



Public Works and  
Government Services Canada

Requisition No. EZ899-152094

SPECIFICATIONS  
for

**Culvert Replacement  
Km 475, Alaska Highway, British Columbia**

Project No. R.017173.058 Jan 2015



**APPROVED BY:**

[Signature] Feb 04 2015  
Program Manager, Alaska Highway Date

[Signature] 2015-01-06  
Construction Safety Coordinator Date

**TENDER:**

[Signature] Feb 10 2015  
Project Manager Date

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# PWGSC

Culvert Replacement  
km 475, Alaska Highway, British Columbia  
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# PWGSC

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## Supplementary documentation

DFO Bridge Maintenance Standard Operating Procedures, available on-line at:

[http://www.dfo-mpo.gc.ca/oceans-habitat/habitat/modernizing-moderniser/epmp-pmpe/qc/pdf/bridge\\_e.pdf](http://www.dfo-mpo.gc.ca/oceans-habitat/habitat/modernizing-moderniser/epmp-pmpe/qc/pdf/bridge_e.pdf)

BC Provincial Government, MOE: Standards and Best Practices for in stream Works

Available on-line at: <http://www.env.gov.bc.ca/wld/documents/bmp/iswstdsbpsmarch2004.pdf>

Environmental Protection Plan Framework (EPP) Checklist

Environmental Effects Evaluation (EEE) Report

## LIST OF DRAWINGS

Cover Sheet

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CO3 General Arrangement Sheet 2

**END OF SECTION**

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**PART 1 - GENERAL**

- 1.1 Codes, Bylaws, Standards .1 Perform work to CURRENT Codes, Construction Standards and Bylaws, including Amendments.
- .2 Perform work in accordance with the Canadian Highway Bridge Design Code CAN/CSA S6-06, and other indicated Codes, Construction Standards, and/or any other Code or Bylaw of local application.
- .3 Comply with applicable local bylaws, rules and regulations enforced at the location concerned.
- .4 Meet or exceed requirements of Contract documents, specified standards, codes, and referenced documents.
- .5 In any case of conflict or discrepancy, the most stringent requirements shall apply.
- 1.2 Contract Documents .1 The Contract Documents, drawings and specifications, are intended to complement each other, and to provide for and include everything necessary for the completion of the Work.
- .2 Drawings are, in general, diagrammatic and are intended to indicate the scope and general arrangement of the work.
- .3 If anything is found by the Contractor to be missing from the Contract Documents immediately inform the Departmental Representative.
- 1.3 Other Contracts .1 Further Contracts may be awarded while this contract is in progress.
- .2 Cooperate with other Contractors in carrying out their respective works and carry out instructions from Departmental Representative.
- .3 Coordinate work with that of other Contractors. If any part of work under this Contract depends for its proper execution or result upon work of another Contractor, report promptly to Departmental Representative, in writing, any defects which may interfere with proper execution of this Work.
- 1.4 Division of Specifications .1 The specifications are subdivided in accordance with the current 5 or 6-digit National Master Specifications System.
- .2 A division may consist of the work of more than 1 subcontractor. Responsibility for determining which subcontractor provides the
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- labour, material, equipment and services required to complete the work rests solely with the Contractor.
- .3 In the event of discrepancies or conflicts when interpreting the drawings and specifications, the specifications govern.
- 1.5 Time of Completion .1 Substantially Complete by June, 10, 2015.
- 1.6 Section Includes .1 In general, Work under this Contract covers the:
- .1 Installation of precast concrete box culvert, km 475, Alaska Highway, British Columbia to replace the existing CSP pipe culvert.
- .2 Installation of substrate material and large diameter rocks inside the culvert.
- .3 Installation of riprap around the inlet and outlet.
- .4 Backfilling, re-establishment of roadways, and embankment slopes disturbed by the work.
- 1.7 Work Included .1 Work includes, but is not limited to:
- .1 Supply and installation of precast concrete box culvert.
- .2 Supply and installation of substrate material and large diameter rocks for culvert bottom.
- .3 Installation of riprap and re-establishment of roadways and embankments at completion of Contract.
- .4 Backfilling behind culvert with soil or gravel.
- .5 Supply of construction equipment and personnel.
- .6 Staging of construction and traffic accommodation.
- .7 Maintaining the stability of the roadway embankment fill during construction.
- .8 Coordination and communication with other Contractors and agencies involved with Project, if applicable.
- .9 Management of Environment. A qualified Environmental Monitor is required to be present during periods of potential environmental concerns or to complete inspections. The Contractor shall engage the services of the site
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Environmental Monitor to ensure adherence with EPP. The cost of hiring the Environmental Monitor is incidental to the project. Environmental Monitor shall be an applied scientist or technologist specializing in a relevant applied science or technology who is registered in British Columbia with their appropriate professional organization (i.e. biologist, engineer, hydrologist, geologist etc.) and acting under that association's Code of Ethics and subject to disciplinary action by that association, and who, through demonstrated suitable education, experience, accreditation and knowledge relevant to the particular matter, may be reasonably relied on to provide advice within their area of expertise.

- .2 "Green" requirements:
    - .1 Use only environmentally responsible green materials/ products with no VOC emissions or minimum VOC emissions of indoor off-gassing contaminants for improved indoor air quality - subject of Departmental Representative's approval of submitted MSDS Product Data.
    - .2 Use materials/products containing highest percentage of recycled and recovered materials practicable - consistent with maintaining cost effective satisfactory levels of competition.
    - .3 Adhere to waste reduction requirement for reuse or recycling of waste materials, thus diverting materials from landfill.
  - .3 Unless specifically stated otherwise, the Work is to include the furnishing of all labour, materials, equipment, and services necessary to complete the Work. The intent is that the Contractor provides a complete Job.
- 1.8 Contractor's Responsibility
- .1 Give all required Notices and comply with all local, provincial, and federal laws, bylaws, ordinances, rules, regulations, codes, and orders relating to the Work which are or become in force during the Performance of the Work.
  - .2 As Prime Contractor, coordinate all the Work and provide all labour, materials, equipment, and services necessary for delivery, storage, handling, protection, installation, removal, inspection, and replacement or maintenance as required to provide a complete Project.
- 1.9 Hours of Work
- .1 Restrictive as follows:
    - .1 Notify Departmental Representative of all after hours work,
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- including weekends and holidays.
- .2 After hours work is likely required for Work near the centreline of the roadway.
- 1.10 Work Schedule .1 Carry on work as follows:
- .1 Within 10 working days after Contract award, provide a "phasing bar chart" and a schedule showing anticipated progress stages and final completion of the Work within the time period required by the Contract documents. Indicate the following:
- .1 Submission of shop drawings, product data, MSDS sheets, and samples.
- .2 Commencement and completion of Work of each section of the specifications or drawings as outlined.
- .3 Final completion date within the time period required by the Contract documents.
- .2 Do not change approved Schedule - without notifying Departmental Representative.
- .3 Interim reviews of work progress based on work schedule will be conducted as decided by Departmental Representative and schedule updated by Contractor in conjunction with and to approval of Departmental Representative.
- 1.11 Cost Breakdown .1 Before submitting the first progress claim, submit a breakdown of the Contract lump sum prices in detail as directed by the Departmental Representative and aggregating Contract price.
- 1.12 Documents Required .1 Maintain 1 copy each of the following at the job site:
- .1 Contract drawings.
- .2 Contract specifications.
- .3 Addenda to Contract documents.
- .4 Copy of approved work schedule.
- .5 Reviewed/approved shop drawings.
- .6 Change orders.
- .7 Other modifications to Contract.
- .8 Field test reports.
- .9 Reviewed/approved samples.
- .10 Manufacturers' installation and application instructions.
- .11 One set of record drawings and specifications for "as-built" purposes.
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- .13 Current construction standards of workmanship listed in technical Sections.
  - .14 Project Safety Plan / Traffic Control Plan.
  - .15 Copy of approved Work schedule.
  - .16 Labour conditions and wage schedules.
- 1.13 Regulatory Requirements .1 Obtain and pay for Building Permit, Certificates, Licenses, and other permits required by regulatory municipal, provincial or federal authorities to complete the work.
- .2 Provide inspection authorities with plans and information required for issue of acceptance certificates.
- .3 Furnish inspection certificates in evidence that the work installed conforms with the requirements of the authority having jurisdiction.
- 1.14 Contractor's Use of Site .1 Use of site:
- .1 Exclusive and complete for execution of Work.
  - .2 Assume responsibility for assigned premises for performance of this Work.
  - .3 Be responsible for coordination of all Work activities on site, including the Work of other contractors engaged by the Departmental Representative.
- .2 Perform Work in accordance with Contract documents. Ensure work is carried out in accordance with indicated phasing.
- .3 Do not unreasonably encumber site with material or equipment
- 1.15 Examination .1 Examine site and be familiar and conversant with existing conditions likely to affect work.
- .2 Provide photographs of surrounding properties, objects and structures liable to be damaged or be the subject of subsequent claims.
- 1.16 Existing Services .1 Where work involves breaking into or connecting to existing services, carry out work at times directed by the authorities having jurisdiction.
- 1.17 Location of Equipment and Fixtures .1 Location of equipment, fixtures, and outlets indicated or specified are to be considered as approximate.
- .2 Locate equipment, fixtures, and distribution systems to provide minimum interference and maximum usable space, and in
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- accordance with manufacturer's recommendations for safety, access and maintenance.
- .3 Inform Departmental Representative of impending installation and obtain his approval for actual location.
- .4 Submit field drawings or shop drawings to indicate the relative position of various services and equipment when required by the Departmental Representative and/or as specified.
- 1.18 Cutting and Patching
- .1 Cut existing surfaces only as required to accommodate new work and as directed by the Departmental Representative.
- .2 Remove items so shown or specified.
- .3 Do not cut, bore, or sleeve load-bearing members unless instructed to do so by the drawings and/or specifications.
- .4 Make cuts with clean, true, smooth edges. Make patches inconspicuous in final assembly.
- .5 Fit work airtight to pipes, sleeves, ducts and conduits.
- .6 Patch and make good surfaces cut, damaged or disturbed, to Departmental Representative's approval. Match existing material, colour, finish and texture.
- .7 Making good is defined as matching construction and finishing materials and the adjacent surfaces such that there is no visible difference between existing and new surfaces when viewed from 1.5 metres in ambient light, and includes painting the whole surface to the next change in plane.
- 1.19 Setting Out Work
- .1 Assume full responsibility for and execute complete layout of work to locations, lines and elevations indicated.
- .2 Assume full responsibility for dimensions, spacings, overall fit with field components, and exact locations of bolt holes and their spacings.
- .3 Provide devices needed to lay out and construct work.
- .4 Supply such devices as templates required to facilitate Departmental Representative's inspection of work.
- 1.20 Quality of Work
- .1 Ensure that quality workmanship is performed through use of skilled tradesmen, under supervision of qualified journeyman.
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- .2 The workmanship, erection methods, and procedures to meet minimum standards set out in the applicable codes and standards.
  - .3 In cases of dispute, decisions as to standard or quality of work rest solely with the Departmental Representative, whose decision is final.
  - 1.21 Works Coordination
    - .1 Coordinate work of subtrades:
      - .1 Designate one person to be responsible for review of contract documents and shop drawings and managing coordination of Work.
    - .2 Convene meetings between subcontractors whose work interfaces and ensure awareness of areas and extent of interface required.
      - .1 Provide each subcontractor with complete plans and specifications for Contract, to assist them in planning and carrying out their respective work.
      - .2 Develop coordination drawings when required, illustrating potential interference between work of various trades and distribute to affected parties.
        - .1 Identify on coordination drawings, structural elements, services lines, rough-in points, and indicate location of services entrance to site.
      - .3 Facilitate meeting and review coordination drawings. Ensure subcontractors agree and sign off on drawings.
      - .4 Publish minutes of each meeting.
      - .5 Plan and coordinate work in such a way to minimize quantity of service line offsets.
      - .6 Submit copy of coordination drawings and meeting minutes to Departmental Representative for information purposes.
      - .7 Coordinate and plan for all necessary road/lane closures ahead of time.
    - .3 Submit shop drawings and order of prefabricated equipment or rebuilt components only after coordination meeting for such items has taken place.
    - .4 Work cooperation:
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- .1 Ensure cooperation between trades in order to facilitate general progress of Work and avoid situations of spatial interference.
  - .2 Ensure that each trade provides all other trades reasonable opportunity for completion of Work and in such a way as to prevent unnecessary delays, cutting, patching, and removal or replacement of completed work.
  - .3 Ensure disputes between subcontractors are resolved.
  - .5 Departmental Representative is not responsible for, or accountable for extra costs incurred as a result of Contractor's failure to coordinate Work.
  - .6 Maintain efficient and continuous supervision.
  - 1.22 Approval of Shop Drawings, Product Data and Samples
    - .1 In accordance with Section 013300, submit the requested shop drawings, product data, MSDS sheets, and samples indicated in each of the technical Sections.
    - .2 Allow sufficient time for the following:
      - .1 Review of product data.
      - .2 Approval of shop drawings.
      - .3 Review of re-submission.
      - .4 Ordering of approved material and/or products.
  - 1.23 Relics and Antiques
    - .1 Relics and antiquities and items of historical or scientific interest shall remain property of Department. Protect such articles and request directives from Departmental Representative.
    - .2 Give immediate notice to Departmental Representative if evidence of archeological finds are encountered during excavation/construction, and await Departmental Representative's written instructions before proceeding with work in this area.
  - 1.24 Project Meetings
    - .1 Departmental Representative will arrange project meetings and assume responsibility for setting times and recording and distributing minutes.
  - 1.25 Testing and Inspections
    - .1 Particular requirements for inspection and testing to be carried out by testing service or laboratory approved by the Departmental Representative are specified in Section 014500 – Quality Control.
    - .2 The Contractor will appoint and pay for the services of testing agencies and/or testing laboratories to meet the requirements specified in the Contract documents and where required for the
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following:

- .1 Inspection and testing required by laws, ordinances, rules, regulations or orders of public authorities.
  - .2 Inspection and testing performed exclusively for Contractor's convenience.
  - .3 Tests specified to be carried out by Contractor under the Departmental Representative's supervision.
  - .3 Where tests or inspections by designated testing laboratory reveal work is not in accordance with the Contract requirements, Contractor shall pay costs for additional tests or inspections as the Departmental Representative may require to verify acceptability of corrected work.
  - .4 Contractor shall notify Departmental Representative in advance of planned testing.
  - .5 Where materials are specified to be tested, deliver representative samples in required quantity to testing laboratory.
  - .6 Pay costs for uncovering and making good work that is covered before required inspection or testing is completed and approved by Departmental Representative.
  - .7 The Departmental Representative may require, and pay for, additional inspection and testing services not included here.
  - .8 Provide Departmental Representative with 2 copies of testing laboratory reports and mill tests and certificates of compliance as soon as they are available.
- 1.26 As-Built Documents
- .1 The Departmental Representative in coordination with the Contractor will provide 2 sets of drawings, 2 sets of specifications, and 2 copies of the original AutoCAD files for "as-built" purposes.
  - .2 As work progresses, maintain accurate records to show all deviations from the Contract documents. Note on as-built specifications, drawings, and shop drawings as changes occur.
- 1.27 Cleaning
- .1 Conduct daily cleaning and disposal operations. Comply with local ordinances and anti-pollution laws.
  - .2 Ensure cleanup of the work areas each day after completion of work.
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- .3 In preparation for inspections:
    - .1 Examine all sight-exposed interior and exterior surfaced and concealed spaces.
    - .2 Remove grease, dust, dirt, stains, labels, fingerprints, and other foreign materials from sight-exposed interior and exterior finished surfaces.
  - .4 Use cleaning materials and methods in accordance with instructions of the manufacturer of the surface to be cleaned.
  - 1.28 Environmental Protection
    - .1 Prevent extraneous materials from contaminating air, land, or water beyond construction area, by providing temporary enclosures during work.
    - .2 Do not dispose of waste or volatile materials into water courses, storm or sanitary sewers.
    - .3 Ensure proper disposal procedures in accordance with all applicable territorial regulations.
  - 1.29 Additional Drawings
    - .1 The Departmental Representative may furnish additional drawings for clarification. These additional drawings have the same meaning and intent as if they were included with plans referred to in the Contract documents.
    - .2 Upon request, Departmental Representative may furnish up to a maximum of 6 sets of Contract documents for use by the Contractor at no additional cost. Should more than 6 sets of documents be required the Departmental Representative will provide them at additional cost.
  - 1.30 System of Measurement
    - .1 The metric system of measurement (SI) will be employed on this Contract.
  - 1.31 Familiarization with Site
    - .1 Before submitting tender, it is recommended to visit bridge site to become familiar with all conditions likely to affect the cost of the Work.
  - 1.32 Submission of Tender
    - .1 Submission of a tender is deemed to be confirmation of the fact that the Tenderer has analyzed the Contract documents and is fully conversant with all conditions therein.
  - 1.33 Basis of Payment
    - .1 Payment of 35% of the total tender price shall be authorized when the Contractor has provided a Construction Schedule and Work onsite has commenced to the satisfaction of the Departmental Representative. Payment of 50% of the total tender price shall be
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made as a series of monthly payments, calculated on the basis of the expected schedule. If the Work falls behind or gets ahead of schedule, these payments will be adjusted accordingly. Payment of the remaining 15% shall be authorized when the Work is completed, and the site is cleaned-up to the satisfaction of the Departmental Representative.

- .2 Payment of only 10% of the total tender price shall be scheduled for Mobilization and Demobilization. If the amount bid for Mobilization and Demobilization is greater than 10%, payment of the remainder of the amount shall be authorized when the site is cleaned-up.

**END OF SECTION**

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PART 1 - GENERAL

- 1.1 Section Includes .1 Coordination of Work with work by others under administration of Departmental Representative.
- .2 Scheduled preconstruction and progress meetings.
- 1.2 Description .1 Coordination of progress schedules, submittals, use of sites, temporary utilities, construction facilities, and construction Work, with progress of work by others under instructions of Departmental Representative.
- 1.3 Construction Progress Meetings .1 The Departmental Representative will schedule and administer project meetings as deemed necessary throughout progress of the and Project Meetings Work.
- .2 Agenda to include, but not limited to, the following:
- .1 Review and approval of minutes of previous meeting.
- .2 Review of Work progress since previous meeting.
- .3 Field observations, problems, conflicts.
- .4 Problems that impede construction schedule.
- .5 Review of off-site fabrication delivery schedules.
- .6 Corrective measures and procedures to regain projected schedule.
- .7 Revision to construction schedule.
- .8 Progress schedule, during succeeding work period.
- .9 Review submittal schedules: expedite as required.
- .10 Maintenance of quality standards.
- .11 Review proposed changes for affect on construction schedule and on completion date.
- .12 Other business.
- .3 The Contractor shall provide physical space and make arrangements for meetings.
- .4 The Departmental Representative will record minutes, including significant proceedings and decisions, identify action by parties, and set time and date for next progress meeting.
- .5 The Departmental Representative will reproduce and distribute copies of minutes within three days after each meeting and transmit to meeting participants, affected parties not in attendance, and Contractor.
- 1.4 Construction Organization .1 Within 15 days after award of Contract, request a meeting of parties and Start-up in contract to discuss and resolve administrative procedures and
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responsibilities.

- .2 Departmental Representatives and senior representatives of the Contractor, major Subcontractors (if applicable), field inspectors and supervisors will be in attendance.
  - .3 Establish time and location of meeting and notify parties concerned minimum 5 days before meeting.
  - .4 Agenda to include, but not limited to, the following:
    - .1 Appointment of official representative of participants in Work.
    - .2 Schedule of Work, progress scheduling in accordance with Section 013217 - Construction Progress and Reporting.
    - .3 Schedule of submission of shop drawings, samples, etc. in accordance with Section 013300 - Submittal Procedures.
    - .4 Requirements for temporary facilities, storage sheds, utilities, etc. in accordance with Section 015100 - Temporary Utilities.
    - .5 Delivery schedule of specified equipment in accordance with Section 013217 - Construction Progress and Reporting.
    - .6 Site security in accordance with Section 015200 - Construction Facilities.
    - .7 Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime, and administrative requirements.
    - .8 Take-over procedures, acceptance, and warranties in accordance with Section 017700 - Closeout Procedures.
    - .9 Monthly progress claims, administrative procedures, photographs, and holdbacks.
    - .10 Appointment of inspection and testing agencies or firms in accordance with Section 014500 - Quality Control.
    - .11 Insurances and transcript of policies.
    - .12 Other business.
  - .5 Comply with Departmental Representative's allocation of mobilization areas of sites; for field offices and sheds, construction camp(s) and camp utilities, access, traffic, and parking facilities.
  - .6 During construction, coordinate use of sites and facilities with Departmental Representative.
  - .7 Comply with instructions of Departmental Representative for use of temporary utilities and construction facilities.
- 1.5 On-Site Documents
- .1 Maintain 1 copy each of the following at the job site:
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- .1 Contract drawings.
  - .2 Contract specifications.
  - .3 Addenda to Contract documents.
  - .4 Copy of approved work schedule.
  - .5 Reviewed/approved shop drawings.
  - .6 Change orders.
  - .7 Other modifications to Contract.
  - .8 Field test reports.
  - .9 Reviewed/approved samples.
  - .10 Manufacturers' installation and application instructions.
  - .11 One set of record drawings and specifications for "as-built" purposes.
  - .13 Current construction standards of workmanship listed in technical Sections.
  - .14 Project Safety Plan / Traffic Control Plan.
  - .15 Copy of approved Work schedule.
  - .16 Labour conditions and wage schedules.
- 1.6 Schedules
- .1 Submit preliminary construction progress schedule in accordance with Section 013217 - Construction Progress and Reporting to Departmental Representative coordinated with Departmental Representative's project schedule.
  - .2 After review, revise and resubmit schedule to comply with revised project schedule.
  - .3 During progress of Work revise and resubmit as directed by Departmental Representative.
- 1.7 Submittals
- .1 Submit preliminary shop drawings and product data and samples in accordance with Section 013300 for review for compliance with Contract Documents; for field dimensions and clearances, for relation to available space, and for relation to Work of other contracts. After review, revise and resubmit for transmittal to Departmental Representative.
  - .2 Submit requests for payment for review, and for transmittal to Departmental Representative.
  - .3 Submit requests for interpretation of Contract Documents, and obtain instructions through Departmental Representative.
  - .4 Process substitutions through Departmental Representative.
  - .5 Process change orders through Departmental Representative.
  - .6 Deliver closeout submittals for review and preliminary inspections,
-

- for transmittal to Departmental Representative.
- 1.8 Closeout Procedures
- .1 Notify Departmental Representative when Work is considered ready for Substantial Performance, in accordance with Section 017700 -- Closeout Procedures.
  - .2 Accompany Departmental Representative on preliminary inspection to determine items listed for completion or correction.
  - .3 Comply with Departmental Representative's instructions for correction of items of Work listed in executed certificate of Substantial Performance.
  - .4 Notify Departmental Representative of instructions for completion of items of Work determined in Departmental Representative's final inspection.

**END OF SECTION**

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**PART 1 - GENERAL**

- 1.1 Section Includes
- .1 Schedule, form, and content.
  - .2 Staged construction.
  - .3 Scheduled revisions.
  - .4 Critical path scheduling.
- 1.2 Definitions
- .1 Activity: element of Work performed during course of Project. Activity normally has expected duration, and expected cost and expected resource requirements. Activities can be subdivided into tasks.
  - .2 Actual Finish Date (AF): point in time that Work actually ended on activity.
  - .3 Actual Start Date (AS): point in time that Work actually started on activity.
  - .4 Bar Chart (Gantt chart): graphic display of schedule-related information. In typical bar chart, activities or other Project elements are listed down left side of chart, dates are shown across top, and activity durations are shown as date-placed horizontal bars.
  - .5 Baseline: original approved plan (for Project, work package, or activity), plus or minus approved scope changes.
  - .6 Completion Milestones: they are firstly Substantial Completion and secondly Final Certificate.
  - .7 Constraint: applicable restriction that will affect performance of Project. Factors that affect activities can be scheduled.
  - .8 Control: process of comparing actual performance with planned performance, analyzing variances, evaluating possible alternatives, and taking appropriate corrective action as needed.
  - .9 Critical Activity: any activity on a critical path. Most commonly determined by using critical path method.
  - .10 Critical Path: series of activities that determines duration of Project. In deterministic model, critical path is usually defined as those activities with float less than or equal to specified value, often zero. It is longest path through Project.
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- .11 Critical Path Method (CPM): network analysis technique used to predict Project duration by analyzing which sequence of activities (which path) has least amount of scheduling flexibility (least amount of float).
  - .12 Data Date (DD) : date at which, or up to which, Project's reporting system has provided actual status and accomplishments.
  - .13 Duration (DU): number of work periods (not including holidays or other non-working periods) required to complete activity or other Project element. Usually expressed as workdays or work weeks.
  - .14 Early Finish Date (EF): in critical path method, earliest possible point in time on which uncompleted portions of activity (or Project) can finish, based on network logic and schedule constraints. Early finish dates can change as Project progresses and changes are made to Project plan.
  - .15 Early Start Date (ES): in critical path method, earliest possible point in time on which uncompleted portions of activity (or Project) can start, based on network logic and schedule constraints. Early start dates can change as Project progresses and changes are made to Project Plan.
  - .16 Finish Date: point in time associated with activity's completion. Usually qualified by one of following: actual, planned, estimated, scheduled, early, late, baseline, target, or current.
  - .17 Float: amount of time that activity may be delayed from its early start without delaying Project finish date. Float is mathematical calculation, and can change as Project progresses and changes are made to Project plan. This resource is available to both PWGSC and Contractor.
  - .18 Lag: modification of logical relationship that directs delay in successor task.
  - .19 Late Finish Date (LF): in critical path method, latest possible point in time that activity may be completed without delaying specified milestone (usually Project finish date).
  - .20 Late Start Date (LS): in critical path method, latest possible point in time that activity may begin without delaying specified milestone (usually Project finish date).
  - .21 Lead: modification of logical relationship that allows acceleration of successor task.
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- .22 Logic Diagram: see Project network diagram.
  - .23 Master Plan: summary-level schedule that identifies major activities and key milestones.
  - .24 Milestone: significant event in Project, usually completion of major deliverable.
  - .25 Monitoring: capture, analysis, and reporting of Project performance, usually as compared to plan.
  - .26 Near-Critical Activity: activity that has low total float.
  - .27 Non-Critical Activities: activities which when delayed, do not affect specified Contract duration.
  - .28 Project Control System: fully computerized system utilizing commercially available software packages.
  - .29 Project Network Diagram: schematic display of logical relationships of Project activities. Always drawn from left to right to reflect Project chronology.
  - .30 Project Plan: formal, approved document used to guide both Project execution and Project control. Primary uses of Project plan are to document planning assumptions and decisions, facilitate communication among stakeholders, and document approved scope, cost, and schedule baselines. Project plan may be summary or detailed.
  - .31 Project Planning: development and maintenance of Project Plan.
  - .32 Project Planning, Monitoring, and Control System: overall system operated by Departmental Representative to enable monitoring of Project Work in relation to established milestones.
  - .33 Project Schedule: planned dates for performing activities and planned dates for meeting milestones. Dynamic, detailed record of tasks or activities that must be accomplished to satisfy project objectives. Monitoring and control process involves using project schedule in executing and controlling activities and is used as basis for decision making throughout project life cycle.
  - .34 Quantified Days Duration: working days based on 5 day work week, discounting statutory holidays.
  - .35 Risk: uncertain event or condition that, if it occurs, has positive or negative effect on Project's objectives.
-

- .36 Scheduled Finish Date (SF): point in time that Work was scheduled to finish on activity. Scheduled finish date is normally within range of dates delimited by early finish date and late finish date.
  - .37 Scheduled Start Date (SS): point in time that Work was scheduled to start on activity. Scheduled start date is normally within range of dates delimited by early start date and late start date.
  - .38 Start Date: point in time associated with activity's start, usually qualified by one of following: actual, planned, estimated, scheduled, early, late, target, baseline, or current.
  - .39 Work Breakdown Structure (WBS): deliverable-oriented grouping of project elements that organizes and defines total Work scope of Project. Each descending level represents increasingly detailed definition of Project Work.
- 1.3 System Description
- .1 Construction Progress Schedule (Project Time Management): describes processes required to ensure timely completion of Project. These processes ensure that various elements of Project are properly coordinated. It consists of planning, time estimating, scheduling, progress monitoring, and control.
    - .1 It involves focusing on objective consideration of future, and integrating forward thinking with analysis; therefore, in planning, implicit assumptions are made about future so that action can be taken today.
    - .2 Planning and scheduling facilitates accomplishment of objectives and should be considered continuous interactive process involving planning, review, scheduling, analysis, monitoring and reporting.
  - .3 Ensure that planning process is iterative and results in generally top-down processing with more detail being developed as planning progresses, and decisions concerning options and alternatives are made. This implies progressively more reliability of scheduling data. Detail Project schedule is used for analysis and progress monitoring.
  - .4 Ensure project schedule efficiencies through monitoring.
    - .1 When activities begin on time and are performed according to estimated durations without interruptions, original
-

Critical Path will remain accurate. Changes and delays will however, create an essential need for continual monitoring of Project activities.

- .2 Monitor progress of Project in detail to ensure integrity of Critical Path, by comparing actual completions of individual activities with their scheduled completions, and review progress of activities that has started but are not yet completed.
  - .3 Monitoring should be done sufficiently often so that causes of delays are immediately identified and removed if possible.
  - .5 Project monitoring and reporting: as Project progresses, keep team aware of changes to schedule, and possible consequences. In addition to Bar Charts and CPM networks, use narrative reports to provide advice on seriousness of difficulties and measures to overcome them.
  - .6 Narrative reporting begins with statement on general status of Project followed by summarization of delays, potential problems, corrective measures and Project status criticality.
- 1.4 CPM Requirements
- .1 Ensure Master Plan and Detail Schedule are practical and remain within specified Contract duration.
  - .2 Master Plan and Detail Schedule deemed impractical by Departmental Representative are revised and resubmitted for approval.
  - .3 Acceptance of Master Plan and Detail Schedule showing scheduled Contract duration shorter than specified Contract duration does not constitute change to Contract. Duration of Contract may only be changed through bilateral Agreement.
  - .4 Consider Master Plan and Detail Schedule deemed practical by Departmental Representative, showing Work completed in less than specified Contract duration, to have float.
  - .5 First Milestone on Master Plan and Detail Schedule will identify start Milestone with an "ES" constraint date equal to Award of Contract date.
  - .6 Calculate dates for completion milestones from Plan and Schedule using specified time periods for Contract.
  - .7 Substantial Completion with "LF" constraint equal to calculated
-

- date.
- .8 Calculations on updates to be such that if early finish of Interim Certificate falls later than specified Contract duration then float calculation to reflect negative float.
  - .9 Delays to non-critical activities, those with float may not be basis for time extension.
  - .10 Do not use float suppression techniques such as software constraints, preferential sequencing, special lead/lag logic restraints, extended activity times or imposed dates other than required by Contract.
  - .11 Allow for and show Master Plan and Detail Schedule adverse weather conditions normally anticipated. Specified Contract duration has been predicated assuming normal amount of adverse weather conditions.
  - .12 Provide necessary crews and manpower to meet schedule requirements for performing Work within specified Contract duration. Simultaneous use of multiple crews on multiple fronts on multiple critical paths may be required.
  - .13 Arrange participation on and off site of subcontractors and suppliers, as required by Departmental Representative, for purpose of network planning, scheduling, updating and progress monitoring. Approvals by Departmental Representative of original networks and revisions do not relieve Contractor from duties and responsibilities required by Contract.
  - .14 Ensure that it is understood that Award of Contract or time of beginning, rate of progress, Interim Certificate and Final Certificate as defined times of completion are of essence of this Contract.
- 1.5 Submittals
- .1 Provide submittals in accordance with Section 013300 - Submittal Procedures.
  - .2 Submit to Departmental Representative Project Control System for planning, scheduling, monitoring, and reporting of project progress.
  - .3 Submit Project Control System to Departmental Representative for approval; failure to comply with each required submission, may result in payment being withheld.
  - .4 Include costs for execution, preparation, and reproduction of schedule submittals in bid documents.
-

- .5 Submit letter ensuring that schedule has been prepared in coordination with major Subcontractors, if applicable.
  - .6 Submit Project planning, monitoring, and control system data as required by Departmental Representative in following form:
    - .1 CD files in original scheduling software and PDF formats containing schedule and cash flow information, labelled with data date, specific update, and person responsible for update.
    - .2 Master Plan Bar Chart.
    - .3 Construction Detail schedule Bar Chart.
    - .4 Listing of project activities including milestones and logical connectors, networks (sub-networks) from Project start to end. Sort activities by activity identification number and accompany with descriptions. List early and late start and finish dates together with durations, codes and float.
    - .5 Criticality report listing activities and milestones with up to 5 days total float used as first sort for ready identification of critical or near critical paths through entire project. List early and late starts and finishes dates, together with durations, codes and float for critical activities.
    - .6 Progress report in early start sequence, listing for each trade, activities due to start, underway, or finished. List activity identification number, description and duration. Provide columns for entry of actual start and finish dates, duration remaining and remarks concerning action required.
    - .7 Within 2 weeks after Contract award, every 2 weeks thereafter during performance of the Contract, and within 2 weeks after final completion of the Work, provide to Departmental Representative:
      - .1 Statement of total person days of labour used on site in performance of Contract, including labour provided under subcontracts.
      - .2 Estimate of total value in dollars of material delivered to site and installed, including material provided and installed under sub-contracts.
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- 1.6 Quality Assurance .1 Use experienced personnel, fully qualified in planning and scheduling, to provide services from start of construction to Final Certificate, including Commissioning.
- 1.7 Project Meeting .1 Meet with Departmental Representative within 5 working days of Award of Contract date, to establish Work requirements and approach to project construction operations.
- 1.8 Work Breakdown Structure .1 Prepare construction WBS within 15 working days of Award of Contract date. Develop WBS through at least five levels: project, stage, element, sub-element and work package.
- 1.9 Project Milestones .1 Project milestones form targets for both Master Plan and Detail Schedule of CPM construction network system. Include:
- .1 Setup of site.
  - .2 Completion of work at South abutment wall.
  - .3 Completion of work at North abutment wall.
  - .4 Final Certificate completion.
- 1.10 Master Plan .1 Structure and base CPM construction networks system on WBS coding in order to ensure consistency throughout Project.
- .2 Prepare comprehensive construction Master Plan (CPM logic diagram) and dependent Cash Flow Projection within 15 working days of finalizing Agreement to confirm validity or alternates of identified milestones.
- .1 Master Plan will be used as baseline.
    - .1 Revise baseline as conditions dictate and as required by Departmental Representative.
    - .2 Departmental Representative will review and return revised baseline within 10 work days.
  - .3 Reconcile revisions to Master Plan and Cash Flow Projections with previous baseline to provide continuous audit trail.
  - .4 Initial and subsequent Master Plans will include:
    - .1 CD containing schedule and cash flow information, clearly labelled with data date, specific update, and person responsible for update.
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- .2 Bar chart identifying coding, activity durations, early/late and start/finish dates, total float, completion as percentile, current status and budget amounts.
  - .3 Network diagram showing coding, activity sequencing (logic), total float, early/late dates, current status and durations.
  - .4 Actual/projected monthly cash flow: expressed monthly and shown in both graphical and numerical form.
- 1.11 Detail Schedule
- .1 Structure and base CPM construction networks system on WBS coding in order to ensure consistency throughout Project.
  - .2 Prepare comprehensive construction Master Plan (CPM logic diagram) and dependent Cash Flow Projection within 15 working days of finalizing Agreement to confirm validity or alternates of identified milestones.
    - .1 Master Plan will be used as baseline.
      - .1 Revise baseline as conditions dictate and as required by Departmental Representative.
      - .2 Departmental Representative will review and return revised baseline within 10 work days.
  - .3 Reconcile revisions to Master Plan and Cash Flow Projections with previous baseline to provide continuous audit trail.
  - .4 Initial and subsequent Master Plans will include:
    - .1 CD containing schedule and cash flow information, clearly labelled with data date, specific update, and person responsible for update.
    - .2 Bar chart identifying coding, activity durations, early/late and start/finish dates, total float, completion as percentile, current status and budget amounts.
    - .3 Network diagram showing coding, activity sequencing (logic), total float, early/late dates, current status and durations.
    - .4 Actual/projected cash flow: expressed monthly and shown in both graphical and numerical form.
  - .5 Provide detailed project schedule (CPM logic diagram) within 15
-

working days of Award of Contract date showing activity sequencing, interdependencies and duration estimates. Include listed activities as follows:

- .1 Shop drawings.
  - .2 Samples.
  - .3 Approvals.
  - .4 Procurement.
  - .5 Construction.
  - .6 Installation.
  - .7 Site works.
  - .8 Testing.
  - .9 Shutdown or closure activity.
  - .10 Commissioning and acceptance.
- .6 Detail CPM schedule to cover in detail minimum period of 6 months beginning from Award of Contract date with each activity duration approximately 3 to 15 days.
- .1 Show remaining activities for CPM construction network system up to Final Certificate and develop complete detail as project progresses.
  - .2 Detail activities completely and comprehensively throughout duration of project.
- .7 Relate Detail Schedule activities to basic activities and milestones developed and approved in Master Plan.
- .8 Clearly show sequence and interdependence of construction activities and indicate:
- .1 Start and completion of all items of Work, their major components, and interim milestone completion dates.
  - .2 Activities for procurement, delivery, installation and completion of each major piece of equipment, materials and other supplies, including:
    - .1 Time for submittals, resubmittals and review.
    - .2 Time for fabrication and delivery of manufactured products for Work.
    - .3 Interdependence of procurement and construction activities.
  - .3 Include sufficient detail to assure adequate planning and
-

execution of Work. Activities should generally range in duration from 3 to 15 workdays each.

- .9 Provide level of detail for project activities such that sequence and interdependency of Contract tasks are demonstrated and allow coordination and control of project activities. Show continuous flow from left to right.
  - .10 Ensure activities with no float are calculated and clearly indicated on logical CPM construction network system as being, whenever possible, continuous series of activities throughout length of Project to form "Critical Path". Increased number of critical activities is seen as indication of increased risk.
  - .11 Insert Change Orders in appropriate and logical location of Detail Schedule. After analysis, clearly state and report to Departmental Representative for review effects created by insertion of new Change Order.
- 1.12 Review of the Construction Detail Schedule
- .1 Allow 10 work days for review by Departmental Representative of proposed construction Detail Schedule.
  - .2 Upon receipt of reviewed Detail Schedule make necessary revisions and resubmit to Departmental Representative for review within 5 work days.
  - .3 Promptly provide additional information to validate practicability of Detail Schedule as required by Departmental Representative.
  - .4 Submittal of Detail Schedule indicates that it meets Contract requirements and will be executed generally in sequence.
- 1.13 Compliance with Detail Schedule
- .1 Comply with reviewed Detail Schedule.
  - .2 Proceed with significant changes and deviations from scheduled sequence of activities that cause delay, only after receipt of approval by Departmental Representative.
  - .3 Identify activities that are behind schedule and causing delay. Provide measures to regain slippage.
    - .1 Corrective measures may include:
      - .1 Increase of personnel on site for effected activities or work package.
      - .2 Increase in materials and equipment.
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- .3 Overtime work and additional work shifts.
  - .4 Submit to Departmental Representative, justification, project schedule data, and supporting evidence for approval of extension to Contract completion date or interim milestone date when required. Include as part of supporting evidence:
    - .1 Written submission of proof of delay based on revised activity logic, duration and costs, showing time impact analysis illustrating influence of each change or delay relative to approved contract schedule.
    - .2 Prepared schedule indicating how change will be incorporated into the overall logic diagram. Demonstrate perceived impact based on date of occurrence of change and include status of construction at that time.
    - .3 Other supporting evidence requested by Departmental Representative.
    - .4 Do not assume approval of Contract extension prior to receipt of written approval from Departmental Representative.
  - .5 In event of Contract extension, display in Detail Schedule that scheduled float time available for work involved has been used in full without jeopardizing earned float.
    - .1 Departmental Representative will determine and advise Contractor number of allowable days for extension of Contract based on project schedule updates for period in question, and other factual information.
    - .2 Construction delays affecting project schedule will not constitute justification for extension of contract completion date.
  - 1.14 Process Monitoring and Reporting
    - .1 On ongoing basis, Detail Schedule on job site must show "Progress to Date". Arrange participation on and off site of subcontractors and suppliers, as, and when necessary, for purpose of network planning, scheduling, updating, and progress monitoring. Inspect Work with Departmental Representative at least once per Project to establish progress on each current activity shown on applicable networks.
    - .2 Update and reissue project Work Breakdown Structure and relevant coding structures as project develops and changes.
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- .3 Perform Detail Schedule update at least once per Project with status dated (Data Date). Update to reflect activities completed to date, activities in progress, logic and duration changes.
  - .4 Do not automatically update actual start and finish dates by using default mechanisms found in project management software.
  - .5 Submit to Departmental Representative copies of updated Detail Schedule.
  - .6 Requirements for progress monitoring and reporting are basis for progress payment request.
  - .7 Submit written report at least once per Project based on Detail Schedule, showing Work to date performed, comparing Work progress to planned, and presenting current forecasts. Report must summarize progress, defining problem areas and anticipated delays with respect to Work schedule, and critical paths. Explain alternatives for possible schedule recovery to mitigate any potential delay. Include in report:
    - .1 Description of progress made.
    - .2 Pending items and status of: permits, shop drawings, Change Orders, possible time extensions.
    - .3 Status of Contract completion date and milestones.
    - .4 Current and anticipated problem areas, potential delays and corrective measures.
    - .5 Review of progress and status of Critical Path activities.
- 1.15 Progress Photographs
- .1 Provide digital photographs with dates and descriptions on CD disk with progress reports. Relate dates and descriptions to photo file names in a separate text file on disk.
  - .2 Number of photographs: minimum of 100 photos per work at each abutment wall.
  - .3 Viewpoints: determined by Departmental Representative.
  - .4 Frequency: with progress statement, at completion of each construction stage, and as directed by Departmental Representative.

**END OF SECTION**

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**PART 1 - GENERAL**

- 1.1 Section Includes .1 This section includes but is not limited to the following:
- .1 Shop drawings.
  - .2 Product data.
  - .3 Samples.
  - .4 Waste Management Work Plan.
  - .5 Environmental Plan.
  - .6 Traffic Management Plan.
  - .7 Health and Safety Plan.
  - .8 Certificates and transcripts.
  - .9 Survey and Quality Testing Reports.
  - .10 Quality Control Plan.
- 1.2 Administrative .1 Submit to Departmental Representative submittals listed for review. Submit with reasonable promptness and in 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 Time and no claim for extension by reason of such default will be allowed.
- .2 Work affected by submittal shall not proceed until review is complete.
- .3 Present shop drawings, product data, samples, and mock-ups in SI Metric units.
- .4 Where items or information is not produced in SI Metric units converted values are acceptable.
- .5 Review submittals prior to submission to 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 requirements of Work and Contract Documents. Submittals not stamped, signed, dated, and identified as to specific project will be returned without being examined and shall be considered rejected.
- .6 Notify Departmental Representative, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.
- .7 Verify field measurements and affected adjacent Work are coordinated. It is recommended that Contractor become familiar with all site conditions likely to affect the cost of the Work before submission of their Tender documents.
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- .8 Contractor's responsibility for errors and omissions in submission is not relieved by Departmental Representative's review of submittals.
- .9 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Departmental Representative review.
- .10 Keep one reviewed copy of each submission on site.
- 1.3 Shop Drawings and Product Data
- .1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by 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. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been coordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.
- .3 Each shop drawing submitted that involves the provision of engineering design to bear signature and stamp of qualified professional engineer registered or licensed in province of British Columbia, Canada. These include but are not limited to:
- .1 Falsework and/or shoring. It is the Contractor's responsibility to ensure that the structure is adequately braced at all times during the performance of the Contract, if and when necessary.
- .4 Allow 10 days for Departmental Representative's review of each submission.
- .5 Adjustments made on shop drawings 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 shop drawings as Departmental Representative may require, consistent with Contract Documents. When resubmitting, notify Departmental Representative in writing of any revisions other than those requested.
- .7 Accompany submissions with transmittal letter, in duplicate, containing:
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- .1 Date.
  - .2 Project title and number.
  - .3 Contractor's name and address.
  - .4 Identification and quantity of each shop drawing, product data, sample, etc.
  - .5 Other pertinent data.
  
  - .8 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 Contractor's authorized representative certifying approval of submissions, verification of field measurements, and compliance with Contract Documents.
    - .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 Wiring diagrams.
      - .9 Single line and schematic diagrams.
      - .10 Relationship to adjacent work.
  
  - .9 After Departmental Representative's review, distribute copies.
  
  - .10 Submit electronic copies and originals on CD of shop drawings for each requirement requested in specification Sections and as Departmental Representative may reasonably request.
  
  - .11 Submit electronic copies of product data sheets or brochures for requirements requested in specification sections and as requested by Departmental Representative where shop drawings will not be prepared due to standardized manufacture of product.
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- .12 Delete information not applicable to project.
  - .13 Supplement standard information to provide details applicable to project.
  - .14 If upon review by Departmental Representative, no errors or omissions are discovered or if only minor corrections are made, copies will be returned and fabrication and installation of Work may proceed. If shop drawings are rejected, noted copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.
  - .15 The review of shop drawings by Departmental Representative is for sole purpose of ascertaining conformance with general concept. This review shall not mean that Departmental Representative approves detail design inherent in shop drawings, responsibility for which shall remain with Contractor submitting same, and such review shall not relieve 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 foregoing, 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 co-ordination of Work of all sub-trades.
- 1.4 Progress Photographs .1 Submit progress photographs in accordance with Section 013217 - Construction Progress and Reporting.
- 1.5 Survey and Quality Testing Reports .1 Submit certified survey and quality testing reports with progress reports.
- 1.6 Quality Control Plan .1 Prepare and submit to Departmental Representative for review and approval a Quality Control Plan including but not limited to:
- .1 Quality control processes and procedures.
  - .2 Quality control reporting and frequency.
  - .3 Testing agencies employed to provide materials testing.
  - .4 Frequency and types of testing.
  - .5 Verification of materials and installation procedures, including but not limited to structural steel, bolts, welds, paint.
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- .6 Coating inspections.
- .7 Dimension checks of pre-fabricated and site-fabricated elements.

**END OF SECTION**

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**PART 1 - GENERAL**

- 1.1 Section Includes .1 Informational and Warning Devices.  
.2 Protection and Control of Public Traffic.  
.3 Operational Requirements.
- 1.2 Measurement for Payment .1 Payments for Traffic Control to be included in Lump Sum for Traffic Control.
- 1.3 References .1 "Traffic Control Manual for Work on Roadways" (distributed by Province of British Columbia, Ministry of Transportation and Highways).
- 1.4 Protection of Public Traffic .1 Comply with current requirements of Acts, Regulations, and By-Laws for regulation of traffic or use of roadways upon or over which it is necessary to carry out Work or haul materials or equipment.  
.2 When working on traveled way:  
.1 Position equipment to present minimum of interference and hazard to traveling public.  
.2 Keep equipment units as close together as working conditions permit and preferably on same side of traveled way.  
.3 Do not leave equipment on traveled way overnight.  
.3 Do not close any lanes of road or highway without consulting Departmental Representative. Before re-routing traffic erect suitable signs and devices in accordance with instructions contained in "Traffic Control Manual for Work on Roadways".  
.4 Keep traveled way graded, free of pot-holes, and of sufficient width for required number of lanes of traffic.  
.5 Provide well-graded, signed, and maintained detours or temporary roads to facilitate passage of traffic around restricted construction areas.  
.6 Provide and maintain reasonable access to property in vicinity of Work and in other areas as indicated.
- 1.5 Informational and Warning .1 Provide, erect, and maintain signs, flashing warning lights, and
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## Devices

other devices required to indicate construction activities and other temporary and unusual conditions resulting from Project Work that requires road user response as specified in "Traffic Control Manual for Work on Roadways".

- .2 Supply signs, delineators, barricades, traffic cones, and miscellaneous warning devices, except those shown on plans as supplied by others, as specified in "Traffic Control Manual for Work on Roadways".
- .3 Place signs and other devices in locations recommended in "Traffic Control Manual for Work on Roadways".
- .4 Meet with Departmental Representative prior to commencement of Work to prepare list of signs and other devices required for project. If situation on site changes, revise list and review with Departmental Representative.
- .5 Continually maintain traffic control devices in use by:
  - .1 Checking signs daily for legibility, damage, suitability, and location. Clean, repair, or replace to ensure clarity and reflectance.
  - .2 Removing or covering signs which do not apply to conditions existing from day to day.
- .6 Provide Type D traffic cones as specified in "Traffic Control Manual for Work on Roadways". Provide minimum of 100 cones for use on site.
- .7 Ensure that necessary traffic cones and signs are in place prior to interference with traffic on existing roadways.

## 1.6 Control of Public Traffic

- .1 Provide traffic control in accordance with "Traffic Control Manual for Work on Roadways". Ensure that current copy of manual is available on site at all times.
  - .2 Flagpersons:
    - .1 Provide trained, competent flagpersons with proof of certification from recognized training program on traffic control procedures through construction zones.
    - .2 Provide flagpersons with proper equipment and clothing as specified in "Traffic Control Manual for Work on Roadways".
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- .3 Flagpersons are required in the following (but not limited to) situations:
    - .1 When public traffic is required to pass working vehicles or equipment that block all or part of traveled roadway.
    - .2 When it is necessary to institute one-way traffic system through construction area or other blockage where traffic volumes are heavy, approach speeds are high, and traffic signal system is not in use.
    - .3 When workmen or equipment are employed on traveled way over brow of hills, around sharp curves, or at other locations where oncoming traffic would not otherwise have adequate warning.
    - .4 When temporary protection is required while other traffic control devices are being erected or taken down.
    - .5 For emergency protection when other traffic control devices are not readily available.
    - .6 In situations where complete protection for workers, working equipment, and public traffic is not provided by other traffic control devices.
    - .7 At each end of restricted sections where pilot cars are required.
    - .8 When construction traffic is crossing a roadway.
  - .3 Maximum delays to public traffic due to Contractor's operators: 15 minutes at any one time during day-time operations.
  - .4 Work of this Contract near the centreline of the roadway should be completed outside of peak traffic timings. Coordinate with Departmental Representative to confirm when Work near the centreline of the roadway should be completed.
  - .5 Pilot Vehicles:
    - .1 Provide pilot vehicles as required.
    - .2 Equip pilot vehicles with orange flashing lights and signs clearly designating vehicles as pilot vehicles in following situations:
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- .1 Where equipment is working on section of roadway longer than 300m.
  - .2 Where traffic is required to travel on partially completed roadway or on detours longer than 300m.
  - .3 Where access through Work would be otherwise dangerous.
  - .6 Provide temporary lane control system where roadway carrying two-way traffic is to be restricted to one lane for 24 hours per day. Adjust, as necessary, and regularly maintain system during period of restriction. Signal system to meet requirements of "Traffic Control Manual for Work on Roadways".
  - .7 Changes to traffic control operation are to be reviewed by Departmental Representative.
  - .8 Safely control traffic through unique or varied construction situations.
- 1.7 Operational Requirements
- .1 Maintain existing conditions for traffic throughout period of Contract except when required for construction under Contract and when measures have been taken as specified herein and reviewed by Departmental Representative to protect and control public traffic.

**END OF SECTION**

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**PART 1 - GENERAL**

- 1.1 References
- .1 Government of Canada:
    - .1 Canada Labour Code - Part II
    - .2 Canada Occupational Health and Safety Regulations.
  - .2 National Building Code of Canada (NBC):
    - .1 Part 8, Safety Measures at Construction and Demolition Sites.
  - .3 Canadian Standards Association (CSA):
    - .1 CSA S269.1, Falsework for Construction Purposes.
    - .2 CSA S269.2, Access Scaffolding for Construction Purposes.
    - .3 CSA-S350, Code of Practice for Safety in Demolition of Structures.
  - .4 Fire Protection Engineering Services, HRSDC:
    - .1 FCC No. 301, Standard for Construction Operations.
    - .2 FCC No. 302, Standard for Welding and Cutting.
  - .5 American National Standards Institute (ANSI):
    - .1 ANSI A10.3, Operations – Safety Requirements for Powder-Actuated Fastening Systems.
  - .6 Province of British Columbia:
    - .1 Workers Compensation Act, Part 3, Occupational Health and Safety.
    - .2 Occupational Health and Safety Regulation.
- 1.2 Related Sections
- .1 Refer to the following current Specification sections as required:
    - .1 Project Management: Section 013119
    - .2 Construction Progress and Reporting: Section 013217
    - .3 Submittal Procedures: Section 013300
    - .4 Special Procedures for Traffic Control: Section 013500
    - .5 Temporary Utilities: Section 015100
    - .6 Construction Facilities: Section 015200
    - .7 Temporary Barriers and Enclosures: Section 015600
- 1.3 Workers Compensation Board Coverage
- .1 Comply fully with the Workers' Compensation Act, regulations, and orders made pursuant thereto, and any amendments up to the
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- 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 PWGSC may terminate the Contract without liability to PWGSC where the Contractor, in the opinion of PWGSC, refuses to comply with a requirement of the Workers' Compensation Act or the Occupational Health and Safety Regulations.
- .2 It is the Contractor's responsibility to ensure that all workers are qualified, competent, and certified to perform the work as required by the Workers' Compensation Act or the Occupational Health and Safety Regulations.
- 1.5 Submittals .1 Submit to Departmental Representative for review all submittals listed.
- .2 Work affected by submittals shall not proceed until review(s) by Departmental representative is/are complete.
- .3 Submit the following:
- .1 Health and Safety Plan within 7 days after date of Notice to Proceed and prior to commencement of Work.
- .2 Copies of reports or directions issued by federal and provincial Health and Safety inspectors.
- .3 Copies of incident and accident reports.
- .4 Complete set of Material Safety Data Sheets (MSDS) and all other documentation required by Workplace Hazardous Materials Information System (WHMIS) requirements.
- .5 On site Contingency and Emergency Response Plan: address standard operating procedures to be implemented during emergency situations.
- .4 The Departmental Representative will review the Contractor's site-specific project Health and Safety Plan and emergency procedures, and provide comments to the Contractor within 7 days after receipt of the plan. Revise the plan as appropriate and resubmit to Departmental Representative for review upon request.
- .5 Medical surveillance: where prescribed by legislation, regulation, or safety program, submit certification of medical surveillance for
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- site personnel prior to commencement of work, and submit additional certifications for any new site personnel to Departmental Representative.
- .6 Submission of the Health and Safety Plan, and any revised version, to the Departmental Representative is 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.
- 1.6 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 site-specific Health and Safety Plan.
- 1.7 Health and Safety Coordinator
- .1 Employ and assign to Work, competent and authorized representative as Health and Safety Coordinator. The Health and Safety Coordinator must:
    - .1 Have site-related working experience.
    - .2 Have working knowledge of occupational Health and Safety regulations.
    - .3 Be responsible for completing all Health and Safety training, and ensuring that personnel that do not successfully complete the required training are not permitted to enter the site to perform Work.
    - .4 Be responsible for implementing, daily enforcing, and monitoring the site-specific Health and Safety Plan.
    - .5 Be on site during execution of work.
-

- 1.8 General Conditions
- .1 Provide safety barricades and lights around Work site as required to provide a safe working environment for workers and protection for pedestrian and vehicular traffic.
  - .2 Secure Work site before leaving each day as deemed necessary to protect site against entry from non-authorized persons / entry by animals overnight.
  - .3 Ensure that non-authorized persons are not allowed to circulate in designated construction areas of the Work site.
    - .1 Provide appropriate means by use of barricades, fences, warning signs, traffic control personnel, and temporary lighting as required.
- 1.9 Project/Site Conditions
- .1 Potential work hazards onsite include: working over water, working in remote locations, highway traffic, bears, and extreme weather.
- 1.10 Regulatory Requirements
- .1 Comply with specified codes, acts, bylaws, standards, and regulations to ensure safe operations at site.
  - .2 In event of conflict between any provision 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.
- 1.11 Work Permits
- .1 Obtain permit(s) related to project before start of work.
- 1.12 Filing of Notice
- .1 The Contractor is to file Notice of Project with Provincial authorities prior to beginning of Work.
  - .2 Provide copies of all notices to the Department Representative.
- 1.13 Health and Safety Plan
- .1 Conduct a site-specific hazard assessment based on review of Contract documents, required work, and project site. Identify any known and potential health risks and safety hazards.
  - .2 Prepare and comply with a site-specific project Health and Safety Plan based on hazard assessment, including, but not limited to, the following:
    - .1 Primary requirements:
      - .1 Contractor's safety policy.
      - .2 Identification of applicable compliance obligations.
      - .3 Definition of responsibilities for project safety/organization chart for project.
-

- .4 General safety rules for project.
  - .5 Job-specific safe work procedures.
  - .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.
- 
- .2 Summary of health risks and safety hazards resulting from analysis of hazard assessment, with respect to site tasks and operations which must be performed as part of the work.
  - .3 List hazardous materials to be brought on site as required by work.
  - .4 Indicate engineering and administrative control measures to be implemented at the site for managing identified risks and hazards.
  - .5 Identify personal protective equipment to be used by workers.
  - .6 Identify personnel and alternates responsible for site Safety and Health.
  - .7 Identify personnel training requirements and training plan, including site orientation for new workers.
- 
- .3 Develop the plan in collaboration with all Subcontractors. Ensure that work/activities of Subcontractors are included in the hazard assessment and are reflected in the plan.
  - .4 Revise and update Health and Safety Plan as required, and re-submit to the Departmental Representative.
  - .5 Departmental Representative's review: the review of Health and Safety Plan by PWGSC shall not relieve the Contractor of responsibility for errors or omissions in final Health and Safety Plan or of responsibility for meeting all requirements of construction and Contract documents.
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- 1.14 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:
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- .1 Designated personnel from own company.
  - .2 Regulatory agencies applicable to work and as per legislated regulations.
  - .3 Local emergency resources.
  - .4 Departmental Representative.
- .2 Include the following provisions in the emergency procedures:
- .1 Notify workers and the first-aid attendant, of the nature and location of the emergency.
  - .2 Evacuate all workers safely.
  - .3 Check and confirm the safe evacuation of all workers.
  - .4 Notify the fire department or other emergency responders.
  - .5 Notify adjacent workplaces or residences which may be affected if the risk extends beyond the workplace.
  - .6 Notify Departmental Representative.
- .3 Provide written rescue/evacuation procedures as required for, but not limited to:
- .1 Work at high angles.
  - .2 Work in confined spaces or where there is a risk of entrapment.
  - .3 Work with hazardous substances.
  - .4 Underground work.
  - .5 Work on, over, under, and adjacent to water.
  - .6 Workplaces where there are persons who require physical assistance to be moved.
- .4 Design and mark emergency exit routes to provide quick and unimpeded exit.
- .5 Revise and update emergency procedures as required, and re-submit to the Departmental Representative.
- 1.15 Hazardous Products
- .1 Comply with requirements of WHMIS regarding use, handling, storage, and disposal of hazardous materials, and regarding labelling and provision of MSDSs acceptable to the Departmental Representative and in accordance with the Canada Labour Code.
  - .2 Where use of hazardous and toxic products cannot be avoided:
    - .1 Advise Departmental Representative beforehand of the product(s) intended for use. Submit applicable MSDS and WHMIS documents as per Section 013300 – Submittal Procedures.
- 1.16 Removal of Lead Containing .1 All paints containing TCLP lead concentrations above 5 ppm are
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Paints		classified as hazardous.
	.2	Carry out demolition activities involving lead-containing paints in accordance with applicable provincial regulations.
1.17 Overloading	.1	Ensure no part of work is subjected to a load which will endanger its safety or will cause permanent deformation.
1.18 Falsework	.1	Design and construct falsework in accordance with CSA-S269.1.
1.19 Scaffolding	.1	Design, construct, and maintain scaffolding in a rigid, secure, and safe manner, in accordance with CAN/CSA-S269.2 and the British Columbia Occupational Health and Safety Regulations.
1.20 Confined Spaces	.1	Carry out work in confined spaces in compliance with provincial regulations.
1.21 Blasting	.1	Blasting or other use of explosives is not permitted.
1.22 Powder Actuated Devices	.1	Use powder-actuated devices in accordance with ANSI A10.3 only after receipt of written permission from the Departmental Representative.
1.23 Fire Safety and Hot Work	.1	Obtain Departmental Representative's authorization before any welding, cutting, straightening, or any other hot work operations can be carried out onsite.
	.2	Hot work includes cutting/melting with use of torch, flame heating roofing kettles, or other open flame devices and grinding with equipment which produces sparks.
1.24 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.
1.25 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.
1.26 Posted Documents	.1	Post legible versions of the following documents on site:
	.1	Health and Safety Plan.
	.2	Sequence of work.
	.3	Emergency procedures.

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- .4 Site drawing showing project layout, locations of the first-aid station, evacuation route and marshalling station, and the emergency transportation provisions.
  - .5 Notice of Project.
  - .6 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.
  - .7 WHMIS documents.
  - .8 MSDSs.
  - .9 List of names of Joint Health and Safety Committee members, or Health and Safety Representative.
- 
- .2 Post all MSDSs onsite, in a common area, visible to all workers and in locations accessible to tenants when work of this Contract includes construction activities adjacent to occupied areas.
  - .3 Postings should be protected from the weather and visible from the street or the exterior of the principal construction site shelter provided for workers and equipment, or as approved by the Departmental Representative.
- 1.27 Meetings
- .1 Schedule and administer a Health and Safety meeting with Departmental Representative prior to commencement of Work.
  - .2 Attend the Health and Safety pre-construction meeting and all subsequent meetings called by the Departmental Representative.
  - .3 Contractor to hold regular Health and Safety meetings onsite as required by applicable legislation.
  - .4 All Health and Safety documentation / meeting minutes completed by the Contractor are to be forwarded to the Departmental Representative.
- 1.28 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 issues identified.
  - .3 The Departmental Representative may issue a "stop work order" if non-compliance with Health and Safety regulations is not corrected immediately or within posted time. The General Contractor/Subcontractors will be responsible for any costs arising from such a "stop work order".

**END OF SECTION**

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## PART

### 1.1 Section Includes

- .1 Related Sections
- .2 Definitions
- .3 Measurement Procedures
- .4 Regulatory Overview
- .5 Submittals
- .6 Environmental Effects Evaluation
- .7 Site Access and Parking
- .8 Protection Work Limits
- .9 Erosion Control
- .10 Pollution Control
- .11 Equipment Maintenance, Fueling and Operation
- .12 Operation of Equipment
- .13 Managing Invasive Plant Vegetation
- .14 Fire Prevention and Control
- .15 Wildlife
- .16 Relics and Antiquities
- .17 Waste Materials Storage and Removal
- .18 Wastewater Discharge Criteria
- .19 Camp Wastewater Discharge Criteria
- .20 Drainage
- .21 Site Clearing and Plant Protection
- .22 Blasting
- .23 Environmental Protection Supplies
- .24 Notification
- .25 Environmental Monitoring

### 1.2 Related Sections

- .1 Section 01 33 00 – Submittal Procedures
- .2 Section 02 61 33 – Hazardous Waste Material

### 1.3 Definitions

- .1 Environmental Pollution and Damage: presence of chemical, physical, biological elements or agents which adversely affect human health and welfare; unfavourably alter ecological balances of importance to human life; affect other species of importance to humankind; or degrade the environment aesthetically, culturally and/or historically.
- .2 Environmental Protection: prevention/control of pollution and habitat or environment disruption during construction. Control of environmental pollution and damage requires consideration of land, water, and air; biological and cultural resources; and includes management of visual aesthetics; noise; solid, chemical, gaseous, and liquid waste; radiant energy and radioactive material as well as other pollutants.
- .3 Environmental Protection Plan: is prepared by Contractor and describes in writing all the environmental protection and mitigation measures that will be applied throughout the life of the Project by the Contractor to avoid or minimize the potential effects on the environment associated with the Project.
- .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 undisturbed 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. See [www.agf.gov.bc.ca/cropprot/noxious.htm](http://www.agf.gov.bc.ca/cropprot/noxious.htm).

.9 Riparian area – for a stream, the 30 m strip on both sides of the stream, measured from the high water mark, (b) for a ravine less than 60 m wide, a strip on both sides of the stream measured from the high water mark to a point that is 30 m beyond the top of the ravine bank, and for a ravine 60 m wide or greater, a strip on both sides of the stream measured from the high water mark to a point that is 10 m beyond the top of the ravine bank (Riparian Areas Regulation).

.10 Species at risk: a species that has been defined as “at risk” [of extirpation] by either the federal or provincial government.

.11 Timing windows: periods when human activities are least likely to cause damage to species and ecosystems.

.12 Culturally Modified Trees (CMTs): a CMT is a tree that has been altered by aboriginal people as part of their traditional use of the forest. For more information please see *the Handbook for the Identification and Recording of Culturally Modified Trees* prepared by the Archaeology Branch B.C. Ministry of Business, Tourism and Culture

1.4 Measurement Procedures

.1 Preparation and implementation of the Environmental Protection Plan (EPP) in accordance with this Section 01 35 43 – Environmental Procedures will not be measured separately for payment and will be considered incidental to work

1.5 Regulatory Overview

.1 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.

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

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

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

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

.6 Pay specific attention to provincial BC MOE guidelines in Standards and Best Practices for Instream Works (2004).

.7 Pay specific attention to MOE Develop With Care NE Region 2014

.8 Where inwater work is conducted, pay specific attention to the B.C. Water

## Quality Guidelines.

1.6 Submittals

- .1 The Contractor is required to prepare an Environmental Protection Plan (EPP) in accordance with Section 01 33 00 – Submittal Procedures. The EPP should include all relevant environmental impacts/issues at the site as indicated by the completion of the EPP Checklist. Review of the PWGSC Environmental Effects Evaluation (EEE) will assist in completing this document. Prior to commencing construction activities or delivery of materials to site, submit the EPP (See Appendices for Checklist) for review and approval by the Departmental Representative. The EPP will require the Contractor to carefully think through the entire project, including identifying what activities as works will be occurring, both generally and at specific sites, and by what methods. The Environmental Protection Plan shall be completed by a P.Biol or RPBio, or other qualified professional, and shall, at a minimum include the following:
  - .1 The specifics of a detailed monitoring program. This includes details and rational concerning sampling locations, timing, duration, and methods, and identification of the person(s) who will be carrying out the monitoring program.
  - .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 MOE Approval or Notification for instream work or under MOE guidelines, and all other applicable regulations including the requirements of these specifications.
  - .4 Drawings should show locations of proposed temporary excavations or embankments for haul roads, stream crossings, material storage areas, structures, sanitary facilities, and stockpiles of any excess or spoil materials including methods to control runoff and to contain materials on-site.
  - .5 Work area plan showing proposed activity in each portion of area and identifying areas of limited use or non-use. Plan to include measures for marking limits of use areas including methods for protection of features to be preserved within authorized work areas.
  - .6 Spill Control Plan: including procedures, instructions, and reports to be used in 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 MOE Approval or Notifications for Instream Work, NWPA Approval for Instream Work 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.
- .2 All submittals in accordance with Section 01 33 00 - Submittal Procedures.
- 1.7 Environmental Effects Evaluation
- .1 Execution of the work is subject to the provisions within the Environmental Effects Evaluation (EEE) completed by a PWGSC Environmental Services Representative for the project. See appendices for a copy of the EEE. NOTE: not all projects are subject to an EEE.
- .2 Pursuant to the expectations of the EEE, EPPs are the next step to achieve the desired results of minimal adverse environmental effect, as the project is constructed.
- .3 Failure to comply with or observe environmental protection measures as identified in these specifications may result in the work being suspended by the Departmental Representative pending rectification of the problems.
- 1.8 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 metres distance from any watercourse.
- .2 The Contractor shall ensure that the environment beyond the work limits is not negatively impacted or damaged by workers' vehicles or construction machinery and shall instruct workers so that the "footprint" of the project is kept within defined boundaries.
- 1.9 Protection of Work Limits
- .1 The Contractor shall include in the Environmental Protection Plan (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.
- 1.10 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 All applicable on-site sediment control measures shall be constructed and functional prior to initiating activities associated with the construction activities. The Contractor shall prepare an Erosion Control Plan, to be part of the EPP, to

the satisfaction of the Departmental Representative.

- .3 The regular monitoring and maintenance of all erosion control measures shall be the responsibility of the Contractor. If the design of the control measures is not functioning effectively they are to be replaced. 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. Contractors should be referencing the provincial MOE Standards and Best Practices for Instream Works (2004).

#### 1.11 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 re-fuelling, lubrication and repair locations that will be capable of dealing with 110% of the largest potential spill and shall be maintained in good working order on the construction site. The Contractor and site staff shall be informed of the location of the spill response kit(s) and be trained in its use.
- .7 Timely and effective actions shall be taken to stop, contain and clean-up all spills as long as the site is safe to enter. The Departmental Representative shall be notified immediately of any spill as well as the provincial authorities. Basic instructions and phone numbers shall be part of the Contractor's EPP.
- .8 In the event of a major spill, the Contractor shall prioritize the clean up and

all other work shall be stopped, where appropriate, and personnel devoted to spill containment and clean up.

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

1.12 Equipment  
Maintenance,  
Fuelling 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 fuelling sites will be identified by the Contractor to the satisfaction of the Departmental Representative. Except for chain saws, any fuelling closer than 100 metres to any surface water (streams, wetlands, water bodies or watercourses) shall require discussion and prior agreement with the Departmental Representative.
- .3 Diesel and gasoline delivery vehicles, including bulk tankers shall be parked more than 30 metres from any surface water. Gravity fed fuel systems are not allowed. Manual or electric pump delivery systems shall be used. Fuelling personnel shall maintain a presence at with immediate attention to the fuelling operations.
- .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 1.11.4 of Pollution Control.
- .5 Equipment use on the project shall be fuelled with E10, and low sulphur diesel fuels where available, and shall conform to local emission requirements. The Contractor is to ensure that unnecessary idling of the vehicles is avoided.
- .6 Oil changes, lubricant changes, greasing and machinery repairs shall be performed at locations satisfactory to the Departmental Representative. Waste lubrication product (e.g. oil filters, used containers, used oil, etc.) shall be secured in spill-proof containers and properly recycled or disposed of at an approved facility. No waste petroleum, lubricant products or related materials are to be discarded, buried or disposed of in borrow pits, turnouts, picnic areas, viewpoints, etc. or anywhere within the work area.
- .7 The Contractor shall ensure that all equipment is inspected daily for fluid/fuel leaks and maintained in good working condition.
- .8 Fuel containers and lubricant products shall be stored only in secure locations to the satisfaction of the Departmental Representative. Fuel tanks or other potential deleterious substance containers shall be secured to ensure they are tamperproof and cannot be drained by vandals when left overnight. Alternatively, the Contractor may hire a security person employed to prevent vandalism.

1.13 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, water

bodies or watercourse, nor damage aquatic and riparian habitat or trees and plant communities. Where construction activities require working close to surface water, the Contractor is required to describe measures to be employed to ensure fugitive materials (e.g. rocks, soil, branches) and especially deleterious substances (e.g. chemicals) does not enter any surface water areas.

- .2 The Contractor shall instruct workers to prevent pushing, placement, raveling, storage or stockpiling of any materials (e.g. slash, rock, fill or top soils) in the trees bordering the right-of-way or into surface water.
- .3 When, in the opinion of PWGSC, negligence on the part of the Contractor results in damage or destruction of vegetation, or other environmental or aesthetic features beyond the designated work area, the Contractor shall be responsible, at his or her expense, for complete restoration including the replacement of trees, shrubs, topsoil, grass, etc. to the satisfaction of the Departmental Representative.
- .4 Restrict vehicle movements to the work limits.
- .5 Workers vehicles are to remain within the construction footprint.

1.14 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.

1.15 Fire Prevention and  
Control

- .1 A fire extinguisher shall be carried and available for use on each machine and at locations within the quarry in the event of fire. Basic firefighting equipment recommended (e.g. a water truck; minimum 2276 litres with 150m of fire hose and a pump capable of producing 172.3 kPa water pressure at the nozzle, three shovels, two Pulaski's, and two five gallon backpack pumps) shall be maintained at the construction site at a location known and easily accessible to all Contractors' staff. Contractor's staff shall receive basic training in early response to wildfire events during the "environmental briefing".
- .2 Construction equipment shall be operated in a manner and with all original manufacturers' safety devices to prevent ignition of flammable materials in the area.
- .3 Care shall be taken while smoking on the construction site to ensure that the accidental ignition of any flammable material is prevented.
- .4 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 start-up meeting.

- .5 Fires or burning of waste materials is not permitted.
- .6 Where fires or burning is permitted, prevent staining or smoke damage to structures, materials or vegetation which is to be preserved. Restore, clean and return to new condition stained or damaged Work.
- .7 Provide supervision, attendance and fire protection measures as directed.
- .8 Obtain all required permits from the province.

#### 1.16 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, buffalo or moose 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.

#### 1.17 Relics and Antiquities

- .1 Artifacts, relics, antiquities, and items of historical interest such as cornerstones, commemorative plaques, inscribed tablets and any objects found on the work site that may be considered artifacts shall be reported to the Departmental Representative immediately. The Contractor and workers shall wait for instruction before proceeding with their work.
- .2 All historical or archaeological objects found on 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.
- .3 Human remains must be reported immediately to the local RCMP.

#### 1.19 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.
- .2 All wastes originating from construction, trade, hazardous and domestic sources, shall not be mixed, but will be kept separate.
- .3 Construction, trade, hazardous waste and domestic waste materials shall not be burned, buried, or discarded at the construction site. These wastes shall be contained and removed in a timely and approved manner by the Contractor and workers, and disposed of at an appropriate waste landfill site located outside the work area.
- .4 A concerted effort shall be made by the Contractor and workers to reduce, reuse and recycle materials where possible.
- .5 Sanitary facilities, such as portable container toilets, shall be provided by the Contractor and maintained in a clean condition.

#### 1.20 Wastewater Discharge Criteria

- .1 Wash water, melt water collection, rinse water resulting from the cleaning of fuel tanks and pipelines, contaminated groundwater, and/or any other liquid effluent stream will be released onto the ground at a location that is a minimum

of 30 metres from natural drainage courses and 100 metres from fish bearing waters, and will conform to the discharge requirements set out in the provincial Water Act Permit.

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

1.21 Camp Wastewater  
Discharge Criteria

- .1 Camp wastewater will be released onto the ground at a location that is a minimum of 30 metres from natural drainage courses and 100 metres from fish bearing waters and conform to the discharge requirements set out in the provincial Water Act Permit.
- .2 If unable to meet the discharge criteria, provide additional storage and/or treatment necessary to meet criteria prior to discharge.
- .3 Treat all camp wastewater to conform to the discharge requirements set out in the Water Act Permit.
- .4 If unable to meet the discharge criteria, provide additional storage and/or treatment necessary to meet criteria prior to discharge.
- .5 No direct discharge is allowed to wetland or surface waters.
- .6 Contractor must obtain approval from the Water Act Officer prior to discharging treated wastewater.

1.22 Drainage

- .1 Provide temporary drainage and pumping as necessary to keep excavations and site free from water. Management of drainage should 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 Where required, water quality should be tested for potential contaminants (turbidity) and the results compared to the B.C. Water quality Guidelines for aquatic life.
- .5 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.
- .6 Submit an Erosion, Sediment and Drainage Control Plan to Departmental Representative for review and approval prior to commencing Work in fisheries sensitive areas or in areas that may affect fisheries sensitive areas and specifically address the protection of water bodies, water courses, and the following:
  - .1 Details of grading Work to prevent surface drainage into or out of Work areas.
  - .2 Details of erosion control works and materials to be used, including the deployment of silt fencing, floating silt curtains and containment booms during construction and excavation activities.
  - .3 Work Schedule including the sequence and duration of all related Work activities.

- .4 The treatment of site runoff to prevent siltation of watercourses.
  - .5 Dewatering procedures for excavated materials including silt removal procedures prior to discharge.
  - .6 Stabilizing procedures during excavation.
  - .7 Maintenance of filters and sedimentation traps.
  - .7 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.
  - .8 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.
- 1.23 Site Clearing and Plant Protection
- .1 Protect trees and plants on site and adjacent properties where indicated.
  - .2 Wrap in burlap, trees and shrubs adjacent to construction Work, storage areas and trucking lanes, and encase with protective wood framework from grade level to height of 2 m.
  - .3 Protect roots of designated trees to dripline during excavation and site grading to prevent disturbance or damage. Avoid unnecessary traffic, dumping and storage of materials over root zones.
  - .4 Minimize stripping of topsoil and vegetation.
  - .5 Restrict tree removal to areas indicated or designated by Departmental Representative.
  - .6 The Contractor should be aware that B.C. has culturally modified trees (CMTs) that are protected under the Heritage Act. If a CMT is encountered, stop work immediately and contact the Departmental Representative.
- 1.24 Blasting
- .1 The Departmental Representative will identify a magazine location for explosives should a factory site or 'ready to use' explosive site be required.
  - .2 The sweep of the blast area shall include looking for wildlife that may be in the area. If any are found, they shall be hazed out of the area by the Environmental Monitoring personnel.
  - .3 The Contractor shall ensure that all work activities meet or exceed the standards outlined in DFO's "Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters"; Canadian Technical Report of Fisheries and Aquatic Sciences 2107, 1998.
  - .4 The Contractor shall, whenever explosives are used, use the Provincial and Workers' Compensation Laws and Regulations, and all respective Agencies Having Jurisdiction over them, such as DFO.
  - .5 Steps shall be taken to minimize fly-rock and dust. Vegetation outside of the designated area shall not be damaged or destroyed.
  - .6 In order to stabilize slopes of the cut, these shall be scaled of all loose material. Ditches shall be formed and cleaned upon the completion of the blasting, and the natural drainage shall be restored as specified by the Contract or as directed by the Departmental Representative.
  - .7 The Contractor shall describe the proposed type and quantities of explosives to be used on the project, to the satisfaction of the Departmental Representative. Some blasting products – such as those very high in nitrogen, may have some

limitations imposed for environmental protection purposes.

1.25 Environmental  
Protection Supplies

- .1 Comply with federal and provincial fisheries and environmental protection legislation, including preventing the loss or destruction of fish habitat, and minimizing the impact of sedimentation, siltation or otherwise causing a degradation in water quality.
- .2 Provide a minimum of 30 m or more and as required of polypropylene silt fence (typical height of 0.9 m) and the necessary stakes for installation. This will be used as necessary to prevent sediment transport into water bodies.
- .3 Provide a minimum of 50 lineal metres or more and as required of 200 mm diameter hydrophobic, sorbent booms. This will be used as necessary to prevent the migration of hydrocarbons.
- .4 Supply, transport, install and maintain erosion, sediment and drainage controls necessary to complete the Work in accordance with the requirements of Departmental Representative.
- .5 At the completion of construction, dispose of used silt fence off-site as non-Hazardous Waste. Dispose of used absorbent boom in accordance with Section 02 61 33 - Hazardous Waste Material.
- .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.

1.26 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.

1.27 Environmental  
Monitoring

- .1 At a minimum the environmental monitoring shall be completed by P.Biol, RPBio, or Qualified Environmental Professional (QEP). If a QEP completes the monitoring, the QEP must work under the direction of the P.Biol or RPBio who completes the Environmental Protection Plan.
- .2 The monitoring program must be anticipatory and responsive to construction practices or environmental changes, reflecting the site specific conditions, level of sensitivity of the receiving environment, potential adverse effects, and level of environmental risk. Submitted documents regarding the proposed monitoring program should clearly identify how monitoring will adhere to this approach.
- .3 The monitoring program shall satisfy all regulatory requirements and terms of these specifications. The onus is on the Contractor to monitor and ensure compliance, to identify arising problems, and to subsequently take responsibility and all necessary measures in response.

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# PWGSC

Culvert Replacement  
km 475, Alaska Highway, British Columbia  
Project No. R.017173.058

# 01 35 43

ENVIRONMENTAL  
PROTECTION  
Page 12 of 12

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## PART 2 PRODUCTS

2.1 Not Used .1 Not Used.

## PART 3 EXECUTION

3.1 Not Used .1 Not Used.

END OF SECTION

**PART 1 - GENERAL**

- |                             |    |   |
|-----------------------------|----|---|
| 1.1 Section Includes        | .1 | Methods and procedures for dismantling / deconstructing portions of the culverts.   |
|                             | .2 | Removing concrete from existing backwall, deck, curb, and curtain wall sections without damaging existing rebar.  |
| 1.2 Measurement for Payment | .1 | All materials, labour, equipment, services, etc. required under this Section (including waste removal) to be included in Lump Sums of other items in this Contract.   |
| 1.3 References              | .1 | Canadian Standards Association. CSA S350-M1980(R1998), Code of Practice for Safety in Demolition of Structures.   |
|                             | .2 | Comply with National Building code of Canada, Part 8, "Safety Measures at Construction and Demolition Sites", and Provincial requirements.  |
| 1.4 Submittals              | .1 | Submit for review, a minimum of 2 weeks before commencing Work, drawings, diagrams, or details showing sequence of Work and supporting of structures in accordance with Section 013300, Submittal Procedures. Include a list of equipment to be used and a schedule for the Work. |
| 1.5 Protection              | .1 | Keep noise, dust, and inconvenience to traveling public to a minimum.   |
|                             | .2 | Protect highway systems, services, and equipment.   |
|                             | .3 | Take all appropriate measures to ensure that, during Work, no materials go adrift. Materials that go adrift must be recovered immediately.  |
|                             | .4 | Do not drop any culvert fragments into the creek.   |
|                             | .5 | Provide temporary dust screens, covers, railings, supports, and other protection as required.   |
|                             | .6 | Perform all waste removal work in accordance with Section 017419, Waste Management and Disposal.  |
|                             | .7 | Ensure Work is done in accordance with Section 013543, Environmental Procedures. Ensure Work does not adversely affect adjacent watercourses, groundwater and wildlife, or contribute to excess air noise pollution.  |
-

- .8 It is the Contractor's responsibility to ensure that the structure is adequately braced at all times during the performance of the Contract.
    - .1 It is beneficial to have personnel onsite with deconstruction experience who can demonstrate techniques to workers unsure of how to disassemble certain assemblies. It is also beneficial to specify that qualified trades disassemble certain portions of the structure.
    - .2 Qualifications: provide adequate workforce training through meetings and demonstrations. Have someone onsite with deconstruction experience throughout project for consultation and supervision purposes.
  
  - 1.6 Existing Conditions
    - .1 It is recommended that the contractor shall visit the bridge site prior to submitting tender to satisfy himself/herself of the nature of the materials and the extent of the Dismantling Work required.
  
  - PART 2 - EXECUTION**
  
  - 2.1 Salvage and Disposal
    - .1 Ensure Work is done in accordance with Section 017419, Waste Management and Disposal.
    - .2 Materials from existing bridge structure to be removed shall be the property of the Contractor to reuse or dispose of at his discretion.
    - .3 Dispose of removed materials off-site in suitably licensed facilities strictly in accordance with all current Federal, Provincial, and local legislation and requirements.
    - .4 Store materials salvaged for reuse and recycling or designated for alternate disposal in locations on site as directed by Departmental Representative.
  
  - 2.2 Removal of Culvert Members
    - .1 Demolish into manageable size pieces. Do not drop any sections into the water. Do not drag any sections along the bridge's deck.
    - .2 Removing concrete from existing backwall, deck, curb, and curtain wall sections must be done in such a manner to avoid damage to the existing internal rebar. If damage to the existing rebar occurs during such operations immediately contact the Departmental Representative for instruction.
    - .2 Separate, stockpile, and dispose of all demolished materials in accordance with Section 017419, Waste Management and Disposal.
-

- .3 At end of each day's work, leave work in safe and stable condition.
- .4 Minimize dusting. Keep materials wetted as directed by Departmental Representative.
- .5 Remove contaminated or dangerous materials, as defined by authorities having jurisdiction, relating to environmental protection, from site and dispose of in a safe manner to minimize danger at site or during disposal.
  - .1 Remove and handle any toxic wastes, if present, in accordance with Section 025013, Management of Toxic Waste.
- .6 Organize site and workers in manner which promotes efficient flow of materials through disassembly, processing, stockpiling, and removal.

**END OF SECTION**

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**PART 1 - GENERAL**

- 1.1 Quality Control Plan .1 Prepare and submit to Departmental Representative for review and approval a Quality Control Plan in accordance with Section 013300 – Submittal Procedures, prior to project startup.
- 1.2 Measurement for Payment .1 No separate payment will be made for quality assurance and testing. Include quality assurance and testing in all work as part of total contract amount.
- 1.3 Inspection .1 Allow Departmental Representative access to Work. If part of Work is in preparation at locations other than Place of Work, allow access to such Work whenever it is in progress.
- .2 Give timely notice requesting inspection if Work is designated for special tests, inspections or approvals by Departmental Representative instructions, or law of Place of Work.
- .3 If Contractor covers or permits to be covered Work that has been designated for special tests, inspections or approvals before such is made, uncover such Work, have inspections or tests satisfactorily completed and make good such Work.
- .4 Departmental Representative may order any part of Work to be examined if Work is suspected to be not in accordance with Contract Documents. If, upon examination such work is found not in accordance with Contract Documents, correct such Work and pay cost of examination and correction. If such Work is found in accordance with Contract Documents, Departmental Representative shall pay cost of examination and replacement.
- 1.4 Independent Inspection Agencies .1 Appoint and pay for services of third-party Independent Quality Assurance testing laboratory and field staff including as follows:
- .1 Where specified in the text of these specifications, including but not limited to:
- .1 Onsite and laboratory testing.
- .2 Inspection and testing required by laws, ordinances, rules, regulations, or orders of public authorities.
- .3 Inspection and testing performed exclusively for Contractor's convenience.
- .4 Mill tests and certificates of compliance.
-

- .5 Tests specified to be carried out by Contractor under the supervision of Departmental Representative.
  - .6 Additional tests specified in the following paragraph.
  - .2 Where tests or inspections by designated testing laboratory reveal Work not in accordance with contract requirements, pay costs for additional tests or inspections as required by Departmental Representative to verify acceptability of corrected work.
  - .3 Provide equipment required for executing inspection and testing by appointed agencies.
  - .4 Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.
  - .5 If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised by Departmental Representative at no cost to Departmental Representative. Pay costs for retesting and reinspection.
  - 1.5 Access to Work
    - .1 Allow inspection/testing agencies access to Work and off-site manufacturing and fabrication plants.
    - .2 Cooperate to provide reasonable facilities for such access.
  - 1.6 Procedures
    - .1 Notify appropriate agency and Departmental Representative in advance of requirement for tests, in order that attendance arrangements can be made.
    - .2 Submit samples and/or materials required for testing, as specifically requested in specifications. Submit with reasonable promptness and in an orderly sequence so as not to cause delay in Work.
    - .3 Provide labour and facilities to obtain and handle samples and materials onsite. Provide sufficient space to store test samples.
  - 1.7 Rejected Work
    - .1 Remove defective Work, whether result of poor workmanship, use of defective products, or damage and whether incorporated in Work or not, which has been rejected by Departmental Representative as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.
    - .2 Make good other Contractor's work damaged by such removals or replacements promptly.
-

- .3 If in opinion of Departmental Representative it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, Departmental Representative may deduct from Contract Price difference in value between Work performed and that called for by Contract Documents, amount of which shall be determined by Departmental Representative.
- 1.8 Reports

  - .1 Submit 4 copies of inspection and test reports to Departmental Representative with all progress reports or, generally, as reports become available.
  - .2 Provide copies to Subcontractor of Work being inspected or tested and to manufacturer or fabricator of material being inspected or tested.
- 1.9 Mill Tests

  - .1 Submit mill test certificates as required of specification sections.

**END OF SECTION**

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PART 1 - GENERAL

- 1.1 Section Includes .1 Temporary utilities.
  - 1.2 Installation and Removal .1 Provide temporary utilities in order to execute Work expeditiously.
    - .2 Remove from site all such work after use.
  - 1.3 Water Supply .1 Provide continuous temporary supply of potable water for construction use, if applicable.
    - .2 Remove or decommission temporary water supply facilities upon completion of project.
  - 1.4 Sanitary Facilities .1 Provide sanitary facilities for construction use.
    - .2 Remove or decommission temporary sanitary facilities upon completion of project.
  - 1.5 Temporary Heating and Ventilation of Work .1 Provide temporary heating required during construction period, including attendance, maintenance, and fuel.
    - .2 Construction heaters used inside buildings must be vented to outside or be flameless type. Solid fuel salamanders are not permitted.
    - .3 Provide temporary heat and ventilation in enclosed areas as required to:
      - .1 Facilitate progress of Work.
      - .2 Protect Work and products against dampness and cold.
      - .3 Prevent moisture condensation on surfaces.
      - .4 Provide ambient temperatures and humidity levels for storage and installation of materials.
      - .5 Provide adequate ventilation to meet health regulations for safe working environments.
    - .4 Ventilating:
      - .1 Prevent accumulations of dust, fumes, mists, vapours, or gases in areas occupied during construction.
      - .2 Provide local exhaust ventilation to prevent harmful accumulation of hazardous substances into atmosphere of occupied area.
      - .3 Dispose of exhaust materials in manner that will not result in harmful exposure to persons or the environment.
      - .4 Ventilate storage spaces containing hazardous or volatile materials.
-

- .5 Ventilate temporary sanitary facilities.
- .6 Continue operation of ventilation and exhaust system for time after cessation of Work process to assure removal of harmful contaminants.
  
- .5 Be responsible for damage to Work due to failure in providing adequate heat, ventilation, and protection during construction.
  
- 1.6 Temporary Power and Light
  - .1 Provide and pay for temporary power during construction for temporary lighting and operating of power tools and for construction use.
  - .2 Arrange for connection with appropriate utility company. Pay all costs for installation maintenance and removal.
  - .3 Provide and maintain temporary lighting throughout project, if applicable.
  
- 1.7 Temporary Communication Facilities
  - .1 Provide and pay for temporary telephone necessary for own use.
  
- 1.8 Fire Protection
  - .1 Provide and maintain temporary fire protection equipment during performance of Work required by governing codes, regulations, and bylaws.
  - .2 Burning rubbish and construction waste materials is not permitted onsite.

**END OF SECTION**

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**PART 1 - GENERAL**

- |                                     |    |   |
|-------------------------------------|----|---|
| 1.1 Section Includes                | .1 | Construction aids.  |
|                                     | .2 | Office and sheds.   |
|                                     | .3 | Parking.  |
|                                     | .4 | Project Identification.   |
| 1.2 Installation and Removal        | .1 | Provide construction facilities in order to execute work expeditiously.   |
|                                     | .2 | Remove from all sites all such facilities after use.  |
| 1.3 Scaffolding                     | .1 | Provide and maintain scaffolding, ramps, ladders, swing staging, platforms, and temporary stairs as necessary to carry out Work.  |
| 1.4 Hoisting                        | .1 | Provide, operate, and maintain hoists and cranes required for moving of workers, materials, and equipment. Make financial arrangements with Subcontractors for use thereof. |
|                                     | .2 | Hoists and cranes shall be operated by qualified operators.   |
|                                     | .3 | Hoists and cranes shall be used only outside of wetted perimeters.  |
| 1.5 Site Storage/Loading            | .1 | Confine Work and operations of employees to only that which is required by the Contract Documents.  |
|                                     | .2 | Do not unreasonably encumber premises with products.  |
|                                     | .3 | Do not load or permit to load any part of Work with a weight or force that will endanger the Work.  |
|                                     | .4 | Locations of heavy machinery with respect to loadings on the existing structures are the responsibility of the Contractor.  |
| 1.6 Construction Access and Parking | .1 | Parking will be permitted onsite provided it does not disrupt performance of Work.  |
|                                     | .2 | Provide and maintain adequate access to project site.   |
|                                     | .3 | Build and maintain temporary roads where indicated or directed by Departmental Representative and provide snow removal during period of Work.                               |
|                                     | .4 | If authorized to use existing roads for access to project sites,  |
-

- maintain such roads for duration of Contract and make good damage resulting from Contractors' use of roads.
- 1.7 Sanitary Facilities
- .1 Provide sanitary facilities for work force in accordance with governing regulations and ordinances.
  - .2 Post notices and take such precautions as required by local health authorities. Keep area and premises in sanitary condition.
- 1.8 Construction Signage
- .1 Locate project identification signs if and when directed by Departmental Representative.
  - .2 Direct requests for approval to erect a Consultant/Contractor signboard to Departmental Representative. Wording shall be in both official languages.
  - .3 Signs and notices for health, safety, traffic control, instruction, etc. shall be in both official languages. See Sections 013533, Health and Safety, and 013500, Special Procedures for Traffic Control, of these Specifications for more information.
  - .4 Maintain approved signs and notices in good condition for duration of project, and dispose of off-site on completion of project or earlier if directed by Departmental Representative.

**END OF SECTION**

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**PART 1 - GENERAL**

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|---|----|---|
| 1.1 Section Includes                            | .1 | Barriers.   |
|   | .2 | Environmental Controls.   |
|   | .3 | Traffic Controls.   |
| 1.2 Installation and Removal                    | .1 | Provide temporary controls in order to execute Work expeditiously.  |
|   | .2 | Remove from all sites all such work after use.  |
| 1.3 Protection for Trees                        | .1 | Provide barriers around trees and plants designated to remain.<br>Protect from damage by equipment and construction procedures.                                       |
|   | .2 | Replace any trees designated for saving in kind that are damaged during construction.   |
| 1.4 Guard Rails and Barricades                  | .1 | Provide as required by governing authorities.   |
| 1.5 Dust Tight Screens                          | .1 | Provide dust tight screens partitions to localize dust generating activities, and for protection of workers, finished areas of Work, and public.                      |
|   | .2 | Maintain and relocate protection until such work is complete.   |
| 1.6 Access to Site                              | .1 | Provide and maintain access roads as may be required for access to Work.  |
| 1.7 Public Traffic Flow                         | .1 | Provide and maintain competent signal flag operators, traffic signals, barricades and flares, lights, or lanterns as required to perform Work and protect the public. |
| 1.8 Fire Routes                                 | .1 | Maintain access to property for use by emergency response vehicles.   |
| 1.9 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.   |
| 1.10 Protection of Structure Finishes           | .1 | Provide protection for existing structure and finished and partially finished structure finishes during performance of Work.  |
|   | .2 | Provide necessary screens, covers, and hoardings.   |
|   | .3 | Confirm with Departmental Representative locations and installation schedule 3 days prior to installation.  |
-

- .4 Be responsible for damage incurred due to lack of or improper protection.

**END OF SECTION**

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**PART 1 - GENERAL**

- |                                   |    |  |
|-----------------------------------|----|--|
| 1.1 Preliminary Requirements      | .1 | Camp and service area locations and layout plans to be submitted to Departmental Representative for review.    |
|                                   | .2 | Temporary construction camps to be established and operated in accordance with local regulations.              |
|                                   | .3 | Obtain necessary licenses and approvals required by Authorities having Jurisdiction.                           |
| 1.2 Environment                   | .1 | Comply with all environmental regulations.   |
| 1.3 Camp Installation and Removal | .1 | Mobilize equipment, camps, personnel, and materials.   |
|                                   | .2 | Establish approved temporary buildings, shops, offices and facilities required.                                |
|                                   | .3 | Remove construction camps, clean up, and leave sites in condition satisfactory to Departmental Representative. |
| 1.4 Maintenance                   | .1 | Maintain construction camps in tidy and sanitary condition.  |

**END OF SECTION**

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PART 1 - GENERAL1.1 Products/Material and  
Equipment

- .1 Use new products/material and equipment unless otherwise specified.
  - .2 Use products of one manufacturer for material and equipment of the same type or classification unless otherwise specified.
  - .3 Unless otherwise specified, comply with manufacturer's latest printed instructions for materials and installation methods.
  - .4 Notify Departmental Representative in writing of any conflict between these specifications and manufacturer's instructions. Departmental Representative will designate which document is to be followed.
  - .5 Metal fastenings:
    - .1 Prevent electrolytic action between dissimilar metals.
    - .2 Use non-corrosive fasteners, anchors, and spacers for securing exterior work.
  - .6 Fastenings which cause spalling or cracking are not acceptable.
  - .7 Bolts may not project more than 1 diameter beyond nuts.
  - .8 Deliver, store and maintain packaged material and equipment with manufacturer's seals and labels intact. Do not remove from packaging or bundling until required in Work.
  - .9 Prevent damage, adulteration, and soiling of products during delivery, handling, and storage. Immediately remove rejected products from site.
  - .10 Store products in accordance with suppliers' instructions.
  - .11 Store products subject to damage from weather in weatherproof enclosures.
  - .12 Store and mix paints in heated and ventilated room. Remove oily rags and other combustible debris from site daily. Take every precaution necessary to prevent spontaneous combustion.
  - .13 Touch-up damaged finished surfaces to Departmental Representative's satisfaction.
  - .14 Remove and replace damaged products at own expense and to
-

satisfaction of Departmental Representative.

- 1.2 Quality of Products
- .1 Products, materials, equipment, and articles (referred to as products throughout Specifications) incorporated in Work shall be new, not damaged or defective, and of best quality (compatible with specifications) for purpose intended. If requested, furnish evidence as to type, source, and quality of Products provided.
  - .2 Defective products will be rejected regardless of previous inspections.
    - .1 Inspection does not relieve responsibility, but is precaution against oversight or error.
    - .2 Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection.
  - .3 Retain purchase orders, invoices, and other documents to prove that all products utilized in this Contract meet the requirements of the specifications. Produce documents when requested by the Departmental Representative.
  - .4 Should any dispute arise as to quality or fitness of products, decision rests strictly with Departmental Representative based upon requirements of Contract Documents.
  - .5 Unless otherwise indicated in the Specifications, maintain uniformity of manufacture for any particular or like item throughout the site.
- 1.3 Availability of Products
- .1 Immediately upon signing the Contract, review product delivery requirements and anticipate foreseeable supply delays for any items. If delays in supply of products are foreseeable, notify Departmental Representative of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of Work.
  - .2 If delays in supply of products are foreseeable, notify Departmental Representative of such in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of the work.
  - .3 In event of failure to notify Departmental Representative at commencement of Work and should it subsequently appear that Work may be delayed for such reason, Departmental Representative reserves right to substitute more readily available products of similar character, at no increase in Contract Price or Contract Time.
-

- 1.4 Manufacturer's Instructions .1 Unless otherwise indicated in Specifications, install or erect products in accordance with manufacturer's instructions.
- .1 Do not rely on labels or enclosures provided with products.
  - .2 Obtain written instructions directly from manufacturers.
- .2 Notify Departmental Representative in writing, of conflicts between Specifications and manufacturer's instructions, so that Departmental Representative may establish course of action.
- .3 Improper installation or erection of products, due to failure in complying with these requirements, authorizes Departmental Representative to require removal and re-installation at no increase in Contract Price or Contract Time.
- .4 Provide Manufacturer's instructions and specifications to Departmental Representative (and Engineer) for review prior to any installations.
- 1.5 Contractor's Options for Selection of Products for Tendering .1 Products are specified by "Prescriptive" specifications: select any product meeting or exceeding specifications.
- .2 Products specified under "Acceptable Products": select any one of the indicated manufacturers, or any other manufacturer meeting or exceeding the Prescriptive specifications and indicated Products.
  - .3 Products specified by performance and referenced standard: select any product meeting or exceeding the referenced standard.
  - .4 Products specified to meet particular design requirements or to match existing materials: use only material specified Approved Products. Alternative products may be considered provided full technical data is received in writing by Departmental Representative.
  - .5 When products are specified by a referenced standard or by Performance specifications, upon request of Departmental Representative obtain from manufacturer an independent laboratory report showing that the product meets or exceeds the specified requirements.
- 1.6 Substitution After Contract Award .1 No substitutions are permitted without prior written approval of the Departmental Representative.
- .2 Proposals for substitution may only be submitted after Contract award. Such request must include statements of respective costs of
-

- items originally specified and the proposed substitution.
- .3 Proposals will be considered by the Departmental Representative if:
    - .1 products selected by tenderer from those specified are not available;
    - .2 delivery date of products selected from those specified would unduly delay completion of Contract, or
    - .3 alternative product to that specified, which is brought to the attention of and considered by Departmental Representative as equivalent to the product specified, and will result in a credit to the Contract amount.
  - .4 Should the proposed substitution be accepted either in part or in whole, assume full responsibility and costs when substitution affects other work on the Project. Pay for design or drawing changes required as result of substitution.
  - .5 Amounts of all credits arising from approval of the substitutions will be determined by the Departmental Representative, and the Contract price will be reduced accordingly.
- 1.7 Transportation
- .1 Pay costs of transportation of products required in performance of Work.
- 1.8 Quality of Work
- .1 Ensure Quality of Work is of highest standard, executed by workers experienced and skilled in respective duties for which they are employed. Immediately notify Departmental Representative if required Work is such as to make it impractical to produce required results.
  - .2 Do not employ anyone unskilled in their required duties. Departmental Representative reserves right to require dismissal from site, workers deemed incompetent or careless.
  - .3 Decisions as to standard or fitness of Quality of Work in cases of dispute rest solely with Departmental Representative, whose decision is final.
- 1.9 Coordination
- .1 Ensure cooperation of workers during Work. Maintain efficient and continuous supervision.
  - .2 Be responsible for coordination and placement of openings, sleeves, and accessories.
- 1.10 Remedial Work
- .1 Perform remedial work required to repair or replace parts or
-

portions of Work identified as defective or unacceptable. Coordinate adjacent affected Work as required.

- .2 Perform remedial work by specialists familiar with materials affected. Perform in a manner to neither damage nor put at risk any portion of Work.

## PART 2 - PRODUCTS

- 2.1 Acceptable Products
- .1 Submit product data sheets for all manufactured products used in the Work to Departmental Representative for review in accordance with Section 013300, Submittal Procedures.
  - .2 Use best quality products.

**END OF SECTION**

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**PART 1 - GENERAL**

- |                         |    |  |
|-------------------------|----|--|
| 1.1 Section Includes    | .1 | Progressive cleaning.  |
|                         | .2 | Final cleaning.  |
| 1.2 Project Cleanliness | .1 | Maintain Work in tidy condition, free from accumulation of waste products and debris.  |
|                         | .2 | Remove waste materials from sites at regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials onsite. |
|                         | .3 | Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.   |
| 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 all waste products and debris.  |
|                         | .3 | Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.   |

**END OF SECTION**

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## PART 1 - GENERAL

- 1.1 Section Includes .1 Waste Management Workplan including Waste Audit, Waste Reduction Workplan and Demolition Waste Audit.
- 1.2 Definitions .1 Waste Management Coordinator (WMC): Designate individual who is in attendance onsite full-time. Designate, or have designated individuals from each Subcontractor to be responsible for waste management related to their trade and for coordinating activities with WMC.
- .2 Waste Audit (WA): Relates to projected waste generation. Involves measuring and estimating quantity and composition of waste, reasons for waste generation, and operational factors that contribute to waste.
- .3 Waste Reduction Workplan (WRW): Written report that addresses opportunities for reduction, reuse, or recycling of materials.
- .4 Materials Source Separation Program (MSSP): consists of a series of ongoing activities to separate reusable and recyclable waste materials into material categories from other types of waste at point of generation.
- 1.3 Documents .1 Maintain at the job site one copy of following documents:
- .1 Waste Management Workplan.
- 1.4 Use of Site and Facilities .1 Locate waste, refuse, recycling, etc. containers in locations to facilitate deposit of materials without hindering daily operations.
- .2 Locate separated materials in areas which minimize material damage.
- 1.5 Submittal .1 Submit requested submittals in accordance with Section 013300, Submittal Procedures.
- .2 Prepare and submit the following submittals within 14 days of the Award of Contract:
- .1 Submit 3 copies of completed Waste Management Workplan (WMW).
- .3 Provide Departmental Representative with receipts indicating quantity of material delivered to landfill.
- .4 Provide Departmental Representative with receipts indicating
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- quantity and type of materials sent for recycling.
- 1.6 Waste Management Workplan .1 Structure WMW to prioritize actions and follow 3R's hierarchy, with Reduction as first priority, followed by Reuse, then Recycle.
- .2 Describe management of waste.
- .3 Identify opportunities for reduction, reuse, and/or recycling (3Rs) of materials.
- .4 Post workplan or summary where workers at site are able to review its content.
- 1.7 Waste Processing Sites .1 Provide waste processing sites as applicable within the Province of British Columbia to Departmental Representative within 14 days of the Award of Contract.
- 1.8 Disposal of Wastes .1 Burying of rubbish and waste materials is prohibited unless approved by Departmental Representative at off-site locations obtained by the Contractor.
- .2 Burning of rubbish and waste materials is prohibited unless permitted by British Columbia Ministry of Forests. Permit to be obtained by the Contractor.
- .3 Disposal of waste volatile materials, mineral spirits, oil, paint thinner, etc. into waterways or by dumping onsite is prohibited.
- 1.9 Storage and Handling .1 Store, materials to be reused, recycled, and salvaged in locations obtained by the Contractor and accepted by Departmental Representative.
- .2 Unless specified otherwise, materials for removal become Contractor's property.
- 1.10 Scheduling .1 Coordinate work with other activities at site to ensure timely and orderly progress of the Work.

## PART 2 – EXECUTION

- 2.1 Application .1 Do work in compliance with the WMW.
- .2 Implement MSSP for waste generated on Project in compliance with approved methods and as approved by Departmental Representative.
- .3 Materials must be immediately separated into required categories
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for reuse or recycling.

- .4 Materials in separated condition: collect, handle, store onsite, and transport off-site to an approved and authorized recycling facility.
  - .5 Handle waste materials not reused, salvaged, or recycled in accordance with appropriate regulations and codes.
- 2.2 Cleaning
- .1 Remove tools and waste materials on completion of work, and leave work area in clean and orderly condition.
  - .2 Cleanup work area as work progresses.
  - .3 Source separate materials to be reused/recycled into specified sort areas.
- 2.3 Diversion of Materials
- .1 Create a list of materials to be separated from the general waste stream and stockpiled in separate containers, to the approval of the Departmental Representative and consistent with applicable fire regulations.
    - .1 Mark containers.
    - .2 Provide instruction on disposal practices.
  - .2 Onsite sale of salvaged, recovered, reusable, recyclable, etc. materials is not permitted.

**END OF SECTION**

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**PART 1 - GENERAL**

- 1.1 Section Includes .1 Administrative procedures preceding preliminary and final reviews of Work.
- 1.2 Inspection and Declaration .1 Contractor's Inspection: Contractor and all Subcontractors shall conduct an inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.
- .1 Notify Departmental Representative in writing of satisfactory completion of Contractor's Inspection and that corrections have been made.
- .2 Request Departmental Representative's Inspection.
- .2 Departmental Representative's Review: Departmental Representative and Contractor will perform review of Work to identify obvious defects or deficiencies. Contractor shall correct Work accordingly.
- .3 Engineer's Review: Engineer, Departmental Representative, and Contractor will perform review of Work to identify if Work has been completed according to the requirements of the Contract Documents. Contractor shall correct Work accordingly.
- .4 Completion: submit written certificate that the following have been performed:
- .1 Work has been completed and inspected for compliance with Contract Documents.
- .2 Defects have been corrected and deficiencies have been completed.
- .3 Work is complete and ready for Final Review.
- .5 Final Review: when items noted above are completed, request final review of Work by Departmental Representative. If Work is deemed incomplete by Departmental Representative, complete outstanding items and request another review.
- .6 Declaration of Substantial Performance: when Departmental Representative considers deficiencies and defects have been corrected and it appears requirements of Contract have been substantially performed, make application for Certificate of Substantial Performance.
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- .7 Commencement of Warranty Periods: date of Departmental Representative's acceptance of submitted declaration of Substantial Performance shall be date of commencement for warranty periods.
- .8 Final Payment: When Departmental Representative considers final deficiencies and defects have been corrected and it appears requirements of Contract have been totally performed, make application for final payment. If Work is deemed incomplete by Departmental Representative, complete outstanding items and request final review.

**END OF SECTION**

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PART 1 - GENERAL

- 1.1 Measurement for Payment .1 Include all materials, labour, equipment, and services necessary for any toxic waste removal. Payments for such Work to be included in Lump Sums of other items in this Contract.
- 1.2 References .1 Canadian Environmental Protection Act, 1999 (CEPA 1999).
- .2 Health Canada/Workplace Hazardous Materials Information System (WHMIS).
- .1 Material Safety Data Sheets (MSDS)
- .3 National Fire Code of Canada 2005.
- .4 Transportation of Dangerous Goods Act (TDG Act) 1999, (c.34).
- .5 Transportation of Dangerous Goods Regulations (T-19.01-SOR/2003-400).
- 1.3 Definitions .1 Toxic: For the purposes of this specification, a substance is considered toxic if it is listed on the Toxic Substances List found in Schedule 1 of CEPA.
- .2 List of Toxic Substances: found in Schedule 1 of CEPA, lists all substances that have been assessed as toxic. The federal government can make regulations with respect to a substance specified on the List of Toxic Substances. Column II of this List identifies the type of regulation applicable to each substance.
- 1.4 Submittals .1 Product Data:
- .1 Submit photocopies of shipping documents and waste manifests to Departmental Representative when shipping toxic wastes off-site.
- .2 Maintain 1 copy of product data in a readily accessible file onsite.
- .2 Submission Requirements:
- .1 Submit product data to Departmental Representative in accordance with Section 013300, Submittal Procedures.
- .2 Express all weights and volumes in SI Metric units.
- .3 Accompany submissions with a transmittal letter
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containing:

- .1 Date.
- .2 Project title and number.
- .3 Contractor's name and address.
- .4 Identification and quantity of attached product data.
- .5 Other pertinent data.

- 1.5 Storage and Handling
- .1 Store and handle toxic wastes in accordance with applicable federal and provincial laws, regulations, codes, and guidelines.
  - .2 Store and handle flammable and combustible wastes in accordance with current National Fire Code of Canada requirements.
  - .3 Coordinate storage of toxic wastes with Departmental Representative and abide by internal requirements for labeling and storage of wastes.
  - .4 Observe smoking regulations at all times. Smoking is prohibited in any area where toxic wastes are stored, used, or handled.
  - .5 Report spills or accidents involving toxic wastes immediately to Departmental Representative and to appropriate regulatory authorities within 24 hours of incident. Take all reasonable measures to contain the release while ensuring health and safety is protected.
  - .6 Transport toxic wastes in accordance with federal Transportation of Dangerous Goods Act, Transportation of Dangerous Goods Regulations, and applicable provincial regulations.
  - .7 Use only an authorized/licensed carrier to transport toxic waste.
  - .8 Coordinate transportation and disposal of toxic wastes with Departmental Representative.
- 1.6 Waste Management and Disposal
- .1 Dispose of toxic wastes generated onsite in accordance with applicable federal and provincial acts, regulations, and guidelines.
  - .2 Ensure toxic waste is shipped to an authorized/licensed treatment or disposal facility and that all liability insurance requirements are met.

**END OF SECTION**

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**PART 1 – GENERAL**

- 1.1 Related Sections
  - .1 Section 01 33 00 – Submittal Procedures
  - .2 Section 01 35 43 – Environmental Procedures
- 1.2 References
  - .1 Export and Import of Hazardous Waste Regulations (EIHWR Regulations), SOR/92637.
  - .2 National Fire Code of Canada 1995
  - .3 Transportation of Dangerous Goods Act (TDG Act) 1992, (T19.01).
  - .4 Transportation of Dangerous Goods Regulations (TDGR), (SOR/8577, SOR/85585, SOR/85609, SOR/86526).
- 1.3 Definitions
  - .1 Dangerous Goods: Product, substance, or organism that 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 Canadawide 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.
- 1.4 Submittals
  - .1 Submit product data in accordance with Section 01 33 00 – Submittal Procedures.
  - .2 Submit to Departmental Representative current Material Safety Data Sheet (MSDS) for each hazardous material required prior to bringing hazardous material on site.
  - .3 Submit hazardous materials management plan to Departmental Representative that identifies all hazardous materials, their use, their location, personal protective equipment requirements, and disposal arrangements.

**1.5 Storage and Handling**

- .1 Coordinate storage of hazardous materials with Departmental Representative and abide by internal requirements for labeling and storage of materials and wastes.
- .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 Observe smoking regulations at all times. Smoking is prohibited in any area where hazardous materials are stored, used, or handled.
- .5 Abide by the following storage requirements for quantities of hazardous materials and wastes in excess of 5 kg for solids, and 5 litres 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 that shall 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.
- .6 Ensure personnel have been trained in accordance with Workplace Hazardous Materials Information System (WHMIS) requirements.
- .7 Report spills or accidents immediately to Departmental Representative and the ESO. Submit a written spill report to Departmental Representative within 24 hours of incident.

**1.6 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.
- .3 If hazardous waste is generated on site:
  - .1 Coordinate transportation and disposal with Departmental Representative.
  - .2 Ensure compliance with applicable provincial laws and regulations for generators of hazardous waste.
  - .3 Use only a licensed carrier authorized by provincial authorities to accept subject material.
  - .4 Prior to shipping material, obtain written notice from intended hazardous waste treatment or disposal facility that it will accept material and that it is licensed to accept this material.
  - .5 Label containers with legible, visible safety marks as prescribed by federal and provincial regulations.
  - .6 Ensure that only trained personnel handle, offer for transport, or transport dangerous goods.
  - .7 Provide a photocopy of all shipping documents and waste manifests to Departmental Representative.
  - .8 Track receipt of completed manifest from consignee after shipping dangerous goods. Provide a photocopy of completed manifest to Departmental Representative.
  - .9 Report any discharge, emission, or escape of hazardous materials immediately to the Departmental Representative and appropriate provincial authority. Take reasonable measures to control release.

**PART 2 - PRODUCTS****2.1 Materials**

- .1 Only bring on site the quantity of hazardous materials required to perform work.
- .2 Maintain MSDSs 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.
  - .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 treatment facilities.
  - .4 Burning, diluting, or mixing hazardous wastes for purpose of disposal is prohibited.
  - .5 Disposal of hazardous materials in waterways, storm or sanitary sewers, or in municipal solid waste landfills is prohibited.
  - .6 Dispose of hazardous wastes in a timely fashion in accordance with applicable provincial regulations.

END OF SECTION

**PART 1 - GENERAL**

- 1.1 Measurement for Payment .1 No measurement will be made under this Section. Include costs in Lump Sum items of concrete work for which reinforcement is required.
- 1.2 References .1 American Concrete Institute (ACI):
- .1 ACI 315R, Manual of Engineering and Placing Drawings for Reinforced Concrete Structure.
- .2 American National Standards Institute/American Concrete Institute (ANSI/ACI):
- .1 ANSI/ACI 315, Details and Detailing of Concrete Reinforcement.
- .3 American Society for Testing and Materials (ASTM):
- .1 ASTM A143/A143M, Standard Practice for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement.
  - .2 ASTM A276 Standard Specification for Stainless Steel Bars and Shapes.
  - .3 ASTM A775 Standard Specification for Epoxy-Coated Reinforcing Steel Bars.
  - .4 ASTM A955 Standard Specification for Deformed and Plain Stainless Steel Bars.
  - .5 ASTM A959 Guide for specifying harmonized standard grade compositions for wrought stainless steels.
- .4 Canadian Standards Association (CSA):
- .1 CAN/CSA-A23.1, Concrete Materials and Methods of Concrete Construction.
  - .2 CAN3-A23.3, Design of Concrete Structures for Buildings.
  - .3 CAN3-G30.3, Cold Drawn Steel Wire for Concrete Reinforcement.
  - .4 CSA G30.5, Welded Steel Wire Fabric for Concrete Reinforcement.
  - .5 CSA G30.14, Deformed Steel Wire for Concrete Reinforcement.
  - .6 CSA G30.15, Welded Deformed Steel Wire Fabric for Concrete Reinforcement.
  - .7 CAN/CSA-G30.18, Billet-Steel Bars for Concrete Reinforcement.
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- .8 CAN/CSA-G40.21, Structural Quality Steels.
  - .9 CAN/CSA-G164, Hot Dip Galvanizing of Irregularly Shaped Articles.
  - .10 CSA W186, Welding of Reinforcing Bars in Reinforced Concrete Construction.
  - .11 CAN/SGSB-1.181, Ready-Mixed Organic Zinc-Rich Coating.
  - .12 CAN/CSA-S6-06, Canadian Highway Bridge Design Code (CHBDC).
- .5 Reinforcing Steel Institute of Canada:
- .1 RISC, Reinforcing Steel Manual of Standard Practice.
- 1.3 Shop Drawings
- .1 Submit shop drawings including placing of reinforcement in accordance with Section 013300 - Submittal Procedures.
  - .2 Indicate on shop drawings, bar bending details, lists, quantities of reinforcement, sizes, spacings, locations of reinforcement and mechanical splices if approved by Departmental Representative, with identifying code marks to permit correct placement without reference to structural drawings. Indicate sizes, spacings, lengths, and locations of chairs, spacers and hangers. Prepare reinforcement drawings in accordance with Reinforcing Steel Manual of Standard Practice - by Reinforcing Steel Institute of Canada.
  - .3 Detail lap lengths and bar development lengths to CAN/CSA-S6-06, unless otherwise indicated.
- 1.4 Waste Management and Disposal
- .1 Separate and recycle waste materials in accordance with Section 017419 - Waste Management and Disposal.
- 1.5 Material Storage
- .1 Do not stockpile material so as to interfere with site operation and drainage.
- PART 2 - PRODUCTS**
- 2.1 Materials
- .1 Reinforcing steel: grade 400, deformed bars, epoxy coated, to CAN/CSA-G30.18, unless indicated otherwise.
  - .2 Substitute different size bars only if permitted in writing by Departmental Representative.
  - .3 Cold-drawn annealed steel wire ties: to CSA G30.3.
  - .4 Tie Wire: minimum 1.6 mm annealed type or patented system approved by Departmental Representative.
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- .5 Chairs, bolsters, bar supports, spacers: to CAN/CSA-A23.1.
  - .6 Mechanical splices: subject to approval of Departmental Representative.
- 2.2 Fabrication
- .1 Fabricate reinforcing steel in accordance with CAN/CSA-A23.1, ANSI/ACI 315, and Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada unless indicated otherwise.
  - .2 Obtain Departmental Representative's approval for locations of reinforcement splices other than those shown on placing drawings.
  - .3 Upon approval of Departmental Representative, weld reinforcement in accordance with CSA W186.
  - .4 Ship bundles of bar reinforcement, clearly identified in accordance with bar bending details and lists.
- 2.3 Source Quality Control
- .1 Provide Departmental Representative with certified copy of mill test report of reinforcing steel, showing physical and chemical analysis, minimum 2 weeks prior to commencing reinforcing work.
  - .2 Inform Departmental Representative of proposed source of material to be supplied.
- PART 3 - EXECUTION
- 3.1 Field Bending
- .1 Do not field bend or field weld reinforcement except where indicated or authorized by Departmental Representative.
  - .2 When field bending is authorized, bend without heat, applying a slow and steady pressure.
  - .3 Replace bars that develop cracks or splits.
- 3.2 Placing Reinforcement
- .1 Place reinforcing steel as indicated on reviewed placing drawings and in accordance with CAN/CSA-A23.1.
  - .2 Prior to placing concrete, obtain Departmental Representative's approval of reinforcing material and placement.
  - .3 Ensure cover to reinforcement is maintained during concrete pour.
  - .4 Secure all reinforcement steel by means of ties, spacers and supports as required.
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- .5 Chairs: where concrete is exposed to view, exposed to elements or where rust is possible, use plastic or non-corrosive material, or precast concrete made from concrete of equal strength and durability of concrete to be placed. Chairs used are not to result in voids or unacceptable appearance in exposed concrete surfaces.

**END OF SECTION**

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**PART 1 - GENERAL**

- 1.1 Measurement for Payment .1 The Integral Abutment Work is a Lump Sum payment item for this Contract. Payments for Cast-in-Place Concrete Work associated with the Integral Abutment Work are to be included in such Lump Sum.
- .2 Include heating of water and aggregates and providing cold weather protection.
- .3 Include cooling of concrete and providing hot weather protection.
- .4 Include supply and installation of anchor bolts, nuts and washers, and bolt epoxying.
- .5 Include cleaning and epoxy adhesive coating of existing concrete and rebar surfaces to receive new concrete.
- .6 Provide new cast-in-place concrete which is compatible in all respects with existing concrete and rebar.
- .7 Include onsite and laboratory testing of concrete by third-party field staff.
- .1 Frequency of testing: at least once every 6 m<sup>3</sup> of concrete and in accordance with approved Quality Control Plan – Section 014500.
- 1.2 References .1 American Society for Testing and Materials (ASTM) :
- .1 ASTM C 109/C109M, Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2 in. or 50-mm Cube Specimens).
- .2 ASTM C 260, Specification for Air-Entraining Admixtures for Concrete.
- .3 ASTM C 332, Specifications for Lightweight Aggregates for Insulating Concrete.
- .4 ASTM C 494, Specification for Chemical Admixtures for Concrete.
- .5 ASTM C 827, Test Method for Change in Height at Early Ages of Cylindrical Specimens from Cementitious Mixtures.
- .6 ASTM C 939, Test Method for Flow of Grout for Preplaced-Aggregate Concrete.
- .7 ASTM D 412, Test Methods for Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers-Tension.
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- .8 ASTM D 624, Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomer.
  - .9 ASTM D 1751, Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural construction (Nonextending and Resilient Bituminous Types).
  - .10 ASTM D 1752, Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.
  
  - .2 Canadian Standards Association (CSA):
    - .1 CAN/CSA-A5, Portland Cement.
    - .2 CAN/CSA-A23.1, Concrete Materials and Methods of Concrete Construction.
    - .3 CAN/CSA-A23.2, Methods of Test for Concrete.
    - .4 CAN/CSA-A23.5, Supplementary Cementing Materials.
    - .5 CAN/CSA A362, Blended Hydraulic Cement.
    - .6 CAN/CSA A363, Cementitious Hydraulic Slag.
    - .7 CAN/CSA A283, Qualification Code for Concrete Testing Laboratories.
    - .8 CAN/CSA-A3000, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).
  
  - 1.3 Samples
    - .1 Submit samples in accordance with Section 013300 - Submittal Procedures.
    - .2 At least 2 weeks prior to commencing work, inform Departmental Representative of proposed source of aggregates and provide access for sampling.
  
  - 1.4 Certificates
    - .1 Submit concrete mix design in accordance with Section 013300 - Submittal Procedures. All new cast-in-place concrete to be compatible with existing concrete.
    - .2 Minimum 2 weeks prior to starting concrete work submit to Departmental Representative manufacturer's test data and certification by qualified independent inspection and testing laboratory that following materials will meet specified requirements:
      - .1 Portland cement.
      - .2 Blended hydraulic cement.
      - .3 Supplementary cementing materials.
      - .4 Grout.
      - .5 Admixtures.
      - .6 Aggregates.
      - .7 Water.
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- .3 Provide certification that mix proportions selected will produce concrete of quality, yield and strength as specified in Contract Documents, and will comply with CAN/CSA-A23.1.
- 1.5 Quality Assurance .1 Minimum 2 weeks prior to starting concrete work, submit proposed quality control procedures in accordance with Section 014500 - Quality Control for Departmental Representative's review for following items:
- .1 Falsework erection.
  - .2 Hot weather concrete.
  - .3 Cold weather concrete.
  - .4 Pumping and placing techniques.
  - .5 Curing.
  - .6 Finishes.
  - .7 Formwork removal.
  - .8 Joints.
- 1.6 Waste Management and Disposal .1 Separate and recycle waste materials in accordance with Section 017419 - Waste Management and Disposal.
- .2 Designate a location for using excess concrete and cleaning out concrete equipment. Prior to concrete pours, obtain approval from the Departmental Representative for the proposed location.
- .3 Use trigger operated spray nozzles for water hoses.
- .4 Designate a cleaning area for tools to limit water use and runoff.
- .5 Carefully coordinate the specified concrete work with weather conditions.
- .6 Ensure emptied containers are sealed and stored safely for disposal.
- .7 Prevent release of plasticizers, water-reducing agents and air-entraining agents. Using appropriate safety precautions, collect liquid or solidify liquid with an inert, noncombustible material and remove for disposal. Dispose of all waste in accordance with applicable local, provincial, and national regulations.
- .8 Choose least harmful, appropriate cleaning method that will perform adequately.

## PART 2 - PRODUCTS

- 2.1 Materials .1 All new materials to be compatible with existing concrete.
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- .2 Portland cement Type GU (formerly Type 10) with 30% fly ash replacement to CAN/CSA-A3000.
  - .3 Blended hydraulic cement: Type GU (formerly Type 10) to CAN/CSA-A3000.
  - .4 Supplementary cementing materials: to CAN/CSA-A3000.
  - .5 Cementitious hydraulic slag: to CAN/CSA-A3000.
  - .6 Water: to CAN/CSA-A23.1.
  - .7 Aggregates: to CAN/CSA-A23.1. Coarse aggregates to be normal density.
  - .8 Air entraining admixture: to ASTM C260.
  - .9 Chemical admixtures: to ASTM C494. Departmental Representative to approve accelerating or set retarding admixtures during cold and hot weather placing.
  - .10 Chemical admixtures: to ASTM C494. Departmental Representative to approve accelerating admixtures used to speed up construction.
  - .11 Concrete retarders: to ASTM C494, water based, low VOC, solvent free. Do not allow moisture of any kind to come in contact with the retarder film.
  - .12 Low-shrinkage concrete: to CAN/CSA-A23.1.
  - .13 Do not use calcium chloride.
  - .14 No chemical substances other than specified herein shall be added to concrete mix or applied to the surface of concrete without Approval by the Departmental Representative.
- 2.2 Mixes
- .1 Design and proportion concrete mix to meet design strength requirements. Include consideration of existing concrete, weather, temperature, curing, shrinkage, and methods of concrete placement.
  - .2 Proportion Type GU (formerly Type 10) normal density concrete in accordance with CAN/CSA-A23.1 to give the following:
    - .1 Minimum compressive strength at 28 days: 35 MPa.
    - .2 Maximum water-cement ratio: 0.40.
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- .3 Calcium chloride or admixtures containing calcium chloride are not to be used in concrete.
  - .4 Supplementary cementing materials by weight of Portland cement: silica fume 7.5% to 10%, fly ash up to 20%.
  - .5 Minimum cementing materials content: 355 kg/cubic metre.
  - .6 Class of exposure: C-1.
  - .7 Nominal maximum size of coarse aggregate: 20 mm.
  - .8 Slump at time and point of discharge: 80 mm plus or minus 20 mm.
  - .9 Air content: 5 to 8 %.
  - .10 Air-dry specific gravity of 2.3.
  - .11 Corrosion inhibitor: Grace "DCI" corrosion inhibitor at 20 L per cubic metre of concrete (in accordance with manufacturers specifications).
  - .12 Chemical admixtures: to ASTM C494. Departmental Representative to approve accelerating or set retarding admixtures during cold and hot weather placing. Corrosion-inhibiting admixtures to slow the rate at which chlorides and moisture enter the concrete may be required to reduce the rate of chlorides reacting with reinforcing steel. Super plasticizers require Departmental Representative's approval.
  - .13 Low-shrinkage concrete: to CAN/CSA-A23.1.
- .3 Maintain the temperature at discharge between 10 degrees and 18 degrees Celsius unless approved otherwise by the Departmental Representative.
  - .4 Certify that the plant, equipment, and all materials to be used in concrete comply with the requirements of CAN/CSA A23.1.
  - .5 Certify that mix proportions selected will provide concrete of specified quality and yield and that strength will comply with CAN/CSA A23.1.
  - .6 Chemical admixtures other than those specified are to be reviewed by the Departmental Representative prior to their use.

**3.1 Preparation**

- .1 Obtain Departmental Representative's approval before placing concrete. Provide 2-day3 notice prior to placing of concrete.
- .2 Pumping of concrete is permitted only after approval of equipment, mix, and procedures.
- .3 Ensure reinforcement and inserts are not disturbed during concrete placement.
- .4 Prior to placing of concrete obtain Departmental Representative's approval of proposed method for protection of concrete during placing and curing in adverse weather.
- .5 Maintain accurate records of poured concrete items to indicate date, location of pour, quality, air temperature and test samples taken.
- .6 Do not place load upon new concrete until authorized by Departmental Representative.
- .7 Do not stockpile materials or equipment on the bridge deck.

**3.2 Construction**

- .1 Do Cast-in-Place Concrete Work in accordance with CAN/CSA-A23.1.
  - .2 Do not place concrete older than 2 hours from batch time. If not possible, coordinate with Departmental Representative regarding set retarder admixtures.
  - .3 Sleeves and inserts.
    - .1 Where approved by Departmental Representative, set sleeves, ties, pipe hangers and other inserts and openings as indicated or specified elsewhere. Sleeves and openings greater than 100 x 100 mm not indicated, must be approved by Departmental Representative.
    - .2 Do not eliminate or displace reinforcement to accommodate hardware. If inserts cannot be located as specified, obtain approval of modifications from Departmental Representative before placing of concrete.
    - .3 Check locations and sizes of sleeves and openings shown on drawings.
  - .4 Anchor bolts:
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- .1 Set anchor bolts to templates under supervision of appropriate trade prior to placing concrete.
  - .2 All anchor bolts to be ASTM F1554, Grade 125ksi threaded anchor rods, galvanized, with corresponding ASTM A563 nuts and ASTM F436 washers, galvanized. Sizes as shown on Design Drawings. Where galvanized threaded anchor rods are in contact with plain steel components, dab plain steel contact areas with epoxy paint.
  - .3 With approval of Departmental Representative, grout anchor bolts in preformed holes or holes drilled after concrete has set. Formed holes to be minimum 100 mm diameter. Drilled holes to be to manufacturer's recommendations.
  - .4 Set bolts and fill holes with shrinkage-compensating 'high strength 2-part epoxy adhesive'. Embedment lengths to be determined by Engineer once epoxy product is chosen by Contractor.
  - .5 Protect anchor bolt holes from water accumulations and snow and ice build-ups.
  - .6 Install anchor bolts in accordance with CAN/CSA S6, S16.1, and A23.3 standards and in accordance with Design Drawings. Pretension anchor rods in accordance with Manufacturer's specifications but to at least 60% of their specified minimum tensile strength.
  - .5 Grout under base plates using procedures in accordance with manufacturer's recommendations which result in 100 % contact over grouted area.
  - .6 Drainage holes and weep holes:
    - .1 Install weep hole tubes and drains as indicated.
  - .7 Finishing:
    - .1 Finish concrete in accordance with CAN/CSA-A23.1.
    - .2 Use procedures acceptable to Departmental Representative or those noted in CAN/CSA-A23.1 to remove excess bleed water. Ensure surface is not damaged.
    - .3 Rub exposed sharp edges of concrete with carborundum to produce 3 mm radius edges unless otherwise indicated.
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- .4 Provide swirl-trowelled finish unless otherwise indicated.
  - .8 Joint Fillers:
    - .1 Furnish filler for each joint in single piece for depth and width required for joint, unless otherwise authorized by Departmental Representative. When more than one piece is required for a joint, fasten abutting ends and hold securely to shape by stapling or other positive fastening.
    - .2 Locate and form construction joints as indicated. Install joint filler.
  - .9 Vibrate all concrete.
  - .10 Upon removal of formwork, as necessary, fill all form holes with non-shrink grout and cure as specified under curing concrete to satisfaction of the Departmental Representative.
  - 3.3 Curing Protection
    - .1 Provide adequate heating and hoarding to protect the new concrete to the satisfaction of the Departmental Representative. Submit proposed concrete heating and protection system to the Departmental Representative for review prior to placing concrete.
    - .2 Use hot weather concreting methods when the mean temperature rises above 25°C.
    - .3 Cure and protect concrete in accordance with CSA-A23.1. Existing concrete shall have a minimum temperature of 10°C when new concrete is being placed against it.
    - .4 Initial curing:
      - .1 Keep concrete surfaces continuously moist and cure at a minimum temperature of 10°C for three days.
    - .5 Final curing:
      - .1 Immediately following initial curing and before the concrete has dried, maintain curing to ensure required strengths and durability are obtained for a further four days.
    - .6 Protect concrete from sudden temperature changes as noted in CSA-A23.1.
    - .7 Acceptable curing methods:
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- .1 Ponding or continuous sprinkling.
  - .2 Absorptive mat or fabric kept continuously wet.
  - .3 Continuous steam vapour mist bath not exceeding 70°C.
  - .4 Watertight forms left in place. Wood forms are not considered watertight unless coated or sealed to prevent moisture absorption.
  - .5 Other moisture-retaining methods approved by the Departmental Representative.
  - .8 Curing compounds will not be permitted.
  - .9 Protect freshly placed and consolidated concrete against damage or defacement from curing methods or adverse weather conditions.
  - .10 Do not use water curing during freezing weather.
  - .11 During hot weather, begin curing process immediately after finishing. Use continuous water or absorptive mats.
- 3.4 Field Quality Control
- .1 Appoint and pay for services of a CSA certified testing agency(s), to provide full testing services of sampling and testing of concrete in accordance with CAN/CSA-A23.1 and Section 014500 – Quality Control, at the discretion of Departmental Representative.
  - .2 Take additional test cylinders during hot/cold weather concreting. Cure cylinders on job site under same conditions as concrete that they represent.
  - .3 Inspection and testing by Departmental Representative will not augment or replace Contractor quality control nor relieve them of contractual responsibilities.

**END OF SECTION**

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Part 1 General**1.1 MEASUREMENTS FOR PAYMENTS**

- .1 No measurement will be made under this Section. Include costs in Lump Sum items of precast concrete works.

**1.2 REFERENCES**

- .1 American Society for Testing and Materials International (ASTM)
  - .1 ASTM A185/A185M-[05a], Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
  - .2 ASTM A775/A775M-[04a], Standard Specification for Epoxy-Coated Reinforcing Steel Bars.
  - .3 ASTM C260-[01], Standard Specification for Air-Entraining Admixtures for Concrete.
  - .4 ASTM D412-[98a(2002)e1], Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers - Tension.
  - .5 ASTM D2240-[05], Standard Test Method for Rubber Property - Durometer Hardness.
- .2 Canadian Construction Documents Committee (CCDC)
  - .1 CCDC 2-[1994], Stipulated Price Contract.
- .3 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-1.40-[97], Anticorrosive Structural Steel Alkyd Primer.
  - .2 CAN/CGSB-1.181-[99], Ready Mixed Organic Zinc-Rich Coating.
- .4 Canadian Standards Association (CSA International)
  - .1 CSA-A23.1/A23.2-[2004], Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
  - .2 CSA-A23.3-[04], Design of Concrete Structures.
  - .3 CSA-A23.4-[05], Precast Concrete - Materials and Construction.
  - .4 CAN/CSA-A3000-[03], Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).
    - .1 CSA-A3001-[03], Cementitious Materials for Use in Concrete.
  - .5 CAN/CSA-G30.18-[M92(R2002)], Billet-Steel Bars for Concrete Reinforcement.
  - .6 CAN/CSA-G40.20/G40.21-[2004], General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
  - .7 CAN/CSA-G164-[M92(R2003)], Hot Dip Galvanizing of Irregularly Shaped Articles.
  - .8 CAN/CSA-S6-[2005], Canadian Highway Bridge Design Code.
  - .9 CSA-W47.1-[03], Certification of Companies for Fusion Welding for Steel.

- .10 CAN/CSA W48-[01(R2006)], Filler Metals and Allied Materials for Metal Arc Welding (Developed in co-operation with the Canadian Welding Bureau).
- .11 CSA-W59-[03], Welded Steel Construction (Metal Arc Welding) (Metric version).
- .12 CSA-W186-[M1990(R2002)], Welding of Reinforcing Bars in Reinforced Concrete Construction.
- .5 The Master Painters Institute (MPI) - Architectural Painting Specification Manual (ASM) - [February 2004]
  - .1 MPI # 18, Organic Zinc Rich Primer.
  - .2 MPI # 23, Oil Alkyd Primer.
- .6 Underwriters' Laboratories of Canada (ULC)
  - .1 CAN/ULC-S701-[05], Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.

**1.3 DESIGN REQUIREMENTS**

- .1 Design precast elements to CSA-A23.3 and CSA-A23.4 to carry handling stresses.
- .2 Design precast elements to carry loads as indicated on the design drawings.

**1.4 QUALIFICATIONS**

- .1 Fabricate and erect precast concrete elements by manufacturing plant certified in appropriate category according to CSA-A23.4
- .2 Precast concrete manufacturer to be certified in accordance with CSA's certification procedures for precast concrete plants prior to submitting tender bid and to specifically verify as part of tender that plant is currently certified in appropriate category.
- .3 Only precast elements fabricated in such certified plants to be acceptable to Engineer and plant certification to be maintained for duration of fabrication, erection until warranty expires.
- .4 Welding companies certified to CSA-W47.1.

**1.5 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, handle and store precast units according to manufacturer's instructions.
- .2 Protect unit corners from contacting earth to prevent from staining.

**Part 2 Products****2.1 MATERIALS**

- .1 Portland cement Type GU (formerly Type 10) with 30% fly ash replacement to CAN/CSA-A3000.
- .2 Blended hydraulic cement: Type GU (formerly Type 10) to CAN/CSA-A3000.
- .3 Supplementary cementing materials: to CAN/CSA A3001.
- .4 Water: to CSA-A23.1/A23.1.
- .5 Hardware and miscellaneous materials: to CSA-A23.1/A23.2.
- .6 Forms: to CSA-A23.4.
- .7 Anchors and supports: to CAN/CSA-G40.21 Type 300 W.
- .8 Welding materials: to CSA W48.
- .9 Welding electrodes: to CSA W48 certified by Canadian Welding Bureau.
- .10 Galvanizing: hot dipped galvanizing with minimum zinc coating of 610 g/m<sup>2</sup> to CAN/CSA-G164.
- .11 Epoxy coating: to ASTM A775/A775M.
- .12 Steel primer: to CAN/CGSB-1.40 MPI #23.
- .13 Zinc-rich primer: to CAN/CGSB-1.181 MPI #18.

**2.2 MANUFACTURED UNITS**

- .1 Manufacture units in accordance with CSA-A23.4.
- .2 Mark each precast unit to correspond to identification mark on shop drawings for location with date cast on part of unit not be exposed.
- .3 Provide hardware suitable for handling elements.
- .4 Design tendons and anchorages and install post tensioning ducts in accordance with [CSA-A23.3] [CAN/CSA-S6].
- .5 Shop prime anchors after fabrication and touch up primer on anchors after welding. Do not apply primer to embedded portion of anchor or inserts.
- .6 Galvanize anchors after fabrication and touch up with zinc-rich primer after welding.

**2.3 FINISHES**

- .1 Finish units to standard grade to CSA-A23.4.

**2.4 SOURCE QUALITY CONTROL**

- .1 Provide Engineer with certified copies of quality control tests related to this project as specified in CSA-A23.4.
- .2 Precast plants should keep complete records of supply source of concrete material, steel reinforcement, prestressing steel and provide to Engineer for review upon request.

**Part 3 Execution****3.1 ERECTION**

- .1 The trench should be prepared as required by the engineer. The bottom of the trench should be as true to grade as possible. The bedding material should be graded smooth and compacted to provide a flat, stable surface on which to place the box culvert sections.
- .2 Attach supplied lifting clutches to lifting inserts in box. Insure that the box is structurally sound prior to lifting. A quick visual examination of the joint areas should be done at this time.
- .3 The box should then be carefully lifted into the trench. At this time, the joint shall be rechecked to be sure that it is clean.
- .4 If the box is to be sealed using butyl mastic jointing material, the material should be installed at this time. The mastic is placed on the top of the spigot of the box being put in place and in the bottom of the bell of the box it is being placed into. Allow for 200mm overlap of material.
- .5 In order to allow a good installation the bedding material under the bell of the previous box should be dug out about 50mm deep, 150mm out along the width of the box. This will allow a space for bedding material to be displaced as the spigot is being homed without it boiling up into the joint.
- .6 The box is now carefully lowered into position to install. Due to the weight of the box culvert, it is important to get the box as close to grade as possible before attempting to home the joint. It should be noted that the box culvert joint design has an annular space (gap for gasket material) much larger than pipe. If the box is homed by pushing with a hoe or being dragged on the bedding you may have an offset of up to 10-12mm. It is very important that the box bedding be level as possible.
- .7 A method of preventing problems with dragging and boiling up of bedding material is to place a sheet of plywood under the joint area prior to installation.
- .8 After the box has been seated, it is important to keep some pressure on the joint as you set the box down. This will help prevent the joint from opening up.

- .9 Detach lifting clutches from inserts. Supplied clutches may be returned for credit if no longer required. Clean field welds with wire brush and touch-up shop primer with primer.

**END OF SECTION**

**PART 1 - GENERAL**

- 1.1 Basis of Payment .1 No measurement will be made under this Section. Include costs in Lump Sum items of Work for which aggregate is required.
- 1.2 References .1 ASTM D4791-99, Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.
- 1.3 Samples .1 Submit samples in accordance with Section 013300 – Submittal Procedures.
- .2 Allow sampling by third-party tester during production.
- .3 Provide third-party tester with access to source and processed material for sampling if requested by Departmental Representative.
- .4 Install sampling facilities at discharge end of production conveyor, to allow third party tester to obtain representative samples of items being produced. Stop conveyor belt when directed by third-party tester to permit full cross section sampling.
- .5 Do not stockpile material so as to interfere with site operation and drainage.

**PART 2 - PRODUCTS**

- 2.1 Materials .1 Aggregate quality: sound, hard, durable material free from soft, thin, elongated or laminated particles, organic material, clay lumps or minerals, or other substances that would act in deleterious manner for use intended.
- .2 Flat and elongated particles of coarse aggregate: to ASTM D4791.
- .1 Greater dimension to exceed 5 times least dimension.
- .3 Fine aggregates satisfying requirements of applicable section to be one or blend of following:
- .1 Natural sand.
- .2 Manufactured sand.
- .3 Screenings produced in crushing of quarried rock, boulders, or gravel.
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- .4 Coarse aggregates satisfying requirements of applicable section to be one or blend of following:
  - .1 Crushed rock.
  - .2 Gravel and crushed gravel composed of naturally formed particles of stone.
  
- 2.2 Source Quality Control
  - .1 Inform Departmental Representative of proposed source of aggregates and provide access for sampling at least 2 weeks prior to commencing production.
  - .2 If materials from proposed source do not meet, or cannot reasonably be processed to meet, specified requirements, locate an alternative source or demonstrate that material from source in question can be processed to meet specified requirements.
  - .3 Advise Departmental Representative 2 weeks in advance of proposed change of material source.
  - .4 Acceptance of material at source does not preclude future rejection if it fails to conform to requirements specified, lacks uniformity, or if its field performance is found to be unsatisfactory.

### PART 3 – EXECUTION

- 3.1 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.
    - .3 Wash aggregates, if required to meet specifications.
  - 3.2 Handling
    - .1 Avoid segregation, contamination, and degradation of aggregate during handling and transporting.
  - 3.3 Stockpiling
    - .1 Stockpile aggregates in locations as indicated unless directed otherwise by Departmental Representative. Do not stockpile on completed pavement surfaces.
    - .2 Stockpile aggregates in sufficient quantities to meet project schedules.
    - .3 Stockpile sites to be level, well drained, and of adequate bearing capacity and stability to support stockpiled materials and handling equipment.
-

- .4 Provide compacted sand or crushed gravel base 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.
- .7 Stockpile aggregates in uniform layers of thickness as follows:
  - .1 Max 1.5 m for coarse aggregate and base course materials.
  - .2 Max 1.5 m for fine aggregate and sub-base materials.
  - .3 Max 1.5 m for other materials.
- .8 Uniformly spot-dump aggregates delivered to stockpile in trucks and build up stockpile as specified.
- .9 Do not cone piles or spill material over edges of piles.
- .10 Do not use conveying stackers.
- .11 During winter operations, prevent ice and snow from becoming mixed into stockpile or in material being removed from stockpile.

#### 3.4 Cleaning

- .1 Leave aggregate stockpile site in tidy, well drained condition, free of standing surface water.
- .2 Leave any unused aggregates in neat compact stockpiles.

**END OF SECTION**

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**PART 1 - GENERAL**

- 1.1 Measurement for Payment
- .1 No separate payment for excavations, trenching, and backfilling operations (except for backfilling with riprap – see Section 313700, Riprap). Payments for such Work to be included in Lump Sums of other items in this Contract.
  - .2 The excavations shall be the minimum required for the installation of the Wingwall components and the Concrete Column Reinforcing components and for performing the Integral Abutment Work.
  - .3 Contractor to fill voids behind the wingwalls with fillcrete, soil, or gravel. Contractor to confirm intended solution and procedures with Departmental Representative prior to performing the backfilling.
  - .4 Contractor to repair portions of roadway damaged (intentionally or not) during construction to Departmental Representative's approval.
- 1.2 References
- .1 American Society for Testing and Materials (ASTM):
    - .1 ASTM C 117, Standard Test Method for Material Finer Than 0.075 mm (No.200) Sieve in Mineral Aggregates by Washing.
    - .2 ASTM C 136, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
    - .3 ASTM D 422, Standard Test Method for Particle-Size Analysis of Soils.
    - .4 ASTM D 698-00a1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft ) (600 kN-m/m ).
    - .5 ASTM D 1557-02e1, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft ) (2,700 kN-m/m ).
    - .6 ASTM D 4318, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
  - .2 Canadian General Standards Board (CGSB):
    - .1 CAN/CGSB-8.1, Sieves, Testing, Woven Wire, Inch Series.
    - .2 CAN/CGSB-8.2, Sieves, Testing, Woven Wire, Metric.
  - .3 Canadian Standards Association (CSA):
    - .1 CAN/CSA-A3000, Portland Cement.
    - .2 CAN/CSA-A23.1, Concrete Materials and Methods of Concrete Construction.
-

- 1.3 Definitions
- .1 Excavation classes: two classes of excavation will be recognized: common excavation and rock excavation.
    - .1 Rock: material from solid masses of igneous, sedimentary or metamorphic rock that, prior to removal, was integral with parent mass. Material that cannot be ripped with reasonable effort from Caterpillar D9L or equivalent to be considered integral with parent mass. Boulder or rock fragments measuring in volume one cubic metre or more.
    - .2 Common excavation: excavation of materials of whatever nature, that are not included under definitions of rock excavation.
  - .2 Topsoil: material capable of supporting good vegetative growth and suitable for use in top dressing, landscaping, and seeding.
  - .3 Waste material: excavated material unsuitable for use in Work or surplus to requirements.
  - .4 Borrow material: material obtained from locations outside area to be graded, and required for construction of fill areas or for other portions of Work.
  - .5 Unsuitable materials:
    - .1 Weak and compressible materials under excavated areas.
    - .2 Frost susceptible materials under excavated areas.
    - .3 Frost susceptible materials:
      - .1 Fine grained soils with plasticity index less than 10 when tested to ASTM D 4318, and gradation within limits specified when tested to ASTM D 422 and ASTM C 136: Sieve sizes to CAN/CGSB-8.2.
      - .2 Table:

<u>Sieve Designation</u>	<u>% Passing</u>
2.00 mm	100
0.10 mm	45 – 100
0.02 mm	10 – 80
0.005 mm	0 – 45
      - .3 Coarse grained soils containing more than 20 % by mass passing 0.075 mm sieve.
  - .6 Unshrinkable fill:
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- .1 Very weak mixture of Portland cement, concrete aggregates and water that resists settlement when placed in utility trenches, and capable of being readily excavated.
- 1.4 Quality Assurance .1 Engage services of qualified Professional Engineer who is registered or licensed in Province of British Columbia, Canada in which Work is to be carried out to design and inspect shoring and bracing required for Work if required by applicable legislation.
- .2 Submit shop drawings in accordance with Section 013300 – Submittal Procedures.
- .3 At least 2 weeks prior to performing Excavation, Trenching, or Backfilling Work, Contractor to provide Departmental Representative with a Construction Sequence for the Work. Do not proceed with the Work until approval has been received from the Departmental Representative.
- 1.5 Waste Management and Disposal .1 Dispose of waste materials in accordance with Section 017419 - Waste Management and Disposal and the Waste Management Workplan.
- .2 Place materials defined as hazardous or toxic in designated containers.
- .3 Ensure emptied containers are sealed and stored safely.
- 1.6 Protection of Existing Features .1 Protect existing features in accordance with Section 015600 - Temporary Barriers and Enclosures and applicable local regulations.
- .2 Existing surface features:
- .1 Conduct, with Departmental Representative, condition survey of existing trees and other plants, survey bench marks and monuments which may be affected by Work.
- .2 Protect existing surface features from damage while Work is in progress. In event of damage, immediately make repair to approval of Departmental Representative.
- .3 Where required for excavation, cut roots or branches as approved by Departmental Representative.

## PART 2 - PRODUCTS

- 2.1 Materials .1 Type 1 and Type 2 fill: properties to Section 310516 - Aggregates: General and the following requirements:
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- .1 Crushed, pit run or screened stone, gravel or sand.
- .2 Gradations to be within limits specified when tested to ASTM C 136 and ASTM C 117. Sieve sizes to CAN/CGSB-8.2.

## .3 Table:

Sieve Designation (mm)	% Passing Type 1	% Passing Type 2
75	-	100
50	-	-
37.5	-	-
25	100	-
19	75 – 100	-
12.5	-	-
9.5	50 – 100	-
4.75	30 – 70	22 – 85
2.00	20 – 45	-
0.425	10 – 25	5 – 30
0.180	-	-
0.075	3 - 8	0 – 10

- .2 Type 3 fill: selected material from excavation or other sources, approved by Departmental Representative for use intended, unfrozen and free from rocks larger than 75 mm, cinders, ashes, sods, refuse or other deleterious materials.

PART 3 - EXECUTION

- 3.1 Site Preparation
  - .1 Remove obstructions, ice and snow, from surfaces to be excavated within limits indicated.
- 3.2 Stripping of Topsoil
  - .1 Commence topsoil stripping of areas as indicated after area has been cleared of brush, weeds, and grasses.
  - .2 Strip topsoil to depths as directed by Departmental Representative. Do not mix topsoil with subsoil.
  - .3 Stockpile in locations as directed by Departmental Representative. Stockpile height not to exceed 2m.
  - .4 Dispose of unused topsoil as directed by Departmental Representative.
- 3.3 Stockpiling
  - .1 Stockpile fill materials in areas designated by Departmental Representative. Stockpile granular materials in manner to prevent

- segregation.
- .2 Protect fill materials from contamination.
- 3.4 Cofferdams, Shoring, Bracing and Underpinning .1 Construct temporary Works to depths, heights, and at locations as required to protect existing structures, embankment slopes, roadway embankment fill, etc. If required, temporary are works to be designed and stamped by a Professional Engineer registered in the Province of British Columbia.
- .2 During backfill operation:
- .1 Unless otherwise as indicated or as directed by Departmental Representative, remove sheeting and shoring from excavations.
- .2 Do not remove bracing until backfilling has reached respective levels of such bracing.
- .3 Pull sheeting in increments that will ensure compacted backfill is maintained at an elevation at least 500mm above toe of sheeting.
- .3 When sheeting is required to remain in place, cut off tops at elevations as indicated.
- 3.5 Dewatering and Heave Prevention .1 Keep excavations free of water while Work is in progress.
- .2 Submit for Departmental Representative's review details of proposed dewatering or heave prevention methods, such as dikes, well points, and sheet pile cut-offs, if required.
- .3 Avoid excavation below groundwater table if quick condition or heave is likely to occur. Prevent piping or bottom heave of excavations by groundwater lowering, sheet pile cut-offs, or other means.
- .4 Protect open excavations against flooding and damage due to surface run-off.
- .5 Dispose of water in accordance with Section 013543 - Environmental Protection and in manner not detrimental to public and private property or any portion of Work completed or under construction.
- .6 Provide silt fences, settling basins, or other treatment facilities to remove suspended solids or other materials before discharging to water courses or drainage areas.
-

- 3.6 Excavation
- .1 Excavate to lines, grades, elevations and dimensions as indicated on the drawings or as required.
  - .2 Perform wingwall / excavation work symmetrically about the centreline of bridge both longitudinally and transversely. i.e. soil pressure loads to be balanced on both abutments during the course of the work.
  - .3 Excavate only the required soil underneath of the bridge to complete the work at hand (i.e. perform the excavation work in stages). Install the top parts of the wingwalls first and work downwards below ground. This will help eliminate the potential for embankment fill sloughing. Also, as work proceeds downwards, install the wall components between the concrete abutment columns first before outside of the concrete columns.
  - .4 Excavation work to be as minimal as possible.
  - .5 Excavation must not interfere with capacities of adjacent foundations and roadway fills. It is the Contractor's responsibility to determine if any temporary works are required to maintain stabilities during construction.
  - .6 Do not disturb soil within branch spread of trees or shrubs that are to remain. If excavating through roots, excavate by hand and cut roots with sharp axe or saw.
  - .7 Dispose of surplus and unsuitable excavated material in approved location off site.
  - .8 Do not obstruct flow of surface drainage or natural watercourses.
  - .9 Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic matter.
  - .10 Notify Departmental Representative when bottom of excavation is reached.
  - .11 Obtain Departmental Representative approval of completed excavation.
  - .12 Correct unauthorized over-excavation as follows:
    - .1 Fill under bearing surfaces and footings with fill concrete.
    - .2 Fill under other areas with Type 2 fill compacted to not less than 95% of corrected maximum dry density.
-

- .13 Hand trim, make firm, and remove loose material and debris from excavations. Where material at bottom of excavation is disturbed, compact foundation soil to density at least equal to undisturbed soil. Clean out rock seams and fill with concrete mortar or grout to approval of Departmental Representative.
- 3.7 Backfilling
- .1 Do not proceed with backfilling operations until Departmental Representative has approved.
- .2 Areas to be backfilled to be free from debris, snow, ice, water and frozen ground.
- .3 Do not use backfill material that is frozen or contains ice, snow or debris.
- .4 Place backfill material in uniform layers not exceeding 150mm compacted thickness up to grades indicated. Compact each layer before placing succeeding layer.
- .5 Backfilling around installations:
- .1 Place bedding and surround material as specified elsewhere.
- .2 Do not backfill around or over cast-in-place concrete within 24 hours after placing of concrete.
- .3 Place layers simultaneously at both ends of the bridge to equalize loadings on the structure as a whole. Difference not to exceed 0.3m from one abutment to the other.
- .4 Where temporary unbalanced earth pressures are liable to develop on walls or other structures:
- .1 Permit concrete to cure for minimum 14 days or until it has sufficient strength to withstand earth and compaction pressure and approval obtained from Departmental Representative or:
- .2 If approved by Departmental Representative, erect bracing or shoring to counteract unbalance, and leave in place until removal is approved by Departmental Representative.
- .6 Install drainage system, in backfill if indicated by Departmental Representative.
- .7 Care must be taken next to existing structures and next to new
-

structures when performing backfilling operations.

3.8 Restoration

- .1 Upon completion of Work, remove waste materials and debris in accordance to Section 017419 - Waste Management and Disposal, trim slopes, and correct defects as directed by Departmental Representative.

**END OF SECTION**

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**PART 1 - GENERAL**

- 1.1 Measurement for Payment
- .1 No separate payment for Roadway Excavation, Embankment, and Compaction operations. Payments for such Work to be included in Lump Sums of other items in this Contract.
  - .2 The excavations in the roadway shall be the minimum required for the installation of the Wingwall components and for performing the Integral Abutment Work..
  - .3 Contractor to repair portions of roadway damaged (intentionally or not) during construction to Departmental Representative's approval.
  - .4 Quantity calculations and surveys will be carried out by a qualified third-party surveyor provided by the Contractor.
  - .5 No separate payment will be made for surveys or quantity calculations. Include surveys and quantity calculations in all Work as part of total contract amount.
  - .6 No extra payment will be made for:
    - .1 Excavating unnecessarily beyond lines established by Departmental Representative, with exception of unavoidable slide material. Slide material not to be measured when such slides are attributable to Contractor's negligence.
    - .2 Scarifying or benching existing slopes or existing road surfaces.
    - .3 Removing and disposing of roots, stumps and other materials excavated during waste operation.
    - .4 Removing and disposing of existing culverts from old road.
    - .5 Removing unsuitable material from embankment attributable to Contractor's negligence.
    - .6 Watering, drying and compacting.
    - .7 Finishing and shaping.
    - .8 Placing of excavated material.
    - .9 Removing and disposing of subgrade boulders.
-

- 1.2 Source of Select Subgrade Material .1 A source of select subgrade material is located in the new right of way at 641+580 and 642+300.
- .2 The contractor will be allowed to extract select subgrade material from this source, for processing to provide select subgrade granular material, if required.
- 1.3 References .1 ASTM D698-00a, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft) (600 kN-m/m).
- 1.4 Definitions .1 Rock Excavation: excavation of:
- .1 Material from solid masses of igneous, sedimentary or metamorphic rock that, prior to removal, was integral with parent mass. Material that cannot be ripped with reasonable effort from Caterpillar D9L or equivalent to be considered integral with parent mass.
- .2 Boulder or rock fragments measuring in volume one cubic metre or more.
- .2 Common Excavation: excavation of materials that are not Rock Excavation or Stripping Excavation.
- .3 Stripping Excavation: excavation of organic material covering original ground.
- .4 Embankment: material derived from usable excavation and placed above original ground or stripped surface up to top of subgrade.
- .5 Waste material: material other than Stripping Excavation that is unsuitable for embankment construction or material surplus to requirements.
- .6 Borrow material: material obtained from areas outside right-of-way and required for construction of embankments or for other portions of work.
- .7 Topsoil: material capable of supporting good vegetative growth and suitable for use in top dressing, landscaping, and seeding.
- .8 Road Reclamation: excavation of existing road bed shall be treated as Common Excavation.
- 1.5 Requirements of Regulatory Agencies .1 Adhere to Provincial and Federal Environmental requirements if potentially toxic materials are involved.
-

- 1.6 Waste Management and Disposal .1 Separate and recycle waste materials in accordance with Section 017419 – Waste Management and Disposal.

PART 2 – PRODUCTS

- 2.1 Materials .1 Embankment materials require approval by Departmental Representative.
- .2 Material used for embankment not to contain more than 3% organic matter by mass, frozen lumps, weeds, sod, roots, logs, stumps, or any other unsuitable material.
- .3 Embankment material may come from the existing road bed if approved by Departmental Representative.

PART 3 - EXECUTION

- 3.1 Compaction Equipment .1 Compaction equipment must be capable of obtaining required densities in materials on project. Equipment that does not achieve specified densities must be replaced or supplemented.
- .2 Operate minimum equivalent of one 12 tonne vibratory packer continuously in each embankment when placing material.
- .3 Care must be taken next to existing structures and next to new structures when performing compaction operations.
- 3.2 Water Distributors .1 Apply water with equipment capable of uniform distribution.
- 3.3 Stripping .1 Commence topsoil stripping of areas as indicated after brush, weeds and grasses have been removed from these areas.
- .2 Strip to depths as indicated or as necessary to remove all organic material.
- .3 Do not mix topsoil with subsoil.
- .4 Stockpile in locations in accordance with Contract Documents or as directed by Departmental Representative.
- .5 Dispose of unused stripped topsoil in accordance with Contract Documents or as directed by Departmental Representative.
- .6 Prevent clearing and grubbing debris from mixing with stripped topsoil.
-

- .7 Upon completion of excavation and embankment construction spread stripped topsoil on slopes and trim, as directed by the Departmental Representative.
  
  - 3.4 Excavating
    - .1 General:
      - .1 Notify Departmental Representative whenever waste materials are encountered. Remove to depth and extent directed.
      - .2 Sub-excavate 600mm below design subgrade in excavations and embankments unless otherwise directed. Compact each layer to minimum 95% standard dry density, and compact top 150mm below sub-excavate to minimum 100% maximum dry density, to ASTM D698 and ASTM D4718. Replace with approved embankment material and compact.
      - .3 Where subgrade is on transition from excavation to embankment treat ground slopes at grade points in accordance with typical drawing, or as directed by Departmental Representative.
    - .2 Drainage:
      - .1 Maintain profiles, crowns and cross slopes to provide good surface drainage.
      - .2 Provide ditches as work progresses to provide drainage.
      - .3 Construct interceptor ditches as shown on plans or as directed before excavating or placing embankment in adjacent area.
    - .3 Rock Excavation:
      - .1 If, during excavation, material appearing to conform to classification for rock is encountered, notify Departmental Representative and provide sufficient time to take measurements to determine volume of rock.
      - .2 Shatter rock to 300mm below subgrade elevation or as indicated on plans, if required.
    - .4 Borrow Excavation:
      - .1 Completely use in embankments, suitable materials removed from right-of-way excavations before taking material from borrow areas.
-

- .2 Departmental Representative to designate extent of borrow areas and depth of excavation.
- 3.5 Embankments
- .1 Scarify or bench existing slopes in side hill or sloping sections to ensure proper bond between new materials and existing surfaces.
- .2 Break up or scarify existing road surface prior to placing embankment material.
- .3 Do not place material which is frozen nor place material on frozen surfaces.
- .4 Maintain crowned surface during construction to ensure ready run-off of surface water.
- .5 Drain low areas before placing materials.
- .6 Place and compact to full width in layers not exceeding 20 mm loose thickness. Departmental Representative may authorize thicker lifts if specified compaction can be achieved and if material contains more than 25% by volume stone and rock fragments larger than 100mm.
- .7 Where material consists of rock:
- .1 Place to full width in layers of sufficient depth to contain maximum sized rocks, but in no case is layer thickness to exceed 1m.
- .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 an earth-tight surface.
- .4 Do not place boulders and rock fragments with dimensions exceeding 150mm within 300mm of subgrade elevation.
- .8 Embankments to be sloped to Departmental Representative's requirements. Intent is that slopes be as gentle as possible within limitations of site geometry. Intent is that slopes to be reinforced with riprap to prevent future roadway embankment and river slope erosion, scour, migration, etc.
- 3.6 Subgrade Compaction
- .1 Break material down to sizes that enable required compaction and mix for uniform moisture to full depth of layer.
-

- .2 Compact each layer to minimum 95% maximum dry density, to ASTM D698 and ASTM D4718 except top 150mm of subgrade. Compact top 150 mm to 100% maximum dry density.
  - .3 Add water or dry as required to bring moisture content of materials to level required to achieve specified compaction.
- 3.7 Finishing
- .1 Shape entire roadbed to within 25mm of design elevations and to Departmental Representative's satisfaction.
  - .2 Finish slopes and ditch bottoms to neat condition, true to lines, grades and drawings where applicable.
  - .3 Remove rocks over 150mm in any dimension from slopes and ditch bottoms.
  - .4 Hand finish slopes that cannot be finished satisfactorily by machine.
  - .5 Round top of backslope 1.5 m on both sides of top of slope.
  - .6 Trim between constructed slopes and edge of clearing to provide drainage and free of humps, sags, ruts, and protruding stones.
- 3.8 Protection
- .1 Maintain finished surfaces in condition conforming to this Section until placement of subsequent materials.

**END OF SECTION**

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### PART 1 - GENERAL

- 1.1 Measurement for Payment
- .1 All materials and Work required by this Section is to be included as a Lump Sum item in this Contract.
  - .2 Work under this Contract is to include:
    - .1 Existing riprap which is in the way of completing the Work of this Contract shall be removed by the Contractor during the Work.
    - .2 At the completion of the Contract riprap is to be replaced underneath of the structure on each abutment embankment slope to the requirements of the Contract Drawings.
  - .3 Note that any additional riprap to be placed in any other locations is as per instruction by the Departmental Representative. This Work is to be completed at an agreed upon price between the Contractor and the Departmental Representative.
- 1.2 Source of Riprap
- .1 Riprap for this project is available at km 650.0, Alaska Highway.
  - .2 Coordinate extraction of riprap from this site with the work of other Contractors extracting riprap there.
  - .3 Monitor and report sizes and amounts of riprap extracted from this site to the Departmental Representative.
  - .4 Complete quarry restorations to the satisfaction of the Departmental Representative.

### PART 2 – PRODUCTS

- 2.1 Stone
- .1 Hard, dense, durable quarry stone, angular in shape, resistant to weathering and water action, free from overburden, spoil, shale or shale seams, and organic material, with all stones having maximum dimension not greater than three times its least dimension, to meet following size distribution:

Class of Riprap (kg)	Nominal Thickness of Riprap (mm)	Rock Gradation: Percentage Larger Than Given Rock Mass		
		85%	50%	15%
10	350	1 kg	10 kg	30 kg
25	450	2.5 kg	25 kg	75 kg
50	550	5 kg	50 kg	150 kg

500	1,200	50 kg	500 kg	1,500 kg
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- .2 The minimum acceptable unit weight of the rock is 2.5 tonnes/cubic metre.

### PART 3 - EXECUTION

- 3.1 Processing .1 Process riprap uniformly using methods that prevent contamination, segregation, and degradation.
- 3.2 Handling .1 Handle and transport riprap to avoid segregation, contamination, and degradation.
- 3.3 Excavation .1 Include protection procedures to minimize disturbance of the river bed in the Environmental Control of Operations (ECO) Plan as specified in Section 013543 – Environmental Protection.
- .2 At least 2 weeks prior to performing Riprap Work, Contractor to provide Departmental Representative with a Construction Sequence for the Work. Do not proceed with the Work until approval has been received from the Departmental Representative.
- 3.4 Placing .1 Where riprap is to be placed on slopes, excavate trench at toe of slope first, if and where instructed by the Departmental Representative.
- .2 Where riprap is to be placed, fine grade the area first to provide a uniform and even surface, if and where instructed by the Departmental Representative. Fill any depressions with suitable materials and compact to provide a firm bed.
- .3 Place stones to secure the surface of the slope and create a stable mass. Place larger stones at the bottom of the slopes.
- .4 Use larger stones for lower courses and as headers for subsequent courses.
- .5 Stagger vertical joints and fill voids with rock spalls or cobbles.
- .6 Finished surface to be reasonably uniform and even, free from bumps, depressions, underlying voids, large openings, or individual stones projecting out above apparent surface.
- .7 Place riprap prior to permitting water to pass through slope drains, as applicable.
- .8 Be careful not to damage the structure (new and existing
-

components) in any way during riprap movement. Any damages shall be repaired at the expense of the Contractor.

- .9 Place layers simultaneously at both ends of the bridge to equalize loadings on the structure as a whole. Difference not to exceed 0.3m from one abutment to the other.
- .10 Embankments to be sloped to Departmental Representative's requirements. Intent is that slopes be as gentle as possible within limitations of site geometry. Intent is that slopes to be reinforced with riprap to prevent future roadway embankment and river slope erosion, scour, migration, etc.

**END OF SECTION**

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**PART 1 - GENERAL**

- 1.1 Measurement for Payment .1 No separate payment for Select Granular Sub-grade Fill work. Payments for such work to be included in Lump Sums of other items in this Contract.
- 1.2 References .1 ASTM C117, Standard Test Method for Materials Finer than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing.
- .2 ASTM C136, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
- .3 ASTM D698-00a, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup> (600 kN-m/m<sup>3</sup>)).
- .4 ASTM D4718, Standard Practice for Correction of Unit Weight and Water Content for Soils Containing Oversize Particles.
- .5 ASTM D4318, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
- .6 CAN/CGSB-8.1, Sieves, Testing, Woven Wire, Inch Series.
- 1.3 Definitions .1 Select Granular Sub-grade Fill: Material excavated from within right-of-way and from designated borrow locations that meets specified gradation and material requirements and will be incorporated into embankment.

**PART 2 - PRODUCTS**

- 2.1 Materials .1 Select Granular Sub-grade Fill: native material selected or blended to following requirements:
- .1 Gradations to be within limits specified when tested to ASTM C136-01 and ASTM C117-95 and to exhibit smooth curve when plotted on semi-log gradation chart. Sieve sizes to CAN/CGSB-8.1.

- .1 Gradation to:

Sieve Designation	% Passing
100 mm	100
5.0 mm	20 – 65
0.075 mm	0 – 8

- .2 Material passing 0.425 mm sieve size to have:
  - .1 Liquid limit: to ASTM D4318-00, maximum 25.
  - .2 Plasticity index: to ASTM D4318-00, maximum 6.
- .3 Placed and compacted material will not rut when loaded tandem truck is passed over it.

### PART 3 - EXECUTION

- 3.1 Inspection of Sub-grade Surface
    - .1 Place Select Granular Sub-grade Fill after underlying surface is inspected and accepted by Departmental Representative.
  - 3.2 Placing
    - .1 Place Select Granular Sub-grade Fill to depths and grades indicated.
    - .2 Begin spreading Select Granular Sub-grade Fill material on crown line or on high side of one-way slope.
    - .3 Place material in uniform layers not exceeding 200 mm compacted thickness. Departmental Representative may authorize thicker lifts (layers) if specified compaction can be achieved.
    - .4 Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.
    - .5 Remove and replace segregated material.
  - 3.3 Compacting
    - .1 Compact to 100% maximum dry density, to ASTM D698-00a and ASTM D4718.
    - .2 Shape and roll alternately to obtain smooth, even and uniformly compacted structure.
    - .3 Add water or dry as required to bring moisture content of materials to level required to achieve specified compaction.
  - 3.4 Finish Tolerance
    - .1 Finished compacted surface to be plus or minus 25 mm of established grade and cross section.
    - .2 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.
  - 3.5 Maintenance
    - .1 Maintain finished Select Granular Sub-grade Fill in condition conforming to this Section until acceptance by Departmental Representative and succeeding material is applied.
-

- .2 Apply dust control measures as required.
- .3 Ensure that Select Granular Sub-grade Fill surface is in properly compacted state prior to application of succeeding material.

**END OF SECTION**

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**PART 1 - GENERAL**

- 1.1 Measurement for Payment .1 No separate payment for Granular Sub-base work. Payments for such work to be included in Lump Sums of other items in this Contract.
- 1.2 References .1 ASTM C117, Standard Test Method for Materials Finer than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing.
- .2 ASTM C136, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
- .3 ASTM D698-00a, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup> (600 kN-m/m<sup>3</sup>)).
- .4 ASTM D4718, Standard Practice for Correction of Unit Weight and Water Content for Soils Containing Oversize Particles.
- .5 ASTM D1557, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup>(2,700 kN-m/m<sup>3</sup>)).
- .6 ASTM D4318, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
- .7 CAN/CGSB-8.1, Sieves, Testing, Woven Wire, Inch Series.
- .8 CAN/CGSB-8.2, Sieves, Testing, Woven Wire, Metric.
- 1.3 Stockpile Handling .1 Stockpile aggregates in accordance with Section 310516 - Aggregates: General.
- .2 Handle and transport aggregate to avoid segregation, contamination, and degradation.
- .3 Leave stockpile in tidy, well-drained condition, free of standing surface water.
- .4 Leave any unused aggregates in neat compact stockpiles as directed.
- .5 Stockpile minimum 50% of total aggregate required prior to commencing placing.

**PART 2 - PRODUCTS**

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- 2.1 Materials
- .1 Granular Sub-base: material to Section 310516 – Aggregates and following requirements:
- .1 Crushed stone or gravel.
- .2 Gradations to be within limits specified when tested to ASTM C136 and ASTM C117. Sieve sizes to CAN/CGSB-8.1.
- .1 Gradation to:
- | Sieve Designation | % Passing |
|-------------------|-----------|
| 50 mm             | 100       |
| 31.5 mm           | 63 – 100  |
| 12.5 mm           | 38 – 71   |
| 4.75 mm           | 22 – 54   |
| 2.00 mm           | 13 – 42   |
| 0.425 mm          | 5 – 24    |
| 0.075 mm          | 2 – 8     |
- .2 Liquid limit: to ASTM D4318, maximum 25.
- .3 Plasticity index: to ASTM D4318, maximum 6.
- .4 Crushed particles: at least 20% of particles by mass retained on 4.75 mm sieve to have at least one freshly fractured face.

**PART 3 – EXECUTION**

- 3.1 Sequence of Operation
- .1 Stockpile Granular Sub-base as specified under Section 310516 – Aggregates.
- .2 Place Granular Sub-base after subgrade is inspected and accepted by Departmental Representative.
- .3 Placing:
- .1 Construct Granular Sub-base to depth and grade in areas indicated.
- .2 Ensure no frozen material is placed.
- .3 Place material only on clean unfrozen surface, properly shaped and compacted, and free from snow and ice.
- .4 Begin spreading sub-base material on crown line or on high side of one-way slope.

- .5 Place material using methods which do not lead to segregation or degradation of aggregate.
  - .6 Place material to full width 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 that portion of layer in which material becomes segregated during spreading.
  - .4 Compaction Equipment:
    - .1 Compaction equipment to be capable of obtaining required material densities.
  - .5 Compacting:
    - .1 Compact to density not less than 100% maximum dry density in accordance with ASTM D698-00a and D4718.
    - .2 Shape and roll alternately to obtain smooth, even and uniformly compacted sub-base.
    - .3 Apply water as necessary during compacting to obtain specified density.
    - .4 Dry gravel if granular sub-base is excessively moist.
    - .5 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers.
    - .6 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.
  - 3.2 Site Tolerances
    - .1 Finished sub-base surface to be within plus or minus 25 mm of established grade and cross section.
  - 3.3 Maintenance
    - .1 Maintain finished Granular Sub-base in condition conforming to this Section until acceptance by Departmental Representative and until succeeding material is applied.
    - .2 Apply dust control measures as required.
-

- .3 Ensure that Granular Sub-base surface is in properly compacted state prior to application of succeeding material.

**END OF SECTION**

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**PART 1 - GENERAL**

- 1.1 Measurement for Payment .1 No separate payment for Granular Base work. Payments for such work to be included in Lump Sums of other items in this Contract.
- 1.2 References .1 ASTM C117, Standard Test Method for Materials Finer than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing.
- .2 ASTM C131, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
- .3 ASTM C136, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
- .4 ASTM D698, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup> (600 kN-m/m<sup>3</sup>)).
- .5 ASTM D4718, Standard Practice for Correction of Unit Weight and Water Content for Soils Containing Oversize Particles.
- .6 ASTM D1557, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup>(2,700 kN-m/m<sup>3</sup>)).
- .7 ASTM D1883, Standard Test Method for CBR (California Bearing Ratio) of Laboratory Compacted Soils.
- .8 ASTM D4318, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
- .9 CAN/CGSB-8.1, Sieves, Testing, Woven Wire, Inch Series.
- .10 CAN/CGSB-8.2, Sieves, Testing, Woven Wire, Metric.
- 1.3 Stockpile Handling .1 Stockpile aggregates in accordance with Section 310516 - Aggregates.
- .2 Handle and transport aggregate to avoid segregation, contamination, and degradation.
- .3 Deliver and leave stockpile in tidy, well-drained condition, free of standing surface water.
- .4 Leave any unused aggregates in neat compact stockpiles as directed.
-

- .5 Stockpile minimum 50% of total aggregate required prior to commencing placing.

**PART 2 - PRODUCTS****2.1 Materials**

- .1 Granular base: material to Section 310516 - Aggregates and following requirements:
- .1 Crushed stone or gravel.
- .2 Gradations to be within limits specified when tested to ASTM C136 and ASTM C117. Sieve sizes to CAN/CGSB-8.1.

- .1 Gradation to:

<b>Sieve Designation</b>	<b>% Passing</b>
19 mm	100
12.5 mm	70 - 100
9.5 mm	-
4.75 mm	40 - 70
2.00 mm	23 - 50
0.425 mm	7 - 25
0.180 mm	-
0.075 mm	3 - 8

- .2 Liquid limit: to ASTM D4318, maximum 25.
- .3 Plasticity index: to ASTM D4318, maximum 6.
- .4 Crushed particles: at least 60% of particles by mass retained on 4.75 mm sieve to have at least one freshly fractured face.

**PART 3 - EXECUTION****3.1 Sequence of Operation**

- .1 Stockpile Granular Base as specified under Section 310516 - Aggregates.
- .2 Place Granular Base after underlying surface has been placed to within tolerances.
- .3 Placing:
- .1 Construct Granular Base to depth and grade in areas indicated.

- .2 Ensure no frozen material is placed.
  - .3 Place material only on clean unfrozen surface, properly shaped and compacted, and free from snow and ice.
  - .4 Begin spreading base material on crown line or on high side of one-way slope.
  - .5 Place material using methods which do not lead to segregation or degradation of aggregate.
  - .6 Place material to full width in uniform layers not exceeding 300 mm compacted thickness.
  - .7 Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.
  - .8 Remove and replace that portion of layer in which material becomes segregated during spreading.
- .4 Compaction Equipment:
- .1 Compaction equipment to be capable of obtaining required material densities.
- .5 Compacting:
- .1 Compact to density not less than 100% maximum dry density in accordance with ASTM D698 and D4718.
  - .2 Shape and roll alternately to obtain smooth, even, and uniformly compacted base.
  - .3 Apply water as necessary during compacting to obtain specified density.
  - .4 Dry gravel if Granular Base is excessively moist.
  - .5 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers.
  - .6 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.
- 3.2 Site Tolerances
- .1 Finished base surface to be within plus or minus 25 mm of established grade and cross section.
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- 3.3 Maintenance
- .1 Maintain finished Granular Base in condition conforming to this section until acceptance by Departmental Representative and until succeeding material is applied.
  - .2 Apply dust control measures as required.
  - .3 Ensure that Granular Base surface is in properly compacted state prior to application of succeeding material.

**END OF SECTION**

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PART 1 - GENERAL

- 1.1 Description
  - .1 This section specifies requirements for application of emulsified asphalt followed by applications of aggregate to roadway.
  - .2 Bituminous Surface Treatment aggregate will be supplied by Departmental Representative.
- 1.2 Measurement for Payment
  - .1 No separate payment for Bituminous Surface Treatment work. Payments for such work to be included in Lump Sums of other items in this Contract. Include repairing, replacing, or disposing of failed surface treatment associated with this Work.
- 1.3 Product Acceptance
  - .1 The completed Bituminous Surface Treatment shall be free of surface defects as described in paragraph 1.3.2 and may be rated by the Departmental Representative for satisfactory performance at any time within 30 days of completion.
  - .2 Performance rating will be in accordance with the criteria described in the following Tables, 1.3.2.1 – Surface Defect Parameters and 1.3.2.2 – Density of Surface Defects.

Table 1.3.2.1 – Surface Defect Parameters

Surface Defects	Severity	Rating Parameters
Loss of Cover Aggregate (Ravelling)	Very Good	No noticeable aggregate loss
	Good	A few pock marks, less than 5 per 0.09 m <sup>2</sup>
	Fair	Frequent pock marks closely spaced, more than 6 per 0.09 m <sup>2</sup>
	Poor	Extensive pock marks or few surface disintegrations
	Very Poor	Disintegration with potholes
Potholes	Very Good	Few minor potholes, only involves B.S.T.
	Good	Few deep potholes, involves granular base
	Fair	Intermittent sections with asphalt on surface
	Poor	Frequent sections with asphalt on surface, has wet look or asphalt on surface throughout
	Very Poor	Wet look with tire noise like a wet pavement
Total Failure	Any	Any condition where the asphalt material softens or disintegrates under traffic and aggregate is pick up or “kicked off” by traffic

Table 1.3.2.2 – Density of Surface Defects

Density of Surface Defects	Ravelling	Potholes	Flushing/Bleeding
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Units	(% Length)	(Numbers)	(% Length)
Few	<5%	<5	<5%
Intermittent	>5% <20%	>5 <15	>5% <20%
Frequent	>20% <50%	>15 <30	>20% <50%
Extensive	>50% <80%	>30 <50	>50% <80%
Throughout	>80%	>50	>80%

(based on % of surface area affected per 0.5 lane km length of Bituminous Surface Treatment application)

- .3 The Departmental Representative will notify the Contractor in writing of the requirement for repairs/replacement of failed Bituminous Surface Treatment.
- .4 At the sole cost of the Contractor, complete repair/replacement of failed surface treatments within 30 days of notification by the Departmental Representative in accordance with the requirements of Table 1.3.4.1. When surface condition is a safety concern, complete repair/replacement of failed surface treatments within 7 days of notification by the Departmental Representative. Any materials used in repair/replacement of failed surface treatments shall be consistent with those originally specified in the Contract or otherwise approved by the Departmental Representative.

Table 1.3.4.1 – Surface Treatment Repair/Replacement Criteria

Surface Defect	Severity	Repair/Replacement Method
Loss of Cover Aggregate (Ravelling)	Very Good/Good	None
	Fair/Poor/Very Poor	Reseal of affected area ***
Potholes	Very Good/Good	All potholes to be filled with asphaltic patching material and reseal
	Fair/Poor/Very Poor	Patch potholes and reseal affected area ***
Flushing/ Bleeding	Very good/Good	None
	Fair	Application of sand blotter.
	Poor/Very Poor	Reseal of affected area, removal of initial surface treatment at Contractor's option.
Total Failure	Any	Remove and dispose of failed surface treatment in its entirety and apply new surface treatment.

Note: \*\*\*Reseal shall consist of a new bituminous surface treatment single application. Area of the Reseal repair/replacement shall not be less than one application width x 10 metres in length. If there is less than 10 metres between two sections in the application pass designated for repair/replacement,

the repair/replacement shall be continuous.

## PART 2 - PRODUCTS

- 2.1 Materials
- .1 Supply asphalt material CAN 2-16.5-M84 Grade HF150S emulsified asphalt with anti-stripping agent added at manufacturer's suggested rate.
  - .2 Include removal and disposal of emulsion products received and stored that show signs of separation or that are not homogeneous.
  - .3 If Contractor elects to incorporate non-traditional material components such as, but not limited to, crude oil, waste products and industrial or manufacturing by-products in the High Float emulsified asphalt, the Departmental Representative must be advised in writing before any material is supplied.
  - .4 Submit to the Departmental Representative, prior to supplying any material, Material Safety Data Sheets for the finished product and all component products.
- 2.2 Application Rates
- .1 Apply asphaltic material at minimum rate of 1.8 litres per square metre on overlay and minimum 2.2 litres per square metre on granular base.
  - .2 Apply aggregates at rate to ensure coverage and minimize wastage (nominally 19 mm thick).
  - .3 Submit proposed job design application rates to the Departmental Representative one week prior to application of Bituminous Surface Treatment.

## PART 3 - EXECUTION

- 3.1 Equipment
- .1 Pressure Distributor:
    - .1 Distributor to be designed, equipped, maintained, and operated so that asphalt material at even temperature may be applied uniformly on variable widths of surface up to 4.88 m at readily determined and controlled rates from (0.3 to 5.5) L/m<sup>3</sup> The litres of asphalt emulsified loaded onto pressure distributor are to be metered for purposes of checking application rates.
    - .2 Capable of distributing asphalt material in uniform spray without atomization at rate and temperature required.
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- .3 Equipped with easily read, accurate, and sensitive device that registers temperature of liquid in reservoir.
  - .4 Equipped with 4.88 metre minimum length spray bar capable of vertical adjustment and of instant full opening and positive cut-off complete with rotary adjustable spray nozzles, designed to ensure uniform fan shaped delivery overlapping to produce uniformly spread surface.
  - .2 Mechanical Aggregate Spreader:
    - .1 A self-propelled unit of approved design supported by at least four wheels equipped with pneumatic tires on two axles. Aggregate spreader to be equipped with positive controls in order that required amount of material will be deposited uniformly over full width of asphalt material.
  - .3 Rollers:
    - .1 Self-propelled pneumatic tired rollers.
- 3.2 Preparation
- .1 Obtain approval of existing surface of Granular Base before applying asphalt surface treatment material.
  - .2 Finish surface of Granular Base to specified grade and cross section in accordance with Section 312413 – Roadway Excavation, Embankment and Compaction. Immediately before asphalt binder is applied, broom or otherwise clean as necessary to remove foreign material.
- 3.3 Application
- .1 Schedule work to the approval of Departmental Representative.
  - .2 Apply asphalt material using approved pressure distributor at rate required. Apply aggregate at rate required following application of asphalt material. All asphalt material to be covered with aggregate. Roll surface after applying aggregate. Broom surface as required to minimize motor-vehicle damage from loose cover aggregate.
  - .3 Apply Bituminous Surface Treatment to cover full design width in a maximum of three passes.
- 3.4 Workmanship
- .1 Layout and construct edges parallel to centreline and true to designated design.
  - .2 Construct longitudinal and transverse joints so as to prevent surface irregularities that would impede moisture runoff or affect vehicle ride or steering.
-

- .3 Construct Bituminous Surface Treatment to prevent surface corrugations or rutting greater than 12 mm or that affect vehicle ride.
  - .4 Construct required repair/replacement patches to prevent surface irregularities that would impede moisture runoff or affect vehicle ride or steering.
  - .5 Begin sweeping no sooner than 36 hours after application of Bituminous Surface Treatment.
- 3.5 Traffic Control
- .1 Direct traffic through project using warning signs, flagpersons and pilot car in accordance with Section 013500 – Special Procedures for Traffic Control.
  - .2 Pilot traffic continually through applied Bituminous Surface Treatment sections until completion of first sweeping.
  - .3 Keep traffic off freshly sprayed asphalt.
  - .4 If necessary to route traffic over new treatment restrict speed to 10 km/hr or less, until rolling is completed and asphalt has taken initial set.

**END OF SECTION**

**PART 1 - GENERAL**

- 1.1 Measurement for Payment .1 No separate payment will be made for ongoing dust control. Include ongoing water dust control in all Work as part of Lump Sum amounts.
- .2 Supply and apply calcium chloride as part of dust control only if directed to do so by the Departmental Representative.
- 1.2 Definition .1 Flake equivalent tonne: Unit used to convert aqueous calcium chloride to its equivalent mass of Type S, Grade 1, regular 77% flake calcium chloride. It is calculated as follows:
- $$FE = M \times C / 77,000$$
- Where: FE = Number of flake equivalent tonnes.  
M = mass of solution in kilograms.  
C = percentage of calcium chloride in solution.
- 1.3 References .1 Canadian General Standards Board (CGSB):
- .1 CAN/CGSB-15.1, Calcium Chloride.
- 1.4 Delivery Storage and Handling .1 Supply calcium chloride in quantities and at times as directed by Departmental Representative.
- .2 Indicate name of manufacturer, name of product, net weight or mass, and percentage of calcium chloride guaranteed by manufacturer.
- .3 Store bags of calcium chloride in weather-proof enclosures.
- .4 Supply calcium chloride as 35% aqueous solution.
- 1.5 Waste Management and Disposal .1 Separate and recycle waste materials in accordance with Section 017419 - Waste Management and Disposal.
- .2 Place materials defined as hazardous or toxic in designated containers.

**PART 2 - PRODUCTS**

- 2.1 Materials .1 Calcium chloride flakes: to CAN/CGSB-15.1, Type S: Grade 1 (77%), Class A.
- .2 Aqueous calcium chloride: to CAN/CGSB-15.1, Class 1 or 2, 35% concentration by weight of anhydrous product.
-

- .3 Water: to Departmental Representative's approval.

### PART 3 - EXECUTION

#### 3.1 Application

- .1 Apply calcium chloride after final grading of Granular Base is accepted and directed by Departmental Representative.
- .2 Apply calcium chloride with equipment capable of an application rate of 5 flake equivalent tonnes/km unless otherwise directed.
- .3 Apply aqueous calcium chloride (or water) with distributors equipped with means of shut-off and with spray system to ensure uniform application.
- .4 Apply calcium chloride flakes uniformly over the centre 7 metres of highway at a rate of 5 flake equivalent tonnes/km unless otherwise directed.
- .5 Immediately after applying calcium chloride flakes, apply water at rate of 15 tonnes/km or until calcium chloride spreads to edge of highway.
- .6 Apply water with distributors equipped with means of shutoff and with spray systems to ensure uniform application.

**END OF SECTION**

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**PART 1 - GENERAL**

- 1.1 Requirements for Working Within or Near Watercourses
- .1 Activities which involve Work within or near waterways should be first coordinated with the Departmental Representative and must always follow applicable legislation/regulations and the Contractor's Environmental Control of Operations (ECO) Plan which is outlined in Section 013543 – Environmental Protection.
  - .2 Comply with Department of Fisheries and Oceans' regulations (DFO) and Ministry of Environment's (MOE) regulations attached to these specifications (i.e.: 'DFO Bridge Maintenance Standard Operating Procedures' and 'MOE Standards and Best Practices for In-stream Work').
  - .3 Keep all Approved activities within wetted perimeters to an absolute minimum.
  - .4 Do not operate construction equipment in waterways unless required by Contract.
  - .5 Do not dump excavated fill, waste material, or debris in waterways.
  - .6 Abide by all conditions of permits obtained from Provincial and Federal Government environmental agencies.
  - .7 Do not skid logs or construction materials across waterways.
  - .8 Obtain a license from Ministry of Environment (British Columbia) Water Division Branch for any domestic water intakes.
  - .9 Provide a buffer area of at least 50 metres between the construction camp and the waterway.
  - .10 Provide a buffer area of at least 50 metres between the storage and handling of fuels, lubricants, or other deleterious substances and the waterway.
  - .11 Do not store construction materials, debris, waste, etc. within 50 metres of any waterbody.
  - .12 Nothing should drop into the creek.
- 1.2 Basis for Payment
- .1 No separate payment will be made for preservation of watercourses. Include watercourse protection in all Work as part of total Contract amount.

**PART 2 – PRODUCTS**

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- 2.1 Preparation .1 Obtain work permits from governing federal and provincial conservation authorities as applicable.

**PART 3 - EXECUTION**

- 3.1 Existing Conditions .1 Maintain existing flow patterns in natural watercourse systems during completion of this Work.
- .2 Only interrupt the natural watercourse system as direct by the Departmental Representative or the Contract Documents for new riprap locations.
- 3.2 Site Clearing and Plant Protection .1 Conduct Work to provide minimal disturbance to vegetated areas. Protect all trees and plants onsite.
- .2 Maintain temporary erosion and pollution control features installed under this Contract.
- 3.3 Drainage .1 Pumping water containing suspended materials into watercourse is prohibited.
- .2 Establish rock chute spillways to accommodate safe surface water entry into watercourses as instructed by Departmental Representative as applicable.
- 3.4 Site Restoration .1 Replant vegetation natural to area, suitable for application without requirement for fertilizers, pesticides, and/or other chemicals in order to restore site to its former condition (before the Work under this Contract began) as instructed by Departmental Representative.
- .2 Establish vegetated buffer zones with suitable native vegetation to a minimum of 3m from water level at time of planting, along edge of watercourse banks as determined by Departmental Representative.
- .3 Extents of embankment riprap to be placed underneath of the bridge are as per the Departmental Representative.

**END OF SECTION**

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## Environmental Protection Plan (EPP) – Checklist

**Note:** This checklist was developed to assist the Contractor in determining and mitigating environmental issues at site. It is considered a generic checklist and it is in the Contractor's best interest to review the PWGSC Environmental Effects Evaluation (EEE) and/or the Fish and Fish Habitat Report as supporting documents in the completion of the site Environmental Protection Plan (EPP). Applicable provincial and federal guidelines and regulations should be reviewed prior to submission of the EPP.

EPP Framework	Content Requirements	Yes	No	N/A
<b>Project Setting and Site Activities</b>				
<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.			
<b>Project Schedule and Site Drawings</b>				
<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.			
<b>Potential Environmental Impacts and Controls</b>				
<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 Effects Evaluation, Environmental Assessments; Fish and Fish Habitat and Compensation Reports, Aquatics Effects Evaluations 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 and potentially upstream and downstream of proposed works. 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 PWGSC's responsibility however, the Contractor must be aware of the requirements of these approvals/authorizations. Permitting for water withdrawal from the water body as part of construction activities is part of the Contractor's responsibility. Scientific Collection Permits such as licences for Fish Salvage Permits are also the responsibility of the Contractor and are obtained by the Contractor's <b>environmental monitor/consultant*</b> who will be completing the salvage.			

<b>Mitigation Strategies</b>	Procedures, controls or best management practices (BMPs) to prevent or reduce adverse impacts on the environment are provided. For example, all work in BC must adhere to the BC MOE “Standards and Best Practices for Instream Works” for those works that are completed below the high water mark. DFO mitigation techniques under the Fisheries Act must also be followed. One useful document that contains information on Ministry of Environment’s ecosystems, guidelines and mitigation techniques is from the MOE Ecosystems Branch – Develop With Care 2014 – Environmental Guidelines for Urban and Rural Land Development in BC.			
<b>Erosion and Sediment Control</b>	Erosion and sediment controls are provided, as appropriate for the jurisdiction.			
<b>Waste Management and Hazardous Materials</b>				
<b>Waste Management and Hazardous Materials</b>	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, re-fuelling of equipment will be conducted at least 30m away from any active drainage courses.			
<b>EPP Implementation</b>				
<b>Site Representative</b>	Name(s) and contact details for the person(s) who will be the Contractor’s Site Representative(s) are provided.			
<b>Training and Communication</b>	Training and communication details are provided.			
<b>Monitoring and Reporting</b>	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.			
<b>Documentation</b>	Information and/or records that will be maintained relating to the EPP and end environmental matters on the project site are described.			
<b>EPP Update</b>	EPP review and update procedures are provided.			
<b>Environmental Emergency Response Procedures</b>				
<b>Environmental Emergency Response Procedures</b>	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.			

**\*Environmental Monitor/Qualified Professional as recognized by the province:** an applied scientist or technologist specializing in a relevant applied science or technology including, but not necessarily limited to, agronomy, forestry, biology, engineering, geomorphology, geology, hydrology, hydrogeology or landscape architecture, and who is registered in British Columbia with their appropriate professional organization, and acting under that association's Code of Ethics and subject to disciplinary action by that association, and who, through demonstrated suitable education, experience, accreditation and knowledge relevant to the particular matter, may be reasonably relied on to provide advice within their area of expertise.

***Environmental Effects Evaluation (EEE) Report***  
***(Sections 66-69 of***  
***Canadian Environmental Assessment Act (CEAA) 2012)***

***Public Works and Government Services Canada***  
***Culvert Replacement at KM 475***

***Alaska Highway, BC***

***PWGSC Project No. R.017173.058***

***Prepared by***  
***Public Works and Government Services Canada –***  
***Environmental Services***  
***Western Region, AB***

***January 2015***

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# Environmental Effects Evaluation Report – Culvert Replacement at KM 475

## Environmental Effects Evaluation Report – Culvert Replacement at KM 475

### ***PART A: PROJECT INFORMATION***

**Project Title:** Culvert Replacement at KM 475  
**Location:** KM 475 Alaska Highway  
**UTM Coordinates:** UTM 10N NAD83 500399E, 6525757N  
**Federal Authority:** Public Works and Government Services Canada

**Contact person:** Alex Taheri  
**Telephone:** (604) 836 8142

**EEE Assessor:** Laurie Crawford  
**Telephone:** (780) 271-8051

**PWGSC Project Number:** R.017173.058

### ***PART B: SCOPE OF PROJECT***

#### **Highway History**

The Alaska Highway stretches 2,450 kilometres through northern British Columbia, the Yukon and the State of Alaska. It was constructed during World War II in 1942 by the US Army Corps of Engineers to ensure land access to Alaska in the event of a Japanese invasion. About eighty percent (1,900 kms) of the Alaska Highway is in Canada. Mile “Zero” (or “Kilometre Zero”) is located in Dawson Creek, BC, with the terminus in Delta Junction, Alaska. The responsibility for the section from KM 133, north of Fort St. John, BC, to KM 968 at the BC/Yukon border, rests with Public Works and Government Services Canada (PWGSC).

The PWGSC section, is the principal land transportation link to Northern BC, the Yukon and Alaska from the rest of Canada and the lower 48 US States.

There is no federal legislation establishing the Alaska Highway. The Highway itself is built on land “owned” by the Province of BC. The Highway has a “map reserve” for 150 feet on either side of the centreline which effectively acts as a license to operate on this portion of land, with BC continuing to “own” it. Similarly the Highway operations (maintenance camps, gravel pits, quarries) have map reserves.

#### **Project Description**

The culvert crossing is located on an unnamed tributary, approximately 6 km upstream of Pouce Creek, in the Lower Muskwa River watershed and crosses under the Alaska Highway approximately 19 km north of the town of Fort Nelson. The culvert replacement activities will consist of the removal of the existing highway pavement surface, overburden soils and riprap materials, to expose the exiting corrugated metal pipe culvert. A total area of temporary disturbance is estimated at approximately 175 m<sup>2</sup>. Temporary material stockpiles will be stored nearby, outside of the high water mark. No additional vegetation clearing will be required for this work. Once the metal pipe culvert is removed, the stream channel will be excavated to allow for the larger replacement culvert. A pre-cast concrete box culvert will be assembled on site, in sections approximately 1.2 metres in length. Approximately 70 m<sup>2</sup> of additional fish habitat will be created, due to the use of a flat-bottomed culvert embedded into the natural stream substrate. The top of the culvert will be wrapped in geotextile fabric before covering with fill and re-paving of the overlying road surface. Class 2-3 rip-rap will be placed at the inlet and outlet of the culvert, extending above the ordinary high water mark to protect the stream banks and the highway

## Environmental Effects Evaluation Report – Culvert Replacement at KM 475

from potential erosion.

### Scheduling

The anticipated construction timeframe for the proposed culvert replacement is May 2015, subject to approvals/funding, with completion of works up to October 2015. Further scheduling considerations may be dependent upon recommendations from the province under Section 9 of the Water Act.

### Regulatory

#### Provincial

##### ***British Columbia Environmental Assessment Act (BCEAA):***

During an environmental assessment conducted in 2010 the Environmental Assessment Office (EAO) of the Province of British Columbia was contacted with a request for a determination of whether or not the Alaska Highway Program triggers the BCEAA. The EAO responded that a BCEAA is not triggered by our program because the requirement for an assessment under BCEAA with respect to highway improvements is quite specific, in that, unless the project involves the addition of more than two (2) lanes of paved public highway over a continuous distance of more than 20 km, a screening assessment under BCEAA is not required (Reviewable Projects Regulation (B.C. Reg. 370/2002)).

**The works proposed for the three sections of the highway will not involve the addition of more than two lanes of paved highway, therefore no EAO is required to screen the project under BCEAA.**

##### ***Water Act Water Regulation (BC/Reg. 204/88).***

Management of inland fisheries has largely been delegated to the provinces and the Yukon Territory although the administration of the fisheries protection provision remains with the federal government. However, provincial authorities deliver a range of natural resource conservation initiatives under various provincial statutes that complement those of the federal government. Arrangements between DFO and other federal, provincial and territorial authorities provide the mechanisms to collaborate on managing threats to fisheries (Fisheries Protection Policy Statement, DFO, 2013).

The BC Water Act is the main provincial statute regulating water resources in British Columbia. Under the Act, it is an offence to divert or use water, or alter a stream, without formal approval from the Province. Section 9 regulates changes in or about a stream and is set out to ensure that water quality, riparian habitat, and the rights of licensed water users are not compromised.

Part 7 of the Water Act Regulation permit the use of notifications rather than approvals for certain types of works; contain provisions for the protection of water quality, habitat, and other water users; and authorize changes to streams. Changes in and about a stream must be compliant with the requirement of the Water Act, and authorized by an approval licence, or order under Section 9 of the Water Act, or authorized through a Notification to the Ministry of Water, Land and Air Protection (WLAP) as permitted by Part 7 of the Regulation. Replacement and maintenance of culverts and outfalls, and temporary stream diversions around a worksite are activities that are allowed under the Notification process if they adhere to general standards and best practices. A Notification must be submitted to WLAP at least 45 days prior to modification or installation of a stream culvert for the purpose of a road, trail, or footpath.

The specific standards associated with permitting this type of work are described in Subsection 44(1)(a) of the provincial *Water Act Water Regulation*. Specifically, installation, maintenance or removal of a stream culvert for crossing a stream for the purposes of a road or trail stream crossing is permitted, provided that:

## Environmental Effects Evaluation Report – Culvert Replacement at KM 475

- equipment used for site preparation, construction, maintenance, or removal of the culvert is situated in a dry stream channel or operated from the top of the bank;
- in fish bearing waters, the culvert allows fish in the stream to pass up or down stream under all flow conditions;
- the culvert inlet and outlet incorporate measures to protect the structure and the stream channel against erosion and scour;
- if debris cannot safely pass, provision is made to prevent the entrance of debris into the culvert;
- the installation, maintenance, or removal does not destabilize the stream channel;
- the culvert and its approach roads do not produce a backwater effect or increase the head of the stream;
- the culvert capacity is equivalent to the hydraulic capacity of the stream channel or is capable of passing the 1 in 200 year maximum daily flow without the water level at the culvert inlet exceeding the top of the culvert;
- the culvert has a minimum equivalent diameter of 600 mm;
- a culvert having an equivalent diameter of 2 m or greater, or having a design capacity to pass a flow of more than 6 cubic metres a second, is designed by a professional engineer and constructed in conformance with that design;
- The culvert is installed in a manner which will permit the removal of obstacles and debris within the culvert and at the culvert ends;
- the stream channel, located outside the cleared width, is not altered;
- embankment fill materials do not and will not encroach on culvert inlets and outlets;
- the culvert has a depth of fill cover which is at least 300 mm or as required by the culvert manufacturer's specifications;
- the maximum fill heights above the top of the culvert do not exceed 2 m; and
- the culvert material meets the standards of the Canadian Standards Association.

Additionally, according to Section 3.2 of *A User's Guide to Working In and Around Water: Understanding the Regulation Under British Columbia's Water Act*, "In general, works that do not involve any diversion of water, that may be completed within a short period of time and that have little impact on the environment may be conducted in compliance with the Regulation under the *Water Act* through the notification process. Such works require notification to and review by the Ministry of Environment's Environmental Stewardship Division." One of the seven categories listed under these provisions addresses stream crossings, including the installation, maintenance or removal of stream culverts for the purpose of a road, trail or footpath. Three culvert upgrade/replacements included in the proposed project fall under this category, therefore notification of such will be forwarded to the Ecosystem Section Head of the Environmental Stewardship Division office in Fort St. John.

### ***BC Standards and Best Practices for Instream Works:***

This document is a comprehensive description of the standards and best practices for the planning, design and construction of instream projects in accordance with the *BC Water Act*. Any proposed works in or about a stream must protect fish and wildlife habitat. Habitat includes the watercourse itself as well as the vegetated streamside areas that provide nutrients and shade to the stream. Fish habitat includes watercourses, streams, ditches, ponds and wetlands that provide water, food, or nutrients into a fish-bearing stream even if they do not contain fish, or if they only have temporary or seasonal flows.

Works in or about a stream requiring a Notification to the province may include stream crossings, stream channel maintenance, stream bank and lakeshore stabilization, habitat enhancement and restoration, beaver and beaver dam management, miscellaneous works, and emergency works. Types of instream work that require an approval application under the provincial Water Act include:

- Culvert installation for reasons other than those listed under the "stream crossings" section
- Watercourse or channel realignment

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- Retaining wall or bank protection installation
- Dam construction
- Dredging
- Weir construction
- Construction of a sediment sump
- Pond or lake creation
- Permanent flow diversions, and
- Other permanent work.

The link to this comprehensive document is

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

**This work is within 30m of water as such, must be compliant with applicable provincial, federal and/or municipal legislation/regulations including the *BC Water Act*, the *BC Fish Protection Act*, and the federal *Fisheries Act*. It is also expected that these works must be consistent with the *Standards and Best Practices for Instream Works* and the *Peace Region Terms and Conditions*. Given the above provincial criteria under Section 9 of the *Water Act*, the proposed work falls under a Notification to the province under the *Water Act*.**

This work may also require limited removal of shoreline vegetation and so is subject to the *Ministry of Forest and Range (MFR) Riparian Management Area Guidebook*. When removing this vegetation it is important to note that *Section 34* of the *BC Wildlife Act* prohibits damage to any active bird nest and nests of raptors regardless of occupation.

### ***Peace Region Least Risk Timing Windows - Biological Rationale***

Because of potential impacts of disturbance on a wide range of species, the Ministry of Environment has established least risk timing windows for the Peace Region. Least-risk windows divide a calendar year into critical, cautionary, and low risk windows based on the ecology of specific species groups. Critical and cautionary timing windows cover the time when a species is most susceptible to disturbance, and development should be avoided. Low risk timing windows are defined when species are least susceptible to disturbance; development activities should be planned for low risk windows whenever possible. Critical timing windows cover breeding and rearing seasons for birds, and late winter, parturition, and early rearing for ungulates. Cautionary windows cover late rearing for some sensitive birds (sandhill cranes, trumpeter swans, and raptors) and the early winter rut period for caribou, mountain sheep, and mountain goats.

**It is unlikely that there will be detrimental effects to the biological community by the culvert rehabilitation. The area of work is within an already established highway corridor and the site is in an outlying semi agricultural area close to the town of Fort Nelson.**

### ***BC Endangered Species and Ecosystems***

#### **Red List**

Includes any ecological community, and indigenous species and subspecies that is extirpated, endangered, or threatened in British Columbia. Extirpated elements no longer exist in the wild in British Columbia, but do occur elsewhere. Endangered elements are facing imminent extirpation or extinction. Threatened elements are likely to become endangered if limiting factors are not reversed. Red-listed species and sub-species may be legally designated as, or maybe considered candidates for legal designation as Extirpated, Endangered or Threatened under the *Wildlife Act* (see <http://www.env.gov.bc.ca/wld/faq.htm#2>). Not all Red-listed taxa will necessarily become formally designated. Placing taxa on these lists flags them as being at risk and requiring investigation.

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### Blue List

Includes any ecological community, and indigenous species and subspecies considered to be of special concern (formerly vulnerable) in British Columbia. Elements are of special concern because of characteristics that make them particularly sensitive to human activities or natural events. Blue-listed elements are at risk, but are not Extirpated, Endangered or Threatened.

The RED and BLUE lists serve two purposes:

- To provide a list of species for consideration for more formal designation as Endangered or Threatened, either provincially under the British Columbia Wildlife Act, or nationally by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC).
- To help inform setting conservation priorities for species/ecological communities considered at risk in British Columbia.\*

The rankings highlight species and ecological communities that have particular threats, declining population trends, or restricted distributions that indicate that they require special attention. These lists serve as a practical method to assist in making conservation and land-use decisions and prioritize research, inventory, management, and protection activities. For example, Operational Planning Regulations in the Forest Practices Code of British Columbia Act use the Red and Blue lists in the development of the list of Identified Wildlife.

\*The Conservation Framework is British Columbia's new approach to setting priorities and actions for species and ecosystems of conservation concern. For more information see the Conservation Framework website at <http://www.env.gov.bc.ca/conservationframework/>.

The following list includes information for the provincial red/blue listed species in the Northeast Region within the BWBS and SWB zones. Information for COSEWIC (Committee on the Status of Endangered Wildlife in Canada) and SARA (Species at Risk Act) is also included where applicable. It is expected that these culvert works will have minimal to no effect on any of the listed species.

Scientific Name	Common Name	BC Endangered Species and Ecosystems	SARA Schedule 1	COSEWIC	Habitat Description and Comments
<i>Ammodramus leconteii</i>	Le Conte's Sparrow	Blue (2009)		NAR (1998)	Habitat is in tall grass, weedy meadows and marsh areas.
<i>Ammodramus nelson</i>	Nelson's Sparrow	Red (2009)	SC (2005)	SC (2012)	A secretive sparrow with a brightly-colored face, the Nelson's Sparrow breeds along the edges of freshwater marshes and in wet meadows of interior North America, and in salt marshes along the northern Atlantic Coast.
<i>Anaxyrus boreas</i>	Western Toad	Blue (2010)	SC (2005)	SC (2012)	The Western Toad will breed in an impressive range of natural and artificial habitats—from the shallow margins of lakes to roadside ditches. It does not seem to matter if the sites have tree or shrub canopy cover, coarse woody debris, or emergent vegetation. Adult toads can be found in forested areas, wet shrublands, avalanche slopes, and meadows. They appear to favour dense shrub cover, or perhaps provide protection from predators and desiccation. Western Toads are often found in clear cuts, and may prefer this habitat to closed canopy forests in coastal areas. The habitat requirements of hibernation sites for the Western Toad in Canada are not known.
<i>Asio flammeus</i>	Short-eared Owl	Blue (2009)	SC (2012)	SC (2008)	Nests in the boreal forests and prefers the shores of wetlands such as slow moving streams, peat bogs, marshes, swamps, beaver ponds and pasture edges. This owl breeds in every Canadian province and territory. It inhabits extensive areas of open habitats including marshlands, estuaries and grasslands, but is absent from the heavily forested

## Environmental Effects Evaluation Report – Culvert Replacement at KM 475

Scientific Name	Common Name	BC Endangered Species and Ecosystems	SARA Schedule 1	COSEWIC	Habitat Description and Comments
					areas. Habitat losses have resulted in a relatively steep, long term decline in Canada. Small numbers breed in the Fraser Valley and the south central interior. The owl nests on the ground under low shrubs, reeds or grasses, and usually near water. When not breeding short-eared owls are nomadic, roaming extensive ranges while hunting for small mammals and birds. Loss and fragmentation of habitat due to urban development and agricultural intensification are considered the primary threats.
<i>Bartramia longicauda</i>	Upland Sandpiper	Red (2009)	NA	NA	A shorebird of grasslands, not shores, the Upland Sandpiper inhabits native prairie and other open grassy areas in North America. Once abundant in the Great Plains, it has undergone steady population declines since the mid-19th century, because of hunting and loss of habitat.
<i>Bos bison athabasca</i>	Wood Bison	Red (2010)	SC (2013)	T (2003)	Wood bison are found in the open boreal and aspen forest where there are large wet meadows and slight depressions caused by ancient lakes. Historical estimates suggest that there were once over 168,000 wood bison in Canada. Today the wood bison populations in Canada are estimated at around 10,000 animals. In the 1970s, about 50 imported Plains Bison escaped to the wild in the Pink Mountain area, and that population has grown to over 1000 head. Wood Bison have become established in northeast British Columbia as a result of reintroductions and reintroduced animals from Mackenzie Territory and Alberta moving into the province. In 1999, there were about 80 to 100 Wood Bison in three herds in British Columbia; an additional 100 Bison occupy the Hay-Zama area in British Columbia and Alberta.
<i>Botaurus lentiginosus</i>	American Bittern	Blue (2010)	NA	NA	Habitat is marshes, tules, and reedy lakes.
<i>Buteo platypterus</i>	Broad-winged Hawk	Blue (2009)	NA	NA	Habitat is in mixed woodlands and groves.
<i>Buteo swainsoni</i>	Swainson's Hawk	Red (2009)	NA	NA	Habitat is on dry plains, open foothills, alpine meadows, rangeland, open forest, sparse trees.
<i>Cardellina canadensis</i>	Canada Warbler	Blue (2011)	T (2010)	T (2008)	Found in a variety of forest types, but most abundant in wet, mixed deciduous-coniferous forest with a well-developed shrub layer. Also found in riparian shrub forests and in ravines and old-growth forests with canopy openings and a high density of shrubs.
<i>Chondestes grammacus</i>	Lark Sparrow	Red (2010)	NA	NA	Habitat is in open country with bushes, trees, open brush and farms.
<i>Chrosomus eos</i>	Northern Redbelly Dace	Blue (2010)	NA	NA	Found in boggy lakes, ponds, beaver ponds, pools of headwaters and creeks, often in tea colored water over fine detritus or silt and usually near vegetation. Spawns among mats of filamentous algae or aquatic plants.
<i>Contopus cooperi</i>	Olive-sided Flycatcher	Blue (2009)	T (2010)	T (2007)	Most often associated with open areas containing tall live trees, or snags for perching. Open areas may be forest clearings, forest edges located near natural openings (such as rivers or swamps) or human made openings (such as logged areas), burned forest or openings within old growth forest stands. Generally, forest habitat is either coniferous or mixed wood. In the boreal forest, suitable habitat is more likely to be in or near wetland areas.
<i>Coregonus artedii</i>	Cisco	Red (2010)	NA	NA	Open bodies of lakes and large rivers, coastal waters of Hudson Bay. Moves into deeper water, to just below thermocline, in summer. Sometimes

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Scientific Name	Common Name	BC Endangered Species and Ecosystems	SARA Schedule 1	COSEWIC	Habitat Description and Comments
					in large rivers. Often spawns in shallow water (1-3 m) over gravel or stony substrate but also may spawn pelagically in midwater. Eggs usually deposited on bottom.
<i>Coregonus sardinella</i>	Arctic Cisco	Red (2010)	NA	NA	Near river mouths and brackish lagoons. Leaves sea or estuary in spring and summer, ascends freshwater rivers to spawn, returns to sea after spawning. Young probably descend rivers to estuaries after hatching. Spawns over gravel in fairly swift water, eggs broadcast and abandoned.
<i>Coregonus sardinella</i>	Least Cisco	Blue (2010)	NA	NA	Non-migratory populations occur in large lakes and rivers. Anadromous populations inhabit Arctic coastal waters, estuaries and rivers. After hatching, young of anadromous populations move downstream to deeper slower water. Spawns in shallows of rivers or along lakeshores over bottom of gravel and/or sand. Eggs sink to bottom and lodge in crevices in gravel, and remain there until hatching in spring.
<i>Coturnicops noveboracensis</i>	Yellow Rail	Red (2010)	SC (2003)	SC (2009)	Found in grassy fresh water marshes and meadows.
<i>Enallagma hageni</i>	Hagen's Bluet	Blue (2004)	NA	NA	Ponds and marshes, prefers acidic water.
<i>Erebia pawloskii</i>	Yellow-dotted Alpine	Red (2013)	NA	NA	Wet tundra, small marshes or wet meadows often with shrub willows in or slightly below alpine zone; also, taiga and grassy openings in pine forests. Hosts in family Poaceae. The population in Stone Mountain Provincial Park is within the subalpine and alpine meadows, grassy areas and bogs (Guppy and Shepard 2001).
<i>Euphagus carolinus</i>	Rusty Blackbird	Blue (2010)	SC (2006)	SC (2009)	Nests in the boreal forests and favours the shores of wetlands, such as slow moving streams, peat bogs, marshes, swamps, beaver ponds and pasture edges. In the wooded areas it only rarely enters the forest interior. During the winter it mainly frequents damp forests and, to a lesser extent, cultivated fields. In Canada, the conversion of wetlands into farmland or land suitable for human habitation is the primary cause of habitat loss, particularly in their wintering habitat.
<i>Falco rusticolus</i>	Gyr Falcon	Blue (2010)	NA	NAR (1987)	Open mountain areas.
<i>Gulo gulo luscus</i>	Wolverine Luscus subspecies	Blue (2010)	NA	SC (2014)	Alpine and Arctic tundra, boreal and mountain forests (primarily coniferous). Limited to mountains in the south, especially large wilderness areas. Usually in areas with snow on the ground in winter. Riparian habitats may be important wintering habitat.
<i>Hiodon alosoides</i>	Goldeye	Blue (2010)	NA	NA	Often in quiet turbid water of medium to large lowland rivers, the small lakes, ponds, and marshes connected to them, and muddy shallows of larger lakes. Overwinters in deep water. Prefers moderate to fast current in Illinois and Ohio. Spawns in shallow firm-bottomed sites in river pools or backwaters or over gravel shoals in tributary streams. Eggs are semi-buoyant and drift downstream or into quiet water (Page and Burr 1991).
<i>Hirundo rustica</i>	Barn Swallow	Blue (2009)		T (2011)	Habitat is open or semi-wooded country, farms, ranches, fields, marshes, lakes, usually near habitation.
<i>Ischnura damula</i>	Plains Forktail	Red (2004)	NA	NA	Ponds with dense vegetation.
<i>Lasiurus</i>	Eastern Red Bat	Red (2013)	NA	NA	Eastern Red Bats prefer to dwell in the forests and, for the most part, they are creatures that enjoy

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Scientific Name	Common Name	BC Endangered Species and Ecosystems	SARA Schedule 1	COSEWIC	Habitat Description and Comments
<i>borealis</i>	Bat				solitude. They are a primarily solitary species of bats. Unlike most other species in North American they will roost either out in the open or up in trees. Although most bats enjoy the occasional cave or tunnel, the Eastern Red Bat usually do not even consider them as a possible roosting site. They greatly prefer trees, especially the foliage.
<i>Limnodromus griseus</i>	Short-billed Dowitcher	Blue (2011)	NA	NA	Habitat is in mudflats, open marshes and ponds.
<i>Lycaena hyllus</i>	Bronze Copper	Blue (2013)	NA	NA	Marshes, sedge meadows, moist to wet grassy meadows, ditches, fens, streamside or pond-shore wetlands, or roads and right of ways through marshlands.
<i>Margariscus nachtriebi</i>	Pearl Dace	Blue (2010)	NA	NA	"Cool, clear headwater streams in the south, bog drainage streams, ponds and small lakes in the north, and in stained, peaty waters of beaver ponds" (Scott and Crossman 1973). Usually over sand or gravel (Page and Burr 1991). Spawns in clear water over sand or gravel in weak or moderate current (Scott and Crossman 1973).
<i>Melanitta perspicillata</i>	Surf Scoter	Blue (2005)	NA	NA	Summer habitat is fresh lakes and tundra.
<i>Notropis hudsonius</i>	Spottail Shiner	Red (2010)	NA	NA	Western populations: more closely restricted to large rivers and lakes, usually over sandy or rocky shallows with scant vegetation (Lee et al. 1980). Spawns in aggregations over areas of gravelly riffles near mouths of brooks, or along sandy shoals of lakeshores (Becker 1983).
<i>Oncorhynchus clarkia lewisi</i>	Cutthroat Trout, lewisi subspecies	Blue (2004)	SC (2010)	SC (2010)	Cutthroat trout usually inhabit and spawn in small to moderately large, clear, well-oxygenated, shallow rivers with gravel bottoms. They also reproduce in clear, cold, moderately deep lakes. They are native to the alluvial or freestone streams that are typical tributaries of the rivers of the Pacific basin, Great Basin and Rocky Mountains.
<i>Oeneis philipi</i>	Philip's Arctic	Red (2013)	NA	NA	Open spruce bogs (Layberry et al. 1998; Ople, 1998).
<i>Oporornis agilis</i>	Connecticut Warbler	Blue (2013)	NA	NA	Habitat is poplar bluffs, muskeg, mixed woods near water.
<i>Papilio machaon pikei</i>	Old World Swallowtail, pikei subspecies	Red (2013)	NA	NA	It frequents alpine meadows and hillsides, and males are fond of 'hilltopping', congregating near summits to compete for passing females. At lower elevations, it can be seen visiting gardens.
<i>Pekania pennant</i>	Fisher	Blue (2006)	NA	NA	Fishers inhabit upland and lowland forests, including coniferous, mixed, and deciduous forests. They occur primarily in dense coniferous or mixed forests, including early successional forest with dense overhead cover (Thomas et al. 1993). Fishers commonly use hardwood stands in summer but prefer coniferous or mixed forests in winter. They generally avoid areas with little forest cover or significant human disturbance and conversely prefer large areas of contiguous interior forest. Riparian areas may be important to fishers because they provide important rest site elements, such as broken tops, snags, and coarse woody debris.
<i>Physella wrighti</i>	Hotwater Physa	Red (2008)	E (2003)	E (2008)	It occurs in habitat that maintains water temperature of 23-30 degrees C year round and occupies substrates near a water/air interface in areas of little or no water flow where the snails can position themselves and their eggs at temperatures optimal for life history requirements (COSEWIC, 2008).
<i>Planorbula armigera</i>	Thicklip Rmas-horn	Blue (2008)	NA	NA	It is usually found in flowing, but sluggish water.

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Scientific Name	Common Name	BC Endangered Species and Ecosystems	SARA Schedule 1	COSEWIC	Habitat Description and Comments
<i>Plebejus optilete</i>	Cranberry Blue	Blue (2013)	NA	NA	Mostly boggy taiga, spruce bogs, and wet tundra.
<i>Rangifer tarandus pop.14</i>	Caribou (boreal population)	Red (2010)	T (2003)	T (2014)	In winter use mature and old growth coniferous forest that contain large quantities of terrestrial and arboreal lichens. These forests are generally associated with marshes, bogs, lakes, and rivers. In summer, the caribou occasionally feed in young stands, after fire or burning. Many subpopulations of Woodland Caribou Boreal populations show a preference for peatlands; they generally avoid clear cuts, shrub rich habitat, and aspen-poplar dominated sites.
<i>Recurvirostra americana</i>	American Avocet	Blue (2012)	NA	NA	Marshes, mudflats, alkaline lakes and ponds.
<i>Salvelinus confluentus</i>	Bull Trout	Blue (2011)		SC (2012)	Bottom of deep pools in cold rivers and large tributary streams, often in moderate to fast currents with temperatures of 45-50 F; also large coldwater lakes and reservoirs. Migratory forms live in tributary streams for up to several years before migrating downstream into a larger river or lake, where they spend several years before returning to tributaries to spawn (Rieman and McIntyre 1993). In lakes, inhabits all depths in fall, winter, and spring; moves to cooler, deeper water for summer. Usually spawns in gravel riffles of small tributary streams, including lake inlet streams. Spawning sites often are associated with springs (Rieman and McIntyre 1993).
<i>Setophaga castanea</i>	Bay-breasted Warbler	Red (2010)	NA	NA	Coniferous forests.
<i>Setophaga tigrina</i>	Cape May Warbler	Red (2010)	NA	NA	Habitat is in spruce forests – in migration any forested areas.
<i>Setophaga virens</i>	Black-throated Green Warbler	Blue (2010)	NA	NA	Conifer forests.
<i>Stenodus leucichthys</i>	Inconnu	Blue (2010)	NA	NA	Anadromous in coastal areas; ascends streams from the sea to spawn. Also in inland lakes, from which it migrates up tributary streams in summer, returning to lake in fall. Spawns in clear, fairly swift streams over bottoms of gravel and sand in water 1-3 m deep. Eggs sink to bottom and lodge in gravel.
<i>Ursus arctos</i>	Grizzly Bear	Blue (2010)	NA	SC (2002)	In British Columbia, grizzly bears inhabit approximately 90% of their original territory. There were approximately 25,000 grizzly bears in British Columbia when the European settlers arrived. However, population size has since significantly decreased due to hunting and habitat loss. In 2008, it was estimated there were 16,014 grizzly bears. Population estimates for British Columbia are based on hair-snagging, DNA-based inventories, mark-recapture, and a refined multiple regression model.

## Federal

### *Canadian Environmental Assessment Act, 2012*

On July 6, 2012 a new *Canadian Environmental Assessment Act, 2012* (CEAA, 2012) came into force. Projects

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that may require an environmental assessment (EA) are set out in the *Regulations Designating Physical Activities*. For projects on federal lands that are not on the *Regulations Designating Physical Activities*, Section 67 of CEAA 2012 applies. Section 67 states that federal authorities must ensure that projects on federal lands will not likely cause significant adverse environmental effects. CEAA 2012 also sets out requirements for annual reporting to Parliament regarding this obligation.

In response to the legislative changes, Public Works and Government Services Canada (PWGSC) developed a CEAA 2012 framework that details the procedure to ensure that projects are assessed for potential adverse environmental effects. The procedure includes a checklist that incorporates a determination of the risk for adverse environmental effects into the departmental Environmental Compliance Management Program (ECMP). The ECMP allows for the comprehensive and effective management of environmental compliance related to project management. The level of risk determined is based on the size and type of the project, level of effort required, as well as the potential for impacts to components of the environment as described in Section 5 of the Act. Under Section 5 of the Act, the environmental effects that are to be taken into account in relation to an act or thing, a physical activity, a designated project or a project are

(a) a change that may be caused to the following components of the environment that are within the legislative authority of Parliament:

- i. Fish as defined in section 2 of the Fisheries Act and fish habitat as defined in subsection 34(1) of that Act;
- ii. Aquatic species as defined in subsection 2(1) of the Species at Risk Act;
- iii. Migratory birds as defined in subsection 2(1) of the Migratory Birds Convention Act, 1994; and
- iv. Any other component of the environment that is set out in Schedule 2.

Other effects to the environment or with respect to aboriginal peoples are outlined under Section 5(1)(c) of the Act.

Under Section 5(2), if the carrying out of the physical activity, the designated project, or the project requires a federal authority to exercise a power or perform a duty or function conferred on it under any Act of Parliament other than this Act, the following environmental effects are also to be taken into account.

(a) A change, other than those referred to in paragraphs (1)(a) and (b), that may be caused to the environment and that is directly linked or necessarily incidental to a federal authority's exercise of a power or performance of a duty that would permit the carrying out, in whole or in part, of the physical activity the designated project or the project; and

(b) An effect, other than those referred to in paragraph (1)(c), of any change referred to in paragraph (a) on

- i. Health and socio-economic conditions,
- ii. Physical and cultural heritage;
- iii. Any structure, site or thing that is of historical, archaeological, paleontological or architectural significance.

### ***Fisheries Act 2012***

The *Fisheries Act* was amended on June 29, 2012. As of November 25, 2013 the new fisheries protection provisions of the Act came into force. The Fisheries Protection Policy describes the changes to the *Fisheries Act* made in 2012. The focus is now on the productivity of commercial, recreational and Aboriginal fisheries; the institution of enhanced compliance and protection tools that facilitate enforcement; provide clarity, certainty and consistency of regulatory requirements; and enable enhanced partnerships with other agencies of government and local groups to ensure a comprehensive approach to fisheries protection. The changes include a prohibition against causing serious harm to fish that are part of or support a commercial, recreational or Aboriginal fishery

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(Sec. 35), provisions for flow and passage (Sec. 20 and 21), and a framework for regulatory decision-making (Sec. 6 and 6.1). These provisions are intended to reduce threats to habitat (degradation or loss), flow alteration, aquatic invasive species, overexploitation of fish, and pollution of many kinds that may adversely affect water quality and fish health.

Proponents of development activities taking place in or near water must:

- Understand the types of impacts projects are likely to cause;
- Take measures to avoid and mitigate impacts to the extent possible;
- Request authorization from the Minister and abide by the conditions of any such authorization, when it is not possible to avoid and mitigate impacts of projects that are likely to cause serious harm to fish; and,
- Ensure that projects conform to all other statutory requirements.

Fish that are **part of** commercial, recreational or Aboriginal fisheries are interpreted to be those fish that fall within the scope of applicable federal or provincial fisheries regulations, as well as those that can be fished by Aboriginal organizations or their members for food, social or ceremonial purposes or for purposes set out in a land claims agreement. Fish that **support** these fisheries are those fish that contribute to the productivity of a fishery (often, but not exclusively, as prey species).

Serious harm to fish is defined under the Act as “the death of fish or any permanent alteration to, or destruction of, fish habitat. Further interpretation of serious harm to fish and principles for meeting the goals and objectives of the Fisheries Protection Policy Statement are provided in the Policy.

Most water bodies contain fish, or their habitat, that would be subject to the prohibition against serious harm to fish. These include all three of Canada’s oceans; areas of fishing for food, social, or ceremonial purposes or under land claims agreements by Aboriginal peoples; and areas covered by federal or provincial fisheries regulations. Note that some water bodies may be specifically excluded from the application of federal or provincial regulations.

When proponents are unable to completely avoid or mitigate serious harm to fish, the project will require authorization under Subsection 35(2) of the *Fisheries Act* in order for the project to proceed without contravening the Act. The Policy indicates that some water bodies may not contain fish or provide fish habitat that are part of or support commercial, recreational or Aboriginal fisheries, and therefore may not be subject to the prohibition. These need to be determined on a case-by-case basis. Proponents are advised to use appropriate and recognized scientific methods to consider whether any such water bodies would be affected by their projects. Provisions for flow and fish passage are outlined in Sections 20 and 21 of the Act. The provisions include the following:

- Allow the Minister to request studies and evaluations related to obstructions or other things that may be hindering fish passage or harming fish;
- Allow the Minister to request: the removal of or modifications to obstructions or things that are harmful to fish or impede flow or fish passage; the installation of fish-ways, screens and guards; or that sufficient water flow be provided for fish passage; or
- Prohibit the damage or removal of fish-guards, fish-ways, and screens.

Projects that have the potential to obstruct fish passage, modify flow, or result in the entrainment of fish, and which may cause serious harm to fish, may require an authorization under Subsection 35(2). The conditions of authorizations may include avoidance, mitigation and offsetting measures to provide fish passage around obstructions. The conditions may also require water flows necessary to permit the free passage of fish, and the need for fish-guards or screens over water intakes. There are four factors outlined in Section 6 of the Fisheries Act that the Minister must consider before exercising a Ministerial power such the issuance of a Subsection 35(2) authorization or a request to provide for fish passage or sufficient flow:

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- The contribution of the relevant fish to the ongoing productivity of commercial, recreational or Aboriginal fisheries;
- Fisheries management objectives;
- Whether there are measures and standards to avoid, mitigate or offset serious harm to fish that are part of the named fisheries, or that support such a fishery; and
- The public interest.

The components of each consideration are provided in more detail in the Fisheries Protection Policy. General advice on understanding when a regulatory review or *Fisheries Act* authorization is required is provided in Box 1 and in steps 1 to 3 of Figure 2 of the Fisheries Protection Policy. The Policy also outlines additional powers of the Minister (Sec. 37) and a duty to notify (Sec. 38) that imposes a series of obligations upon persons responsible for projects that lead to occurrences that result in serious harm to fish that are part of or support the designated fisheries. An inspector or fishery officer has the authority to order the immediate action necessary to correct the situation at the expense of the person(s) identified as responsible.

In addition, consequences for non-compliance with the prohibition against serious harm to fish or noncompliance with the conditions of an authorization include minimum and maximum penalties, depending on the type of offence, and whether it is a first or subsequent offence.

*Operational Guidance* - In preparation for coming into force of the new fisheries protection provision, on-line guidance is being developed for external stakeholders. This guidance will allow proponents, consultants and partners to identify when projects require Departmental review.

Guidance is being developed to identify water body types that are unlikely to support fish and fish habitat that are part of, or support a commercial, recreational or Aboriginal fishery. Projects occurring within these water body types are therefore unlikely to cause impacts to the ongoing productivity of fisheries, and would not receive project-specific review by the Department. Examples of these marginal water bodies may include, but are not limited to:

- non-fish bearing-waters
- watercourses not providing migratory corridors or in-stream habitat
- artificial irrigation, water supply, water management, or industrial waterbodies not connected to aquatic systems that support fish

Guidance is also being developed to identify specific species and areas that are at greater risk of impact to the ongoing productivity of fisheries. Site-specific review by the Department of projects affecting these species and/or habitats types should be conducted regardless of work, undertaking or activity proposed. These sensitive species and habitats may include, but are not limited to:

- designated species at risk and their residences or critical habitat
- defined limiting or rare habitats (including spawning, rearing, nursery, feeding and migratory routes), for instance areas that have been identified as important in support of local fisheries management objectives

*The Minor Impacts List* – The list of minor impacts to fish and fish habitat will identify impact types, and by extension project types, that are unlikely to result in effects to the ongoing productivity of commercial, recreational and Aboriginal fisheries. Due to the low-risk nature of these impacts, the Department of Fisheries and Oceans (DFO) will not provide a site-specific review of these projects, and proponents will be responsible for implementing existing best practices to maintain compliance with the *Fisheries Act*. Minor impacts may include, but are not limited to:

- watercourse alterations, such as channel realignment or vegetation removal, that are temporary or can be done in the dry

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- temporary obstructions that take place outside critical migratory, spawning and nursery periods for local fish species
- spatial impacts, such as infilling, dredging or excavation activities, that occur within the existing footprint of previous works or that are of a footprint small enough that local effects on fisheries productivity would not likely occur

Compliance monitoring will be carried out primarily on projects which the Department reviews, provides advice, authorizes, or issues requests or orders, to determine if *Fisheries Act* requirements are being complied with. Partnerships will be developed and will include regulatory arrangements with other federal agencies, and provincial regulators to allow for administration of the applicable fisheries protection provisions of the *Fisheries Act* by the organizations best positioned to do so. Existing regulatory partnership arrangements will continue to be supported by DFO.

Under the *Fisheries Act* the following definitions are provided:

“fish” includes:

- a) parts of fish
- b) shellfish, crustaceans, marine animals and any parts of shellfish, crustaceans or marine animals, and
- c) the eggs, sperm, spawn, larvae, spat and juvenile stages of fish, shellfish, crustaceans and marine animals;

"fish habitat" means spawning grounds and any other areas, including nursery, rearing, food supply and migration areas, on which fish depend directly or indirectly in order to carry out their life processes;

"fishery" includes the area, locality, place or station in or on which a pound, seine, net, weir or other fishing appliance is used, set, placed or located, and the area, tract or stretch of water in or from which fish may be taken by the said pound, seine, net, weir or other fishing appliance, and also the pound, seine, net, weir or other fishing appliance used in connection therewith.

Under the *Fisheries and Oceans – Pathways of Effects Diagrams*, the following have effects on fish and fish habitat during in-water activities:

- **Change in food supply:** the aquatic food supply must be plentiful and diverse to sustain the productivity of a watershed. An increase or decrease in the quantity or composition of the food supply, beginning with plants and organic debris that fall into a waterway, can alter the structure of the aquatic community.
- **Change in habitat structure and cover:** the addition of in-stream organic structure and the deposition of eroded soil can affect the capacity of a watercourse to maintain a dispersed and diverse community of aquatic organisms by restricting habitat connectivity and the opportunities for organisms to use, colonize, and move between existing aquatic environments. The removal of in-stream and riparian vegetation can reduce channel stability, cover and protection from predators and physical disturbances, and the availability of diverse and stable environments.
- **Change in sediment concentrations:** increased erosion of stream bank soils and rocks result in an excess of fragmented organic and inorganic material which is transported by water, wind, ice and gravity. These sediments, which contain nitrifying elements and can capture or absorb contaminants, are suspended or else settle and collect in waterways affecting physical processes, structural attributes and ecological conditions such as water clarity (by reducing visibility and sunlight and damaging fish gills) and reducing the availability and quality of spawning/rearing habitat (through infilling).
- **Change in nutrient concentrations:** some activities may cause an increase in nitrifying elements such as nitrogen and phosphorus and mineral compounds such as ammonia, nitrates, nitrites, and

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orthophosphates. This leads to “eutrophication”, thick growths of aquatic plants (especially algae) that block light needed by aquatic vegetation, either by clouding the water column or coating the vegetation itself. When the algae die, they settle to the bottom and are consumed by bacteria during the decomposition process. This process consumes oxygen, depleting it from the bottom waters. The resulting low dissolved oxygen concentrations drive fish from their preferred habitat and can cause other organisms to die.

**As such, the changes to the DFO legislation regarding the regulatory review process has placed more responsibility on the proponent to independently assess and mitigate potential impacts under terms of DFO’s Risk Management Framework (2010). This work falls under a DFO self assessment review *Measures to Avoid Harm* (formerly known as Notification to DFO). The project will not cause adverse effects to the fish and fish habitat within the project area. Any potential impacts are mitigable under the site specific construction activities Environmental Protection Plan using various DFO documents including the Pathways of Effects Diagrams. In this case, DFO will not be contacted for review and information regarding fish and fish habitat reports will be sent into the province to obtain a Notification under the Water Act.**

### *Navigation Protection Act*

The new *Navigation Protection Act* (NPA) has replaced the *Navigable Waters Protection Act* (NWPA). The new NPA lists the waterways where approval is required prior to the building of works that substantially interfere with navigation. Works in waterways not listed in the Act will be subject to the common law public right of navigation.

**This project does not fall under the NPA list of waterways where approval is required.**

### *Species at Risk Act*

Promulgated in 2003 the purpose of the *Species at Risk Act* (SARA) is to prevent wildlife species from being extirpated or becoming extinct, to provide for wildlife recovery, and to manage species of special concern. In addition, SARA has certain implications for environmental assessment under CEAA. Specifically, under Section 79, every person who is required to ensure that an assessment of the environmental effects of a project is conducted, and every authority who makes a determination under paragraph 67(a) or (b) of the CEAA, 2012 in relation to a project, must without delay, notify the competent minister or ministers in writing of the project if it is likely to affect a listed wildlife species or its critical habitat. The person must identify the adverse effects of the project on the listed wildlife species and its critical habitat and, if the project is carried out, must ensure that measures are taken to avoid or lessen those effects and to monitor them. The measures must be taken in a way that is consistent with any applicable recovery strategy and action plans.

The SARA applies to federal lands, the internal waters of Canada and the territorial sea of Canada. The SARA recognizes that Canada’s protected areas, especially national parks, are vital to the protection and recovery of species at risk.

Under SARA the following definitions are provided:

“aquatic species” means a wildlife species that is a fish, as defined in section 2 of the *Fisheries Act*. Refer to the definition of “fish” under *Fisheries Act* above.

“habitat” is defined as:

(a) In respect of aquatic species, spawning grounds and nursery, rearing, food supply, migration and any other areas on which aquatic species depend directly or indirectly in order to carry out their life processes, or areas where aquatic species formerly occurred and have the potential to be reintroduced;

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(b) in respect of other wildlife species, the area or type of site where an individual or wildlife species naturally occurs or depends on directly or indirectly in order to carry out its life processes or formerly occurred and has the potential to be reintroduced.

“critical habitat” is defined as the habitat that is necessary for the survival or recovery of listed wildlife species and that is identified as the species’ critical habitat in the recovery strategy or in an action plan for the species.

“project” is defined as:

- a designated project as defined in subsection 2(1) of the *Canadian Environmental Assessment Act, 2012* or a project as defined in section 66 of that Act;
- a project as defined in subsection 2(1) of the *Yukon Environmental and Socio-economic Assessment Act*; or
- a development as defined in subsection 111(1) of the *Mackenzie Valley Resource Management Act*.

"wildlife species" means a species, subspecies, variety or geographically or genetically distinct population of animal, plant or other organism, other than a bacterium or virus, that is wild by nature and

(a) is native to Canada; or

(b) has extended its range into Canada without human intervention and has been present in Canada for at least 50 years.

The following prohibitions are applicable to species listed on Schedule 1 of the Act:

**Section 32(1):** No person shall kill, harm, harass, capture or take an individual of a wildlife species that is listed as an extirpated species, an endangered species or a threatened species;

**Section 33:** No person shall damage or destroy the residence of one or more individuals of a wildlife species that is listed as an endangered species or a threatened species; and

**Section 58(1):** No person shall destroy any part of the critical habitat of any listed endangered species or of any listed threatened species.

**Section 73 and 74 of SARA** state that a competent minister may enter into an agreement or issue a permit authorizing the person to engage in an activity affecting a listed wildlife species, its critical habitat or the residences of its individuals provided certain conditions are met.

**This project is not expected to cause any disruption to any species at risk. See page 5 of this report under the provincial RED-BLUE list for species at risk (SARA) information.**

### ***PART C: SCOPE OF EVALUATION***

#### **Environmental Setting**

The project falls into the Hay River Lowland ecoregion. This ecoregion is a broad, level lowland plain that is drained by the Fort Nelson River which flows northward into the Liard River. It is then joined by the Muskwa, Prophet, Sikanni Chief, Lkua, Fontas, Kahntah, Snake, Sahtenah and Kiwigana rivers/streams. The Hay River, which flows eastward into the Peace River in Alberta is joined by the Sheklilie, Kotcho, Kyklo and Ekwan rivers in northeastern British Columbia, all of which ultimately flow into the Mackenzie River in the Northwest Territories. This ecoregion is classified as having a subhumid mid-boreal ecoclimate. Much of the region is characterized by permafrost, resulting in a limited number of plant species that are well adapted to the poor soil conditions and cold climate. Tree species in the ecozone include Black Spruce, White Spruce, Jack Pine,

## **Environmental Effects Evaluation Report – Culvert Replacement at KM 475**

Tamarack, Paper Birch, Trembling Aspen and Balsam Poplar. Poorly drained fens and bogs, about 30% of the ecoregion, are covered with tamarack and black spruce. The region contains several species of shrubs, including heathers, cranberries and currants and a variety of lichens and mosses which dominate the ground cover.

There are various wildlife species associated with the Taiga Plains Ecozone, including moose, caribou, Wood Bison, wolf, Red Fox, Snowshoe Hare and lynx. Common bird species include the Common Raven, Sharp-tailed Grouse, Gray Jay, Willow Ptarmigan, Ring-necked Duck, Greater Scaup, Hawk Owl, Northern Shrike, geese and swans. The Mackenzie Valley is an important migratory corridor for waterfowl breeding along the arctic coast.

The project area does not have any original vegetative cover as it was disturbed and replaced with gravel and fine sand during highway construction. The shoulder of the Alaska Highway along the right-of-way consists mainly of disturbed, re-vegetated areas.

### **Physical Environment**

The proposed culvert replacement at KM 475 falls into the Northeast Region under the Ministry of Environment's documentation. The area surrounding the proposed site consists of 2 main biogeoclimatic zones based on climate, vegetation and geological features.

The Boreal White and Black Spruce (BWBS) zone covers the majority of the Northeast region and is a matrix of wetland and muskeg with smooth rolling upland areas dominated by Lodgepole Pine, White Spruce, Black Spruce and Trembling Aspen stands. The BWBS zone, with its low to moderate snow accumulation, provides important ungulate wintering habitat.

The Spruce-Willow-Birch (SWB) Zone is found at lower elevations and is forested with White Spruce and Subalpine Fir, with lesser amounts of Lodgepole Pine, Black Spruce and Trembling Aspen. Wetlands are common and are vegetated with White Spruce and Tall Willow swamps, sedge fens, and marshes.

### **Biological Environment**

The lowland boreal forest is rich in wildlife and provides habitat for common ungulates such as moose and deer as well as Wood Bison and the boreal population of Woodland caribou, both of which are designated as threatened by COSEWIC. The ecosystem also supports abundant populations of Black Bear and Grey Wolf. Birds and small mammals are common, particularly in the deciduous forests that develop following fire. Waterfowl inhabit marshes and shallow-lake habitats. Because of the cold climate, the few amphibians and reptiles mainly inhabit the warmer valley bottoms.

The Liard River and its tributaries drain an area of approximately 275,000 km<sup>2</sup> of boreal forest and muskeg, making it Canada's ninth largest watershed. Much of the eastern portion of the Liard River basin is covered by a mosaic of poorly drained, organic peatlands, interspersed with deciduous and mixed wood upland and riparian habitats, wetlands and upland boreal forest.

### **Socio-economic Environment**

Urban development in the Northeast Region occurs largely in the three main population centres: Dawson Creek, Fort St John and Fort Nelson. Oil and gas exploration and production is the largest economic sector in the Northeast Region. Over the past two decades population in the Region has risen and fallen largely in relation to activity in the energy sector. Other important economic drivers in the region include agriculture, forestry, and extraction of sand, gravel and industrial mineral resources.

## **Environmental Effects Evaluation Report – Culvert Replacement at KM 475**

Recreation activities result in a lesser pressure on the ecosystem health and connectivity than development however, human use of wilderness areas for recreational purposes has impacts on the ability of the land base to sustain healthy wildlife populations. River systems are used as major recreational corridors in the region due to their size and ease of access. Roads to these corridors can increase the spread of invasive species and provide predator access to important ungulate and riparian habitats and can impact the natural predator-prey systems in the region.

### **Scoping**

This environmental effects evaluation, as defined in the appendix, considers the full range of project / environment interactions and the environmental factors that could be affected by the project as defined above and the significance of related effects after mitigation.

**Environmental Effects Evaluation Report – Culvert Replacement at KM 475**

**Table 1: Potential Project / Environment Interactions Matrix**

P = Potential Effect of Project on Environment; ? = Not enough Information; ' - ' = No Interaction

Project Phase / Physical Work/Activity	Soil (Surface and Subsurface) Quality	Groundwater Quality/Quantity	Rivers / Lakes / Streams (and Associated Drainage) Quality/Quantity	Marine/Estuary/Saltmarsh Water Quality	Wetlands (Bogs, Fens, Swamps)	Fish / Fish Habitat	Birds / Bird Habitat	Terrestrial Species	Aquatic Species	Agriculture / Aquaculture	Aboriginal Interests	Archaeology / Paleontology / Heritage	Socio-economic Environment	Land Use	Air Quality / Noise	Health/Safety
<b>Construction</b>																
Mobilization																
Work Area Isolation	P	-	P	-	-	P	P	P	P	-	-	-	-	-	-	P
Excavation and removal of existing culvert	P	-	P	-	-	-	P	P	P	-	-	P	-	-	P	P
Placement of concrete box culvert	P	-	P	-	-	P	P	P	P	-	-	-	-	-	P	P
Demobilization	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P

**Environmental Effects Evaluation Report – Culvert Replacement at KM 475**

**Table 2.1 – 2.9: Potential Project / Valued Ecosystem Interactions and Mitigation Measures (S.2(1))**

<b>Table 2.1 Valued Ecosystem Component – Soil (Surface and Subsurface) Quality</b>			
<b>Potential Effect:</b> Contamination of soils during construction activities (work area isolation, excavation and removal of existing culvert, placement of concrete box culvert).			
<b>Potential Interaction</b>	<b>Mitigation</b>		
Spillage of hydrocarbon products during refueling activities or via leakage from faulty equipment.	Prior to entering within 100 m of a water body, all equipment and machinery scheduled to work in and/or along a water body should be inspected and found to be clean, free of leaks and in good working condition. As such, all equipment and machinery should have all foreign material removed including dirt, mud, debris, grease, oil, hydraulic fluid or other substances that may impact the water quality or the fish and fish habitat values of the water body. As well, all identified leaks will be repaired and then appropriately cleaned. Such inspections, cleaning and/or servicing can occur either before the equipment or machinery is transported into the field or at the work site. Any cleaning and/or servicing of equipment and machinery at the work site should not be conducted in or along water bodies. Rather, all such works should occur at least 100 m from the water body with any runoff controlled to ensure wash materials and/or other substances do not enter the riparian zone or the channel of the water body. This information will be detailed and provided in the contractor's environmental protection plan (EPP) that is approved by PWGSC.		
<b>Magnitude</b>	<b>Reversibility</b>	<b>Geographic Extent</b>	<b>Duration</b>
Small	Reversible	Immediate	Short-term
<b>Residual Effects:</b>			
Insignificant			
<b>Monitoring:</b>			
The site will require an environmental monitor during times of instream works and diversion activities. Details will be provided in the EPP.			
<b>Comments:</b> There is minimal potential for soil contamination due to faulty equipment or during refueling operations as the contractor will be following the regulations and guidelines as per the EPP.			
<b>Table 2.2 Valued Ecosystem Component – Rivers/Lakes/Stream (and associated drainage) Quality/Quantity</b>			
<b>Potential Effect:</b> Siltation of stream during construction activities (work area isolation, excavation and removal of existing culvert, placement of concrete box culvert).			
<b>Potential Interaction</b>	<b>Mitigation</b>		

**Environmental Effects Evaluation Report – Culvert Replacement at KM 475**

<p>It is possible that siltation or suspended solids will enter the water column during work area isolation and construction activities and after placement of new concrete culvert when water is reintroduced through the site.</p>		<p>There may be some siltation during the work site isolation and introduction of the stream through the new culvert however, this will be minimal and short term (hours). Effective, short term and long term sediment and erosion control measures should be installed before starting work to prevent the entry of sediment into the watercourse. These measures should be inspected regularly during construction and afterwards to ensure that they are functioning properly and are maintained and/or upgraded as required until vegetation has been re-established on the disturbed area. Sediment should not be released into any waters frequented by fish. The work site is to be isolated from the stream and water diverted around the site to avoid any siltation or suspended solids from entering the water column. Contractor will be using the BC MOE Standards and Best Practices for instream Work guidelines for work area isolation.</p>		
<b>Magnitude</b>	<b>Reversibility</b>	<b>Geographic Extent</b>	<b>Duration</b>	<b>Frequency</b>
Small	Reversible	Immediate	Short-term	Intermittent
<b>Residual Effects:</b>				
Insignificant				
<b>Monitoring:</b>	An environmental monitor will be at site during any instream works (e.g. site isolation and reintroduction of water through new culvert).			
<b>Comments:</b> The contractor's EPP will detail timeframes where the presence of an environmental monitor will be required at site.				
<b>Table 2.3 Valued Ecosystem Component – Fish/Fish Habitat</b>				
<b>Potential Effect:</b> fish and fish habitat could be affected during site isolation and construction activities.				
<b>Potential Interaction</b>				
<p>The area of construction is considered low value and potentially non-fish bearing and therefore, fish are not likely to be encountered during construction activities. A fish salvage will be conducted at site to ensure no fish mortalities. Fish habitat downstream could be affected by siltation of waters during construction.</p>		<p>The contractor is obligated to ensure all MOE and DFO regulations and guidelines are followed during site isolation and construction activities. Where water is pumped from fish habitat, water intakes must be appropriately screened according to DFO's Freshwater Intake End-of-Pipe Fish Screen Guidelines (1995) in order to prevent the entrainment or impingement of fishes during pump operation. Gasoline powered pumps or generators and associated fuel must be enclosed or set within secondary containment large enough to contain all harmful materials should a spill, leak or overflow occur. This will minimize the introduction of silt into the water column and thereby mitigating any detrimental effects of downstream fish and fish habitat. All discharged water from dewatering the isolated in-stream work area must be released at a location, and in a manner, that either prevents water from re-entering the watercourse or allows suitable filtering and/or settling (to background levels) of sediment out of the water before re-entry into the watercourse. Water re-entering the creek should be of equal or better quality than the receiving water. Water discharged into the channel downstream of the crossing site from the pump by-pass will be released onto a structure or material that diffuses and slows water flow to prevent scouring of the channel bed or banks.</p>		
<b>Magnitude</b>	<b>Reversibility</b>	<b>Geographic Extent</b>	<b>Duration</b>	<b>Frequency</b>

Environmental Effects Evaluation Report – Culvert Replacement at KM 475

Small	Reversible	Immediate	Short-term	Intermittent
<b>Residual Effects:</b>				
<b>Insignificant</b>				
<b>Monitoring:</b> An environmental monitor will be at site during any instream works (e.g. site isolation and reintroduction of water through new culvert).				
<b>Comments:</b> The contractor's EPP will detail timeframes where the presence of an environmental monitor will be required at site.				
<b>Table 2.4 Valued Ecosystem Component – Birds/Bird Habitat</b>				
<b>Potential Effect:</b> Disturbance of habitat.				
<b>Potential Interaction</b>				
<b>Mitigation</b>				
It is possible that the construction activities will cause some disruption of bird habitat.				
This will be for a short timeframe and it is likely only noise related. This is an area of existing highway corridor with continual large vehicular traffic. It is likely that bird habitat will not be in the immediate area.				
<b>Magnitude</b>	<b>Reversibility</b>	<b>Geographic Extent</b>	<b>Duration</b>	<b>Frequency</b>
Small	Reversible	Immediate	Short-term	Intermittent
<b>Residual Effects:</b>				
<b>Insignificant</b>				
<b>Monitoring:</b>				
<b>None required</b>				
<b>Comments:</b>				
<b>Table 2.5 Valued Ecosystem Component – Terrestrial Species</b>				
<b>Potential Effect:</b> possible noise effect on the species in the area.				
<b>Potential Interaction</b>				
<b>Mitigation</b>				
The construction activities may cause some disturbance of the terrestrial species. Specifically ungulate.				
The effects on the terrestrial environment are short term and will likely only be noise related. This is an existing highway corridor with continual large vehicular traffic. It is unlikely that there will be any lasting disturbance to habitat.				
<b>Magnitude</b>	<b>Reversibility</b>	<b>Geographic Extent</b>	<b>Duration</b>	<b>Frequency</b>

Environmental Effects Evaluation Report – Culvert Replacement at KM 475

Small	Reversible	Immediate	Short-term	Once
<b>Residual Effects:</b>				
Insignificant				
<b>Monitoring:</b>				
None required				
<b>Comments:</b>				
<b>Table 2.6 Valued Ecosystem Component – Aquatic Species</b>				
<b>Potential Effect:</b> Disturbance during construction activities				
<b>Potential Interaction</b>		<b>Mitigation</b>		
Aquatic habitat could be affected during construction activities.		Although it is unlikely that the aquatic environment will sustain any long lasting disturbance, the construction activities will be isolated to a specific work area and the contractor is obligated to ensure all MOE and DFO regulations and guidelines are followed during site isolation and construction activities. This will minimize the introduction of silt into the water column and thereby mitigating any detrimental effects to aquatic life.		
<b>Magnitude</b>	<b>Reversibility</b>	<b>Geographic Extent</b>	<b>Duration</b>	<b>Frequency</b>
Small	Reversible	Immediate	Short-term	Intermittent
<b>Residual Effects:</b>				
Insignificant				
<b>Monitoring:</b>				
An environmental monitor will be at site during any instream works (e.g. site isolation and reintroduction of water through new culvert).				
<b>Comments:</b> The contractor's EPP will detail timeframes where the presence of an environmental monitor will be required at site.				
<b>Table 2.7 Valued Ecosystem Component – Archaeology/Paleontology/Heritage</b>				
<b>Potential Effect:</b> potential for archaeology relics				
<b>Potential Interaction</b>		<b>Mitigation</b>		

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<p>There is a very slight potential for archaeological relics in this area due to the stream.</p>		<p>A request for data was sent into the BC Heritage Conservation Act to see if there are any known areas of archaeological sites near the construction area. The information sent back indicated the work is a replacement of an existing culvert, therefore the potential of finding intact archaeological material in the sediments surrounding the culvert is low. However, there is always a limited possibility for unknown archaeological sites to exist in the proposed work area. Archaeological sites (both recorded and unrecorded) are protected under the Heritage Conservation Act and must not be altered or damaged without a permit from the Archaeological Branch. If a suspected archaeological site is encountered during development, activities must be halted and the Archaeology Branch contacted at (250) 953-3334 for direction.</p>		
<b>Magnitude</b>	<b>Reversibility</b>	<b>Geographic Extent</b>	<b>Duration</b>	<b>Frequency</b>
Small	Reversible	Immediate	Short-term	Once
<b>Residual Effects:</b>		Insignificant		
<b>Monitoring:</b>		None required		
<p><b>Comments:</b> This information is part of the PWGSC specifications under the Environmental Procedures spec 01 35 43.</p>				
<p><b>Table 2.8 Valued Ecosystem Component – Air Quality/Noise</b></p>				
<b>Potential Effect:</b>		Potential for air quality and noise pollution during construction activities.		
<b>Potential Interaction</b>		Mitigation		
<p>There is a very slight potential for air quality and noise pollution during construction activities.</p>		<p>The project will be short term and the amount of noise and air quality issues that arise from this project will be minimal. The contractor will be required to follow all provincial and federal regulations and guidelines regarding noise and air quality during construction phases.</p>		
<b>Magnitude</b>	<b>Reversibility</b>	<b>Geographic Extent</b>	<b>Duration</b>	<b>Frequency</b>
Small	Reversible	Immediate	Short-term	Intermittent
<b>Residual Effects:</b>		Insignificant		
<b>Monitoring:</b>		None required		
<p><b>Comments:</b></p>				
<p><b>Table 2.9 Valued Ecosystem Component – Health and Safety</b></p>				
<p><b>Potential Effect:</b> the site will be an active construction area with potential for health and safety issues.</p>				

**Environmental Effects Evaluation Report – Culvert Replacement at KM 475**

<b>Potential Interaction</b>		<b>Mitigation</b>		
There is always a possibility of health and safety issues arising on a construction site situation.		The contractor is required to provide PWGSC with a Health and Safety Plan to detail all aspects of the potential accidents/incidents that may occur on a construction site. This HASP is reviewed and approved by PWGSC prior to construction start up.		
<b>Magnitude</b>	<b>Reversibility</b>	<b>Geographic Extent</b>	<b>Duration</b>	<b>Frequency</b>
Small	Reversible	Immediate	Short-term	Intermittent
<b>Residual Effects:</b>				
Insignificant				
<b>Monitoring:</b>				
The contractor will delegate a health and safety representative who will be responsible for adhering to the health and safety plan (HASP).				
<b>Comments:</b>				

***D: CONSULTATIONS***

**Public Consultation**

The potential for public concern is minimal due to the fact that this is an existing public transportation route that is already established. Public consultation was deemed necessary as part of this screening. A record of public participation determination is found in **Appendix B**.

**Aboriginal Consultation**

PWGSC evaluated this project to determine if the environmental effects will result in a significant adverse environmental effect upon aboriginal peoples. All projects that require notification or approval under the Ministry of Environment, or the provincial government in general, require the province to contact all aboriginal communities and/or Treaty 8 with respect to the project details and description. All aboriginal interests are taken into account by the province prior to giving approval or permitting. This notification to the aboriginal communities/Treaty 8 is also completed when there are highway projects within provincial park boundaries.

**Government Consultation**

Provincial authorities likely to have an interest in the project were consulted by PublicWorks & Government Services Canada, Environmental Services, during the course of this environmental effects evaluation. A project description was distributed to these provincial authorities in order to garner expert advice. These authorities included:

- BC MOE Water Act
- BC Heritage Conservation Act – Archaeological Branch

As a result of this consultation, the above authorities provided expert advice that was considered and incorporated in the environmental effects evaluation.

***PART E: ENVIRONMENTAL EFFECTS EVALUATION CONCLUSION***

**Significant Adverse Environmental Effect**

Potential impacts of this project are associated with construction disturbances. It is reasonable to conclude that with appropriate mitigation in place and good work practices, environmental effects will be of short duration and the potential zone of influence will be confined to the immediate vicinity if the work.

**Mitigation**

- The contractor is required to provide PWGSC with an environmental protection plan (EPP) to ensure they are aware of the environmental concerns and issues associated with construction activities during the replacement of the culvert. PWGSC must approve this plan prior to construction start up.
- Prior to entering within 100 m of a water body, all equipment and machinery scheduled to work in and/or along a water body should be inspected and found to be clean, free of leaks and in good working condition. As such, all equipment and machinery should have all foreign material removed including dirt, mud, debris, grease, oil, hydraulic fluid or other substances that may impact the water quality or the fish and fish habitat values of the water body. As well, all identified leaks will be repaired and then appropriately cleaned. Such inspections, cleaning and/or servicing can occur either before the equipment or machinery is transported into the field or at the work site. Any cleaning and/or servicing of equipment and machinery at the work site should not be conducted in or along water bodies. Rather, all such works should occur at least 100 m from the water body with any runoff controlled to ensure wash materials and/or other substances do not enter the riparian zone or the channel of the water body. This information will be detailed and provided in the contractor's environmental protection plan (EPP) that is approved by PWGSC.
- There may be some siltation during the work site isolation and introduction of the stream through the new culvert however, this will be minimal and short term (hours). Effective, short term and long term sediment and erosion control measures should be installed before starting work to prevent the entry of sediment into the watercourse. These measures should be inspected regularly during construction and afterwards to ensure that they are functioning properly and are maintained and/or upgraded as required until vegetation has been re-established on the disturbed area. Sediment should not be released into any waters frequented by fish. The work site is to be isolated from the stream and water diverted around the site to avoid any siltation or suspended solids from entering the water column. Contractor will be using the BC MOE Standards and Best Practices for instream Work guidelines for work area isolation.
- The contractor is obligated to ensure all MOE and DFO regulations and guidelines are followed during site isolation and construction activities. Where water is pumped from fish habitat, water intakes must be appropriately screened according to DFO's Freshwater Intake End-of-Pipe Fish Screen Guidelines (1995) in order to prevent the entrainment or impingement of fishes during pump operation. Gasoline powered pumps or generators and associated fuel must be enclosed or set within secondary containment large enough to contain all harmful materials should a spill, leak or overflow occur. This will minimize the introduction of silt into the water column and thereby mitigating any detrimental effects of downstream fish and fish habitat. All discharged water from dewatering the isolated in-stream work area must be released at a location, and in a manner, that either prevents water from re-entering the watercourse or allows suitable filtering and/or settling (to background levels) of sediment out of the water before re- entry into the watercourse. Water re-entering the creek should be of equal or better quality than the receiving water. Water discharged into the channel downstream of the crossing site from the pump by-pass will be released onto a structure or material that diffuses and slows water flow to prevent scouring of the channel bed or banks.
- The contractor is obligated to ensure all MOE and DFO regulations and guidelines are followed during site isolation and construction activities. This will minimize the introduction of silt into the water

## **Environmental Effects Evaluation Report – Culvert Replacement at KM 475**

- column and thereby mitigating any detrimental effects of downstream fish and fish habitat.
- Although it is unlikely that the aquatic environment will sustain any long lasting disturbance, the construction activities will be isolated to a specific work area and the contractor is obligated to ensure all MOE and DFO regulations and guidelines are followed during site isolation and construction activities. This will minimize the introduction of silt into the water column and thereby mitigating any detrimental effects to aquatic life.
- A request for data was sent into the BC Heritage Conservation Act to see if there are any known areas of archaeological sites near the construction area. The information sent back indicated the work is a replacement of an existing culvert, the potential of finding intact archaeological material in the sediments surrounding the culvert is low. However, there is always a limited possibility for unknown archaeological sites to exist in the proposed work area. Archaeological sites (both recorded and unrecorded) are protected under the Heritage Conservation Act and must not be altered or damaged without a permit from the Archaeological Branch. If a suspected archaeological site is encountered during development, activities must be halted and the Archaeology Branch contacted at (250) 953-3334 for direction. This information is part of the PWGSC specifications under the Environmental Procedures spec 01 35 43.
- The contractor is required to provide PWGSC with a Health and Safety Plan to detail all aspects of the potential accidents/incidents that may occur on a construction site. This HASP is reviewed and approved by PWGSC prior to construction start up.
- Any and all stipulations of federal, provincial, or municipal authorities and/or their officers must be strictly followed. As a best practice the most stringent standards must be used where applicable. Any discrepancies must be successfully resolved before the pertinent work may begin.

### ***PART F: ACCURACY AND COMPLIANCE MONITORING***

Site monitoring (accuracy and compliance monitoring) may be conducted to verify whether required mitigation measures were implemented. The proponent must provide site access to Responsible Authority officials and/or its agents upon request.

## Environmental Effects Evaluation Report – Culvert Replacement at KM 475

### ***PART G: DETERMINATION***

The federal authority is required to provide a determination of the significance of environmental effects as a result of this project. The decision outlined below is based on the interpretation of environmental effects and mitigation measures described in Part D of this report.

**Project Name:** Culvert Replacement at KM 475 of the Alaska Highway, British Columbia  
**PWGSC Project #:** R.017173.058  
**Location:** KM 475 Alaska Highway, BC

The Federal Authority has evaluated the project for significant adverse environmental effects as required under Section 67 of *Canadian Environmental Assessment Act (CEAA), 2012*. On the basis of this evaluation, the department has determined that the decision opposite the "X" applies to the proposed project.

- Project not likely to cause significant adverse environmental effects - proceed.
- Project not likely to cause significant adverse environmental effects with mitigation - proceed using mitigative measures as determined.
- Inadequate information available - further study and assessment is required.
- Project likely to cause significant adverse environmental effects that cannot be justified in the circumstances - project will not proceed.
- Project likely to cause significant adverse environmental effects that may be justified in the circumstances - refer to the Governor in Council for decision.

### ***PART H: SIGNATURE CERTIFICATE***

This document summarizes the results of an environmental effects evaluation related to the above project that has been performed and completed by the Federal Authority in accordance with the *Canadian Environmental Assessment Act, 2012*.

Environmental Specialist: \_\_\_\_\_ Date: \_\_\_\_\_  
Laurie Crawford, Environmental Coordinator AHP, Environmental Services, PWGSC, Western Region

*The above has completed this environmental effects evaluation (EEE) report to the best of their ability and knowledge, and ensures that it meets the requirement of the Canadian Environmental Assessment Act, 2012.*

Project Manager: \_\_\_\_\_ Date: \_\_\_\_\_  
Alex Taheri, Project Manager, Real Property Services, PWGSC, Pacific Region

*The above has read and understood this environmental effects evaluation (EEE) report and acknowledges responsibility for ensuring the implementation of mitigation measures and for ensuring the design and implementation of 'accuracy and compliance monitoring', if any, identified in this report.*

## Environmental Effects Evaluation Report – Culvert Replacement at KM 475

### ***PART I: REFERENCES***

1. BC Water Act Regulation
2. BC Standards and Best Practices for Instream Works
3. BC Endangered Species and Ecosystems,
4. Peace Region Least Risk Timing Windows – Biological Rationale, 2004
5. Ministry of Forest and Range (MFR) Riparian Management Area Guidebook
6. Develop with Care – Section Five: Regional Information Packages, Northeast Region, 2012
7. Canadian Environmental Assessment Act, 2012
8. Fisheries Act, 2012
9. Fisheries and Oceans Canada – Placement of Material or Structures in Water – Pathways of Effects
10. Fisheries Productivity Investment Policy: A Proponent’s Guide to Offsetting
11. Fisheries Protection Policy
12. Species at Risk Act
13. Aquatics Effects Assessment, Culvert Replacement at KM 474, Alaska Highway, BC, 2014

**APPENDIX A**  
**FIGURES**

*Figure 1- Culvert Location*

*Figure 2- Photo of Culvert Inlet*

*Figure 3- Photo of Downstream Conditions*

*Figure 4- Photo of Upstream Conditions*

**APPENDIX B**  
RECORD OF PUBLIC PARTICIPATION DETERMINATION

## Record of Public Participation Determination

**Stage of work plan:** Early planning phase of screening (pre-scoping)

Is there an indication that...	Describe potential indication and issues	Consider public participation?	
<i>there is an existing or likely public interest in the type, location or potential effects of the project?</i>		<input type="checkbox"/> Yes	X No
<i>There are members of the public with a history of being involved in past proposed projects in the area?</i>		<input type="checkbox"/> Yes	X No
<i>the project has the potential to generate conflict between environmental and social or economic values of concern to the public?</i>		<input type="checkbox"/> Yes	X No
<i>the project may be <u>perceived</u> as having the potential for significant adverse environmental effects? <sup>1</sup></i>		<input type="checkbox"/> Yes	X No
<i>there is potential to learn from community ecological? knowledge or Aboriginal traditional knowledge?</i>		<input type="checkbox"/> Yes	X No
<i>there is uncertainty about potential direct and indirect environmental effects or the significance of identified effects?</i>		<input type="checkbox"/> Yes	X No
<i>the project has been or will be subject to other public participation processes that would meet the objectives of the Ministerial Guideline <a href="http://www.ceaa.gc.ca/013/006/ministerial_guideline_e.htm">http://www.ceaa.gc.ca/013/006/ministerial_guideline_e.htm</a></i>		<input type="checkbox"/> Yes	X No
<i>there is any other reason why public participation is or is not appropriate?</i>		<input type="checkbox"/> Yes	X No

**As a result of the scan above, is public participation under CEEA appropriate in the circumstances?**

Yes

No

**Additional comments to support determination:**

<sup>1</sup> Environmental Effect as per the definition in CEEA (2012) is

- Changes to the environment to components of the environment that are within the legislative authority of Parliament (fish as defined by the Fisheries Act, aquatic species under the Species at Risk Act, and migratory birds as defined in the Migratory Birds Convention Act (1994))
- Changes to the environment that occur on federal lands, or inter-provincially or outside of Canada.
- The effect of any change on health and socio-economic condition, physical and cultural heritage, use of resources for traditional purposes and structures of historical significance are limited with respect to Aboriginal peoples.

**APPENDIX C**  
DEFINITIONS AND METHODOLOGIES

Environment (defined in S.2(1)) – the components of the Earth, and includes land, water and air, including all layers of the atmosphere; and all organic and inorganic matter and living organisms (and the interacting natural systems of those).

Environmental Effects (defined in S.5(1) and 5(2)) – (a) a change that may be caused to the following components of the environment that are within the legislative authority of Parliament:

- Fish as defined in section 2 of the *Fisheries Act* and fish habitat as defined in subsection 34(1) of that Act,
- Aquatic species as defined in subsection 2(1) of the *Species at Risk Act (SARA)*,
- Migratory birds as defined in subsection 2(1) of the *Migratory Birds Convention Act, 1994*, and
- Any other component of the environment that is set out in Schedule 2.

(b) a change that may be caused to the environment that would occur on federal lands, or inter-provincially, or outside Canada; and

(c) with respect to aboriginal peoples, the effect of any change on health and socio-economic conditions, physical and cultural heritage, the current use of lands and resources for traditional purposes, or any structure, site or thing that is of historical, archaeological, paleontological or architectural significance.

Federal Authority (defined in S.2(1)) – a Minister of the Crown in right of Canada; an agency of the Government of Canada or a parent Crown corporation, as defined in subsection 83(1) of the *Financial Administration Act (FAA)*; or any department or departmental corporation that is set out in Schedule I or II to the FAA.

Federal lands (defined in S.2(1)) – defined as follows:

- lands that belong to Her Majesty in right of Canada, or that Canada has power to dispose of, and all waters on and airspace above those lands, other than lands under the administration and control of the Commissioner of Yukon, the Northwest Territories or Nunavut;
- the internal waters of Canada, in any area of the sea not within a province;
- the territorial sea of Canada in any area of the sea not within a province;
- the exclusive economic zone of Canada, and the continental shelf of Canada; and
- reserves, surrendered lands and any other lands that are set apart for the use and benefit of a band and that are subject to the *Indian Act*, and all waters on and airspace above those reserves or lands.

Mitigation measures (defined in S. 2(1)) – measures for the elimination, reduction or control of the adverse environmental effects of a designated project, and includes restitution for any damage to the environment cause by those effects through replacement, restoration, compensation or any other means.

Project (defined in S. 66) – a physical activity that is carried out in relation to a physical work and is not a designated project.

Valued Ecosystem Component (defined on Agency - [www.ceaa.gc.ca/default.asp?lang=En&n=B7CA71391&offset=3#v](http://www.ceaa.gc.ca/default.asp?lang=En&n=B7CA71391&offset=3#v)) - The environmental element of an ecosystem that is identified as having scientific, social, cultural, economic, historical, archaeological or aesthetic importance.

The value of an ecosystem component may be determined on the basis of cultural ideals or scientific concern. Valued ecosystem components that have the potential to interact with project components should be included in the assessment of environmental effects.

### **Methodology**

The environmental effects evaluation methodology used in this report focuses the evaluation on those environmental components of greatest concern. The Valued Ecological Components (VECs) most likely to be affected by the project as described are indicated in **Table 1**. VECs were selected based on ecological importance to the existing environment (above), the relative sensitivity of environmental components to project influences and their relative social, cultural or economic importance. The potential impacts resulting from these interactions are described below.

### ***Evaluation of Environmental Effects***

The VECs selected in Table 1 are addressed in Tables 2.1 through 2.9 in the EEE. The residual effects of the project on the environment are defined. Similarly, the physical works/activities and required mitigation measures are detailed and the significance of residual (post-mitigation) effects is estimated.

The following ratings are based on:

- **information provided by the proponent;**
- **a review of project related activities;**
- **an appraisal of the environmental setting, and identification of resources at risk;**
- **the identification of potential impacts within the temporal and spatial bounds; and**
- **personal knowledge and professional judgment of the assessor.**

The significance of project related impacts was determined in consideration of their frequency, the duration and geographical extent of the effects, magnitude relative to natural or background levels, and whether the effects are reversible or are positive or negative in nature. These criteria are indicated in Table 2.

**Table 3. Assessment Criteria for Determination of Significance.**

<b>Magnitude</b>	Magnitude, in general terms, may vary among Issues, but is a factor that accounts for size, intensity, concentration, importance, volume and social or monetary value. It is rated as compared with background conditions, protective standards or normal variability.	
	Small	Relative to natural or background levels
	Moderate	Relative to natural or background levels
	Large	Relative to natural or background levels
<b>Reversibility</b>	Reversible	Effect can be reversed
	Irreversible	Effects are permanent
<b>Geographic Extent</b>	Immediate	Confined to project site
	Local	Effects beyond immediate project site but not regional in scale
	Regional	Effects on a wide scale
<b>Duration</b>	Short Term	Between 0 and 6 months in duration
	Medium Term	Between 6 months and 2 years
	Long Term	Beyond 2 years
<b>Frequency</b>	Once	Occurs only once
	Intermittent	Occurs occasionally at irregular intervals
	Continuous	Occurs on a regular basis and regular intervals

**APPENDIX D**  
**MITIGATION TABLE**

Environmental Component	Reference	PWGSC Commitment	Phase	Responsibility
Responsible Environmental Management	1.1	Design and construct the culvert at KM 475 in an environmentally responsible manner, and will employ Best Management Practices (BMPs), or equivalents, and comply with federal, provincial and municipal statutes. PWGSC will also instruct and advise the contractor to abide by all relevant commitments.	Pre Construction Construction	PWGSC Contractor
	1.2	Ensure that required Permits, Approvals and Authorizations are in place before proceeding to construction.	Pre Construction Construction	PWGSC Contractor
	1.3	Prepare a final version of a construction-phase Environmental Protection Plan (EPP), prior to the start of construction. The EPP will provide contractors and on-site workers with procedures and requirements for meeting Permits, Notifications, Approvals and Authorizations and for carrying out on-site activities using accepted BMPs or equivalents. The EPP will be updated as required.	Pre Construction Construction	PWGSC Contractor
	1.4	Engage an Environmental Monitor for the construction phase of the Project. The Environmental Monitor will undertake regular environmental monitoring activities, and will ensure the implementation of EEE terms and conditions for the Project. The Environmental Monitor will review, evaluate, and report to regulators on the construction activities and the effectiveness of the environmental control strategies and mitigation measures, with respect to the terms and conditions of the EEE, the EPP and other regulatory Permits, Notifications, Approvals and Authorizations that may apply.	Construction	Contractor

## Mitigation Table

It is reasonable to conclude that with appropriate mitigation in place and good work practices, significant adverse environmental effects will be of short duration and the potential zone of influence will be confined to the immediate vicinity if the work.

### *Mitigation*

- The contractor is required to provide PWGSC with an environmental protection plan (EPP) to ensure they are aware of the environmental concerns and issues associated with construction activities during the replacement of the culvert. PWGSC must approve this plan prior to construction start up.
- Prior to entering within 100 m of a water body, all equipment and machinery scheduled to work in and/or along a water body should be inspected and found to be clean, free of leaks and in good working condition. As such, all equipment and machinery should have all foreign material removed including dirt, mud, debris, grease, oil, hydraulic fluid or other substances that may impact the water quality or the fish and fish habitat values of the water body. As well, all identified leaks will be repaired and then appropriately cleaned. Such inspections, cleaning and/or servicing can occur either before the equipment or machinery is transported into the field or at the work site. Any cleaning and/or servicing of equipment and machinery at the work site should not be conducted in or along water bodies. Rather, all such works should occur at least 100 m from the water body with any runoff controlled to ensure wash materials and/or other substances do not enter the riparian zone or the channel of the water body. This information will be detailed and provided in the contractor's environmental protection plan (EPP) that is approved by PWGSC.
- There may be some siltation during the work site isolation and introduction of the stream through the new culvert however, this will be minimal and short term (hours). Effective, short term and long term sediment and erosion control measures should be installed before starting work to prevent the entry of sediment into the watercourse. These measures should be inspected regularly during construction and afterwards to ensure that they are functioning properly and are maintained and/or upgraded as required until vegetation has been re-established on the disturbed area. Sediment should not be released into any waters frequented by fish. The work site is to be isolated from the stream and water diverted around the site to avoid any siltation or suspended solids from entering the water column. Contractor will be using the BC MOE Standards and Best Practices for instream Work guidelines for work area isolation.
- The contractor is obligated to ensure all MOE and DFO regulations and guidelines are followed during site isolation and construction activities. Where water is pumped from fish habitat, water intakes

## Mitigation Table

must be appropriately screened according to DFO's Freshwater Intake End-of-Pipe Fish Screen Guidelines (1995) in order to prevent the entrainment or impingement of fishes during pump operation. Gasoline powered pumps or generators and associated fuel must be enclosed or set within secondary containment large enough to contain all harmful materials should a spill, leak or overflow occur. This will minimize the introduction of silt into the water column and thereby mitigating any detrimental effects of downstream fish and fish habitat. All discharged water from dewatering the isolated in-stream work area must be released at a location, and in a manner, that either prevents water from re-entering the watercourse or allows suitable filtering and/or settling (to background levels) of sediment out of the water before re-entry into the watercourse. Water re-entering the creek should be of equal or better quality than the receiving water. Water discharged into the channel downstream of the crossing site from the pump by-pass will be released onto a structure or material that diffuses and slows water flow to prevent scouring of the channel bed or banks.

- The work site is to be isolated from the stream and water diverted around the site to avoid any siltation or suspended solids from entering the water column. There may be some siltation during the work site isolation and introduction of the stream through the new culvert however, this will be minimal and short term (hours). Contractor will be using the BC MOE Standards and Best Practices for Instream Work guidelines for work area isolation.
- The contractor is obligated to ensure all MOE and DFO regulations and guidelines are followed during site isolation and construction activities. This will minimize the introduction of silt into the water column and thereby mitigating any detrimental effects of downstream fish and fish habitat.
- Although it is unlikely that the aquatic environment will sustain any long lasting disturbance, the construction activities will be isolated to a specific work area and the contractor is obligated to ensure all MOE and DFO regulations and guidelines are followed during site isolation and construction activities. This will minimize the introduction of silt into the water column and thereby mitigating any detrimental effects to aquatic life.
- A request for data was sent into the BC Heritage Conservation Act to see if there are any known areas of archaeological sites near the construction area. The information sent back indicated the work is a replacement of an existing culvert, the potential of finding intact archaeological material in the sediments surrounding the culvert is low. However, there is always a limited possibility for unknown archaeological sites to exist in the proposed work area. Archaeological sites (both recorded and unrecorded) are protected under the Heritage Conservation Act and must not be altered or damaged without a permit from the Archaeological Branch. If a suspected archaeological site is encountered during development, activities must be halted and the Archaeology Branch contacted at (250) 953-3334 for direction. This information is part of the PWGSC specifications under the Environmental Procedures spec 01 35 43.

### Mitigation Table

- The contractor is required to provide PWGSC with a Health and Safety Plan to detail all aspects of the potential accidents/incidents that may occur on a construction site. This HASP is reviewed and approved by PWGSC prior to construction start up.
- Any and all stipulations of federal, provincial, or municipal authorities and/or their officers must be strictly followed. As a best practice the most stringent standards must be used where applicable. Any discrepancies must be successfully resolved before the pertinent work may begin.
- Any and all stipulations of federal, provincial, or municipal authorities and/or their officers must be strictly followed. As a best practice the most stringent standards must be used where applicable. Any discrepancies must be successfully resolved before the pertinent work may begin.

**Site monitoring (accuracy and compliance monitoring) may be conducted to verify whether required mitigation measures were implemented. The proponent must provide site access to Responsible Authority officials and/or its agents upon request**



**Public Works and  
Government Services  
Canada**

**Travaux publics et  
Services gouvernementaux  
Canada**

**REAL PROPERTY SERVICES**  
Pacific Region

**SERVICES IMMOBILIERS**  
Région de Pacifique

# **CULVERT REPLACEMENT, km 475 2400x2400x36.60m CONCRETE BOX CULVERT**

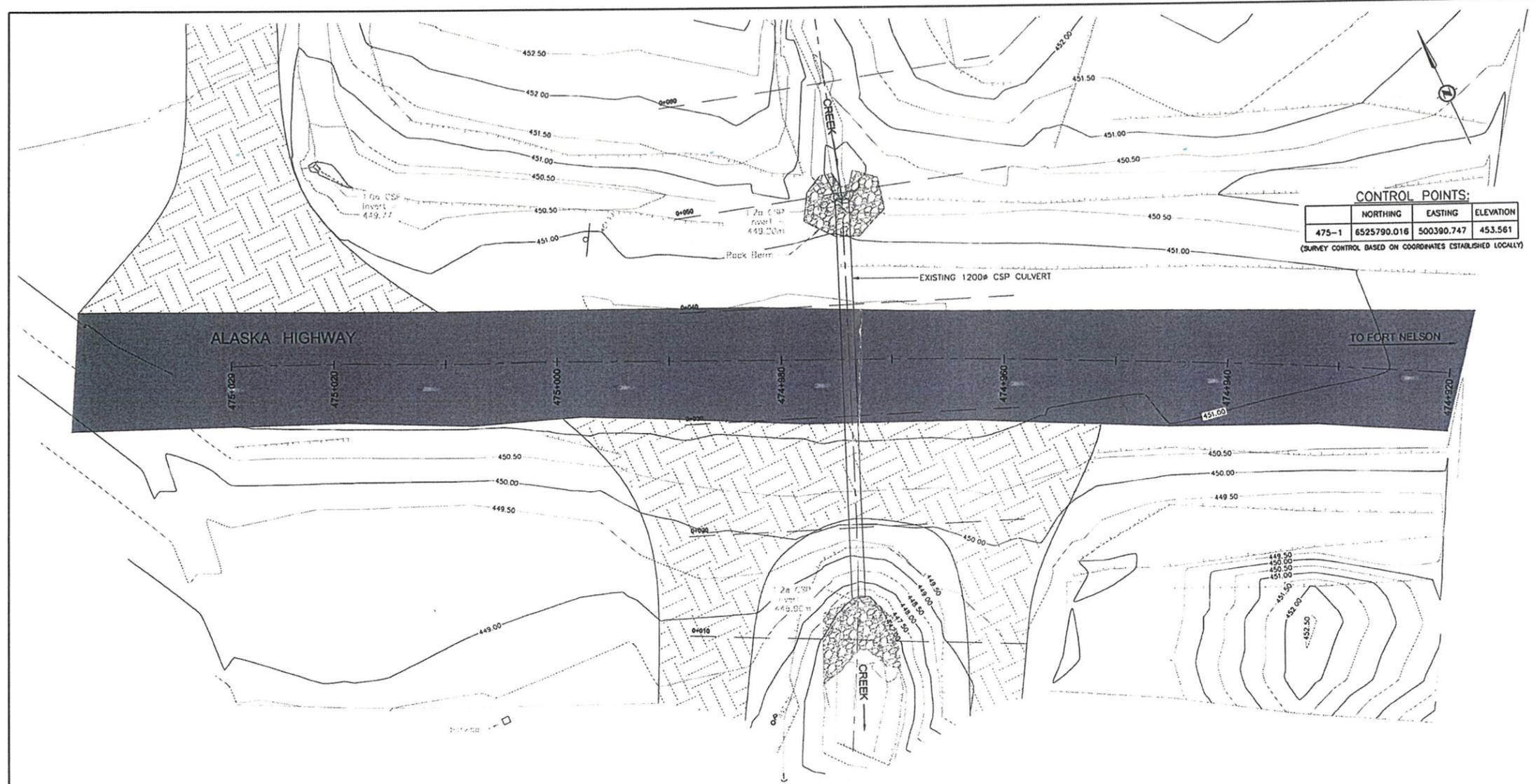


## **ALASKA HIGHWAY BRITISH COLUMBIA**



**PROJECT No. R.017173.056**

**MARCH 28, 2014**

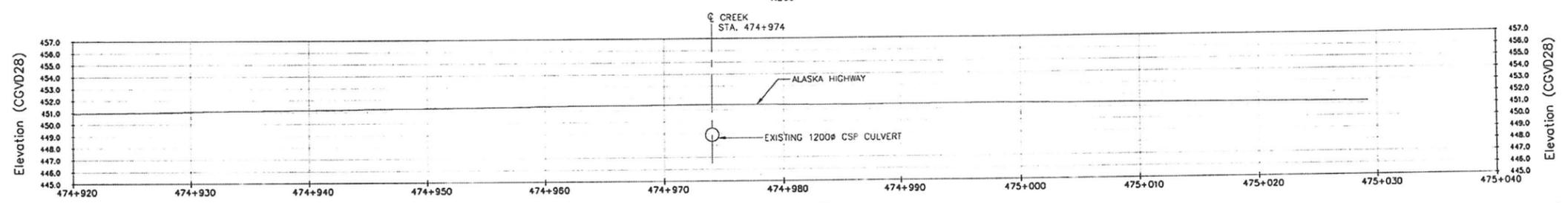


**CONTROL POINTS:**

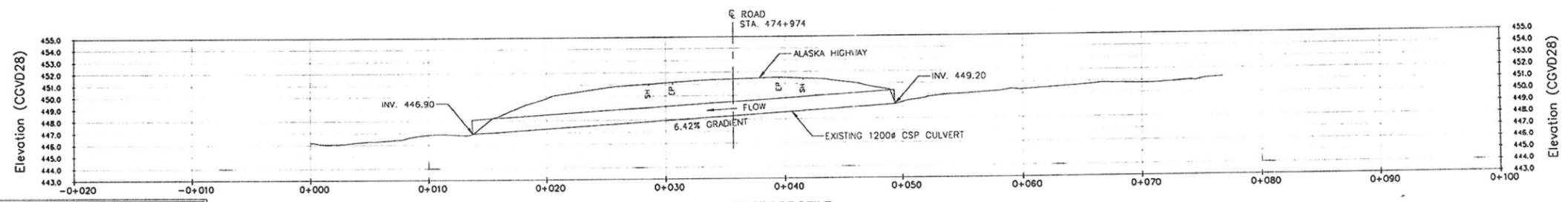
	NORTHING	EASTING	ELEVATION
475-1	6525790.016	500390.747	453.561

(SURVEY CONTROL BASED ON COORDINATES ESTABLISHED LOCALLY)

- LEGEND:**
- Bench Mark
  - Survey Point
  - Sign
  - Existing Road Centreline
  - Existing Road Pavement Edge
  - Existing Road Shoulder
  - Ditchline
  - Present Waterlines
  - Top of Bank
  - Existing Riprap



**ROAD PROFILE**  
1:200



**CREEK PROFILE**  
1:200

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Revision/Revisión	Description/Description	Date/Date
1	FINAL SUBMISSION	14/03/28
0	ISSUE FOR SET REVIEW	14/03/17

Client/Client: North Country Maintenance

Project title/Titre du projet: km 475 ON THE ALASKA HIGHWAY

**2400x2400x36.60m CONCRETE BOX CULVERT**

Approved by/Approuvé par: M. F. Hristov  
 Designed by/Conçu par: F. Hristov  
 Drawn by/Dessiné par: S. Graser  
 Professional Engineer # 31982

Client/Client: North Country Maintenance  
 Drawing title/Titre du dessin: SITE PLAN & PROFILES

Project No./No. du projet	Sheet/Feuille	Revision no./La Révisión no.
R.017173.056	C01	0

of 3

**NORTH COUNTRY MAINTENANCE**



**CONTROL POINTS:**

	NORTHING	EASTING	ELEVATION
475-1	6525790.016	500390.747	453.561
WP1	6525724.078	500390.439	446.900
WP2	6525744.130	500398.780	451.416
WP3	6525757.871	500404.496	448.363

(SURVEY CONTROL BASED ON COORDINATES ESTABLISHED LOCALLY)

- LEGEND:**
- Bench Mark
  - Sign
  - Telephone Pole/Overhead Line
  - Existing Road
  - Proposed Road Excavation
  - Ditchline
  - Present Waterline
  - Top of Bank
  - Existing Riprap (May be Reused)
  - New Riprap
  - Substrate



Revision/	Description/Description	Date/Date
1	FINAL SUBMISSION	11/03/18
0	ISSUES FOR BSR REVIEW	11/03/17

Project title/Titre du projet  
**km 475 ON THE ALASKA HIGHWAY**

**2400x2400x36.60m  
 CONCRETE BOX CULVERT**

Approved by/Approve par  
 M. FLORENDO

Designed by/Concept par  
 F. HUSTOV

Drawn by/Dessiné par  
 S. FRASER

PMSC Project Manager/Administrateur de Projets IP200  
 K. MORTON

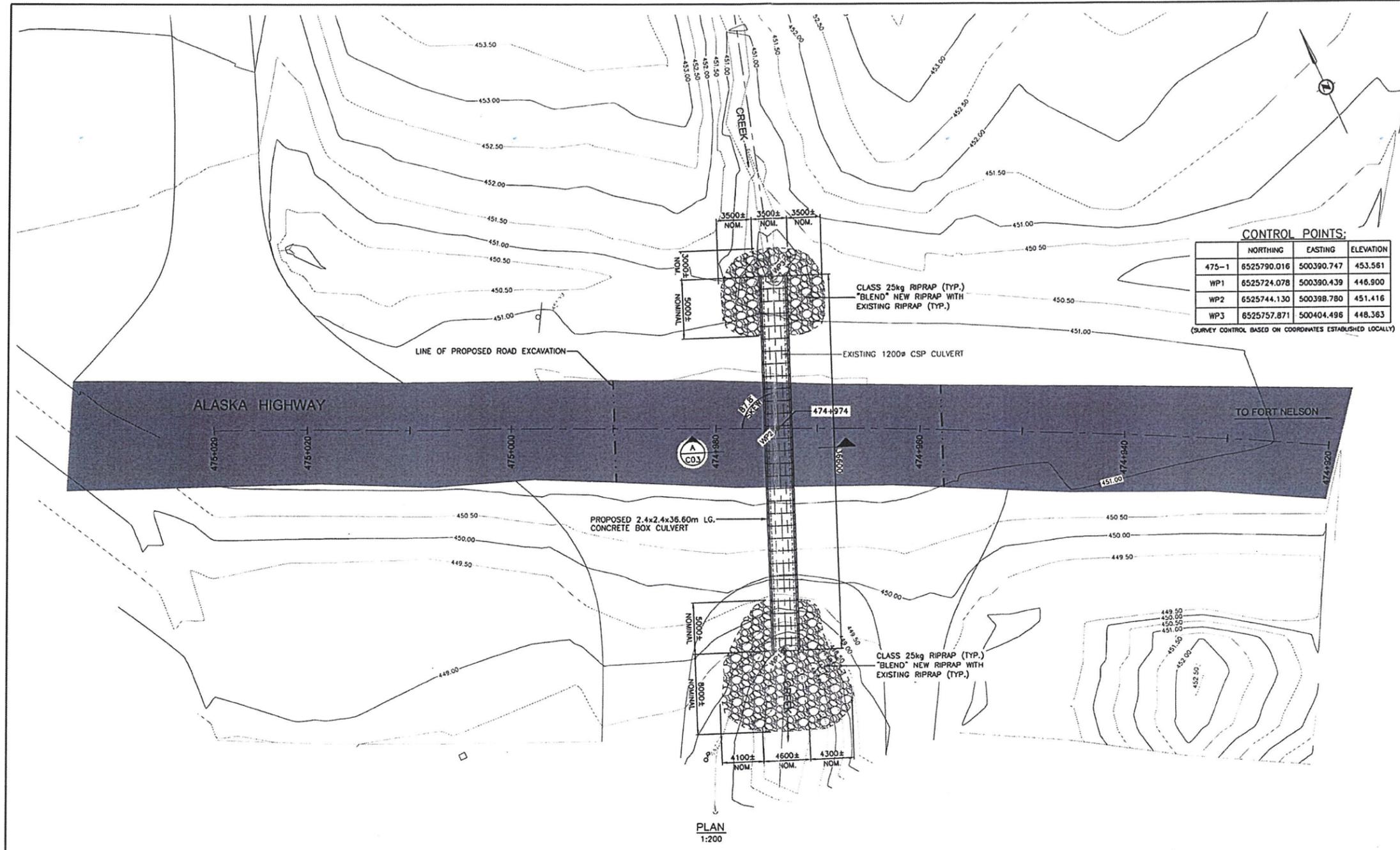
PMSC Architectural and Engineering Services Manager/  
 Ressources Architecturales et Ingénierie, IP200

Client/Client  
 North Country Maintenance

Drawing title/Titre du projet  
**GENERAL ARRANGEMENT**

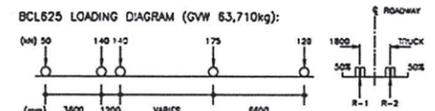
**#31962**  
**BRITISH COLUMBIA ENGINEER**

Project No./No. du projet R.017173.056	Sheet/Feuille C02	Revision no./ La Révision 0
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**SPECIFICATION NOTES:**

1. ALL ASPECTS OF THE CULVERT DESIGN, MATERIAL AND INSTALLATION OF THIS CULVERT SHALL BE IN ACCORDANCE WITH THE "2009 Standard Specifications for Highway Construction", October 1, 2008. THE CULVERT SHALL HAVE BCL625 HIGHWAY LOAD CAPACITY AND DESIGNED IN ACCORDANCE TO CAN/CSA-S6-06 AND THE FOLLOWING LOAD DIAGRAM:



REFER TO 2007 Edition FOR ADDITIONAL INFORMATION ON BCL625 LOADING WITHIN THE "MOT Supplement to CHBDC S6-06".

2. HYDRAULIC DATA:  
 - MINIMUM CHANNEL WIDTH: 2.4m  
 - O100# ELEVATION: 449.0m  
 - DESIGN VELOCITY: 3.0m/s

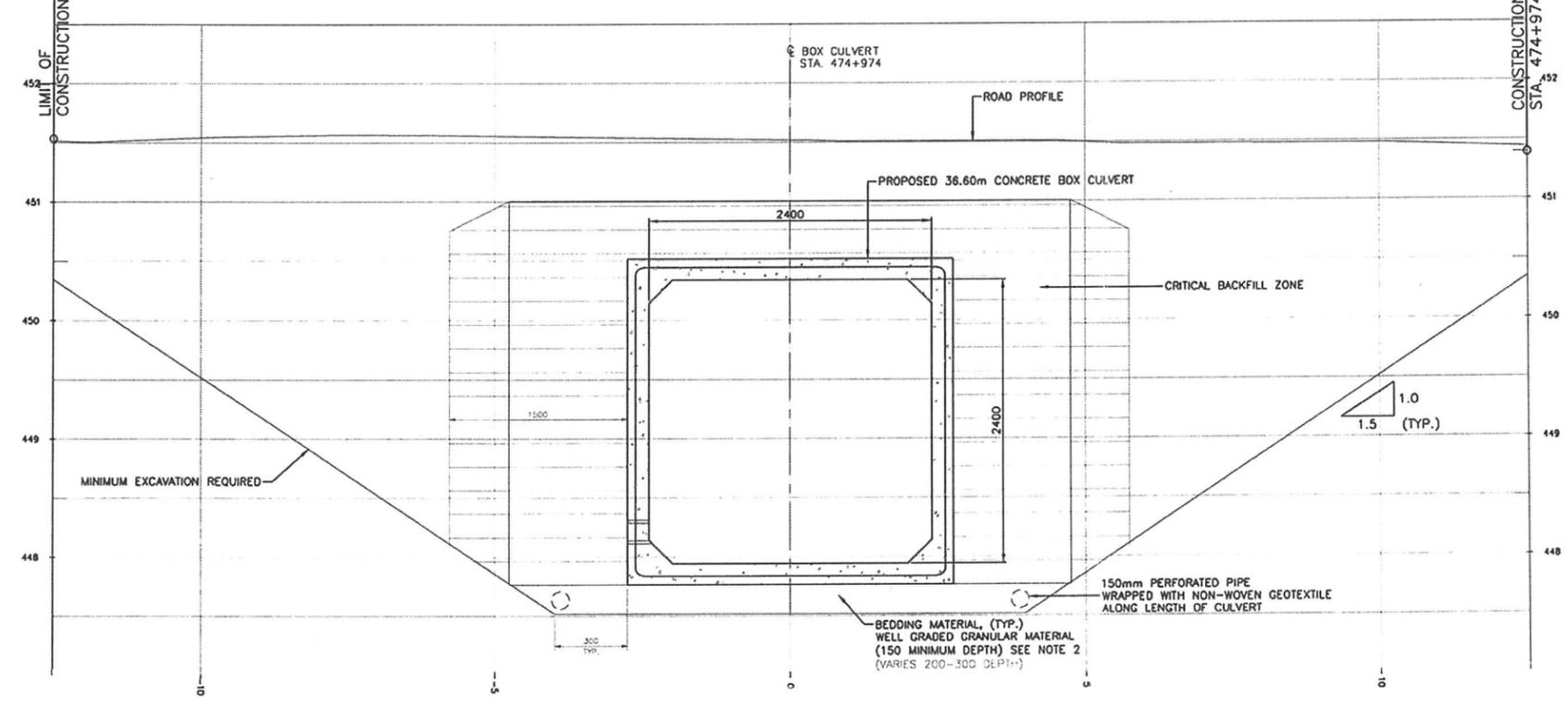
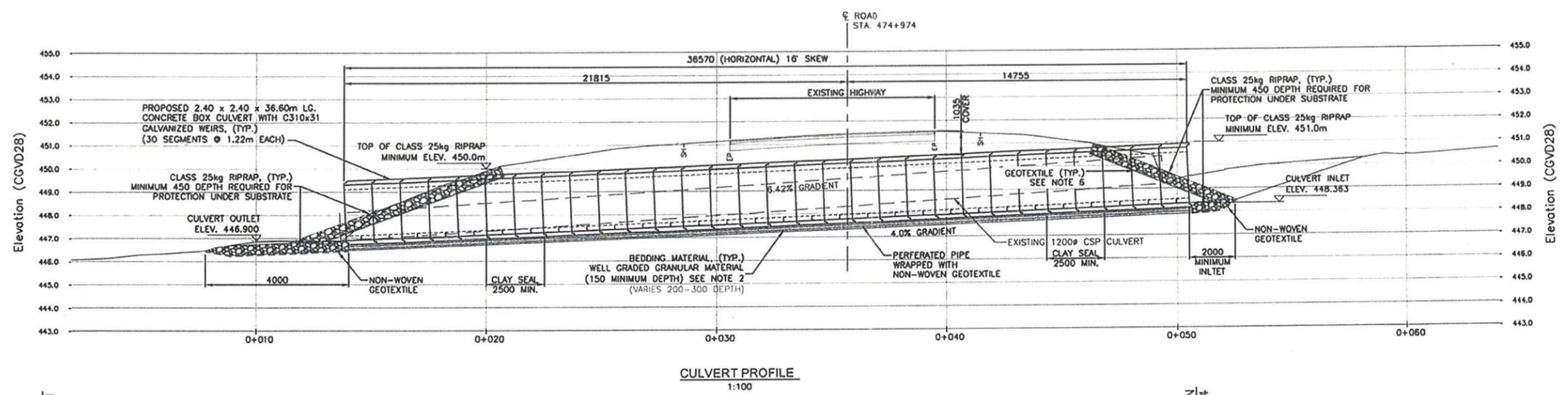
3. CULVERT LIFE SHALL BE IN ACCORDANCE WITH CSA G401 S5320 AND THE FOLLOWING:

**SERVICE LIFE:**  
 - 75 YEARS MINIMUM

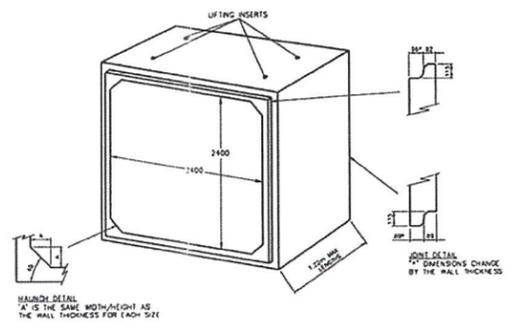
**DESIGN CODES:**  
 - BC MOT SUPPLEMENT TO CHBDC S6-06  
 - CAN/CSA S6-06  
 - ASTM C1433M

**GEOTECHNICAL:**  
 NO GEOTECHNICAL REPORT HAS BEEN COMPLETED.

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**A CULVERT SECTION**  
 1:50



**BOX CULVERT DETAILS**  
 N.T.S.

- GENERAL NOTES:**
- CULVERT INSTALLATION:**
- INSTALLATION OF CULVERT AS PER STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION 2012 (SS303).
  - BACKFILL COMPACTION REQUIREMENTS:
 

BEDDING MATERIAL:	98% SPD
COMPACTED GRANULAR MATERIAL:	95% SPD

 WGB 1-1/2" MINUS MATERIAL REQUIRED FOR BACKFILL  
 NO FROZEN OR DELETERIOUS MATERIAL SHALL BE PRESENT IN THE BACKFILL OR BEARING AREAS.
  - ALL EXPOSED SOIL AREAS SHALL BE REVEGETATED USING RECLAMATION MIX SEED AND COVERED WITH STRAW IMMEDIATELY UPON COMPLETION OF CULVERT CONSTRUCTION.
  - ALL DIMENSIONS ARE IN MILLIMETRES (mm) UNLESS OTHERWISE SPECIFIED.
  - ESTIMATED VOLUMES:
 

EXCAVATION:	1300m <sup>3</sup>
BEDDING MATERIAL:	35m <sup>3</sup>
COMPACTED GRANULAR BACKFILL:	650m <sup>3</sup>
  - RIPRAP SHALL BE HARD, DURABLE, ANGULAR ROCK AND IN ACCORDANCE TO THE "2012 Standard Specifications for Highway Construction", November 1, 2011 (SS205).
 

CLASS 25kg AVERAGE SIZE ROCK RIPRAP, 450 THICK, WITH THE FOLLOWING ROCK GRADATION:	
<b>MASS</b>	<b>DIAMETER</b>
85% LARGER THAN	2.5kg 150#
50% LARGER THAN	25kg 300#
15% LARGER THAN	75kg 450#

 RIPRAP VOLUME: 150m<sup>3</sup>  
 PLACE NON-WOVEN GEOTEXTILE, MINIMUM MULLEN BURST STRENGTH OF 1550kPa (Armetec 170 or APPROVED EQUIVALENT), UNDER CLASS 25kg RIPRAP  
 TOTAL GEOTEXTILE: 150m<sup>3</sup>  
 EXISTING ROCK RIPRAP ON SITE MAY BE REUSED. IMPORT ROCK RIPRAP ONLY AS NEEDED TO COMPLETE CULVERT INSTALLATION.
  - ENVIRONMENTAL:  
 ALL WORKS ASSOCIATED WITH THE INSTALLATION OF THIS CULVERT SHALL COMPLY WITH ALL RELEVANT ENVIRONMENTAL STANDARDS AND APPLICABLE LEGISLATION, REGULATIONS, AND PERTINENT DOCUMENTS.  
 SEDIMENT MUST BE PREVENTED FROM ENTERING THE NEARBY WATERCOURSES AS IT IS A VIOLATION UNDER THE FISHERIES ACT. ALL WORK SHALL BE DONE IN A MANNER THAT WILL NOT RESULT IN DEPOSITION OF CONSTRUCTION DEBRIS, SOIL, OR OTHER MATERIAL DELETERIOUS TO FISH, IN ANY WATERCOURSE. CONTRACTOR TO PROVIDED EROSION AND SEDIMENT CONTROL PLAN PER APPROVAL PRIOR TO START OF CONSTRUCTION.  
 PROVISIONS FOR DIVERSION OF WATER AND DRY WORKING CONDITIONS THROUGHOUT THE CULVERT BED MUST BE MADE BY THE CONTRACTOR. THE CONTRACTOR SHALL ENSURE THESE PROVISIONS ARE MAINTAINED.
  - BACKFILL SHALL BE COMPLETED IN LIFTS OF 200. MAXIMUM DIFFERENTIAL FROM SIDE TO SIDE SHALL NOT EXCEED 400.
  - A 600 STRIP OF GEOTEXTILE SHALL BE PLACED TO FORM A CONTINUOUS BARRIER AROUND THE EXTERIOR OF ALL BURIED JOINTS. ALL JOINTS SHALL BE SEALED WITH ConSeal CS-231 OR APPROVED EQUIVALENT.

Revision/Description	Description/Description	Date/Date
1	FINAL SUBMISSION	14/03/28
0	ISSUED FOR PER REVIEW	14/03/17

Client/Client	North Country Maintenance
Project Title/Titre du projet	Km 475 ON THE ALASKA HIGHWAY
Project Description/Description	2400x2400x36.60m CONCRETE BOX CULVERT
Approved by/Approve par	M. FLORENDO
Designed by/Concept par	F. Hristov
Drawn by/Dessiné par	S. Fraser
Project Manager/Administrateur de Projets	K. Morton
Client/Client	North Country Maintenance
Drawing Title/Titre de la feuille	C03
GENERAL ARRANGEMENT SHEET 2	
Project No./No. du projet	R.017173.056
Sheet/Feuille	C03
Revision no./Le Révision	0
	OF 3

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