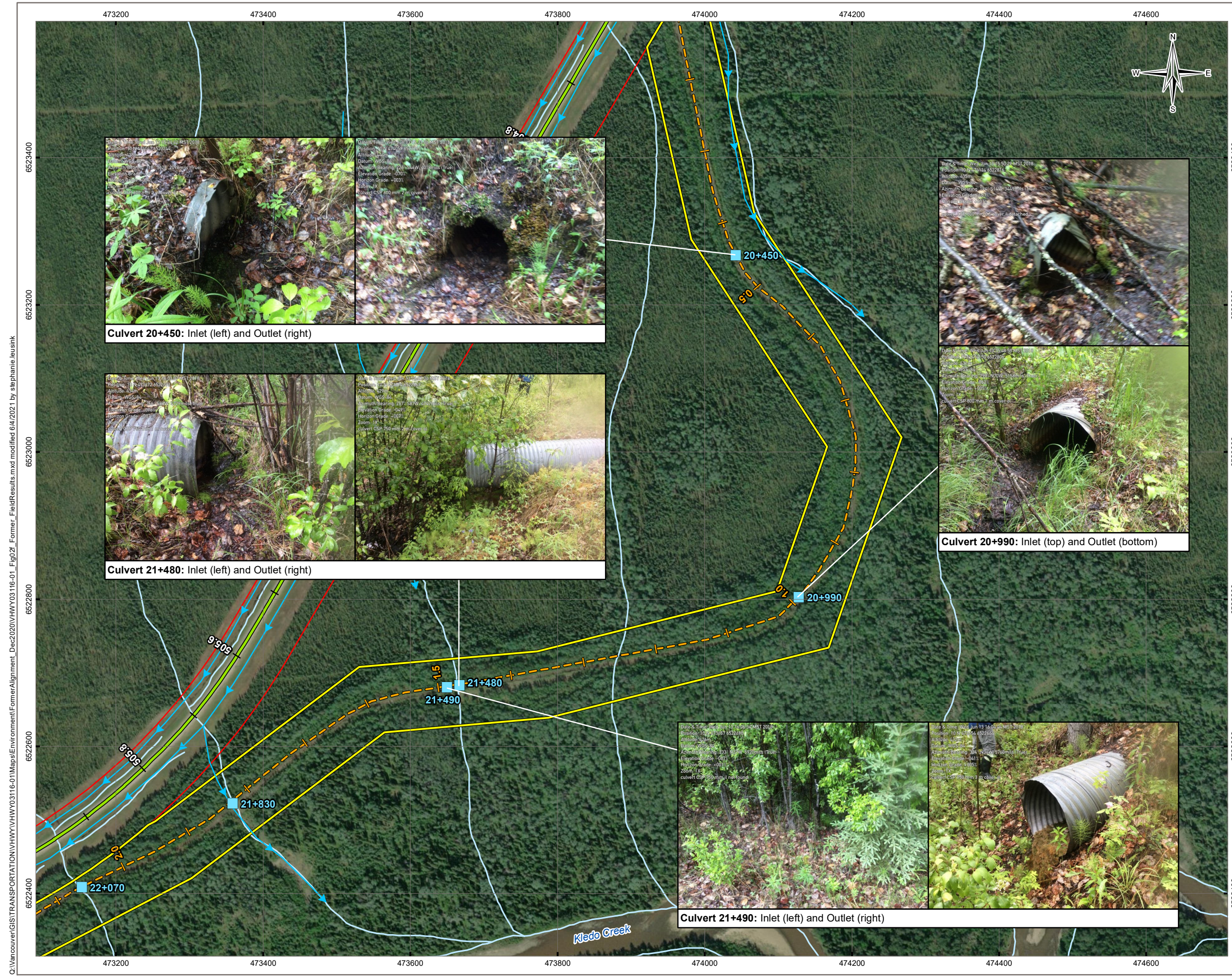
NOTES
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STATUS
ISSUED FOR USE

DEACTIVATION OF FORMER ALIGNMENTS KM 501.05 TO KM 508.80 ALASKA HIGHWAY, BC

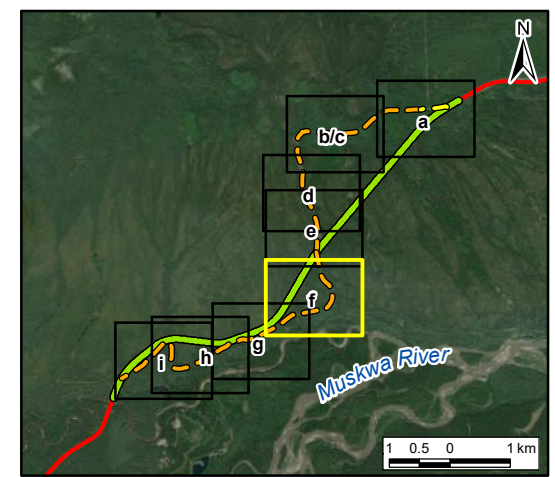
Field Results			
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Scale: 1:5,000			
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OFFICE TL-VANC	DWN SL	CKD BB	APVD EH
DATE June 4, 2021	PROJECT NO. TRN.VHWY03116-01		
			Figure 2e





LEGEND

- Existing Culvert
- Drainage Flow
- ~ Watercourse
- ⊕ Waterbody
- Former Alaska Highway Alignment**
- - - Limited Vehicle Access
- Former Alaska Highway ROW - KM 501.05-508.80
- Current Alaska Highway Alignment**
- Current Alignment - KM 501-509
- - - Current Alaska Highway
- Current Alaska Highway ROW



NOTES
 Base data source:
 CanVec 1:50,000.
 Imagery from ESRI; Maxar (2019).

STATUS
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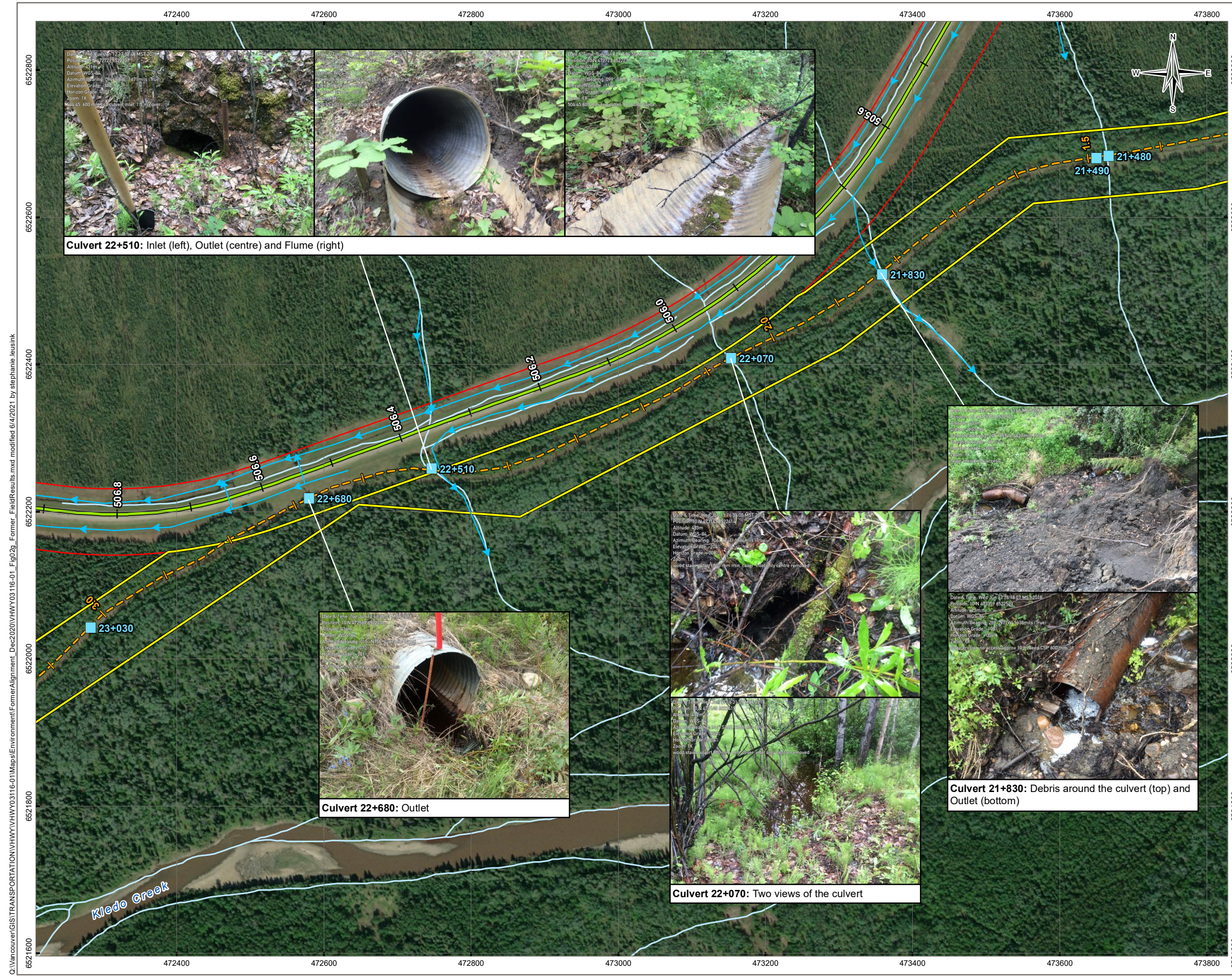
DEACTIVATION OF FORMER ALIGNMENTS KM 501.05 TO KM 508.80 ALASKA HIGHWAY, BC

Field Results

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Scale: 1:5,000					
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OFFICE TL-VANC		DWN SL	CKD BB	APVD EH	REV 0
DATE June 4, 2021		PROJECT NO. TRN.VHWY03116-01			

Figure 2f

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Culvert 22+510: Inlet (left), Outlet (centre) and Flume (right)



Culvert 22+680: Outlet



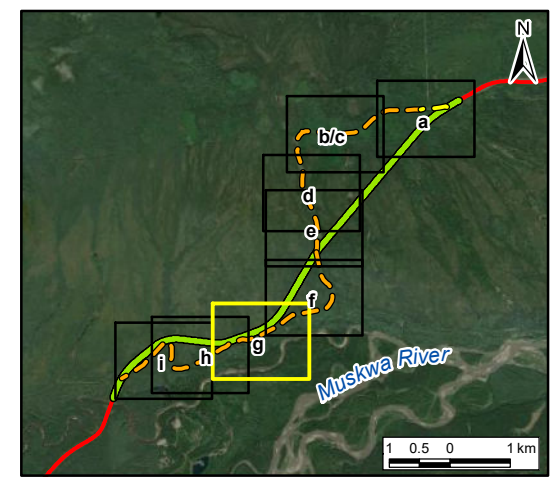
Culvert 22+070: Two views of the culvert



Culvert 21+830: Debris around the culvert (top) and Outlet (bottom)

LEGEND

- Existing Culvert
- Drainage Flow
- ~ Watercourse
- ☁ Waterbody
- Former Alaska Highway Alignment**
- - - Limited Vehicle Access
- Former Alaska Highway ROW - KM 501.05-508.80
- Current Alaska Highway Alignment**
- Current Alignment - KM 501-509
- - - Current Alaska Highway
- Current Alaska Highway ROW



NOTES
 Base data source:
 CanVec 1:50,000.
 Imagery from ESRI; Maxar (2019).

STATUS
ISSUED FOR USE

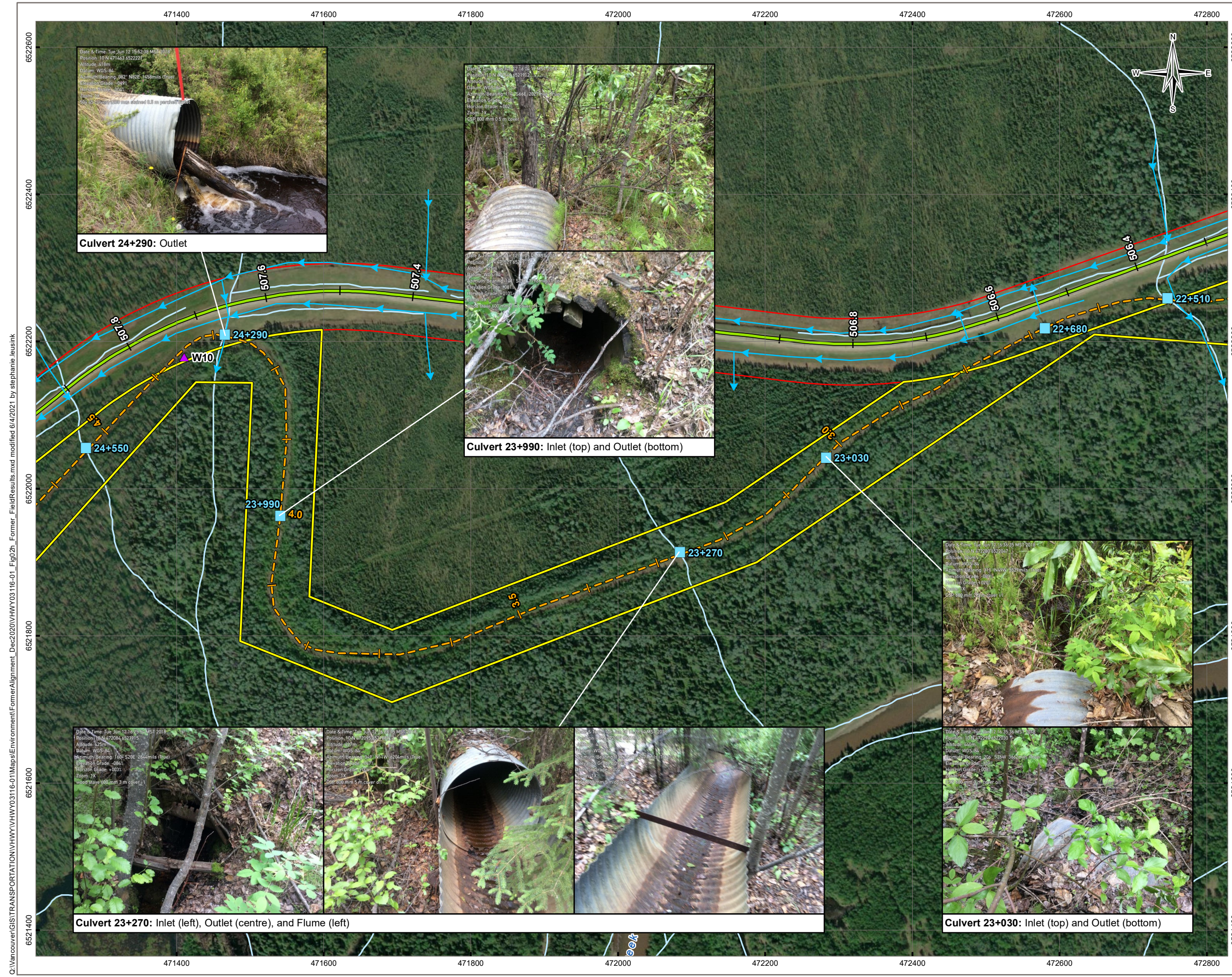
DEACTIVATION OF FORMER ALIGNMENTS KM 501.05 TO KM 508.80 ALASKA HIGHWAY, BC

Field Results

PROJECTION UTM Zone 10		DATUM NAD83		CLIENT Public Services and Procurement Canada	
Scale: 1:5,000					
FILE NO. VHWHY03116-01_Fig02g_Former_FieldResults.mxd					
OFFICE TL-VANC	DWN SL	CKD BB	APVD EH	REV 0	TETRA TECH
DATE June 4, 2021	PROJECT NO. TRN.VHWHY03116-01				

Figure 2g

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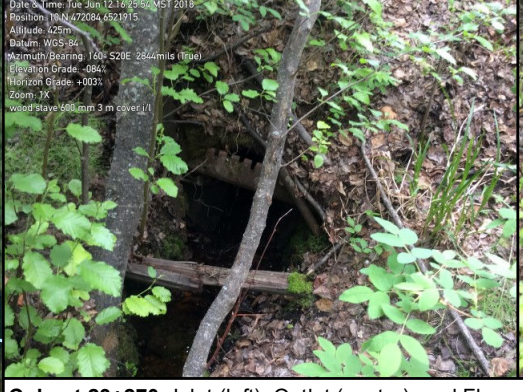
Culvert 24+290: Outlet



Culvert 23+990: Inlet (top) and Outlet (bottom)



Culvert 23+030: Inlet (top) and Outlet (bottom)



Culvert 23+270: Inlet (left), Outlet (centre), and Flume (left)

LEGEND

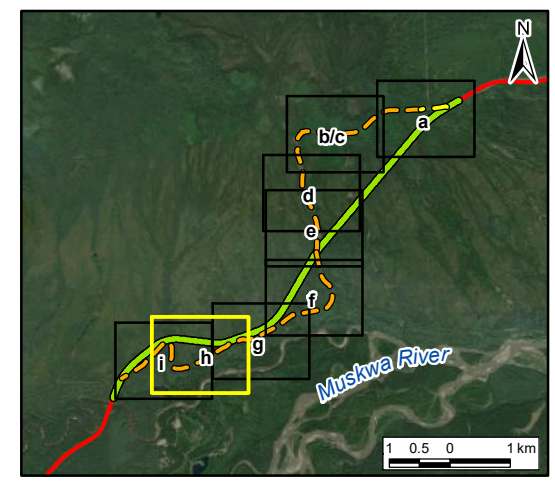
- ▲ Wildlife Field Note
- Existing Culvert
- ← Drainage Flow
- ~ Watercourse
- ☪ Waterbody

Former Alaska Highway Alignment

- ⚡ Limited Vehicle Access
- ▭ Former Alaska Highway ROW - KM 501.05-508.80

Current Alaska Highway Alignment

- Current Alignment - KM 501-509
- Current Alaska Highway
- ▭ Current Alaska Highway ROW



NOTES
 Base data source:
 CanVec 1:50,000.
 Imagery from ESRI; Maxar (2019).

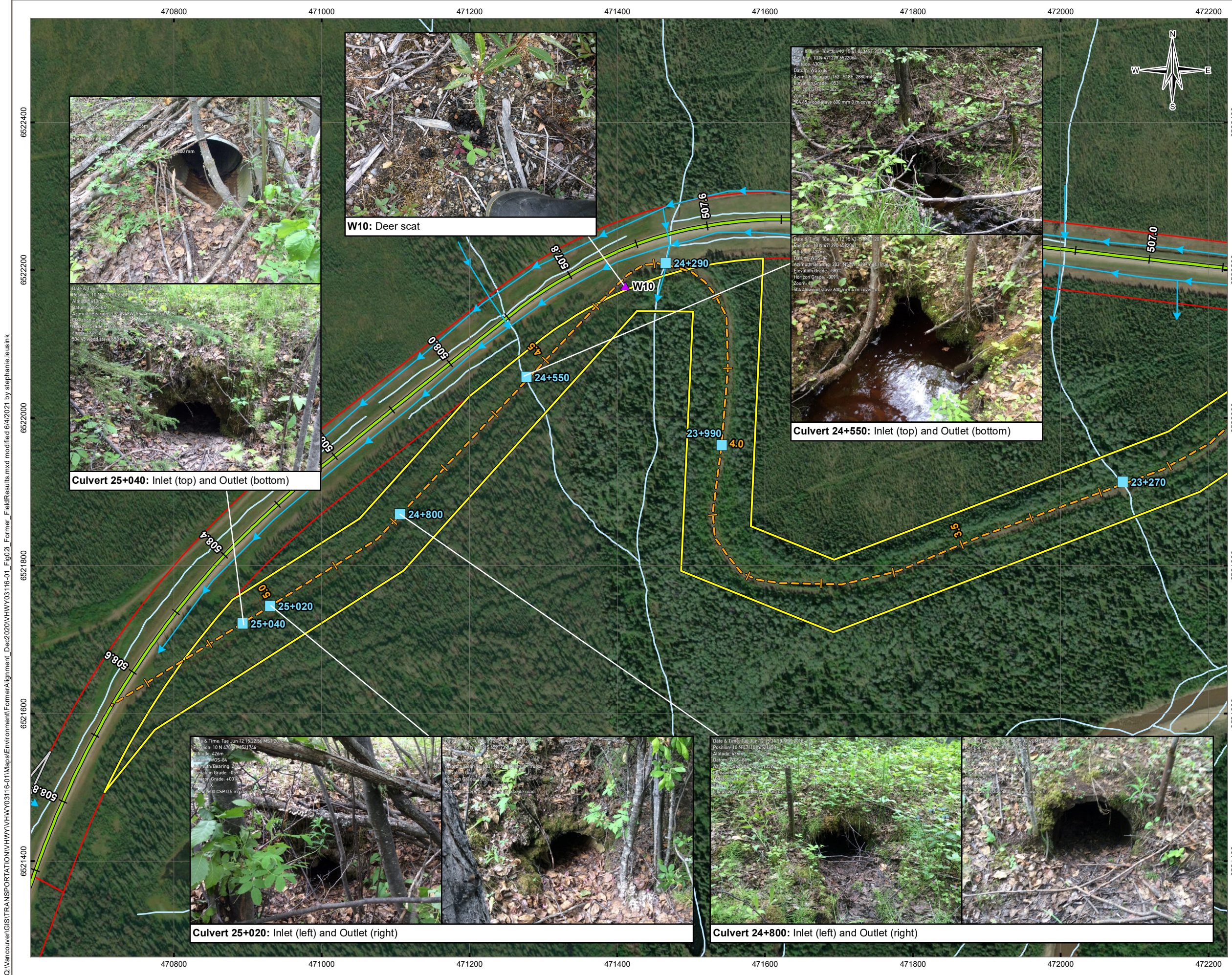
STATUS
 ISSUED FOR USE

**DEACTIVATION OF FORMER ALIGNMENTS
 KM 501.05 TO KM 508.80
 ALASKA HIGHWAY, BC**

Field Results

PROJECTION UTM Zone 10	DATUM NAD83	CLIENT Public Services and Procurement Canada
Scale: 1:5,000		
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OFFICE TL-VANC	DWN SL	CKD BB
DATE June 4, 2021	APVD EH	REV 0
PROJECT NO. TRN.VHWY03116-01		Figure 2h

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LEGEND

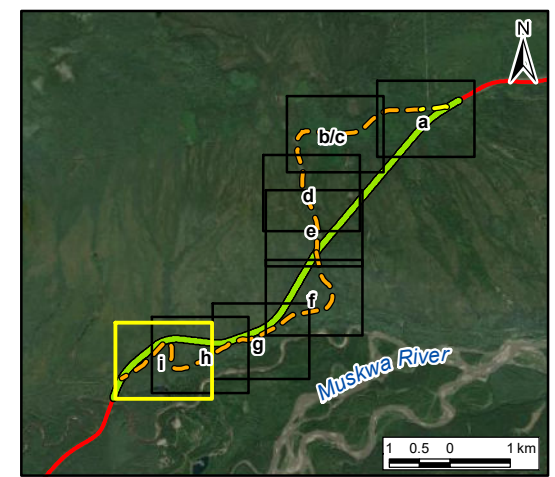
- ▲ Wildlife Field Note
- Existing Culvert
- ← Drainage Flow
- ~ Watercourse
- ☁ Waterbody

Former Alaska Highway Alignment

- Limited Vehicle Access
- Former Alaska Highway ROW - KM 501.05-508.80
- Former Alaska Highway ROW - Other Site

Current Alaska Highway Alignment

- Current Alignment - KM 501-509
- Current Alaska Highway
- Current Alaska Highway ROW



NOTES
 Base data source:
 CanVec 1:50,000.
 Imagery from ESRI; Maxar (2019).

STATUS
ISSUED FOR USE

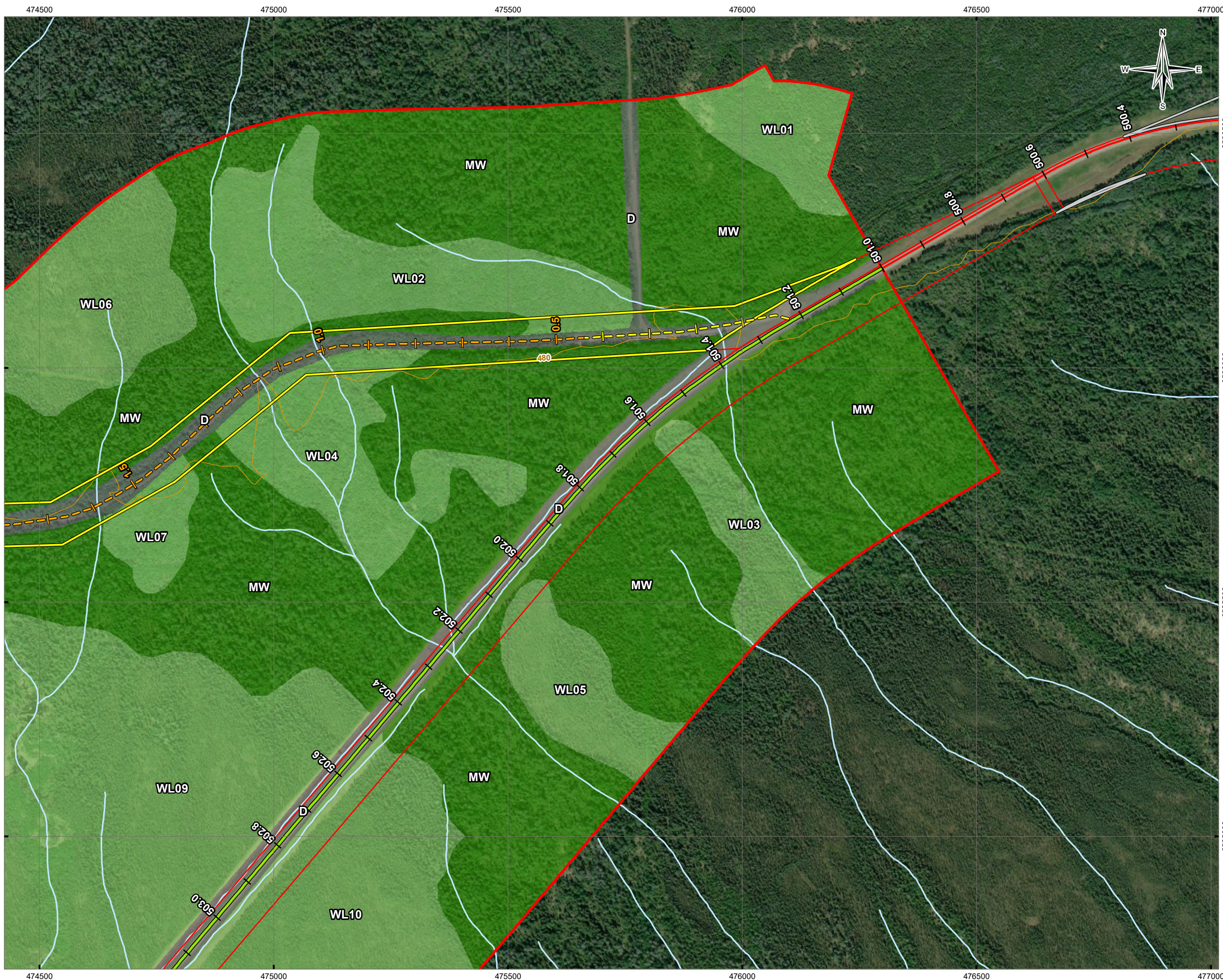
DEACTIVATION OF FORMER ALIGNMENTS KM 501.05 TO KM 508.80 ALASKA HIGHWAY, BC

Field Results			
PROJECTION UTM Zone 10	DATUM NAD83	CLIENT Public Services and Procurement Canada	
Scale: 1:5,000			
FILE NO. VHWY03116-01_Fig02i_Former_FieldResults.mxd			
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DATE June 4, 2021			
PROJECT NO. TRN.VHWY03116-01			

Figure 2i

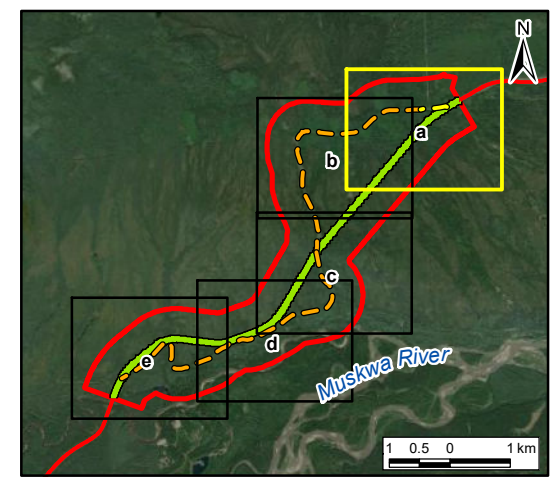
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LEGEND

- 500 m Buffer
- Former Alaska Highway Alignment**
- 2-Wheel Drive Access
- Limited Vehicle Access
- Former Alaska Highway ROW - KM 501.05-508.80
- Former Alaska Highway ROW - Other Site
- Current Alaska Highway Alignment**
- Current Alignment - KM 501-509
- Current Alaska Highway
- Current Alaska Highway ROW
- Ecosite Vegetation Management Unit**
- Disturbed (D)
- Mixedwood Forest (MW)
- Wetland (WL)
- Base Features**
- Contour (40 m)
- Watercourse



NOTES
 Base data source:
 CanVec 1:50,000.
 Imagery from ESRI; Maxar (2019).

STATUS
ISSUED FOR USE

**DEACTIVATION OF FORMER ALIGNMENTS
 KM 501.05 TO KM 508.80
 ALASKA HIGHWAY, BC**

Ecosites			
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FILE NO. VHWY03116-01_Fig03_Former_Ecosites.mxd			
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DATE June 4, 2021	PROJECT NO. TRN.VHWY03116-01		



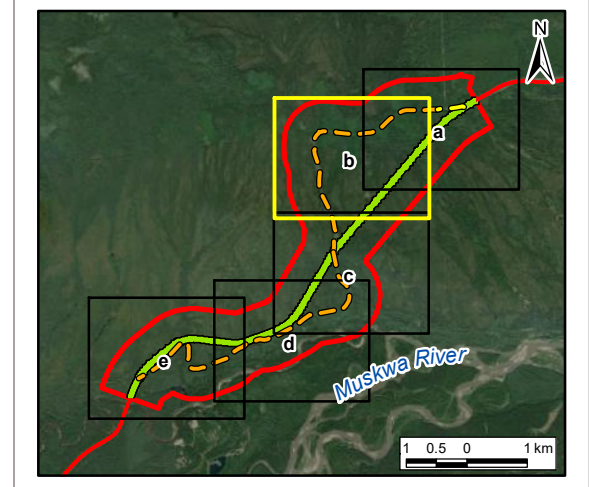
Figure 3a

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LEGEND

- 500 m Buffer
- Former Alaska Highway Alignment**
- 2-Wheel Drive Access
- Limited Vehicle Access
- Former Alaska Highway ROW - KM 501.05-508.80
- Current Alaska Highway Alignment**
- Current Alignment - KM 501-509
- Current Alaska Highway
- Current Alaska Highway ROW
- Ecosite Vegetation Management Unit**
- Disturbed (D)
- Mixedwood Forest (MW)
- Wetland (WL)
- Base Features**
- Contour (40 m)
- Watercourse



NOTES
 Base data source:
 CanVec 1:50,000.
 Imagery from ESRI; Maxar (2019).

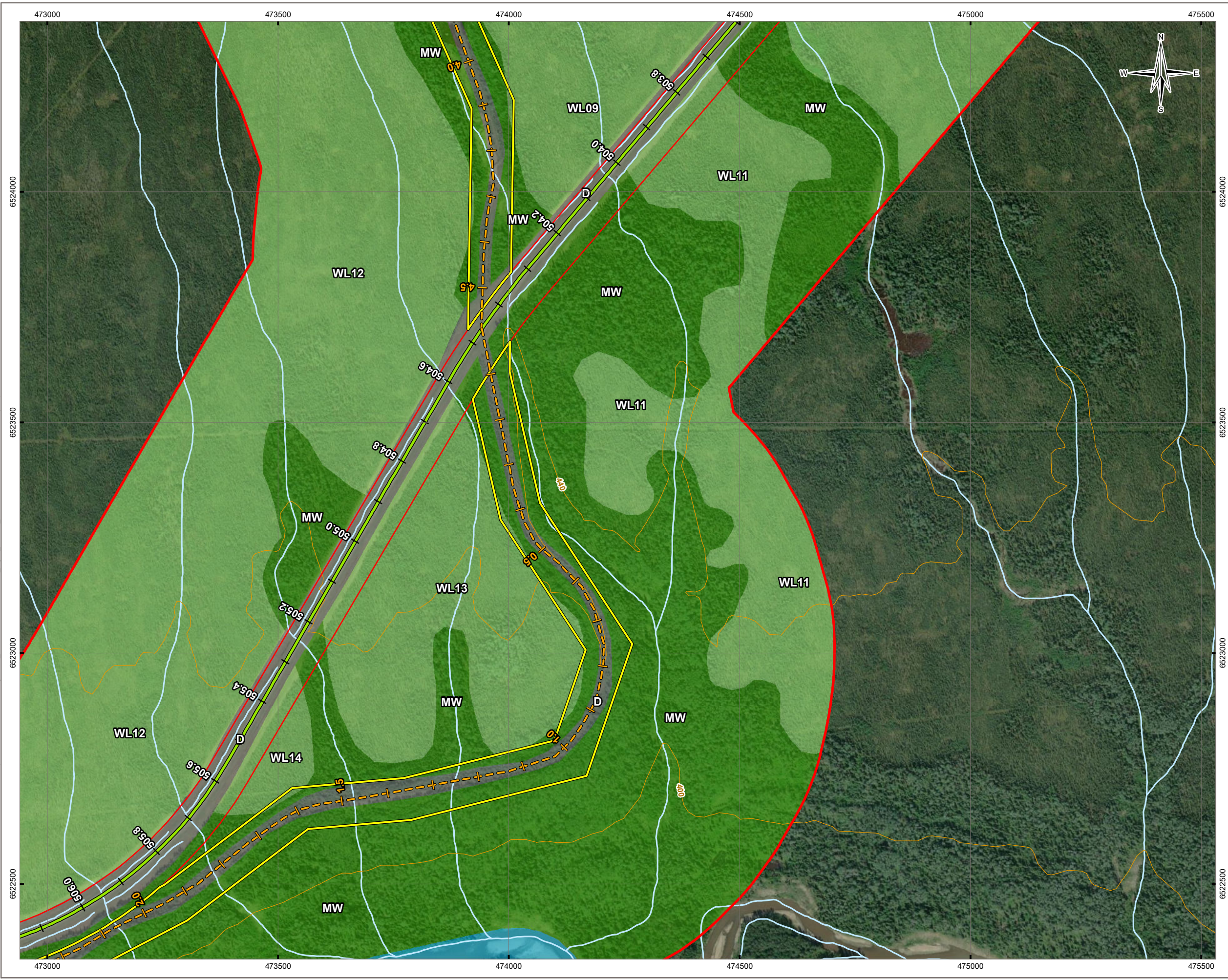
STATUS
ISSUED FOR USE

**DEACTIVATION OF FORMER ALIGNMENTS
 KM 501.05 TO KM 508.80
 ALASKA HIGHWAY, BC**

Ecosites			
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FILE NO. WHWY03116-01_Fig03_Former_Ecosites.mxd			
OFFICE TL-VANC	DWN SL	CKD BB	APVD EH
DATE June 4, 2021	PROJECT NO. TRN.VHWY03116-01		

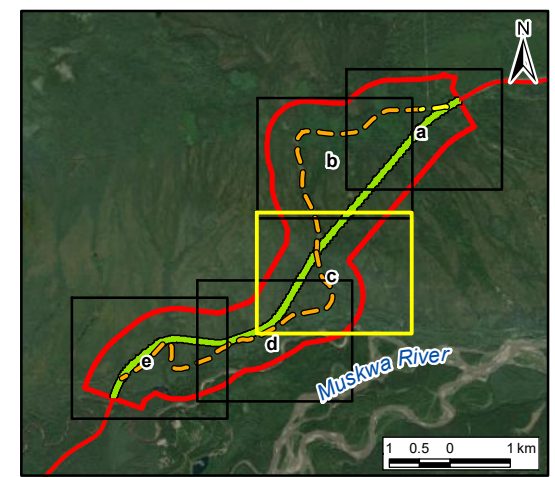
Figure 3b

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LEGEND

- 500 m Buffer
- Former Alaska Highway Alignment**
- 2-Wheel Drive Access
- Limited Vehicle Access
- Former Alaska Highway ROW - KM 501.05-508.80
- Current Alaska Highway Alignment**
- Current Alignment - KM 501-509
- Current Alaska Highway
- Current Alaska Highway ROW
- Ecosite Vegetation Management Unit**
- Disturbed (D)
- Mixedwood Forest (MW)
- Wetland (WL)
- Watercourse (W)
- Base Features**
- Contour (40 m)
- Watercourse
- Waterbody



NOTES
 Base data source:
 CanVec 1:50,000.
 Imagery from ESRI; Maxar (2019).

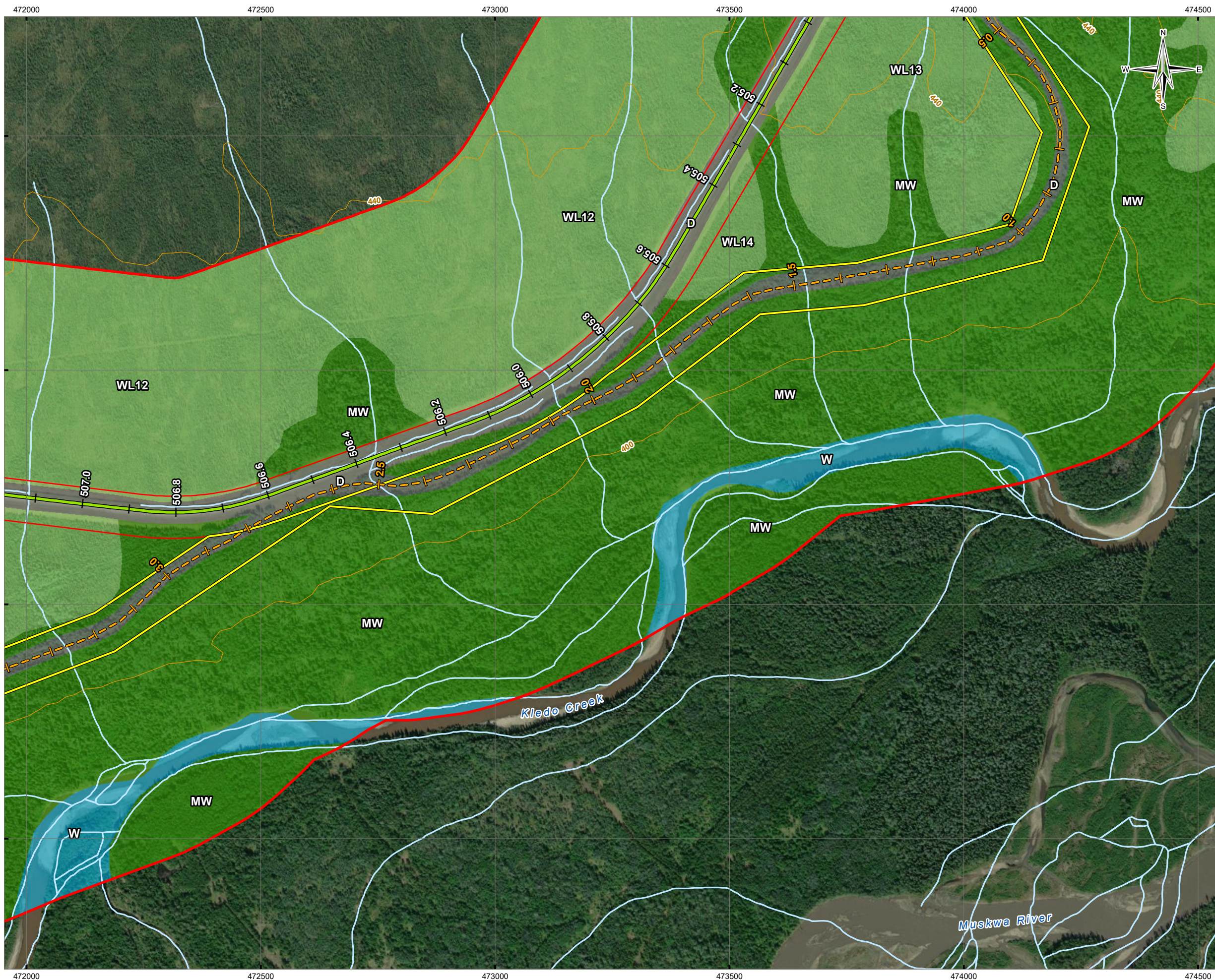
STATUS
ISSUED FOR USE

DEACTIVATION OF FORMER ALIGNMENTS KM 501.05 TO KM 508.80 ALASKA HIGHWAY, BC

Ecosites

PROJECTION UTM Zone 10	DATUM NAD83	CLIENT Public Services and Procurement Canada
Scale: 1:8,000 		TETRA TECH
FILE NO. VHWY03116-01_Fig03_Former_Ecosites.mxd		
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DATE June 4, 2021	APVD EH	REV 0
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LEGEND

- 500 m Buffer
- Former Alaska Highway Alignment**

 - 2-Wheel Drive Access
 - Limited Vehicle Access
 - Former Alaska Highway ROW - KM 501.05-508.80

- Current Alaska Highway Alignment**

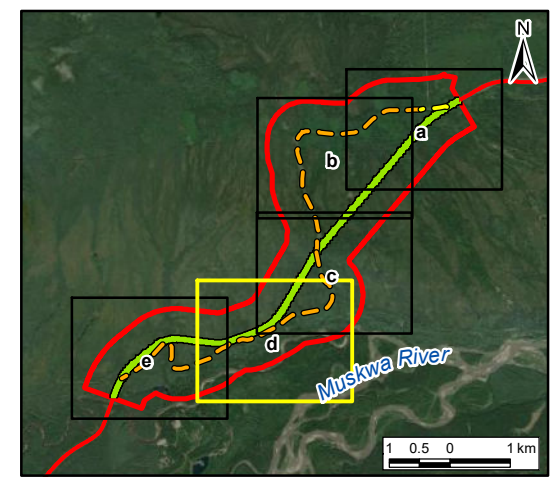
 - Current Alignment - KM 501-509
 - Current Alaska Highway
 - Current Alaska Highway ROW

- Ecosite Vegetation Management Unit**

 - Disturbed (D)
 - Mixedwood Forest (MW)
 - Wetland (WL)
 - Watercourse (W)

- Base Features**

 - Contour (40 m)
 - Watercourse
 - Waterbody



NOTES
 Base data source:
 CanVec 1:50,000.
 Imagery from ESRI; Maxar (2019).

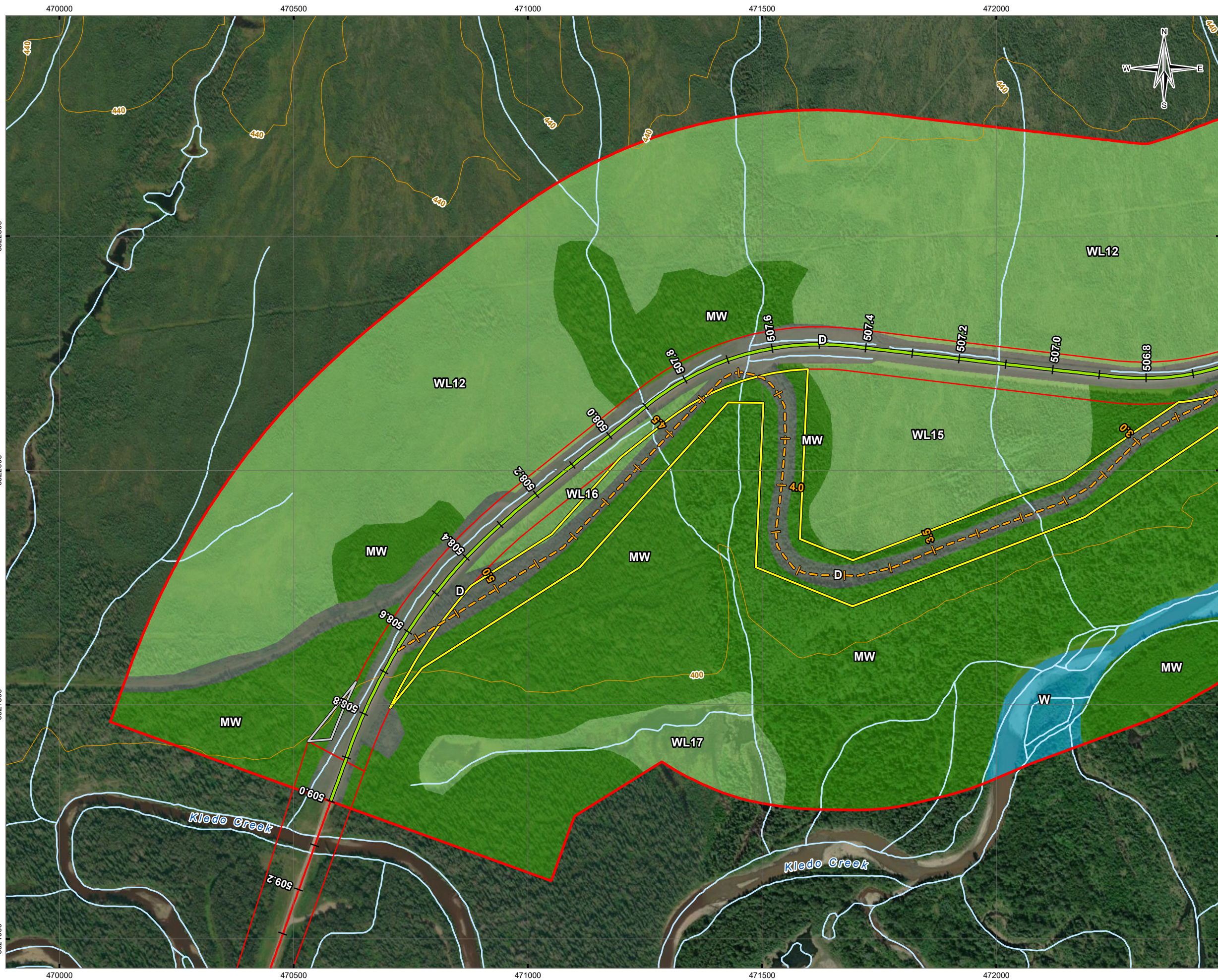
STATUS
ISSUED FOR USE

**DEACTIVATION OF FORMER ALIGNMENTS
 KM 501.05 TO KM 508.80
 ALASKA HIGHWAY, BC**

Ecosites

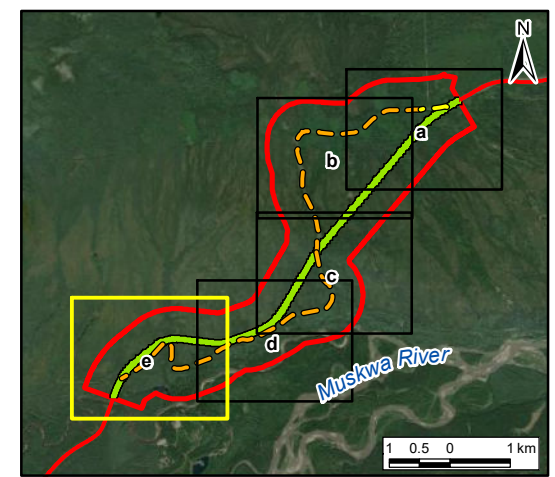
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PROJECT NO. TRN.VHWY03116-01		Figure 3d

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LEGEND

- 500 m Buffer
- Former Alaska Highway Alignment
 - 2-Wheel Drive Access
 - Limited Vehicle Access
 - Former Alaska Highway ROW - KM 501.05-508.80
 - Former Alaska Highway ROW - Other Site
- Current Alaska Highway Alignment
 - Current Alignment - KM 501-509
 - Current Alaska Highway
 - Current Alaska Highway ROW
- Ecosite Vegetation Management Unit
 - Disturbed (D)
 - Mixedwood Forest (MW)
 - Wetland (WL)
 - Watercourse (W)
- Base Features
 - Contour (40 m)
 - Watercourse
 - Waterbody



NOTES
 Base data source:
 CanVec 1:50,000.
 Imagery from ESRI; Maxar (2019).

STATUS
 ISSUED FOR USE

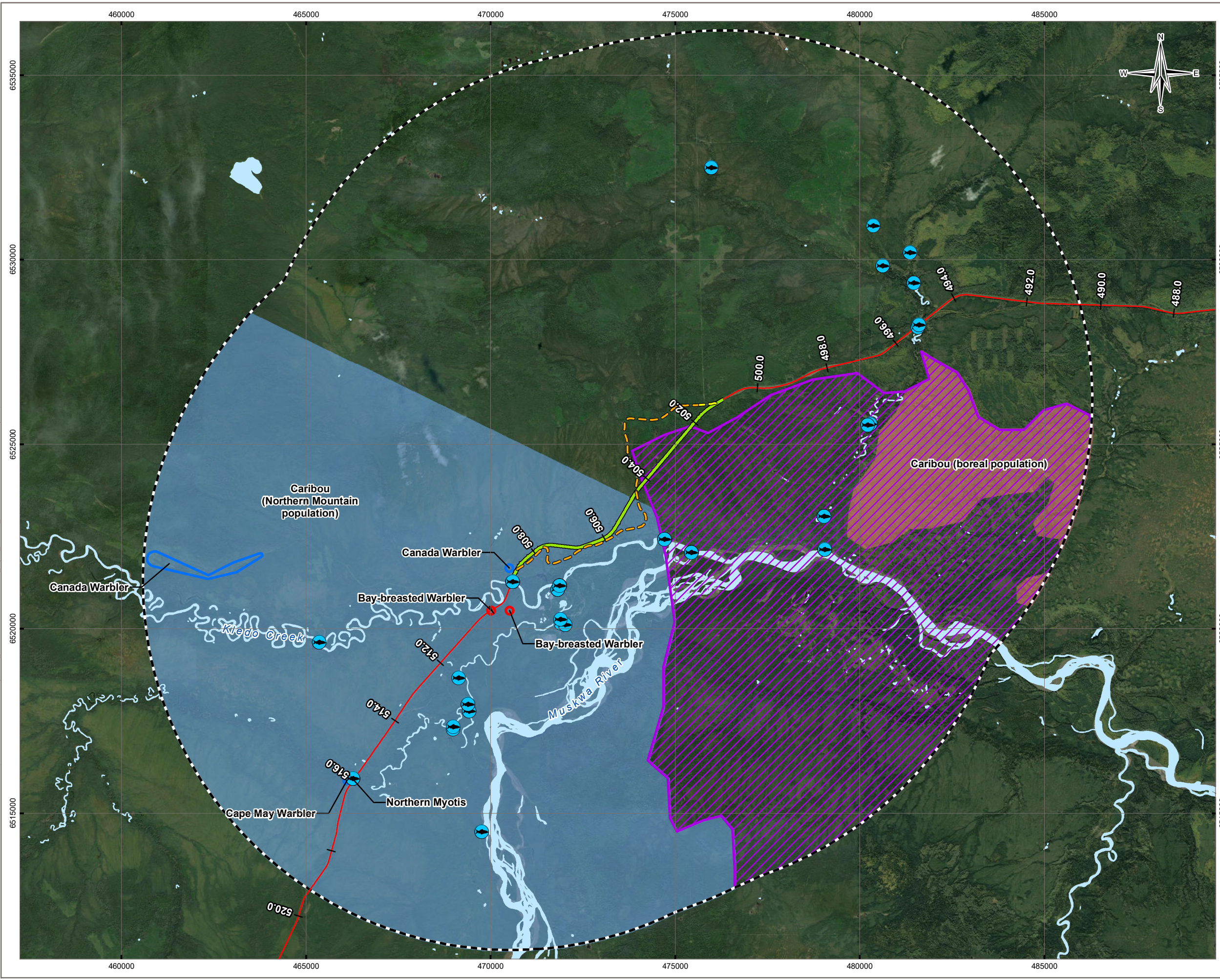
**DEACTIVATION OF FORMER ALIGNMENTS
 KM 501.05 TO KM 508.80
 ALASKA HIGHWAY, BC**

Ecosites

PROJECTION UTM Zone 10	DATUM NAD83	CLIENT Public Services and Procurement Canada
Scale: 1:8,000 100 50 0 100 Metres		TETRA TECH
FILE NO. VHWY03116-01_Fig03_Former_Ecosites.mxd	OFFICE TL-VANC	DATE June 4, 2021
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REV 0	PROJECT NO. TRN.VHWY03116-01	

Figure 3e

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LEGEND

- Former Alaska Highway Alignment**
 - 2-Wheel Drive Access
 - Limited Vehicle Access
- Current Alaska Highway Alignment**
 - Current Alignment - KM 501-509
 - Current Alaska Highway
- 10 km Buffer
- Waterbody
- Known BC Fish Observations**
 - Fish Observation
- SARA Critical Habitat**
 - Boreal Caribou Critical Habitat
- CDC Species at Risk Occurrences**
 - Northern Mountain Caribou (Blue-Listed)
 - Boreal Caribou (Red-Listed)
 - Other Blue-Listed Species
 - Other Red-Listed Species

Fish Species Name	Number of Observations
Arctic Grayling	19
Bull Trout	3
Burbot	4
Finescale Dace	12
Fish Unidentified Species	2
Flathead Chub	3
Lake Chub	13
Longnose Dace	7
Longnose Sucker	13
Mountain Whitefish	5
Northern Pearl Dace	3
Northern Pike	3
Slimy Sculpin	14
Troutperch	5
White Sucker	3

NOTES
 Base data source:
 CDC Species at Risk and BC Fish Observations from DataBC (accessed July 2019).
 SARA Critical Habitat from Environment and Climate Change Canada (2018).
 CanVec 1:50,000.
 Imagery from ESRI; Maxar (2018/2019).

STATUS
ISSUED FOR USE

DEACTIVATION OF FORMER ALIGNMENTS KM 501.05 TO KM 508.80 ALASKA HIGHWAY, BC

Conservation Data Centre Occurrences and Known Fish Observations

PROJECTION UTM Zone 10	DATUM NAD83	CLIENT Public Services and Procurement Canada				
Scale: 1:100,000						
FILE NO. VHWHY03116-01_Fig04_Former_CDC.mxd	TETRA TECH					
OFFICE TL-VANC			DWN SL	CKD BB	APVD EH	REV 0
DATE June 4, 2021			PROJECT NO. TRN.VHWHY03116-01			

Figure 4

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.

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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

ENVIRONMENTAL MANAGEMENT PLAN (EMP)

Environmental Management Plan Deactivation of Former Alignments KM 501.05 to KM 508.80, Alaska Highway, BC



PRESENTED TO
Public Services and Procurement Canada

JUNE 4, 2021
ISSUED FOR USE
FILE: 704-TRN.VHWY03116-01

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APPENDIX SECTIONS

APPENDICES

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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 AND BACKGROUND

Tetra Tech Canada Inc. (Tetra Tech) was retained by Public Services and Procurement Canada (PSPC) to prepare an Environmental Management Plan (EMP) for the deactivation of two sections of the former Alaska Highway between KM 501.05 to KM 508.80 of the current alignment (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.

1.1 Project Location

The Project area includes two former alignments located between KM 501.05 to KM 508.80 of the Alaska Highway (Figure 1) in Northern BC and is approximately 40 km west of Fort Nelson.

- Section A is northwest of the current highway alignment from KM 501.05 to KM 504.50.
- Section B is southeast of the current highway alignment from KM 504.45 to KM 508.80.

1.2 Project Description

Since 1964, PSPC has been the federal custodian for the Alaska Highway and is responsible for the maintenance of the current highway and deactivation of former highway alignments (PSPC n.d.). PSPC’s current operational jurisdiction of the Alaska Highway extends from KM 133 (north of Fort St. John) to the BC-Yukon border at KM 968 and the highway has undergone multiple alignment modifications since its construction in 1942 (PSPC n.d.). As such, there are many former alignment sites along the Alaska Highway that are no longer active and require deactivation and divestiture.

Former alignment sites were prioritized for deactivation and grouped into tender packages based on geographical proximity and/or the types of deactivation works required. The two priority sites between KM 501.05 to KM 508.80 of the Alaska Highway were grouped together to undergo decommissioning/deactivation works.

These two former alignments have been identified as a potential source for highway construction materials (i.e., embankment or common fill). Deactivation may take place following or at the same time as extraction of these

materials. Material extraction would not take place within 30 meters of any watercourses. The deactivation prescriptions are proposed to be based primarily on the BC Ministry of Forestry Guidelines as described in the Tetra Tech report, *Alaska Highway Former Alignments Project: Typical Criteria / Standards for Road Deactivation (August 14, 2018)*; as well as feedback received from PSPC, BC Ministry of Transportation and Infrastructure, and BC Ministry of Environment and Climate Change Strategy.

These two sites have been identified for permanent deactivation, which is typically applied when use of the road will no longer be required and no further inspections or maintenance is required. Decommissioning works for permanent deactivation on these two former alignments will include:

- Clearing of existing trees and stripping vegetation within the former highway road prism;
- Excavation and off-site stockpiling of materials in the former highway road prism for re-use in the highway widening construction;
- Revegetation through seeding once required materials have been extracted;
- Removal of 25 culverts (Table 1-1) and replacement with cross-ditches, berms, or water bars to re-establish drainage patterns;
- Slope stabilization at Km 21.85 of Section B (KM 504.40 to KM 508.60);
- Scarifying the remaining former gravel driving surface and Bituminous Surface Treatment (BST) layer;
- Removal of Beaver Dam's to facilitate removal of culverts from Km 13.70 to Km 14.00.
- Removal of debris including abandoned car body, tire and axel, drum barrel, traffic barricades, hanging garbage cans/existing signs at various locations along both alignments; and
- Access removal at each entry point to the former alignment, with placement of large boulders at the east end of Section A (KM 501.05 to KM 504.50) to remove ATV/vehicle access to these deactivated road segments.

Standard heavy equipment will be used throughout construction for various activities listed above. These may include excavators, dozers, rock trucks, graders, rollers, etc. The location and size of staging and laydown areas and debris stockpiles will be determined through detailed design phase of the Project.

Table 1-1: Existing Culverts along the Former Alignment

Station	UTM Coordinates		Size (mm)	Type
	Easting	Northing		
Section A (KM 501+200 to KM 504+400)				
11+150	474969	6525972	900	CSP
11+350	474824	6525843	600	CSP
11+610	474613	6525692	800	CSP
12+150	474079	6525667	750	CSP
13+230	473721	6525012	800	CSP
13+680	473782	6524577	750	CSP
13+910	473879	6524363	750	CSP
13+920	473888	6524366	800 (Assumed)	Wood Stave
14+280	473974	6524010	1000	Wood Stave

Station	UTM Coordinates		Size (mm)	Type
	Easting	Northing		
Section B (KM 504+400 to KM 508+600)				
20+470	474053	6523247	600	CSP
20+970	474143	6522809	800	CSP
21+470	473673	6522682	750	CSP
21+480	473659	6522667	750	CSP
21+830	473362	6522522	600	CSP
22+070	473149	6522409	800 (Assumed)	Wood Stave
22+540	472714	6522238	800	CSP
22+680	472582	6522213	900	CSP
23+020	472289	6522043	600	CSP
23+260	472093	6521902	800 (Wood) 750 (CSP)	Wood Stave & CSP
23+940	471536	6521914	800 (Wood) 750 (CSP)	Wood Stave & CSP
24+290	471458	6522200	1200 (Wood) 600 (CSP)	Wood Stave & CSP
24+550	471285	6522050	600	Wood Stave
24+810	471100	6521854	600	Wood Stave
25+020	470927	6521739	600	CSP
25+060	470895	6521708	650 (Wood) 750 (CSP)	Wood Stave & CSP

1.3 Project Schedule

PSPC anticipates awarding the construction contract in the Fall of 2021.

PSPC anticipates construction to begin November 2021. Construction may be completed over multiple years with all construction works completed by March 31, 2024. Active construction will occur during dry or frozen conditions (e.g., winter) or during the least risk work window for fish (because both spring and fall spawners are potentially present in downstream watercourses, the least risk window is July 15 to August 15). Beaver removal, if necessary, to facilitate dam removal, will be conducted by a licenced trapper during open season (October 15 and April 30).

2.0 ENVIRONMENTAL SENSITIVITIES

This Project entails work within environmentally sensitive areas, including Woodland Caribou habitat, watercourses, wetlands, and riparian areas and will require in-stream works to remove culverts 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 the highway upgrades and decommissioning activities. 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 2-1.

Table 2-1: 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). Boreal Caribou are provincially red-listed and designated as 'threatened' under the SARA.</p> <p>There is potential for Woodland Caribou to be encountered during the decommissioning activities since the majority of KM 501.05 to KM 508.80 along the former Alaska highway is within provincially mapped caribou range. Part of this range is immediately adjacent to the Project area and is identified as Critical Habitat for Boreal Caribou. Due to the close proximity of the Project to Boreal Caribou Critical Habitat, special care should be taken during construction to minimize impacts to caribou and caribou habitat.</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 D 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 to monitor for Caribou within the Project area during decommissioning works. ▪ If Caribou are observed within the Project area, cease all Project activities until they have left the area. ▪ See EMP section 4.4 and the Caribou Protection Plan for further mitigation strategies.
Beavers/Beaver Dams	<p>Beaver dams are present in Section A, between approximately 13+200 and 13+920. Beaver dam removal will release a considerable amount of water which may alter/destroy habitat.</p>	<ul style="list-style-type: none"> ▪ Beaver removal, if necessary, can only be conducted by a licenced trapper during open season (October 15 to April 30). ▪ Beaver dam removal should be conducted when water levels are low to minimize the amount of water and/or sediments released. ▪ See EMP section 4.4 for further mitigation strategies.
Wildlife and Species at Risk	<p>A total of 28 Species of Management Concern (1 amphibian, 13 birds, all 8 mammals and 6 invertebrates) have the potential to be present in or near to the Project. The BC Conservation Data Centre (CDC) search revealed documented occurrences of 5 Species at Risk (SAR) within 10 km of the Project: Northern Myotis, Canada Warbler, Cape May Warbler, Bay-breasted Warbler and Woodland Caribou.</p> <p>Twenty-eight other SAR were identified as having the potential to be present or near to the Project.</p> <p>In-stream 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 in-stream works, the impacted area should be isolated and amphibians should be salvaged and relocated by the contractor's EM. A</p>	<ul style="list-style-type: none"> ▪ Inspect culverts and wooden structures for wildlife (especially bats) prior to their removal. ▪ Minimize vegetation clearing and clear vegetation outside of the breeding bird nesting period for the B6 region (i.e., April 30 until August 20) or immediately following a Qualified Environmental Professional (QEP) led nest survey. ▪ 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 EMP section 4.4 for further mitigation strategies.

Environmental Concern	Project-Specific Considerations	Mitigation Summary*
	<p>General Wildlife Permit will have to be obtained from FrontCounter under the <i>Wildlife Act</i>.</p>	
Birds and Their Nests	<p>Section 34 of the BC <i>Wildlife Act</i> specifically protects 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>Vegetation clearing may be required during the Project, either to facilitate the highway upgrades and/or the access of vehicles and machinery to the decommissioning sites. It is important that these clearing activities do not disturb birds or their nests.</p>	<ul style="list-style-type: none"> ▪ When possible, clear vegetation outside of the breeding bird nesting period for the region (April 30 until August 20). If this is not possible, a QEP-led nest survey will be required prior to clearing. ▪ Minimize vegetation clearing. ▪ See EMP section 4.4 for further mitigation strategies.
Fish and Fish Habitat		
In-stream Works	<p>The decommissioning works include removals which will involve in-stream works, installation of cross ditches and placement of riprap to stabilize the banks.</p> <p>Based on the Project activities, Tetra Tech anticipates that a Notification under the Water Sustainability Act will have to be made.</p> <p>If there is water within the watercourses at the time of construction, the work areas must be isolated from flowing water before in-stream works can begin. If there is no water in the watercourses at the time of in-stream 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 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 in-stream works, a qualified Environmental Monitor (EM) must be on site for isolation and fish salvage operations. ▪ If there is no flow/water within the watercourse or if the watercourses are frozen to bottom during the in-stream works the EM must be available/on-call in case of an emergency. ▪ See EMP sections 4.3 and 4.7 for further mitigation strategies.
Disturbance to Fish	<p>Watercourses in the Project area are small permanent or intermittent streams with poor to moderate habitat quality. Although no fish capture efforts were conducted directly at the culvert crossing locations in the Project area, no fish are documented in the watercourses and their presence is unlikely. Regardless, each stream must be treated as if there is the potential for fish to be found within the watercourse, since these small streams connect to larger fish-bearing streams downstream and no known obstacles to fish passage are known. As such, they are still considered "Fish Habitat" under the <i>Fisheries Act</i>.</p> <p>If there is water within the watercourse at the time of construction, the work area must be isolated, and a 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>The Project should be conducted during the appropriate regulatory timing windows. It is recommended that in-stream works should be carried out</p>	<ul style="list-style-type: none"> ▪ In-stream work should be timed to occur within the window of least risk for fish in the Project Area (July 15 – August 15) or when water is at its lowest levels. ▪ Tetra Tech understands that some of the Project activities are proposed to occur outside of the Reduced Risk Timing Window during low flow conditions. Given the generally poor habitat quality at each culvert site, it is unlikely that the Project would negatively impact fish or fish habitat if works are conducted outside the reduced risk window as long as the mitigation detailed within this EMP is applied. ▪ Fish salvages must be conducted after isolation of the work site and before dewatering. ▪ An EM must be on-site during fish salvage operations.

Environmental Concern	Project-Specific Considerations	Mitigation Summary*
	during the reduced risk work windows for streams in northeastern BC. Because the tributaries at the culvert crossing locations flow into watercourses known to contain both spring and fall spawners, the reduced risk work window for the Project is July 15 through August 15 (FLNRORD 2016).	<ul style="list-style-type: none"> ▪ See EMP section 4.3 for further mitigation strategies.
Erosion and Sediment Control	This Project has the potential to create sediment-laden run-off which if introduced into a stream could harm fish or fish habitat. The contractor must complete the beaver dam removal and highway decommissioning activities in such a manner that the risk of releasing sediment-laden water into streams is minimized.	<ul style="list-style-type: none"> ▪ Avoid construction during periods of poor weather and phase work appropriately. ▪ The Contractor should prepare an Erosion and Sediment Control (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 EMP section 4.6 for further mitigation strategies.
Vegetation and Invasive Species Management		
Vegetation	Database searches identified no documented occurrences of vegetation SAR within 5 km of the Project. Minimal vegetation removal is expected as a result of this project to facilitate the highway upgrades and allow the machinery to access the decommissioning sites. The majority of the trees to be removed would be young, early successional species such as Balsam Poplar. After construction is complete, disturbed areas will be seeded with a native grass mixture.	<ul style="list-style-type: none"> ▪ Limit vegetation removal. ▪ Contain decommissioning activities within the former highway 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. ▪ See EMP section 4.5 for further mitigation strategies.
Non-native or invasive plant spread.	Measures must be taken to prevent the spread of invasive species into or out of the Project area.	<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 EMP section 4.5 for further mitigation strategies.

Environmental Concern	Project-Specific Considerations	Mitigation Summary*
Waste Management and Disposal		
Disposal of creosote-treated wood	The decommissioning work along the two former alignments may involve the removal of wood-stave culverts. This wood may be creosote treated and if so, the removal of creosote-treated wood requires special considerations that are outlined in this EMP.	<ul style="list-style-type: none"> ▪ Prevent contact of creosote-treated wood with water within the watercourse. ▪ Place removed wood and exposed soils on poly sheeting and cover the stockpile until it can be appropriately disposed of off-site. ▪ See EMP section 4.9 for further mitigation strategies.
Removal of abandoned car and debris.	Decommissioning works include removal of abandoned car body, tire and axel, drum barrel, traffic barricades, hanging garbage cans/existing signs at various locations along both alignments. Hydrocarbons have potential to be present and could be spilled during removal.	<ul style="list-style-type: none"> ▪ Hydrocarbons should be removed from debris and placed in secure containment before moving, if possible. ▪ All hydrocarbons and debris should be disposed of at an appropriate off-site facility. ▪ See EMP Section 4.8 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> . A desktop search of the Project area found no identified archaeological sites nearby.	<ul style="list-style-type: none"> ▪ Retain an Archaeological Monitor provide a site walk-through prior to construction and to be on call for any ground-disturbance activities and culvert removals. ▪ Develop a chance find protocol that can be enacted if sites are uncovered. ▪ See EMP section 4.13 for further mitigation strategies.

*This summary of mitigation measures is not comprehensive. For a full list of mitigation measures, please refer to the EMP (Section 4.0).

3.0 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.

3.1 Provincial

3.1.1 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.

Under Section 9 of the *Wildlife Act*, it is an offence to disturb, molest or destroy a beaver den or dam except where that person is a trapper licensed under the act or under “lawful authority” for the protection of property where the action is authorized by regulation. A General Wildlife Permit (type 3(1)(a)) must be obtained through FrontCounter BC for beaver dam removal and a Notification under the Water Sustainability Act (see Section 3.1.2) must also be submitted.

3.1.2 BC Water Sustainability Act

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 FLNRORD and recent experience with similar projects, the Project activities (i.e., beaver dam removal, culvert removals and cross-ditch installation), Tetra Tech anticipates that a Notification will be required for the Project. Until the 45-day Notification period has passed without comment from FLNRORD on the activities, no Project works should be conducted.

3.1.3 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 3-1) 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 3-1: 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>)	

3.1.4 BC Environmental Management Act

The BC *Environmental Management Act* (EMA) was enacted in July 2004 and combined the *Waste Management Act* and *Environment Management Act*. The 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.

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.

3.1.5 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).

Known Heritage Resources have been investigated along the current highway alignment and at the adjacent decommissioning sites (Soriak – Tetra Tech Canada 2018). No archaeological sites have been identified near the Project; however, 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 (Appendix B).

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.

3.2 Federal

3.2.1 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* (Government of Canada 2019) came into force on August 28, 2019 and included 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 (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 the death of fish or a HADD if typical best management practices and mitigation (such as those detailed in the appended EMP [Appendix B]) are implemented. Therefore, no DFO Project Review or Authorization has been submitted.

3.2.2 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 SOMC 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 C). 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.

3.2.3 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 (ECCC).

4.0 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, permits, authorizations, 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, or permits/approvals acquired. Therefore, following selection of the successful Contractor, and acquisition of approvals and permits, the Contractor should prepare an EPP to meet all regulatory terms and conditions detailed or referenced therein. Additionally, the EPP should specifically, in relation to the work methods proposed and equipment used during decommissioning works, 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.
- DFO. 2020. Interim Code of Practice: Beaver Dam Removal
- DFO. 2020. Interim Code of Practice: End-of-Pipe Fish Screens for Small Water Intakes in Freshwater
- DFO. 2020. Interim Code of Practice: Temporary Cofferdams and Diversion Channels
- DFO. 2020. Interim Code of Practice: Temporary Stream Crossings
- 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. 2020. 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 3.0.

4.1 General

1.01	The successful contractor must review this EMP and the applicable guidelines prior to starting the Project.
1.02	The Contractor is responsible for ensuring that a QEP prepares an EPP following the provisions outlined in this EMP.
1.03	All relevant federal and provincial acts, regulations, guidelines, and BMPs will apply to all work and activities associated with the Project.
1.04	The Contractor must be aware of and implement all permitting and approval requirements/conditions.
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.
1.06	Daily tailboard meetings should make reference to environmental issues that may arise and inform new employees about environmental compliance on site.
1.07	Plan and schedule project activities for dry weather whenever possible to minimize potential Erosion and Sediment Control (ESC) issues.
1.08	Ensure Contractors 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.
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.
1.10	All decommissioning activities will be maintained within the former Alaska Highway alignment. Upon completion of activities, all equipment, supplies, materials and waste will be removed from the work site.
1.11	All environmental incidents should be reported to the EM, Project Manager (Tetra Tech) the Contractor Site Superintendent, and PSPC’s Environmental Coordinator as soon as possible.
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 Contractors are familiar with the marking system and are given clear instructions/training before work begins. Augment and replace field markers as needed.

4.2 Site Access, Mobilization, and Laydown Areas

2.01	Mobilization should be planned to minimize the number of trips to and from the site.
2.02	A laydown area for storage of equipment and materials should be established. It should be located on a flat, stable area at least 30 m from the top of bank any nearby watercourses.
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.

4.3 Protection of Fish, Fish Habitat and Aquatic Resources

3.01	The Contractor is responsible for implementing the terms and conditions outlined in any permits that are obtained. No work can occur before the appropriate regulatory notifications are made, permits are secured or after the permits expire.
3.02	Ideally, in-stream work should be timed to occur within the window of least risk for fish in the Project Area (July 15 August 15), when water is at its lowest levels or during frozen conditions. 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) or frozen to bottom at the time of construction, in-stream work can occur outside of the least risk window for fish without consultation of a QEP.
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.
3.04	Any work conducted below the high-water mark must occur in isolation of flow (including at the nine 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 (2020) "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.
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 (2020) "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)
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/measures-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).
3.07	All fish and wildlife (e.g., amphibians) 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. Additional guidance related to fish and beavers during beaver dam removal can be found in DFO's (2020) "Interim Code of Practice: Beaver Dam Removal".
3.08	Equipment and vehicles should avoid crossing watercourses (including the nine 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 (2020) "Interim Code of Practice: Temporary Stream Crossings".
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).
3.10	Refueling 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.
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 if necessary).
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).
3.13	No water should be extracted from any watercourse for Project use.
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 (EMP #6.00) and detailed more fully within the Contractor's ESC Plan.
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 5.5 for additional details).
3.16	No deleterious materials or Project-related debris are allowed to enter any watercourse. Debris generated from the decommissioning works must be contained, collected and disposed of properly off-site.
3.17	In the event of any fluid spills or leaks into a watercourse, the Spill Response Plan (Appendix 3) should be enacted and notifications are to begin immediately.

4.4 Protection of Wildlife and Wildlife Habitat

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.
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)
4.03	For decommissioning activities occurring within known Caribou ranges, the Contractor is responsible for implementing the provisions outlined in the Caribou Protection Plan (Appendix D of the EOA).
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.
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.

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.
4.07	Wildlife species have been known to roost/den in old 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.
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.
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.
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.
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.
4.12	Beaver removal (if necessary) must only be conducted by a licenced trapper during open season (October 15 to April 30).
4.13	Beaver Dam removal must comply with the federal <i>Fisheries Act</i> and the provincial <i>Water Sustainability Act</i> . To minimize the disturbance caused by the removal, the following BMPs should be implemented: <ul style="list-style-type: none"> ▪ Conduct a fish salvage in the area of disturbance (upstream and downstream of the dam). ▪ Wherever possible, dam debris should be removed by hand or light machinery. ▪ To control and prevent the release of silt to downstream fish habitat, appropriate silt fencing should be installed prior to any debris removal. ▪ To allow the pond head to gently discharge with minimal silt transfer and minor instream impacts, dam should be removed in sections of roughly 6-12 inches staged every few hours. If possible, conduct removal during low flow or frozen conditions to minimize the amount of water released. ▪ If machinery is used, it should be positioned above the high-water mark on a stable surface to minimize ground and vegetation disturbance to the stream bank. ▪ All debris be removed from the site to prevent the beaver from reusing it in their repairs. Additional guidance related to beavers during beaver dam removal can be found in DFO's (2020a) "Interim Code of Practice: Beaver Dam Removal".

4.5 Vegetation and Soil Management

5.01	Tree removal should be minimized as much as possible. 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.
5.02	Vegetation removal that will affect 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 EMP # 4.05).
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 soil and plant material (power washed if necessary).
5.04	In areas of known invasive plant infestations, 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.

5.05	Machinery and vehicles should be restricted to defined travel routes to avoid excess trampling/compaction of vegetation and soil. Construction activities should be contained within the current and former Alaska Highway ROWs.
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.
5.07	Vegetated areas disturbed by Project related works (including clearing within the highway road prism, lay-down sites, temporary work sites, and material stock pile 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.
5.08	To prevent soil compaction around the root zone, avoid storing machinery within the drip-line of trees.
5.09	To remediate soil compaction and encourage the re-establishment of native vegetation communities, the former road prism should be scarified and seeded.
5.10	Minimize use of equipment on exposed soils and when possible, restrict vehicle traffic to existing roadways or disturbed areas to avoid unnecessary soil compaction.
5.11	A fire prevention plan should be developed as part of the EPP. The fire prevention plan should comply with applicable fire prevention policies.
5.12	Gravel extraction activities must remain more than 30 m from the high-water mark of any watercourse.

4.6 Erosion and Sediment Control

6.01	The Contractor is responsible for developing an Erosion and Sediment Control Plan as part of their EPP prior to starting decommissioning activities. Additional guidance related to mitigating sediment mobilization during beaver dam removal can be found in DFO's (2020a) "Interim Code of Practice: Beaver Dam Removal".
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.
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 work day. Tracked materials should be removed by sweeping, shoveling, or vacuuming; materials should not be removed by hosing or sweeping sediments into drainage channels.
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.
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.
6.06	Periods of heavy precipitation are probable during the proposed decommissioning 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. Work may be stopped completely or works may require additional ESC measures be implemented 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>
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.
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.
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, will be installed within 1 m around the perimeter.
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.
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.
6.12	Any exposed soils created as a result of decommissioning activities must be protected from erosion by implementing the appropriate ESC measures (i.e., ESC blanket, straw etc.)

4.7 Water Quality

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 MOE's (2019) Approved Water Quality Guidelines (BCAWQG) for Aquatic Life, the EM may direct activities, including additional sediment control measures or halting work.
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.
7.03	The BC Aquatic Life Water Quality Guideline (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).
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).
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).
7.06	Proper ESC measures should be installed prior to starting decommissioning activities to protect adjacent watercourses from sediment run-off. If sediment laden runoff is observed entering nearby watercourses, the EM should be notified and water quality measurements (i.e., turbidity) obtained.
7.07	Debris from the decommissioning activities must not enter adjacent watercourses. Generated debris must be contained, collected and disposed of properly off site.
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 the 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).

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

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.
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.
8.03	Should garbage containers be required on site, they should be made inaccessible to wildlife, including bear-proof lids.
8.04	Non-hazardous construction waste should be collected at designated areas on the site and removed to appropriate facilities on a regular basis.
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.
8.06	Recycle materials whenever possible.
8.07	Waste materials should not be buried or burned.
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.
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.
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.
8.11	Prior to removing debris (e.g., abandoned car, drums etc.) any hydrocarbons still present should be removed, if possible. Carefully transfer the materials to an appropriate storage container and dispose of off-site at the appropriate facility. If removal is not possible, secure the existing container and wrap in absorbent pads before moving. The contractor should assign a person to watch for leaks and spills while the debris is being removed so that immediate clean up can occur if necessary
8.12	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.
8.13	Any waste considered to be hazardous will be labeled and disposed of off-site according to the WHMIS criteria and the <i>BC Environmental Management Act</i> and TDG Regulations.
8.14	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.
8.15	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.

4.9 Proper Disposal of Creosote-treated Wood

9.01	During removal of any creosote-treated wood (i.e., wood stave culverts), all wood and/or disturbed soil should not come in contact with water within the watercourse.
9.02	Exposed soils that present visual or olfactory evidence of residual creosote (or at minimum all soil within approximately 1 m radius from the treated wood) should be excavated and stockpiled on poly sheeting. This soil should be sampled in accordance with accepted soil sampling procedures (i.e., BC Field Sampling Manual ¹) by an appropriately Qualified Environmental Professional (QEP) and submitted to an accredited analytical laboratory for analysis of polycyclic aromatic hydrocarbons (PAHs) and the analytes required to meet the receiving facility's disposal criteria (one sample for each: flashpoint, pH, total BTEX) to determine disposal options. PAHs are regulated substances per the CSR of the <i>Environmental Management Act</i> of BC and Canadian Council of Ministers of the Environment (CCME) Canadian Environmental Quality Guidelines.
9.03	All removed Creosote Treated Wood should be placed on poly sheeting while temporarily stockpiled in order to prevent the possibility of leached creosote from any newly exposed wood surfaces from gaining access to the surface and subsurface soils which would potentially contaminate the soils with PAHs.
9.04	Until such time that any stockpiled soil is removed from the site, the stockpile(s) should be covered with poly sheeting to prevent precipitation from leaching PAHs from the stockpile.
9.05	Creosote Treated Wood should be transported in accordance with the Transportation of Dangerous Goods Act and disposed of at a facility approved to accept and store materials treated with creosote.

4.10 Fuel Storage and Spill Response

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)
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.
10.03	If feasible, machinery used in proximity to watercourses should use environmentally friendly hydraulic fluids (i.e., biodegradable or vegetable oil based).
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.
10.05	Refueling 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.
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.
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

¹ BC Ministry of Environment and Climate Change Strategy, formerly BC Ministry of Environment (2013) B.C. Field Sampling Manual. BC Ministry of Environment & Climate Change Strategy, Victoria, BC, retrieved January 2019 from <https://www2.gov.bc.ca/gov/content/environment/research-monitoring-reporting/monitoring/laboratory-standards-quality-assurance/bc-field-sampling-manual>

	possible. Minimize hose length and the number of connections - use dripless connections if possible. Drain hoses when finished.
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.
10.09	The Contract is responsible for ensuring that site-specific Spill Response Plan is prepared and on-site at all times (Appendix 3).
10.10	All spill containment kits should be readily accessible both onsite 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.
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 soil/ground of a substance that is toxic, polluting, or deleterious to life of reportable quantities must immediately be reported to the EMBC 24-hour phone line at 1-800-663-3456 (see Spill Response Plan, Appendix 3).
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.
10.13	Hazardous materials and wastes should be stored in covered containers and in secondary containment.
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.
10.15	Before removing old debris (e.g., abandoned car body, drum barrel etc.) check for remnant fluids (hydrocarbons) and remove if possible. Carefully transfer the materials to an appropriate storage container and dispose of off-site at the appropriate facility. If removal is not possible, secure the existing container and wrap in absorbent pads before moving. The contractor should assign a person to watch for leaks and spills while the debris is being removed so that immediate clean up can occur if necessary.

4.11 Air Quality

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.
11.02	Vehicles or equipment producing excessive exhaust pollution should be repaired or replaced.
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 can't be withdrawn from surrounding watercourses for this purpose.
11.04	When hauling materials with the potential to generate dust, loads should be tarped to avoid blow-off.
11.05	No burning of oils, rubber, tires and any other material should take place at the site.
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.
11.07	Equipment and vehicles should be turned off when not in active use so to reduce idling.

4.12 Noise and Vibration

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 work place 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
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.
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.

4.13 Archaeological Resources and Historical Sites

13.01	Tetra Tech has developed a Chance Find Procedure (CFP) which should be part of the Contractor's EPP and enacted in the event that cultural artifacts or anthropogenic deposits (e.g., remains of hearths, dwellings, storage pits) are uncovered during construction (Appendix 2).
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.

5.0 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.

5.1 Key Project Personnel

The Project contact list (Table 5-1) for the works proposed in this EMP should be completed as soon as the information is known and made available to all parties. At the time this EMP was completed, PSPC was in the process of preparing tender documents for bidding. The successful contractor should provide details to complete and update this list as part of their EPP.

Table 5-1: Project Contact List

Name	Role	Phone Number	Email
TBD	Contractor Site Superintendent	TBD	TBD
TBD	Contractor's Environmental Monitor (EM)	TBD	TBD
Ron Sedor	Tetra Tech Construction Inspector	250-321-1520	nfrm@northwestel.net
Charla Arnott	Tetra Tech Archaeological Monitor (AM)	587-460-3498	charla@soriakconsulting.com
Laurie Crawford	PSPC Environmental Coordinator	250-520-0363	Laurie.Crawford@pwgsc-tpsgc.gc.ca
Phil Davis	Tetra Tech Project Manager	778-222-2794	Phil.Davis@tetratech.com

5.2 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 decommissioning works are conducted in such a way that impacts to 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.
- 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 within the isolated work areas, should fish be present at a crossing location.
- 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 archeological site is detected, the Contractor is responsible for following the Chance Find Protocol (Appendix 2).

5.3 Environmental Monitor Responsibilities

On-site monitoring is a key component of ensuring that the mitigation measures recommended in this EMP and the contractor's forthcoming Environmental Protection Plan (EPP) are implemented properly and function as intended. The selected contractor will retain a QEP as the environmental monitor (EM) to provide guidance on implementing the recommended measures outlined in the EMP and, if necessary, to develop additional mitigation measures if the need arises.

At a minimum, the EM should visit the Project area prior to the start of construction works to ensure all Project personnel are aware of environmental sensitivities and the requirements of the EMP, as well as to assess that the EPP is effectively implemented. Monitoring should be conducted with greater frequency during periods of inclement weather (i.e., heavy precipitation, strong winds) and during critical stages of the Project. Generally, work within the 30 m buffer of watercourses in which flow is present requires the close oversight of the EM. While the EM is not required to be on site when in-stream works (i.e., culvert removals) are being conducted on dry streams, it is recommended that the EM be on site when in-stream works (i.e., including culvert removals, cross ditch construction, beaver dam removals, etc.) are being conducted within streams containing water, as isolation and fish salvage operations will be required in these instances.

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:

- **Compliance Monitoring:** Monitor compliance with the EMP, EPP, permits and other legal requirements;
- **Tailboard Meetings:** Communicate the requirements of the EMP and EPP to the contractors and their respective employees during pre-job and tailboard meetings;
- **Environmental Services:** The EM should provide the required environmental services/components of the Project including fish and/or wildlife salvage;
- **On-Site Monitoring:** Be on site full-time during all critical work periods critical work periods which includes installation of the Erosion and Sediment Control (ESC) infrastructure, all in-stream works, work within 30 m of a watercourse, site isolation, fish salvage, and decommissioning/removal of mitigation measures (e.g., isolation infrastructure, ESC measures etc.). The EM should provide part-time monitoring during non-critical work periods at a frequency established between the EM and PSPC and remain on-call (via phone or email) to respond to emerging environmental issues or emergencies. and following any significant rainfall events.
- **Environmental Protection:** 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 species at risk (SAR) are observed in the Project area;
- **Environmental Incidents:** Advise Project personnel if Project activities have caused or are likely to cause an environmental incident and make recommendations for corrective action;
- **Technical Advice:** Liaise directly with Project personnel and provide technical advice to resolve situations that may impact the environment as they arise;
- **Water Quality Monitoring:** Conduct routine field water quality data collection (i.e., turbidity, pH, temperature, conductivity) using portable water quality meters prior to (baseline) and during construction activity near the watercourse. Results will be compared to the British Columbia Approved Water Quality Guidelines for Aquatic Life. If there are exceedances, the EM will direct the contractor to undertake corrective measures or, as necessary, halt works until the EM deems the issue that caused the non-compliance is effectively resolved; and
- **Monitoring Reports:** Complete and submit a Project Environmental Monitoring Report to PSPC at the completion of the Project. Unanticipated adverse effects to the environment will be reported to MOTI 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.

5.4 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 Environmental Protection Plan, an EM and an AM in place prior to starting work.
- A Project-specific Environmental Protection Plan (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 contractors 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.

5.5 Environmental Auditor (Tetra Tech) Responsibilities

Tetra Tech will provide environmental oversight on behalf of PSCP 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;
- Coordinate a site visit by Tetra Tech's AM and the Contractor prior to on-site work starting to review for any concerns and confirm that the Contractor understands all requirements of the Chance Find Protocol;
- Apply for environmental permits on behalf of PSPC required for Project activities;
- Liaise with PSPC's Environmental Coordinator to meet Project objectives; and
- Prepare project design details, drawings, and specifications on PSPC's behalf.

6.0 ENVIRONMENTAL COMMUNICATION / REPORTING REQUIREMENTS

6.1 Environmental Protection Plan

A Project-specific Environmental Protection Plan (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 Environmental Monitor (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 the construction activities.
- 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.

6.2 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;
- 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.

6.3 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 6-1) should be updated as part of the EPP, as necessary.

Table 6-1: 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)	1-250-785-43633
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. Contractors are responsible for completing the EIR and the EM should follow-up with the Contractors 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 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.

7.0 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.VHWY03116-01
FILE: 704-TRN.VHWY03116-01
FILE: 704-TRN.VHWY03116-01

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

FILE: 704-TRN.VHWY03116-01
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FILE: 704-TRN.VHWY03116-01

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

/sy

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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:	May 14, 2021
c:		Memo No.:	
From:	Tetra Tech Canada Inc.	File:	704-TRN.VHWY03116
Subject:	Archaeological Site Chance Find Protocol Alaska Highway KM 501.05 to KM 508.80 Geometric and Drainage Improvements		

1.0 INTRODUCTION

Tetra Tech Canada Inc. (Tetra Tech) has been retained by Public Services and Procurement Canada (PSPC) to support highway upgrades along an 8 km segment of the current Alaska Highway alignment from KM 501.05 to KM 508.80. The proposed works primarily include widening the finished highway roadtop and shoulders, flattening the embankment sideslopes, drainage culvert repairs/replacements/installations, and ditch improvement and erosion protection works. Two adjacent former Alaska Highway alignments have been identified as a potential borrow source for gravel materials for use on the Project. After gravel has been extracted from these former alignment sites, PSPC is going to permanently decommission these two sites.

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). For mapped locations of KM 501.05 to KM 508.80 of the current Alaska Highway and the two adjacent decommissioning sites, please refer to the Preliminary Archeological Assessment prepared for this Project (Soriak Consulting & Tetra Tech Canada 2018).

The purpose of this 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) ensures employees and contractors understand the regulations 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
Laurie Crawford	PSPC Project Manager / Representative	250.520.0363	Laurie.Crawford@pwgsc-tpsgc.gc.ca
Charla Arnott	Archaeologist, Soriak Consulting Ltd.	780.995.4859	Charla@soriakconsulting.com
Andrew Horwood	Project Manager, Tetra Tech Inc.	778.945.5879	Andrew.Horwood@tetratech.com

1.2 Preliminary Archaeological Assessment (Desktop Review)

A mapping review of KM 501.05 to KM 508.80 of the current alignment, and the two adjacent decommissioning sites was completed to determine the Project's potential to impact previously recorded cultural resource sites. Provincial site data files were obtained, and a review of ground disturbance relative to the Project was completed.

No previously recorded archaeological sites are in conflict with the Project. However, potential remains for cultural material to be identified during construction, particularly in areas close to water sources. If cultural material is identified during construction additional assessment will be required and Project revision may be needed.

The findings of this assessment are summarized in the Preliminary Archaeological Assessment memo prepared by Soriak Consulting and Research Ltd. and Tetra Tech for PSPC (Soriak – Tetra Tech Canada 2018).

2.0 EDUCATION

This section ensures employees are aware 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 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).

No archaeological sites have been identified near the Project; however, it is recommended 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 construction.

There is always a limited possibility for unknown archaeological sites to exist, particularly in proximity to water sources. Archaeological sites (both recorded and unrecorded) are protected under the Act and must not be altered or damaged without a site alteration permit issued by British Columbia'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 identified 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:</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 B.C. 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 the course of 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. All archaeological remains encountered at the Project location shall be deemed to be the property of Canada.
6. After consulting with PSPC, the Archaeological Monitor should 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.

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704-TRN.VHWY03116

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

Prepared by:
Charla Arnott, M.Sc., RPCA, PMP, RPA
Archaeologist
SORIAK Consulting & Research Ltd.
Direct Line: 780.995.4859
Charla@Soriakconsulting.com

704-TRN.VHWY03116
704-TRN.VHWY03116
704-TRN.VHWY03116

Reviewed by:
Andrew Horwood, B.Tech, AScT
Project Manager
Transportation Group
Direct Line: 604.685.0275
Andrew.Horwood@tetrattech.com

/sy

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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 1-1, which should be updated when information is available.

Table 1-1: 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 (Please note there is no 911 service in the NRRD)		Police Emergency: 1-250-774-2777 Fire Emergency: 1-250-774-2222	Emergency Assistance
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 clean-up procedures and residue sampling.
 - All equipment and/or material used in clean-up (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 3). 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.

4.1 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 **1-800-663-3456**. 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*****

4.2 Reportable Spill Quantities

Table 4-1 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 4-1: 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 4-1: 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 Representative	<input type="checkbox"/>	Phone/cell:		EM	<input type="checkbox"/>	Phone/cell:	
Tetra Tech Representative	<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 6.3 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 D

CARIBOU PROTECTION PLAN (CPP)

Caribou Protection Plan Deactivation of Former Alignments KM 501.05 to KM 508.80, Alaska Highway, BC



PRESENTED TO
Public Services and Procurement Canada

JUNE 4, 2021
ISSUED FOR USE
FILE: TRN.VHWY03116-01.003

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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
ECCE	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 (PSPC) 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 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 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) to supplement the Environmental Management Plan (EMP) being prepared for decommissioning activities along two sections of the former Alaska Highway alignment between KM 501.05 and KM 508.80 of the current alignment (herein referred to as the “Project”). This Project is located east of Kledo Creek, west of Fort Nelson, in northeast British Columbia (BC).

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 both the northern mountain (*Rangifer tarandus* pop. 15) and boreal (*Rangifer tarandus* pop. 14) ecotypes to be present within the Project area. Caribou from both ecotypes likely occur infrequently along the highway, especially in winter when lower elevation habitats are used more for foraging (COSEWIC 2014).

This CPP has been prepared to support the decommissioning works along the Alaska Highway. The CPP objectives are to provide standard strategies and best management practices to:

1. Avoid, where practical, and minimize 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 and description of proposed work, a summary of caribou management in British Columbia, mitigation measures to protect caribou and caribou habitat, and a map of decommissioning locations. Mitigation should consider reducing all sources of human-related caribou mortality, minimizing excessive predation on both calves and adults, limiting habitat loss, minimizing partial avoidance, 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 BC 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 can be found 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 BC, the southern mountain, central mountain, and boreal caribou ecotypes are red-listed, and the northern mountain ecotype is blue-listed. The BC 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 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 (i.e., 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 length of highway between KM 501.05 and KM 508.80 intersects with the ranges of two Woodland Caribou herds: the Parker herd and the Muskwa herd. The Parker herd is part of the boreal caribou ecotype and the Muskwa, herd belongs to the northern mountain caribou ecotype (Figure 1).

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).

Boreal caribou are non-migratory and can be found at low-elevations in muskegs, peatlands and black spruce forests. Female boreal caribou calve in undisturbed swamps and wetlands and disturbance to these calving habitats can be highly detrimental to population numbers due to the site fidelity shown by reproducing females (FLNRORD 2014).

Regardless of ecotype, 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.

2.3 Caribou Habitat Management in BC

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). A portion of the current Alaska Highway alignment between KM 501.05 and KM 508.80 lies within the Parker Range critical caribou habitat as defined by SARA (Figure 1). 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).

Neither of the two decommissioning sites located between KM 501.05 and KM 508.80 fall within the Parker Range critical caribou habitat; however, the decommissioning sites are located immediately to the north and west of the critical habitat (Figure 1). Due to their proximity to critical habitat, special care should be taken when working at these two sites to avoid harm to caribou habitat.

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). An approved UWR (# u-9-010) that was established for Boreal Caribou is located east of the Project location (Figure 1). If work is to occur within this area, the General Wildlife Measures (GWM) outlined in the UWR order should be followed (FLNRORD 2011a). No work is anticipated in the UWR as the decommission sites are located 5 km to the west of the UWR (Figure 1).

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 BC Government considers critical habitat (i.e., necessary to fulfill the habitat requirements) of Identified Wildlife. To protect the critical habitats 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, and deactivation of former highway alignments (PSPC n.d.). PSPC’s current operational jurisdiction of the Alaska Highway extends from KM 133 (north of Fort St. John) to the BC-Yukon border at Km 968.

PSPC retained Tetra Tech to provide engineering services for highway upgrades along an 8.0 km section of the existing Alaska Highway, and decommissioning activities along two adjacent former alignment sites. The two former alignment sites are located at KM 501.05 – KM 504.50 and KM 504.45 – KM 508.80 (Figure 1). Gravel will be removed from the former alignment sites and for the highway upgrades on the current alignment. After gravel extraction is complete, decommissioning activities will be conducted within the former alignments.

Inside caribou range, the Project occurs entirely within the former Alaska Highway rights-of-way. Habitats immediately adjacent to roads are effectively lost to many species (Jalkotzy and Nasserden 1997), including caribou. Anticipated Project-related effects on caribou and caribou habitat are limited due to the Project's location on or immediately adjacent to the Alaska Highway. Nonetheless PSPC is committed to mitigating Project-related effects to caribou and caribou habitat.

3.1 Project Activities

The deactivation prescriptions will be largely based off BC Ministry of Forestry Guidelines as described in the Tetra Tech (2018) report, *Alaska Highway Former Alignments Project: Typical Criteria / Standards for Road Deactivation*, and feedback received from PSPC, BC Ministry of Transportation and Infrastructure, and BC Ministry of Environment and Climate Change Strategy.

These two sites have been identified for permanent deactivation, which is typically applied when use of the road will no longer be required and no further inspections or maintenance is required. Decommissioning works for permanent deactivation on these two former alignments will include:

- Clearing of existing trees and stripping vegetation within the former highway road prism;
- Excavation and off-site stockpiling of materials in the former highway road prism for re-use in the highway widening construction;
- Revegetation through seeding once required materials have been extracted;
- Removal of 25 culverts (Table 1-1) and replacement with cross-ditches, berms, or water bars to re-establish drainage patterns;
- Slope stabilization at Km 21.85 of Section B (KM 504.40 to KM 508.60);
- Scarifying the remaining former gravel driving surface and Bituminous Surface Treatment (BST) layer;
- Removal of Beaver Dam's to facilitate removal of culverts from Km 13.70 to Km 14.00;
- Removal of debris including abandoned car body, tire and axel, drum barrel, traffic barricades, hanging garbage cans/existing signs at various locations along both alignments; and
- Access removal at each entry point to the former alignment, with placement of large boulders at the east end of Section A (KM 501.05 to KM 504.50) to remove ATV/vehicle access to these deactivated road segments.

3.2 Project Area in Caribou Range

The total Project footprint of the former highway alignment is 83.21 ha. The length of the former highway between KM 501.05 and KM 508.80 is within or immediately adjacent to the ranges of the Parker herd and the Muskwa Herd (Figure 1). At each site, the decommissioning activities will occur entirely within the former Alaska Highway rights-of-way to avoid new impacts to caribou habitat.

3.3 Project Schedule

PSPC anticipates awarding the construction contract in the Fall of 2021.

PSPC anticipates construction to begin November 2021. Construction may be completed over multiple years with all construction works completed by March 31, 2024. Active construction will occur during dry or frozen conditions (e.g., winter) or during the least risk work window for fish (Because both spring and fall spawners are potentially present in downstream watercourses, the least risk window is July 15 to August 15). Beaver removal, if necessary, to facilitate dam removal, will be conducted by a licenced trapper during open season (October 15 and April 30).

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 occur near the Alaska Highway during the proposed Project activities (starting in the spring of 2020). During this time, caribou may be directly affected and disturbed by (i.e., flee) and or displaced (i.e., partial avoidance) from habitats by Project activities such as sustained or repeated noise or light disturbances. Behavioral response to Project activities may vary depending on the frequency, timing, and severity of the disturbing activity. Caribou, especially pregnant cows and young calves are particularly sensitive to disturbances from late winter to early summer.

Indirectly, Project activities may affect caribou through land developments and activities that change caribou habitat quality (e.g., hydrology changes), quantity (i.e., direct habitat loss), distribution (e.g., habitat fragmentation), and or availability. Landscape changes as a result of the Project (i.e., removal of vegetation and/or revegetation) have the potential to expand predator distribution, enhance predator hunting efficiency (i.e., increase travel speeds), and increase alternate prey (e.g., moose, deer, elk) populations. These have the potential to indirectly increase caribou mortality risk.

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; and
- 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 should be implemented throughout the duration of the Project. Mitigations considered for this CPP follow those outlined in the following documents:

- A Compendium of Wildlife Guidelines for Industrial Development Projects in the North Area, British Columbia (FLNRORD 2014);
- Recovery Strategy for the Woodland Caribou (*Rangifer tarandus caribou*), Boreal population, in Canada (ECCC 2012a);

- Interim Operating Practices for Oil and Gas Activities in Identified Boreal Caribou Habitat in British Columbia (FLNRO 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 2.

Table 2: 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).
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 decommissioning 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"> ▪ Deactivate the roads in a condition that discourages motorized access and passage by predators.
2.6	<ul style="list-style-type: none"> ▪ Sequence to avoid/reduce repeat operations or multiple entries in caribou range.
2.7	<ul style="list-style-type: none"> ▪ Prohibit workers feeding, harassing, and approaching wildlife.
2.8	<ul style="list-style-type: none"> ▪ Prohibit temporary work camps inside caribou range to minimize predator attraction.
2.9	<ul style="list-style-type: none"> ▪ Prohibit firearms or hunting and fishing by workers.
2.10	<ul style="list-style-type: none"> ▪ Avoid idling equipment and trucks.
2.11	<ul style="list-style-type: none"> ▪ Ensure all exhaust systems have mufflers and all equipment operates as per specifications.
2.12	<ul style="list-style-type: none"> ▪ Apply the following BMP during aircraft operations: <ul style="list-style-type: none"> – Remain 2000 m horizontal distance away from mineral licks – Remain 400 m above ground level and do not circle above all winter range, mineral licks and for birthing areas. – No direct approach to animals or special features such as mineral licks.

CPP #	Mitigation Measures
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 and former 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 decommissioning 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"> ▪ When possible, retain visual buffers that will obstruct the line of sight along linear features. This could include minimizing vegetation clearing or strategically placing boulders/planted trees within the former highway ROW after decommissioning activities have been completed.
3.13	<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.

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

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

/dr/sy

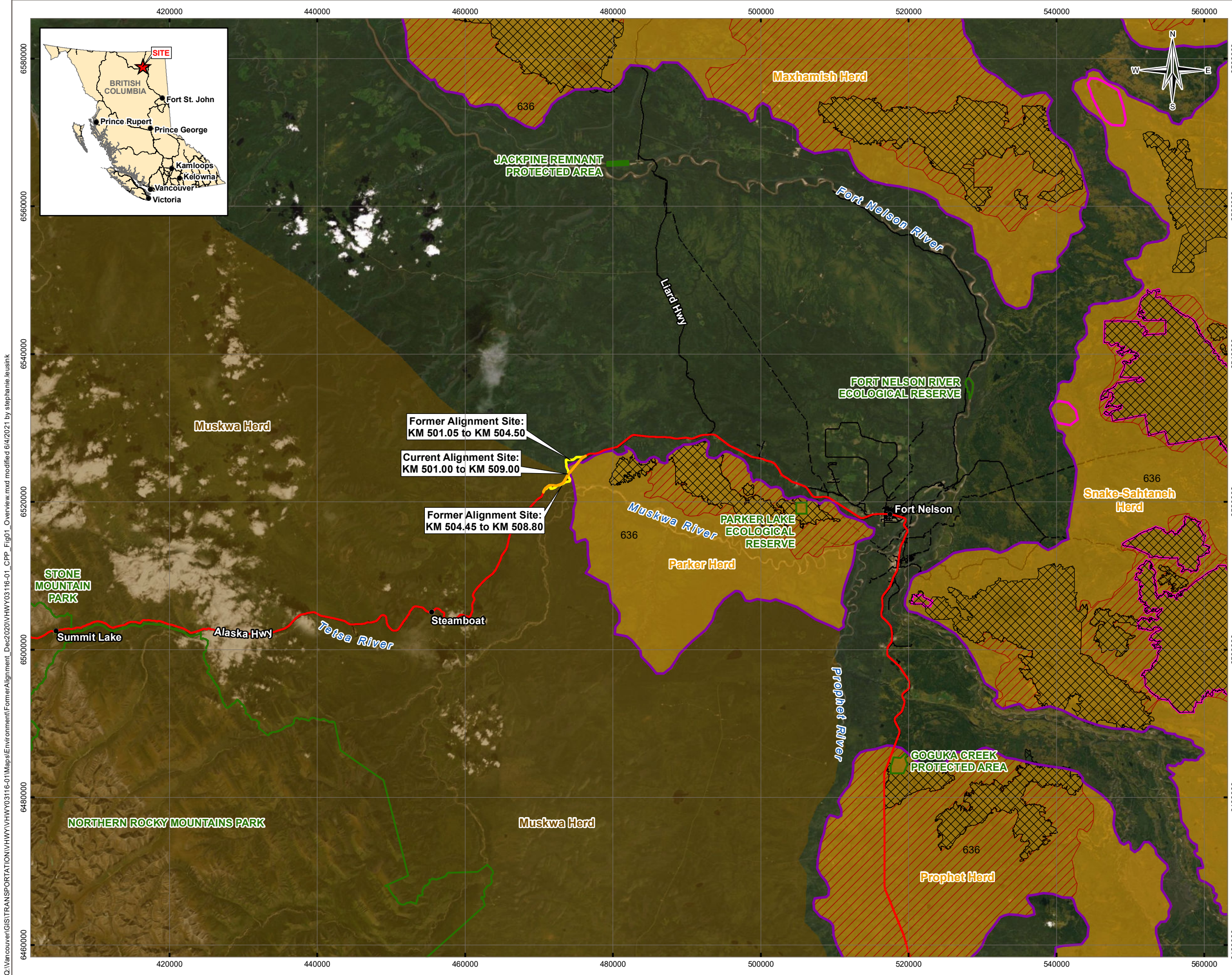
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FIGURES

Figure 1 Project Location Overview



LEGEND

- Current Alaska Highway Centerline - KM 501-509
- Former Alaska Highway Alignment - Priority Site
- Alaska Highway
- Populated Place
- Road
- Resource/Recreational Road
- Park or Protected Area

Caribou Distribution

- Boreal Caribou Herd
- Northern Mountain Caribou Herd

Critical Habitat for Species at Risk

- Boreal Caribou

Core Wildlife Habitat Area for Species at Risk

- Boreal Caribou

Ungulate Winter Range

- No Harvest Zone
- Conditional Harvest Zone

NOTES
 Base data sources:
 Caribou Distribution, SARA Critical Habitat Wildlife Habitat Areas, and Ungulate Winter Range from DataBC (accessed Jan 2019).
 Imagery from ESRI; DigitalGlobe.

STATUS
ISSUED FOR USE

DEACTIVATION OF FORMER ALIGNMENTS KM 501.05 TO KM 508.80 ALASKA HIGHWAY, BC

Project Location Overview

PROJECTION UTM Zone 10	DATUM NAD83	CLIENT Public Services and Procurement Canada
Scale: 1:500,000 		
FILE NO. VHWY03116-01_CPP_Fig01_Overview.mxd		
OFFICE TL-VANC	DWN SL	CKD YL
DATE June 4, 2021	APVD EH	REV 0
PROJECT NO. TRN.VHWY03116-01		

Figure 1

Q:\Vancouver\GIS\TRANSPORTATION\HWY\HWY03116-01\Maps\Environment\FormerAlignment_Dec2020\HWY03116-01_CPP_Fig01_Overview.mxd modified 04/2021 by stephanie.leusink

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.

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

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

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

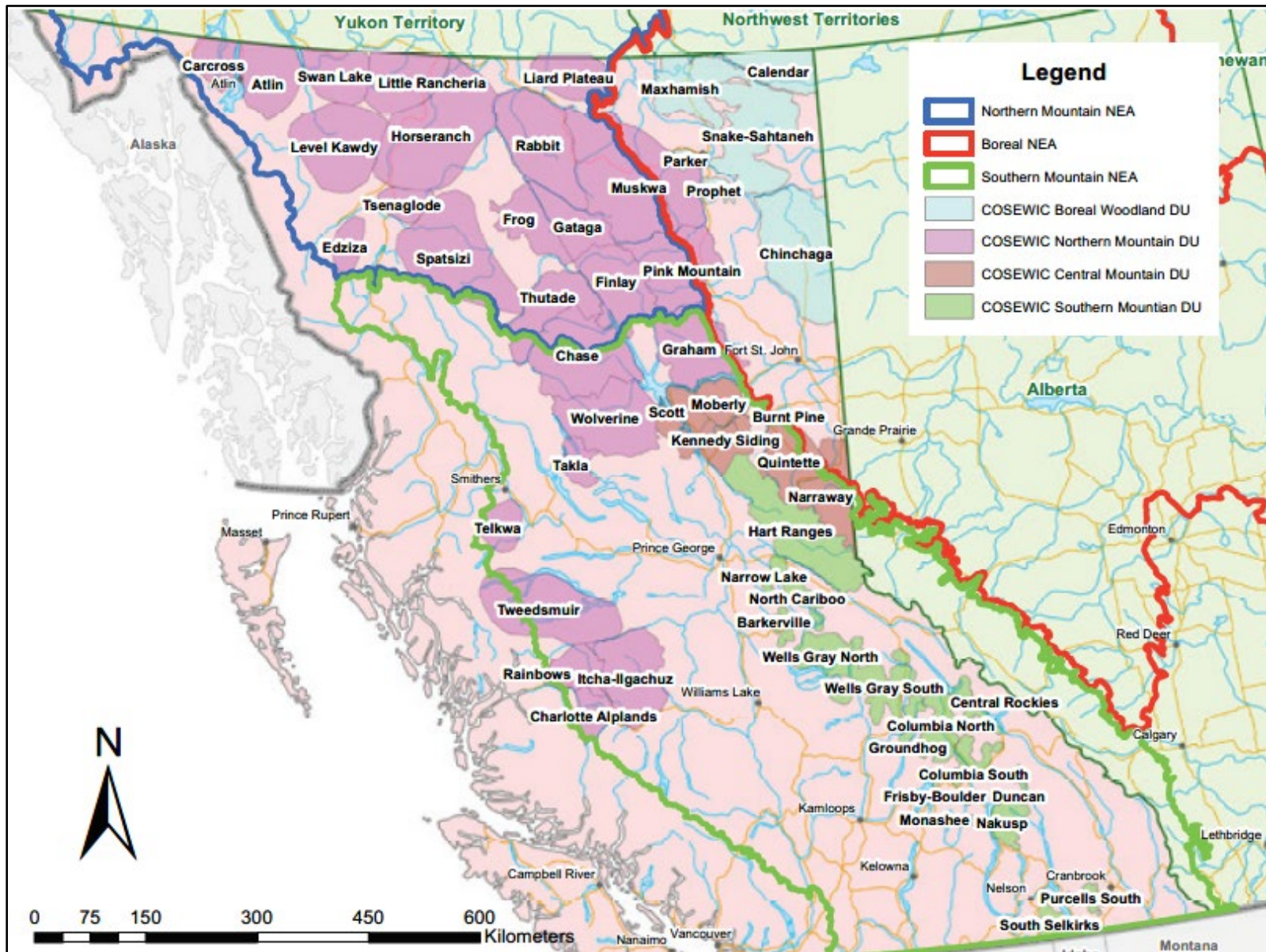
TETRA TECH professionals are bound by their ethical commitments to act within the bounds of all pertinent regulations. In certain instances, observations by TETRA TECH of regulatory contravention may require that regulatory agencies and other persons be informed. The client agrees that notification to 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]. 2018a. 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 E

ENGINEERING DESIGN DRAWINGS

APPENDIX F

PRELIMINARY ARCHAEOLOGICAL ASSESSMENT



To:	Reza Haghighi, Public Works and Government Services Canada	Date:	September 5, 2018
c:		Memo No.:	01
From:	Matt Keleher, Charla Arnott	File:	704-TRN.VHWY03116-01
Subject:	PWGSC Alaska Highway Km 501-509 Geometric and Drainage Improvements. Preliminary Archaeological Assessment (Desktop Assessment)		

This document may contain 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. It is not to be disseminated, and no copies of this document are to be made without written permission of Public Services and Procurement Canada.

1.0 INTRODUCTION

Tetra Tech Canada Inc. (Tetra Tech) was retained by Public Works and Government Services Canada (PWGSC) to support highway upgrades along an 8 km segment of the current Alaska Highway alignment from Km 501 to Km 509. This section of the Alaska Highway is located east of Kledo Creek, west of Fort Nelson, in northeast British Columbia (the Project). The proposed works primarily include widening the finished highway roadtop and shoulders, flattening the embankment sideslopes, drainage culvert repairs/replacements/installations, and ditch improvement and erosion protection works. The former Alaska Highway alignment, that mostly parallels the current alignment between Km 501-509, is identified as a potential borrow source for gravel materials for use on the Project.

As part of this work, Tetra Tech requested the services of Soriak Consulting and Research Ltd. (Soriak Consulting) to complete a Preliminary Archaeological Assessment for the Project. This work was undertaken to determine potential impacts to cultural heritage resources within the proposed Project area. Heritage resources include a range of culturally and naturally modified materials deposited both above and below ground surfaces. Ground disturbance, therefore, has potential to damage these materials. Land developers can facilitate cultural heritage resource protection through appropriate planning prior to development.

1.1 Objectives

While the primary objective of this review is to determine if development of the Project will adversely impact cultural heritage resources, it also serves to identify the potential extent of these impacts and outlines mitigative options prior to development.

Through a review of satellite imagery and other topographic data, an analysis of the Project's geographic location and ground cover was completed. Existing archaeological and historic site records in the region were reviewed. Both past and proposed project construction activities were studied; early road construction techniques from when the highway was first constructed were focused upon. In summary, the scope of this assessment included evaluation of:

- Existing databases and archaeological site records, including the British Columbia Archaeology Branch's Remote Access to Archaeological Data (RAAD) online database 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
- General soil stratigraphy and geomorphology of the area to understand how geomorphic processes or other environmental conditions may have impacted site distribution within the Project area.

Although a Preliminary Field Reconnaissance (PFR) was not part of this scope of work, supplemental information about the Project footprint was obtained through consultation with Tetra Tech biologists upon the completion of the Project's Environmental Field Reconnaissance and Habitat Assessment (EFR) in June 11-14, 2018.

1.2 Assessment of Archaeological Potential

An area's archaeological potential is determined through a review of its geography, the nature and distribution of previously recorded cultural resources in the region, traditional knowledge, and levels of ground disturbance and site preservation. If these factors, in combination or individually, are suggestive of prehistoric or historic use of an area, then a moderate to high probability rating for archaeological sites is normally designated regarding the presence and/or preservation of cultural resource sites within a development area. This designation may trigger recommendations for further archaeological studies. A PFR or Archaeological Impact Assessment (AIA) may be undertaken to better understand a project's archaeological potential, particularly when existing datasets are limited, outdated, or unavailable. A designation of low archaeological potential does not mean that heritage resources are not present; in these instances, it is advisable to implement a tailored Chance Find Procedure for the Project and to stop work in the event cultural materials are recovered during construction.

2.0 STUDY AREA DESCRIPTION

The Project encompasses the existing cleared right-of-way of the Alaska Highway between Km 501 and 509, and the former Alaska Highway alignment which parallels much of the Project site. Figure 1 (Appendix A) outlines the location of the current alignment in comparison to the former highway alignment. The current alignment crosses level to gently undulating terrain that transitions from high ground situated above the Muskwa River valley to lower, poorly terrain adjacent to Kledo Creek. Three significant hydrological features are in proximity of the Project – the Muskwa River, Kledo Creek and Raspberry Creek as well as numerous seasonal drainages. Terrain is characterised as level to steeply sloping with south and southwest aspects. There are two vegetation communities within the project area: mixedwood forest and peatland. The mixedwood forest is comprised of large trembling aspen, balsam poplar, white spruce, and tamarack. The peatland consists of small black spruce and paper birch. The understory is characterised by rose, strawberry, grasses, clover, and horsetail.

The Alaska Highway is subject to continual repair and realignment. Since 1942 when the highway was first constructed it has transitioned into a straighter, less dangerous, paved roadway. The new alignment is straighter and is situated further back from Kledo Creek than its predecessor. Portions of the Project footprint are significantly disturbed.

3.0 EVALUATION

3.1 Cultural Heritage Resources and Archaeological Sites

Cultural heritage 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 areas protected from the elements, can justify why certain areas were, and may continue to be favoured for use. Micro-topographic features, such as knolls, eskers, banks, terraces and ridges frequently contain subsurface cultural materials.

There are no previously recorded archaeological sites located within 5 km of the Project. The closest recorded pre-contact archaeological site is IfRv-1, located approximately 7.8 km northwest of the Project (Appendix A – Figure 1). There are no previously recorded historic period sites located within 5 km of the Project. Cultural materials associated with modern forestry and transportation activities are located within the footprint.

3.2 Ground Disturbance

Cultural heritage resources can occur at various locations and soil depths. Ground alteration activities have the potential of causing damage to, or the displacement of, artifacts and other cultural heritage resources, particularly those occurring in shallow deposits. Ground disturbances 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, which may result in incorrect interpretations of archaeological data. For this reason, ground disturbance is a factor to be considered when determining if an area exhibits elevated archaeological potential.

Significant ground disturbances within the Project area are the result of previous highway road construction activities and natural impacts caused by wind, water and animals. Small construction pits within the right-of-way have filled with water and are functioning as small ephemeral wetlands. The degree of impact to soil horizons within these areas is unknown. Impacts to soil stratigraphy and possible subsurface cultural deposits within disturbed Areas of Potential (AOP), if present, can be determined through further assessment, notably an AIA. Accordingly, documentation of intact native soils can confirm whether AOPs are naturally occurring or the result of previous construction activities.

3.3 Archaeological Potential

A multi-year assessment of archaeological potential within select areas of northeast British Columbia was undertaken between 2000 and 2005. This assessment served to create a predictive archaeological model and was completed on behalf of the British Columbia Oil and Gas Commission and British Columbia Archaeology Branch. The goal of the project was to improve upon a previously developed model that was created when little information was known regarding archaeological site distribution in the region. Portions of the Project fall within areas of modelled high archaeological potential (Millenia Research Ltd., 2005¹). These areas are primarily associated with terrain near seasonal drainages and high ground near Kleedo Creek.

The lack of previously recorded archaeological sites within (or near) the Project does not indicate that past populations did not inhabit the area. Rather, a lack of archaeological sites recorded in remote areas is generally

¹ Millenia Research Ltd., *Archaeological Overview of Northeastern British Columbia, Heritage Inspection Permit #2005-0504 Final Report*. Prepared on behalf of the Oil and Gas Commission, Ministry of Forests, Archaeology and Registry Services Branch, University of Victoria and Ministry of Energy and Mines, 2005.

due to the paucity of new development. Most archaeological sites recorded in northeast British Columbia are discovered during AIAs completed for oil and gas, forestry, geophysical and highway development projects. Aside from past highway construction activities, the greater Project area remains relatively undisturbed.

The Project area was favoured by past populations because of its south facing slopes and proximity to the confluence Kledo Creek and the Muskwa River. The Muskwa River is a major tributary of the Fort Nelson River which is part of the MacKenzie River system and it is believed that prehistoric peoples migrated from Asia to North America through the MacKenzie valley over 10,000 years ago. The MacKenzie River is also highly documented in historical literature as being a major route into Canada's northern interior, used by European explorers. Thus, not only were creeks and rivers a source of fresh water they were utilised for transportation and exploration purposes. Early trails often paralleled rivers and later, roads were built along traditional travel corridors.

Predominantly sloping, micro topographic features indicative of moderate or higher archaeological potential (e.g. knolls, ridges, rises, banks) may be situated outside of the existing alignment, particularly in proximity of Kledo Creek. Avoidance of AOPs is generally recommended unless additional fieldwork confirms the presence or absence of topographic features.

4.0 RECOMMENDATIONS AND CONCLUSIONS

The Project is situated within an area of low archaeological potential due to its predominantly disturbed and sloping terrain. No further work is recommended for previously cleared areas within the current and former Alaska Highway alignments. However, terrain adjacent to the Project may include AOPs indicative of moderate and higher potential. A PFR is recommended if any ground altering activities, including tree removal, are proposed outside the cleared right-of-way. 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 (under Section 14 of the *Heritage Conservation Act*) is required for lands held by the Province of British Columbia. For federal lands under the jurisdiction of PWGSC, a Provincial Heritage Inspection permit may not be required (permit requirements to be discussed with PWGSC).

It is further recommended that the Construction Contract for the Project include PWGSC'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 PWGSC 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 PWGSC 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 General Conditions are attached to this memo (Appendix B).

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,

Soriak Consulting & Research Ltd.

Tetra Tech Canada Inc.



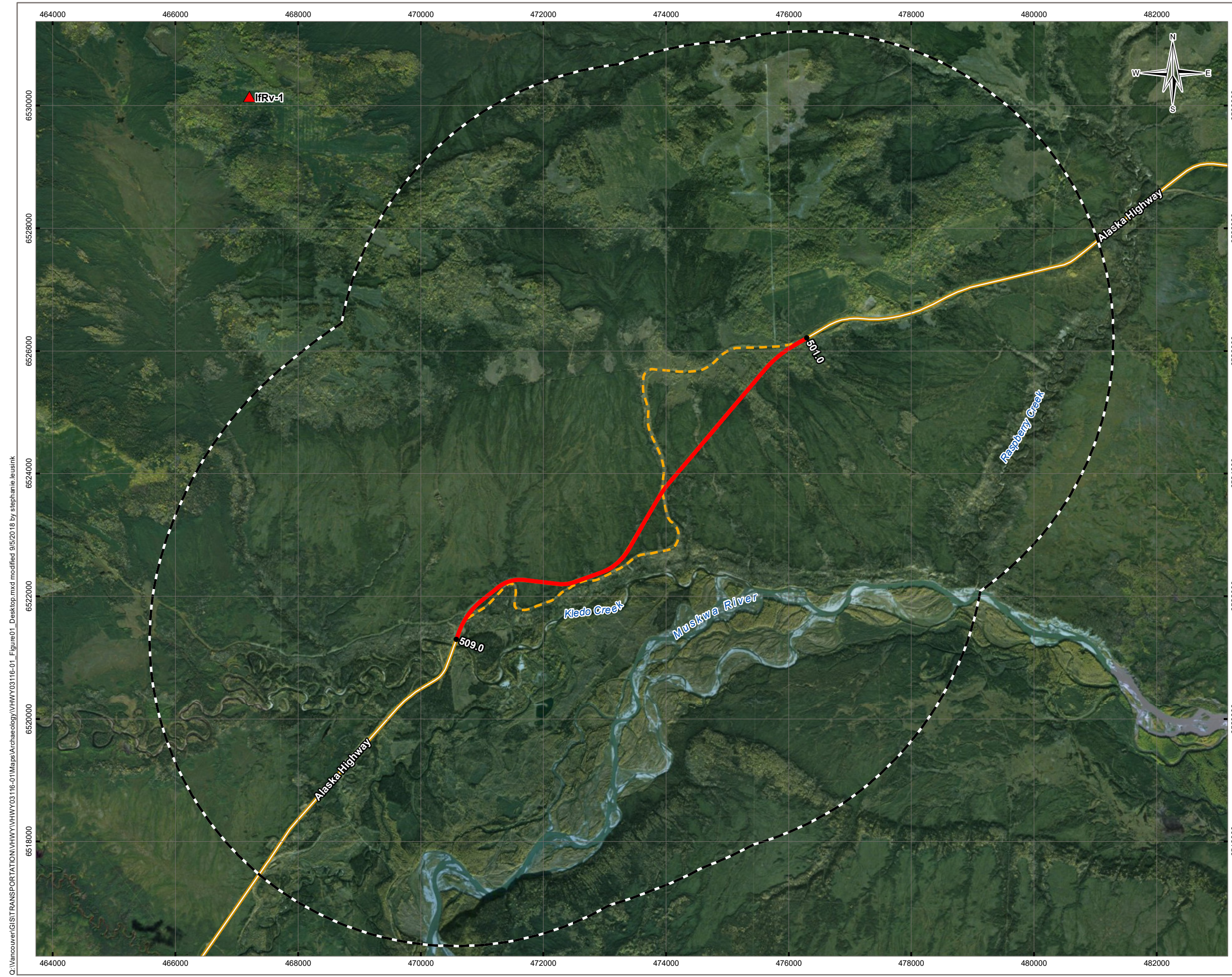
Prepared by:
Charla Arnott, M.Sc., RPCA, PMP, RPA
Archaeologist, Soriak Consulting & Research Ltd.
Direct Line: 780.995.4859
charla@soriakconsulting.com

Reviewed by:
Matt Keleher, B.Eng., E.I.T
Transportation Engineer
Direct Line: 604.608.8615
matt.keleher@tetrattech.com

Attachments: Appendix A – Figure 1
Appendix B – Tetra Tech’s General Conditions

APPENDIX A - FIGURES

Figure 1 Heritage Resources Review – Desktop Assessment



LEGEND

- ▲ Approximate Archaeological Site
- Archaeology Study Area
- Former Highway Alignment
- 5 km Search Area
- Highway

Q:\Vancouver\GIS\TRANSPORTATION\VH\WY\03116-01\Maps\Archaeology\03116-01_Figure01_Desktop.mxd modified 9/5/2018 by stephanie.leusink

NOTES
 Base data source:
 Imagery from ESRI; DigitalGlobe (2008).

STATUS
ISSUED FOR USE

**ALASKA HIGHWAY KM 501-509
 WIDENING AND DITCH WORK
 PRELIMINARY ARCHAEOLOGICAL ASSESSMENT**

Desktop Assessment

PROJECTION UTM Zone 10		DATUM NAD83		CLIENT Public Works and Government Services Canada	
Scale: 1:60,000					
FILE NO. VH\WY03116-01_Figure01_Desktop.mxd					
OFFICE TL-VANC	DWN SL	CKD BB	APVD CD	REV 0	TETRA TECH
DATE September 5, 2018	PROJECT NO. TRN.VH\WY03116-01				

Figure 1

APPENDIX B

TETRA TECH'S GENERAL CONDITIONS

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, 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.

R.106984.001

Appendix Q

Deactivation of Former Alignments Km 501.05 to Km 508.80

Site Photos

Note: The selective site photos are provided for the Contractor's general information only. Photos have not been provided for all required work. PSPC takes no responsibility for the completeness or any misinterpretation by the Contractor of the site conditions based on the photos provided. Site conditions may have changed since the photos were taken. It is the Contractor's responsibility to visit the site and confirm all existing site conditions.



Photo 1: Debris Location A (Approx. Km 22.26) – Photo 1 of 2



Photo 2: Debris Location A (Approx. Km 22.26) – Photo 2 of 2



Photo 3: Debris Location B (Approx. Km 22.52) – Photo 1 of 1



Photo 4: Debris Location C (Approx. Km 22.84) – Photo 1 of 1



Photo 5: Debris Location D (Approx. Km 24.42) – Photo 1 of 1



Photo 6: Debris Location E (Approx. Km 24.96) – Photo 1 of 1

R.106984.001
Appendix R

Deactivation of Former Alignments Km 501.05 to Km 508.80

**British Columbia Ministry of Forests, Lands, Natural Resource
Operations, and Rural Development (FLNRORD) Section 11
Approval for Instream Work – Date: July 23, 2021 – Notice of
Authorized Changes – Changes In and About a Stream (File
9000667)**



July 23, 2021

Job Number: 118502
vFCBC Tracking Number: 100351139

Public Services and Procurement Canada
219-800 Burrard ST
Vancouver, BC V6Z 0B9

Dear Public Services and Procurement Canada,

Notice of Authorized Changes - Changes In and About a Stream (File 9000667)

Thank you for your Authorized Change Application for changes in and about a stream regarding the road crossing culvert construction/maintenance/removal and beaver dam removal activities for the deactivation project along km 501.50 to km 508.80 of the Alaska Highway, at the following stream crossing locations:

Site ID (Station)	UTM Coordinates	
	Easting	Northing
11+150	474969	6525972
11+350	474824	6525843
11+610	474613	6525692
12+150	474079	6525667
13+230	473721	6525012
13+680	473782	6524577
13+910	473879	6524363
13+920	473888	6524366
14+280	473974	6524010
20+470	474053	6523247
20+970	474143	6522809
21+470	473673	6522682
21+480	473659	6522667
21+830	473362	6522522
22+070	473149	6522409
22+540	472714	6522238
22+680	472582	6522213
23+020	472289	6522043
23+260	472093	6521902
23+940	471536	6521914

24+290	471458	6522200
24+550	471285	6522050
24+810	471100	6521854
25+020	470927	6521739
25+060	470895	6521708

This letter acknowledges that the proposed activities meet the requirements as identified for Authorized Changes under the *Water Sustainability Act*.

As per Section 39(1)(a) and (u), you may make changes as per the regulation.

Should the work plan or scope of work change, you must notify the Habitat Officer. If the proposal is outside the authorized changes as described by Section 39 of the *Water Sustainability Regulation*, you will be directed to obtain an Approval under Section 11 of the *Water Sustainability Act*.

All works shall be completed in accordance with the:

- Notification submitted on June 9, 2021 (tracking number 100351139).
- Environmental Overview Assessment Deactivation of Former Alignments KM 501.05 to KM 508.80, Alaska Highway, BC, prepared for Public Services and Procurement Canada by Tetra Tech Canada Inc. (File TRN.VHWY03116-01.003) on June 4, 2021. This includes the various management and protection plans attached as appendices in the assessment.
- Provincial "Standards and Best Practices for In-stream Works 2004" <http://www.env.gov.bc.ca/wld/documents/bmp/iswstdsbpsmarch2004.pdf> and "A Users' Guide to Working In and Around Water" https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/natural-resource-use/land-water-use/crown-land/working_around_water.pdf.

As the Habitat Officer under the *Water Sustainability Act*, I am requiring that the proposed changes in and about a stream be made in accordance with the following terms and conditions to protect fish, fish habitat, and/or water quality as per Section 42(2) of the *Water Sustainability Regulation*.

TERMS AND CONDITIONS:

a) THE TIMING WINDOW DURING WHICH THE CHANGE MAY BE MADE

The least risk fish window is between July 15 and August 15 to accommodate both spring and fall spawning fish species that may be present. The least risk window for beavers is July 15 – September 14.

As a Habitat Officer I authorize your instream works; permitting works from November 1, 2021 to March 31, 2024 with conditions:

- instream works are to be undertaken during the least risk window of July 15-August 15, 2022 and July 15-August 15, 2023 or
- when the worksite stream channel is naturally dry (no flow) or completely frozen to the bottom at the time of construction. A QEP must be onsite to make a determination whether or not the stream is dry or frozen to the bottom prior to the commencement of the project works to ensure the instream activity will not adversely impact fish or fish habitat (e.g. result in the introduction of sediment into fish habitat).

Minimize the amount of time the work site is in a disturbed state by completing work as quickly as possible, while considering worker safety and minimizing environmental risk.

b) THE MINIMUM INSTREAM FLOW OR THE MINIMUM FLOW OF WATER THAT MUST REMAIN IN THE STREAM WHILE THE CHANGE IS BEING MADE

The natural rate of water flow must be maintained upstream and downstream of the worksite during all phases of instream activity.

c) THE REMOVAL OF MATERIAL FROM THE STREAM OR STREAM CHANNEL IN CONNECTION WITH THE CHANGE

The removal of material must not lead to stream channel instability or increase the risk of sedimentation into the watercourse.

Retain, where possible, existing instream and riparian vegetation and other features. These include trees, bushes, shrubs, weeds, or tall grasses along any stream bank, mats of floating vegetation, overhanging vegetation, natural, large woody debris that does not appear to be causing damage to the bottom, and large boulders.

Any spoil materials must be placed in a location which ensures that sediment or debris does not enter the watercourse.

The removal of the beaver dam(s) shall be completed in a controlled manner and undertaken in a series of 20 cm drops in dam height. After each drop in dam height, the subsequent water level and sediment plume shall be allowed to stabilize prior to the next level drop, thereby allowing for a controlled breach and controlled flows downstream.

When the water level in the reservoir has been lowered to the extent that no undue scour of the stream channel will occur, the beaver dam may then be breached and the dam debris removed.

In a series of beaver dams, only one dam at a time shall be removed, beginning with the most downstream dam and progressing upstream.

All material excavated from the beaver dam(s) is to be side cast/removed from the area in such a manner that it is prevented from re-entering the watercourse.

Care shall be exercised during all phases of removal of the beaver dam(s) to minimize sediment introduction to any watercourse.

d) THE ADDITION OF SUBSTANCE, SEDIMENT, DEBRIS OR MATERIAL TO THE STREAM OR STREAM CHANNEL IN CONNECTION WITH THE CHANGE

Instream activities must be conducted in the dry and the worksite must be isolated from water flowing in the stream channel.

All equipment must be located and operated in the dry, outside the wetted perimeter of the stream.

Measures must be taken to ensure that no harmful material (e.g. fuel and other hydrocarbons, soil, road fill, or sediment) which could adversely impact water quality, fish and other aquatic life, and/or fish habitat, be allowed to enter the wetted perimeter as a result of the project activities.

Equipment used in close proximity to the wetted perimeter must be free of deleterious material (e.g. hydrocarbons) and in good mechanical condition (e.g. no fuel or hydraulic leaks).

Ensure all hydraulic machinery working near a stream uses environmentally sensitive hydraulic fluids that are non-toxic to aquatic life and that are readily or inherently biodegradable.

Fuelling and servicing of vehicles and equipment must occur a minimum of 30 metres away from all streams, lakes and waterbodies. Keep a spill containment kit on site and train onsite staff in its use. Immediately report any spill of a substance that is toxic, polluting, or deleterious to aquatic life of reportable quantities to the Provincial Emergency Program 24-hour phone line at **1-800-663-3456**.

Erosion and sediment control structures are to be available onsite and utilized as necessary.

Do not work in weather conditions likely to contribute to sediment production to the stream.

e) THE SALVAGE OR PROTECTION OF FISH OR WILDLIFE WHILE THE CHANGE IS BEING MADE OR AFTER THE CHANGE HAS BEEN MADE

If dewatering of the worksite is necessary, fish salvage must occur on a fish-bearing stream prior to commencing works. A fish salvage permit must be obtained <http://www.env.gov.bc.ca/pasb/>.

Do not disturb other wildlife and/or their residences within the project area.

Measures must be taken to ensure that equipment (e.g. water pumps) does not harm aquatic life.

f) THE PROTECTION OF NATURAL MATERIALS AND VEGETATION THAT CONTRIBUTE TO THE AQUATIC ECOSYSTEM OR STREAM CHANNEL STABILITY

Minimize disturbance to natural materials (e.g. embedded logs) and vegetation that contribute to habitat or stream channel stability.

Minimize the disturbance to existing vegetation on and adjacent to the stream banks.

g) THE RESTORATION OF THE WORKSITE AFTER THE CHANGE HAS BEEN MADE

Protect disturbed soil areas on the banks and areas adjacent to the stream from surface erosion.

Revegetate any disturbed areas using appropriately selected species, as required. Riparian areas which are disturbed by the works shall be restored to their original condition and protected from erosion.

Remove any remaining sediment and erosion control measures.

Complete post-construction multi-year monitoring to ensure your revegetation meets full survival.

h) THE REQUIREMENT TO OBTAIN AN APPROVAL FROM THE FEDERAL DEPARTMENT OF FISHERIES AND OCEANS IN CONNECTION WITH THE CHANGES

Proponents are responsible for complying with the federal *Fisheries Act*. No serious harm to fish is authorized by this document, where serious harm is the death of fish or any permanent alteration to, or destruction of, fish habitat.

Proponents are responsible for determining whether Fisheries and Oceans Canada (FOC) must be consulted and whether an authorization from FOC is required prior to making the change.

i) OTHER

To ensure protection of fish, fish habitat and aquatic resources, an Environmental Monitor must be on site while instream operations take place for the scenarios described in the Environmental Overview Assessment (including its management plans which are attached as appendices to the assessment).

This Notification **does not** constitute a ***Wildlife Act Authorization***.

This letter does not cover works previously conducted without Authority.

This document does not supersede the requirements of the *Water Sustainability Act* and Regulations, *Federal Fisheries Act* or any other related legislation. The proponent is obligated to comply with all applicable federal, provincial or municipal enactments. For more information on the *Water Sustainability Act*, Section 11 Change Approval and Authorization for “Changes In and About a Stream” can be found at: <http://www2.gov.bc.ca/gov/content/environment/air-land-water/water/water-licensing-rights/working-around-water>.

Retain a copy of this document on site during construction of the works.

If you have any questions or concerns, please contact Kerry.Harvey@gov.bc.ca who can also be reached at 778-576-1136.

Sincerely,



Kerry Harvey
Senior Ecosystems Biologist

Cc:
Enclosure(s)