



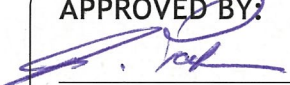
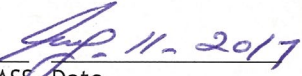
Public Services and Procurement Canada


Requisition No: EZ899-181070/A

DRAWINGS & SPECIFICATIONS
for
Bridge Barrier Replacement, Buckinghorse River Bridge,
km 277.6
Alaska Highway, British Columbia


Project No. R.017173.202 August 2017

APPROVED BY:

 _____  _____
Alaska Highway Program Manager, EASS Date

 _____ 2017-08-11 _____
Construction Safety Coordinator Date

TENDER:

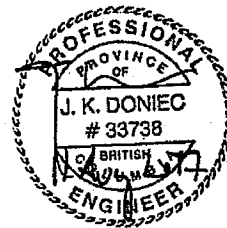
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Project Manager Date

PSPC

Bridge Barrier Replacement, Buckinghorse River Bridge, km 277.6
Alaska Highway, British Columbia.
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REFERENCE DOCUMENTS

1. DFO Bridge Maintenance Standard Operating Procedures
2. MOE Standards and Best Practices for Instream Works - Bridges
3. Selected Buckinghorse River Bridge 1968 Record Drawings

Drawing Number	Drawing Title
035480-1	General Layout
035480-3	Abutment Concrete
035480-4	Abutment Reinforcing
035480-8	Deck Concrete and Railing Layout
035480-9	Deck Reinforcement
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035480-13	Existing Structure

4. Buckinghorse River Bridge - General Photo Record - June 2017
5. Preliminary Contractor Hazard Assessment Form
6. Confirmation of Prime Contractor Form
7. EPP - Environmental Protection Plan

END OF SECTION



PART 1 - GENERAL

- 1.1 Codes, Bylaws, Standards**
- .1 Perform work to current Codes, Construction Standards and Bylaws, including Amendments up to the TENDER closing date.
 - .2 Perform work in accordance with the National Building Code of Canada (NBC) 2015, the Canadian Highway Bridge Design Code CAN/CSA S6-14, 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.
- 1.3 Other Contracts**
- .1 Further Contracts may be awarded while this contract is in progress. It is recommended that the Bidder visit the site prior to submission of tender to satisfy himself/herself of the nature of the site conditions and the extent of the work required.
 - .2 The Contractor shall confirm onsite all dimensions required for fabrication and dimensions shown on the Contract Drawings prior to any fabrication.
 - .3 Cooperate with other Contractors in carrying out their respective works and carry out instructions from Departmental Representative.
 - .4 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 6 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 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 Complete the Work by November 30, 2017.
- 1.6 Summary of work**
- .1 The work should be represented as:
Bridge Barrier Replacement, Buckinghorse River Bridge, km 277.6, Alaska Highway, British Columbia
 - .2 Work under this contract consists of:
 - .1 Bridge Barrier Replacement, Buckinghorse River Bridge, km 277.6.
 - .3 Other requirements:
 - .1 Staging of construction and traffic accommodation.
 - .2 Environment management.
 - .3 Adhere to waste reduction requirement for reuse or recycling of waste materials, thus diverting materials from landfill.
 - .4 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.
- 1.7 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 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.
- 1.8 Hours of Work**
- .1 Restrictive as follows:
 - .1 Notify Departmental Representative of all after hours work, including weekends and holidays
-

1.9 Work Schedule

- .1 All works are to be completed by November 30, 2017.
- .2 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.
- .3 Do not change approved Schedule - without notifying Departmental Representative.
- .4 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.

1.10 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.

1.11 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 Change orders.
 - .6 Other modifications to Contract.
 - .7 Field test reports.
 - .8 Reviewed/approved samples.
 - .9 Manufacturers' installation and application instructions.
 - .10 One set of record drawings and specifications for "as-built" purposes.
 - .11 Current construction standards of workmanship listed in technical Sections.
-

- .12 Project Safety Plan / Traffic Control Plan.
 - .13 Copy of approved Work schedule.
 - .14 Labor conditions and wage schedules.
- 1.12 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.
- 1.13 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
- 1.14 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.
- 1.15 Existing Services** .1 Where work involves breaking into or connecting to existing services, carry out work at times directed by the authorities having jurisdiction.
- 1.16 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 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.

1.17 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, color, 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.

1.18 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.

1.19 Quality of Work

.1 Ensure that quality workmanship is performed through use of skilled tradesmen, under supervision of qualified journeyman.

.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.

1.20 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:

- .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.
- 1.21 Approval of Product Data and Samples**
- .1 In accordance with Section 01 33 00 – Submittal Procedures, submit the requested 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 Review of re-submission.
 - .3 Ordering of approved material and/or products.
- 1.22 Project Meetings**
- .1 Departmental Representative will arrange project meetings and assume responsibility for setting times and recording and distributing minutes.
- 1.23 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 01 45 00 – Quality Control.
 - .2 The Contractor will appoint and pay for the services of testing agency or testing laboratory as specified, and where required for the 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 (Clause 1.23).
- .8 Provide Departmental Representative with 2 copies of testing laboratory reports and mill tests and certificates of compliance as soon as they are available.
- 1.24 As-Built Documents** .1 The Departmental Representative 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.
- 1.25 Cleaning** .1 Conduct daily cleaning and disposal operations. Comply with local ordinances and anti-pollution laws.
- 1.26 Environmental Protection** .1 Refer to section 01 35 43 – Environmental Protection for additional requirements.
- .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.
- 1.27 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.

- 1.28 System of Measurement** .1 The metric system of measurement (SI) will be employed on this Contract.
- 1.29 Familiarization with Site** .1 Before submitting tender, visit the Project site to become familiar with all conditions likely to affect the cost of the Work.
- 1.30 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 inspected the site and is fully conversant with all conditions.

END OF SECTION

Section Includes

This section provides the descriptions of scope of work for each items included in this tender and outlined in the "Quantities and Costs", and their methods of measurement and payment. The bidder shall be aware of the conditions and constraints of the site and the price quoted for each bid item shall include all works as described to complete the item of work regardless of the site conditions. All costs associated to complete the project including insurance & bonding, mobilization of equipment, plants, materials, & labour, any temporary facilities, environmental, safety and any other regulatory requirements as per the contract shall be incidental to the bid items in the tender and shall not be paid separately.

PART 1.0 - GENERAL**1.1 Mobilization and
Demobilization**

.1

Payment of 25% of the Lump Sum 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 60% of the Lump Sum shall be 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 as outlined above 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 to the satisfaction of the Departmental Representative.

1.2 Traffic Control

.1

No separate payment will be made for Traffic Control. Traffic Control costs will be incidental and included in the fixed prices bid for "Deck Cantilever Replacement", "Bridge Transition Barrier", or "Thriebeam Bridgerail", accordingly.

1.3 Deck Cantilever Replacement

.1

Payment for deck cantilever replacement will be made on the basis of fixed price bid for "Deck Cantilever Replacement" as shown in the schedule of "Quantities and Costs". Refer to specification Section 03 30 00 Cast-in-Place Concrete for Measurement for Payment requirements.

1.4 Bridge Transition Barrier

.1

Payment for bridge transition barrier will be made on the basis of fixed price bid for "Bridge Transition Barrier" as shown in the schedule of "Quantities and Costs". Refer to specification Section 03 30 00 Cast-in-Place Concrete for Measurement for Payment

requirements.

- 1.5 Thriebeam Bridgerail** .1 Payment for thriebeam bridgerail will be made on the basis of fixed price bid for "Thriebeam Bridgerail" as shown in the schedule of "Quantities and Costs". Refer to specification Section 05 12 35 Bridge Rail For Bridges for Measurement for Payment

END OF SECTION

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 and Project Meetings**
- .1 The Departmental Representative will schedule and administer project meetings as deemed necessary throughout progress of the 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 and Start-up

- .1 Within 15 days after award of Contract, request a meeting of parties in contract to discuss and resolve administrative procedures and 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 Site specific health and safety requirements
 - .2 Appointment of official representative of participants in Work.
 - .3 Schedule of Work, progress scheduling in accordance with Section 01 32 17 - Construction Progress and Reporting.
 - .4 Schedule of submission of shop drawings, samples, colour chips, etc. in accordance with Section 01 33 00 - Submittal Procedures.
 - .5 Requirements for temporary facilities, storage sheds, utilities, etc. in accordance with Section 01 51 00 - Temporary Utilities.
 - .6 Delivery schedule of specified equipment in accordance with Section 01 32 17 - Construction Progress and Reporting.
 - .7 Site security in accordance with Section 01 52 00 - Construction Facilities.
 - .8 Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime, and administrative requirements.
 - .9 Take-over procedures, acceptance, and warranties in accordance with Section 01 77 00 - Closeout Procedures.
 - .10 Monthly progress claims, administrative procedures, photographs, and holdbacks.
 - .11 Appointment of inspection and testing agencies or firms in accordance with Section 01 45 00 - Quality Control.
 - .12 Insurances and transcript of policies.
 - .13 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 Schedules

- .1 Submit preliminary construction progress schedule in accordance with Section 01 32 17 - 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.

1.6 Submittals

- .1 Submit requests for payment for review, and for transmittal to Departmental Representative.
- .2 Submit requests for interpretation of Contract Documents, and obtain instructions through Departmental Representative.
- .3 Process substitutions through Departmental Representative.
- .4 Process change orders through Departmental Representative.
- .5 Deliver closeout submittals for review and preliminary inspections, for transmittal to Departmental Representative.

1.7 Closeout Procedures

- .1 Notify Departmental Representative when Work is considered ready for Substantial Performance, in accordance with Section 01 77 00 – 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.
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Bridge Barrier Replacement, Buckinghorse River Bridge, km 277.6
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01 31 19

**PROJECT
MEETINGS**

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END OF SECTION

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.
 - .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 PSPC and Contractor.
- .18 Lag: modification of logical relationship that directs delay in successortask.
- .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 successortask.
- .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.
-

1.3 System Description

- .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 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.
 - .2 Planning: this is most basic function of management, that of determining presentation of action, and is essential.
 - .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 01 33 00 - 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 progress 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
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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 ten working days after each March 31 and September 30 occurring between commencement of Work and final completion, and within ten working days after final completion, 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.

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 sites.
 - .2 Longitudinal steel plates installation for each culvert.
 - .3 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.
 - .2 Bar chart identifying coding, activity durations, early/late and start/finish dates, total float, completion as percentile, current status and budget amounts.
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1.11 Detail Schedule

- .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 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:
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- .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.
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- .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.
 - .3 Overtime work and additional work shifts.
 - .4 Submit to Departmental Representative, justification, project
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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.
 - .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.
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- .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 20 photos per Longitudinal steel plates installed.
- .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

PART 1 - GENERAL**1.1 Section Includes**

.1 This section includes but is not limited to the following:

- .1 Product data.
- .2 Samples.
- .3 Waste Management Work Plan.
- .4 Environmental Protection Plan (EPP).
- .5 Traffic Management Plan.
- .6 Health and Safety Plan.
- .7 Certificates and transcripts.
- .8 Quality Testing Reports.
- .9 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 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. Contractor to become familiar with all conditions likely to affect the cost of the Work before submission of their Tender documents.
 - .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
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requirements of Contract Documents is not relieved by Departmental Representative review.

1.3 Product Data

- .10 Keep one reviewed copy of each submission on site.
- .1 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.
- .2 Delete information not applicable to project.
- .3 Supplement standard information to provide details applicable to project.
- .4 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 product data sheets are rejected, noted copy will be returned and resubmission of corrected data sheets, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.
- .5 The review of product data sheets 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 product data sheets, responsibility for which shall remain with Contractor submitting same, and such review shall not relieve Contractor of responsibility for errors or omissions in product data sheets 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 01 32 17 - 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
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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.
- .6 Dimension checks of pre-fabricated and site-fabricated elements.

END OF SECTION

PART 1 - GENERAL

- 1.1 Section Includes**
- .1 Informational and Warning Devices.
 - .2 Protection and Control of Public Traffic.
 - .3 Operational Requirements.
- 1.2 Basis of Payment**
- .1 No separate payment will be made for traffic control. Include traffic control in other Work as outlined in Section 01 29 01 Method of Measurement and Payment.
- 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 Devices**

- .1 Provide, erect, and maintain signs, flashing warning lights, and 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".

- .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.
- .4 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".
- .5 Changes to traffic control operation are to be reviewed by Departmental Representative.
- .6 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.

- .2 Maintain existing conditions for traffic crossing right-of-way.

END OF SECTION

PART 1 - GENERAL**1.1 Related Sections**

- .1 All sections.

1.2 References

- .1 Government of Canada
 - .1 Canada Labour Code, Part II
 - .2 Canada Occupational Health and Safety Regulations
- .2 Province of British Columbia
 - .1 Worker's Compensation Act Part 3, Occupational Health and Safety
 - .2 Occupational Health and Safety Regulations.

1.3 Workers' Compensation Coverage

- .1 Comply fully with the Workers' Compensation Act, regulations and orders pursuant thereto, and any amendments up to the completion of the work.
- .2 Maintain Workers' Compensation Board coverage during term of the contract, until and including the date that the Final Certificate of Completion is issued.

1.4 Compliance with Regulations

- .1 PSPC may terminate the contract without liability to PSPC where the Contractor, in the opinion of PSPC, refuses to comply with a requirement of the Workers' Compensation Act or the Occupational Health and Safety Regulations.
- .2 It is the Contractor's responsibility to ensure that all workers are qualified, competent and certified to perform the work as required by the Workers' Compensation Act or the Occupational Health and Safety Regulations.

1.5 Submittals

- .1 Submit the following:
 - .1 Copies of reports or directions issued by Federal, Provincial, Territorial Health and Safety inspectors.
 - .2 Copies of incident and accident reports.
 - .3 Complete set of Material Safety Data Sheets (MSDS), and all other

- documentation required by Workplace Hazardous Materials Information System (WHMIS) requirements.
- .4 Emergency Procedures.
 - .5 Health and Safety Plan.
- .2 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 two days after receipt of the plan. Revise the plan as appropriate and resubmit to Departmental Representative on request.
 - .3 Medical surveillance: where prescribed by legislation, regulation, or safety program, submit certification of medical surveillance for site personnel prior to commencement of work and submit additional certifications for any new site personnel to Departmental Representative.
 - .4 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 of 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.
 - .5 The Contractor will be required to sign the "Preliminary Hazard Assessment Form" to confirm the Contractor's acknowledgement of hazards identified by PSPC at the onset of the project. This form is included in the Reference Documents.
 - .6 The Contractor will be required to acknowledge appointment as Prime Contractor for work under this contract and be signatory to the "Confirmation of Prime Contractor's Main Responsibilities Under the Worksafe B.C. Occupational Health and Safety Regulations and *Worker's*

Compensation Act". This form is included in the Reference Documents.

1.6 Responsibility

- .1 The Contractor shall be responsible for:
 - .1 Assume responsibility as the Prime Contractor for work under this contract.
 - .2 The safety of persons and property on site.
 - .3 The protection of persons off-site and the environment to the extent that they may be affected by the conduct of the work.
 - .4 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 General

- .1 Provide safety barricades and lights around work site as required to provide a safe working environment for workers and protection for pedestrian and vehicular traffic.
- .2 Ensure that non-authorized persons are not allowed to circulate in designated construction areas of the work site.
 - .1 Provide appropriate means by use of barricades, fences, warning signs, traffic control personnel and temporary lighting as required.
 - .2 Secure site at night-time as deemed necessary to protect site against entry.

1.8 Regulatory Requirements

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

1.9 Filing of Notice

- .1 The Contractor is to complete and submit an Advance Notice of Project as required by British Columbia Worker's Compensation Branch.
- .2 Provide copies of all notices to the Departmental Representative.

1.10 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. This is in addition to the Preliminary Hazard Assessment Form to be completed by PSPC as outline in Clause 1.5.1.5 of this section.
- .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/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 Occupation 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 the 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 (PPE) to be used by workers.
 - .6 Identify personal protective equipment (PPE) to be used by workers.
 - .7 Identify personnel and alternates responsible for site safety and health.
 - .8 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 resubmit to Departmental Representative.
 - .5 The review of Health and Safety Plan by Public Works & government Services Canada (PSPC) is for the sole purpose of ascertaining conformance with General Directive 073. PSPC's review 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.

1.11 Emergency Procedures

- .1 List standard operating procedures and measures to be taken in emergency situations. Include an evacuation plan and emergency contact (i.e. Names/telephone numbers) of:
 - .1 Designated personnel from own company.
 - .2 Regulatory agencies applicable to work and as per legislated regulation.
 - .3 Local emergency resources.
 - .4 Departmental Representative (site staff).

- .2 Included the following provisions in the emergency procedures:
 - .1 Notify workers and 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 Revise and update Emergency Procedures as required and re-submit to the Departmental Representative.

1.12 Health and Safety Coordinator

- .1 Employ and assign to work, competent and authorized representative as Health and Safety Coordinator. Health and Safety Coordinator must:
 - .1 Have minimum 2 years' site-related working experience specific to activities associated with Construction.
 - .2 Have working knowledge of occupational safety and health regulations.
 - .3 Be responsible for completing Contractor's Health and Safety Training Sessions and ensuring that personnel not successfully completing required training are not permitted to enter site to

perform work.

- .4 Be responsible for implementing, enforcing daily and monitoring site-specific Contractor's Health and Safety Plan.
- .5 Be on site during execution of work and report directly to and be under direction of site supervisor.

1.13 Hazardous Products

- .1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials and regarding labeling and provision of Material Safety Data Sheets (MSDS) acceptable to the Departmental Representative and in accordance with the Canada Labour Code.
- .2 Where use of hazardous or toxic waste cannot be avoided:
 - .1 Advise Departmental Representative beforehand of the products intended for use. Submit applicable MSDS and WHMIS documents.

1.14 Unforeseen Hazards

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

1.15 Posted Documents

- .1 Post legible versions of the following documents on site:
 - .1 Health and Safety Plan.
 - .2 Sequence of Work.
 - .3 Emergency Procedures.
 - .4 Site drawing showing project layout, locations of first-aid station, evacuation route and marshalling station and the emergency transportation provisions.
 - .5 Notice of Project.
 - .6 Floor Plans.
 - .7 Notice as to where copy of the Workers' Compensation Act and

Regulations are available on the work site for review by employees and workers.

- .8 Workplace Hazardous Information System (WHMIS) documents.
- .9 Material Safety Data Sheets (MSDS).
- .10 List of names of joint Health and Safety Committee members of Health and Safety Representative as applicable.
- .2 Post all Material Safety Data Sheets (MSDS) on site, in a common area, visible to all workers and in locations accessible to tenants when work of the contract includes construction activities adjacent to occupied areas.
- .3 Postings and Insert Postings should be approved by Departmental Representative.

1.16 Meetings

- .1 Attend health and safety pre-construction meeting and all subsequent meetings called by the Departmental Representative.

1.17 Correction of Noncompliance

- .1 Immediately address health and safety noncompliance issues identified by authority having jurisdiction or by Departmental Representative.
- .2 Provide Departmental Representative with written report of action taken to correct noncompliance of health and safety issues identified.
- .3 Departmental Representative may stop work if noncompliance of health and safety regulations is not corrected. The General/subcontractors will be responsible for any costs arising from such a "stop work order".

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 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.
 - .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 rationale 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, NWP A 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.

1.18 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.

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 Quality Control Plan** .1 Prepare and submit to Departmental Representative for review and approval a Quality Control Plan in accordance with Section 01 33 00 – Submittal Procedures, prior to project startup.
- 1.2 Basis of 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 In order to ensure quality control on-site, a National Association of Corrosion Engineers (NACE) International Certified Coating Inspector - Level III (Peer Reviewed) (the "Inspector") will be on-site during all critical stages of surface preparation and painting operations.
- .2 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.
- .3 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.
- .4 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.
- .5 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 Test Certificates

- .1 Submit all test certificates as required of specification Sections.

END OF SECTION

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 Heating and Ventilation of Work Area and Enclosures** .1 Provide temporary heating required during construction period, including attendance, maintenance, and fuel.
.2 Construction heaters used inside enclosures 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 prepared 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.
.6 Provide ambient temperatures and humidity levels for all stages of coating application.
.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
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- .4 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 Payment:
 - .1 Heating and ventilation of work area and enclosures for recoating are incidental to the recoating work is incidental to surface preparation and recoating work and no separate payment will be made.
 - .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

PART 1 - GENERAL

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| 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. |
| 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. |
| 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. |
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1.8 Construction Signage

- .2 Post notices and take such precautions as required by local health authorities. Keep area and premises in sanitary condition.
- .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 01 35 33- Health and Safety, and 01 35 00 - 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

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.
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 finished and partially finished structure finishes and equipment during performance of Work. |
| | .2 | Provide necessary screens, covers, and hoardings. |
| | .3 | Confirm with Departmental Representative locations and |

installation schedule 3 days prior to installation.

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

1.11 Payment

- .1 Work included in this section is incidental to the recoating work and no separate payment will be made.

END OF SECTION

PART 1 - GENERAL**1.1 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 Remove and replace damage caused to any existing product or part of infrastructure at own expense and to satisfaction of Departmental Representative.
 - .5 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.
 - .6 Metal fastenings:
 - .1 Prevent electrolytic action between dissimilar metals.
 - .2 Use non-corrosive fasteners, anchors, and spacers for securing exterior work.
 - .7 Fastenings which cause spalling or cracking are not acceptable.
 - .8 Bolts may not project more than 1 diameter beyond nuts.
 - .9 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.
 - .10 Prevent damage, adulteration, and soiling of products during delivery, handling, and storage. Immediately remove rejected products from site.
 - .11 Store products in accordance with suppliers' instructions.
 - .12 Store products subject to damage from weather in weatherproof enclosures.
 - .13 Touch-up damaged finished surfaces to Departmental Representative's satisfaction.
 - .14 Remove and replace damaged products during installation at own expense and to satisfaction of Departmental Representative.
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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

- .1 Unless otherwise indicated in Specifications, install or erect
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Instructions

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.

**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;
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- .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.
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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 01 33 00 - Submittal Procedures.
- .2 Use best quality products.

END OF SECTION

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

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 01 33 00, 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 quantity and type of materials sent for recycling.
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**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 for reuse or recycling.
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- .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

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 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.
- .4 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.
- .5 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.
- .6 Commencement of Warranty Periods: date of Departmental Representative's acceptance of submitted declaration of Substantial Performance shall be date of commencement for warranty period.
- .7 Final Payment: When Departmental Representative considers final deficiencies and defects have been corrected and it appears
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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.

- .8 Payment of Holdback: After issuance of certificate of Substantial Performance of Work, submit an application for payment of holdback amount in accordance with General Conditions.

END OF SECTION

PART 1 - GENERAL

- 1.1 Measurement for Payment** .1 No payment shall be made for demolition, replacement if severely corroded bar and material removal required under this contract as this work is considered incidental to the works.
- 1.2 Related Sections** .1 Section 01 29 01 – Method of Measurement and Payment
.2 Section 01 74 19 – Waste Management and Disposal
- 1.3 Protection** .1 Further Repair damage caused by construction operations as directed by Departmental Representative
.2 Support affected structures and, if safety of structure being demolished appears to be endangered, take preventative measures and then cease operations and notify Departmental Representative.
.3 Prevent debris from falling into waterways or blocking surface drainage system.
.4 Ensure that demolition work does not adversely affect adjacent watercourses, groundwater and wildlife, or contribute to excess air and noise pollution
.5 Do not bury waste or materials on site unless approved in writing by Departmental Representative
.6 Do not dispose of waste or volatile materials such as: mineral spirits, oil, petroleum based lubricants, or toxic cleaning solutions into watercourses, storm or sanitary sewers. Ensure proper disposal procedures are maintained throughout project. Refer to Fisheries Act with respect to discharge of deleterious substances into natural water bodies.
.7 Do not pump water containing suspended materials into watercourses, storm or sanitary sewers, or onto adjacent properties. Refer to Fisheries Act with respect to discharge of deleterious substances into natural water bodies
.8 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authorities
.9 Protect trees, plants and foliage on site and adjacent properties where indicated.
.10 Prevent extraneous materials from contaminating air beyond
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application area, by providing temporary enclosures during demolition work.

- .11 Cover or wet down dry materials and waste to prevent blowing dust and debris. Control dust on all temporary roads.

PART 2 - PRODUCTS

2.1 Equipment

- .1 Equipment and heavy machinery to meet or exceed all applicable emission requirements.
- .2 Leave machinery running only while in use, except where extreme temperatures prohibit shutting machinery down.
- .3 Power-driven hand tools for removal of concrete will be permitted with the following restrictions:
 - .1 Jackhammers and chipping hammers heavier than nominal 15 kg shall not be used to remove concrete.
 - .2 Jack hammers or mechanical chipping tools shall not be operated at an angle in excess of 45 degrees measured from the surface of the deck slab.
 - .3 Mechanical scabblers of 8 Nm (6 ft/lb) impact, grinders or shot blasting capable of removing the concrete and producing an angular finished surface to ICRI Standard CSP7.
 - .4 Concrete cutting saws capable of sawing to the depths indicated on Drawings.
- .4 Hand tools such as hammers and chisels.

PART 3 - EXECUTION

3.1 Demolition

- .1 Demolish parts of the bridge structure, as indicated on the drawings to permit the replacement work.
 - .2 Take all appropriate measures to ensure that during demolition, no materials go adrift or become a hazard. Material that becomes a hazard must be recovered immediately.
 - .3 Stockpile materials in a location as directed by Departmental Representative. Eliminate double handling where possible.
 - .4 At end of each day's work, leave work in safe and stable condition.
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- .5 Demolish to minimize dusting. Keep materials wetted as directed by Departmental Representative.
- .6 Remove and dispose of demolished materials except where noted otherwise and in accordance with authorities having jurisdiction.
- .7 Existing reinforcement designated to be left in place shall be left intact and undamaged.
- .8 Severely corroded reinforcement (with more than 20% of the section loss as determined by the Departmental Representative) shall be either replaced or supplemented with new reinforcement of the same diameter. Supplemental bars shall overlap with the corroded bar by the minimum lap length each side of the severely corroded section. Minimum length of any new reinforcement shall not be less than 1.0m.

END OF SECTION

PART 1 – GENERAL

- 1.1 Related Sections
- .1 Section 01 33 00 – Submittal Procedures
 - .2 Section 01 35 43 – Environmental Procedures
- 1.3 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).
- 1.4 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 Canada wide system designed to give employers and workers information about hazardous materials used in the workplace. Under WHMIS, information on hazardous materials is to be provided on container labels, material safety data sheets (MSDS), and worker education programs. WHMIS is put into effect by a combination of federal and provincial laws.
- 1.5 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.
- 1.6 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.

1.7 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 Procedures** .1 The work under this section is incidental and no extra payment shall be made.
- 1.2 References** .1 Canadian Standards Association (CSA)
- .1 CAN/ CSA-A23.1, Concrete Materials and Methods of Concrete Construction.
 - .2 CAN/ CSA-O86.1, Engineering Design in Wood (Limit States Design
 - .3 CSA-0121, Douglas Fir Plywood.
 - .4 CSA-0151, Canadian Softwood Plywood.
 - .5 CSA 0153, Poplar Plywood
 - .6 CAN3-0188.0, Standards Test Methods for Mat Formed Wood Practicleboards and Waferboard.
 - .7 CSA-0437 Series -93, Standards for OSB and Waferboard.
 - .8 CSA-S269.1, Falsework for Construction Purposes.
 - .9 CAN/CSA-S269.3, Concrete Formwork
- .2 Council of Forest Industries of British Columbia (COFI)
- .1 COFI Exterior Plywood for Concrete Formwork
- 1.3 Waste Management and Disposal** .1 Separate and recycle waste materials
- .2 Place material defined as hazardous or toxic waste in designated containers.
 - .3 Ensure emptied containers are sealed and stored safely for disposal away form children.
 - .4 Use sealers, form release and stripping agents that are non toxic, biodegradable and have zero or low VOC's.

PART 2 - PRODUCTS

- 2.1 Materialst** .1 Formwork materials: to CAN/CSA-A23.1
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- .2 Form ties:
 - .1 Use snap ties complete with plastic cones and light grey concrete plugs or cement mortar fill in surface to be left smooth, even and uniform in colour.
- .3 Form liner:
 - .1 Plywood: high density overlay Douglas Fir to CSA O121 exterior grade, square edge, 19 mm thick.
- .4 Form release agent low VOC
- .5 Form stripping agent colorless mineral oil, low VOC, free of kerosene with viscosity between 70 and 110s Saybolt Universal 15 to 24 mm²/s at 40°C, flashpoint minimum 150°C, open cup.
- .6 Falsework materials: to CSA-S269.1.

PART 3 - EXECUTION

3.1 Fabrication and Erection

- .1 Verify lines, levels and centres before proceeding with formwork/falsework and ensure dimensions agree with drawings.
 - .2 Obtain Departmental Representative's approval for use of earth forms framing openings not indicated on drawings.
 - .3 Hand trim sides and bottoms and remove loose earth from earth forms before placing concrete.
 - .4 Fabricate and erect falsework in accordance with CSA S269.1 and COFI Exterior Plywood for Concrete Formwork.
 - .5 Refer to architectural drawings for concrete members requiring architectural exposed finishes.
 - .6 Fabricate and erect formwork in accordance with CAN/CSA-S269.3 to produce finished concrete conforming to shape, dimensions, locations and levels indicated within tolerances required by CAN/CSA-A23.1.
 - .7 Align form joints and make watertight. Keep form joints to minimum.
 - .8 Use 20 mm chamfer strips on external corners and/or 20 mm fillets at interior corners, joints, unless specified otherwise.
 - .9 Form chases, slots, openings, drips, recesses, expansion and
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control joints as indicated.

- .10 Construct forms for architectural concrete, and place ties as indicated and/or as directed. Joint pattern not necessarily based on using standard size panels or maximum permissible spacing of ties.
- .11 Build in anchors, sleeves, and other inserts required to accommodate Work specified in other sections. Assure that all anchors and inserts will not protrude beyond surfaces designated to receive applied finishes, including painting.
- .12 Clean formwork in accordance with CAN/CSA-A23.1, before placing concrete.

END OF SECTION

PART 1 - GENERAL**1.1 Related Sections**

- .1 Concrete Forms and Accessories 03 10 00

1.2 References and Standards

- .1 Cast in place Concrete 03 30 00
- .1 CAN/ CSA-A23.1-09/A23.2-9 - Concrete Materials and Methods of Concrete Construction/Test Methods and Standards Practices for Concrete.
- .2 CAN/ CSA-A23.3-04 (R2010) - Design of Concrete Structures.
- .3 CAN/CSA-G30.18-09 – Carbon Steel Bars for Concrete Reinforcement.
- .4 CAN/CSA-W186-M1990 (R2012) - Welding of Reinforcing Bars in Reinforced Concrete Construction.
- .5 American Concrete Institute (ACI) Detailing Manual 2004-(SP-66)
- .6 Concrete Reinforcing Steel Institute (CRSI) Manual of Standard Practice, 28th Edition.

1.3 Submittals

- .1 Prepare and submit shop drawings, consisting of bending, cutting and placing drawings for all reinforcing steel
- .1 Generally, placing to be in accordance with the ACI Manual of Standard Practice for Detailing Reinforcing Concrete Structures and the CRSI Manual of Standard Practice for Placing of Reinforcing Bars.
- .2 Structural drawings take precedence over placement drawings and bar schedules.

1.4 Inspection

- .1 The consultant's general review are undertaken to inform the Owner of the Contractor's performance, and in no way shall augment the Contractor's quality control procedures or relieve him of his contractual responsibilities.
- .2 Advise the Consultant a minimum of 24 hours prior to placement of concrete. Failure to give adequate notice may cause Consultant to classify the work as defective.
- .3 Concrete shall not be placed until the reinforcement and its placement has been reviewed by the Consultant.
- .4 Correct defects and irregularities to the satisfaction of the Consultant, at no cost to the Owner

1.5 Delivery, Storage and Cleaning

- .1 Reinforcing steel, welded wire fabric, and accessories shall be delivered, handled and stored as required to prevent
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contamination and damage.

- .2 All steel reinforcement, before being placed, shall be cleaned of loose scaly rust, dirt, oil, paint and other coatings that may be detrimental.

PART 2 - PRODUCTS

2.1 Materials

- .1 Re Reinforcing bars: billet steel deformed bars, Grade 400R 400MPa (60 ksi) yield strength, conforming to CAN/CSA-G30.18-M92 (R2007).
- .2 Weldable reinforcing bars: weldable low alloy steel deformed bars, Grade 400W 400MPa (60 ksi) yield strength, conforming to CAN/CSA-G30.18-M92 (R2007).
- .3 Welded steel wire fabric: sizes and gauges are to be as shown on the structural drawings, flat sheets only.
- .4 Supports: wire chairs, bolsters, hanger bars, spirals, stirrups and plastic spacers of size and strength to adequately support reinforcing in required position.

2.2 Fabrication

- .5 Tie wire: annealed wire, 1.5mm (16ga) or heavier.
- .1 Fabricate reinforcing to CAN/CSA-A23.1/A23.2-04.
- .2 Reinforcing bars shall be cold bent. Reinforcing bars shall not be straightened or re-bent without written approval of the Consultant.
- .3 The location of reinforcement splices not shown on the drawings shall be approved by the Consultant.

2.3 Detailing

- .1 Conform to CAN/CSA-A23.1-04 and CAN/CSA-A23.3-04 for all hooks, bends, laps and similar details not specifically noted.
 - .2 Lap bottom bars at support locations and top bars at mid-spans, unless noted otherwise on drawings.
 - .3 Provide 15M x 610 mm (24") long (each leg) corner bars to match all horizontal bars at all wall and grade beam corners and intersections.
 - .4 Provide 4 extra 15M diagonal corner bars around holes larger than 100 mm (4") in floor slabs and walls. Corner bars shall be 1.5 times length of shortest side of hole or minimum 750 mm (30") long.
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- .5 Provide 15M bar each face for holes larger than 1000 mm (40") in walls.
- .6 Cover electrical conduit, ductwork or piping buried in slabs with 600 mm (24") wide strip of 152 x 152 x MW13.3 x MW13.3 (6x6x8/8) welded wire fabric. If principal slab reinforcement is placed above conduit then place 600 mm (24") strip under conduit. Position of reinforcing steel takes precedence over conduit, ductwork or piping.

PART 3 - EXECUTION

3.1 Placing

- .1 Place reinforcement within a tolerance of 6 mm (1/4") for slab steel and 12 mm (1/2") for other steel. Locate bends and end of bars within 50 mm (2") of specified location.
- .2 Provide minimum concrete cover to reinforcing steel in accordance with CAN/CSA-A23.1-04 and as indicated herein or on drawings:
 - .1 Cast against and permanently exposed to earth 75 mm (3").
 - .2 Other faces 50 mm (2").
- .3 Provide 10M "U" spacers at 3 m (10'-0") on centre horizontally and 1.5 m (5'-0") on centre vertically to hold wall reinforcing mats in position.
- .4 Provide non-corrosive and non-staining reinforcing steel supports at surfaces where concrete will be exposed.
- .5 Support welded wire mesh or reinforcing steel in slabs on grade, using concrete bricks or chairs located at maximum 1000mm (40") on centre each way. Locate mesh or bars at mid-depth of slabs on grade unless indicated otherwise on drawings.
- .6 Set all dowels prior to placing concrete so that each dowel is maintained in its correct position. Do not insert dowels in freshly placed concrete unless approved by the Consultant.

3.2 Welding

- .1 Any welding of reinforcing steel shall be in accordance with CAN/CSA-W186-M1990 (R2007).
- .2 No welding of reinforcing steel shall occur without approval of the Consultant.

END OF SECTION

PART 1 - GENERAL**1.1 Section Includes**

- .1 Cast in place Concrete:
 - .1 This Section outlines the requirements for all High Performance Concrete (HPC) for use in rehabilitation of bridge curbs, approach transition barriers, and all other related concrete repairs.
 - .2 High Performance Concrete specified in this document shall meet a combination of performance and uniformity requirements that are more stringent than those for normal structural concrete.
 - .3 The HPC properties shall be obtained by using a specified water-cementitious material ratio (w/cm), supplementing cementitious component with silica fume and other pozzolans, enhanced concrete mixing and placing procedures, and diligent curing procedures.
 - .4 The performance characteristics will be measured by conformance to the plastic concrete properties, hardened concrete properties, durability properties and bond strength between new and old concrete.
 - .5 HPC shall be used for structure components exposed to the severe field conditions, such as temperature fluctuations, cycles of freezing and thawing, presence of de-icing chemicals, and heavy traffic loading.
 - .6 This Specification incorporates requirements pertinent to concrete exposure Class C-XL, as defined in the Canadian Standards Association (CSA) Standard A23.1-09 Concrete Materials and Methods of Concrete Construction. Those elements of concrete construction not specifically addressed in this Section shall conform to other Sections of the Specifications, Reference Standards, and Drawings included in the Contract Documents.

1.2 Related Selections

- .1 Section 01 29 01 - Method of Measurement and Payment.
 - .2 Section 01 45 00 - Quality Control.
 - .3 Section 01 74 11 - Cleaning.
 - .4 Section 01 74 19 - Waste Management and Disposal.
 - .5 Section 02 22 30 - Selective Demolition.
 - .6 Section 03 10 00 - Concrete Forming and Accessories.
 - .7 Section 03 20 00 - Concrete Reinforcing.
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1.3 Measurement for Payment .1**Deck Cantilever Replacement**

- .7 Payment for deck cantilever replacement will be made on the basis of fixed price bid acceptably completed. The bid price shall include full compensation for the cost of furnishing all labour, materials, equipment, tools for new deck cantilever and new end posts at ends of the deck, removal of existing deck cantilever concrete as indicated on the drawings, salvaging of existing reinforcement as shown on the drawings, formwork, additional or supplemental reinforcement, curb plates, deck drains, and any other incidentals necessary to complete the deck cantilever replacement work in all respect.

.2 Bridge Transition Barrier

- .8 Payment for bridge transition barrier will be made on the basis of fixed price bid acceptably completed. The bid price shall include full compensation for the cost of furnishing all labour, materials, equipment, tools for new bridge transition barriers (as shown on the drawing), removal of existing concrete curb on top of the wingwalls, formwork, additional reinforcement, dowelling of additional barrier reinforcing, epoxy material for dowelling, hooks at the ends of barriers and any other incidentals necessary to complete this work in all respect.

1.4 Durability Requirements

- .1 Compressive strength - 45 MPa at 28 days.
- .2 Supplementary cementing materials (SCM): Silica Fume - 7% to 10% by mass of cementing materials; Fly ash – maximum 20%.
- .3 Nominal maximum aggregate size - 5 to 14 mm.
- .4 Water to cementing materials ratio (w/cm) - 0.35 to 0.37.
- .5 Entrained air content in plastic concrete - 5% to 8%.
- .6 Maximum slump after super plasticizer - 180 mm.
- .7 The hardened concrete shall have an average air void spacing factor per lot of no more than 250 μm with no individual test result greater than 300 μm as determined in accordance with ASTM C 457. The air void system will be verified at the discretion of the Departmental Representative.
- .8 The spacing factor may depart from these requirements if its durability factor after 300 rapid freezing and thawing cycles
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performed in conformance with procedure A of ASTM C666 is higher than 90%.

- .9 Plastic mix air content and the air void system in the hardened concrete shall conform to this Specification regardless of the method of concrete placement. Pumped concrete shall be designed to retain required properties at the point of discharge to the forms.
- .10 Rapid chloride permeability of concrete at 28 to 32 days determined in accordance with ASTM C1202 shall conform to limits specified for Class C-XL exposure (CSA A23.1-09) of a maximum 1000 Coulombs.

1.5 Submittals

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 The Contractor, through his supplier, shall undertake the concrete mix designs and pay for all costs associated with the development, testing, and submissions of the mix designs and results of performance testing.

1.6 Certificates

- .1 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.
- .2 Provide certification that mix proportions selected will produce concrete of quality, yield and strength as specified in concrete mixes, and will comply with CAN/CSA-A23.1.
- .3 Provide certification that plant, equipment, and materials to be used in concrete comply with requirements of CAN/CSA-A23.1.

1.7 Quality Assurance

- .1 Minimum 2 weeks prior to starting concrete work, submit proposed quality control procedures for Departmental Representative's approval for following items:
 - .1 Falsework erection.
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- .2 Hot weather concrete.
- .3 Cold weather concrete.
- .4 Curing.
- .5 Finishes.
- .6 Formwork removal.
- .7 Joints.

1.8 Waste Management and Disposal

- .1 Use trigger operated spray nozzles for water hoses.
- .2 Designate a cleaning area for tools to limit water use and runoff.
- .3 Carefully coordinate the specified concrete work with weather conditions.
- .4 Ensure emptied containers are sealed and stored safely for disposal away from children.
- .5 Prevent plasticizers, water-reducing agents and air-entraining agents from entering drinking water supplies or streams. Using appropriate safety precautions, collect liquid or solidify liquid with an inert, non-combustible material and remove for disposal. Dispose of all waste in accordance with applicable local, provincial and national regulations.
- .6 Choose least harmful, appropriate cleaning method which will perform adequately.
- .7 Be aware of any site/operation related environmental constraints. Refer to the section (01 35 43) Environmental procedures for detail information.
- .8 Ensure sandblasting operation meet the environmental protection requirements. Refer to the section (01 35 43) Environmental procedures.
- .9 Ensure satisfactory clean-up and landscape restoration. Refer to the section (01 35 43) Environmental procedures.

PART 2 - PRODUCTS**2.1 Materials**

- .1 Portland cement: to CSA A3000-08, Type GU.
 - .2 Supplementary cementing materials: to CSA A3000-08.
 - .3 Water: to CAN/CSA-A23.1-09.
 - .4 Aggregates: to CAN/CSA-A23.1-09. Coarse aggregates to be normal density.
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- .5 Air entraining admixture: to ASTM C260.
- .6 Chemical admixtures: to ASTM C494. Departmental Representative to approve accelerating or set retarding admixtures during cold and hot weather placing.
- .7 Daraweld C or any other approved equivalent bonding agent for concrete repair.
- .8 Type 1c Sealer to Material testing specification for concrete sealers – B388.

2.2 Equipment

- .1 Power-driven hand tools for removal of concrete will be permitted for areas shown on the Drawings unless specified otherwise with the following restrictions:
 - .1 Jack hammers and chipping hammers heavier than nominal 14 kg and 7 kg respectively shall not be used.
 - .2 Jack hammers or mechanical chipping tools shall not be operated at an angle in excess of 45 degrees measured from the surface of the deck slab.
 - .3 Mechanical scrabblers of 8 Nm (6 ft/lb) impact, grinders or shotblasting, capable of removing the concrete and producing an angular finished surface.
 - .4 Concrete cutting saws capable of sawing to the depths indicated on the Drawings.
- .2 As an alternate other equipment may be used for concrete removal upon approval from the Departmental Representative, if it can be demonstrated that the method will not damage overlying and/or underlying or adjacent concrete elements.
- .3 Hand tools such as hammers and chisels.

PART 3 - EXECUTION

3.1 Surface Preparation

- .1 Remove the curb and overhang portion of deck concrete or any other portion need to be removed as shown on drawing after the approval of departmental representative.
 - .2 Upon exposure of visibly corroded or debonded reinforcement, additional concrete removal shall be performed until bars appear to be rust free or otherwise directed by the Department Representative.
 - .3 Outline area with a 20 mm deep vertical sawcut as close as possible to limits of concrete already removed. Reduce sawcut
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depth if necessary to avoid cutting reinforcement. Remove concrete to sawcut taking precautions to avoid damaging sawcut edge. Edges with spalls or chips will be rejected and shall be re-sawcut at Contractor's expense.

- .4 Care shall be taken to prevent damage to existing reinforcing steel.
 - .5 Remove all defective concrete, laitance, dirt, oil, grease and other foreign materials from concrete surfaces by hammer chipping, as required, until a sound, clean, roughened concrete surface is achieved.
 - .6 The surface marked for repair shall be sandblasted prior to washing. Remove all rust from reinforcing by sandblasting. The contractor shall provide adequate shielding to protect any exposed epoxy-coated reinforcing steel. The sandblasting shall be done to the satisfaction of the departmental representative.
 - .7 Prepare surfaces to be repaired in conformance with product manufacturer's recommendations and this Specification.
 - .8 Prior to erection of formwork again all surfaces shall be washed with high pressure washer.
 - .9 The temperature of the material to which the concrete is to be placed shall be between 5 - 25°C. Use heating or cooling procedures as required to stay within this temperature range. Maintain this temperature range for a minimum period of 24 hours prior to, during and 72 hours after application.
 - .10 After all concrete surface preparation is complete continuously soak the entire surface for a minimum of 3 hours with clean water conforming to concrete mixing water. Just before concrete placing commences the concrete surface shall be blown free of all excess water. A thin coating of cement slurry grout shall be scrubbed onto the prepared surface.
 - .11 The grout for bonding the new concrete to the existing concrete shall be mixed in a mechanical mixer, and shall consist of equivalent parts by weight of 4% silica fume, 46% Type GU Portland cement and 50% sand of maximum 2.5 mm aggregate size, mixed with a sufficient water to form slurry. The consistency of the slurry shall be such that it can be applied with a stiff brush or broom to the existing concrete surface in a thin, even coating that will not run or puddle in low spots.
 - 12 The bonding agent shall be used as per manufacturer
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recommendations.

.13 Care shall be exercised to ensure that the surface receives a thorough, even coating, and that no grout is permitted to pond. The rate of progress in applying grout shall be limited so that the grout is placed immediately prior to placing the new concrete, and in no case shall the grout be permitted to dry before placing of the concrete.

14 Mixed grout, not yet deposited, shall be re-agitated at frequent intervals to prevent segregation. Any grout that has not been placed within 45 minutes will be rejected. The contractor shall have at least two grout mixers on site during placing of overlay.

3.2 Preparation

.1 Obtain Departmental Representative's approval before placing concrete. Provide 48 hour's notice prior to placing of concrete.

.2 Perform concrete work, including fabrication, placement, finishing, and curing in accordance with the requirements of CSA A23.1-09, unless indicated otherwise in this Specification or on the drawings.

.3 Pumping of concrete is permitted only after approval of equipment and mix.

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

.5 Prior to placing of concrete obtain Departmental Representative's approval of proposed method for protection of concrete during placing and curing in adverse weather.

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

.7 In locations where new concrete is dowelled to existing work, drill holes in existing concrete. Place steel dowels and pack solidly with shrinkage compensating grout to anchor and hold dowels in positions as indicated.

.8 Do not place load upon new concrete until authorized by Departmental Representative.

3.3 Placement and Finishing

1 Placement

.1 Do cast-in-place concrete work in accordance with CAN/CSA-A23.1-09.

- .2 The Contractor is advised of the potential impact placement procedures have on the durability performance of the concrete, especially as it relates to concrete cracking. Special environmental conditions, procedures, monitoring, and products may be required to produce the quality of HPC in place expected on this project.
- .3 Placement of HPC shall not commence if:
 - .1 The anticipated air temperature during the pour is expected to exceed 20°C for placement of HPC on bridge decks.
 - .2 The anticipated air temperature during the concrete pour is expected to drop below 5°C at the day of concrete placement and during the subsequent seven days unless enclosure and heating are used or insulated forms, approved by the Departmental Representative, capable of maintaining minimum 10°C, are used.
 - .3 Windy conditions are present or expected during the pour, whereby combined effects of air temperature, relative humidity, concrete temperature, and wind could result in a surface moisture evaporation rate in excess of 1 kg/m² per hour as determined by the CSA A23.1-09 Annex D.
 - .4 Rain is predicted for the time of concrete pour.
- .4 During the placement and finishing operation, the Contractor shall use fogging and an evaporation retarder. The Contractor shall mix and apply the material in accordance with the manufacturer's instructions no later than ten minutes after the floating operation.
- .5 Comply with hot/cold weather concrete fabrication, placement, and curing requirements as per CSA-23.1-09.

.2 Finishing

- .1 Finish concrete in accordance with CAN/CSA-A23.1.
 - .2 Provide floated finish with textured surface to all deck repair areas. The surface texture will consist of tining having a depth of 3 to 5 mm, 1.5 mm wide at 10 mm spacing.
 - .3 Finish concrete in deck area to match abutting deck concrete elevations and to maintain existing grade and cross-fall of roadway.
 - .4 The finished surface of the concrete shall conform to the design gradeline profiles as indicated on the drawings and/or as determined on site.
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- .5 The surface shall be free from open texturing, plucked aggregate and local projections.
 - .6 The surface shall be checked by the Contractor, as described above, immediately after final floating and before texturing.
 - .7 The surface shall again be checked by the Contractor at the end of the curing period in the same manner and to the same tolerance.
 - .8 Areas that do not meet the required surface accuracy shall be clearly marked out and the Contractor shall, at his own expense:
 - .1 Grind down any areas higher than 3 mm but not higher than 10 mm above the correct surface.
 - .2 Correct any areas lower than 3 mm but not lower than 10 mm below the correct surface, by grinding down the adjacent high areas.
 - .3 When the deviation exceeds 10 mm from the correct surface, the deck repair shall be replaced for a length, width and depth which will allow the formation of a new repair, of the required quality, in no way inferior to the adjacent undisturbed repaired section. Replaced areas shall be at the Contractor's expense.
 - .4 Grinding shall be carried out by an approved machine, of a type and capacity suitable for the total area of grinding involved, until the surface meets the specified requirements.
 - .9 If the surface is damaged in any way by construction operations, or if the deck shows signs of distress or scaling prior to the final acceptance of the deck, it shall be repaired or replaced by the Contractor at his own expense.
 - .10 Inside surfaces of curb and barrier shall be rubbed surface finish and top surfaces of curbs shall be floated surface finish with broomed texture.
 - .11 An approved Type 1c sealer shall be applied to all concrete surfaces. The sealer shall meet the current material testing specification for concrete sealers – B388. The sealer shall be applied in accordance with the manufacturer recommendations. Before applying the sealer, the concrete shall be cured for at least 28 days. The concrete surface shall be dry, and air blasted to remove all dust and accepted by the departmental representative prior to applying sealer. In order to ensure uniform and sufficient coverage rates the contractor shall apply measured volumes of sealing compound to appropriately dimensioned areas of concrete surface, using a minimum of 2 coats.
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.3 Curing

- .1 Curing methods and procedures shall be reviewed and accepted by the Consultant prior to scheduling placement of Class HPC. Equipment and materials necessary for the fog mist and wet cure systems shall be demonstrated prior to scheduling placement of Class HPC.
 - .2 During the cure period the Contractor shall provide protection to ensure that the difference between the concrete temperature and the ambient air temperature at the site remains within the limits. The Contractor shall supply and install two thermocouples, one in the centre and one at the surface of the concrete, for every 100 m² of deck, at locations determined by the Consultant. The Contractor shall monitor and record the temperatures every four hours for the first 3 days after concrete placement and every 12 hours thereafter for the remainder of the specified cure period. Daily temperature records shall be forwarded to the Consultant and Department.
 - .3 The temperature of the centre of the in-situ concrete shall not fall below 10°C or exceed 60°C and the temperature difference between the centre and the surface shall not exceed 20°C. In addition, the requirements of Table 21 of CSA A23.1 shall apply.
 - .4 Fog mist shall be applied continuously from the time of concrete is started until the concrete is covered with filter fabric or burlap, in such a way as to maintain high relative humidity above the concrete and prevent drying of the concrete surface. Water shall not be allowed to drip, flow or puddle on the concrete surface during fog misting, when placing the filter fabric or burlap, or at any time before the concrete has achieved final set. Fog misting will not be required for casting of curbs and barriers.
 - .5 Two layers of light colored filter fabric or burlap shall be placed on the concrete surface as soon as the surface will not be marred as a result of this placement. A fine spray of clean water shall be immediately applied to the filter fabric or burlap. Edges of the filter fabric or burlap shall overlap a minimum of 150 mm and shall be held in place without marring the surface of the concrete. The filter fabric or burlap shall be in a continuously wet condition throughout the curing period by means of a soaker hose or other means as reviewed and accepted by the departmental representative. Curing with filter fabric or burlap and water shall be maintained for a minimum period of 14 days.
 - .6 In the event that the wet curing is unacceptable, and any portion of the HPC becomes surface dry during the curing period, the departmental representative will have cause to
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- reject the concrete.
- .7 When Class HPC is used for concrete paving lips and deck joint blockouts, the wet cure can be reduced to 3 days followed by the application of a Type 2 curing compound meeting the requirements of ASTM C309 or ASTM C1315.
 - .8 For those locations where formwork is removed prior to the completion of this specified curing period, the resulting exposed concrete surfaces shall be wet cured for the remaining days.
 - .9 After the curing period and before opening to public traffic, the Contractor and the departmental representative shall jointly inspect the dry concrete surface(s) to identify all cracks. The departmental representative will plot the width in mm and length in linear m of cracks per m² and report the findings to the Department. The Contractor shall repair the cracks at his own expense if crack width is 0.2 mm or more. The following procedure shall be used in the treatment of the same.
 - .10 Blow out cracks clean and dry with a jet of oil-free compressed air.
 - .11 Seal cracks with a gravity flow epoxy in accordance with the Manufacturer's instructions. The gravity flow epoxy shall maximize the penetration by taking into consideration the ambient temperature, substrate temperature, viscosity and pot life of the material. The gravity flow epoxy material shall be chosen from the List approved by department.
 - .12 When cracks extend the full depth of the deck slab, barriers or curbs or to the top layer of reinforcement of decks that are cast to grade, epoxy injection will be required. The epoxy material and injection procedure shall be submitted by the Contractor for acceptance of the Consultant and Department.

3.4 Deck Cantilever Replacement

- .1 Remove the concrete as shown on the drawing following the procedure described above or as per the direction of departmental representative. The reinforcement shown on the drawing shall be salvaged.
 - .2 Supplement the rebar in the repair area when the existing bar has a cross sectional area loss equal to or greater than 20%. Provide additional rebar of the same bar size, lap spliced and wired to the existing rebar. Provide a minimum lap as specified on the drawings. Payment for any rebar required is considered incidental.
 - .3 Form in accordance with Section 03 10 00 - Concrete Forms and Accessories.
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- .4 Sandblast all exposed concrete and rebar within the repair area. Prepare exposed rebar to near white metal condition. Remove all dust and impurities within repair area.
 - .5 Cast new deck cantilever with HPC concrete as specified in Clause 3.
 - .6 Provide continuous wet cure for 72 hours.
- 3.5 Bridge Transition Barrier**
- .1 Remove the existing approach barriers and curbs along the existing wingwalls as shown on the drawings to top of the roadway following the procedure described above or as per the direction of departmental representative. Remove all existing reinforcement within the curbs to top of the roadway.
 - .2 Form in accordance with Section 03 10 00 - Concrete Forms and Accessories.
 - .3 Cast new approach transition barriers with HPC concrete as specified in clause 3.
 - .4 Cure as per manufacturer recommendations.
- 3.6 Cold Weather Concreting**
- .1 Accept full responsibility for the protection of concrete during adverse weather conditions.
 - .2 When the ambient air temperature is, or is expected to be below 5°C, or when determined by the Departmental Representative, implement the following provisions for cold weather concreting.
 - .3 Heat all aggregate and mixing water to a temperature of at least 20°C but not more than 65°C. The aggregates may be heated by either dry heat or steam; in the latter case the quantity of mixing water may need to be reduced. Maintain the temperature of the concrete between 10°C and 25°C at the time of placing in the forms. In the case of mass pours, the Departmental Representative may alter the temperature requirements to suit.
 - .4 Enclose the structure in such a way that the concrete and air within the enclosure can be kept above 15°C for a period of 7 days after placing the concrete. Construct the enclosure so that a minimum 300 mm clearance exists between the enclosure and the concrete. To prevent overheating, frequently monitor the air temperature with the enclosure, especially during the first 24 hours. Maintain the relative humidity within the enclosure at not less than 65 %. Keep heaters well clear of the formwork housing. Ensure there is adequate ventilation to provide air for combustion, and to prevent the accumulation of carbon dioxide
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- which can be harmful to the concrete. Do not use salamanders, coke stoves, oil or gas burners and similar spot heaters which have an open flame and intense local heat without the Departmental Representative's specific approval. Design the system of heating, and positioning of steam outlets, heaters, and fans, to give the most uniform distribution of heat possible, subject to the approval of the Departmental Representative.
- .5 Before placing concrete, provide adequate pre-heat to raise the temperature of formwork, reinforcing steel, previously-placed concrete, and/or soil to at least 10°C. Make all arrangements for heating, and to ensure continuous protection from unsatisfactory temperature and moisture condition during the curing period. Obtain the Departmental Representative's approval of the arrangements; ensure that pre-heat is adequate, in the Departmental Representative's opinion, to ensure that no portion of the fresh concrete is damaged by freezing, or curing retarded by cold temperatures.
- .6 Fully insulated formwork may be proposed as an alternative to provision of further heat during the curing period. Design and insulate such formwork with approved materials so that the initial heat of the mix, and the heat generated during the hydration of the cement, is retained to provide the specified curing conditions. The adequacy of the protection is the Contractor's responsibility.
- .7 Where used, withdraw protection and heating in such a manner so as not to induce thermal shock stresses in the concrete. Gradually reduce the temperature of the concrete at a rate not exceeding 10°C per day to that of the surrounding air. To achieve this, in a heated housing, slowly reduce the heat and then shut off, and the whole housing allowed to cool to air temperature before the housing itself is removed. However, do not remove the protection until the temperature of the concrete has fallen to within 10°C of the temperature of the outside air.

3.7 Field Quality Control

- .1 The Departmental Representative shall be afforded full facilities for the random quality assurance inspection and testing that may be carried out relative to the concrete itself and/or the constituent materials. This includes at the worksite and any plant used for the manufacture of concrete wherever this may be situated. The facilities shall be adequate in the opinion of the Departmental Representative to permit proper sampling of concrete cylinders in accordance with the relevant specifications is the responsibility of the Contractor and shall be provided prior to any concrete pour.
- .2 The results of the quality assurance testing carried out by the Departmental Representative will serve to monitor and review the quality control program of the Contractor and does not augment
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or replace Contractor quality control or relieve the Contractor of their contractual responsibilities.

- .3 Retain CSA certified workers, as required by Section 01 45 00 - Quality Control, to test at site, the air content, slump, and temperature of each batch; results of all such tests shall be provided to the Departmental Representative. Additional tests will be required if the results are borderline or widely variable. In case of an unacceptable result, one check test will be permitted.
- .4 "Strength Test" shall consist of the compression tests of four standard test specimens, sampled, made, cured, and tested in accordance with CSA Standard Specifications as referenced with modification as indicated. One cylinder shall be tested at seven days. The 28 day test result shall be the average of the strengths of the remaining three specimens, except that if one specimen in a test in the opinion of the Departmental Representative shows manifest evidence or improper sampling, molding, or testing, it shall be discarded and the remaining two strengths averaged. Additional cylinders may be cast, at the discretion of the Departmental Representative or Contractor.
- .5 Take a strength test to represent each approximately 10 m³ portion of the concrete pour, or a minimum of one test per day if concrete volume poured is less than 10 m³.
- .6 Provide all strength tests to the Departmental Representative.
- .7 Non-destructive Methods for Sampling and Testing Concrete shall be in accordance with CAN/CSA-A23.2-09.
- .8 Inspections or testing by Departmental Representative will not augment or replace Contractor quality control nor relieve him or his contractual responsibility.

END OF SECTION

PART 1 - GENERAL**1.1 Basis of Payment**

- .1 All materials and work required under this Section shall be based on Section 01 29 01 Method of Measurement and Payment.

1.2 References

- .1 American Association for State Highway and Transportation Officials (AASHTO).
 - .1 AASHTO Standard Specifications for Highway Bridges.
- .2 American Society for Testing and Materials (ASTM).
 - .1 ASTM A 325M, Specification for Structural Bolts, Steel, Heat Treated 120/105ksi Minimum Tensile Strength.
 - .2 ASTM A490M, Specification for High-Strength Steel Bolts, Classes 10.9 and 10.9.3, for Structural Steel Joints.
 - .3 ASTM F959M-02, Standard Specifications for Compressible-Washer-Type Direct Tension Indicators (DTI) for Use with Structural Fasteners.
 - .4 ASTM A370, Standard Methods and Definitions for Mechanical Testing of Steel Products.
- .3 Canadian Standards Association (CSA).
 - .1 CAN/CSA-G40.20, General Requirements for Rolled or Welded Structural Quality Steel.
 - .2 CAN/CSA-G40.21, Structural Quality Steels.
 - .3 CAN/CSA S6-06, Canadian Highway Bridge Design Code.
 - .4 CAN/CSA-S16.1-04, Limit States Design of Steel Structures.
 - .5 CSA S269.1, Falsework for Construction Purposes.
 - .6 CSA W48, Series, Various Dates, Electrodes.
 - .7 CSA W59, Welded Steel Construction (Metal Arc Welding).
 - .8 CSA W47.1, Certification of Companies for Fusion Welding of Steel Structures.

1.3 Shop Drawings

- .1 Submit shop drawings in accordance with Section 01 33 00, Submittal Procedures.
 - .2 Indicate shop and erection details including but not limited to shop splices, cuts, copes, connections, holes, bearing plates, threaded fasteners, rivets, and welds. Indicate welds by CSA W59 welding symbols.
 - .3 Proposed welding procedures to be stamped and approved by Canadian Welding Bureau.
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- .4 Prepare and submit all drawings and documents necessary to describe the following:
 - .1 Access to work and culvert cleaning.
 - .2 Type and capacity of equipment to be used.
 - .3 Sequence of operation: position of cranes, snooper vehicles, and trucks with members.
 - .4 Position of cranes and snooper vehicles with details of load distribution of wheels and outriggers.
 - .5 Lifting devices and lifting points.
 - .6 Details of temporary works: complete falsework and/or shoring plans where required including proposed methods to be used to ensure the required connections and structure shape are maintained prior to bolt torquing, method of providing temporary supports for stability.
 - .7 Details of temporary works: method of providing temporary supports for stability.
 - .8 Bolt torquing sequence and method.
 - .9 Details of release of falsework and/or shoring.
 - .5 Shop Drawings showing partial details or details of some elements but not all will not be reviewed until all details have been submitted to the Departmental Representative.
 - .6 The Erection Proposal submission or its approval shall not relieve Contractors of responsibility for providing proper methods, equipment, workmanship, and safety precautions.
- 1.4 Qualifications**
- .1 Notify the Departmental Representative of all Subcontractors and be responsible for all Subcontractors. All terms of the Contract shall apply to the Subcontractor(s) as well.
 - .2 The Fabricator shall operate a recognized steel fabricating shop approved by the Departmental Representative.
 - .3 The Fabricator shall be fully approved by the Canadian Welding Bureau (CWB) as per CSA Standard W47.1.
 - .4 Only welders, welding operators, and tackers approved by the
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1.5 Delivery, Storage, and Handling

- CWB in their particular category shall be permitted to perform weldments. Their qualifications shall be current and available for examination by the Departmental Representative.
- .1 Deliver, store, and handle products in accordance with Section 01 61 10, Product Requirements.
 - .2 Provide protective blocking for lifting, transportation, and storing. Exercise care during fabrication, transportation, and erection so as not to damage steel members. Do not notch edges of members. Do not cause excessive stresses.
 - .3 Mark mass on members weighing more than 3 tonnes.
 - .4 Ensure that no portion of steel comes into contact with the ground.
 - .5 Provide Departmental Representative with delivery schedules a minimum of 7 days prior to shipping.

PART 2 - PRODUCTS**2.1 General**

- .1 Conform to applicable ASTM standards in the absence of applicable CSA or CGSB standards.
- .2 Integrate in the Works only new permanent materials, except when authorized in writing by the Departmental Representative.
- .3 Do not modify materials or construction details without previous written approval by the Departmental Representative, even if these modifications are deemed necessary or desirable by the Contractor.

2.2 Materials

- .1 Structural steel: to CAN/CSA-G40.21, grades and types 300W, or as noted on drawings.
- .2 High strength bolts, nuts, and washers: to ASTM A325M. Bolts to ASTM A490M may be used if approved by Departmental Representative.
- .3 Welding electrodes: to CSA W48 series.
- .4 Direct tension indicator washer: to ASTM F959M.

2.3 Source Quality Control

- .1 Provide Departmental Representative prior to fabrication, with four copies of steel producer certificates, in accordance with CAN/CSA G40.20. Include in certificates all mill test reports related to chemical analysis and physical tests for each heat from which elements have been fabricated.
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- .2 Make available for inspection all mill samples used for physical tests.
- .3 When steel elements are obtained from stock, prove quality of materials by providing Departmental Representative with fabricator stamps and certificates stating that steel conforms to prescribed requirements.
- .4 When steel elements are obtained from stock, Departmental Representative reserves the right to select elements and pieces to test at Contractor's expense.
- .5 In the absence of mill certificates, for all steel from stock, provide Departmental Representative with a certificate stating that all steel conforms to prescribed requirements.
- .6 Provide suitable facilities and cooperate with inspection organization and Departmental Representative in carrying out inspections and tests required.
 - .1 Inspection of the coating will be carried out by Departmental Representative. Supply power, scaffolding, weather protection, and access for the required testing procedures. Pay for all costs, including the cost of re-inspection and re-testing, associated with the correction or repair of rejected defects.
 - .2 Give the Departmental Representative not less than 24 hours notice of when work is ready for inspection. Include notice of the type and quantity of work to be inspected. Provide access to the Departmental Representative for all inspection procedures.

PART 3 - EXECUTION

3.1 Erection

- .1 Do not commence steel erection until approval of the Erection Proposal has been obtained from the Departmental Representative.
 - .2 If staining or defacing occurs, clean steel surfaces to Departmental Representative's approval.
 - .3 Do not disturb river banks or embankments without prior written permission of Departmental Representative.
 - .4 Restrict drifting during assembly to minimum required to bring
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parts into position without enlarging or distorting holes, and without distorting, kinking, or sharply bending metal of any unit. Enlarge holes if necessary by reaming only after written approval is obtained from Departmental Representative. Reamed holes not to exceed size of bolt used by more than 2 mm.

- .5 Check exact position, diameter, and number of existing bolt holes when these have to be used for connecting new members or elements. Immediately report any discrepancies to Departmental Representative.
- .6 Straightening onsite of existing bent steel members/elements which are not specified on the Contract drawings to be replaced to be done by cold straightening. Any steel members/elements that are cracked due to cold straightening shall be replaced at the Contractor's cost and to the approval of Departmental Representative. Hot straightening not to be used unless approval is obtained from Departmental Representative.
- .7 The Contractor shall confirm onsite all dimensions required for fabrication and dimensions shown on the Contract Drawings prior to any fabrication.

3.2 Installation

- .1 Unless otherwise noted, carry out fabrication and erection of structural steel in accordance with CAN/CSA S6-06, Canadian Highway Bridge Design Code.
 - .2 Allowable tolerances for elements:
 - .1 Conform to Clause 28.9 of CAN/CSA S16.1-04 standard.
 - .2 Conform to prescriptions of CAN/CSA G40.20 standard.
 - .3 Conform to prescriptions of CAN/CSA W59 standard
 - .3 Falsework shall be in accordance with CSA S269.1, except where specified otherwise.
 - .4 Welding: do welding in accordance with CSA W59, except where specified otherwise.
 - .1 For CAN/CSA G40.21, grade 300W steel, deposited weld metal to have Charpy V-Notch value not lower than that of steel.
 - .2 Unless indicated otherwise on the drawings, no welding, of whatever nature and extent, is allowed without the written authorization of the Departmental Representative, and then,
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- only in such a way and at locations designated in his/her authorization.
- .3 Minimal fillet weld size: conform to the requirements prescribed in CAN/CSA S6-06 standard. Detail these in shop drawings.
- .4 Appoint and pay for the services of an independent welding inspector certified to visually inspect all completed welds as per CSA W59-M standard.
- .5 High strength bolting: install bolts in accordance with CAN/CSA S6-06 and CAN/CSA S16.1-04 standards. Tighten as per manufacturer's requirements. Use Direct Tension Indicator (DTI) spacing washers in all cases.
- .6 Finish: members true to line, free from twists, bends, open joints, sharp corners, sharp edges, etc.
- .7 Allowable tolerance for bolt holes:
- .1 Matching holes for bolts to line up so that dowel 2 mm less in diameter than hole passes freely through assembled members at right angles to such members.
- .2 Finish holes not more than 2 mm in diameter larger than diameter of bolt unless otherwise specified by Departmental Representative.
- .3 Centre-to-centre distance between any two holes of group to vary by not more than 1 mm from dimensioned distance between such holes.
- .4 Centre-to-centre distance between any two groups of holes to vary not more than following:
- | Centre-to-Centre Distance (m) | Tolerance Plus or Minus (mm) |
|-------------------------------|------------------------------|
| Less Than 10 | 1 |
| 10 to 20 | 2 |
| 20 to 30 | 3 |
- .5 Correct misspunched or misdrilled members only as directed by Departmental Representative.
- .8 Span length tolerances in accordance with CAN/CSA S6-06 and CAN/CSA S16.1-04 standards
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- .9 Shop splices:
 - .1 Use complete joint penetration groove welds finished flush. Details of butt joints to CSA W59. Use only as approved by Departmental Representative.
- .10 Field splices: to approval of Departmental Representative.
- .11 Mark members in accordance with CAN/CSA G40.20. Do not use die stamping.
- .12 Match marking: shop mark bearing assemblies and splices.
- .13 Ensure that all participants in construction works comply with the requirements of CAN/CSA-Z94.4 standard regarding the use of respiratory apparatuses when working with paint or as required.

END OF SECTION

PART 1 - GENERAL

- .1 This specification is for the supply and installation of thriebeam bridgerail. Thriebeam bridgerail shall include all work constructed above the top of the bridge deck and curb, and the supply and placing of anchor bolt assemblies, anchor and interior anchor plates and connection angles.
- 1.1 Payment Procedures** .1 Payment for bridge rail shall be made on the basis of a fixed price bid acceptably completed. The bid price shall include full compensation for the cost of furnishing all labour, materials, equipment, tools, all connections and all other related work to complete this work.
- 1.2 Related Requirements** .1 Section 01 29 01 - Method of Measurement and Payment.
.2 Section 02 22 30 - Selective Demolition.
- 1.3 Standards** .1 The fabrication of bridge rail components shall conform to "The American Association of State Highway and Transport Officials (AASHTO), Standard Specifications for Highway Bridges" and the American Welding Society (AWS) - Bridge Welding Code, D1.5.
.2 Where imperial/metric conversions are necessary, the National Standard of Canada, CAN3 - Z234.1 - 79 shall be used as the basis of conversion.
.3 All welding, cutting and preparation shall be in accordance with the American Welding Society (AWS) - Bridge Welding Code, D1.5.
- 1.4 Qualifications** .1 The Contractor shall notify the Department and Department Representative of any subcontractors in his employ. The Contractor shall remain responsible for the work of the subcontractors. All terms of the contract, such as CWB approval, right of access, etc., shall apply to the subcontractor.
.2 The Fabricator shall be fully approved by the Canadian Welding Bureau (CWB) as per CSA Standard W47.1 in Divisions 1 or 2.
.3 Only welders, welding operators and tackers approved by the Canadian Welding Bureau in the particular category shall be permitted to perform weldments. Their qualifications shall be current and available for examination by the Department Representative.
- 1.5 Engineering Data** .1 Welding Procedures
.1 Welding procedures bearing the approval of the Canadian Welding Bureau shall be submitted for each type of weld to be used. The welding procedures shall be reviewed by the Department Representative before welding proceeds.
.2 Shop Drawings
.1 Shop drawing requirements shall be as per Section 01 33 00 - Submittal Procedures. When railing for more than one bridge is
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included, individual shop and erection drawings shall be submitted for each bridge. Shop drawing mark numbers must be unique for each bridge.

.3 Mill Certificates

- .1 Mill certificates shall be provided for all material before fabrication commences.

PART 2 - PRODUCTS

2.1 Steel

- .1 All steel shall conform to the standard noted on the drawings. The silicon content for various bridge rail and handrail components shall be as follows:

- .1 Structural sections and base plates less than 0.04%.

- .2 If substitutions are required they must be accepted by the Department Representative. In these cases interpretation of equivalent steel will be as per Appendix "A" of the CSA Standard G40.21 (1976 only).

- .3 Do not modify materials or construction details without previous written approval by the Departmental Representative, even if these modifications are deemed necessary or desirable by the Contractor.

2.2 Anchor Bolts

- .1 Anchor bolts shall conform to the requirements of ASTM A 193 Grade B7 (Fy=725 MPa, Fu=860 MPa). All nuts and washers shall conform to A325. Galvanizing shall strictly follow the following procedure with the presence of departmental representative:

- .1 Brush blast anchor rods to remove mill scale and oil after threading ends.
.2 Flash pickling not to exceed 5 minutes.
.3 Quick dry prior to Hot-Dip galvanizing (do not store in flux or acid rinse).

- .2 The Contractor shall provide mill reports indicating the physical properties of the material to the Department Representative.

2.3 Connection Plate and Angle

- .1 Steel for connection plate and angle shall conform to CSA Standard G40.21 Grade 300W or ASTM A36.

- .2 Grout

- .1 Grout for post bases shall be approved by the Departmental Representative before application.

2.4 Welding

- .1 Filler Metals

- .1 Low hydrogen fillers, fluxes and welding practices shall be used throughout. The low hydrogen covering and flux shall be protected and stored as specified by AWS Standard D1.5. Flux cored welding
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- or use of cored filled wires in the submerged arc process or shielding gas processes will not be permitted.
- .2 Metal core welding process utilizing low hydrogen consumables with AWS designation of H4 is allowed. The deposited weld metal shall provide strength, durability, impact, toughness and corrosion resistance equivalent to base metal.
 - .3 Field application of metal core arc welding is not allowed.
- .2 Joint Preparation
 - .1 Preparation of welded joints shall be as indicated on the drawings. Weld areas shall be clean, free of mill scale, dirt, grease, paint and other contaminants prior to welding.
 - .3 Tack and Temporary Welds
 - .1 Tack and temporary welds shall not be allowed unless they are to be incorporated into the final weld. Tack welds, where allowed, shall be of a minimum length of four times the nominal size of the weld, and shall be subject to the same quality requirements as the final welds. Cracked tack welds shall be completely removed prior to welding over.
 - .4 Backing Bars
 - .1 Backing bars shall be fitted all around the inside of the joint. The separation of faying surfaces between the backing bars and material to be welded shall not exceed 1 mm, 100% fusion must be obtained into the backing bar including the corners of HSS members.
 - .5 Run-off Tabs
 - .1 Run-off tabs shall be used at the ends of all welds that terminate at the edge of a member. They shall be tack welded only to the portion of the material that will not remain a part of the structure, or where the tack will be welded over and fused into the final joint. After welding, the tabs shall be removed by flame cutting, not by breaking off.
 - .6 Arc Strikes
 - .1 Arc strikes are not permitted.
 - .7 Methods of Weldment Repair
 - .1 Repair procedures for unsatisfactory weldments shall be submitted for review and acceptance by the Department Representative prior to repair work commencing.
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.8 Grinding of Welds

- .1 Fillet welds not conforming to acceptable profile shall be ground to the proper profile without substantial removal of the base metal. Grinding shall be smooth and parallel to the line of stress. Caution shall be exercised to prevent over grinding. Acceptability of welds without grinding will be determined by the Department Representative.

2.5 Fabrication

- .1 Fabrication shall be performed in a fully enclosed area which is adequately heated to be at least 10°C.

.2 Thrie Beam Bridge Rail Fabrication.

- .1 All railing shall have a minimum yield strength of 345 MPa.
- .2 Thrie beam bridge rail shall consist of rail sections fabricated for installation to develop the continuous beam strength with the necessary safety and feature components.
- .3 All rails and terminal elements shall be hot dip galvanized after fabrication conforming to the current edition of ASTM A123/A123M Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- .4 All bolts, nuts and washers shall conform to ASTM A307, unless noted otherwise on the drawings, and shall be hot dip galvanized conforming to the current edition of ASTM A153/A153M Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
- .5 The size and thickness of 3.5 mm nominal base metal thickness rails and terminal elements shall be within the tolerance specified below:

Base metal thickness	3.43mm
Galvanized finished thickness	3.58mm
Tolerance	0.23mm

- .6 All non-standard bridge rail lengths shall be saw cut to suit and all non standard bridge rail holes shall be drilled. Flame cutting of bridge rail shall not be allowed. Apply two coats of zinc rich paint on areas damaged by saw cutting or drilling.

.2 Post Fabrication.

- .1 W Posts
- .2 Posts shall be perpendicular to the base plates, unless otherwise

noted on the drawings.

- .3 The rail post to base plate shall be welded by using 60°C preheat.

.3 Anchor Bolts

- .1 The threaded ends of all anchor bolts shall be chamfered. All anchor bolts, hardware and anchor bolt template shall be hot dip galvanized, after fabrication in accordance with ASTM A153/A153M Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware. Nuts shall freely spin on the bolt threads after galvanizing. The anchor bolts shall be shop assembled in cages after galvanizing with bolts aligned square and plumb. Alignment nuts shall not exceed 16 mm in thickness.

.4 Tolerances

- .1 Posts - Post assembly lengths shall be within 3 mm of the specified length.
- .2 Rails - Individual rail sections shall be straight and true with no evidence of kinks or dents and with a maximum variation from straightness not exceeding 3 mm over a 3 m length.
- .3 Anchor Bolts - The bolts in an anchor bolt assembly shall fit in a template comprised of accurately located holes 2 mm greater in diameter than the anchor bolts. The top of the bolts in the assembly shall be ± 3 mm from a level plane when the threaded portion is plumb. The threaded length shall not be less than specified, nor more than 15 mm greater than that specified.

.5 Identification

- .1 To assist field erection, shop drawing mark numbers shall be stamped on the rails and posts. Rail mark numbers shall be stamped on the underside of the rail near the ends. Post mark numbers shall be stamped on the underside of the base plates. The areas to be stamped shall be ground to remove mill scale. Stamps shall be a minimum of 12 mm high, and the resulting marks shall be at least 1.0 mm deep to be legible after galvanizing.

.6 Galvanizing

- .1 Galvanizing shall be by the hot dip method after fabrication, in accordance with the current edition of ASTM A123/A123M Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products and ASTM A153/A153M Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware with additions and exceptions as described in this specification.
 - .2 The Fabricator shall provide a smooth finish on all edges and
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surfaces and remove all weld spatters and all welding flux residue from the steel components prior to galvanizing. The galvanized finish shall meet the aesthetic requirements of the application and shall have a continuous outer free zinc layer without any significant zinc-iron alloy showing through the outside surface. Lumps, globules or heavy deposits of zinc will not be permitted.

- .3 Double dip galvanizing is not advised but will be accepted if a surface finish similar in appearance, colour and quality to that of single dip galvanizing is produced. The lapped area of the double dip shall be straight, the coating smooth, adherent and free of uncoated areas, blisters, flux deposits, dross inclusions, acid and black spots.
- .4 Repair of galvanizing shall only be done if bare areas are infrequent, small, and suitable for repair. A detailed repair procedure shall be submitted for review and acceptance prior to its use. It should be noted that repairs may require complete removal of the galvanized coating and regalvanizing. Repair shall be in compliance with ASTM A780, Method A3 Metallizing. The thickness of the metallizing shall be 180 μm , and the repair tested for adhesion. The finished appearance shall be similar to the adjacent galvanizing. The Department Representative will determine the acceptability of lapped or repaired areas.

.7 Base Plate Corrosion Protection

- .1 The bottom surface of each base plate shall be protected by a medium grey colour barrier coating accepted by the Department Representative, to prevent contact between the zinc and the concrete. The galvanized surface must be roughened prior to application of barrier coating. The surface preparation of the galvanized surface and the dry film thickness (DFT) of the coating shall be in accordance with the coating Manufacturer's recommendations. The Department Representative will test the adhesion of fully cured coating as per ASTM D3359 "Standard Test Methods for Measuring Adhesion by Tape Test". The method selected for testing (Method A or B) shall depend on the dry film thickness of the coating. The coating manufacturer's product data sheets shall be provided to the Department Representative prior to the application of the coating. The adhesion test result shall meet a minimum of "4B" classification i.e. a maximum allowable flaking of 5%.

.8 Schedule

- .1 The Contractor shall provide and keep current a complete fabrication schedule in a form satisfactory to the Department Representative.
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2.6 Testing and Inspection

- .1 Testing by the Department Representative
 - .1 Visual, radiographic, ultrasonic, magnetic particle and any other inspection that may be specified or required will be performed by the Department Representative or his testing agencies at the Department Representative's expense.
 - .2 The Contractor shall ensure that adequate notice for inspection and testing be given to the Department Representative and that access to the work is assured at all times. When required by the Department Representative, the Contractor shall provide needed manpower for assistance in checking layout and performing inspection duties.
- .2 Non Destructive testing
 - .1 The methods of non-destructive examination shall be in accordance with the following standards:
 - 1. Radiography - AWS Standard D1.5
 - 2. Ultrasonic - AWS Standard D1.5.
 - 3. Magnetic Particle - ASTM Standard E-709.
 - 4. Dye - Penetrant - ASTM Standard E-165.
- .3 Testing by the Contractor
 - .1 The Contractor shall be responsible for sectioning and macro-etching the post to base plate weld as specified in "HSS Posts".
 - .2 Testing and inspection made necessary by the repair of faulty work shall be paid for by the Contractor. All of the Contractor's records made in the course of quality control shall be open for examination by the Department Representative.
- .4 Notification
 - .1 The Contractor shall notify the Department Representative 48 hours prior to contemplate shipment to facilitate final inspection of the materials. Material that has not been inspected in the fabrication plant will not be paid for until such material has been inspected and accepted. The Contractor may be charged with all expenses incurred for inspection of the material at the site.

2.7 Material Handling and Storage

- .1 All lifting and handling shall be done using devices that do not mark, mar, damage or distort the galvanized members and assemblies in any way. Galvanized material shall be stacked or bundled and stored to prevent wet storage stain as per the American Hot Dip Galvanizers Association (AHDGA) publication "Wet Storage Stain". Delivery of a damaged product will be a cause for rejection.
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PART 3 - EXECUTION**3.1 Erection**

- .1 Anchor bolt assemblies shall be accurately positioned with anchor bolt projections as shown and specified.
- .2 The line and grade of the railing shall be true to that shown on the drawings, and not follow any unevenness in the superstructure. It will be necessary to adjust the height and plumbness of each post, in order to compensate for normal superstructure variations, and achieve the desired line and grade on the bridge rail.
- .3 Anchor bolts that project less than the full thickness of the nuts, by more than 2 threads, shall be extended. The proposed repair will require the acceptance of the Department Representative in writing and the repair shall be done at no cost to the Department. The method of forming and pouring the grout shall be submitted to the Department Representative for review and acceptance.
- .4 All structural bolts shall be tightened by using 'turn-of- nut' method.
- .5 Bridge rail anchor bolts shall be tightened and additional ½ turn of the nut past the "Snug tight" condition.

END OF SECTION

PART 1 - GENERAL**1.1 References**

- .1 American Society for Testing and Materials International, (ASTM).
 - .1 ASTM A53/A53M-02, Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
 - .2 ASTM A269-02, Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
 - .3 ASTM A307-02, Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
- .2 Canadian General Standards Board (CGSB).
 - .1 CAN/CGSB-1.40-97, Anti-corrosive Structural Steel Alkyd Primer.
 - .2 CAN/CGSB-1.181-92, Ready-Mixed, Organic Zinc-Rich Coating.
- .3 Canadian Standards Association (CSA International).
 - .1 CAN/CSA-G40.20/G40.21-98, General Requirements for Rolled or Welded Structural Quality Steel.
 - .2 CAN/CSA-G164-M92(R1998), Hot Dip Galvanizing of Irregularly Shaped Articles.
 - .3 CAN/CSA-S16.1-01, Limit States Design of Steel Structures.
 - .4 CSA W48-01, Filler Metals and Allied Materials for Metal Arc Welding (Developed in co-operation with the Canadian Welding Bureau.
 - .5 CSA W59-1989 (R2001), Welded Steel Construction (Metal Arc Welding) (Imperial Version).

1.2 Submittals

- .1 Product Data:
 - .1 Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Submit three copies of WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 33 00 - Submittal Procedures. Indicate VOC's:
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1. For finishes, coatings, primers and paints.
 - .3 Shop Drawings
 1. Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
 2. Indicate materials, core thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.

 - 1.3 Quality Assurance**
 - .1 Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.
 - .2 Certificates: Product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
 - .3 Pre-installation Meetings: Conduct pre-installation meeting to verify project requirements, manufacturer's installation instructions and manufacturer's warranty requirements. Comply with Section.

 - 1.4 Delivery, Storage and Handling**
 - .1 Packing, Shipping, Handling and Unloading:
 1. Deliver, store, handle and protect materials in accordance with Section 01 61 00 - Common Product Requirements.
 - .2 Storage and Protection:
 1. Cover exposed stainless steel surfaces with pressure sensitive heavy protection paper or apply strippable plastic coating, before shipping to job site.
 2. Leave protective covering in place until final cleaning of building. Provide instructions for removal of protective covering.

 - 1.5 Waste Management**
 - .1 Separate and recycle waste materials in accordance with Section 01 74 19 - Construction/Demolition Waste Management And Disposal.
 - .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
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- .3 Collect and separate for disposal paper plastic, polystyrene, and corrugated cardboard packaging material off site for recycling in accordance with Waste Management Plan.
- .4 Divert unused metal materials from landfill to metal recycling facility approved by Departmental Representative.

PART 2 - PRODUCTS**2.1 Materialst**

- .1 Steel sections and plates: to CAN/CSA-G40.20/G40.21, Grade 300W.
- .2 Steel end protection: fabricated from bent DN200 STD pipe.
- .3 CSP pipe piece: to ASTM A53/A53M standard weight, galvanized finish.
- .4 Welding materials: to CSA W59.
- .5 Welding electrodes: to CSA W48 Series.
- .6 Bolts and anchor bolts: to ASTM A307.
- .7 Grout: non-shrink, non-metallic, flowable, 15 MPa at 24 hours.

2.2 Fabrication

- .1 Fabricate work square, true, straight and accurate to required size, with joints closely fitted and properly secured.
- .2 Where possible, fit and shop assemble work, ready for erection.
- .3 Ensure exposed welds are continuous for length of each joint. File or grind exposed welds smooth and flush.

2.3 Isolation Coating

- .1 Isolate aluminum from following components, by means of bituminous paint:
 - 1. Dissimilar metals except stainless steel, zinc, or white bronze of small area.
 - 2. Concrete, mortar and masonry.
 - 3. Wood.

2.4 Steel Angles

- .1 Steel angles: as shown on drawings.

PART 3 - EXECUTION**3.1 Erection**

- .1 Do welding work in accordance with CSA W59 unless specified otherwise.
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- .2 Erect metalwork square, plumb, straight, and true, accurately fitted, with tight joints and intersections.
- .3 Provide suitable means of anchorage acceptable to Departmental Representative such as dowels, anchor clips, bar anchors, expansion bolts and shields, and toggles.
- .4 Exposed fastening devices to match finish and be compatible with material through which they pass.
- .5 Provide components for building by other sections in accordance with shop drawings and schedule.
- .6 Make field connections with bolts to CAN/CSA-S16.1, or weld.
- .7 Hand items over for casting into concrete or building into masonry to appropriate trades together with setting templates.
- .8 Touch-up rivets, field welds, bolts and burnt or scratched surfaces after completion of erection with primer.
- .9 Touch-up galvanized surfaces with zinc rich primer where burned by field welding.
- .1 Perform cleaning after installation to remove construction and accumulated environmental dirt.
- .2 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

3.2 Cleaning**END OF SECTION**

PART 1 - GENERAL

- 1.1 Work Included**
- .1 Curb Replacement
 - .1 Bridge Transition Barrier.
- 1.2 Basis for Payment**
- .1 The work under this section is incidental and no extra payment shall be made.
- 1.3 Related Requirements**
- .1 Section 01 29 01 – Method of Measurement and Payment.
 - .2 Section 01 45 00 – Quality Control.
 - .3 Section 03 10 00 – Concrete Forming and Accessories.
 - .4 Section 03 20 00 – Concrete Reinforcing.
 - .5 Section 03 30 00 – Cast-in-Place Concrete.
- 1.4 Reference Standards**
- .1 Perform welding in accordance with the requirements of CSA W59 Welded Steel Construction (Metal Arc Welding) or AWS D1.5.
 - .2 Only welders approved by the Canadian Welding Bureau shall be permitted to perform weldment. Their qualification shall be current and available for examination by the Departmental Representative.
- 1.5 Shop Drawings**
- .1 Submit shop drawings for review.
 - .2 Clearly indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners and accessories.
 - .3 Indicate welded connections using CISC standard welding symbols. Clearly indicate net weld lengths.

PART 2 - PRODUCTS

- 2.1 Material**
- .1 General: Metals are to be free from defects impairing strength, durability and appearance and be of the best commercial quality for the purpose specified. All materials are to be new. All exposed fastenings are to be of the same material, colour and finish as the metal to which applied; unless otherwise noted.
 - .2 Steel: Conforming to CSA G40.21M, Type W, with minimum yield strength of 300 MPa, except hollow structural sections - 350 MPa.
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- .3 Welding electrodes to CSA W48 series.
 - .4 High Tensile Bolts, Nuts and Washers: conform to ASTM A325M.
 - .5 Standard Machine Bolts, Nuts: conform to ASTM A307.
 - .6 Anchor Bolts: conform to ASTM A307 and hot dipped galvanized.
- 2.2 Finishes**
- .1 Galvanizing: hot dipped galvanizing conforming to ASTM A123/A123M and ASTM A153/A153M.
 - .2 Field Touch up Galvanizing: conform to ASTM A780 "Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coating".
- 2.3 Fabrication**
- .1 Fit and shop assemble in largest practical sections for delivery to site.
 - .2 Supply all components required for proper anchorage of miscellaneous metals. Fabricate anchorage and related components of same material and finish as metal fabrications unless otherwise specified or shown.
 - .3 Accurately form all connections and joints with exposed faces flush, mitres and joints tight.
 - .4 Provide lugs, clips, brackets, hangers and struts as required for attaching miscellaneous metal items securely to the structure.
 - .5 Thoroughly clean all surfaces of rust, scale, grease and foreign matter prior to galvanizing.
 - .6 All fabrications supplied under this section shall be hot dipped galvanized.
- PART 3 - EXECUTION**
- 3.1 Erection**
- .1 Perform required field welding. Conform to the requirements of CSA W59 or AWS D1.5.
 - .2 Perform necessary cutting and altering for the installation of work of other Sections. No additional cutting is to be done without the approval of the Departmental Representative.
 - .3 Perform all field assembly bolting and welding to match standard of shop bolting and welding.
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- .4 After installation, touch up field bolts, nuts, welds and scratched and damaged galvanized surfaces. Touch up galvanized surfaces with zinc rich primer in accordance with ASTM A780.

END OF SECTION
